CONTAMINATION ASSESSMENT WORK PLAN SITES 2029, 3021, AND 5052NSB KINGS BAY GA
11/1/1993
ABB ENVIRONMENTAL SERVICES, INC

(6)

CONTAMINATION ASSESSMENT WORKPLAN

SITES 2029, 3021, AND 5052
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

Contract Task Order (CTO) No. 104

Contract No. N62467-89-D-0317

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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, especially petroleum products. Hazardous wastes stored in USTs were already regulated under the Resource Conservation and Recovery Act (RCRA) of 1976. 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 (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 the Georgia Department of Natural Resources (GDNR) Chapter 391-3-15, Rules of GDNR Environmental Protection Division (*Underground Storage Tank Management*) regulations on petroleum contamination in Georgia's environment as a result of spills or leaking tanks or piping.

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
ASTs	aboveground storage tanks
bls	below land surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CA	Contamination Assessment
CAP	Corrective Action Plan
CAW	Contamination Assessment Workplan
CNO	Chief of Naval Operations
CompQAP	Comprehensive Quality Assurance Plan
CTO	Contract Task Order
GC	gas chromatograph
GDNR	Georgia Department of Natural Resources
HASP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
ID	inside diameter
mg/kg	milligrams per kilogram
mg/ℓ	milligrams per liter
MOP	Monitoring Only Plan
μg/kg	micrograms per kilogram
NSB	Naval Submarine Base
OVA	organic vapor analyzer
PAH	polynuclear aromatic hydrocarbon
ppm	parts per million
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
SWDA	Solid Waste Disposal Act of 1965
TRPH	total recoverable petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
USTs	underground storage tanks
VOC	volatile organic compound

1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), has been contracted by Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) to prepare a Contamination Assessment Workplan (CAW) for the Diesel Fuel Marine Facility (Site 2029), the Electrical Substation No. 1 (Site 3021), and the Electrical Substation No. 3 (Site 5052), at Naval Submarine Base (NSB), Kings Bay, Georgia. The CAW outlines a field investigation and sampling program that will assess the source(s) of petroleum contamination in the vicinity of the three sites and evaluate the horizontal and vertical extent of petroleum contamination detected. The following report presents the site locations and develops a rationale for the proposed field investigation to be implemented at each site under the contamination assessment (CA).

2.0 BACKGROUND

2.1 SITE DESCRIPTION. NSB Kings Bay is located in the southeast corner of Georgia, approximately 8 miles north of the Georgia-Florida border. It covers a total area of approximately 16,168 acres. The closest community to the facility is the city of St. Marys, which is located on the southern boundary of the base. NSB Kings Bay is located in Camden County. The county has a population of 12,800, primarily residents of St. Marys, Kingsland, and Woodbine. Kings Bay, which borders the base on the east, empties into Cumberland Sound and eventually the Atlantic Ocean.

The U.S. Army began developing NSB Kings Bay property as a military ocean terminal in the early 1950's. The terminal was designed to store and ship ammunition and explosives in the event of a national emergency. It was called Kings Bay Army Terminal until April 1965, when the terminal was placed under the jurisdiction of the newly organized Military Traffic Management and Terminal Service. The terminal then became officially known as the U.S. Army Military Ocean Terminal, Kings Bay (MOTKI). MOTKI was selected as the east coast basing site for its fleet ballistic missile submarine support facility under Navy management in 1978. In 1979, the base became known as the Naval Submarine Base, Kings Bay.

2.2 SITE HISTORY.

Site 2029. The Diesel Fuel Marine Facility is the location of two 220,000-gallon aboveground storage tanks (ASTs) (see Figure 2-1). The ASTs contain diesel fuel which is used to support marine operations at NSB Kings Bay. The tanks, which were installed in 1988, are constructed of bare steel. Each tank is surrounded by a concrete-lined earthen berm capable of containing the entire tank contents. Each berm area has a catch basin and drain line for the removal of rainwater and diesel-contaminated water drawn off the tank. The drain line releases its effluent into an oil-water separator.

On March 5, 1993, contaminated soil was discovered during the repair of a valve in the drain line of Tank 2. Further investigation revealed that the drain pipe had not been properly grouted into the catch basin wall during construction. The cracks in the basin wall around the drainpipe allowed diesel-contaminated effluent to leak and contaminate the surrounding soil and groundwater. The catch basin may have been leaking for as long as 4 years before the leak was detected. The leak has been repaired. The drain line was pressure tested and no evidence of leaks was found. Soil tests for total recoverable petroleum hydrocarbons (TRPH) indicated contamination ranging from greater than 500 parts per million (ppm) to greater than 6,000 ppm in the leak area.

Site 3021. The Electrical Substation No. 1 is the location of three 15,000-gallon underground storage tanks (USTs) (see Figure 2-2). The USTs contain diesel fuel used to supply fuel for the substation generators. The USTs, installed in 1984, are constructed of fiberglass and have flow shut-off overfill protection.

In 1988, fuel contamination was discovered near the piping system of the tanks. The tanks and piping were tightness tested and found to be uncompromised. The

