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CONTAMINATION ASSESSMENT PLAN BACHELOR ENLISTED QUARTERS BUILDING

1586 NS MAYPORT FL

5/1/1994

ABB ENVIRONMENTAL SERVICES

CONTAMINATION ASSESSMENT PLAN

BACHELOR ENLISTED QUARTERS, BUILDING 1586
NAVAL STATION MAYPORT, FLORIDA

Contract Task Order No. 077

Contract No. N62467-89-D-0317

Prepared by:

ABB Environmental Services, Inc.
2590 Executive Center Circle East
Tallahassee, Florida 32301

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29418

Bryan Kizer, Engineer-In-Charge

May 1994

FOREWORD

Subtitle I of the Hazardous and Solid Waste Amendments (HSWA) of 1984 to the Solid Waste Disposal Act (SWDA) of 1965 established a national regulatory program for managing underground storage tanks (USTs) containing hazardous materials, primarily petroleum products. Hazardous wastes stored in USTs were already regulated under the Resource Conservation and Recovery Act (RCRA) of 1976, which was also an amendment to SWDA. Subtitle I requires that the U.S. Environmental Protection Agency (USEPA) promulgate UST regulations. The program was designed to be administered by the individual States, who were allowed to develop more stringent standards, but not less stringent standards. Local governments were permitted to establish regulatory programs and standards that are more stringent, but not less stringent than either State or Federal regulations. The USEPA UST regulations are found in the Code of Federal Regulations, Title 40, Part 280 (Title 40 CFR 280), *Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks*, and Title 40 CFR 281, *Approval of State Underground Storage Tank Programs*. Title 40 CFR 280 was revised and published on September 23, 1988, and became effective December 22, 1988.

The Navy's UST program policy is to comply with all Federal, State, and local regulations pertaining to USTs. This report was prepared to satisfy the requirements of Chapter 17-770, Florida Administrative Code (FAC), *State Underground Petroleum Environmental Response*, regulations pertaining to petroleum contamination in Florida's environment as a result of spills or leaking tanks or piping.

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
BEQ	Bachelor Enlisted Quarters
BTEX	benzene, toluene, ethylbenzene, and xylenes
bls	below land surface
BOSS	Base Operations and Support Services
CA	Contamination Assessment
CAP	Contamination Assessment Plan
CAR	Contamination Assessment Report
CFR	Code of Federal Regulations
EDB	ethylene dibromide
EIC	Engineer-in-Charge
ERG	Environmental Recovery Group
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FID	flame ionization detector
GC	gas chromatograph
HSWA	Hazardous and Solid Waste Amendments of 1984
ID	inside diameter
mg/ℓ	milligrams per liter
msl	mean sea level
MTBE	methyl tert-butyl ether
µmhos/cm	micromhos per centimeter
NAVSTA	Naval Station
OVA	organic vapor analyzer
PAHs	polynuclear aromatic hydrocarbons
PCA	Preliminary Contamination Assessment
PCAR	Preliminary Contamination Assessment Report
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RAP	remedial action plan
RCRA	Resource Conservation and Recovery Act

GLOSSARY (Continued)

SOUTHNAV-FACENGCOM	-Southern Division, Naval Facilities Engineering Command
SOW	statement of work
SWDA	Solid Waste Disposal Act of 1965
TRPHs	total recoverable petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
USCGS	U.S. Coastal and Geodetic Survey
UST	underground storage tank
VOAs	volatile organic aromatics
VOCs	volatile organic compounds

1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), has been contracted by the Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) to prepare a Contamination Assessment Plan (CAP) for the Bachelor Enlisted Quarters (BEQ), Building 1586, at Naval Station Mayport, Florida. The CAP outlines a field investigation and sampling program that will provide an assessment of soil and/or groundwater contamination at the site. The following report presents the site location, summarizes previous investigations, and develops the rationale for the proposed field investigation to be implemented during the Contamination Assessment (CA).

2.0 BACKGROUND

2.1 SITE DESCRIPTION. The U.S. Naval Station (NAVSTA) at Mayport, Florida, is located about 15 miles east-northeast of downtown Jacksonville, Florida (Figure 2-1). NAVSTA Mayport was established in 1942 on approximately 700 acres of land. The original mission of the station included use of patrol craft, target, and rescue boats. The station was placed in caretaker status in 1946, reopened in 1948, and in 1952 was assigned an aircraft carrier. Today NAVSTA Mayport is primarily involved in intermediate level maintenance of equipment, ships, aircraft, and other support units assigned to the portion of the Second Fleet stationed at the facility.

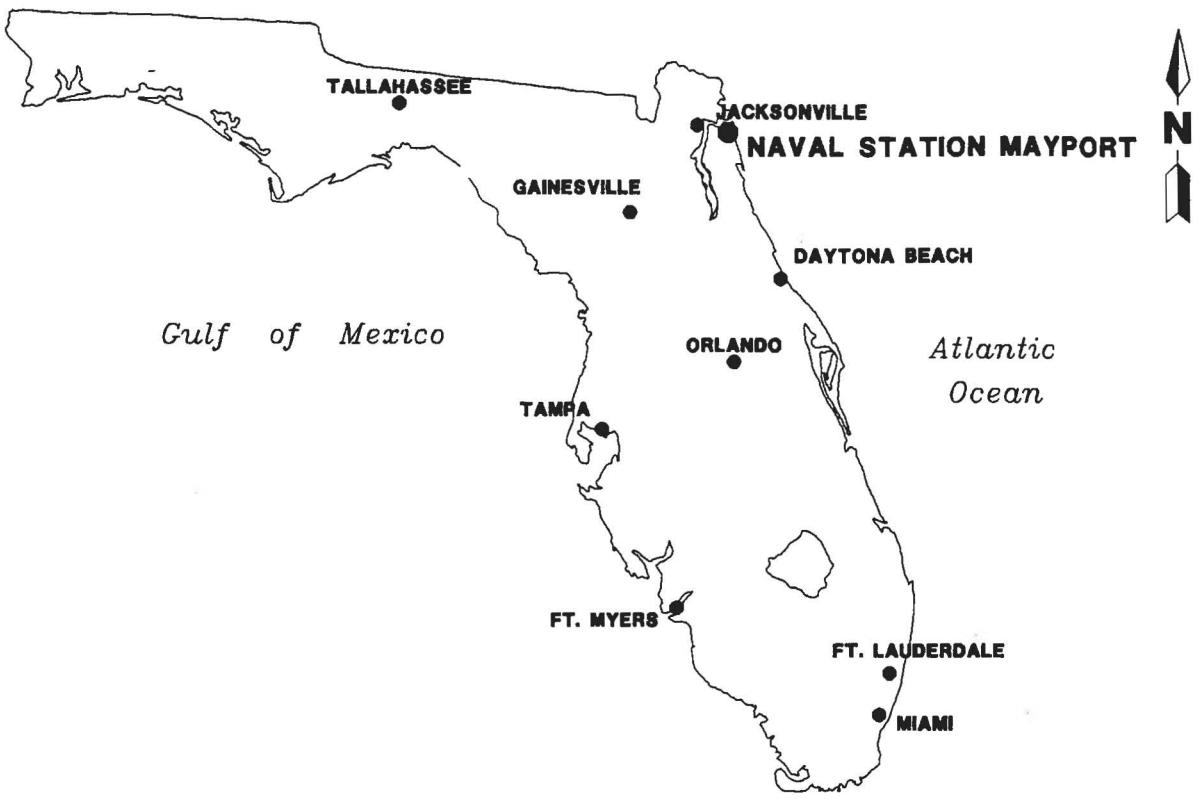
The BEQ site is located at Building 1586 at NAVSTA Mayport (Figure 2-2).

2.2 SITE HISTORY. Approximately 3,000 gallons of diesel fuel No. 2 leaked from part of the heating fuel pipeline outside the BEQ in the fall of 1991. The boiler fuel system leak was detected September 6, 1991, by weekly fuel inventory records. The leak in the pipeline was reportedly caused by galvanic corrosion of the boiler fuel system pipeline. According to base personnel, the pipeline and associated 4,000-gallon underground storage tank (UST) have never been tested. The UST was installed in 1985 and is constructed of asphalt-coated steel. The system has steel piping and no leak detection systems.

Based on information provided by the Base Environmental Coordinator, an initial site assessment was conducted by Enviropact in September 1991. Soil samples were obtained and the headspace screened using a field organic vapor analyzer (OVA) equipped with a flame ionization detector (FID). Results are included in Appendix A, Historical Data.

The corroded part of the fuel supply pipeline was replaced in September 1991. In addition, two 24-inch inside diameter (ID) by 48-inch perforated, corrugated metal pipes were installed to act as recovery sinks to remove any remaining free product from the groundwater at the site. The Base Operations and Support Services (BOSS) contracted with Environmental Recovery Group (ERG) for services to implement initial remedial action at the site, which included removal of approximately 800 gallons of free product, 2,000 gallons of contaminated groundwater, and 270 cubic yards of contaminated soil. The excavated area was reportedly backfilled with 4 feet of gravel, covered with a plastic Visqueen™ liner to act as a vapor barrier, then covered with an additional 2 feet of topsoil.

During the excavation, RSDI Environmental, Inc., conducted onsite soil screening. Soil borings were completed to an average depth of 4 feet below land surface (bls). From September 10, 1991, through September 24, 1991, soil samples were collected using a stainless-steel hand auger and were screened with an OVA equipped with an FID. Soil screening results and site sketches from the 1991 RSDI report are included as Appendix A, Historical Data.



