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FINAL

SITE CHARACTERIZATION AND PLAN OF ACTION FOR UNDERGROUND STORAGE TANKS AT BUILDING S-106 AND QUARTERS G

NWS EARLE, COLTS NECK, NEW JERSEY

FOR

NORTHERN DIVISION, NAVFAC

NAVAL BASE, PHILADELPHIA

MARCH 14, 1991

K&D PROJECT #E1-1629-23

PREPARED BY

KASELAAN & D'ANGELO ASSOCIATES, INC.

A HILL GROUP COMPANY

ENVIRONMENTAL SCIENCE AND ENGINEERING

HADDON HEIGHTS, NEW JERSEY

BOSTON O LOS ANGELES O NEW ORLEANS O NEW YORK O WASHINGTON

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1.0 INTRODUCTION

Underground Storage Tank (UST) owners are required by NJDEP to complete a Discharge Investigation and Corrective Action Report (DICAR) when a discharge occurs from an underground storage tank or piping system. Two underground storage tank (UST) systems at NWS Earle have discharged fuel oil to the environment, and are subject to this requirement. The two UST systems are located at Quarters G and Building S-106 respectively. They each have the same UST registration number which is 0151003.

The objective of this report is to characterize each site and define a sampling plan, specific to each tank discharge, which will determine if fuel oil has impacted the groundwater, soil, surface water bodies or other environmental pathways which could have a potential adverse effect on the public health or the environment.

2.0 PROCEDURE

In May, 1990, the two tanks were Precision tested by the Petro-tite method because the Navy suspected possible leaks with these tanks. Both tanks were exposed to the tank top, isolated from the lines and individually tested. The individual lines and tanks were tested separately to determine the source of the leak.

It should be noted that the 1,000 gallon tank at S-106 appeared to leak so fast that a leak rate could not be measured. The product level in the standpipe continued to drain into the tank several times after all vapor pockets were removed and bung holes sealed. The entire tank top had been exposed and no visible leaks at the tank top were observed.

Tank S-106 is located in a housing complex with over 20 other similar 1,000 gallon underground storage tanks. S-106 is topographically the most downgradient tank in the housing complex. It appears that leaks from any of the other fuel oil tanks in the complex would migrate towards S-106 until encountering groundwater. The water table tends to follow local topography, so possible off-site contamination may be present. See Figures 3 and 5.

Kaselaan & D'Angelo Associates has investigated the two sites with an HNu, metal detector and visual observation. Mr. Frank Hunsberger, Hydrogeologist and Mr. Andrew Rola, P.E. of K&D visited the site on October 16, 1990. Subsequent to the field investigation, a record search of available historical drawings and geological data was obtained from the Public Works Office with the assistance of Mr. John Paulis of NWS Earle.

Geological and Hydrogeological background information was obtained from a Site Investigation Work Plan of November 1989 prepared by Roy F. Weston, Inc. for the Navy Installation Restoration program.

Old drawings of renovations to Quarters G and to Building S-106 revealed some historical evidence of their use and management, however actual dates of installation were not found.

At Quarters G, the surrounding grade is flat and fuel oil leaks will likely travel in the direction of groundwater flow or follow migration routes along subsurface utilities, storm drains or the septic system. A septic tank lies adjacent to this tank and could be contaminated with fuel oil. There exists a basement at Quarters G which could also be a receptor of fuel oil contamination. The basement and the septic system were further investigated with an HNu during this phase of the investigation. See Figures 4 and 6 for a graphical description of Quarters G and local topography.

3.0 SITE CHARACTERIZATION

3.1 Physical Geography

NWS Earle is located in the Coastal Lowlands of Monmouth County in eastern New Jersey. This area falls within the Atlantic Coastal Plains Physiographic Province, approximately 6 miles inland from the Atlantic Ocean.

The station is divided into three physically separate areas, the largest being the Main Base (10,428 acres), the smaller being the waterfront and Chapel Hill areas (706 acres, combined).

The Main Base lies within the Outer Coastal Plain, a relatively flat area with little topographic relief, except for the Hominy Hills. The Hominy Hills are a northeast-trending set of low hills near the center of the Main Base. Elevations range from approximately 100 to 300 feet above mean sea level (MSL).

3.2 Climate

The Main Base area is characterized by a predominantly continental climate with significant seasonal and daily temperature fluctuations. High humidity occurs frequently along the coast and less frequently inland. Freezing temperatures occur intermittently from October to April. The average first frost occurs on October 17, and the average last frost occurs on April 24, allowing for an average growing season of 198 days. The average annual precipitation is 44.67 inches at Long Branch and 41.82 inches at Newark. The annual peak daily rainfall (1-year, 24-hour) is greater than 2.5 inches. The mean annual temperatures at the Long Branch and Newark meteorological stations are 56.2°F and 45.2°F, respectively.

Winds are highly variable in the area of NWS Earle. The dominant winds are from the northwest during the winter and early spring. On shore winds predominate during the spring and summer.

3.3 Surface Drainage

All rivers and streams draining NWS Earle, which are just a few miles inland, ultimately discharge to the Atlantic Ocean.

The headwaters and drainage basins of three major Coastal Plain Rivers (i.e., Swimming, Manasquan, and Shark) originate on the main base. The northern half of the Main Base is in the drainage basin of the Swimming River, and tributaries include Main Brook, Hockhockson Brook, and Pine Brook. The southwestern portion of the Main Base drains to the Manasquan River via either Marsh Bog Brook or Mingamahone Brook. The southeastern corner of Main Base drains to the Shark River. Both the Swimming River and the Shark River supply water to reservoirs used for public water supplies.

Building S-106 lies within the drainage basin which feeds Hochhockson Creek and flows north to the Swimming River. Quarters G lies within the drainage basin which feeds the Mingamahone Brook and flows south to the Manasquan River. Figure 1 shows the locations of building S-106 and Quarters G in relation to surface hydrogeology.

3.4 Soils

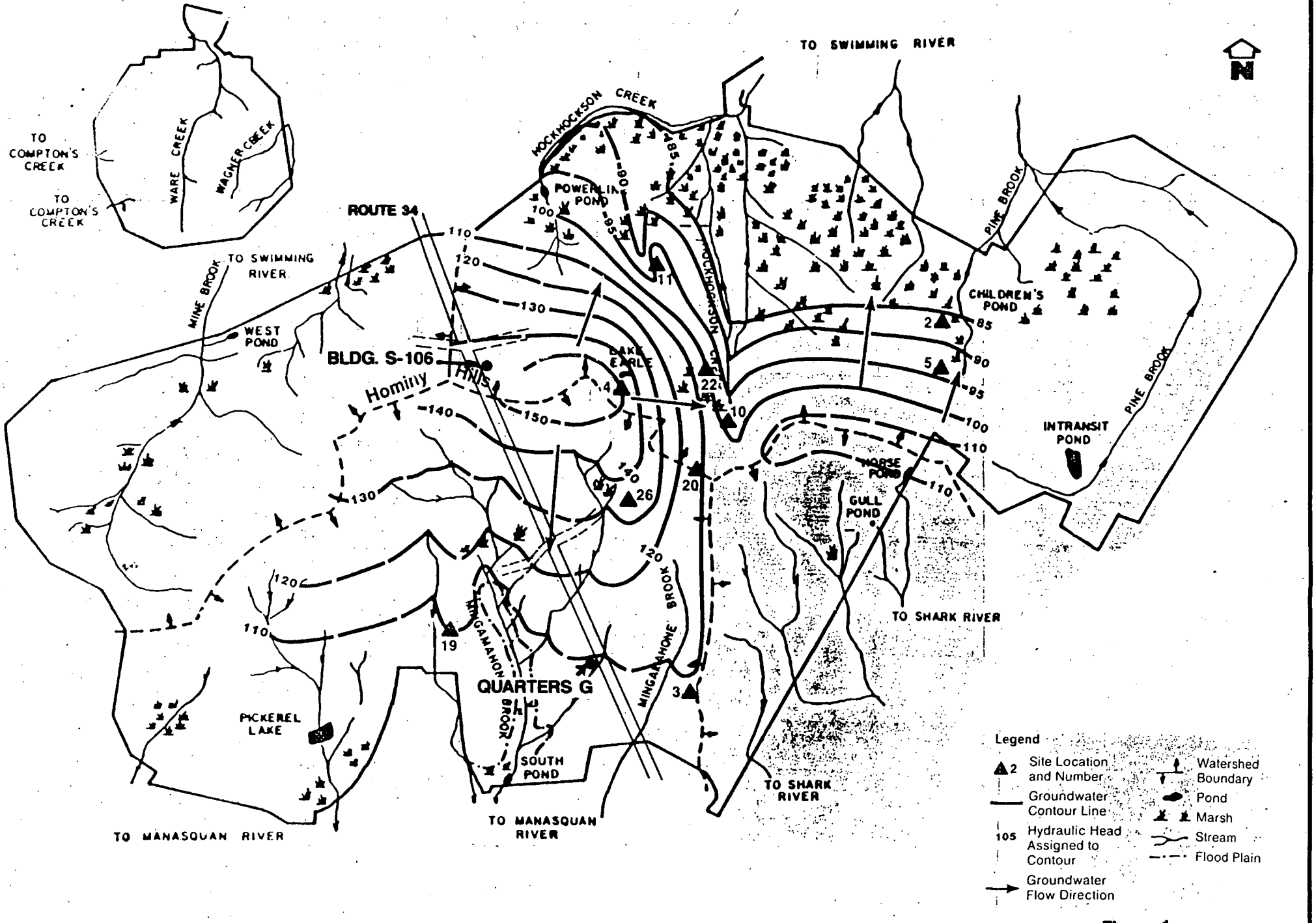
The soils at NWS Earle are generally distributed in northeast/southwest-trending belts that parallel the outcrop patterns of the underlying geologic units. More than half of the identified soil types in Monmouth County are found on the NWS Earle facility.

The dominant soil in this area is sandy and well drained. The soils typically have high iron and sulfur contents and many are acidic.

Acidic soils are formed from the weathering of pyrite (iron sulfide) or lignite (low-grade coal) contained in the sedimentary deposits. When exposed to air and water these materials form corrosive sulfuric acid. Severely acidic soils with pH values as low as 3.5 can be developed naturally in some of the soils found at NWS Earle.

At the Main Base, the most prevalent soils include the Lakewood, Lakehurst, Leon, and St. Johns Series. These range from well drained sandy soils to very poorly drained flood plain soils adjacent to streams and swamps. Highly acidic black soils have been exposed at various depths on the Main Base by construction activities. The black soils are apparently related to lignite-rich clays of the Kirkwood Formation, which crop out across the southern end of the station.

Both buildings S-106 and Quarters G lie on the well drained sandy soils of the dry upland areas of the base.


TO COMPTON'S CREEK
TO COMPTON'S CREEK
WARE CREEK
WAGNER CREEK
TO SWIMMING RIVER
MINE BROOK
WEST POND
ROUTE 34
BLDG. S-106
Hominy
HNS
HOCKHOCKSON CREEK
POWERLINE POND
LAKE EARLE
HOCKHOCKSON CREEK
TO SWIMMING RIVER
PINE BROOK
CHILDREN'S POND
INTRANSIT POND
PINE BROOK
HORSE POND
GULL POND
TO SHARK RIVER
MINGAMAHONE BROOK
MINGAMAHONE BROOK
QUARTERS G
SOUTH POND
PICKEREL LAKE
TO MANASQUAN RIVER
TO MANASQUAN RIVER
TO SHARK RIVER
N
Legend
Site Location and Number
Groundwater Contour Line
Hydraulic Head Assigned to Contour
Groundwater Flow Direction
Watershed Boundary
Pond
Marsh
Stream
Flood Plain

Figur 1

3.5 Surficial Geology

The geological setting at NWS Earle consists of a thick wedge of layered unconsolidated sediments that dip seaward (southeast). The sedimentary formations of the Coastal Plain are exposed at the surface in a banded outcrop pattern roughly parallel to the shore.

The Kirkwood Formation of the Miocene age is an important aquifer both regionally and locally. It crops out at the surface over two-thirds of the Main Base (the central and southern portions) as wells as across the southern tier of Monmouth County.

In fact, most of the southern part of New Jersey consists of surface exposure of the Kirkwood Formation (grouped with the Cohansey Sand). Textually, the Kirkwood consists of fine to medium grained quartz sand with some mica, some lignite, and some distomaceous clay. A lower member is finer-grained, darker, and pebbly and contains some glauconite. The total thickness ranges from approximately 30 feet at the outcrop area on the station to 800 feet near the coast. The texture grades from fine-grained sand and silt inland (updip) to clay beds with finer strings of sand along the coast.

The Kirkwood is used locally for domestic wells and in other areas of the Coastal Plain for municipal supplies. Yields range from 15 to over 1,000 gpm, but the water is generally acidic and contains iron and sulfide.

The overlying Cohansey Sand is a light-colored medium to coarse-grained sand, occasionally pebbly, with local clay beds. In combination with the Kirkwood, it forms a major unconfined aquifer throughout the New Jersey Coastal Plain. It produces brackish or salty water in some coastal areas. The Cohansey Sand crops out at the Main Base, forming topographically prominent Hominy Hills area. No wells are known to top the Cohansey on the station. Due to its position at the top of the sedimentary sequence, the Cohansey provides recharge of the underlying aquifers, particularly the Kirkwood.