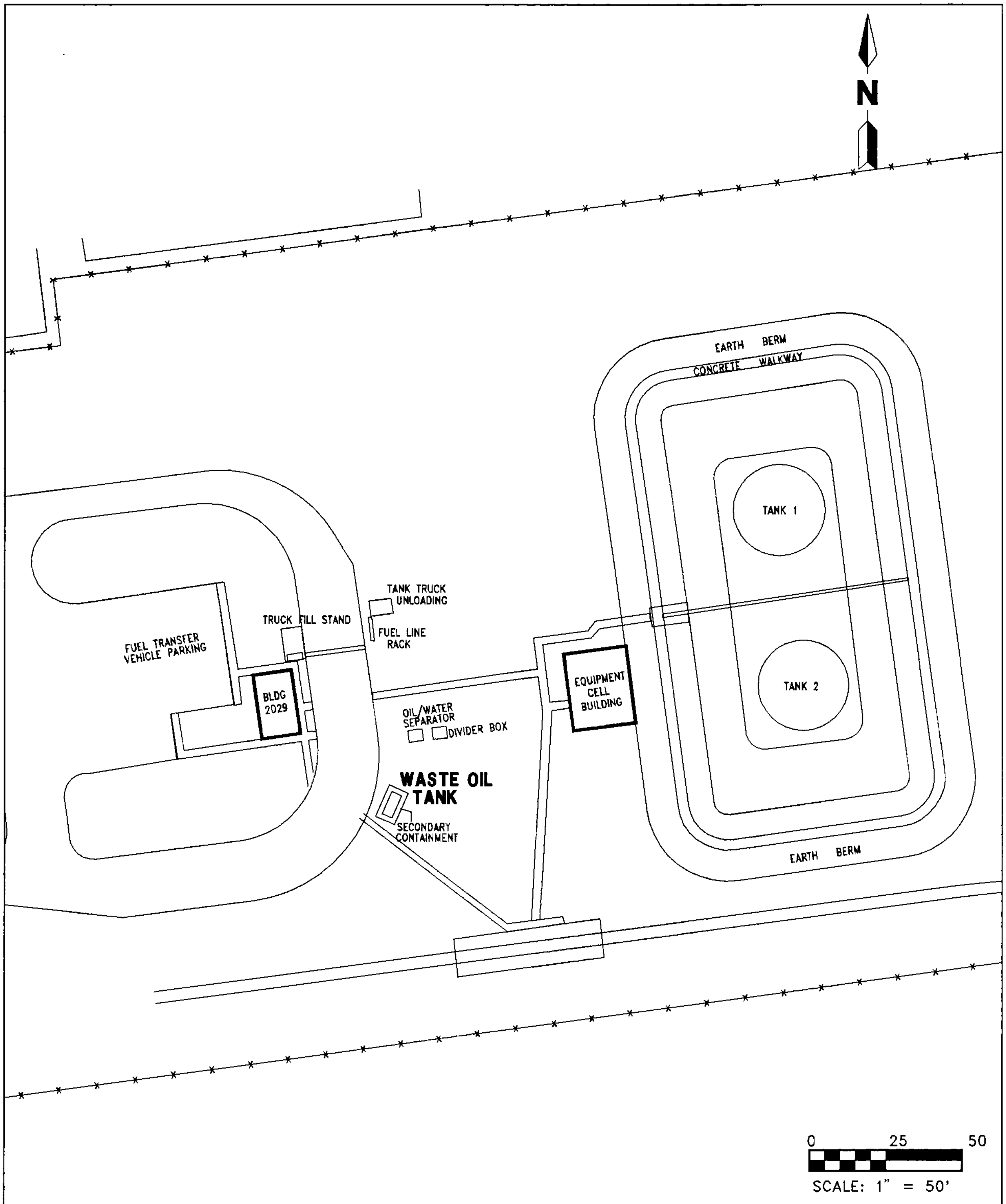

FIGURE 2-1
SITE MAP
SITE 2029

CONTAMINATION ASSESSMENT WORKPLAN
SITES 2029, 3021, AND 5052

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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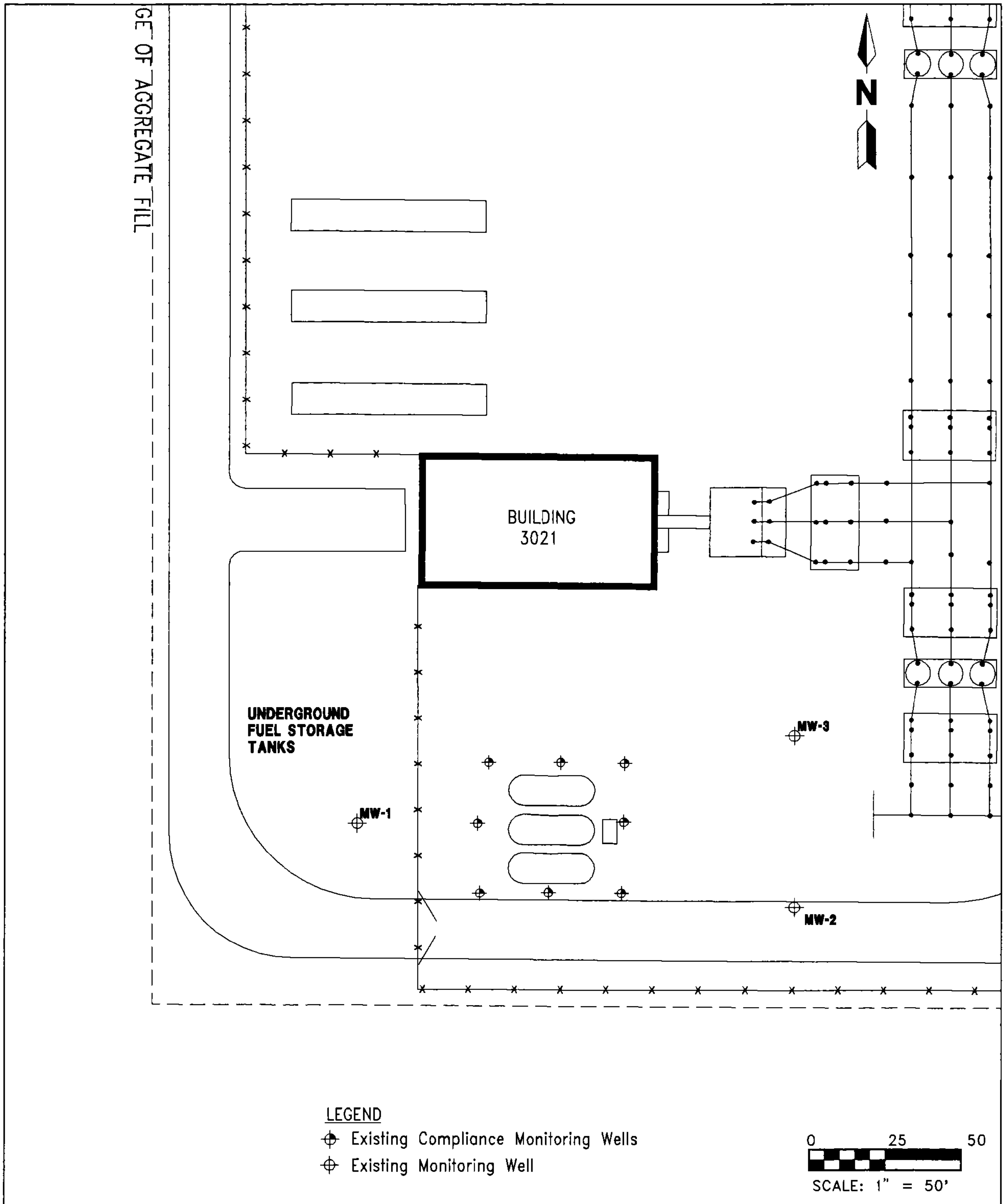

FIGURE 2-2
SITE MAP
SITE 3021

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source of the fuel contamination is not known. It has been speculated by base personnel that the source of contamination was spillage, possibly during construction occurring at the site.

In September 1992, an initial site characterization of the area was completed. The investigation consisted of a soil vapor survey, installation of three monitoring wells, and soil and groundwater laboratory analyses.

The soil vapor survey performed at the site indicates that petroleum soil contamination does exist at the site. Volatile organic compound (VOC) concentrations of greater than 50 ppm were detected in 25 of 77 soil samples. The soil contamination appears to be concentrated in the southern and eastern parts of the site. Fifteen soil samples with high VOC concentrations were sent for laboratory analyses.

Laboratory analyses confirmed the presence of soil contamination. TRPH concentrations greater than 0.2 milligrams per kilogram (mg/kg) were detected in 11 of the soil samples analyzed. Polynuclear aromatic hydrocarbon (PAH) concentrations of greater than 330 micrograms per kilogram (μg/kg) were detected in seven of the soil samples analyzed.

Analyses of groundwater samples collected from the three monitoring wells installed during the initial site characterization indicated that petroleum groundwater contamination was present at the site and apparently migrating southeast, in the direction of groundwater flow.

Site 5052. The Electrical Substation No. 3 is the location of four 20,000-gallon USTs (see Figure 2-3). The USTs contain diesel fuel used for the generators located at the substation. The USTs, installed in 1984, are constructed of fiberglass and have flow shut-off overfill protection. Eight leak detection monitoring wells were also installed at the site.

In 1991, fuel was discovered to be leaking from the piping system of the tanks. Both the tanks and the piping were tightness tested. The piping was found to be leaking and was subsequently repaired. Free product, ranging in thickness from 0.3 foot to 2.58 feet, was discovered in six of the site's eight leak detection wells.

An initial site characterization investigation was completed for the site in September 1992. The investigation included the installation of 102 soil borings and 3 monitoring wells. Soil vapor analysis revealed relatively low levels (less than 50 ppm) of VOC soil contamination at the site. Laboratory analysis of 10 selected soil samples revealed significant TRPH contamination (greater than 50 ppm) in only 1 soil sample. The concentration of TRPH in that soil sample was 1,180 ppm, possibly indicating a spill area. Laboratory analyses of groundwater samples taken from the three monitoring wells revealed that concentrations of both TRPH and PAH were below detection limits.

