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SITE ASSESSMENT REPORT FOR MCCOY ANNEX NTC ORLANDO FL  
5/1/1998  
ABB ENVIRONMENTAL

**SITE ASSESSMENT REPORT**

**BUILDING 7174  
MCCOY ANNEX**

**NAVAL TRAINING CENTER  
ORLANDO, FLORIDA**

**Unit Identification Code: N65928**

**Contract No.: N62467-89-D-0317/107**

**Prepared by:**

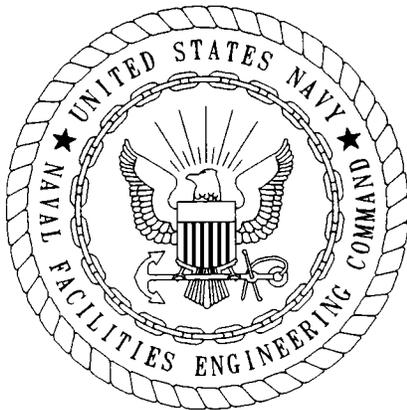
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**Prepared for:**

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

**Nick Ugolini, Code 1843, Engineer-in-Charge**

**May 1998**



CERTIFICATION OF TECHNICAL  
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/107 are complete and accurate and comply with all requirements of this contract.

DATE: May 1, 1998

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Task Order Manager

NAME AND TITLE OF CERTIFYING OFFICIAL: Manuel Alonso, P.G.  
Project Technical Lead

(DFAR 252.227-7036)



## FOREWORD

To meet its mission objectives, the U.S. Navy performs a variety of operations, some requiring the use, handling, storage, or disposal of hazardous materials. Through accidental spills and leaks and conventional methods of past disposal, hazardous materials may have entered the environment in ways unacceptable by today's standards. With growing knowledge of the long-term effects of hazardous materials on the environment, the Department of Defense initiated various programs to investigate and remediate conditions related to suspected past releases of hazardous materials at their facilities.

One of these programs is the Comprehensive Long-Term Environmental Action, Navy Underground Storage Tank (UST) program. This program complies with Subtitle I of the Resource Conservation and Recovery Act and the Hazardous and Solid Waste Amendments of 1984. In addition, the UST program complies with all State and local storage tank regulations as they pertain to the locations of each naval facility.

The UST program includes the following activities:

- registration and management of Navy and Marine Corps storage tank systems,
- site assessment planning,
- site field investigations,
- preparation of site assessment reports,
- remedial (corrective) action planning,
- implementation of the remedial action plans, and
- tank and pipeline closures.

The Southern Division, Naval Facilities Engineering Command manages the UST program, and the Florida Department of Environmental Protection oversees the Navy UST program at the Naval Training Center (NTC), Orlando, Florida.

In addition to the UST program, NTC, Orlando, in conjunction with the Department of the Navy, has instituted several programs to address the requirements of Base Realignment and Closure (BRAC). BRAC cleanup teams composed of representatives from the Navy, as well as Federal and State regulatory agencies, have been formed to address the multitude of issues surrounding base closure and to enhance environmental decision making at BRAC installations where property will be available for transfer to the community. This team approach is intended to foster partnering, accelerate the environmental cleanup process, and expedite timely, cost-effective, and environmentally responsible disposal and reuse decisions.

At NTC, Orlando, the BRAC process includes the evaluation of the environmental condition of the property to ensure the suitability of transfer, reuse, or lease.

Questions regarding the UST program at the NTC, Orlando should be addressed to Mr. Nick Ugolini, Code 1843, at (843) 820-5596.

## EXECUTIVE SUMMARY

ABB Environmental Services, Inc. (ABB-ES), has been authorized by Southern Division, Naval Facilities Engineering Command to prepare site assessment reports (SARs) for petroleum-impacted sites discovered during the Base Realignment and Closure (BRAC) Tank Management Plan implementation at the Naval Training Center, Orlando, McCoy Annex property in Orange County, Florida. This SAR has been prepared to evaluate soil and groundwater conditions at the former Exchange Service Station, McCoy Annex, Building 7174.

This site assessment has been conducted following the guidelines contained in Section 62-770.600, Florida Administrative Code. A brief summary of the assessment results is provided below.

1. Twelve underground storage tanks (USTs) have been operated at this facility. In 1942, six gasoline storage tanks (five 5,000-gallon and one 3,000-gallon) were installed at the site and later abandoned in place after showing inventory losses. In addition, two 1,000-gallon waste oil USTs were abandoned in place on the northeast side of Building 7174.
2. In 1986, four 10,000-gallon fiberglass USTs were installed. In 1994, these USTs were removed along with 250 cubic yards of excessively contaminated soil. Currently, no petroleum storage system operates at this facility.
3. A strong petroleum odor in the compliance wells was noted in 1988, and E.C. Jordan was contacted to conduct a preliminary contamination assessment (PCA), which included precision testing of Tanks 7174-9 through 7174-12 (four 10,000-gallons tanks) and their associated piping. During the PCA, groundwater testing confirmed that contamination was present and it was recommended that a contamination assessment (CA) be conducted at the site.
4. A contamination assessment report (CAR) was completed for the site in August of 1991. A total of eighteen shallow monitoring wells and one deep monitoring well were installed at the site during the CA.
5. In 1993, a remedial action plan (RAP) was prepared for the site. The RAP consisted of a pump-and-treat system, which was used to treat the impacted groundwater, and a vacuum extraction system, which was used to treat petroleum-impacted soil. Following review comments from the Florida Department of Environmental Protection, two addendums to the RAP were prepared for the site. This RAP was never implemented.
6. In April 1995, the monitoring wells were sampled. Modifications to the recovery well ylocations prompted additional soil investigations.
7. Based on the findings of the April 1995 sampling, it was determined that the CA was outdated. Soil and groundwater delineation was used in order to modify the RAP.
8. CA activities were conducted by ABB-ES from October 1995 to August 1996. Thirty-five soil borings were installed throughout the study area to

assess the extent of petroleum-impacted soil. The results of the soil assessment confirmed that the plume had traveled towards the southeast.

9. During the CAR activities in July 1996, four additional shallow monitoring wells were installed to assess petroleum-impacted groundwater southeast of the site. In addition, nine piezometers were installed to assess the extent of free-product discovered near the former petroleum pipeline in the vicinity of the pump island.
10. During the Orlando Partnering Team meeting held in Orlando in November 1996, two topics were discussed. The first topic was the removal of the eight remaining USTs with their associated piping, along with all the soil saturated with free product. The second topic discussed was the excessively contaminated soil at the site.
11. On May 20 through June 5, 1997, five 5,000-gallon USTs, one 3,000-gallon gasoline UST, two 1,000-gallon waste oil USTs, and an associated oil-water separator were removed from the excavation, cleaned, and disposed of by Public Works Center, Pensacola.
12. An initial remedial action (IRA) was conducted on June 9 through June 13, 1997, and 2,100 cubic yards of contaminated soil were removed and later thermally treated.
13. During the IRA activities, twelve monitoring wells were abandoned by grouting the well casing following the St. Johns River Water Management District's guidelines and soil removals.
14. Site assessment activities were conducted after the tank and soil removal from December 1997 to May 1998. On December 2, 3, 8, and 9, 1997, soil borings were advanced in the vicinity of the former tank areas to assess whether or not petroleum-impacted soil was present. Evidence of petroleum-impacted soil was detected from 2 to 8 feet below land surface (bls) near the former location of the USTs. Soil samples were collected and shipped to Savannah Laboratories and Environmental Services, Inc., to confirm petroleum-impact to soil found with the organic vapor analyzer.
15. On January 5 and 6, 1998, eight shallow monitoring wells (OLD-7174-24 through OLD-7174-31) were installed to assess the horizontal extent of dissolved petroleum hydrocarbon contamination in the shallow aquifer.
16. On January 20, 21, 22 and 23, 1998, groundwater analytical results from samples collected from the monitoring wells indicated that dissolved petroleum hydrocarbon contamination exceeding Chapter 62-770, Florida Administrative Code (FAC) cleanup target levels, was present in monitoring wells OLD-7174-24, OLD-7174-25, OLD-7174-28, OLD-7174-30 and OLD-7174-31.
17. On March 5 and 6, 1998, one deep lithologic soil boring (SS-1) and one deep monitoring well (OLD-7174-32), were installed to further assess the horizontal and vertical extent of petroleum impact in the shallow aquifer. All shallow monitoring wells were installed to 15 feet bls and the deep well was installed to 35 feet bls with 5 feet of screen and 30 feet surface casing.