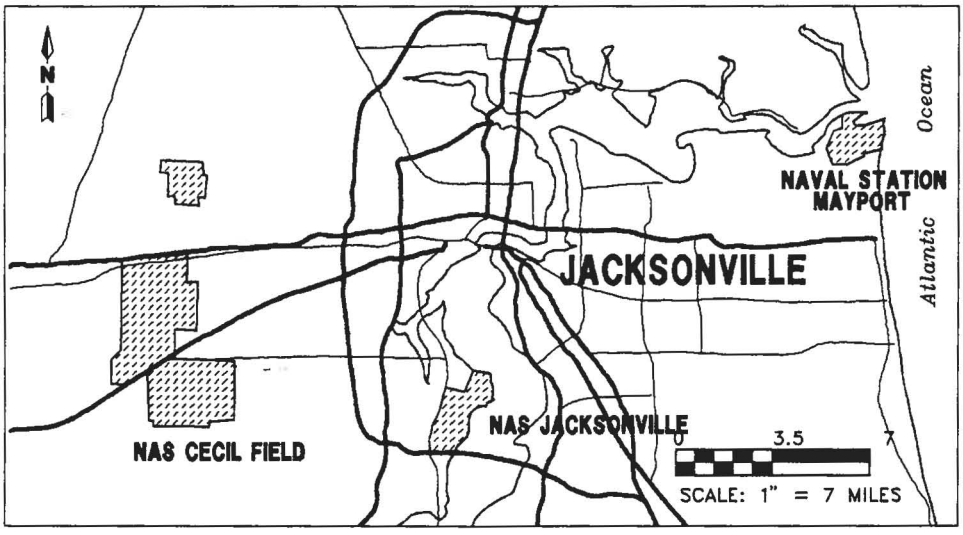
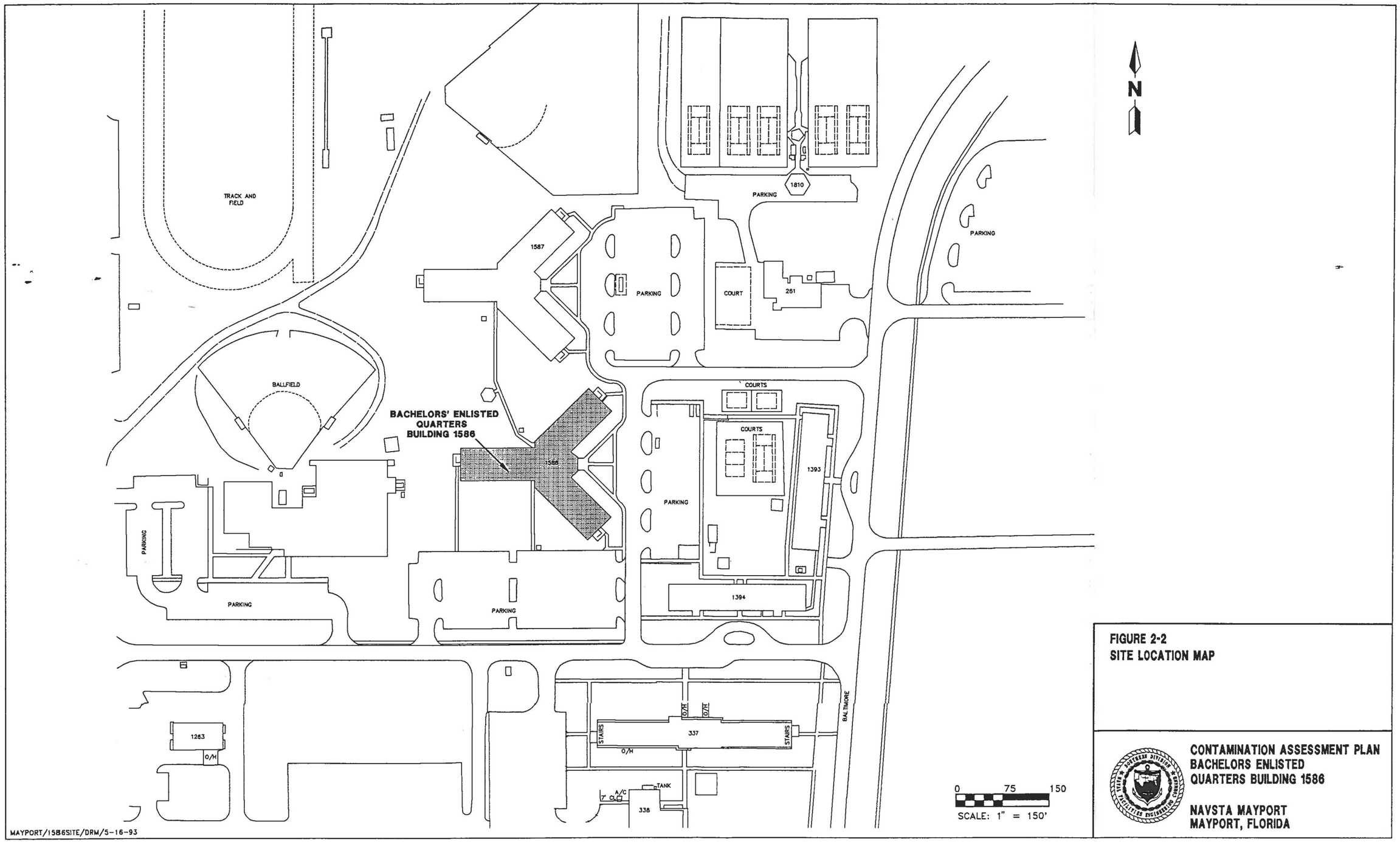


FIGURE 2-1
FACILITY LOCATION MAP

MAYPORT\MAYLOCAT.DWG\MAH\11-17-93

CONTAMINATION ASSESSMENT PLAN
BACHELORS ENLISTED QUARTERS BUILDING 1586

NAVSTA MAYPORT
MAYPORT, FLORIDA



MAYPORT/1586SITE/DRM/5-16-93

FIGURE 2-2
SITE LOCATION MAP

CONTAMINATION ASSESSMENT PLAN
BACHELORS ENLISTED
QUARTERS BUILDING 1586

NAVSTA MAYPORT
MAYPORT, FLORIDA

A preliminary contamination assessment (PCA) was performed by ABB-ES from April 12 through 14, 1993. The objectives of the PCA were to assess the effectiveness of the previous cleanup and the extent of petroleum contaminants, if any, in the soil and groundwater at the site. The TerraProbe℠ system was used to obtain groundwater and soil samples for field screening and laboratory analysis. A total of 21 soil samples from 7 soil borings were field screened using an OVA. A portable gas chromatograph (GC) was used to screen four saturated soil samples collected at three soil borings. Figure 2-3 shows the locations of the soil borings and the results of the OVA field analyses. OVA results are summarized in Table 2-1. Soil sample GC screening results are summarized in Table 2-2.

Three soil samples were collected from all TerraProbe℠ boring locations at the soil-water interface for GC analysis. A fourth sample was collected from 3 to 4 feet bls from MPT-1586-03 for GC screening to assess the extent of contaminants in soil above the water table downgradient from the excavated area. Soil samples were analyzed on a portable GC from April 12 through 14, 1993.

Benzene was detected in soil samples from MPT-1586-03 at 13 parts per billion (ppb) (2 to 3 feet bls) and 4 ppb (4 to 5 feet bls); MPT-1586-06 at 14 ppb (5 to 6 feet bls), and MPT-1586-07 at 18 ppb (5 to 6 feet bls). Toluene was detected in MPT-1586-03 at 2 ppb (4 to 5 feet bls). No other contaminants were detected in the remaining soil samples and no contaminants were detected in any groundwater samples screened for field analysis.

Seven groundwater samples were collected from monitoring and recovery wells for laboratory analyses of kerosene analytical group constituents as defined in Chapter 17-770, Florida Administrative Code (FAC). Groundwater contaminants identified by laboratory analysis during the PCA investigation include volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), naphthalenes, and total recoverable petroleum hydrocarbons (TRPHs). Contaminants detected in groundwater samples at concentrations that equal or exceed standards or target levels established by the Florida Department of Environmental Protection (FDEP) include total volatile organic aromatics (VOAs), total naphthalenes, PAHs, and TRPHs. Laboratory analysis of groundwater at one sampling location along the fuel pipeline approximately 15 to 20 feet from the source area indicates contaminant levels exceeding FDEP standards. Compounds detected by laboratory analysis of groundwater samples are listed in Table 2-3. Laboratory analytical results are presented in Figure 2-4.

A Technical Memorandum was submitted to the FDEP in July 1993. The findings, conclusions, and recommendations of the Technical Memorandum are summarized below.

- Soil encountered at TerraProbe℠ boring locations typically consisted of fine-grained silty clayey sand with shell fragments throughout.
- Groundwater beneath the site was encountered at approximately 5 to 6 feet bls.
- The apparent groundwater flow direction at the site is toward the northwest.
- Contaminants detected in saturated soil by field GC headspace analysis include benzene and toluene.