2.3 HYDROGEOLOGY. The general hydrogeology in the Kings Bay area is discussed in the regional hydrogeology section. The hydrogeologic conditions that exist beneath the Kings Bay sites are presented in the site-specific hydrogeology section.

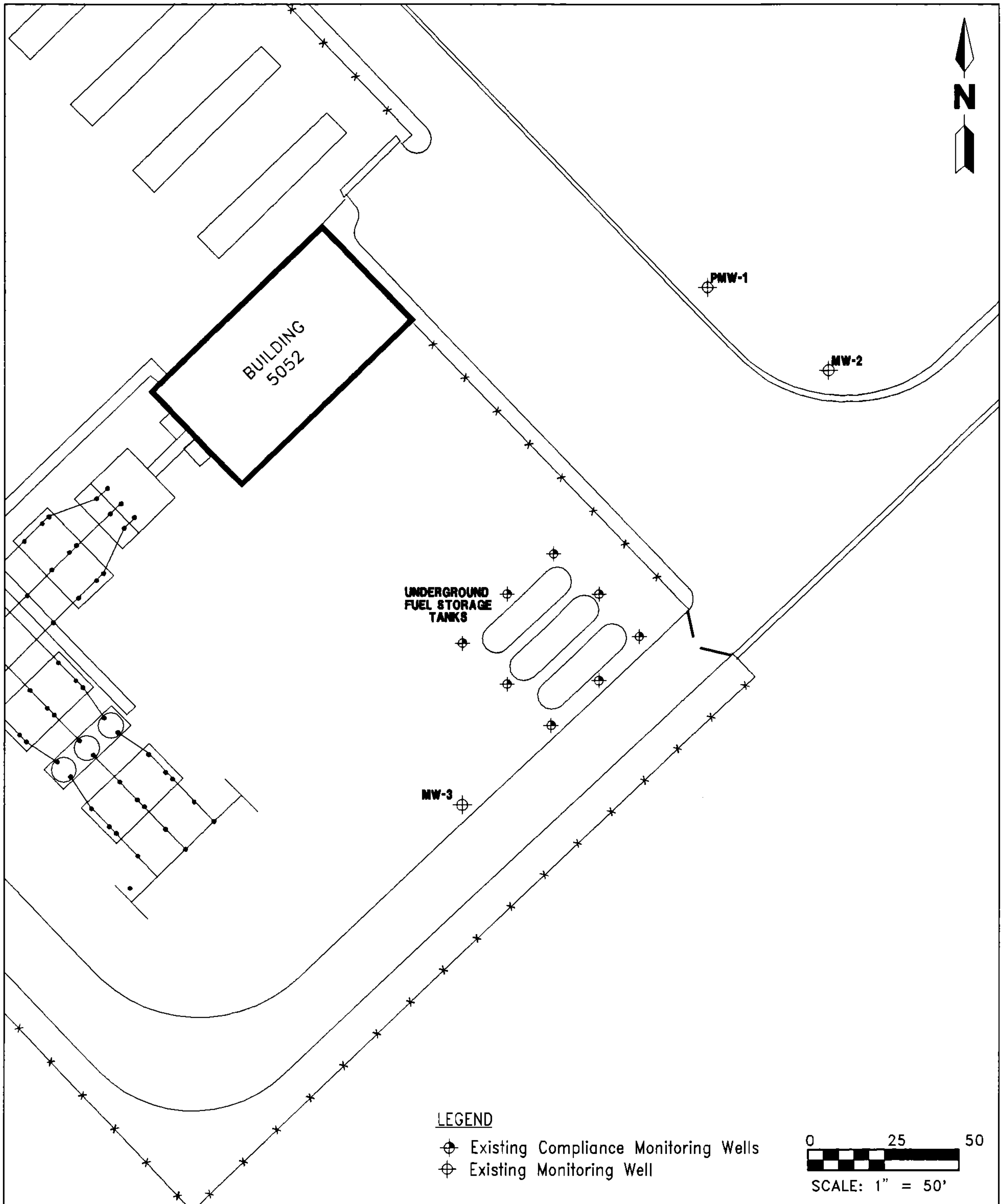

FIGURE 2-3
SITE MAP
SITE 5052

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2.3.1 Regional The Kings Bay region is located within the Coastal Plain physiographic province along the Georgia coast line. Seven different depositional shorelines exist around Kings Bay as a result of sea level fluctuations during the Quaternary period. The shoreline complexes have not been accurately dated, but are of approximate Pleistocene and Holocene age (C.C. Johnson, 1985). The Kings Bay area is underlain by three water bearing zones. These zones include an unconfined (surficial) aquifer system, an upper confining unit, and the Floridan aquifer system.

The surficial aquifer ranges in thickness from approximately 6 to 90 feet and consists of post-Miocene age unconsolidated fine- to very coarse-grained, well-sorted sand. Layers of poorly sorted sand, clayey silty sand, and at depth, argillaceous limestone are interbedded with these well-sorted sand beds. The primary source of recharge to the surficial aquifer is infiltration from precipitation. Water movement is laterally downgradient with discharge to streams, ponds, and other surface water bodies. Evaporation and transpiration, as well as downward migration to lower aquifers, account for some water loss. Water levels in the surficial aquifer respond rapidly to rainfall. Seasonal variations correspond to variations in rainfall and evapotranspiration. Water levels may fluctuate seasonally by 15 to 20 feet in areas of high topographic relief and high permeability aquifer material. In flat-lying areas where low-permeability material is present, seasonal fluctuations are commonly less than 10 feet. The aquifer functions as a source of recharge for the Floridan aquifer system by downward leakage through the secondary aquifer in areas where the water table in the aquifer is above the potentiometric surface in the Floridan aquifer system. Where the head gradient between the surficial aquifer and the Floridan aquifer system is in the opposite direction, the surficial aquifer receives recharge from the Floridan aquifer system.

The upper confining unit, beginning at approximately 90 feet bls, ranges from 380 to 530 feet thick. This confining unit separates the surficial aquifer from the Floridan aquifer system and includes not only extremely low-permeability clay, but also moderately permeable sand beds. The confining unit is a regional formation, the Hawthorn Formation of late and middle Miocene age, present from Florida to South Carolina. Over most of the region, the unit consists of middle Miocene age, interbedded sand, silt, clay, and low-permeability sandy clay beds. Groundwater yield in the confining unit is highly variable, and it is not considered a principal source of water (ABB-ES, 1993).

The Floridan aquifer system is composed of upper and lower permeable zones, termed the Upper Floridan and the Lower Floridan aquifers, respectively. This unit is used for drinking water. In southeast Georgia and northeast Florida, the aquifer system contains cavities, cavernous zones, and solution channels tens of feet in the vertical and horizontal dimensions. Primarily, these zones are found in the Upper Floridan, but the Lower Floridan contains some of the largest in its Fernandina zone. Most of these zones are oriented horizontally, enhancing lateral permeabilities. However, some solution channels have formed along probable zones of weakness caused by high-angle, nearly vertical fractures and faults. In extreme southeast Georgia and northeast Florida, permeable zones within the entire Floridan aquifer system are locally connected by these nearly vertical conduits. Faults are believed to be present in the Floridan aquifer system along the coast in extreme southeast Georgia and northeast Florida; however, none were indicated on regional structure maps (ABB-ES, 1993).