18. On March 18, 1998, groundwater samples collected from the deep monitoring well OLD-7174-32 indicated that dissolved hydrocarbon contamination is below laboratory standard detection limits.
19. The groundwater flow direction was determined to be from north to south with a hydraulic gradient of  $1.27 \times 10^{-2}$  feet per foot (ft/ft). The hydraulic conductivity was calculated to be 2.25 ft/ft. The groundwater flow velocity was estimated to be 29.8 feet per year, and the transmissivity was estimated to be 707 gallons per day per foot.
20. No active potable water wells are located within 0.25 mile of this site.
21. ABB-ES recommends that an RAP be prepared to remediate groundwater and soil impacted by petroleum product at this site.

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Naval Training Center  
Orlando, Florida

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## GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
bls	below land surface
CA	contamination assessment
CAR	Contamination Assessment Report
CTL	cleanup target level
EDB	ethylene dibromide
ft/day	feet per day
ft/ft	feet per foot
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FL-PRO	Florida-Petroleum Residual Organic
gpd/ft	gallons per day per foot
gpd/ft <sup>2</sup>	gallons per day per foot squared
HSA	hollow-stem auger
kg	kilograms
μg/l	micrograms per liter
mg/kg	milligrams per kilogram
NTC	Naval Training Center
OVA	organic vapor analyzer
PAH	polynuclear aromatic hydrocarbons
PCA	preliminary contamination assessment
ppm	parts per million
PVC	polyvinyl chloride
PWC	Public Works Center
RAP	remedial action plan
SAR	Site Assessment Report
SCTLs	soil cleanup target levels
SM	service mark
SOUTHNAV- FACENCOM	Southern Division, Naval Facilities Engineering Command
SPLP	Synthetic Precipitation Leaching Procedures
SVE	soil vapor extraction
TOC	top-of-casing
TRPH	total recoverable petroleum hydrocarbons

GLOSSARY (Continued)

USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VOA	volatile organic aromatics
yd <sup>3</sup>	cubic yard

## 1.0 SITE DESCRIPTION AND BACKGROUND INFORMATION

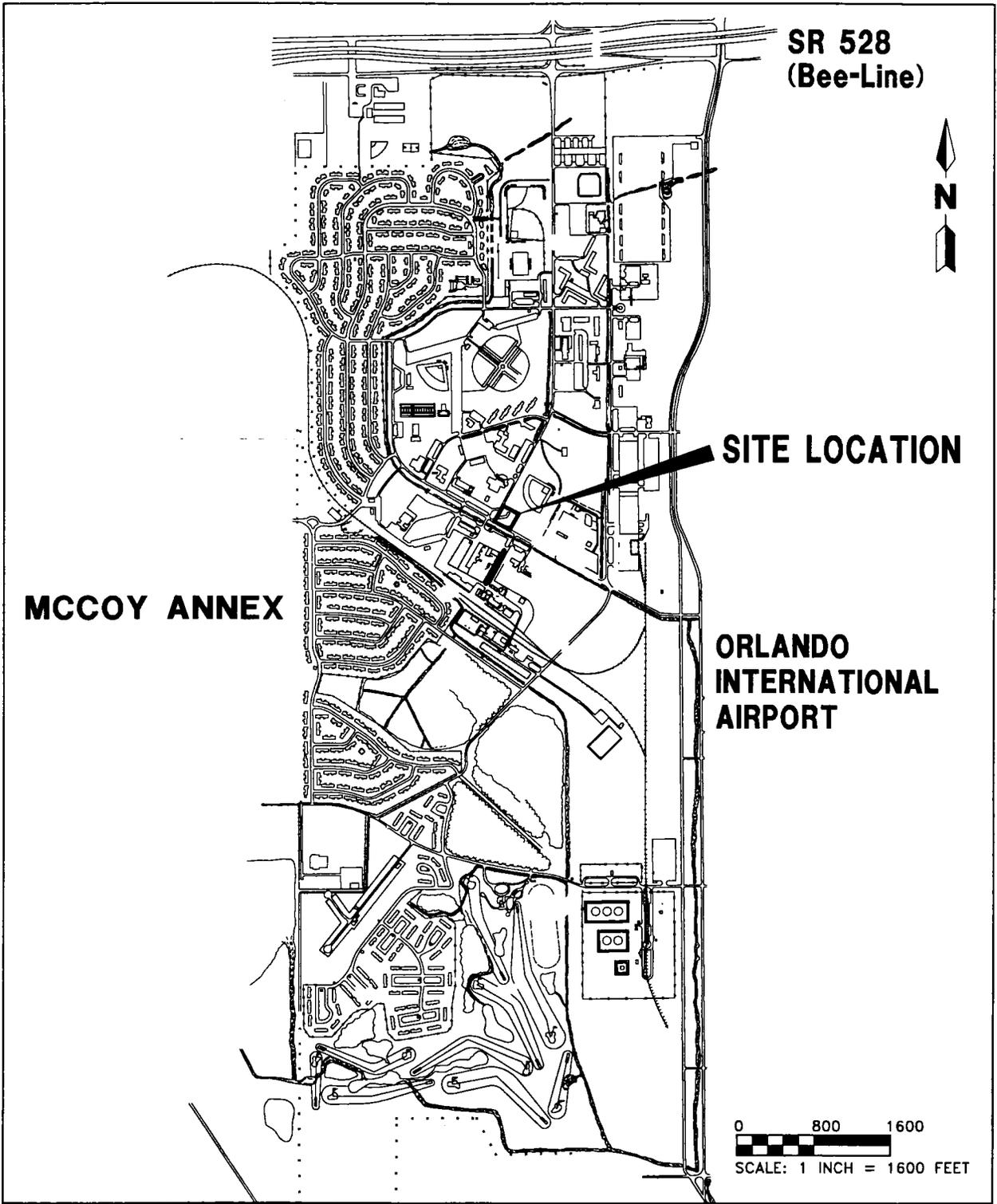
Building 7174 is located on the northeast corner of intersection of Binnacle Way and Daetwyler Drive in the central part of the Naval Training Center (NTC), McCoy Annex, in Orange County, Florida. Figure 1-1 shows the site location and a map of the surrounding area. The site lies within the southwest part of Section 32, Township 23 South and Range 30 East, as shown on the Pine Castle, Florida, U.S. Geological Survey Quadrangle Map. Figure 1-2 is the topographic map of the site and surrounding area.

Building 7174 is a one-story building constructed of concrete block with a flat corrugated metal roof. It is currently vacant, but the building was formerly used as the McCoy Annex base exchange service station. Photographs of the site that show existing physical features are included in Appendix A, Site Photographs.

In 1942, six gasoline storage tanks (7174-1 through 7174-6) were installed at the site (one 3,000-gallon tank and five 5,000-gallon tanks). The tanks were abandoned in place under the pump island in 1986, and were filled with sand to conform with Florida Department of Environmental Protection (FDEP) abandonment procedures. However, no records were found. In 1986, four 10,000-gallon fiberglass underground storage tanks (USTs) (7174-9 through 7174-12) were installed to replace the abandoned tanks. Four compliance monitoring wells were installed (OLD-7174-1 through OLD-7174-4) in association with the new tank construction to meet FDEP monitoring requirements. During sampling of the compliance monitoring wells by Naval personnel on June 15, 1988, a petroleum odor was detected in wells OLD-7174-1, OLD-7174-2, and OLD-7174-3. E.C. Jordan was contacted to conduct a preliminary contamination assessment (PCA) on the site as a result of the positive leaks detection.

E.C. Jordan personnel completed a PCA in 1988 that included precision testing of the four USTs (7174-9 through 7174-12) and their associated piping. During the PCA, E.C. Jordan installed an additional six monitoring wells (OLD-7174-5 through OLD-7174-10). Results from the PCA showed that the tanks and their associated piping were not leaking; however, it was observed that the annuli around the tank fill ports were not properly sealed. Groundwater testing confirmed that contamination was present and it was recommended that a contamination assessment (CA) be conducted at the site.