The Hornerstown Sand is the basal Tertiary formation in Monmouth County, and other oldest unit in the Rancocas Group. It is a massive, green, glauconitic sand with interbedded shale. The lithology is homogeneous, and the thickness is fairly constant downdip, with an average thickness of 30 to 50 feet. The Hornsertown crops out along the northwestern boundary of the Main Base.

The Vincentown Formation is a fossiliferous quarts sand, up to 130 feet thick, that contains some coarse-grained glauconite and some clay. An upper member is a lime sand with abundant fossil fragments. The Vincentown Formation is an important source of water for low-yield home wells, with an average range of 10 to 50 gpm. The Vincentown Formation crops out at the surface at the Main Base, covering approximately 25 percent of the station in a bank along the northern border of the facility.

As shown in Figure 2, building S-106 lies on Cohansey sands which recharges directly into the Kirkwood Formation. Quarters G lies directly on the Kirkwood Foundation.

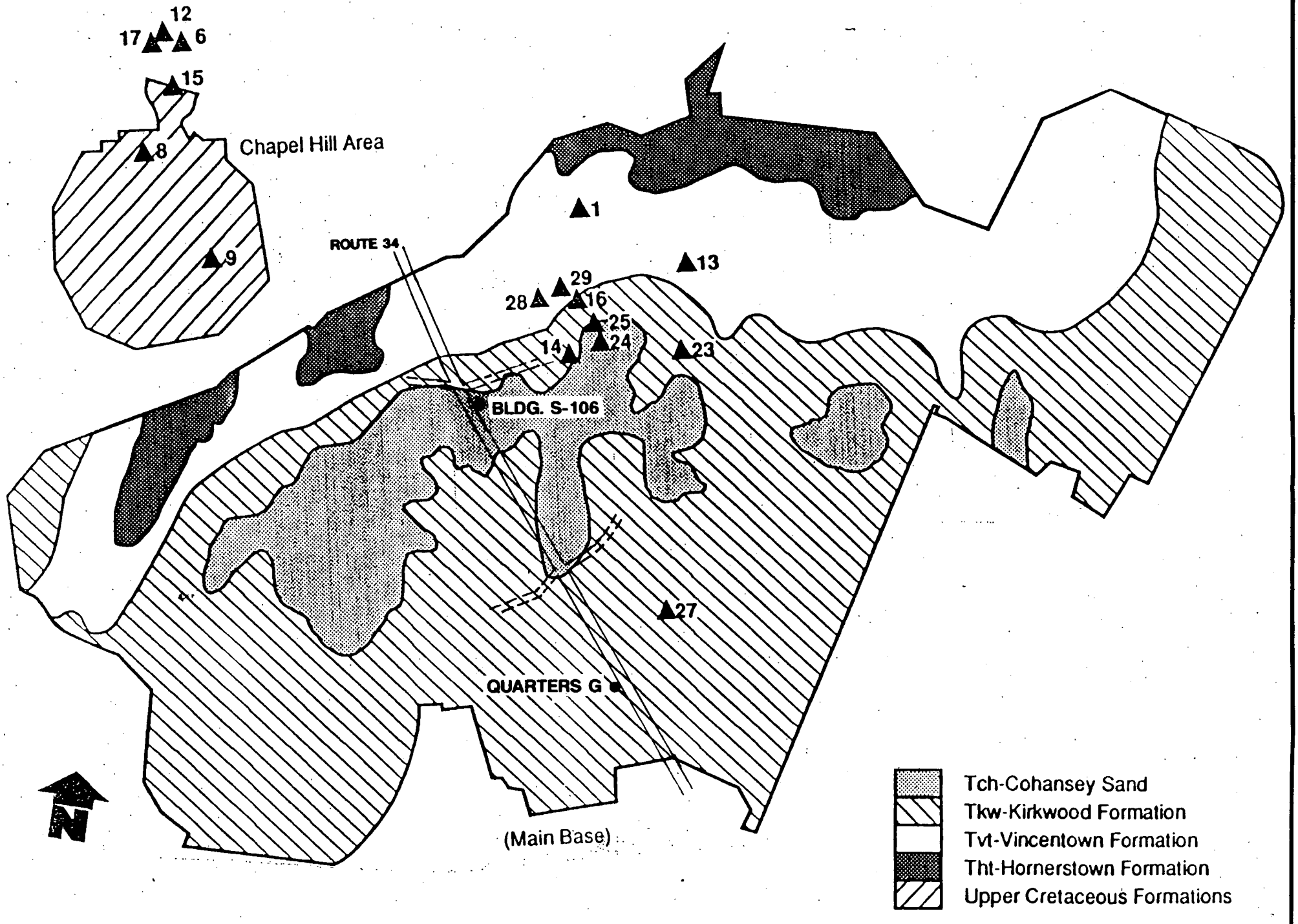

12
17
6
15
Chapel Hill Area
8
9
ROUTE 34
1
13
29
28
16
25
24
14
23
BLDG. S-106
27
QUARTERS G
(Main Base)
N
Tch-Cohansey Sand
Tkw-Kirkwood Formation
Tvt-Vincentown Formation
Tht-Hornerstown Formation
Upper Cretaceous Formations

Figure 2

3.6 Hydrogeology

3.6.1 Regional Hydrogeology

The Atlantic Coastal Plain sediments are the most important source of potable water in the region. More than 75 percent of the fresh water supply in the New Jersey Coastal Plain is from groundwater.

The Coastal Plain province is composed of a wedge-shaped deposit of alternating layers of sand and clay that thickens to the southeast and overlies a crystalline basement. These deposits store and transmit water through interconnected pore spaces.

Recharge to the groundwater system is derived from precipitation, which averages 44 inches per year. Approximately 15 to 39 inches of this precipitation recharges the groundwater reservoir annually. In addition to precipitation in the outcrop areas, recharge is also provided by vertical leakage through confining beds and by seepage from surface water bodies.

The five principal Coastal Plain aquifers are the:

- Kirkwood-Cohansey aquifer system
- Atlantic City "800-foot sand."
- Wenonah-Mount Laurel aquifer
- Englishtown aquifer
- Potomac-Raritan-Magothy aquifer system

All but the Kirkwood-Cohansey are confined, except where they crop out or are overlain by permeable surficial deposits. NWS Earle is situated over the recharge area of many of these formations.

Water quality is generally satisfactory for drinking. Minor problems due to locally high iron concentrations occur in several aquifers, including the Potomac-Raritan-Magothy. Saline water is a problem in some coastal areas with unconfined aquifers and in deep portions of some confined aquifers.

In general, in the New Jersey Coastal Plain, the deeper aquifers are used for public water supplies, while near-surface aquifers are used for shallow domestic wells.

3.6.2 Local Hydrogeology at NWS Earle

Four sedimentary formations of the Coastal Plain crop out at the Main Base:

- The Hornerstown Sand
- The Vincentown Formation
- The Kirkwood Formation
- The Cohansey Sand

These units and their hydrologic significance are described in detail in Subsection 3.5 and are shown on Figure 2. All these units are recharged by direct precipitation at the surface. Of particular importance are the Vincentown, and Kirkwood Formations because they are used extensively for residential wells in the nearby area. None of the aquifers are used for municipal wells in the area. High iron content is a problem in these aquifers.

The most important groundwater aquifers in the area of NWS Earle occur in the Englishtown, Vincentown, and Kirkwood-Cohansey Formations. Natural groundwater quality in these formations is good and is generally suitable for drinking water purposes. Local high concentrations of nitrate/nitrite occur and are generally associated with higher population densities.

Groundwater flow from the Main Base is generally to the east/southeast. The surface water table flow directions follow the local topography.

Four groundwater wells are located on the NWS Earle property however, none are within one mile of Quarters G or Building S-106. Building S-106 lies within 3200 feet of the northern border of NWS Earle so no wells within 1/2 mile (2500 feet) will be found. Quarters G lies within 1500 feet of the southern border of the NWS Earle property. There are several potable water wells supplying residential properties and a trailer park just outside the southern border and within one (1) mile of Quarters G. Specific information on these wells has not yet been obtained from the NJDEP Water Allocation Bureau. The permits for these wells, with all detailed information, will be obtained if contamination is found within 1000 feet of the area.

A 1/2 mile radius of each tank on USGS quadrangle maps are depicted in figures 3 and 4 with locations of the closest known wells.

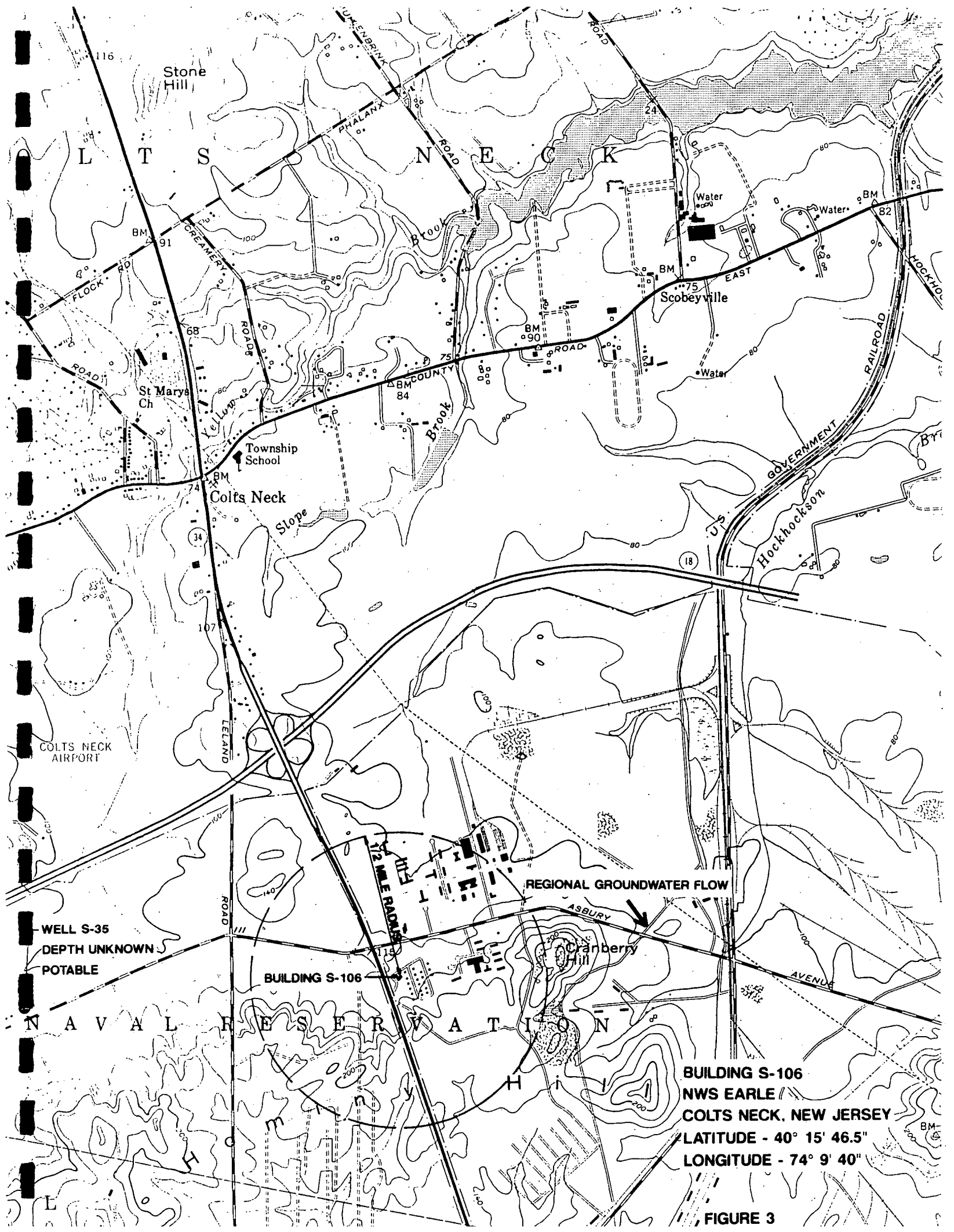

Stone Hill
L T S N E C K
PHALANX ROAD
Brook
Water
BM 82
BM 91
CREAMERY ROAD
FLOCK RD
BM 75
EAST
Scobeyville
HOCKHOCKSON
BM 90
ROAD
COUNTY
BM 84
Water
RAILROAD
St Marys Ch
Yellow
Township School
BM 74
Colts Neck
Slope
Brook
U.S. GOVERNMENT
Hockhockson
COLTS NECK AIRPORT
LELAND
1/2 MILE RADIUS
REGIONAL GROUNDWATER FLOW
ASBURY
Cranberry Hill
AVENUE
WELL S-35
DEPTH UNKNOWN
POTABLE
BUILDING S-106
N A V A L R E S E R V A T I O N
Hominy Hill
BUILDING S-106
NWS EARLE
COLTS NECK, NEW JERSEY
LATITUDE - 40° 15' 46.5"
LONGITUDE - 74° 9' 40"