The Upper Floridan aquifer consists primarily of late Eocene Ocala Limestone and equivalents. The Ocala Limestone is a very fossiliferous limestone having high effective porosity and permeability, especially the upper portion. Migration of groundwater along bedding planes, joints, fractures, and other zones of weakness have developed secondary permeability making the Ocala Limestone extremely permeable. The Upper Floridan is composed of two permeable zones in the area of southeast Georgia. These units are designated the upper and lower water-bearing zones. The upper water-bearing zone ranges in thickness from 75 to 150 feet and consists of late Eocene age limestone that is very fossiliferous and permeable. The lower water-bearing zone ranges in thickness from 15 to 110 feet and consists of middle to late Eocene age dolomitic limestone that is recrystallized and less permeable than the upper water-bearing zone. Hydraulic characteristics of the Floridan aquifer system are primarily known for the Upper Floridan aquifer. Regional groundwater flow in the Upper Floridan is primarily easterly with southeasterly and northeasterly components. Because of the aquifer's heterogeneity, transmissivity ranges from nearly zero near the aquifer's updip extent (east-central Georgia and southern South Carolina) to approximately 1 million feet squared per day in the thick carbonate sequence in southern Georgia. Because the Upper Floridan is so prolific, water supply wells in southeast Georgia generally do not tap other water-bearing units beneath the Upper Floridan (ABB-ES, 1993).

The Lower Floridan aquifer consists primarily of middle to lower Eocene carbonate rocks that are less fossiliferous and more dolomitic than the Upper Floridan aquifer. The permeability of the unit is primarily secondary, developed along bedding planes and other zones of weakness. In the southeastern Georgia area, the Lower Floridan aquifer includes a water-bearing zone designated the Fernandina permeable zone. The zone consists of Paleocene and late Cretaceous age recrystallized limestone and dolomite that is extremely permeable. The middle semi-confining unit, which lies between the Upper and Lower Floridan aquifers, consists of middle Eocene dense limestone and dolomite that is recrystallized and of low permeability.

2.3.2 Site Specific Surface runoff infiltrates into the permeable sands of the surficial aquifer. The surficial aquifer is a relatively homogeneous, water table aquifer and consists mainly of layers of fine-grained sands interbedded with silty and/or clayey fine-grained sands and some medium-grained sands. No strata have been identified that would act as a confining layer or barrier to contaminant migration. The depth to water averages approximately 3 to 4 feet below land surface (bls) at Site 2029, Diesel Fuel Marine Facility; depth to water averages approximately 8 to 9 feet bls at Site 3021, Electrical Substation No. 1; and depth to water averages approximately 13 to 14 feet bls at Site 5052, Electrical Substation No. 3. Groundwater flows laterally and is interpreted to ultimately discharge to surface water. Groundwater levels at one site will be measured over a 24-hour period to evaluate the potential for tidal influence in the aquifer at the site.

3.0 INVENTORY OF PROXIMATE POTABLE WATER WELLS

Groundwater in the surficial aquifer is used primarily for irrigation. The public water supply for the NSB Kings Bay and surrounding towns and urban areas comes from the Floridan aquifer system. ABB-ES, with the cooperation of the Environmental Coordinator at NAS Kings Bay, will conduct an inventory of identified potable wells within a 3-mile radius of the base.

4.0 PROPOSED ASSESSMENT PLAN

4.1 FIELD INVESTIGATION. The purpose of the CA field investigation is to assess the vertical and horizontal extent of petroleum contamination and to assess the source(s) of contamination. The CA will require the collection of soil boring samples using push probe technology, the installation of permanent groundwater monitoring wells, field screening and laboratory analyses of soil samples, and the collection and laboratory analyses of groundwater samples from the monitoring wells at each site.

The following is the cleanup criteria as required by the Georgia Department of Natural Resources, Environmental Protection Division:

Parameter	Target Concentration	
	Soil (mg/kg)	Groundwater (mg/ℓ)
Total BTEX	20	13
TRPH	100	--

Notes: mg/kg = milligrams per kilogram.
mg/ℓ = milligrams per liter.
BTEX = the sum of benzene, toluene, ethylbenzene, and xylenes.

Prior to the beginning of the field investigation, a start-up meeting will be held onsite at NSB Kings Bay. All personnel associated with the investigation will review the scope of work in the CAW and Health and Safety Plan (HASP). Scheduling, logistics, and special precautions will be discussed.

Soil borings will be advanced using the TerraProbe^{SM} where possible. Hand augers will be used to advance those soil borings whose locations are inaccessible to the Terraprobe^{SM}. Soil samples will be collected starting at a depth of 0 to 1 foot bls and will continue at 1 foot intervals until the water table is reached. All soil samples will be screened by organic vapor analyzer (OVA) headspace techniques to quantify VOCs. A minimum of one soil sample (per boring) showing the highest VOC concentration will be sent to a laboratory for TRPH analysis by U.S. Environmental Protection Agency (USEPA) Method 9071 and BTEX by USEPA Method 8020. Appropriate quality assurance and quality control (QA/QC) samples will be collected as well.

Permanent monitoring wells will be installed in selected soil borings at each site to characterize the groundwater contaminant plume and assess its horizontal extent. The shallow monitoring wells will be constructed of 2-inch inside diameter (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 and tidal fluctuations of the water table. The screen will be surrounded with a 6/20 quartz sand filter pack to a minimum of 0.5 foot above the top of the screen as determined by the depth to water in each well. A minimum of 0.5-foot bentonite seal will be placed above the filter pack. The remaining annulus will be grouted to land surface with neat cement.

A deep monitoring well will be installed at each site to assess the vertical extent of the groundwater contaminant plume. The deep monitoring well will be constructed of 2-inch ID, schedule 40, flush-threaded, PVC screen and casing. Screen length will be 5 feet with a slotted screen opening of 0.010 inch. The monitoring well will be placed within a 6-inch PVC surface casing, installed to prevent vertical dispersion of contaminants. The depth of the surface casing will be determined by the vertical extent of contaminants being measured on the OVA. The screen will be surrounded with a 6/20 quartz sand filter pack to at least 2 feet above the top of the screen. A 2-foot fine-grained sand (30/65 grade) seal will be placed immediately above the filter pack. The remaining annulus will be grouted to land surface with neat cement. The annular space surrounding the surface casing will also be grouted to land surface with neat cement.