In late June 1991, ABB Environmental Services, Inc. (ABB-ES) (formerly E.C. Jordan) personnel conducted a CA at the site. During the CA, eight additional 2-inch-diameter shallow monitoring wells (OLD-7174-11 through OLD-7174-16, OLD-7174-18 and OLD-7174-19) and one 4-inch-diameter monitoring well (OLD-7174-7) were installed. Groundwater samples were collected by ABB-ES personnel and analyzed by Savannah Laboratories and Environmental Services, Inc. A groundwater elevation survey was completed and aquifer slug tests for hydraulic conductivity were performed. Organic vapor analyzer (OVA) readings were taken on October 11, 1991, on soil samples that were collected during the CA. OVA readings confirmed that soil contamination exists at the site. Based on the results of the CA investigation, ABB-ES recommended a remedial action plan (RAP) be performed at this site.



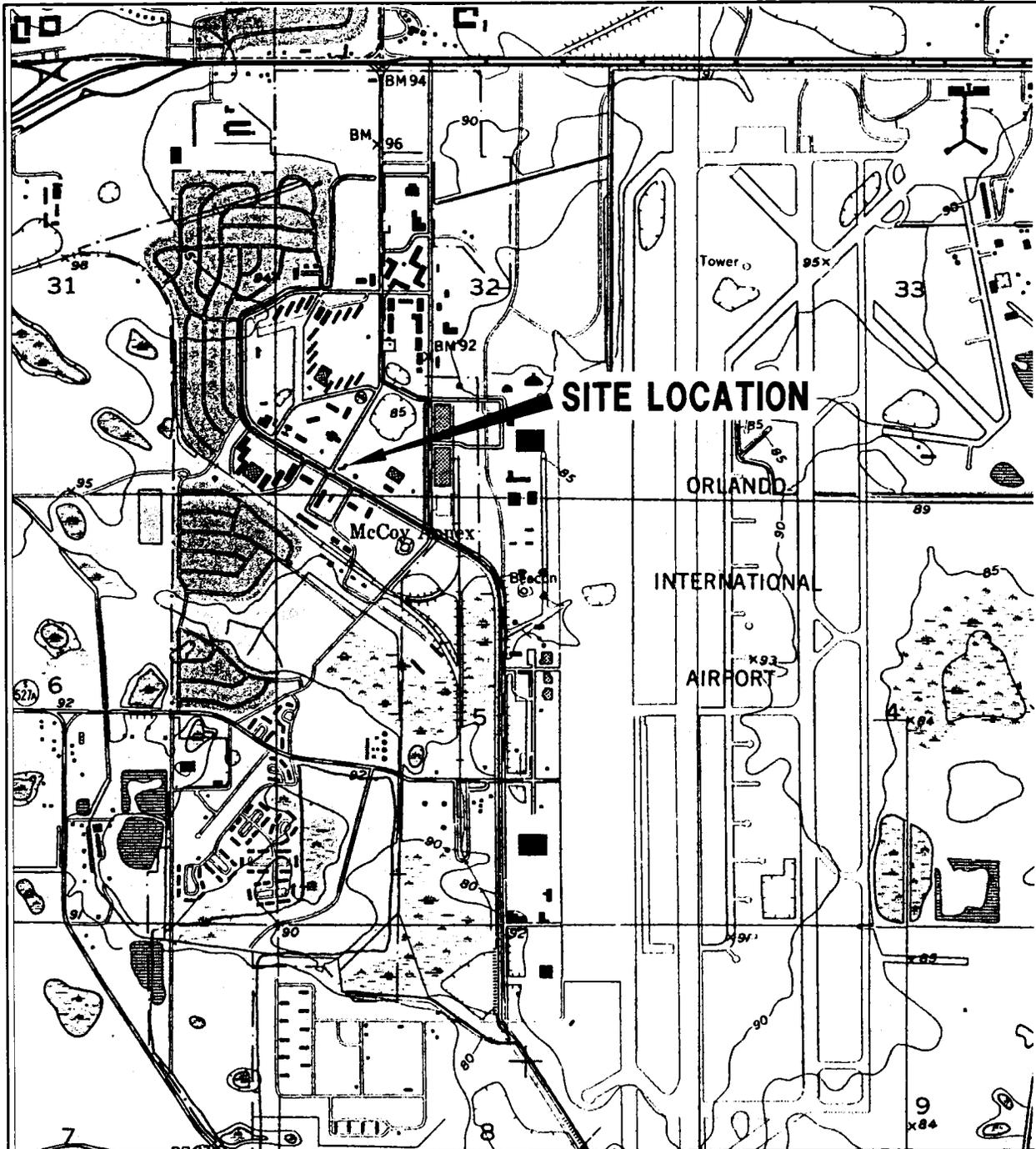
**FIGURE 1-1  
SITE VICINITY MAP**



**SITE ASSESSMENT REPORT  
BUILDING 7174  
MCCOY ANNEX**

**NAVAL TRAINING CENTER  
ORLANDO, FLORIDA**

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SOURCE: U.S. Geological Survey Quadrangle for Pine Castle, Florida 1953, Photorevised 1980.

**FIGURE 1-2  
TOPOGRAPHIC MAP**



**SITE ASSESSMENT REPORT  
BUILDING 7174  
MCCOY ANNEX  
  
NAVAL TRAINING CENTER  
ORLANDO, FLORIDA**

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In April 1993, ABB-ES prepared the RAP for the site (ABB-ES, 1993) and in May 1993, OHM Inc., prepared an RAP addendum (OHM, 1993). Both reports presented a plan for cleanup of the petroleum contamination at the site. The groundwater contamination will be treated by installing a pump-and-treat system that includes the installation of four groundwater recovery wells and an air stripper to remove volatile organic compounds from the contaminated water. The levels of soil contamination was to be reduced by a vacuum extraction and treated with a carbon adsorption system. These systems would have been operated until the petroleum-related contamination in both the groundwater and the soil reaches the required cleanup target levels (CTLs).

On July 6 and 7, 1994, a meeting was held at NTC, Orlando with Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), NTC, Orlando personnel, ABB-ES, and the remedial action contractor (Bechtel Environmental, Inc.). One result of the meeting was to plan the removal of the four 10,000-gallon USTs installed in 1986. From December 27, 1994 to January 3, 1995, the four tanks were removed from subsurface soil. Approximately 257.89 cubic yards (yd<sup>3</sup>) of excessively contaminated soil was excavated from the tank area for off-site thermal treatment. During the tank removal, monitoring wells OLD-7174-1 through OLD 7174-4 were damaged. Clean fill was placed in the excavation and four inches of concrete were placed over the tank area to assist in the planned soil vapor extraction (SVE).

In January 1995, ABB-ES further investigated disposal options for effluent generated during implementation of the proposed RAP. A second RAP addendum presents a plan for effluent disposal via a storm sewer system under a National Pollutant Discharge Elimination System permit. Other changes included monitoring plan modifications and a filter size change for the removal of lead.

On May 2, 1995, a technical memorandum was prepared incorporating minor modifications to the planned groundwater recovery system to account for a slight increase in groundwater contaminant concentration and changes in the aerial extent of the contaminants. Following these modifications it was determined that the SVE system would also be affected by the repositioning of the groundwater recovery wells. This also called into question the extent of the soil contamination that was last investigated on October 10, 1991. ABB-ES mobilized on May 2, 1995, to conduct confirmatory sampling of soil southeast of the groundwater contaminant plume, an area in which groundwater remedial modifications had the greatest impact on the SVE system. Six soil borings were advanced with samples collected and OVA headspace readings taken, which confirmed that soil contamination concentrations had increased. At that time, ABB-ES recommended further assessment of the soil contamination at the site.

On October 4 and 5, 1995, 35 additional soil borings were installed at the site to complete the horizontal assessment of the soil contamination. Since late June 1995, the plume has traveled further to the south and east.

In October 1996, a contamination assessment report (CAR) was completed by ABB-ES, which included the installation of four new shallow monitoring wells and nine piezometers. The piezometers were installed to assess the extent of free product discovered near the former petroleum pipeline in the vicinity of the pump island.

Based on the CAR results, two actions were considered feasible for Site 7174 during the Orlando Partnering Team meeting in November 1996. The first was to

remove the eight USTs filled with sand, the free product, and the excessively contaminated soil saturated with free product for off-site thermal treatment. The second was to landfarm the contaminated soil surrounding the USTs.