FIGURE 3

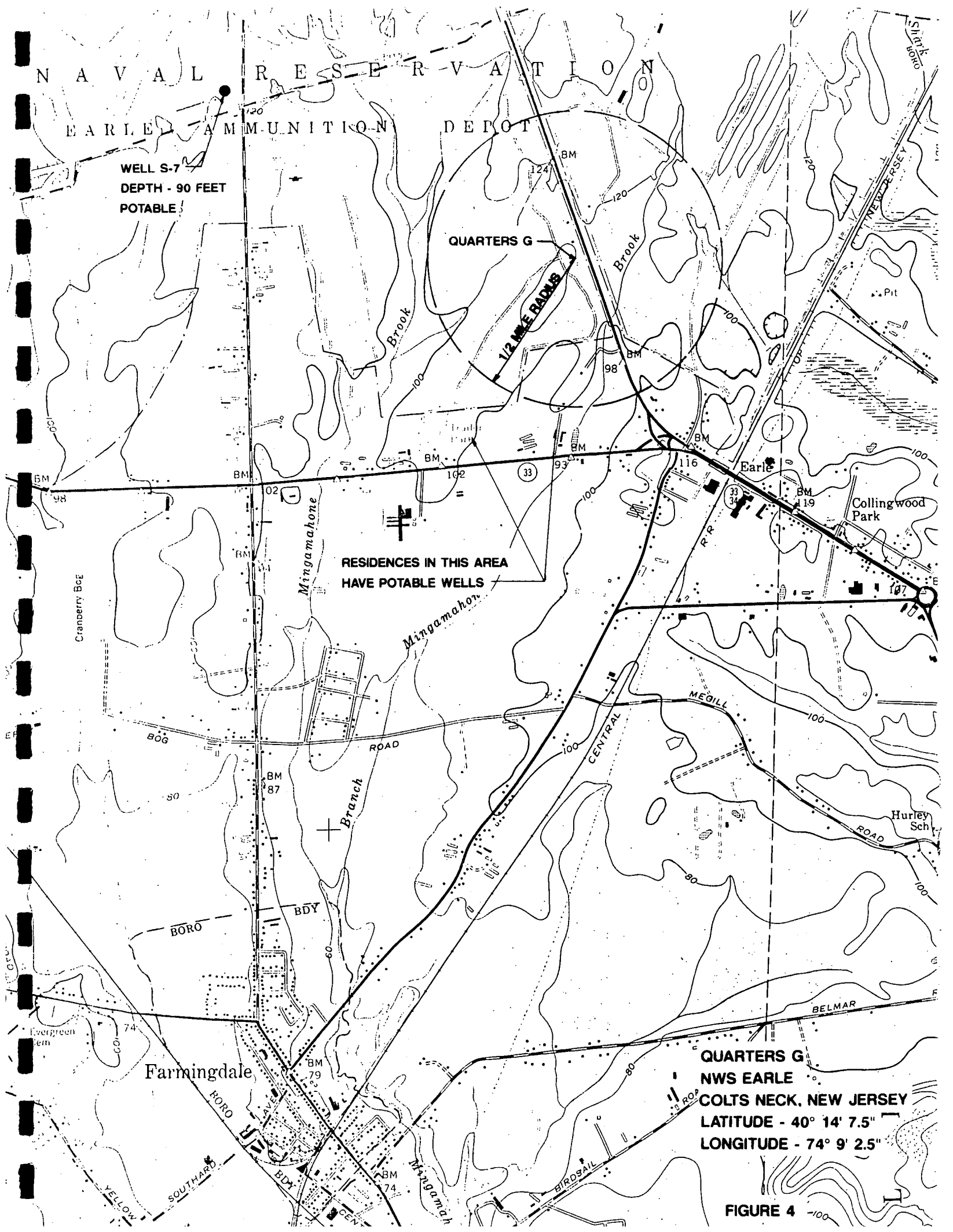

NAVAL RESERVATION
EARLE AMMUNITION DEPOT
WELL S-7
DEPTH - 90 FEET
POTABLE
QUARTERS G
1/2 MILE RADIUS
RESIDENCES IN THIS AREA
HAVE POTABLE WELLS
Brook
Mingamahone
Branch
Earle
Collingwood Park
Farmingdale
Cranberry Bog
BOG ROAD
MEGILL
CENTRAL
BELMAR
BIRDSAIL
SOUTHARD
YELLOW
BORO
BDY
Hurley Sch
Pit
QUARTERS G
NWS EARLE
COLTS NECK, NEW JERSEY
LATITUDE - 40° 14' 7.5"
LONGITUDE - 74° 9' 2.5"

FIGURE 4

3.7 Population

NWS Earle is situated within the municipalities of Monmouth County, New Jersey, namely the towns of Colts Neck and Middletown.

NWS Earle has an active duty population equivalent to 600 Navy personnel. In addition, there are seven hundred (700) civilians employed within NWS Earle. Approximately ninety percent (90%) of these civilian employees are located on the Main Station.

As of 31 December 1990, an estimate of 1800 Navy personnel and dependents live on the base. Thus, the total daytime population on the base is estimated at between 2,500 and 3,000.

A number of small communities are located along or close to NWS Earle boundaries. The closet ones are Colts Neck, Green Grove, and Freehold.

Within 1/2 mile of Building S-106 lies most of the main base and immediately adjacent to S-106 are approximately forty (40) family housing units. These units are topographically upgradient from S-106. The newest family housing complex which houses the remaining 1,500 personnel and dependents is located approximately two thirds of a mile north of Building S-106.

Within 1/2 mile of Quarters G lies three (3) family housing units which are connected to municipal water supplies. The three (3) housing units lie north of Quarters G and apparently upgradient. The remaining area within 1/2 mile is vacant forested land with ammunition bunkers which comprises much of the open space on NWS Earle.

3.8 Land Use

The following land use categories are within one (1) mile of the main station (approximately 11,000 acres): Building S-106 lies on the main station while Quarters G lies off the main station approximately one (1) mile south.

- Institutional (approximately 75 percent).
- Woodland.
- Abandoned Land.
- Residential (small area along the Route 34 corridor).
- Agricultural (small portion).
- Extractive (a very small section).

Current land uses at the station include:

- Buildings/Offices.
- Dormitories/Residences.
- Transportation (roads).
- Recreational Area.
- Medical Clinics/Community Facilities.
- Open Space.
- Undeveloped.

4.0 SUMMARY SITE-CHARACTERIZATION

4.1 Building S-106

The 1,000 gallon underground storage tank at building S-106 is over 25 years old, is constructed of bare steel and formerly contained #2 fuel oil. It has failed a Petro-tite precision test and has been emptied and temporarily abandoned. The building S-106 has been evacuated of inhabitants and the tank is programmed for removal in early 1991.

During our site investigation, no evidence of fuel oil leakage was found in two drainage swales downgradient of the tank, in a sanitary manhole downgradient of the tank or beneath the buildings in the crawl space downgradient of the tank. All areas were visually inspected and air quality was examined with an HNu.

The leakage which occurred while the tank had been in service did not appear in any surficial migration pathways. The leakage likely has migrated into the well drained sands of the Cohansey Formation and into the Kirkwood-Cohansey aquifer system. This aquifer system is a high yield major aquifer system in which groundwater occurs generally under water table conditions.

The water table generally follows surface topography, however exact local groundwater flow direction can be influenced by localized substructures such as sanitary sewer pipes, utility conduits, road beds and other manmade or natural obstructions. The water table appears to be generally to the north to northeast, but the exact direction can only be determined by the installation of at least three piezometers.

4.2 Quarters G

The 550-gallon underground storage tank at Quarters G is of undetermined age (possibly greater than 30 years) is constructed of bare steel, and has contained #2 fuel oil. This tank has failed a Petro-tite precision test and has been emptied and temporarily abandoned. The Quarters G building has been evacuated of inhabitants and the tank is programmed for removal in early 1991.

During our site investigation, evidence of fuel oil contamination was found in the empty chamber of the septic tanks and in the sump of the basement. HNu readings in the septic tank and in the sump were 5 ppm and 12 ppm respectively. Ambient air readings in the basement and first floor registered zero on the HNu.

The leakage from the tank appears to have migrated to the sump in the basement and to the septic system. It has probably also migrated through well drained sands and into the Kirkwood-Cohansey Aquifer System. This aquifer system is a high yield major aquifer system in which groundwater occurs generally under water table conditions.

The water table generally follows surface topography, however exact local groundwater flow direction can be influenced by localized substructures such as septic system leaching fields, the building basement, road beds and other man-made or natural obstructions. The water table appears to flow to the south to southwest, but the exact direction can only be determined by the installation of at least three piezometers.

5.0 PLAN OF ACTION

5.1 Building S-106

NWS Earle shall install three piezometers triangularly placed around the tank as shown in Figure 5 to establish the local direction of groundwater flow. After surveying the piezometers to develop groundwater contours in the area, a monitoring well will be installed directly downgradient from the tank and within ten (10) feet from the tank unless accessibility for a drill rig is prohibited by utility locations or structures. The well will be installed to a depth of approximately 25 feet. Sample collection and analytical methods for this monitoring well shall be as described in Appendix A.

Additionally grab water samples will be collected at the concrete headwalls where surface drainage flows into two swales. These samples will be collected in accordance with the same guidelines as the well water samples and analyzed for the same parameters.

As drilling progresses in each piezometer and monitoring well, discrete spilt spoon samples will be collected at 3'-5', 8'-10', 13'-15' and so forth at five foot intervals until groundwater is encountered. Soil samples shall be screened for fuel oil contamination by analysis for total petroleum hydrocarbons by EPA method 418.1. Each split spoon sample will be logged and boring logs written for each hole. The piezometers and monitoring wells will be installed in accordance with the specifications in Appendix B.

Sampling and analytical procedures will follow the quality control/quality assurance protocol found in Appendix C.

All sampling at Building S-106 will follow the health and safety plan attached in Appendix D. Vapor hazards will be assessed in accordance with the procedures described in the health and safety plan.

The sampling and analytical protocol is summarized in Table 1.

NJDEP procedures for determining the presence of free product in soil will be used on the drill cuttings for all piezometers and monitoring wells. These procedures are described in Appendix D.

5.2 Quarters G

For Quarters G, NWS Earle will install three piezometers triangularly placed around the tank as shown in figure 6, to establish the local direction of groundwater flow. After surveying the piezometers and developing a local groundwater contour map of the area, a monitoring well will be installed directly downgradient from the tank and within ten (10) feet of the tank unless accessibility for a drill rig is prohibited by utility locations or structures. The well will be installed to a depth of approximately 25 feet. Sample collection and analytical methods shall be as described in Appendix A.

One additional grab water sample will be collected from the standing water in the basement sump. The sump shall also be sampled in accordance with the same guidelines as the well water sample and analyzed for the same parameters. The water elevation in the sump will also be surveyed to determine if it is tied into the water table.

Discrete split spoon soil samples will be collected at five foot intervals and analyzed for Total Petroleum Hydrocarbons in the same fashion as soil samples collected at building S-106.

Piezometers and wells shall be installed in accordance with the specifications in Appendix B. Sampling and analytical procedures shall follow the Quality Control/Quality Assurance Protocol in Appendix C.

All sampling at Quarters G will follow the health and safety plan attached in Appendix D. Vapor hazards will be assessed in accordance with the procedures described in the health and safety plan.

A summary of the sampling and analytical protocol for Quarters G is contained in Table 2.

NJDEP procedures for determining the presence of free product in soil will be used on the drill cuttings for all piezometers and monitoring wells. These procedures are described in Appendix D.

Upon completion of sampling and analysis, the data will be compiled, evaluated and incorporated into a DICAR report and submitted to the NJDEP.