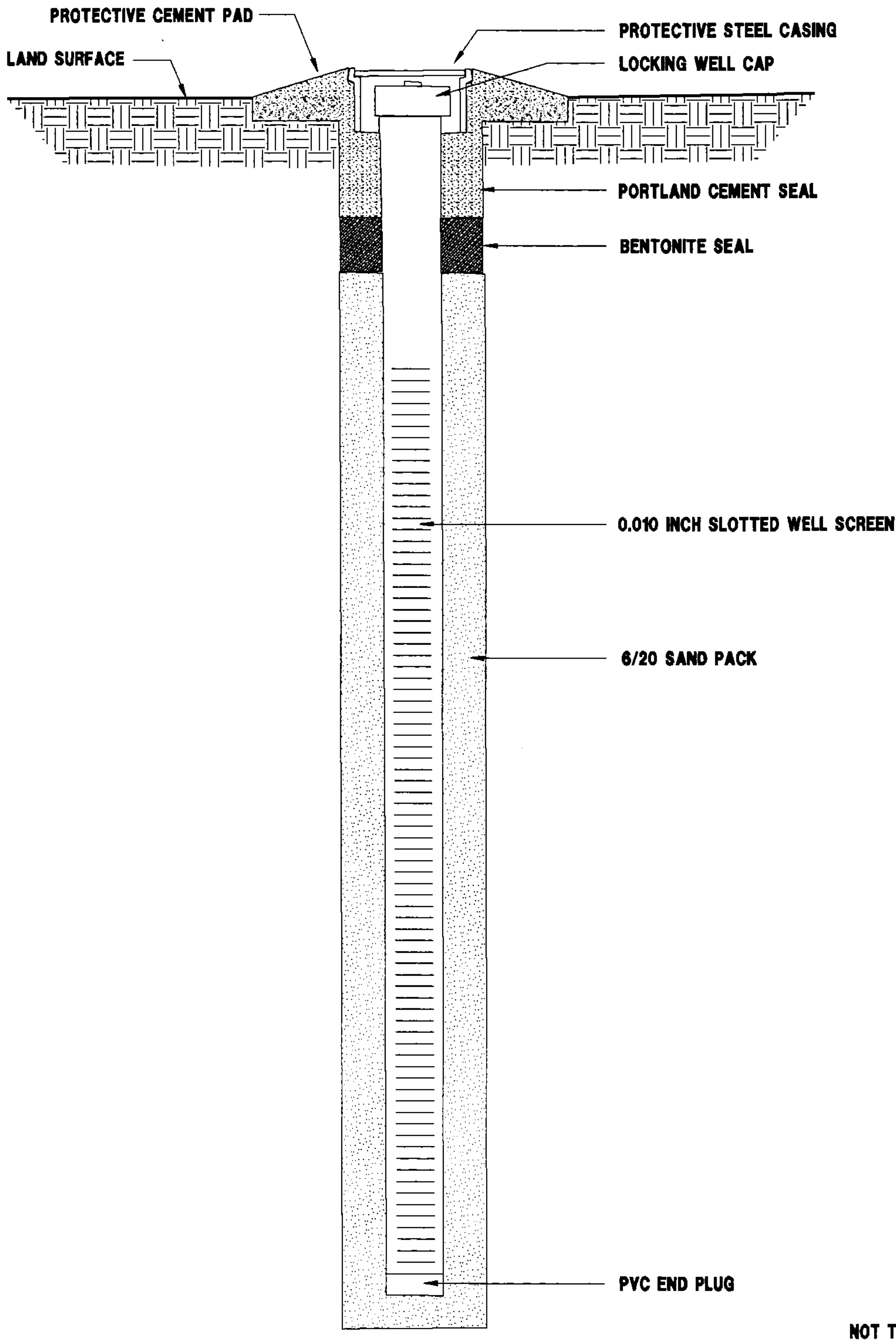
A locking, watertight cap will be installed on each well. All monitoring wells except those in traffic areas will be finished above grade. Monitoring wells located in traffic areas will be finished below grade in a subsurface traffic-bearing vault and protected with a metal manhole assembly. Upon completion, all newly installed monitoring wells will be developed by pumping until the purged water is clear and relatively free of sediment to provide a good hydraulic connection with the surrounding aquifer.

Diagrams of typical shallow and deep monitoring well construction are illustrated in Figures 4-1 and 4-2, respectively. Detailed information of monitoring well construction, lithologic descriptions, split-spoon samples, and other pertinent data will be graphically displayed in boring logs in the Corrective Action Plan (CAP). Soil will be classified in accordance with the Unified Soil Classification System.

Groundwater samples will be collected from all monitoring wells at each site that do not contain free product and analyzed by USEPA Method 602 for BTEX, PAH analysis by USEPA Method 610, and TRPH analysis by USEPA Method 418.1. Appropriate QA/QC samples, including a decontamination water source blank, will also be collected and analyzed. Groundwater samples will be collected with Teflon™ bailers and shipped via overnight carrier to a USEPA-approved analytical laboratory. The analytical sampling program will comply with the ABB-ES Comprehensive Quality Assurance Plan (CompQAP).

Aquifer tests will be conducted to estimate the hydraulic properties of the water-table aquifer. Rising-head slug tests will be performed on a minimum of two monitoring wells from each site to collect data for calculating hydraulic conductivity. Hydraulic conductivity will be calculated using the computer program AQTESOLV™ (Geraghty & Miller, Inc. 1989). The AQTESOLV™ program calculates hydraulic conductivity from slug test data following the methods of Bouwer and Rice (1976) for partially penetrating wells screened in unconfined aquifers.

A Georgia-licensed professional surveyor will survey the horizontal and vertical coordinates of each monitoring well for incorporation into either the U.S. Geological Survey (USGS) North American Datum of 1927 or base coordinate grid system.



NOT TO SCALE

FIGURE 4-1
TYPICAL SHALLOW MONITORING WELL CONSTRUCTION DETAIL

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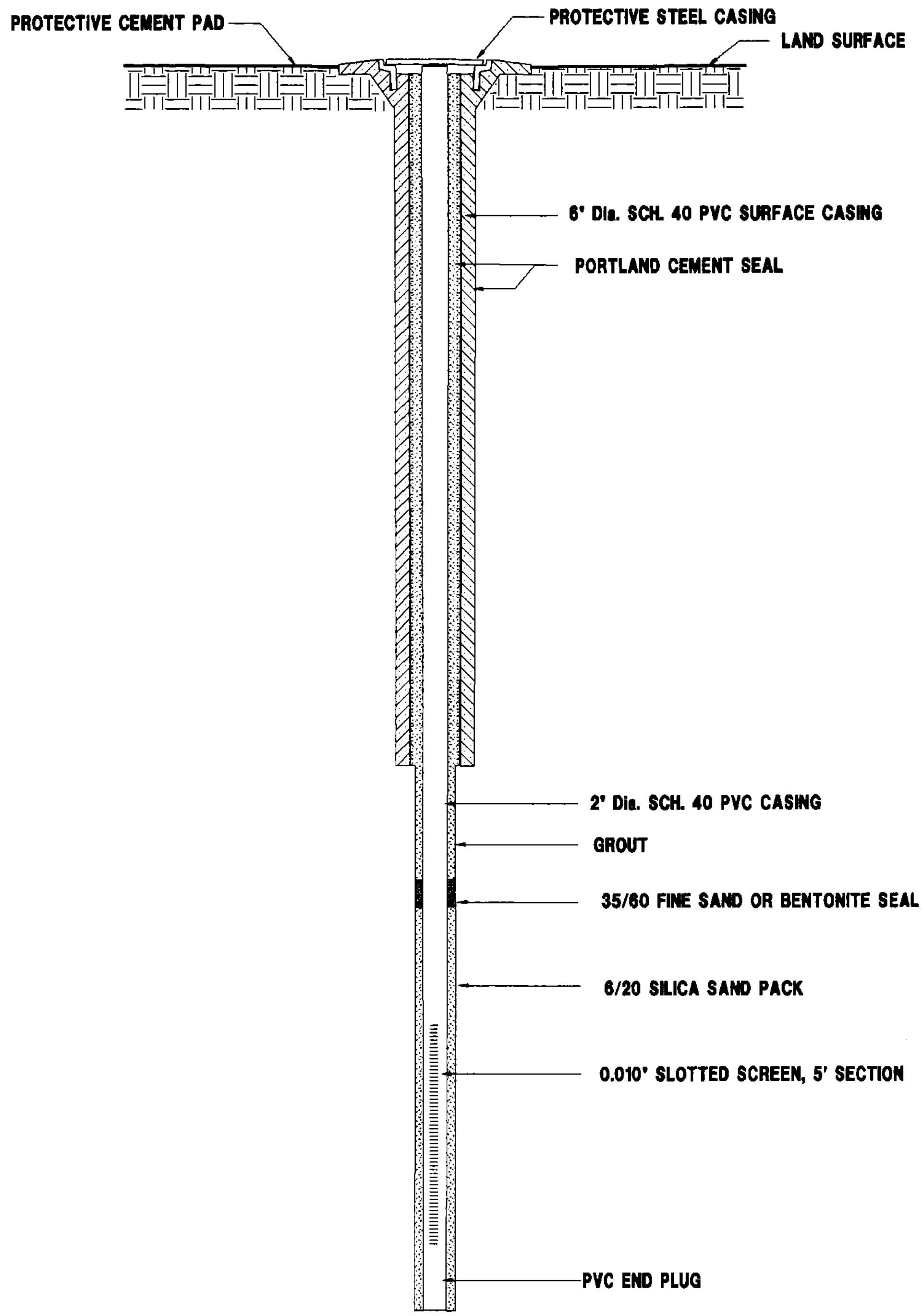

NOT TO SCALE

FIGURE 4-2
TYPICAL DEEP MONITORING WELL CONSTRUCTION DETAIL

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During this field investigation, ABB-ES personnel and their subcontractors will coordinate efforts with the NSB Kings Bay Environmental Coordinator to dispose of contaminated fluids and soil onsite. It will be the Navy's responsibility to dispose of hazardous waste.