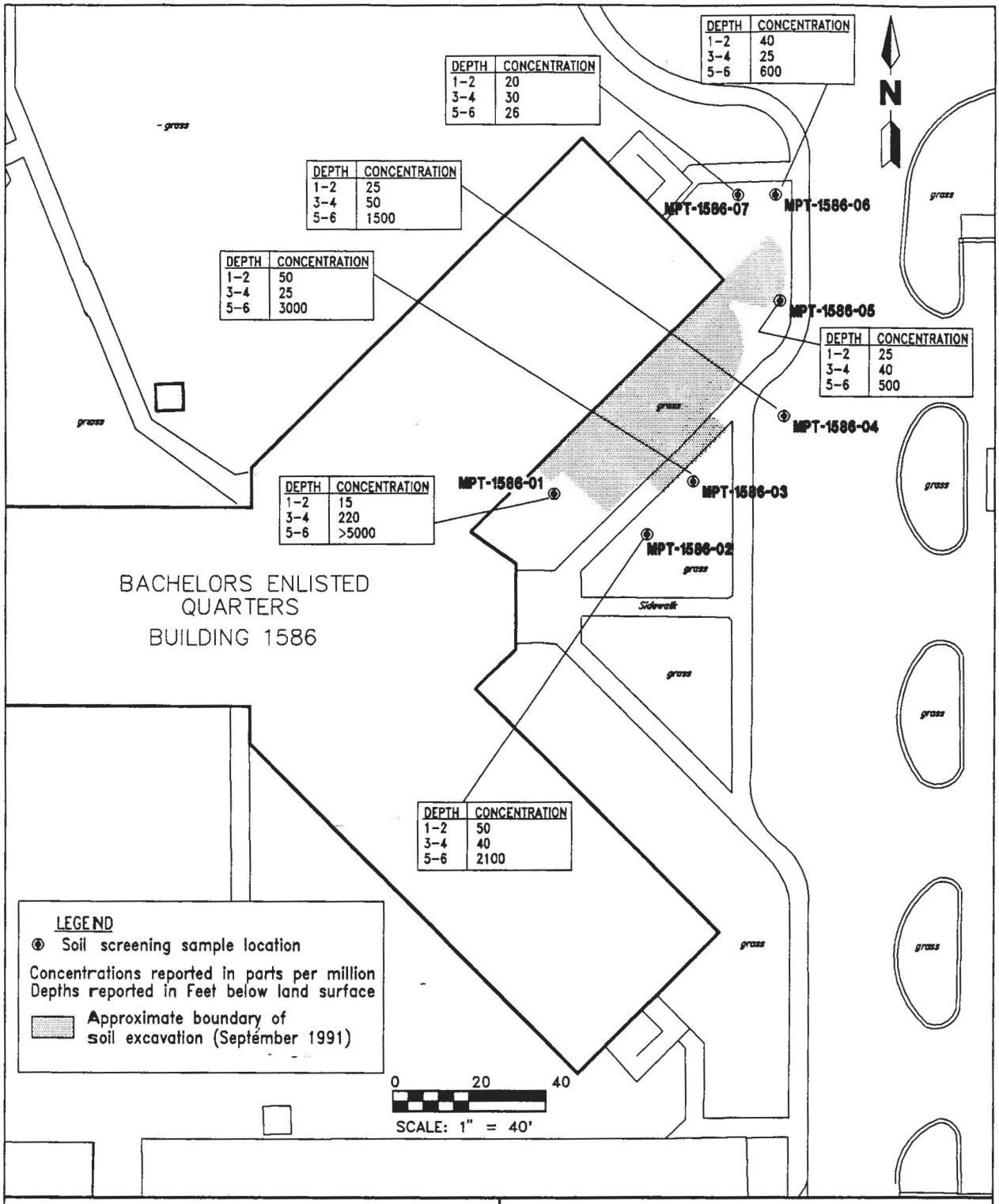


FIGURE 2-3
TERRAPROBE SAMPLE LOCATIONS AND OVA SOIL HEADSPACE RESULTS
APRIL 1993

BLDG1586/KGP /07/07/93

CONTAMINATION ASSESSMENT PLAN
BACHELORS ENLISTED QUARTERS BUILDING 1586

NAVSTA MAYPORT
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Table 2-1
Summary of Organic Vapor Analyzer (OVA) Soil Sample Results, April 12 through April 14, 1993

Contamination Assessment Plan
Bachelor Enlistment Quarters, Building 1586
NAVSTA, Mayport, Florida

TerraProbe℠ Boring Identification	Depth (feet bls)	Unfiltered[1] (ppm)	Comments
MPT-1586-01	1 to 2	15	
	3 to 4	220	
	5 to 6	>5,000	Strong fuel odor
MPT-1586-02	1 to 2	50	
	3 to 4	40	
	5 to 6	2,100	Strong fuel odor
MPT-1586-03	1 to 2	50	
	3 to 4	25	
	5 to 6	3,000	
MPT-1586-04	1 to 2	25	
	3 to 4	50	
	5 to 6	1,500	
MPT-1586-05	1 to 2	40	
	3 to 4	25	
	5 to 6	600	Slight fuel odor
MPT-1586-06	1 to 2	25	
	3 to 4	40	
	5 to 6	500	
MPT-1586-07	1 to 2	20	
	3 to 4	30	
	5 to 6	26	

[1] No methane filter used.

Notes: bls = below land surface.
ppm = parts per million.

Table 2-2
Compounds Detected by Gas Chromatograph (GC) Analysis of Soil Samples, April 12 through 14, 1993

Contamination Assessment Plan
Bachelor Enlistment Quarters, Building 1586
NAVSTA Mayport, Mayport, Florida

TerraProbe℠ Boring Identification	Depth (feet)	Benzene (ppb)	Toluene (ppb)
MPT-1586-03	2 to 3	13	ND
	4 to 5	4	2
MPT-1586-06	5 to 6	14	ND
MPT-1586-07	5 to 6	18	ND

Notes: ppb = parts per billion.
ND = not detected.

Table 2-3
Groundwater Sample Analytical Results, April 12 through 14, 1993

Contamination Assessment Plan
Bachelor Enlistment Quarters, Building 1586
NAVSTA Mayport, Mayport, Florida

Contaminant	Monitoring Point Number, MPT-1586-								Regulatory Standards Guidance Concentrations
	07	08	09	09D	10	11	REC1	REC2	
Volatile Organics (USEPA Method 601/602), ppb									
Benzene	ND	ND	ND	ND	88	ND	ND	ND	[1]1
Ethylbenzene	ND	ND	ND	ND	110	3	ND	ND	
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	
Xylenes	ND	ND	ND	ND	320	ND	ND	ND	
Total VOA	ND	ND	ND	ND	518	3	ND	ND	[1]50
Bromodichloromethane	ND	ND	2	2	ND	ND	ND	1	
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	[2]10
Chloroform	ND	3	ND	14	ND	ND	ND	17	
Methylene chloride	ND	6	ND	1	ND	ND	ND	1	[2]3,800
Total Naphthalenes (USEPA Method 625), ppb									
1-Methylnaphthalene	ND	ND	ND	ND	130	0.67J	ND	ND	
2-Methylnaphthalene	ND	ND	ND	ND	170	1.10J	ND	ND	
Naphthalene	ND	ND	ND	ND	140	0.90J	ND	ND	
Total Naphthalene	ND	ND	ND	ND	442.8	2.67	ND	ND	[1]100
Polynuclear Aromatic Hydrocarbons (625), ppm									
Acenaphthylene	ND	ND	ND	ND	2.8J	ND	ND	ND	[2]10
Acenaphthene	ND	ND	ND	ND	8.6	ND	ND	ND	[2]20
Fluorene	ND	ND	ND	ND	11	ND	ND	ND	[2]10
Phenanthrene	ND	ND	ND	ND	19	ND	ND	ND	[2]10
Pyrene	ND	ND	ND	ND	2.8J	ND	ND	ND	[2]10
Total Recoverable Petroleum Hydrocarbons (TRPHs), ppm									
TRPH	ND	ND	ND	ND	104	ND	ND	ND	[1]5
Metals, ppb									
Lead	ND	ND	ND	ND	ND	6	ND	ND	[3]50

[1] State target level (Florida Department of Environmental Protection [FDEP], Chapter 17-770, Florida Administrative Code [FAC]).
[2] Guidance concentration recommended by FDEP (February 1989).
[3] Florida primary drinking water standard (Chapter 17-550, FAC).

Notes: REC = recovery well.
USEPA = U.S. Environmental Protection Agency.
ND = not detected.
D = duplicate.
ppb = parts per billion.
ppm = parts per million.
J = estimated concentration.

Total VOA = total volatile organic aromatics; the sum of benzene, ethylbenzene, toluene, and xylenes.
Total naphthalenes = the sum of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.
TRPHs = total recoverable petroleum hydrocarbons.