5.3 Groundwater Monitoring Requirements

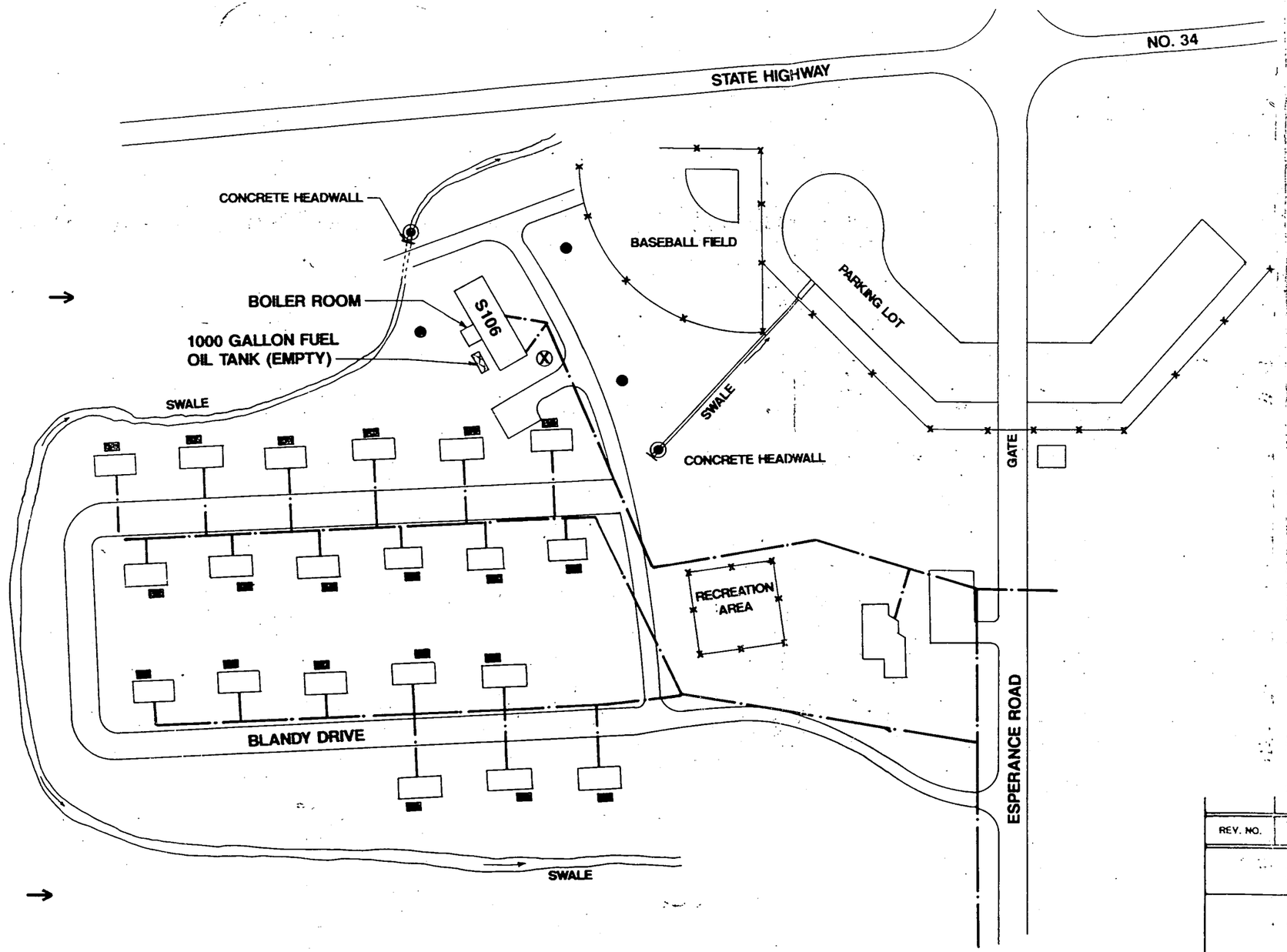
Monitoring well design will follow the Department's monitoring well specifications (Appendix B).

New Jersey well permits will be obtained prior to each monitoring well installation. Well permits will be obtained from the Bureau of Water Allocation, Well Permit Section. The well permit numbers will be reported.

All monitoring wells will be installed by a New Jersey licensed well driller.

Split spoon sampling will be conducted, every five feet on the well(s) closest to the source(s) of contamination to characterize stratigraphy. An illustrative and descriptive written log will be submitted for all wells using the Burmeister textural classification methods. The depth to the saturated zone and the blow counts will be reported. PID/OVA readings shall be taken and recorded in the logs every 5 feet and at changes in stratigraphy.

Any boring not completed as a well will be sealed using cement or bentonite grout as per N.J.A.C. 7:9-9.1 et seq.



LEGEND

- DRAINAGE
- SWALE
- SANITARY SEWER
- GRADE
- PROPOSED PIEZOMETER
- PROPOSED MONITORING WELL
- 1000 GALLON FUEL OIL TANKS (IN USE)
- SURFACE WATER SAMPLE

N

REV. NO.	DATE	REVISION DESCRIPTION

SITE CHARACTERIZATION

U.S. NAVAL WEAPONS STATION
BUILDING S-106
EARLE, NEW JERSEY

Drawn By: M.S.	Kaselaan & D'Angelo Associates, Inc.	Scale: N.T.S.
Approved By:	Engineering & Land Surveying Environmental Consultants	Sheet: Figure 5
Date: 10/26/90	515 Grove Street, Haddon Heights, N.J. 08035 (609) 547-6500	Drawing No.: E1-1629-23

BLDG S-106 SAMPLING ANALYTICAL PROTOCOL

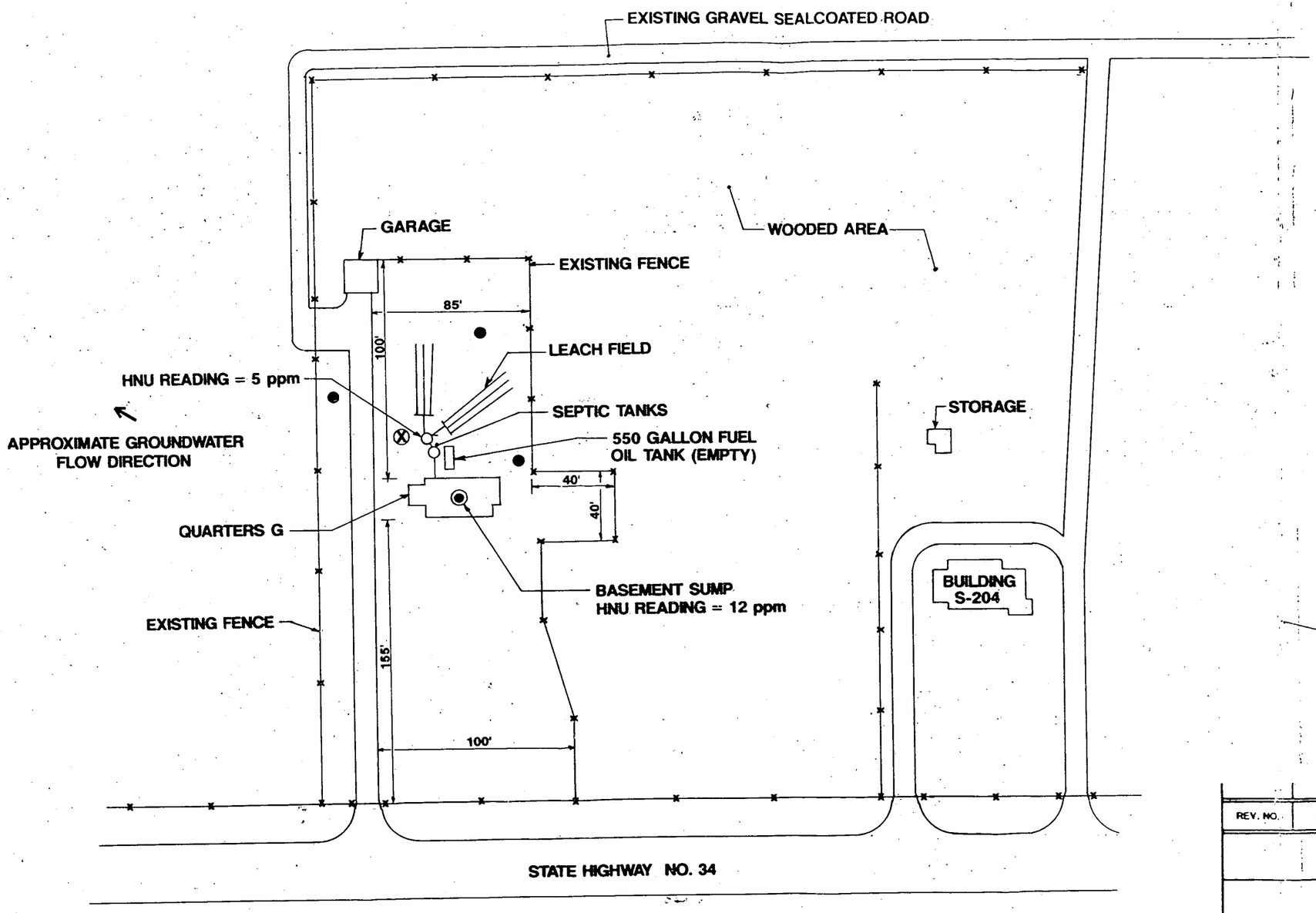
SAMPLE	MEDIA	DEPTH	ANALYSIS	METHOD	CONTAINER	HOLDING TIME	PRESERVATIVE
BLDG S-106							
P -1A	SOIL	3' - 5'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 1B	SOIL	8' -10'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 1C	SOIL	13' - 15'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 2A	SOIL	3' - 5'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 2B	SOIL	8' -10'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 2C	SOIL	13' - 15'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 3A	SOIL	3' - 5'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 3B	SOIL	8' -10'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 3C	SOIL	13' - 15'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
MW - 1A	SOIL	3' - 5'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
MW - 1B	SOIL	8' -10'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
MW - 1C	SOIL	13' - 15'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
MW - 1W	WATER	WATER TBL	VOLATILE ORG	EPA 624+15	40ml VILE(3X)	14 DAYS	COOL,ACIDIFY pH<2
			SEMI-VOL ORG	EPA 625+15	1000ml GLASS(2X)	7 DAYS	COOL,ACIDIFY pH<2
S - 1	WATER	SURFACE	VOLATILE ORG	EPA 624+15	40ml VILE(3X)	14 DAYS	COOL,ACIDIFY pH<2
			SEMI-VOL ORG	EPA 625+15	1000ml GLASS(2X)	7 DAYS	COOL,ACIDIFY pH<2
S - 2	WATER	SURFACE	VOLATILE ORG	EPA 624+15	40ml VILE(3X)	14 DAYS	COOL,ACIDIFY pH<2
			SEMI-VOL ORG	EPA 625+15	1000ml GLASS(2X)	7 DAYS	COOL,ACIDIFY pH<2

TABLE 1

QUARTERS G SAMPLING ANALYTICAL PROTOCOL

SAMPLE	MEDIA	DEPTH	ANALYSIS	METHOD	CONTAINER	HOLDING TIME	PRESERVATIVE
P -1A	SOIL	3' - 5'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 1B	SOIL	8' -10'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 1C	SOIL	13' - 15'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 2A	SOIL	3' - 5'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 2B	SOIL	8' -10'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 2C	SOIL	13' - 15'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 3A	SOIL	3' - 5'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 3B	SOIL	8' -10'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
P - 3C	SOIL	13' - 15'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
MW - 1A	SOIL	3' - 5'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
MW - 1B	SOIL	8' -10'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
MW - 1C	SOIL	13' - 15'	TPH	EPA 418.1	GLASS	28 DAYS	COOL 4C
MW - 1W	WATER	WATER TBL	VOLATILE ORG	EPA 624+15	40ml VILE(3X)	14 DAYS	COOL,ACIDIFY pH<2
			SEMI-VOL ORG	EPA 625+15	1000ml GLASS(2X)	7 DAYS	COOL,ACIDIFY pH<2
S - 1	WATER	SUMP	VOLATILE ORG	EPA 624+15	40ml VILE(3X)	14 DAYS	COOL,ACIDIFY pH<2
			SEMI-VOL ORG	EPA 625+15	1000ml GLASS(2X)	7 DAYS	COOL,ACIDIFY pH<2

TABLE 2



LEGEND

- PROPOSED PIEZOMETER
- PROPOSED MONITORING WELL
- PROPOSED WATER SAMPLE

N

REV. NO.	DATE	REVISION DESCRIPTION

SITE CHARACTERIZATION

U.S. NAVAL WEAPONS STATION
QUARTERS G
EARLE, NEW JERSEY

Drawn By: M.S.	Kaselaan & D'Angelo Associat s, Inc.	Scale: N.T.S.
Approved By:	Engineering & Land Surveying Environmental Consultants	Sheet: Figur 6
Date: 10/26/90	515 Grove Street, Haddon Heights, N.J. 08035 (609) 547-6500	Drawing No.: E1-1629-23

APPENDICES

APPENDIX A

SAMPLING AND ANALYTICAL METHODS FOR KEROSENE, JET FUELS, DIESEL FUELS AND NO. 2 THROUGH NO. 6 HEATING OILS IN WATER

SAMPLE COLLECTION:

Water samples should be collected within two feet of the static water level in the wall.

Check for free product and sheens on the water surface in the wall.

Check for and note the presence of odors (these substances have an odor threshold limit that may be lower than the analytical detection limits).

Follow NJDEP guidelines for collection, preservation and transport of water samples for volatile organics analysis found in the Field Procedures Manual for Water Data Acquisition and in the Field Sampling Procedures Manual.

If the analytical results are negative (no contamination found) a second round of sampling of all monitoring wells must be conducted approximately 30 days following the first round of sampling to confirm the results.

ANALYTICAL METHODS

EPA Method 624 + 15 (GC/MS plus identification of non-targeted compounds), modified to include calibration for xylenes.