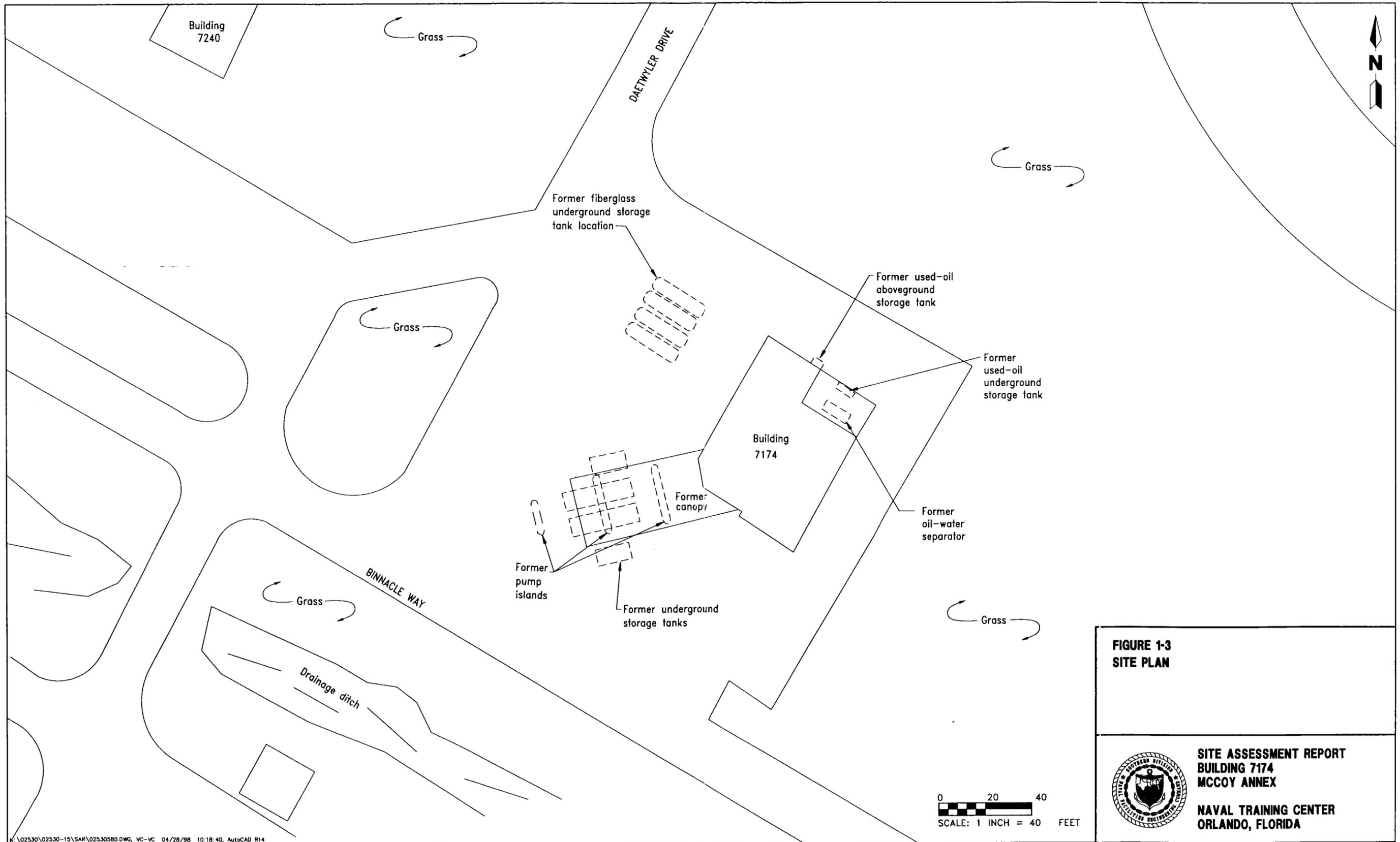
In May and June 1997, eight USTs and associated piping were removed from the site: six USTs near the pump islands on the southwest side of Building 7174 (five 5,000-gallon USTs and one 3,000-gallon gasoline UST), two 1,000-gallon USTs (7174-7 and 7174-8) used to store waste oil, and an oil-water separator connected to one of these tanks (7174-7) from the southeast side of Building 7174 (shown on Figure 1-3). An oil-water separator assessment report is under preparation for this site.

During tank removal and soil excavation, two separate stockpiles of soil were stored on site. The first pile was approximately 1,900 yd<sup>3</sup> of excessively contaminated soil (soil vapor that exhibits organic vapors exceeding 500 parts per million [ppm]). The second pile was approximately 200 yd<sup>3</sup> of soil saturated with free product.

The unsaturated contaminated soil (1,900 yd<sup>3</sup>) was transported on June 12, 1997, to two separate areas. The landfarm areas were designed by Public Works Center (PWC), Pensacola with impervious surfaces, berm, and cover to prevent rain water from entering the landfarm area. The soil was tilled daily for the first week, then once a week thereafter. PWC, Pensacola was responsible for the maintenance of the landfarm areas. The soil was covered with clear plastic after tilling. ABB-ES was responsible for sampling the soil at the landfarm area. The OVA results show that readings were greater than 1,000 ppm in most of the sampled location within the landfarms. On July 16, 1997, SOUTHNAVFACENGCOCM decided to thermally treat the 1,900 yd<sup>3</sup> of petroleum-contaminated soil.

The saturated soil (200 yd<sup>3</sup>) and the excessively contaminated soil (1,900 yd<sup>3</sup>) was transported by PWC, Pensacola to C.A. Meyer Paving and Construction Co., in Clermonte, Florida, to be thermally treated.

This Site Assessment Report (SAR) summarizes the data gathered during the initial remedial activities and the site assessment activities at Building 7174. General information, such as regional physiography, geology, hydrogeology, investigative methodologies, and procedures, is included in the NTC, Orlando, McCoy Annex, CAR (ABB-ES, 1996).