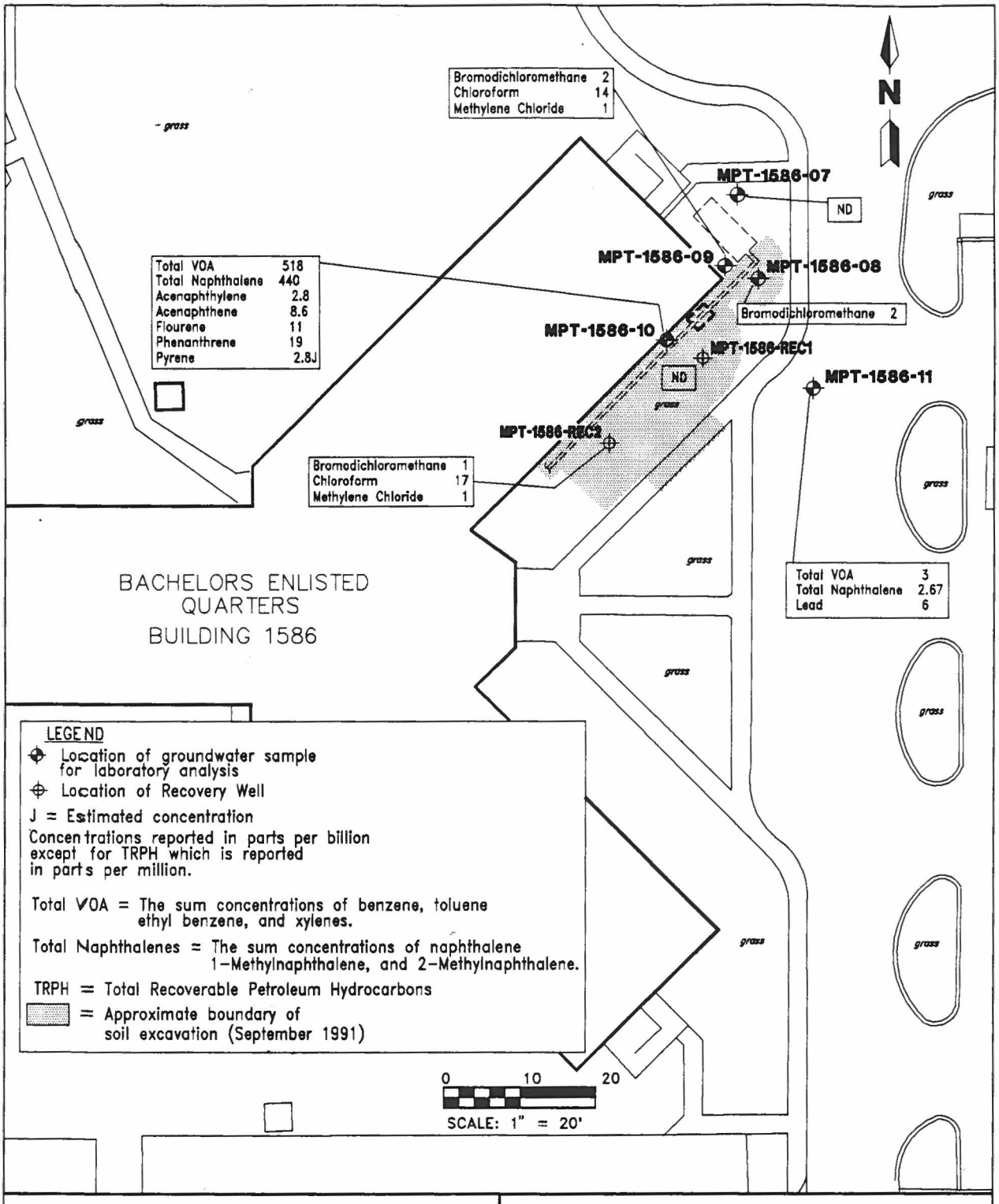

FIGURE 2-4
LABORATORY ANALYTICAL RESULTS OF GROUNDWATER SAMPLES, APRIL 1993

BLDG1586/KGP/07/07/93

CONTAMINATION ASSESSMENT PLAN
BACHELORS ENLISTED QUARTERS BUILDING 1586

NAVSTA MAYPORT
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- Free product was not encountered in any soil boring locations or recovery wells at the site.

- Groundwater contaminants identified during the PCA include volatile organics (BTEX), PAHs, naphthalenes, and TRPHs.

- Concentrations of contaminants in groundwater samples that equal or exceed standards or target levels established by the FDEP include total VOAs, total naphthalenes, PAHs, and TRPHs.

- The contamination at the BEQ site emanated from a broken fuel oil pipeline associated with the building. The pipeline has been repaired.

- Soil at the site is excessively contaminated, as defined in Chapter 17-770, FAC, to a depth of at least 6 feet bls along the boundary of the previously excavated area.

- Groundwater at one sampling location along the fuel pipeline (approximately 15 to 20 feet from the source area) was found to contain contaminant levels exceeding standards established in Chapter 17-770, FAC.

- In accordance with Chapter 17-770, FAC, a CA should be conducted to assess the extent of contaminated soil and groundwater at the site so that remedial action, if necessary, can be recommended to meet FDEP cleanup requirements.

2.3 PHYSIOGRAPHY.

2.3.1 Regional The general physiography of the Duval County area is discussed in Appendix B, Site Conditions.

2.3.2 Site Specific NAVSTA Mayport, located at the junction of the St. Johns River and the Atlantic Ocean, lies at the northern extent of a low, broad plain, the Eastern Valley (White, 1970). Relict beach ridges exist throughout the length and width of the valley. Elevations typically vary from 25 feet above mean sea level (msl) to less than 5 feet msl. The relict beach ridges can attain maximal elevations of 30 feet msl. At NAVSTA Mayport, both the broad lowland and a relict beach are represented. At the BEQ site, elevations generally range between 5 and 10 feet msl. Much of the site is sloped and paved or has buildings upon it. Because of the naturally occurring high areas and the sloped paved areas, surface drainage from the site is toward the storm drains located in the parking lot on the east side of Building 1586.

2.4 HYDROGEOLOGY.

2.4.1 Regional The regional hydrogeology of the Duval County area is discussed in Appendix B, Site Conditions.

2.4.2 Site Specific The Holocene to Pliocene undifferentiated deposits that comprise the surficial aquifer are of variable thicknesses in Duval County. These sediments will not be totally penetrated during the CA, but the literature

indicates these sediments are approximately 70 feet thick at NAVSTA Mayport. The sediments consist of unconsolidated sand, shell, and clay (Causey and Phelps, 1978). The principal water-bearing zone is a shell bed 35 to 55 feet bls (Franks, 1980).

The subsurface materials that were encountered during the PCA at the BEQ study area represent fill material, including sandy topsoil underlain by fill gravel and sand.

The unconfined surficial aquifer at NAVSTA Mayport is not used as a water supply source. Water in the aquifer contains high concentrations of dissolved solids and would not likely be used as a future source of potable water supply. During the PCA, the water table was generally encountered at the BEQ site at approximately 5 to 6 feet bls. Franks (1980) indicates that the water table at NAVSTA Mayport ranges in depth from approximately 2.5 to approximately 4.5 feet bls. Water table elevations from the U.S. Army Corps of Engineers preliminary assessment were reported to be approximately 5 feet below those recorded during the PCA investigation. Seasonal variations of water table depths at the site have not been determined, and water levels are expected to be influenced by tides.

3.0 POTABLE WELL SURVEY

ABB-ES conducted a survey of potable wells within a ½-mile radius of the site to assess the risk of contamination to potable water sources from petroleum constituents associated with the site. NAVSTA Mayport currently uses five onsite wells for potable and irrigation water. These wells are numbered N-1 through N-4 (potable water) and D-236 (irrigation water) (Figure 3-1).

The closest well, N-3, is upgradient of the site, and well D-236 is sidegradient to the south. Wells N-3 and D-236 have total depths and open hole intervals in the Floridan aquifer. Table 3-1 lists the construction and operation information concerning the wells. These wells are separated from the shallow sediments and the surficial aquifer by the sediments of the Hawthorn Group. The Hawthorn Group sediments, which act as a confining unit, are approximately 300 feet thick at the facility.

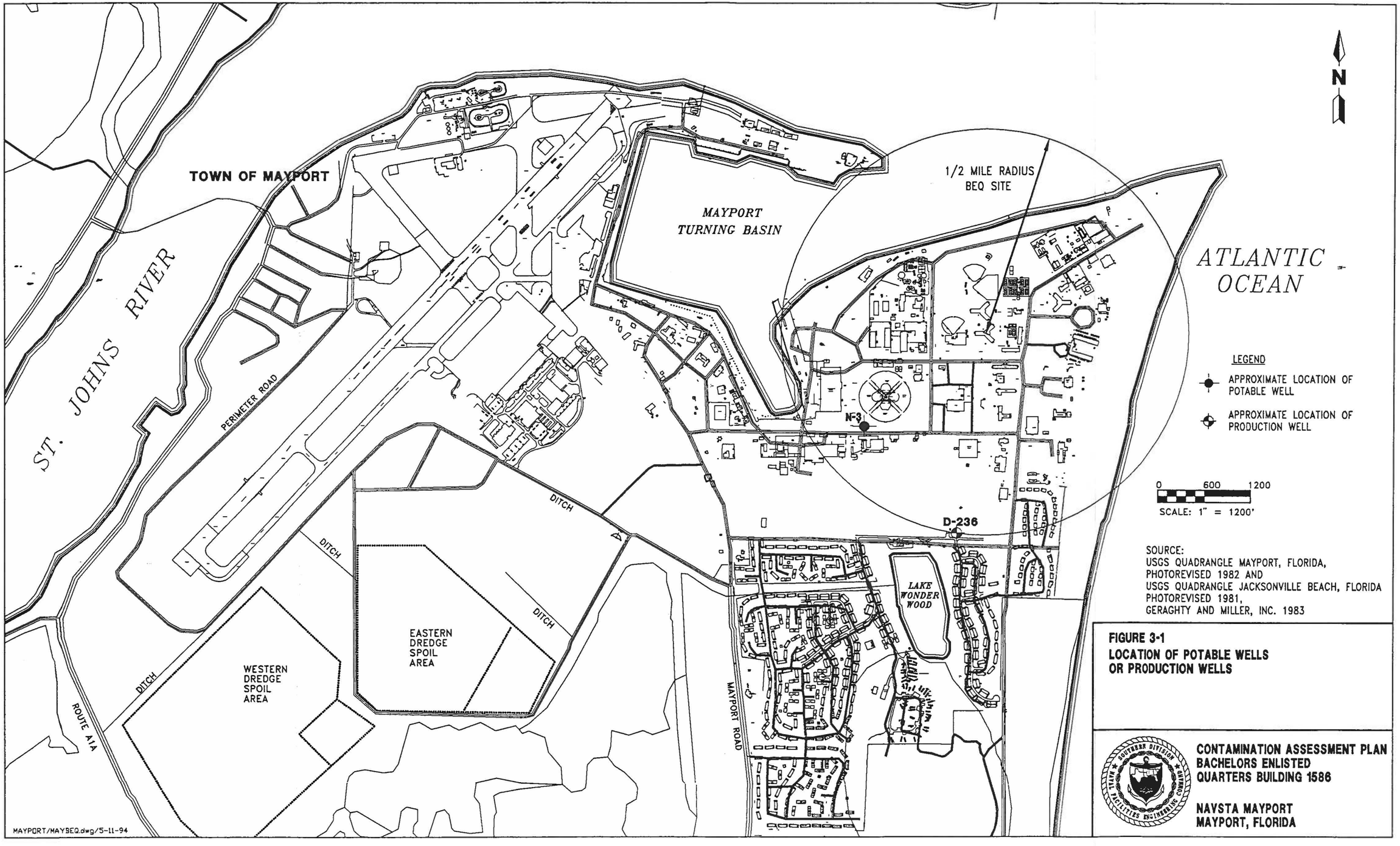
Table 3-1
Potable Well Data

Contamination Assessment Plan
Bachelor Enlisted Quarters, Building 1586
NAVSTA Mayport, Mayport, Florida

Well Designation	Owner	Date Installed	Casing Diameter (inches)	Approximate Surface Elevation (feet msl)	Total Depth (feet)	Interval Open to Formation (feet depth)	Status
N-3	U.S. Navy	1979	16	10	1,000	433 to 1,000	In use
D-236	U.S. Navy	1962	6	9	814	440 to 814	Used for irrigation

Source: Geraghty & Miller, 1983.