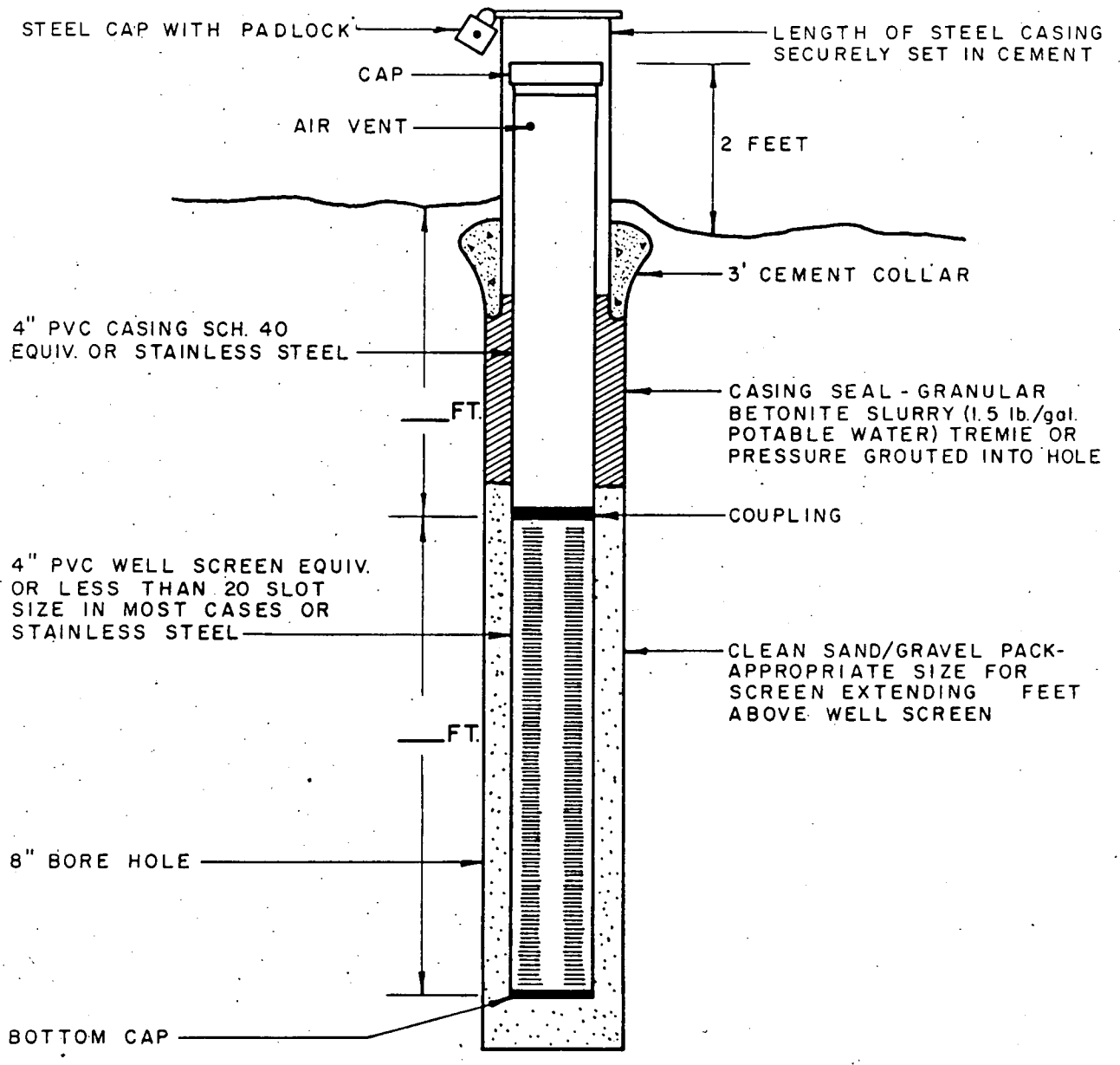
AND

EPA Method 625 + 15 (base/neutral extractable organics)

Once contamination has been identified, other methods found in 40 CFR Part 136 may be used for the second and subsequent rounds of sampling following submittal of the DICAR and upon specific approval of the NJDEP.

APPENDIX B

Piezometer and Monitoring Well Installation Specifications



NEW JERSEY DEPARTMENT OF ENVIROMENTAL PROTECTION
UNCONSOLIDATED MONITOR WELL SPECIFICATIONS

SITE NAME: _____

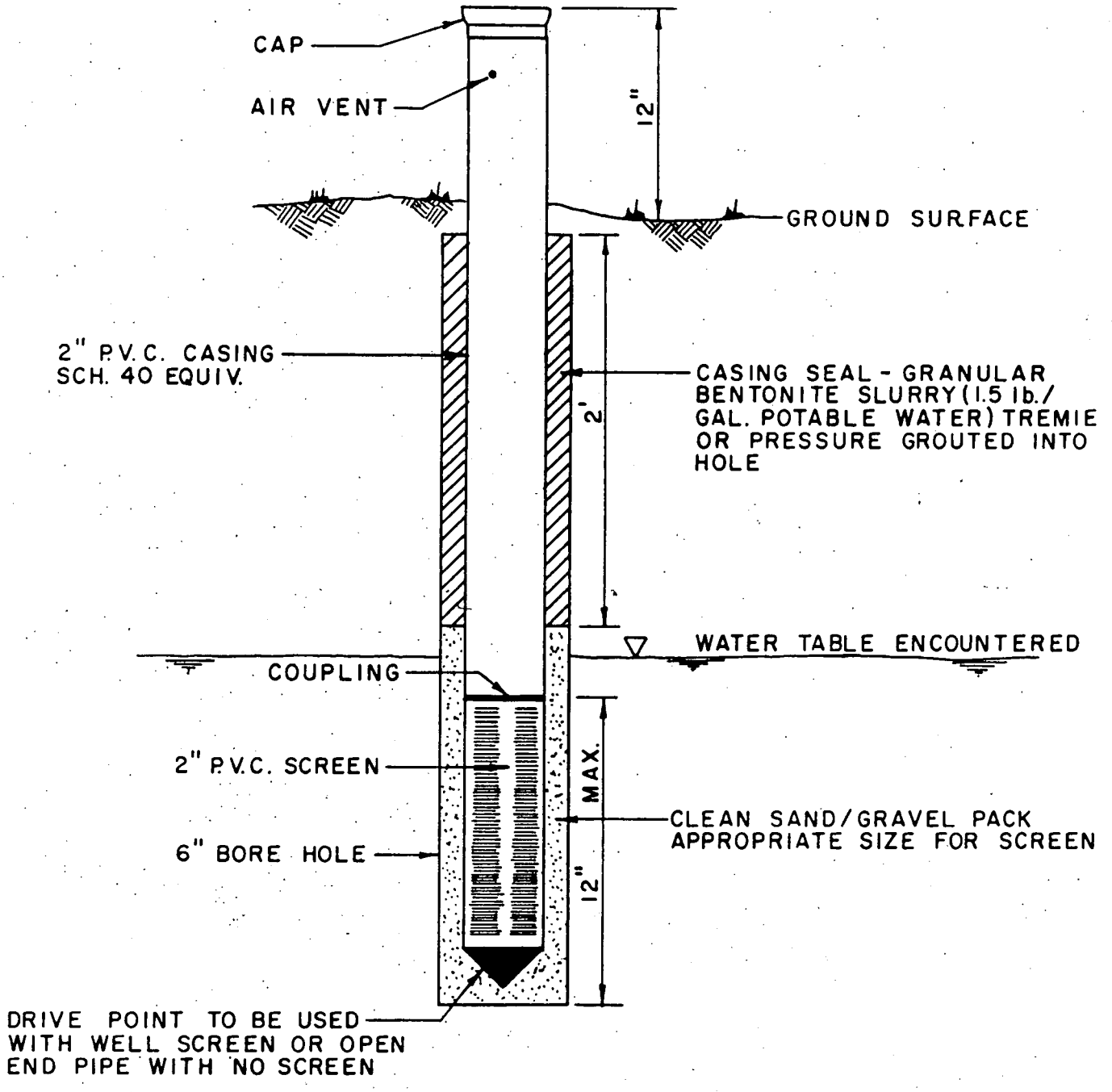
LOCATION: _____

DATE: _____

Kaselaan & D'Angelo Associates, Inc.
Engineering & Land Surveying
Environmental Consultants

Haddon Heights, N.J. 08035
(609) 547-6500

UNCONSOLIDATED TEMPORARY PIEZOMETER INSTALLATION SPECIFICATIONS



rev. 9/87

MONITORING WELL CONSTRUCTION AND GROUTING SPECIFICATIONS FOR UNCONSOLIDATED FORMATIONS

1. Notification to the NJDEP is required two weeks prior to drilling.
2. State well permits are required for each monitoring well constructed by the driller. The well permit tag must be permanently affixed to each monitoring well.
3. Copies of the site specific well specifications must be maintained at the drilling site by the driller.
4. The monitoring well must be installed by a New Jersey licensed well driller.
5. Monitoring well design must conform with NJAC 7:9-7, 8, and 9.
6. The borehole diameter must be a minimum of 4 inches greater than the casing diameter.
7. Acceptable grouting materials are:

   Neat Cement - 6 gallons of water per 94 pound bag of cement.

   Bentonite - 1 gallon of water per 1.5 pounds of bentonite.

   Cement-Bentonite - 8 gallons of water to 5 pounds of bentonite dry mixed per 94 pound bag of cement.

   Cement-Bentonite - 10 gallons of water per 8 pounds of bentonite water-mixed with a 94 pound bag of cement.

   Non-expandable cement - 7.5 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 4 pounds of bentonite and 94 pounds of cement.

   Non-expandable cement - 7 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 94 pounds of cement (Type I or Type II).
8. Potable water must be used for mixing grouting materials and drilling fluids.
9. Only threaded joints are acceptable as couplings.
10. The driller must maintain an accurate written log of all materials encountered, record construction details for each well, and record the depth of water bearing zones. This information must be submitted to the Bureau of Water Allocation as required by N.J.S.A. 58:4A.
11. A length of protective steel casing with a locking cap must be securely set in cement around the well casing. Flush mount monitoring wells are acceptable provided they have manholes, locking caps, and seals to prevent leakage of surface water into the well.
12. Top of each well casing (excluding cap) must be surveyed to the nearest 0.01 foot by a New Jersey licensed surveyor. The survey point must be marked on each well.
13. Wells must be developed to a turbidity-free discharge.
14. Modifications to designs are allowed only with NJDEP approval.

Additional requirements (if checked):

Split spoon samples ( ) _____

Borehole geophysical logs ( ) _____

Top of screen set _____ feet above/below water table

Dedicated bailer (sampler) in well ( )

Other ( ) _____

_____

_____

_____

Notice is hereby given of the following:

Review by the Department of well locations and depths is limited solely to review for compliance with the law and Department rules.

The Department does not review well locations or depths to ascertain the presence of, nor the potential for, damage to any pipeline, cable, or other structures.

The permittee (applicant) is solely responsible for the safety and adequacy of the design and construction of monitoring well(s) required by the Department.

The permittee (applicant) is solely responsible for any harm or damage to person or property which results from the construction or maintenance of any well; this provision is not intended to relieve third parties of any liabilities or responsibilities which are legally theirs.

APPENDIX C

Quality Control/Quality Assurance Program

APPENDIX C

QUALITY ASSURANCE/QUALITY CONTROL

A. Sampling Procedures

All sampling shall be in accordance with procedures and specifications set forth in the publication "Samplers and Sampling Procedures for Hazardous Waste Streams", EPA - 600/2-80-018, and the NJDEP Field Sampling Procedures Manual, February 1988. Samples shall be collected at 2' intervals from the surface to the required collection depth.

I. Soil Samples 3'-5', 8'-10', 13'-15' etc.

Soil borings and samples collected during drilling of piezometers and monitoring wells will be performed using a Machine-Operated Powered Auger. Field methodologies and procedures followed will be consistent with that described in ASTM Standards, Volume 04.08 Soil and Rock; Building Stones, Designation: D-1452-80 Standard Practice for Soil Investigation and Sampling by Auger Borings. The are as follows:

1. After the sampling point is selected, unnecessary rocks, twigs, and other non-soil materials will be removed.

2. The boring will be made by rotating and advancing the auger a desired distance into the soil

3. The sampling apparatus will be removed from the ground and the sample transferred into a suitable container. The process will be repeated until an adequate sample quantity is collected.

4. Each container will then be immediately capped. Before collecting the next sample all pertinent data will be recorded in the log book and the sample analysis request form and chain of custody record will be completed.

5. If required the sample will be preserved and/or placed on ice.

6. After decontamination of all equipment, the samples will be immediately delivered to the laboratory for analysis.

II. Groundwater Samples

Each monitoring well shall be bailed with a clean 4" PVC bottom filled bailer. Three volumes of well water volume shall be evacuated and stored in 55-gallon drums until analysis is received. After bailing three volumes, a representative sample will be collected with a clean teflon 2" bottom filled bailer. Sample jars, supplied by the laboratory for the specific analysis, shall be filled directly from the teflon bailer. All bailers shall be decontaminated between monitoring wells in accordance with the decontamination procedures described herein.

B. Decontamination Procedures for Soil Sampling Equipment

All sample equipment will be cleaned before and after each sample is collected. This is always necessary in order to prevent cross-contamination of samples.

All decontamination and cleaning procedures will be in accordance with procedures and specifications set forth in the publications: "Samplers and Sampling Procedures for Hazardous Waste Streams", EPA - 600/2-80-018 and in the New Jersey Department of Environmental Protection's Division of Waste Management Field Procedures Manual, February, 1988.

The following procedures are to be used in decontamination:

1. All sampling equipment will be hand-wiped to removed all visible residues or any caked-on materials.

2. The equipment will then be thoroughly washed with a detergent/tap water solution, then rinsed with tap water.

3. The equipment will then be rinsed with distilled/deionized water.

4. If the samples are to be analyzed for metals, the sampling equipment must be rinsed with a ten percent nitric acid solution. After this rinse it is necessary to re-rinse the equipment with distilled/deionized water.

5. All equipment will then be rinsed with a pesticide grade acetone and allowed to air dry.

6. A final rinse of all equipment using distilled/deionized water is required. The equipment should be allowed to air dry, unless conditions permit oven drying of sampling equipment.