**FIGURE 1-3  
SITE PLAN**



**SITE ASSESSMENT REPORT  
BUILDING 7174  
MCCOY ANNEX  
NAVAL TRAINING CENTER  
ORLANDO, FLORIDA**

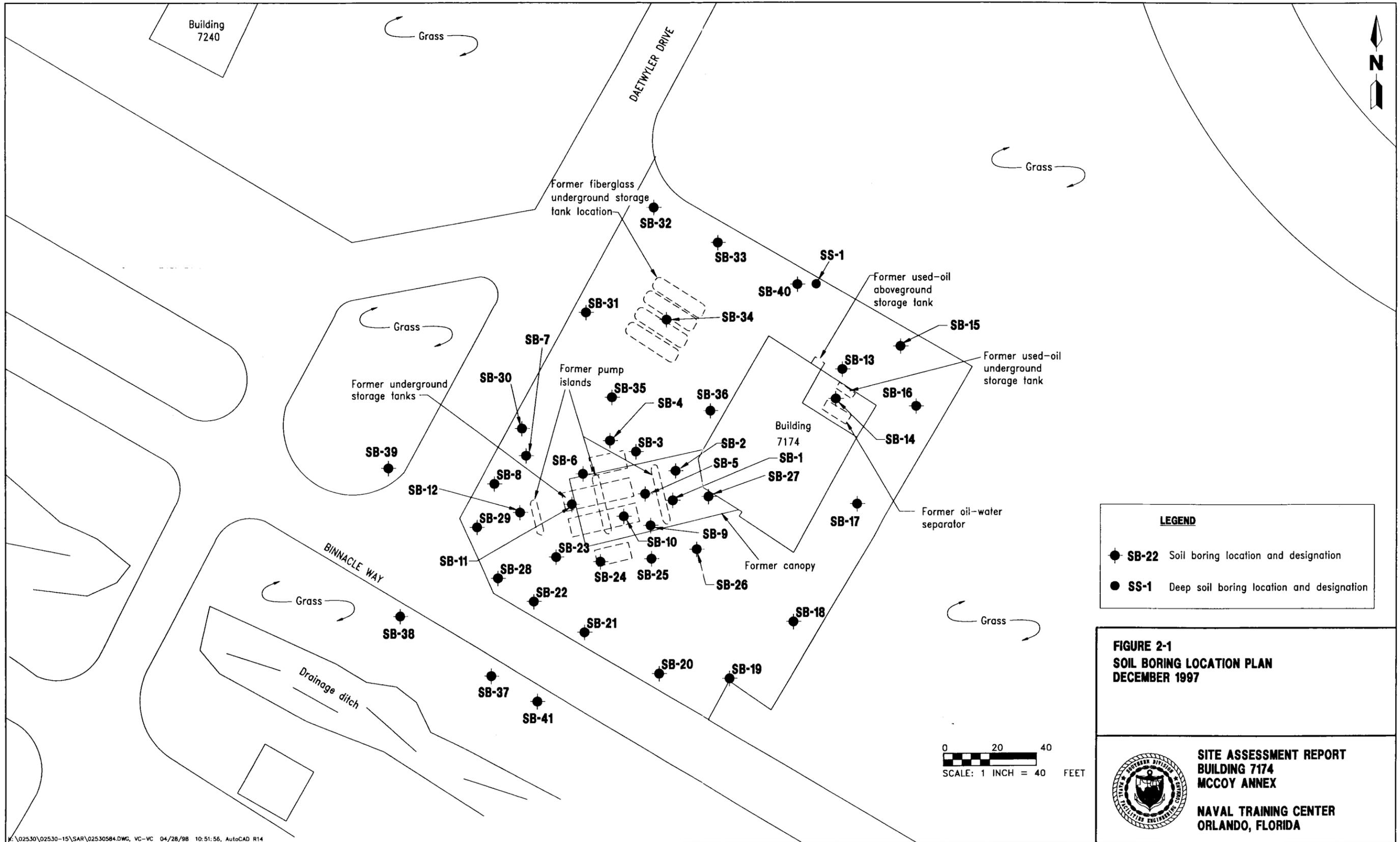
## 2.0 SITE ASSESSMENT METHODOLOGY

2.1 SOIL BORING PROGRAM. In order to determine if petroleum-impacted soil exists on the site following the 1997 tank and soil removal activities and to determine the optimal locations for collection of soil samples for laboratory analysis, 41 soil borings (SB-1 through SB-41) were completed at Building 7174. On December 2, 3, 8 and 9, 1997, a TerraProbe<sup>SM</sup> was used to collect soil samples for screening with an OVA. Figure 2-1 shows the hand-auger boring locations and soil sampling locations. The borings were completed into the water table which was encountered at approximately 6 to 8 feet below land surface (bls). In addition, one deep soil boring (SS-1) was completed using a truck-mounted drilling rig to a depth of 42 feet bls.

A total of 164 soil samples was collected from the 41 soil borings for OVA screening, and 3 soil samples were collected, packed on ice, and shipped to an off-site laboratory for analysis. The soil samples for OVA field screening were collected at depth of 0 to 2 feet, 2 to 4 feet, 4 to 6 feet, and 6 to 8 feet bls. Headspace organic vapor readings were measured for all soil screening samples by placing the soil sample in a 16-ounce glass jar and using a calibrated OVA, Foxboro 128 equipped with a flame ionization detector, following procedures outlined in Chapter 62-770, Florida Administrative Code (FAC). Carbon filters were utilized to differentiate total hydrocarbon response from naturally occurring methane gas. Filtered and unfiltered readings were obtained from two separate jars. All sampling and analysis was performed in accordance with the ABB-ES and FDEP-approved Comprehensive Quality Assurance Plan.

2.2 SOIL SAMPLING PROGRAM. In order to confirm and characterize petroleum impact to soil, three soil samples (AB-12, AB-22, and AB-40) were collected for laboratory analysis on December 9, 1997. The soil samples were selected to correspond to high, medium, and low OVA results obtained during field screening. Soil samples were packed on ice and shipped to Savannah Laboratories and Environmental Services, Inc., of Savannah, Georgia, for analysis. The soil samples were analyzed using U.S. Environmental Protection Agency (USEPA) Methods 8020, 8310, and Florida-Petroleum Residual Organics (FL-PRO).

2.3 MONITORING WELL INSTALLATION PROGRAM. In January 1997 and before the source removal activities, twelve wells were abandoned by Groundwater Protection Inc., (OLD-7174-5, OLD-7174-7, OLD-7174-8, OLD-7174-9, OLD-7174-11, OLD-7174-12, OLD-7174-13, OLD-7174-15, OLD-7174-17, OLD-7174-20, OLD-7174-21, and OLD-7174-22. In order to determine if petroleum-impacted groundwater exists on the site following the 1997 tank removal activities, eight shallow monitoring wells (OLD-7174-24, through OLD-7174-31) were installed at the site on January 5 and 6, 1998, and one deep monitoring well (OLD-7174-32) was installed on March 5 and 6, 1998. The shallow wells were installed using hollow-stem auger (HSA) drilling techniques to a depth of 15 feet bls. The deep well was installed using mud-rotary techniques to a depth of 35 feet bls. Typical shallow and deep monitoring well construction details are provided as Figures 2-2 and 2-3, respectively. Each shallow well was constructed with 10 feet of a 2-inch-diameter 0.010-inch slotted well screen coupled to 5 feet of 2-inch Schedule 40 solid polyvinyl chloride (PVC). This assembly was placed in the borehole so that the screen



**LEGEND**

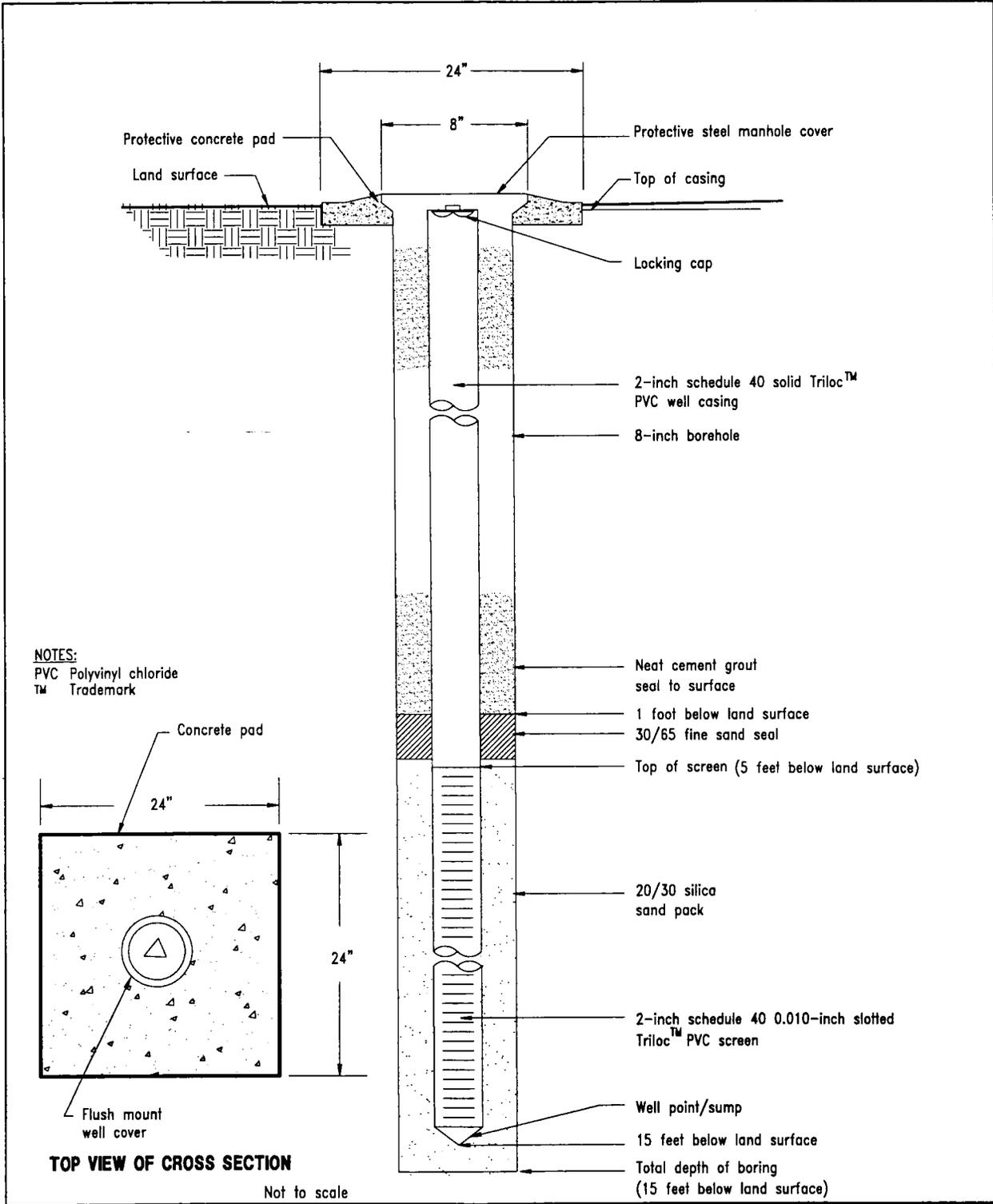
- SB-22 Soil boring location and designation
- SS-1 Deep soil boring location and designation