Note: msl = above mean sea level.



SOURCE:
USGS QUADRANGLE MAYPORT, FLORIDA,
PHOTOREVISED 1982 AND
USGS QUADRANGLE JACKSONVILLE BEACH, FLORIDA
PHOTOREVISED 1981,
GERAGHTY AND MILLER, INC. 1983

FIGURE 3-1
LOCATION OF POTABLE WELLS OR PRODUCTION WELLS

CONTAMINATION ASSESSMENT PLAN
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NAVSTA MAYPORT
MAYPORT, FLORIDA

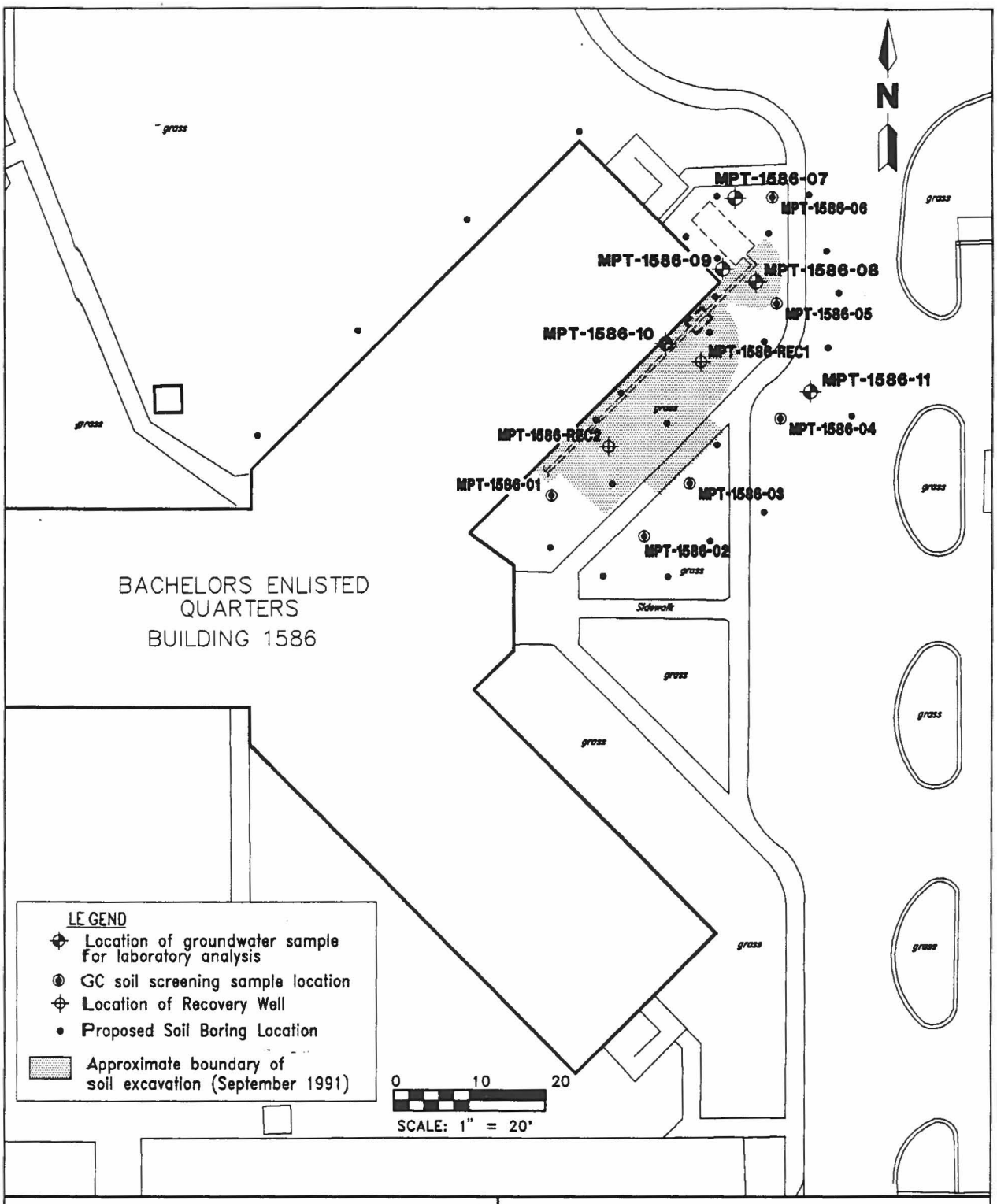

FIGURE 4-1
PROPOSED SOIL BORING LOCATIONS

CONTAMINATION ASSESSMENT PLAN
BACHELORS ENLISTED
QUARTERS BUILDING 1586

NAVSTA MAYPORT
MAYPORT, FLORIDA

TANKS/MAYPORT/BLDG1586/KGP/07/07/93

4.0 PROPOSED ASSESSMENT PLAN

4.1 FIELD INVESTIGATION. To assess the extent of soil contamination, the CA will include manually advancing approximately 25 soil borings. Soil samples will be collected at the surface and every 2 feet vertically thereafter until total depth is reached. The maximum depth for the boring will depend on the groundwater depth. Based on information gathered during the Preliminary Contamination Assessment Report (PCAR), the estimated depth to groundwater is less than 5 feet bls. OVA headspace analyses will be performed using a FID for each sample in accordance with Chapter 17-770, FAC. The screening of soil samples from these borings is required to estimate the horizontal and vertical extent of the soil contamination and provide information for placement of groundwater monitoring wells. Proposed soil boring locations are shown on Figure 4-1.

Approximately 10 shallow monitoring wells will be installed in selected soil borings to characterize and assess the horizontal extent of groundwater contamination. One deep well will be installed to assess the vertical extent of groundwater contamination. Soil samples will be collected at intervals of 2 feet vertically until total depth is reached. Soil samples collected above the water table, and where FDEP regulatory criteria apply below the water table, will undergo OVA headspace analysis. Soil samples collected below the water table with a headspace measurement less than 1 part per million (ppm) will be screened with a portable GC for comparison with petroleum standards. Proposed monitoring well locations are shown on Figure 4-2.

The shallow monitoring wells will be installed to a total depth of approximately 13 feet bls and will be constructed of 2-inch ID, schedule 40, flush-threaded, polyvinyl chloride (PVC) screen and casing. Screen length will be 10 feet with a slotted screen opening of 0.010 inch. At least 2 feet of screen will be placed above the water table to accommodate seasonal fluctuations of the water table. The screen will be surrounded with a quartz sand filter pack of 20/30 size (or an acceptable equivalent) to at least 1 foot above the top of the screen. A 1-foot bentonite seal will be placed above the filter pack. The remaining annulus will be grouted to land surface with neat cement.

The deep monitoring well will be installed by advancing a 10-inch borehole to a depth approximately 10 feet below the base of the contaminant plume at the site. Six-inch PVC surface casing will be set into the borehole. The annular space surrounding the surface casing will be filled with neat cement grout to land surface. A 5⅞-inch borehole will be advanced inside the surface casing to a depth approximately 10 feet below the bottom of the surface casing and the monitoring well will be set inside the surface casing. The well will be constructed of 2-inch, schedule 40 PVC riser with 5 feet of 2-inch ID, schedule 40 PVC screen at the bottom. The screen will have 0.010-inch slot size openings. The annular space around the well screen will be filter packed with 20/30 grade sand to a depth of approximately 2 feet above the top of the screen. Two feet of fine sand (30/65 grade) will be placed above the filter pack. The remainder of the annular space will be filled with a neat cement grout to land surface.