4.1.1 Site 2029 Approximately 10 soil borings will be advanced at this site. Proposed soil boring and monitoring well locations are shown in Figure 4-3. The number and locations of proposed soil borings are based upon previous preliminary soil screening performed at the site. Groundwater measurements from the preliminary soil investigation performed by base personnel indicated that the depth to water averages approximately 3 to 4 feet bls. It is, therefore, anticipated that total depth of borings will average 5 feet bls, except for those located on the berm itself, which should average 12 feet bls. A minimum of 10 soil samples (at least 1 per boring) will be analyzed for TRPH and BTEX.

Approximately seven shallow (total depth of approximately 15 feet bls) permanent monitoring wells and one permanent deep well (a maximum depth of 10 feet below the surface casing) will be installed at Site 2029. Groundwater samples will be collected from each newly installed site monitoring well. The following is a listing of the groundwater samples that will be collected during the CA:

- 8 monitoring well samples,
- 1 duplicate sample,
- 1 equipment blank, and
- 1 trip blank.

4.1.2 Site 3021 Approximately six soil borings will be advanced at this site. Proposed soil boring and monitoring well locations are shown in Figure 4-4. The number and locations of proposed soil borings are based on a preliminary soil screening performed by Enviropact, September 1992, at the site. Groundwater measurements from the preliminary soil investigation indicated that the depth to water averages approximately 8 to 9 feet bls. It is, therefore, anticipated that total depth of borings will average 10 feet bls. A maximum of 12 soil samples will be analyzed for TRPH and BTEX.

Approximately seven shallow (total depth of approximately 15 feet bls) permanent monitoring wells and one permanent deep well (a maximum depth of 10 feet below the surface casing) will be installed at Site 3021. Groundwater samples will be collected from each newly installed site monitoring well and three pre-existing site monitoring wells. The following is a listing of the groundwater samples that will be collected at during the CA:

- 11 monitoring well samples,
- 1 duplicate sample,
- 1 equipment blank, and
- 1 trip blank.

4.1.3 Site 5052 Approximately 10 soil borings will be advanced at this site. Proposed soil boring and monitoring well locations are shown in Figure 4-5. The number and locations of proposed soil borings are based upon previous preliminary soil screening performed by V.B. Brown Distribution, Inc., on September 1992. Groundwater measurements from the preliminary soil investigation indicated that the depth to water averages approximately 13 to 14 feet bls. It is, therefore,