**FIGURE 2-1**  
**SOIL BORING LOCATION PLAN**  
**DECEMBER 1997**

0 20 40  
 SCALE: 1 INCH = 40 FEET



**SITE ASSESSMENT REPORT**  
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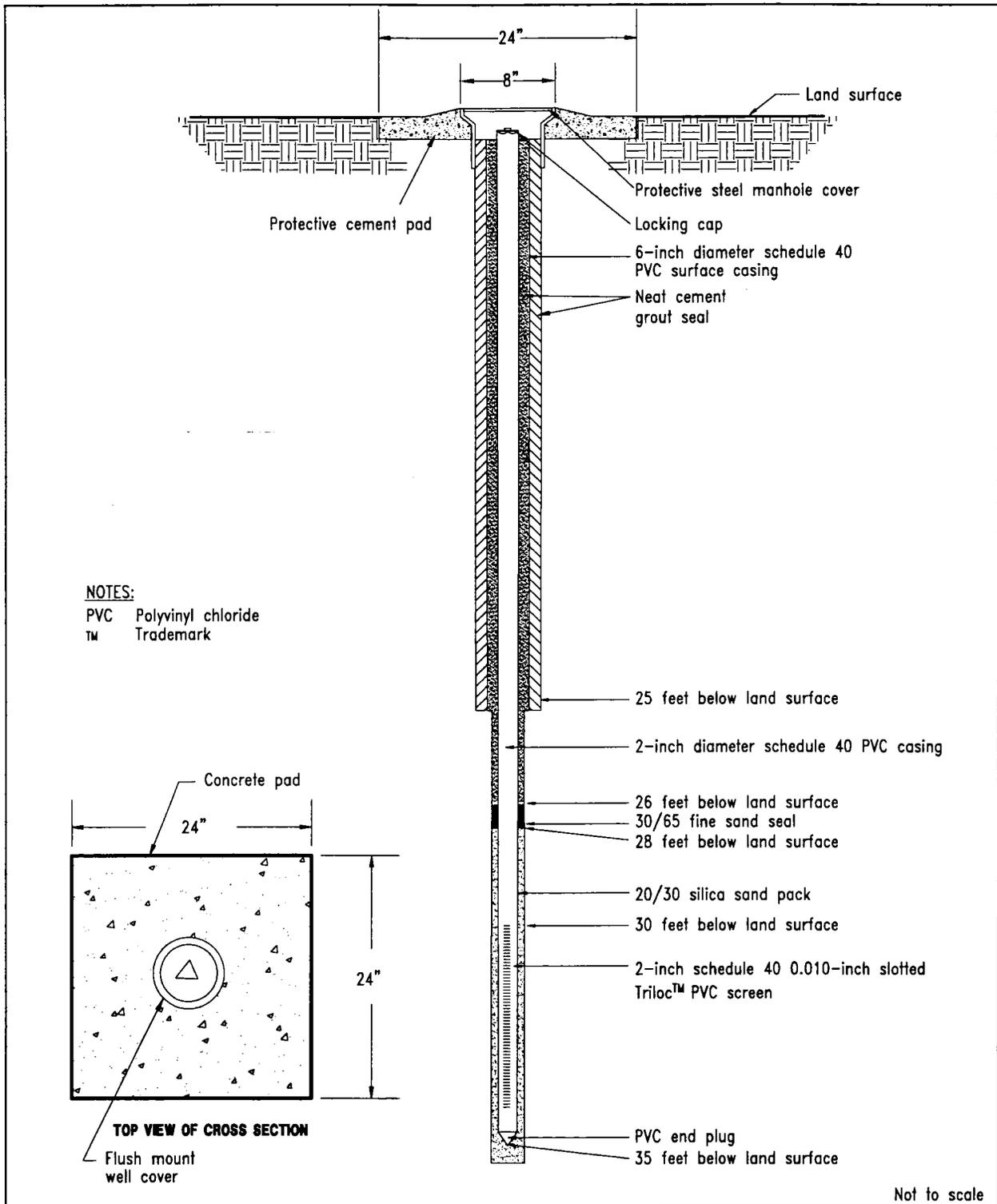
**FIGURE 2-2  
TYPICAL SHALLOW MONITORING WELL  
CONSTRUCTION DETAIL**



**SITE ASSESSMENT REPORT  
BUILDING 7174  
MCCOY ANNEX**

**NAVAL TRAINING CENTER  
ORLANDO, FLORIDA**

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**FIGURE 2-3**  
**TYPICAL DEEP MONITORING WELL**  
**CONSTRUCTION DETAIL**



**SITE ASSESSMENT REPORT**  
**BUILDING 7174**  
**MCCOY ANNEX**

**NAVAL TRAINING CENTER**  
**ORLANDO, FLORIDA**

interval was located at a depth that encompassed seasonal water table fluctuations. The deep well was constructed with 5 feet of 2-inch diameter 0.010-inch slotted well screen coupled to 30 feet of 2-inch Schedule 40 solid PVC. This assembly was installed through 25 feet of 6-inch-diameter PVC surface casing cemented in place. The annular space between the screen and the borehole for the shallow wells was filled with 20/30-grade silica sand to 0.5 foot above the screened interval, and a 0.5-foot fine sand (30/65-grade) seal was placed on top of the filter pack.

The annular space between the screen and the borehole for the deep well was filled with 20/30-grade silica sand to 2 feet above the screened interval, and a 2-foot fine sand (30/65-grade) seal was placed on top of the filter pack. The remaining annular space for the shallow and deep wells was sealed to grade with a neat cement grout mixture. A summary of the well construction details is presented in Table 2-1, and Appendix C, Well Construction Details, contains the well completion logs provided by the drilling subcontractor.

All monitoring wells were completed flush mount with surface grade well vaults, and locking well caps were installed to conform with standards outlined in Chapter 40C-3, FAC. Each monitoring well was developed by pumping until clear and free of sediment. Thorough field decontamination procedures were strictly enforced to prevent possible cross-contamination between field monitoring points. All drilling equipment, including drilling rods, bits, and HSAs, was thoroughly decontaminated between each well installation.

**2.4 GROUNDWATER SAMPLING PROGRAM.** Groundwater samples were collected from monitoring wells OLD-7174-26 and OLD-7174-31 on January 20, 1998; from monitoring wells OLD-7174-16, OLD-7174-24, OLD-7174-25, OLD-7174-27, OLD-7174-28, OLD-7174-29, and OLD-7174-30 on January 21, 1998; from monitoring wells OLD-7174-14 and OLD-7174-19 on January 22, 1998; from monitoring wells OLD-7174-18 and OLD-7174-23 on January 23, 1998; and from the deep well OLD-7174-32 on March 18, 1998. The samples were packed on ice and transported to Savannah Laboratories and Environmental Services, Inc., of Savannah, Georgia, for analysis. Groundwater samples collected from all the monitoring wells were analyzed for the sampling requirements established in Chapter 62-770, FAC, for sites with petroleum discharges defined under the Kerosene Analytical Group, which includes the following USEPA methods: 504 (ethylene dibromide [EDB]), 601 (volatile halocarbons), 602 (volatile organic aromatics [VOA]), 239.2 (total lead), 610 (polynuclear aromatic hydrocarbons [PAHs]), and total recoverable petroleum hydrocarbons (TRPH) using the FL-PRO.