C. Sample Documentation

1. All information pertinent to sampling will be recorded in a log book. The log book will be bound and will accompany sampling personnel to each sample location. All entries will be in ink. The following information will be recorded.

   - Date and Time of Sampling
   - Sample Location
   - Field Measurements
   - Weather Condition
   - Additional Comments

2. The following sample records will be kept:

- Sample Description
- Volume
- Sample Source
- Sampler Identification
- Time and Date of Sampling
- Weather Conditions
- Sample Laboratory Number
- Sample Method
- Presence of Preservation
- Sample Container
- Reason for Sampling
- Appearance of Sample (color, turbidity, etc.)
- Name and Location of Laboratory Performing Analysis
- Thermal Preservations (method of transportation)

Once the sample is collected, the container is resealed. All pertinent information is recorded on the seal such as collector's name, date and time of sampling, and sample number. Sample seals are necessary to ensure the integrity of the sample until it is opened in the laboratory.

All samples will be submitted to Lancaster Laboratories Inc. of Lancaster, PA for analysis.

D. Laboratory

1. Lancaster Laboratories, Inc. of Lancaster Pennsylvania shall perform all analytical work. Lancaster Labs is located at 2425 New Holland Pike, Lancaster, Pennsylvania 17601-5994. Lancaster Labs holds a NJDEP certification #77443 for potable and non-potable water analysis of metals, THMS, VOCs, BTEX pesticides and herbicides. Lancaster Labs shall deliver a final certificate of analysis which includes all requirements of Appendix 6 to the NJDEP "Scope of Work" document, September, 1990.

E. Chain of Custody

1. To establish the documentation necessary to trace sample possession from the time of collection, until storage after analysis, a chain of custody record will be filled out and will accompany every sample. An example of chain of custody record is attached. Kaselaan & D'Angelo Associates, Inc, utilizes the following chain of custody procedures:

   The sampler is to fill in Section 1 with the client's name and address.

   Section II is filled out as each sample is taken. Record the number of sample, the container type and a description and/or designation of the sample. Safety concerns or other remarks should also appear here.

   Section III is filled out by the person who takes custody of the sample from the sampling team and delivers them to the laboratory.

Section IV is completed as custody of the sample is initiated and relinquished by those who subsequently handle the sample. All names must be printed and then signed.

The preparation of sample containers is recorded in the laboratory notebook. The sample container is prepared, coded and permanently sealed with a tamper-proof uniquely coded label tape (i.e. Chain of Custody Label). The tape is ripped open in the field when the samples is to be taken.

After the sample is taken, the container is resealed. Such a seal is provided with each sample container. This seal is a corresponding unique label. By sealing the container with the sample, it prevents anyone from opening the container prior to receipt by the laboratory.

F. Laboratory Sample Decontamination

1. All samples received by Lancaster Laboratories are recorded in a laboratory log book, and assigned an identification number. A sign-in procedure is necessary to ensure delivery of samples to the laboratory, as well as accurate registration into the laboratory's data system. The laboratory shall record the following information:

   - Sample Number
   - Data Sampled
   - Temperature of Sample
   - Matrix (Aqueous/Non-Aqueous/Solid)
   - Special Handling Procedures
   - Bottle Types

   The laboratory shall check for:

   - Proper Preservatives
   - Chain of Custody
   - Sample Designation
   - Appropriateness of Analysis

   The laboratory shall prepare a label for sample identification and indicate method of handling, and method of storage after analysis is complete.

G. Laboratory Internal Quality Checks and Frequency

Lancaster Laboratory makes the following claim to Internal Quality Assurance:

1. Internal quality control is conducted with either Duplicate Determination and/or Spiked Sample Determination. A duplicate or duplicate spike analysis on one out of every ten (10) samples is done for every parameter determined.

2. The results of the duplication analysis are documented on control charts. Each test shall have a separate document showing the percent deviation in the duplicate results. A separate table will be attached to each chart showing notebook references and dates of each spiked analysis.

H. Quality Assurance Samples

The following procedures are utilized in identifying unknown waste materials and for soil samples:

1. Blanks:

A travel blank shall occupy the sample containers throughout the sampling and handling protocol. The travel blank consists of a 40 ml. septum vial containing deionized water and is prepared in the laboratory.

2. Duplicates:

For every parameter, duplicate spike analysis should be analyzed on one out of every ten samples (twenty for certain parameters). Duplicate and duplicate spike analysis is conducted to determine recovery. As a general rule, the laboratory performs duplicate or spike analysis on approximately 10 percent of its samples. All data results shall be documented.

3. Split Samples:

All samples will be stored by the laboratory performing the analysis. Upon request, split samples will be made available for the New Jersey Department of Environmental Protection Agency.

KASELAAN & D'ANGELO Associates, Inc.

(609) 547-6500

CHAIN OF CUSTODY RECORD

Name of Unit and Address:

Sample Number	Number of Containers	Description of Samples

Person Assuming Responsibility for Sample: Time Date

Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody

APPENDIX D

Health and Safety Program

HEALTH AND SAFETY PLAN

NWS EARLE, COLTS NECK, NEW JERSEY

GROUNDWATER INVESTIGATION

AT

QUARTERS G AND S-106

FOR

NORTHERN DIVISION, NAVFAC

NAVAL BASE PHILADELPHIA

JANUARY 4, 1990

PREPARED BY

KASELAAN & D'ANGELO ASSOCIATES, INC.

A HILL GROUP COMPANY

ENVIRONMENTAL SCIENCE AND ENGINEERING

HADDON HEIGHTS, NEW JERSEY

BOSTON O LOS ANGELES O NEW ORLEANS O NEW YORK O WASHINGTON

HEALTH AND SAFETY PLAN

NWS EARLE, COLTS NECK, NEW JERSEY

GROUNDWATER INVESTIGATION

AT

QUARTERS G AND S-106

FOR

NORTHERN DIVISION, NAVFAC

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JANUARY 4, 1990

PREPARED BY: Andrew C. Rola
ANDREW C. ROLA, P.E.
SENIOR PROJECT MANAGER

REVIEWED BY: Don Abramowitz CIH
DON ABRAMOWITZ
MANAGER, INDUSTRIAL HYGIENE

baw

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1.0 INTRODUCTION

The Site Health and Safety Plan (HASP) defines general applicability and general responsibilities with respect to compliance with OSHA 1910.120, the hazardous waste operations and emergency response standard.

1.1 Scope of Applicability of the Site Health and Safety Plan

The purpose of this Site Health and Safety Plan is to define the requirements and designate protocols to be followed at Quarters G and Building S-106 at NWS Earle during investigation activities. Applicability extends to all Government employees, contractors, subcontractors, and visitors.

All personnel on-site, contractors and subcontractors included, shall be informed of the site emergency response procedures and any potential fire, explosion, health or safety hazards of the operation. This HASP summarizes those hazards in table 3.1 and 3.2 and defines protective measures planned for the site.

1.2 SITE CHARACTERIZATION

1.2.1 Site Location and History

The underground storage tanks (UST) at Building S-106 and Quarters G of NWS Earle, Colts Neck, New Jersey have been found to be leaking #2 fuel oil. Both tanks were emptied after they were tested in May 1990. The tanks have been in use for over 25 years.

It should be noted that the 1,000 gallon tank at S-106 appeared to leak so fast that a leak rate could not be measured. The product level in the stand pipe continued to drain into the tank several times after all vapor pockets were removed and bung holes sealed. The entire tank top had been exposed and no visible leaks at the tank top were observed.

Tank S-106 is located in a housing complex with over 20 other similar 1,000 gallon underground storage tanks. S-106 is topographically the most downgradient tank in the housing complex. It appears that leaks from any of the other fuel oil tanks in the complex would migrate towards S-106 until encountering groundwater. The water table tends to follow local topography, so possible off-site contamination may be present.

At Quarters G, the surrounding grade is flat and fuel oil leaks will likely travel in the direction of groundwater flow or follow migration routes along subsurface utilities, storm drains or the septic system. A septic tank lies adjacent to this tank and could be contaminated with fuel oil. There exists a basement at Quarters G which could also be a receptor of fuel oil contamination. The basement and the septic system have been further investigated with a photoionization detector (PID) organic vapor meter (Hnu Model PI-101) during this phase of the investigation.

1.2.2 CLIMATOLOGY

The climate in the vicinity of the Earle NWS, Colts Neck is predominantly continental with some influence of Atlantic maritime air. The temperature is moderate with a mean daily high of 60-65°F, and mean daily low of 45-50°F. Average annual precipitation is about 42 inches which is evenly distributed throughout the year.

Most of the field work for the project is expected to occur in the midwinter or spring of 1991. This will include the following activities:

Installation of six (6) shallow piezometers and two shallow monitoring wells with split spoon samples every five feet.

Two (2) stream surface water samples.

One (1) Basement sump water sample.

The Groundwater monitoring wells will be sampled approximately two weeks after their installation.

1.3 Visitors

All visitors entering the contamination reduction zone and exclusion zone at Building S-106 and Quarters G will be required to read and comply with the provisions of this HASP. In addition, visitors will be expected to comply with relevant OSHA requirements such as medical monitoring (Sec. 6.0), training (Sec. 4.0), and respiratory protection (if applicable). Visitors will also be expected to provide their own protective equipment.

In the event that a visitor does not adhere to the provisions of the HASP, he/she will be requested to leave the work area. All non-conformance incidents will be recorded in the site log, which shall be maintained by the health and safety officer.

2.0 KEY PERSONNEL/IDENTIFICATION OF HEALTH AND SAFETY PERSONNEL

2.1 Key Personnel

The following personnel and organizations are critical to the planned activities at the Quarters G and S-106. The organizational structure will be reviewed and updated periodically by the site supervisor.

Name/Title	Organization/Branch	Address	Telephone
Andrew C. Rola Project Manager	Kaselaan & D'Angelo	515 Grove Street Haddon Heights, New Jersey	(609) 547-6500
Valdur Kaselaan Senior Management	Kaselaan & D'Angelo	Haddon Heights New Jersey	(609) 547-6500
Site Supervisor (See Section 4.2)	Kaselaan & D'Angelo	Haddon Heights	(609) 547-6500
Don Abramowitz Health & Safety Officer	Kaselaan & D'Angelo	Haddon Heights	(609) 547-6500

The Health and Safety Officer HSO will have the authority to override the Project Manager, the On-Scene Coordinator and field personnel in any decision potentially impacting the health and safety of workers, the environment or the community. In the event of a disagreement, the HSO shall report directly to senior management.

2.2 Site Specific Health and Safety Personnel

The Site Health and Safety Officer (HSO) has responsibility for ensuring that the provisions of this HASP are adequate and implemented in the field.

3.0 TASK/OPERATION SAFETY AND HEALTH RISK ANALYSIS

3.1 Potential Hazards Anticipated at the Site.

The primary hazards at Building S-106 and Quarters G appear to be due to the contamination of groundwater by fuel oil and its volatile constituents. The septic system at Quarters G presents a possible source of methane and hydrogen sulfide. Due to the investigative nature of the work activities on this phase of the project, additional hazards may be revealed during the work. Selective sampling will be performed for volatile organics in sampling wells on the site, and for volatile organic compounds in air (via photoionization type organic vapor detector).

Groundwater Testing

Analysis for selected VOC's will be performed in groundwater and stream water samples collected from Quarters G and building S-106.

TABLE 3.1

AIRBORNE CHEMICAL CONTAMINANTS ANTICIPATED AT THE SITES

Contaminant	Ionization Potential (ev)	IDLH (ppm)	Exposure Std. OSHA PEL/ACGIH TLV 8 hour TWA (ppm)
Benzene (A2)	9.25	Ca.	1/10
Ethylbenzene	8.76	2,000	100/100
Hydrogen Sulfide	10.43	300	10/10
Methane	12.98	12,500*	Flammable Asphyxiant
Toluene	8.82	2,000	100/100
Xylene	8.56	1,000	100/100

Note:

Ca: Potential human carcinogen

IDLH: Concentration in air considered immediately dangerous to life or health.

(A2): Recognized as a suspect human carcinogen by the ACGIH

ACGIH: American Conference of Governmental Industrial Hygienists.

* Twenty-five percent (25%) lower exposure limit.

The concentration of these materials in air at the site is a function of their concentration in the groundwater and soil, groundwater elevation, temperature, and atmospheric conditions (wind, barometric pressure). Due to the potential for varying concentrations in air, the sampling plan will require initial monitoring to determine the levels in the vicinity of all of the anticipated work activities.

Preliminary sampling for total volatile organics using an HNu (PID) indicated detectable levels in air at the basement sump and the septic tank in Quarters G. This sampling was conducted in October, 1990 during seasonal dry temperatures and presumably low groundwater levels.

TABLE 3.2

TASK ANALYSIS AND DESCRIPTION

TASK	TIME	DESCRIPTION	HAZARD
(1) Initial Air Monitoring	(1 day)	Air Sampling throughout the site at anticipated work areas for contaminants listed in Table 1	Inhalation of airborne contaminants/ flammable gas presence
(2) Well Inspection/ Survey	(1 day)	Visual observation of of monitoring wells	Inhalation of airborne contaminants
(3) Soil Sampling (split spoon)	(3 days)	Collection of soil samples utilizing a split spoon sampling from depths above the water table (10-15 feet)	Presence of flammable gas/inhalat of airborne VOC's. Noise.
(4) New well Installation	(2 days)	Drilling (hollow stem auger), construction of monitoring wells and installation of piezometers.	Inhalation of VOCs release of methane and other gases. Contact with groundwater. Noise.
(5) Stream Sampling (Surface & Sediment)	(1 day)	Collection of surface water sample.	Inhalation of airborne VOC's. Contact with surface water.
(6) Well Purging	(1 day)	Bail and surge to develop the groundwater monitoring wells.	Inhalation of VOC's. Contact surface water.
(7) Groundwater	(1 day)	Sampling of monitoring wells Estimated 2 wells to be sampled. Includes bailing of three volumes of each well	Inhalation of VOC's Release of methane Contact with groundwater.