A locking, watertight cap will be installed on each well. The monitoring wells will be finished below grade in a subsurface traffic-bearing vault and protected with a metal manway. Upon completion, all newly installed monitoring wells will

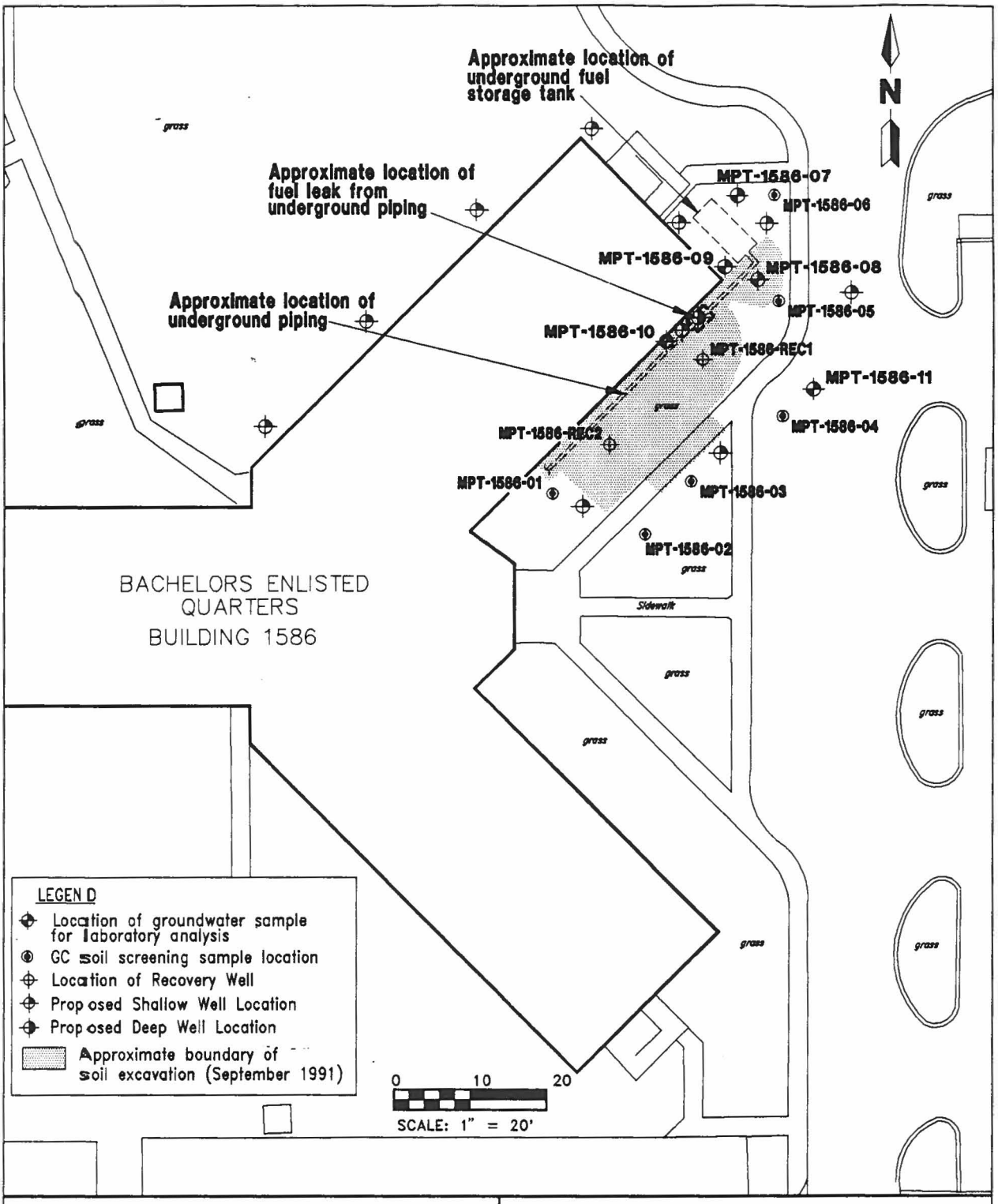

FIGURE 4-2
PROPOSED MONITORING WELL LOCATIONS

TANKS/MAYPORT/BLDG1586/KGP/07/07/93

CONTAMINATION ASSESSMENT PLAN
BACHELORS ENLISTED QUARTERS BUILDING 1586

NAVSTA MAYPORT
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be developed by pumping until the purged water is clear and relatively free of sediment to assure a good hydraulic connection with the surrounding aquifer.

Typical shallow and deep monitoring well construction details are illustrated in Appendix C, - Monitoring Well Construction Details (Figures C-1 and C-2, respectively).

Monitoring wells and soil sample descriptions will be used to develop data on the hydraulic properties of the surficial aquifer. Detailed information including lithologic descriptions, sample intervals, and other pertinent data will be graphically displayed on boring logs. These data will be included in the Contamination Assessment Report (CAR). Soil will be classified in accordance with the Unified Soil Classification System.

A Florida-licensed professional surveyor will be contracted to conduct a location and elevation survey of the horizontal and vertical coordinates for each of the monitoring wells. This information will be incorporated into either the U.S. Coastal and Geodetic Survey (USCGS) 1927 North American Datum or base coordinate grid system as appropriate.

Following installation of the monitoring wells as described above, groundwater samples will be collected from each monitoring well and analyzed for kerosene analytical group compounds according to USEPA Method 601 (volatile organic halocarbons including ethylene dibromide [EDB]), USEPA Method 602 (VOAs, including MTBE), USEPA Method 610 (PAHs), USEPA Method 418.1 (TRPHs), and USEPA Method 239.2 (lead) in accordance with Chapter 17-770, FAC. Quality assurance/quality control (QA/QC) samples will be collected and analyzed as prescribed in ABB-ES' approved Comprehensive Quality Assurance Plan.

After monitoring well installation and concurrent with the groundwater sampling event, water level measurements will be obtained from the wells. Water level measurements will be used to establish the direction of groundwater flow and provide data on fluctuations in the water table.

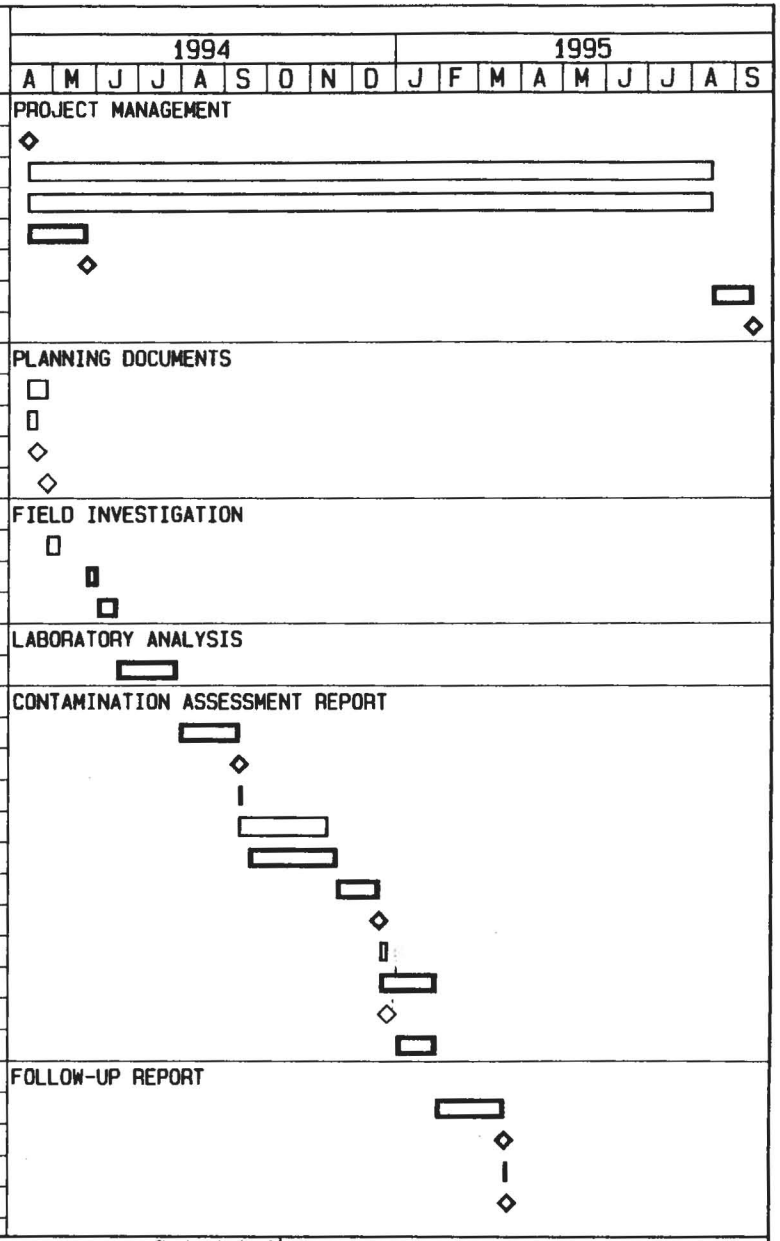
4.2 **PREPARATION OF CONTAMINATION ASSESSMENT REPORT**. Upon completion of the field investigation and receipt of the groundwater and soil sample analytical results, a CAR will be prepared and submitted to SOUTHNAVFACENGCOM and NAVSTA Mayport for review and approval. The report will discuss site background information, site conditions, investigative methodologies, findings, and recommendations for the NAVSTA Mayport BEQ site. Site location maps, locations of soil borings and monitoring wells, and investigative summary maps will be included with the report. Recommendations will be made in the CAR as to the need for any follow-up investigations. If follow-up investigations are necessary, additional reports will be prepared. An addendum to the CAR will be prepared to address comments, if required.

5.0 SCHEDULE

A projected schedule to complete the CA field investigation program at the NAVSTA Mayport BEQ site is approximately 4 weeks. The schedule includes mobilization, drilling, sampling, surveying, and demobilization. The field investigative work is scheduled to begin the week of May 20, 1994. Upon completion of the field investigation, approximately 3 weeks will be required for receipt of the groundwater sample analytical results. A Gantt Chart outlining the project schedule is presented as Figure 5-1.