**2.5 GROUNDWATER ELEVATION SURVEY.** The elevation and slope of the water table was calculated using the field-surveyed top-of-well casing data for each monitoring well and correlating the elevation data to a common datum. On January 9, February 11, and March 31, 1998, depth to groundwater was measured from the top-of-casing (TOC) to the nearest hundredth of a foot in each of the monitoring wells with an electronic water-level indicator. The groundwater depths were subtracted from the TOC elevation to obtain relative water table elevations. The wells were checked for the presence of free product by visual inspection of groundwater samples taken from each well and the use of an oil-water interface probe.

**Table 2-1  
Groundwater Monitoring Well Construction  
Data Summary**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Well Number	Date Installed	Total Depth (feet bls)	Well Diameter (inches)	Screened Interval (feet bls)	Slot Size (inches)	Comments
7174-1	NA	NA	NA	NA	NA	Destroyed during tank removal.
7174-2	NA	NA	NA	NA	NA	Destroyed during tank removal.
7174-3	NA	NA	NA	NA	NA	Destroyed during tank removal.
7174-4	NA	NA	NA	NA	NA	Destroyed during tank removal.
7174-5	8/22/88	13.5	2	3.5 to 13.5	0.01	Destroyed in January 1997 by Groundwater Protection, Inc. (GP).
7174-6	8/22/88	15	2	5 to 15	0.01	Installed by GP.
7174-7	8/23/88	13	2	3 to 13	0.01	Destroyed in January 1997 by GP.
7174-8	8/23/88	13	2	3 to 13	0.01	Destroyed in January 1997 by GP.
7174-9	8/23/88	13	2	3 to 13	0.01	Destroyed in January 1997 by GP.
7174-10	8/23/88	14	2	4 to 14	0.01	Destroyed in January 1997 by GP.
7174-11	8/18/91	13	2	3 to 13	0.01	Destroyed in January 1997 by GP.
7174-12	8/18/91	13	2	3 to 13	0.01	Destroyed in January 1997 by GP.
7174-13	8/18/91	13	2	3 to 13	0.01	Destroyed in January 1997 by GP.
7174-14	8/18/91	13	2	3 to 13	0.01	Installed by GP.
7174-15	8/18/91	15	2	5 to 15	0.01	Destroyed in January 1997 by GP.
7174-16	8/18/91	15	2	5 to 15	0.01	Installed by GP.
7174-17	8/19/91	37	4	31 to 36	0.01	Destroyed in January 1997 by GP.
7174-18	8/18/91	13	2	3 to 13	0.01	Installed by GP.
7174-19	8/19/91	14	2	4 to 14	0.01	Installed by GP.
7174-20	7/12/96	14	2	4 to 14	0.01	Destroyed in January 1997 by GP.
7174-21	7/12/96	14	2	4 to 14	0.01	Destroyed in January 1997 by GP.
7174-22	7/12/96	14	2	4 to 14	0.01	Destroyed in January 1997 by GP.
7174-23	7/12/96	14	2	4 to 14	0.01	Installed by GP.
7174-24	1/5/98	15	2	5 to 15	0.01	Installed by GP.
7174-25	1/5/98	15	2	5 to 15	0.01	Installed by GP.
7174-26	1/5/98	15	2	5 to 15	0.01	Installed by GP.
7174-27	1/5/98	15	2	5 to 15	0.01	Installed by GP.
7174-28	1/5/98	15	2	5 to 15	0.01	Installed by GP.
7174-29	1/6/98	15	2	5 to 15	0.01	Installed by GP.
7174-30	1/6/98	15	2	5 to 15	0.01	Installed by GP.
7174-31	1/6/98	15	2	5 to 15	0.01	Installed by GP.
7174-32	3/5/98	35	2	30 to 35	0.01	Installed by GP.

Notes: bls = below land surface.  
NA = not available.

### 3.0 GEOLOGY AND HYDROGEOLOGY

3.1 SITE STRATIGRAPHY. For purposes of this investigation, site stratigraphy and aquifer evaluation were limited to the surficial aquifer beneath the site. The soil profile for the Building 7174 site is based on visual examination of soil samples collected from soil borings, drill cuttings, and split-spoon stratigraphy samples obtained during the investigation. A typical stratigraphic soil profile consists of light gray to dark gray, fine-grained sand down to a depth of 25 feet bls, and gray fine-grained slightly silty to clayey sand to a depth of 42 feet bls. The soil profile is based upon the lithologic boring (SS-1), located approximately 40 feet northeast (upgradient) of the former UST area (Figure 2-1). Figure 3-1 shows the deep lithologic log for the soil boring (SS-1), and the lithologic logs for the hand-auger borings and monitoring wells installed during this investigation are included as Appendix D, Lithologic Logs.

3.2 SITE HYDROGEOLOGY AND GROUNDWATER FLOW DIRECTION. Groundwater elevations across the site were calculated by measuring water levels on January 9, February 11, and March 31, 1998, in the site's monitoring wells and by surveying the relative TOC elevations. The hydraulic gradient across the site was calculated by measuring the change in elevation head between monitoring wells OLD-7174-6 (upgradient well) and OLD-7174-18 (downgradient well) and dividing this head difference by the horizontal distance between these two wells. The scaled horizontal distance is 250 feet, and the change in elevation head between the wells, as measured on March 31, 1998, was 3.18 feet. The calculated hydraulic gradient is equal to  $1.27 \times 10^{-2}$  feet per foot (ft/ft). The site groundwater flow direction, based on the water table surface contour maps, is from north to south. Table 3-1 is a summary of groundwater elevation data for the January 9, February 11, and March 31, 1998, sampling events. Figures 3-2, 3-3, and 3-4 are the water table contour maps for January 9, February 11, and March 31, 1998, respectively.

3.3 AQUIFER CHARACTERISTICS. Rising-head aquifer slug tests were performed on monitoring wells OLD-7174-23, OLD-7174-26, and OLD-7174-32 using a Hermit 1,000C data logger and a 10 pounds-per-square-inch pressure transducer. The slug tests were performed to estimate a representative hydraulic conductivity for the underlying aquifer. The field data were resolved via AQTESOLV (Geraghty & Miller, 1989), an analytical computer program, using the Bouwer and Rice (1976) method for unconfined aquifers. Several slug tests were performed in each of the selected monitoring wells and the average results of the slug tests indicated a hydraulic conductivity value of 4.75 feet per day (ft/day) for OLD-7174-32, 0.37 ft/day for OLD-7174-23, and 1.63 ft/day for OLD-7174-26. The average hydraulic conductivity value is estimated to be 2.25 ft/day. Copies of the computer-generated graphical representations are contained in Appendix E, Slug Test Data.

Once the hydraulic conductivity, hydraulic gradient, and effective porosity of an aquifer are known, groundwater flow velocity can be calculated from the relationship:

$$V = K \times i / n \quad (1)$$

TITLE: NTC Orlando, Building 7174		LOG of WELL: NA	BORING NO. SS-1
CLIENT: SOUTHNAVFACENGCOM		PROJECT NO: 253015	
CONTRACTOR: Groundwater Protection, Inc.		DATE STARTED: 03/05/98	COMPLTD: 03/05/98
METHOD: Hollow Stem Auger 4.25"	CASE SIZE: N/A	SCREEN INT.: N/A	PROTECTION LEVEL: D
TOC ELEV.: N/A FT.	MONITOR INST.: OVA	TOT DPTH: 42FT.	DPTH TO $\nabla$ 6 FT.
LOGGED BY: Mirna Barq	WELL DEVELOPMENT DATE: N/A		SITE: 7174