4.0 PERSONNEL TRAINING REQUIREMENTS

4.1 Preassignment and Annual Refresher Training

Prior to arrival on-site, each employer will be responsible for certifying that his/her employees meet the requirements of preassignment training. Consistent with OSHA 29 CFR 1910.120 paragraph (e)(3) and N.J. DEP requirements, each employer shall provide a document certifying 40 hours of health and safety training for site workers. An employer may also grandfather experienced personnel with equivalent documentable work experience or training. Personnel must receive 8 hours of annual refresher training if they have not completed the 40 hours of training within the last year. In addition, each employer must be able to document training in compliance with the federal hazard communication standard (OSHA 29CFR 1910.1200).

At a minimum, this 40 hour training shall address the following:

1. Chemical hazards
2. Physical hazard
3. Toxicology and permissible exposure limits
4. Personal protective equipment and protection levels
5. Respiratory protection (29 CFR 1910.134) and written respirator program
6. Air monitoring
7. Confined spaces

4.2 Site Supervisors Training

Consistent with OSHA 29 CFR 1910.120 paragraph (e)(8), individuals designated as site supervisors require an additional 8 hours of training.

The following individuals are currently trained on site supervisors:

Name	Title/Responsibility
Don Abramowitz	Certified Industrial Hygienist/HSO.

Additional names shall be added as training is acquired.

4.4 Respiratory Protection Program

- Each employer shall provide a copy of the corporate respiratory protection plan, which must be in compliance with OSHA 29 CFR 1910.134.

- Each employer, as part of this respiratory protection plan shall include copies of fit test forms for each employee who is to perform work on the NWS Earle. This form must include the following information.

    - fit test administrator: name and signature
    - method of fit testing
    - name of employee
    - date of fit testing
    - respirator make, model, size
    - fit test results

- Only NIOSH/OSHA approved respiratory protection equipment shall be permitted on-site.

5.0 PERSONAL PROTECTIVE EQUIPMENT TO BE USED

This section describes the general requirements of the EPA designated Levels of Protection (A-D), and the specific levels of protection required for each task at Quarters G & S-106.

5.1 Levels of Protection

The specific levels of protection and necessary components for each have been divided into four categories according to the degrees of protection afforded:

Level A: Should be worn when the highest level of skin, eye, and respiratory protection is needed.

Level B: Should be worn when the highest level of respiratory protection (but a lesser level of skin protection) is needed. Level B is the primary level of choice when encountering unknown environments.

Level C: Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.

Level D: For the purpose of this HASP, level D refers to an ensemble without respiratory protection. It provides limited protection against chemical hazards via contact.

Modifications of these levels are permitted, and routinely employed during site work activities to maximize efficiency. For example, Level C respiratory protection and Level D skin protection may be required for a given task. Likewise the type of chemical protective ensemble (i.e., material, format) will depend upon contaminants and degrees of contact.

The Level of Protection selected is based upon the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done.
- Knowledge of chemicals on-site along with properties such as toxicity, route of entry, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgment until the hazards can be better identified.

5.2 Level A and B PPE: It is not anticipated that level A or B protection will be necessary for any activities at Building S-106 and Quarters G during this phase of the investigation.

5.3 Level C Personnel Protective Equipment:

Level C protection will be used when the airborne contaminant is known, concentration measured, criteria for using air-purifying respirators is met, a canister is available, and skin and eye exposure is unlikely. Periodic monitoring of the air will be performed. The atmospheric concentration of oxygen must be at least 19.5 percent. Level C consists of the following personnel protective equipment.

- Air-purifying respirator, full-face, cartridge-equipped (OSHA/NIOSH approved) (cartridge to be specified by HSO)
- Chemical-resistant clothing (coveralls; hooded, one-piece or two-piece chemical splash suit disposable chemical-resistant coveralls such as Saranex or polyethylene coated Tyvek.
- Gloves: Outer: chemical resistant (nitrile, neoprene, or equivalent) Inner: latex or vinyl single use.
- Work Boots (leather), steel toe
- Chemical-resistant over boots*
- Hard hat
- Duct tape connection between chemical resistant clothing outer boots and gloves

* A steel toe, all rubber, over the sock boot may be substituted for work boot + over boot.

5.4 Level D Personnel Protective Equipment:

- Coveralls
- Gloves: outer: chemical resistant (nitrile, neoprene, or equivalent) Inner: latex or vinyl single use.
- Boots leather or chemical-resistant, steel toe, that meet or exceed ANSI Z41.1
- Chemical resistant over boots.*
- Safety glasses or goggles (if eye hazards anticipated)
- Hard hat
- Disposable coveralls (at the discretion of the HSO)

* A steel toe, all rubber over-the-sock boot may be substituted for work boot and overboot.

- Duct tape connections between coveralls, outer boots, and outer gloves

5.5 Donning Personal Protective Equipment

A sequence for donning an ensemble shall be established. Assistance should be provided if necessary. Once the equipment has been donned, its fit should be evaluated. Following is a sample procedure for donning Level C personal protective equipment. This procedure should be modified as required, depending on exact ensemble used.

1. Inspect the clothing and respiratory equipment according to manufacturers' recommendations.
2. Don coveralls (work clothing/underclothing).
3. Don chemical-resistant clothing; step into legs of suit, ensuring feet are properly placed if "booties" are attached. Gather suit around waist, taping if necessary.
4. Don steel-toe boots.
5. Don chemical-resistant outer boots
6. Don chemical resistant disposable boot Tape top of outermost boots to suit covers.
7. Don respirator and perform positive and negative face seal tests as follows:

- o positive pressure test: cover exhalation valve with palm of hand, being careful not to exert any pressure on respirator. Exhale lightly for approximately 10 seconds. Any escape of air around the facepiece indicates a poor fit.

- o Negative pressure test: cover each cartridge simultaneously with palms of hands. Inhale gently for approximately 10 seconds. Any inward rush of air indicates a poor fit.

- o Employees who, after routine adjustments of the respirator straps, cannot obtain an acceptable fit, shall not be permitted to enter the Exclusion Zone if such respirator is required for that area.

8. Don inner (latex) gloves.

9. Don hard hat/face shield, adjusting as necessary.

10. Carefully raise hood over head and adjust to give satisfactory comfort.

11. Don outer chemical-resistant gloves and secure to sleeves.

12. Have assistant check all closures and observe wearer for period of time to be certain wearer is psychologically and physically comfortable.

5.6 Doffing Personal Protective Equipment

Exact procedures for removing personal protective equipment are needed to prevent contaminant migration from the Exclusion Zone and transfer of contamination to the wearer, the doffing assistant and others. Doffing procedure for a Level C ensemble is given. This procedure requires a suitably attired assistant. Both the wearer and the assistant should avoid direct contact with the outside surface of the suit.

1. Remove tape, outer boot covers, and outer gloves.
2. Have assistant open chemically resistant suit, lifting hood over head of wearer.
3. Carefully remove arms from suit while assistant rolls suit outside in.
4. Remove both legs from suit while sitting. Continue to roll suit outside in.
5. Remove respirator.
6. Remove safety boots.
7. Remove inner gloves by rolling them off hands, outside in.
8. Remove coveralls

5.7 Reassessment of Protection Program

The Level of Protection provided by PPE selection shall be upgraded or downgraded based upon a change in site conditions or findings of investigations as deemed appropriate by the site HSO.

When a significant change occurs, the hazards should be reassessed. Some indicators of the need for reassessment are:

- Commencement of a new work phase, such as the start of stream or well sampling or work that begins on a different portion of the site.
- Change in job tasks during a work phase.
- Change of season/weather.
- When temperature extremes or individual medical considerations limit the effectiveness of PPE.
- Contaminants other than those previously identified are encountered.
- Change in ambient levels of contaminants.
- Change in work scope which effects the degree of contact with contaminants.

5.10 Standard Operating Procedures for Personal Protective Clothing.

5.10.1 Inspection

The primary inspection of PPE in use for activities at Building S-106 and Quarters G will occur prior to immediate use and will be conducted by the user. This ensures that the specific device or article has been checked-out by the user, and that the user is familiar with its use.

Table 5.1 Sample PPE Inspection Checklists

CLOTHING

Before use:

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for:
  - imperfect seams
  - non-uniform coatings

- tears
- malfunctioning closures

- Hold up to light and check for pinholes.

- Flex product:
  - observe for cracks
  - observe for other signs of shelf deterioration

- If the product has been used previously, inspect inside and out for signs of chemical attack:
  - discoloration
  - swelling
  - stiffness

During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.

- Closure failure.

- Tears.

- Punctures.

- Seam Discontinuities.

GLOVES

Before use:

- Visually inspect for:
  - imperfect seams
  - tears, abrasions
  - non-uniform coating
  - Pressurize glove with air; listen for pin-hole leaks.

5.10 Specific Levels of Protection Planned for Building S-106 and Quarters G.

The following levels of protection will be utilized during activities at Building S-106 and Quarters G:

____	Level A:	____	modified
____	Level B:	____	modified
x	Level C:	x	modified
x	Level D:	x	modified

Table 5.2 presents the level of protection planned for the completion of individual task assignments and the specific components of each protective ensemble.

TABLE 5.1
SPECIFIC LEVELS OF PROTECTION PLANNED FOR THE TASK ASSIGNMENTS AT BUILDING S-106 AND QUARTERS G

____ Level A
Tasks:

None Anticipated

____ Level B
Tasks:

None Anticipated

____ Level C

- o New Well Installation (Drilling)
- o Well Purging
- o Groundwater Sampling (Including Well Bailing)

____ Level D

- o Initial Air Monitoring Survey
- o Well Inspection Survey
- o Soil Sampling (surface)
- o Stream Sampling

6.0 MEDICAL SURVEILLANCE REQUIREMENTS

Medical monitoring programs are designed to track the physical condition of employees on a regular basis as well as survey preemployment or baseline conditions prior to potential exposures. The medical surveillance program is a part of each employer's Health and Safety program.

6.1 Baseline or Preassignment Monitoring

Prior to being assigned to a hazardous or a potentially hazardous activity involving exposure to toxic materials, each employee will receive a preassignment or baseline physical to be performed by a licensed physician, preferably a specialist in occupational medicine. The contents of the physical are to be determined by the employer's medical consultant. The NIOSH/OSHA/USCG/EPA's Occupational Safety & Health Guidance Manual for Hazardous Waste Site Activities recommends the following medical protocol:

- Complete medical and work histories.
- Physical examination.
- Pulmonary function tests (FVC and FEVI).
- Chest X-ray (every 2 years).
- Resting EKG.
- Eye examination and visual acuity.
- Audiometry.
- Urinalysis (microscopic morphology & dipstick).
- Blood chemistry (SMAC 18 or equivalent).
- CBC, including plastlets and differential.

The preassignment physical should categorize employees as fit-for-duty and able to wear respiratory protection. A written certification of fitness for all onsite personnel will be provided by the administering physician prior to the start of work.

6.2 Periodic Monitoring

If the baseline physical was performed over one year ago, employees require a periodic physical within the last 12 months unless the advising physician believes a shorter interval is appropriate. The employer's medical consultant should prescribe an adequate medical examination which fulfills OSHA 29 CFR 1910.120 requirements. The preassignment medical examination outlined above may be applicable.

All personnel working in contaminated or potentially contaminated areas at S-106 and Quarters G will be required to have current medical examinations (within 12 months).

7.0 AIR MONITORING PLAN

This section explains the general concepts of an air monitoring program and specifies the surveillance activities that will take place during project completion at Building S-106 and Quarters G.

The purpose of air monitoring is to assess airborne contaminants in order to determine the level of worker protection needed. Initial screening for identification is often qualitative, i.e., the contaminant, or the class to which it belongs, is demonstrated to be present but the determination of its concentration (quantification) must await subsequent testing. Two principal approaches are available for identifying and/or quantifying airborne contaminants:

- The on-site use of direct-reading instruments.
- Laboratory analysis of air samples obtained by gas sampling bag or collection media (i.e., filter, sorbent).

The Quarters G and S-106 air monitoring plan is designed to provide for the safety of the workers and surrounding population and to determine if on-site activities are creating the potential for off site migration of air contaminants. Due to the nature of the work activities there is very limited potential for the release of air contaminants. Thus the air monitoring plan is intended to be flexible by requiring increased sampling during selected activities and reduced efforts during non-invasive sampling and survey work. The HSO shall have the authority to require additional air monitoring as warranted for the various activities and conditions encountered at the site.

7.1 Initial Site Monitoring

Note that a preliminary air monitoring survey of the site was conducted by K&D during October 16, 1990. The survey involved the measurement of volatile organic compounds in air using an HNu photoionizer detector (direct reading PID). The results indicated no detectable levels of photoionizable species at Building S-106. At Quarters G, Hnu readings of 5 ppm and 12 ppm were found in the septic tank and in the basement sump respectively. No readings were found in the breathing zone.