Figure 5-1 Naval Station Mayport BEQ Project Schedule

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
NOTICE TO PROCEED - CTO 077 MOD	14APR94		0
DAY-TO-DAY MANAGEMENT	14APR94	16AUG95	341
TFMR REVIEW & PREPARATION	14APR94	16AUG95	341
SUBCONTRACT PREP	14APR94	25MAY94	30
SUBCONTRACT AWARD		25MAY94	0
PROJECT CLOSEOUT	17AUG95	14SEP95	20
CTO NO. 077 COMPLETE		14SEP95	0
CAP PREPARATION	14APR94	27APR94	10
HASP PREPARATION	14APR94	20APR94	10
SUBMIT HASP TO NAVY		20APR94	0
SUBMIT CAP TO NAVY		27APR94	0
SOIL INVESTIGATION AND MOB PREP	28APR94	6MAY94	7
WELL INSTALLATION	26MAY94	2JUN94	5
GROUNDWATER SAMPLING	3JUN94	16JUN94	10
LABORATORY ANALYSIS (SUBCONTRACT)	17JUN94	29JUL94	30
NARRATIVE CAR PREPARATION	1AUG94	12SEP94	30
SUBMIT NARRATIVE CAR TO NAVY		12SEP94	0
NAVY REVIEW OF NARRATIVE CAR	13SEP94	14SEP94	2
ABB SUPPORT OF CAR NARRATIVE REVIEW ACTIVITIES	13SEP94	14NOV94	45
FDEP REVIEW OF NARRATIVE CAR	20SEP94	21NOV94	45
AMENDMENT #1 CAR PREPARATION	22NOV94	21DEC94	20
SUBMIT AMENDMENT #1 CAR TO NAVY		21DEC94	0
NAVY REVIEW AMENDMENT #1 CAR	23DEC94	27DEC94	2
ABB SUPPORT OF CAR REVIEW ACTIVITIES	23DEC94	31JAN95	26
NAVY SUBMITS AMENDMENT #1 CAR TO FDEP		27DEC94	0
FDEP REVIEW OF AMENDMENT #1 CAR	4JAN95	31JAN95	20
NARRATIVE RAP PREPARATION	1FEB95	21MAR95	35
SUBMIT NARRATIVE RAP TO NAVY		21MAR95	0
NAVY REVIEW RAP	22MAR95	23MAR95	2
NAVY SUBMITS RAP TO FDEP		23MAR95	0



Plot Date 23MAR94
Data Date 6JUL93
Project Start 6JUL93
Project Finish 14SEP95

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

B015 A077

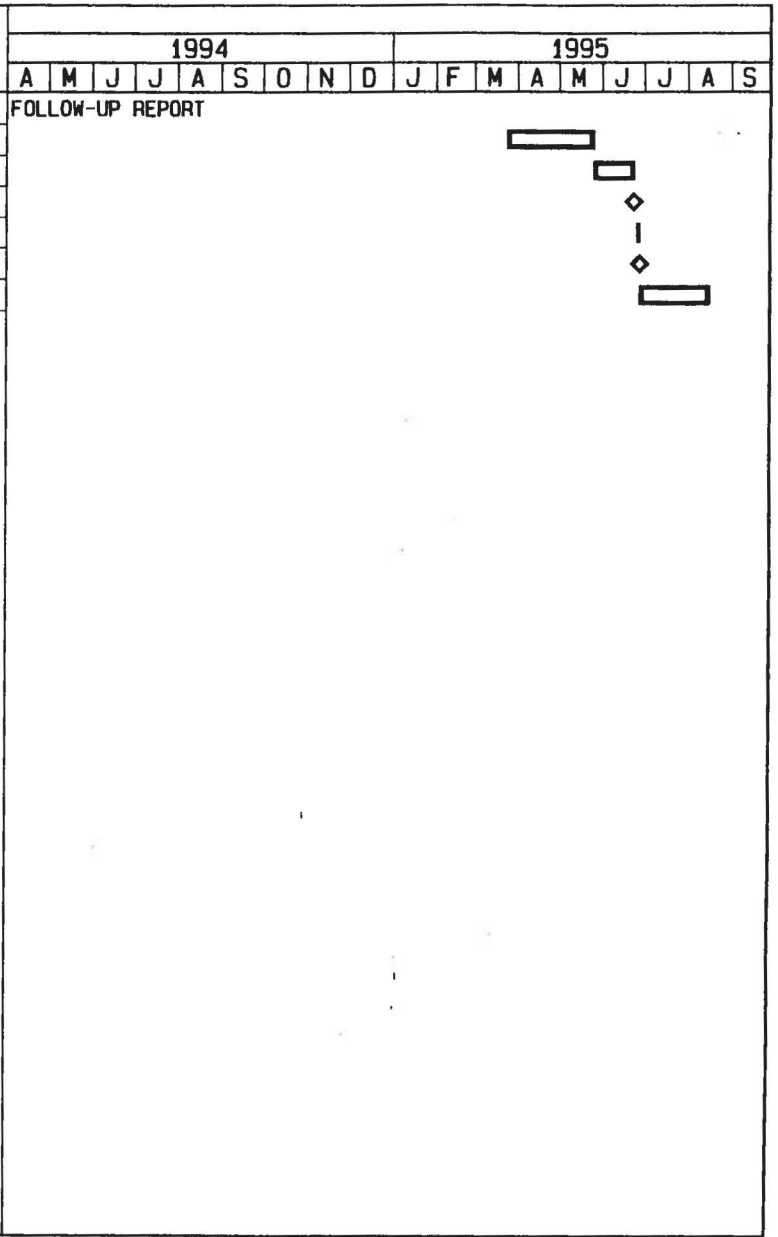
Sheet 1 of 2

NAVY CLEAN
SOW CTO NO. 077 MODIFICATION
BASELINE PROJECT SCHEDULE

ABB ENVIRONMENTAL SERVICES, INC.

Date	Revision	Checked	Approved

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
FDEP REVIEW RAP	24MAR95	25MAY95	45
RAP ADDENDUM PREP	26MAY95	23JUN95	20
SUBMIT RAP ADDENDUM TO NAVY		23JUN95	0
NAVY REVIEW RAP ADDENDUM	26JUN95	27JUN95	2
NAVY SUBMITS RAP TO FDEP		27JUN95	0
FDEP REVIEWS RAP ADDENDUM	28JUN95	16AUG95	35



Plot Date 23MAR94
Data Date 6JUL93
Project Start 6JUL93
Project Finish 14SEP95

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

B015 A077

Sheet 2 of 2

NAVY CLEAN
SOW CTO NO. 077 MODIFICATION
BASELINE PROJECT SCHEDULE

ABB ENVIRONMENTAL SERVICES, INC.

Date	Revision	Checked	Approved

REFERENCES

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Spechler, R.M., 1982, Generalized Configuration of the Top of the Limestone Unit of the Lower Part of the Surficial Aquifer, Duval County, Florida: U.S. Geological Survey Water-Resources Investigations Open-File Report 82-336, 1 sheet.

White, W. A., 1970, The Geomorphology of the Florida Peninsula: Florida Bureau of Geology Bulletin No. 51, 164 p.

APPENDIX A

HISTORICAL DATA

APPENDIX B

SITE CONDITIONS

Physiography

A persistent scarp exists in the eastern part of Florida. The longitudinal axis of the scarp roughly parallels the present coastline. East of the scarp is a broad flat valley that White (1970) calls the Eastern Valley. The length of Eastern Valley also parallels the coastline and exists along much of eastern Florida. In north Florida, the valley extends eastward to the Atlantic Coastal Ridge and westward to the Duval Upland. Relict beach ridges exist throughout the length and width of the valley. Elevations vary from about 30 feet to less than 5 feet above mean sea level. It is likely that the valley represents a relict beach ridge plain.

Naval Station Mayport is located in the northern part of the Eastern Valley, near the western border of the Atlantic Coastal Ridge. The facility is located at the junction of the St. Johns River and the Atlantic Ocean. Physiographic features at the facility include the broad, low plain of the Eastern Valley, relict beach ridges of the Valley or the Atlantic Coastal Ridge, and tidal flats and plains associated with the St. Johns River. Elevations at the facility vary from approximately 5 feet to greater than 26 feet above mean sea level. These features and the topography play a significant role in determining the configuration of the potentiometric surface of the unconfined aquifer. The potentiometric surface roughly follows the contours of the land surface.

Regional Hydrogeology

NAVSTA Mayport is underlain by two water-bearing units. These include the shallow aquifer and the Floridan aquifer system. Franks (1980) states that the surficial (or unconfined) aquifer at NAVSTA Mayport has a thickness of approximately 70 feet. It consists of unconsolidated sand, shell, and clay. Fairchild (1972) considers this surficial aquifer to be part of the shallow-aquifer system in Duval County. According to Fairchild (1972), the thickness of the unconsolidated sand is as much as 200 feet in some parts of Duval County. Also included in the system is the Hawthorn Group, increasing the thickness of the system to greater than 400 feet at NAVSTA Mayport. Much of sediments of the Hawthorn Group act as a hydraulic barrier, separating the shallow aquifer system from the deeper Floridan aquifer system.

Franks (1980) separates the surficial aquifer into an upper zone and a lower zone. The zones are separated by beds of lower permeability. These beds generally consist of a greenish-gray clay with minor amounts of shell fragments and sand.

The upper zone generally extends from land surface to 25 to 50 feet below land surface (bls). The sediments of the upper zone are generally unconsolidated, fine-grained, well-sorted sand and shell beds. Thin lenses of clay may be locally present. The shell beds generally have a higher water yield than does the sand.

The lower zone (locally called the shallow-rock zone) consists of sand, shell, sandy clay and limestone. This zone is typically encountered from approximately 50 to greater than 200 feet bls. The limestone is the major water-yielding zone in the shallow aquifer system. At NAVSTA Mayport, this limestone has been encountered at approximately 85 feet bls (Franks, 1980).

The upper section of the surficial aquifer is recharged by local rainfall and discharges to area streams or percolates downward to the lower sections. The depth to the surficial aquifer water table at the BEQ site is typically about 5 feet bls.

Water quality data (Franks, 1980) indicate that there is both fresh and brackish water at the NAVSTA Mayport facility. Specific conductance in the fresh water zone ranged from 630 micromhos per centimeter (μmhos/cm) to 1,350 μmhos/cm. Specific conductance in the brackish water zone ranged from 12,800 μmhos/cm to 15,500 μmhos/cm. The interface between the fresh and brackish zones ranges from 35 to 44 feet bls. Total dissolved solids in the upper zone water table aquifer range from 570 to 840 milligrams per liter (mg/ℓ). This zone can be used as a potable water source and has total dissolved solids of less than 10,000 mg/ℓ. Therefore, the water is considered Class G-II groundwater as defined in Chapter 17-3, Florida Administrative Code (FAC), *Water Quality Standards*. Waters of the brackish water zone are considered to be Class G-III groundwater.