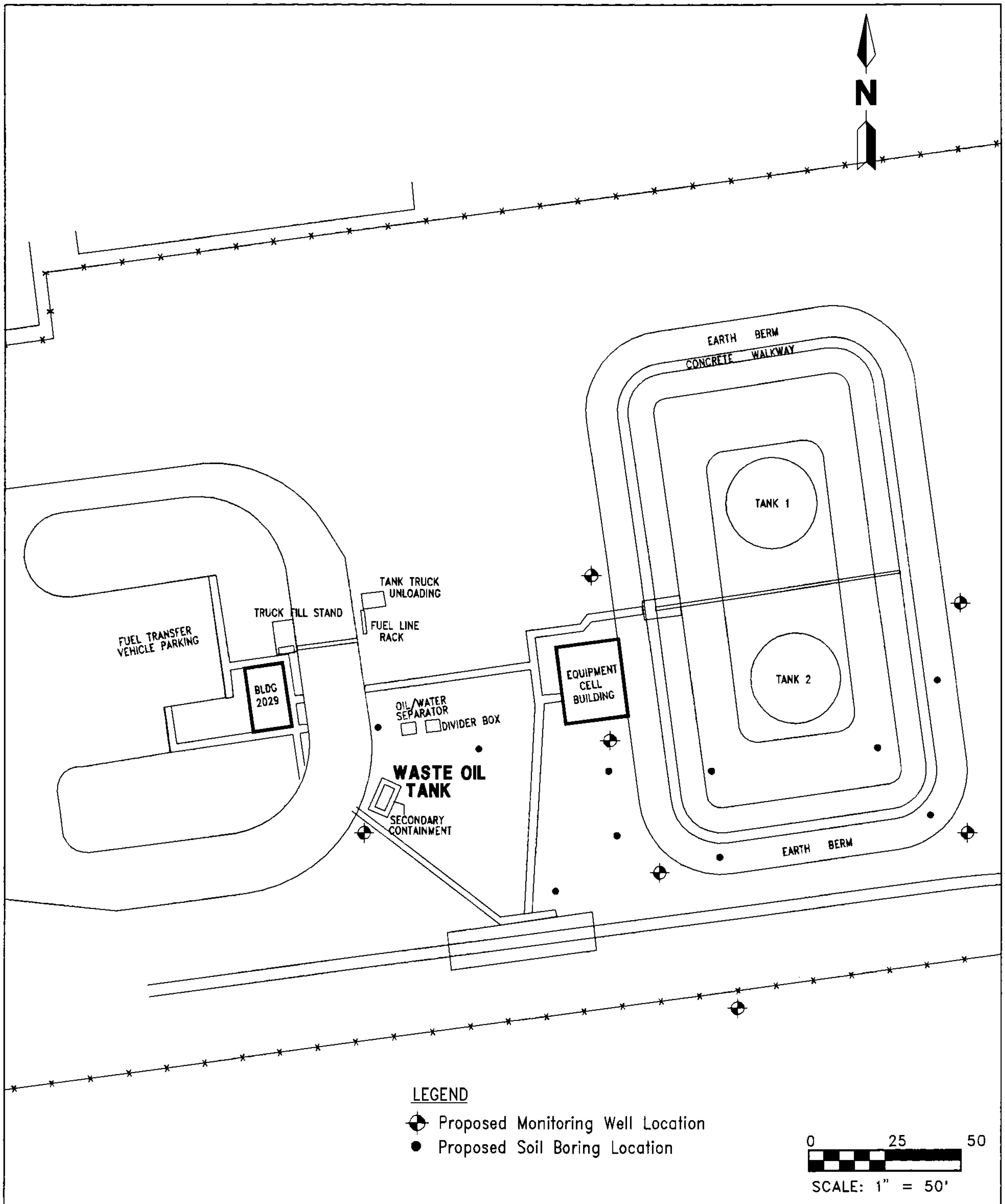

FIGURE 4-3
PROPOSED SOIL BORING AND MONITORING WELL LOCATIONS, SITE 2029

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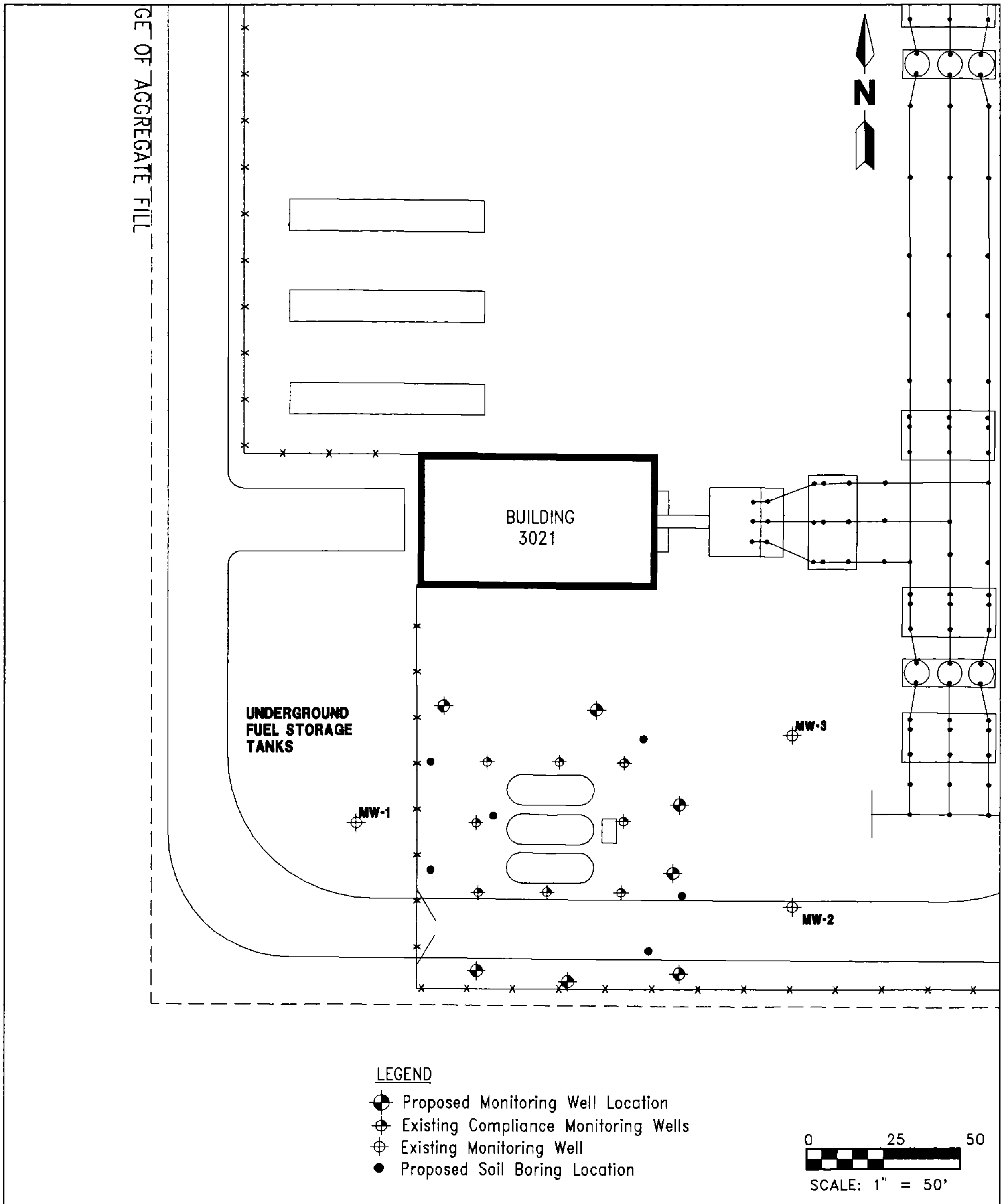

FIGURE 4-4
PROPOSED SOIL BORING AND MONITORING WELL LOCATIONS, SITE 3021

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SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

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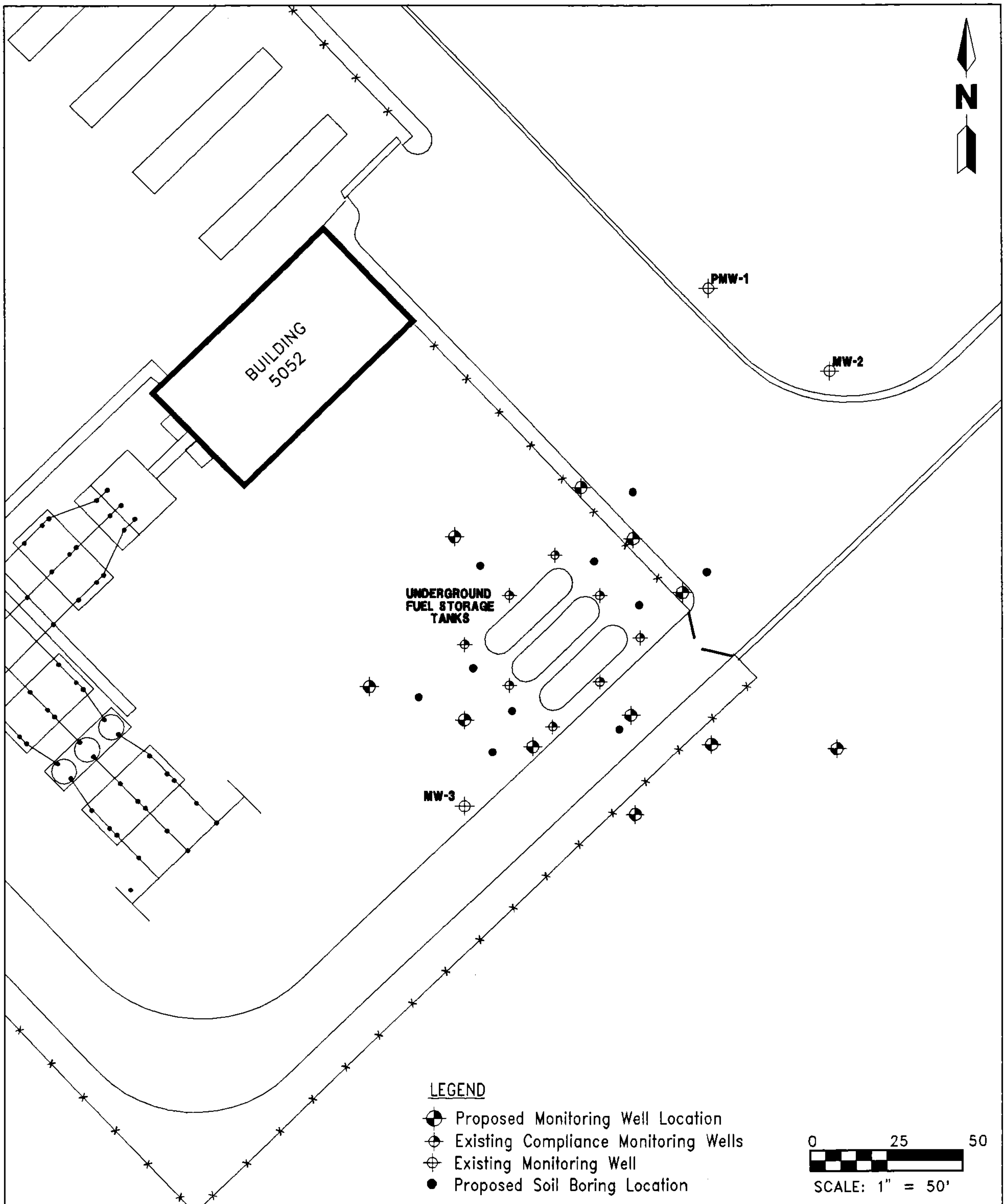

FIGURE 4-5
PROPOSED SOIL BORING AND MONITORING WELL LOCATIONS, SITE 5052

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anticipated that total depth of borings will average 13 feet bls. A minimum of 20 soil samples (a least two per boring) will be analyzed for TRPH and BTEX.