Site monitoring shall be performed at the beginning of each work day or event to determine the presence of volatile organics. Testing shall be conducted using direct reading instruments (as follows) in all areas of anticipated work activity

- o PID direct reading instrument (HNu or equivalent) to detect levels of photoionizable volatile organics.
- o Combustible gas indicator (for presence of methane)
- o Toxic gas indicator or detector tubes (for presence of hydrogen sulfide)

7.2 Periodic Monitoring

Periodic monitoring is an integral part of the plan and helps ensure the appropriate levels of PPE are maintained for the work activity. Again, the level of periodic monitoring is based on the nature of the work and background air sampling results. The levels of periodic monitoring are differentiated as follows. These efforts can be modified by the site HSO after sufficient data has been collected.

A. Level I - for all work exclusive of drilling.

Initial monitoring using a CGI, PID, and hydrogen sulfide detector and periodic monitoring throughout the duration of the work activity. Periodic monitoring requires a minimum of four readings per day. Initial monitoring is required at the start of all work activity.

B. Level II - during drilling activities (well installation)

Continuous monitoring during drilling for combustible gases, percent O_2, and organic vapors (CGI, PID) plus initial and periodic measurements for hydrogen sulfide.

TABLE 7.2

Instrumentation Action Levels:

Instrument	Action Level	Level of Protection or Action Required
Photoionization Detector	Background to 2 ppm ** (5 min Time Weighted Avg)	No respirator maintain monitoring schedule
	≥ 2 ppm to 20 ppm**	Full facepiece air purifying respirator; establish exclusion zone if not already present.
	≥ 20 ppm to 500 ppm**	Supplied air respirator.
	≥ 500 ppm**	Shut down operation, evacuate personnel from area and let vent.

The photoionization detector shall be calibrated daily to benzene (or its equivalent). Monitoring will be performed in the breathing zone of personnel.

Combustible Gas Indicator	< 10% LEL*	Maintain monitoring schedule.
	10% to 25% LEL*	Conduct continuous monitoring.
	≥ 25% to 50% LEL*	Shut down operation, allow to vent, continue monitoring.
	≥ 50% LEL*	Shut down operation, evacuate personnel from area and let vent.
Hydrogen Sulfide	< 5ppm *	Maintain periodic monitoring.
	≥ 5 ppm to 10 ppm*	Conduct measurements every 15 minutes during work activities.
	≥ 10ppm**	Supplied air respirator.

> 50 ppm**	Shut down operation, evacuate personnel from area and let vent.

* Samples taken within 1 foot of the bore hole or excavation area.
** Samples taken at the breathing zone.

NOTE: IF AIR MONITORING RESULTS CALL FOR RESPIRATORS OR OTHER PROTECTIVE MEASURES WHICH ARE NOT IMMEDIATELY AVAILABLE, THE WORK SHALL CEASE AND PERSONNEL SHALL EVACUATE THE EXPOSURE AREA.

8.0 SITE CONTROL MEASURES

The following section defines measures and procedures for maintaining site control. Site control is an essential component in the implementation of the site health and safety program.

8.1 Buddy System

During all activities in the Exclusion Zone, the implementation of a buddy system is mandatory. A buddy system requires at least two people who work as a team, each looking out for each other. They must be in visual contact at all times.

8.2 Site Communications Plan

Successful communications between field teams and contact with personnel in the support zone is essential. The following communications systems will be available during activities at G and S-106.

- o A car will be used to drive to the nearest telephone, or a car phone will be present
- o For Quarters G, the nearest telephone is at the diner at the Route 33/Route 34 traffic circle.
- o For Building S-106 the nearest telephone is in the housing office located across from the main gate.
- o All communication in the field will be verbal.

8.3 Work Zone Definition

There will be two general work zones established for Level C task assignments. For each level C task, an exclusion zone shall be established which extends 20 feet in radius from the center of work. All people entering the exclusion zone during work activities shall be donned in Level C personal protective equipment. The Exclusion zone are may be reduced or increased by the HSO depending on the results for air monitoring.

Second general work area, called the contamination reduction zone shall be located between a twenty (20) foot and fifty (50) foot radius from the center of each level C activity.

The Contamination Reduction Zone is the area in which personnel conduct personal and equipment decontamination. It is essentially a buffer zone between contaminated areas and clean areas. This area shall be used for the decontamination of personnel and equipment including materials brought from off-site locations for decontamination.

All decontamination wash and water residues shall be collected and stored in this area. Volumes of water and residue will depend upon the degree and frequency of decontamination necessary, and cannot be predicted prior to the start of on-site activities.

The contamination reduction zone, as with the exclusion zone, shall be reduced or increased by the HSO depending on air monitoring results.

All areas beyond the contamination reduction zone shall be considered clean areas.

9.0 DECONTAMINATION PLAN

9.1 Personnel

All outer layers of clothing such as suits, gloves, boots etc. will be disposed in 6 mil. plastic bags after use. Hand and face washing facilities are available at Quarters G and S-106. The site supervisor will obtain keys to the building and arrange for water to be turned on so that water and toilet facilities are available. All site personnel will minimize contact with contaminants in order to minimize the need for extensive decontamination.

9.2 Equipment

Drilling equipment will be decontaminated in the exclusion zone with a steam genny using potable water.

Air monitoring instruments will be wiped clean with baby wipes or clean wet rags. Rags will be disposed in 6 mil. plastic bags after use.

9.3 Sampling Equipment

Split spoon samples, bailers and thief samples will be decontaminated before and after each use as follows.

a. All sampling equipment will be hand-wiped to removed all visible residues or any caked-on materials.

b. The equipment will then be thoroughly used with a detergent/tap water solution, then rinsed with tap water.

c. The equipment will then be rinsed with distilled/deionized water.

d. If the samples are to be analyzed for metals, the sampling equipment must be rinsed with a ten percent nitric acid solution. After this rinse it is necessary to re-rinse the equipment with distilled/deionized water.

e. All equipment will then be rinsed with pesticide grade acetone and allowed to air dry.

f. A final rinse of all equipment using distilled/deionized water is required. The equipment should be allowed to air dry, unless conditions permit oven drying of sampling equipment.

9.4 Disposition of Decontamination Wastes

All equipment and solvents used for decontamination shall be decontaminated or disposed of properly. A drum staging area will be established in the Contaminant Reduction Zone. All used, disposable PPE shall be bagged and placed in the staging are for subsequent disposal at a facility authorized to receive such waste. Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment shall be informed of the nature of the contaminants anticipated to be present.

10.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

This section describes contingencies and emergency planning procedures to be implemented at Building S-106 and Quarters G.

10.1 Pre-Emergency Planning

During the site briefings held periodically/daily, all employees will be trained in and reminded of provisions of the emergency response plan, communication systems, and evacuation routes. Table 11.1 identifies the hazardous conditions associated with specific site activities.

The plan will be reviewed and revised if necessary on a regular basis by the HSO. This will ensure that the plan is adequate and consistent with prevailing site conditions.

10.2 Personnel Roles and Lines of Authority

The Site Supervisor has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measure to ensure the safety of site personnel and the public. Possible actions may notification of NWS Earle Emergency Coordinator of any emergencies involve evacuation of personnel from the site area, and coordination with NWS Earle Emergency Coordination regarding evacuation of adjacent residents. He/she is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. The HSO may be called upon to assist or act on the behalf of the site supervisor.

The individual contractor organizations are responsible for assisting the project manager in his/her mission within the parameters of their scope of work.

10.3 Evacuation Routes/Procedures

In the event of an emergency which necessitates an evacuation of the site, the following procedures will be implemented:

- Personnel will be expected to proceed to the closest exit with their buddies, and mobilize at a safe distance area. Personnel will remain at that area until or an authorized individual provides further instructions.

The NWS Earle Emergency Coordinator, Chief Henry, shall be notified immediately of any site emergencies. He will assume responsibility for evacuating residents and other off-site personnel. Chief Henry can be contacted at (201) 577-2333.

10.4 Emergency Contact/Notification System

The following list provides names and telephone numbers for emergency contact personnel. In the event of a medical emergency, personnel will take direction from the site supervisor and notify the appropriate emergency organization. In the event of a fire or spill, the site supervisor will notify the appropriate local, state, and federal agencies.

Organization	Contact	Telephone
Emergency (on site spill, fire, release)	Chief Henry NWS Earle Fire Department	(201) 577-2333
Ambulance:	NWS Earle	(201) 577-2401
Security:	Marine Sergeant	(201) 577-2457/2443
Fire:	NWS Earle Fire	(201) 577-2333
Hospital:	Riverview Hospital	(201) 741-2700
Poison Control Center:		(800) 962-1253
State Authority:	NJDEP	(800) 648-0394
National Response Center		(800) 424-8802

10.5 Emergency Medical Treatment Procedures

Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, partial decontamination should be attempted to the extent feasible, provided it does not present a risk of worsening the victim's condition. First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the project manager.

10.6 Spill or Leaks

In the event of a spill or a leak, site personnel will:

- Inform their supervisor immediately;
- Locate the source of the spillage and stop the flow if it can be done safely; and,
- Begin containment and recovery of the spilled materials.
- Notify the NWS Earle Emergency Coordinator.

11.0 RECORD KEEPING

11.1 Medical Records

- o Medical records shall numerical in accordance with the requirements of 29 CFR 1910-20.
- o Any subcontractors whose services will be utilized for the project shall make available to Kaselaan & D'Angelo Associates documentation of their employees' participation in a medical surveillance program.

11.2 Training Records

Records should be maintained in each employee's file to confirm that persons assigned to a task have had adequate, appropriate and up-to-date training regarding:

- o Occupational noise exposure in accordance with 29 CFR 1910.95
- o Hazard Communication in accordance with 29 CFR 1910.1200.
- o Records of training (e.g. daily safety meeting) shall be kept in a log book and shall include the following information, record keeping etc. at a minimum: date, topic(s) discussed, attendees, and signature of leader.

11.3 Sampling Results

The HSO must ensure that records pertaining to all on-site monitoring are maintained. This information shall include, but not be limited to: date, technician, sample identification number, sampling method, analysis requested, destination, and signatures of all persons involved in transferring the sample to its endpoint.

11.4 Respirator Fit Test Forms

Each company shall provide the following information for each employee assigned a respirator in accordance with 29 CFR 1910.134.

- o Make, model, and size respirator.
- o Fit test records including the method used and the person administering the test, shall also be provided.
- o This information shall be kept by Kaselaan & D'Angelo Associates or their designee and be accessible to the HSO.

11.5 Occupational Noise Exposure

Personnel in the immediate vicinity will wear hearing protection during drilling operations.

APPENDIX E

Field Method for Determining Free Product in Soil

FIELD METHODS FOR DETERMINATION OF FREE PRODUCT CONTAMINATED SOILS

The two methods proposed below can be used in the field to make a distinction between soils contaminated with free product (soils at residual saturation) and soils that are contaminated with dissolved product. These methods will not determine if a soil is "clean".

These field methods allow the owner/operator to make a rapid field determination of "worst case" soil contamination, thereby eliminating delays in installation/removal and backfilling of underground tanks and piping.

These methods are only applicable to petroleum fuels (gasoline and heating oils) and some lubricants (i.e. motor oil). In addition, these methods are only intended to separate out free product contaminated soils from those soils which may be contaminated at a lower concentration. The need for further remediation of soil other than free product contaminated soils shall be based on results of ground water sampling at the site. If ground water cleanup is necessary, remediation of dissolved product contaminated soils may be necessary.

"Soil Remediation" may consist of removal and off-site disposal or a method of on-site or in place treatment of the soils which is acceptable to the Department (e.g. subsurface venting of gasoline contaminated soils). Dissolved product contaminated soils which pose a future risk to ground water quality (e.g. a discharge that has not had sufficient time to reach ground water) must be remediated beyond the extent of free product contaminated soils.

Both methods should be conducted at a site. The results of the method which is most sensitive should be utilized.

METHOD 1 - SOIL / WATER AGITATION

A clear jar is partially filled with the soil/fill sample. Sufficient water is added to saturate the soil and bring the water level to about 1 cm above the soil surface. The jar is sealed, and the sample is agitated by shaking. The jar is then opened to check for the presence of a sheen on the water surface. If a sheen is present, the soils have been contaminated by free product. If no sheen is present, the soils are either contaminated with dissolved product or are free of contamination. The presence of a sheen should be checked under various lighting conditions and backgrounds since these factors will affect the visibility of the sheen. Obviously, this method should only be used with products that exhibit visible sheens in water. This method should be supplemented with Method 2 below.

METHOD 2 - FIELD SORPTION METHOD

This method is used to sorb free product from contaminated soils. A sample of the soil/fill is pressed against a brown paper bag for about 10 seconds. Soils contaminated by free product result in a "greasy" staining of the bag. The stain is more pronounced with fuel oils than for gasoline. Due to rapid evaporation of gasoline, the observer must check for evidence of staining from gasoline quickly, before it volatilizes from the paper. Interference from soil moisture may result in water transfer to the bag but generally the water does not spread on the bag as does fuel oil or gasoline. This method should be supplemented with the soil/water agitation method.