The Floridan aquifer system is the principal source of freshwater in northeast Florida. It is comprised of, in ascending order, the Oldsmar, Lake City, and Avon Park Limestones, the Ocala Group, and a few discontinuous, thin, water-bearing zones in the lower part of the Hawthorn Group, some of which are not present in all areas.

The Ocala Group is a homogeneous sequence of permeable, hydraulically connected, marine limestones containing a few hard, less transmissive dolomite or limestone beds that restrict the vertical movement of water. The Avon Park Limestone consists almost entirely of hard, relatively impermeable, dolomite confining beds and soft permeable limestone and dolomite water-bearing zones.

The top of the Floridan aquifer occurs at a depth of about 300 feet bls at NAVSTA Mayport. Leve (1966) reports that NAVSTA Mayport receives water from the Florida aquifer. Leve states that productions wells at the facility are approximately 1,000 feet deep and produce an average of 1.5 million gallons per day of water. Groundwater flow in the Floridan aquifer in eastern Duval County is to the east and northeast (Leve, 1966).

APPENDIX C

MONITORING WELL CONSTRUCTION DETAILS

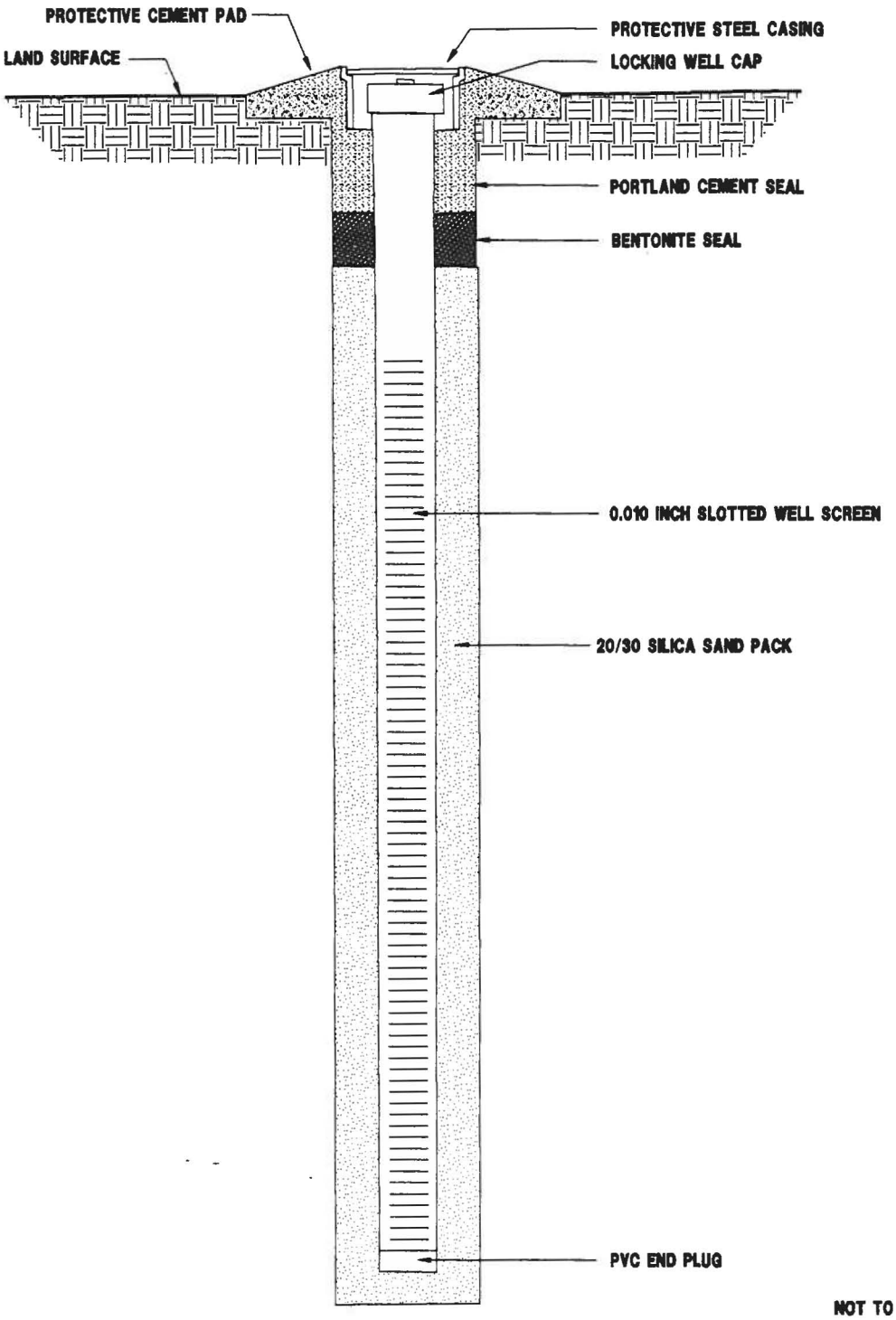

FIGURE C-1
TYPICAL SHALLOW MONITORING WELL CONSTRUCTION DETAIL

MAYPORT\MAYB_LOCAT.DWG\MAH\11-17-93

CONTAMINATION ASSESSMENT PLAN
BACHELORS ENLISTED QUARTERS BUILDING 1586

NAVSTA MAYPORT
MAYPORT, FLORIDA

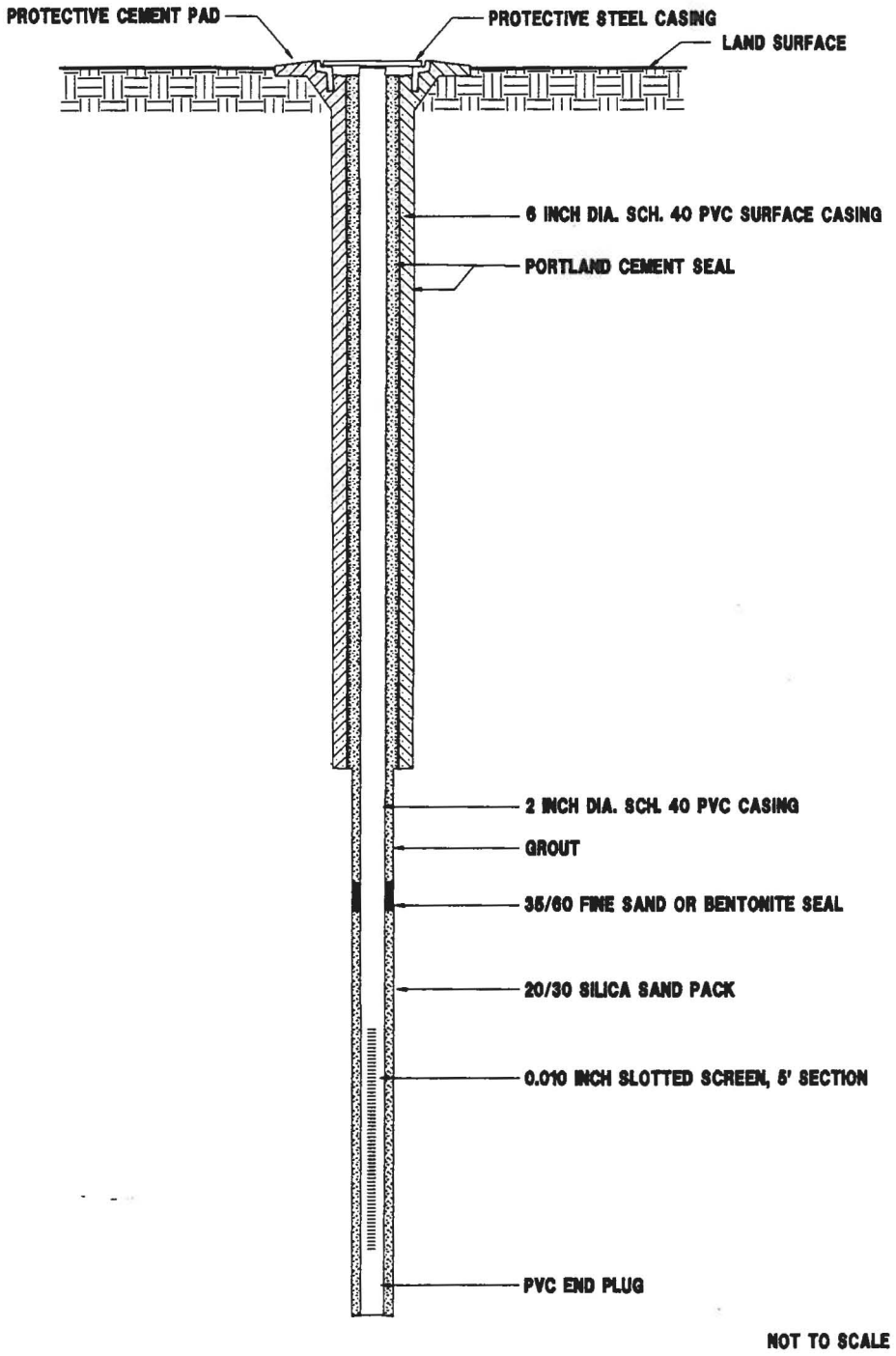

FIGURE C-2
TYPICAL DEEP MONITORING WELL CONSTRUCTION DETAIL

MAYPORT\WELLS.dwg\MAH\11-17-93

CONTAMINATION ASSESSMENT PLAN
BACHELORS ENLISTED QUARTERS BUILDING 1586

NAVSTA MAYPORT
MAYPORT, FLORIDA