Approximately 11 shallow (total depth of approximately 20 feet bls) permanent monitoring wells and one permanent deep well (a maximum depth of 10 feet below the surface casing) will be installed to characterize the groundwater contaminant plume and assess its horizontal and vertical extent. Groundwater samples will be collected from each newly installed site monitoring well and three pre-existing site monitoring wells. The following is a listing of the groundwater samples that will be collected at Site 5052 during the CA:

- 15 monitoring well samples,
- 2 duplicate samples,
- 1 equipment blank, and
- 2 trip blanks.

Additionally, a tidal influence study will be performed at Site 5052 to determine whether the site's proximity to the bay affects groundwater flow direction. The tidal study for this site will be used as a "worst case" for each of the other sites.

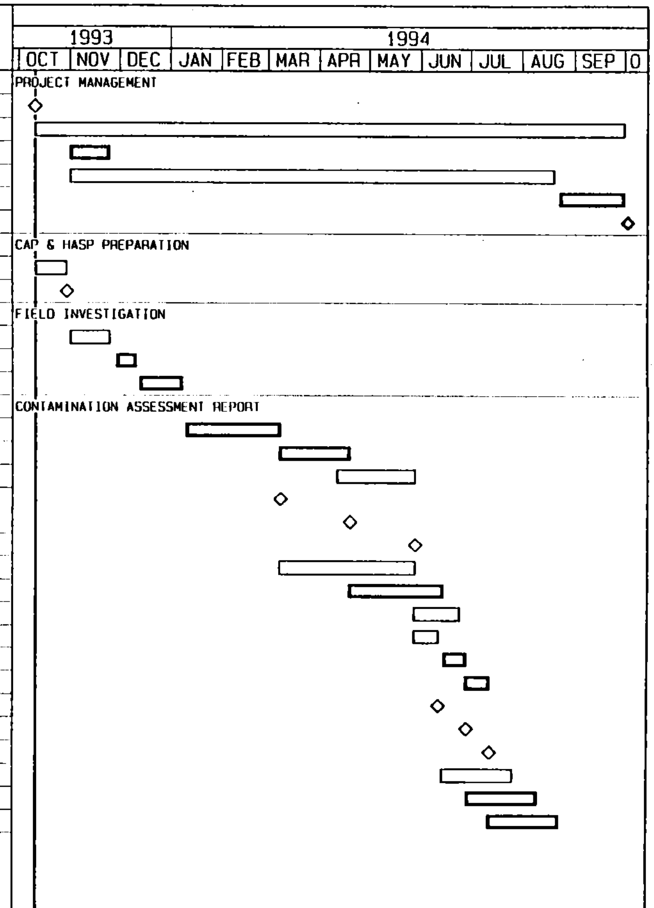
4.2 PREPARATION OF REPORTS. Subsequent to completion of the field investigations and receipt of the soil and groundwater laboratory analytical results, a separate CAP will be prepared for each site and submitted to SOUTHNAVFACENGCOM for review and approval. The report will discuss site background information, site conditions, findings, and recommendations for each site. Site location maps, locations of monitoring wells, groundwater elevation contour maps, and contaminant concentration maps will be included with the report.

Based on the findings of each investigation, the design of a corrective action system is required in the CAP. However, if findings deem it unnecessary for a corrective action system to be designed, then other corrective action objectives may be proposed, such as "monitor only" or "no action". CAPs for each site will be prepared in conformity with *Requirements for Underground Storage Tank (UST) Release: Corrective Action Plan (CAP) Content (GUST-7)*, July 1991, as published and submitted to the Environmental Protection Division, Georgia Department of Natural Resources.

5.0 SCHEDULE

A projected schedule to complete the CA field investigation program at the three sites is approximately 4 weeks (see Figure 5-1). This includes mobilization, drilling, sampling, surveying, aquifer testing, and demobilization. The field investigation work is scheduled to begin November 29, 1993. Upon completion of the field investigation, a 3-week turnaround time is anticipated before receipt of the laboratory analyses of the groundwater samples collected during the investigation. A final draft CAP for Site 2029 is scheduled for submittal to SOUTHNAVFACENGCOM by March 7, 1994; for Site 3021 by April 18, 1994; and for Site 5052 by May 27, 1994. If time schedules for report review are followed, final CAPs are due on June 10, June 27, and July 11, 1994, for Sites 2029, 3021, and 5052, respectively.

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
NOTICE TO PROCEED SOW NO. 104	11OCT93		0
DAY-TO-DAY MANAGEMENT	11OCT93	30SEP94	248
SUBCONTRACTOR PROCUREMENT PROCESS	1NOV93	24NOV93	18
TFMR REVIEW & PREPARATION	1NOV93	19AUG94	204
SOW CLOSEOUT	23AUG94	30SEP94	28
SOW NO. 104 COMPLETE	3OCT94	30SEP94	0
CAMP/HASP PREPARATION	11OCT93	29OCT93	15
SUBMIT CAMP/HASP TO NAVY		29OCT93	0
FIELD SCHEDULING DELAY	1NOV93	24NOV93	18
FIELD INVESTIGATION	29NOV93	10DEC93	10
LAB ANALYSIS/SURVEY	13DEC93	7JAN94	18
PREPARE FINAL DRAFT CAP SITE 2029	10JAN94	7MAR94	41
PREPARE FINAL DRAFT CAP SITE 3021	7MAR94	18APR94	31
PREPARE FINAL DRAFT CAP SITE 5052	11APR94	27MAY94	35
SUBMIT FINAL DRAFT CAP SITE 2029 TO NAVY		7MAR94	0
SUBMIT FINAL DRAFT CAP SITE 3021 TO NAVY	19APR94	18APR94	0
SUBMIT FINAL DRAFT CAP SITE 5052 TO NAVY		27MAY94	0
NAVY REVIEW OF FINAL DRAFT CAP SITE 2029	7MAR94	27MAY94	60
NAVY REVIEW OF FINAL DRAFT CAP SITE 3021	18APR94	13JUN94	40
NAVY REVIEW OF FINAL DRAFT CAP SITE 5052	27MAY94	23JUN94	19
PREP OF FINAL CAP - SITE 2029	27MAY94	10JUN94	10
PREP OF FINAL CAP - SITE 3021	14JUN94	27JUN94	10
PREP OF FINAL CAP - SITE 5052	27JUN94	11JUL94	10
SUBMIT FINAL CAP TO NAVY/GDNR SITE 2029		10JUN94	0
SUBMIT FINAL CAP TO NAVY/GDNR SITE 3031		27JUN94	0
SUBMIT FINAL CAP TO NAVY/GDNR SITE 5052		11JUL94	0
GDNR REVIEW OF SITE 2029	13JUN94	25JUL94	30
GDNR REVIEW OF SITE 3021	28JUN94	9AUG94	30
GDNR REVIEW OF SITE 5052	11JUL94	22AUG94	31



Plot Date 7OCT93
Data Date 11OCT93
Project Start 11OCT93
Project Finish 30SEP94

(c) Primavera Systems, Inc.

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

B010 A104

Sheet 1 of 1

NAVY CLEAN
SOW NO. 104
BASELINE PROJECT SCHEDULE

ABB ENVIRONMENTAL SERVICES, INC.

Date	Revision	Checked	Approved

FIGURE 5-1
PROJECT SCHEDULE

CONTAMINATION ASSESSMENT WORKPLAN
SITES 2029, 3021, AND 5052

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

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