DEPTH FT.	INTERVAL SAMPLED	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5		<1	0-2 Feet: SAND, fine grained, dark gray, no odor.	[Symbol]	SP	1,1,2,3	
		<1	2-4 Feet: SAND, fine grained, dark gray, no odor.			4,4,4,5	
		<1	4-6 Feet: SAND, fine grained, gray, no odor, wet, at 6 feet.			7,8,11,11	
		<1	6-8 Feet: SAND, fine grained, light gray, no odor.			7,8,11,18	
		<1	8-10 Feet: SAND, fine grained, gray, no odor.			9,11,14,23	
10							
15		<1	15-17 Feet: SAND, fine grained, gray to dark gray, no odor.	[Symbol]	SP	3,5,7,9	
20		<1	20-22 Feet: SAND, fine grained, slightly silty, gray, no odor, moist.	[Symbol]	SP	2,3,3,3	
25		<1	25-27 Feet: Slightly silty SAND, fine grained, gray, moist, no odor.	[Symbol]	SC	8,9,9,13	
30		<1	30-32 Feet: Clayey SAND, fine grained, gray, moist, no odor.	[Symbol]	SP	3,3,3,3	
35		<1	35-37 Feet: Slightly silty SAND, fine grained, dark gray, saturated, no odor.	[Symbol]	SP	4,8,10,14	
40		<1	40-42 Feet: SAND, fine grained, light gray, no odor.	[Symbol]	SC		
45							
50							

**FIGURE 3-1  
DEEP SOIL LITHOLOGIC LOG**



**SITE ASSESSMENT REPORT  
BUILDING 7174  
MCCOY ANNEX  
NAVAL TRAINING CENTER  
ORLANDO, FLORIDA**

K:\02530\02530-15\SAR\SS-1.LOG, NP 04/13/98, GTC5

**Table 3-1  
Groundwater Elevation Summary**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Well Number	Date	Depth to Product (ft btoc)	Depth to Water (ft btoc)	Product Thickness (feet)	Top-of-Casing Elevation* (feet)	Water-Level Elevation* (feet)
OLD-7174-MW-6	1/9/98	--	5.03	--	100.00	94.97
	2/11/98	--	6.82	--		93.18
	3/31/98	--	6.48	--		93.52
OLD-7174-MW-14	1/9/98	--	6.30	--	97.30	91.00
	2/11/98	--	7.04	--		90.26
	3/31/98	--	6.86	--		90.44
OLD-7174-MW-16	1/9/98	--	4.68	--	97.44	92.76
	2/11/98	--	5.80	--		91.64
	3/31/98	--	5.42	--		92.02
OLD-7174-MW-18	1/9/98	--	6.21	--	97.08	90.87
	2/11/98	--	6.86	--		90.22
	3/31/98	--	6.74	--		90.34
OLD-7174-MW-19	1/9/98	--	1.35	--	95.70	94.35
	2/11/98	--	3.05	--		92.65
	3/31/98	--	2.73	--		92.97
OLD-7174-MW-23	1/9/98	--	6.31	--	97.17	90.86
	2/11/98	--	6.95	--		90.22
	3/31/98	--	6.80	--		90.37
OLD-7174-MW-24	1/9/98	--	2.75	--	97.51	94.76
	2/11/98	--	4.32	--		93.19
	3/31/98	--	3.96	--		93.55
OLD-7174-MW-25	1/9/98	--	3.79	--	97.11	93.32
	2/11/98	--	5.18	--		91.93
	3/31/98	--	4.96	--		92.15

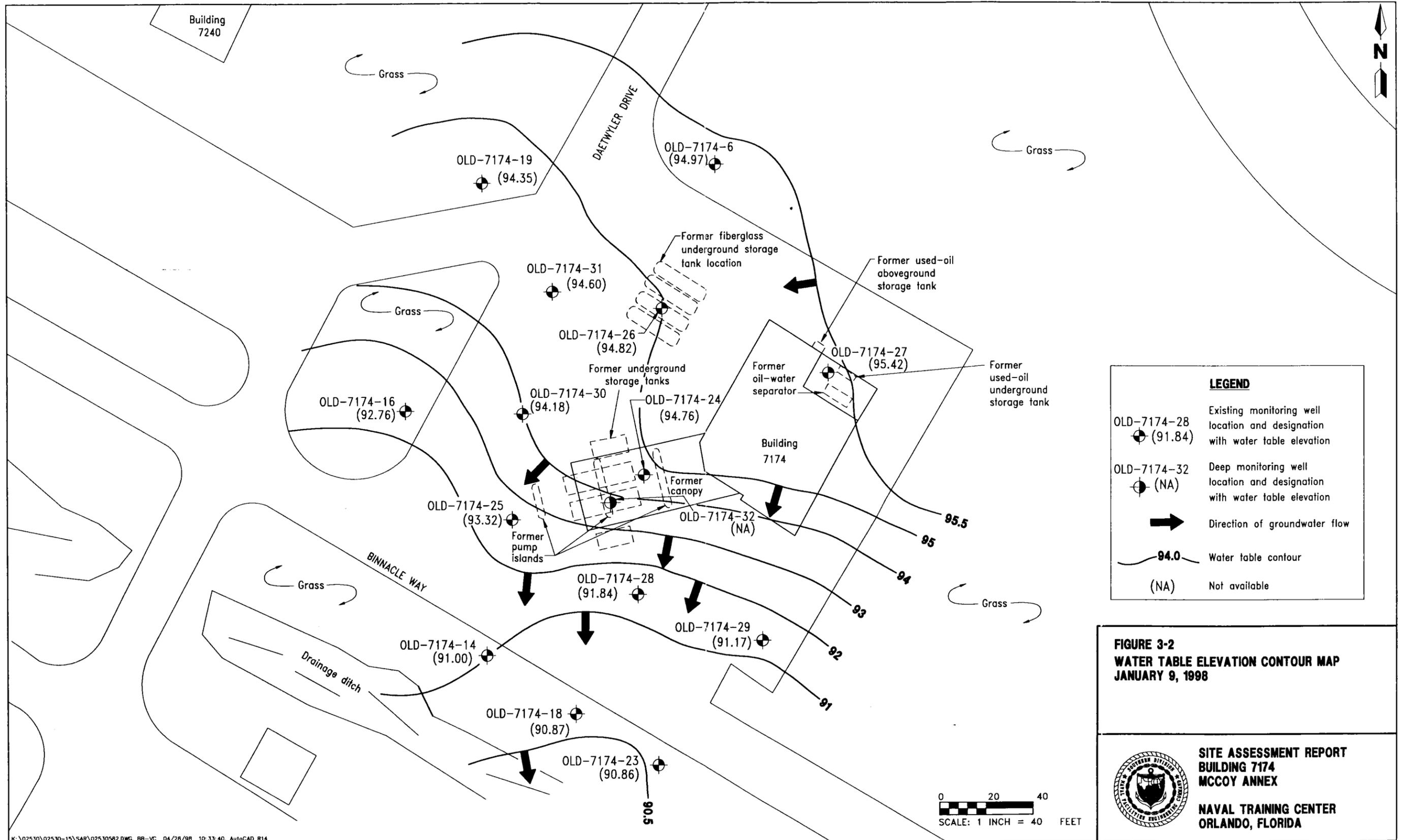
See notes at end of table.

**Table 3-1 (Continued)**  
**Groundwater Elevation Summary**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Well Number	Date	Depth to Product (ft btoc)	Depth to Water (ft btoc)	Product Thickness (feet)	Top-of-Casing Elevation* (feet)	Water-Level Elevation* (feet)
OLD-7174-MW-26	1/9/98	--	2.43	--	97.25	94.82
	2/11/98	--	4.10	--		93.15
	3/31/98	--	3.65	--		93.60
OLD-7174-MW-27	1/9/98	--	2.65	--	98.07	95.42
	2/11/98	--	4.31	--		93.76
	3/31/98	--	3.75	--		94.32
OLD-7174-MW-28	1/9/98	--	4.96	--	96.80	91.84
	2/11/98	--	5.84	--		90.96
	3/31/98	--	5.64	--		91.16
OLD-7174-MW-29	1/9/98	--	5.51	--	96.68	91.17
	2/11/98	--	6.32	--		90.36
	3/31/98	--	6.00	--		90.68
OLD-7174-MW-30	1/9/98	--	3.28	--	97.46	94.18
	2/11/98	--	5.25	--		92.21
	3/31/98	--	4.82	--		92.64
OLD-7174-MW-31	1/9/98	--	2.60	--	97.20	94.60
	2/11/98	--	4.21	--		92.99
	3/31/98	--	3.92	--		93.28
OLD-7174-MW-32	1/9/98	--	--	--	--	--
	2/11/98	--	--	--	--	--
	3/31/98	--	5.30	--	97.41	92.11

Notes: ft btoc = feet below top of casing.  
\* = referenced to arbitrary datum.  
-- = not applicable.



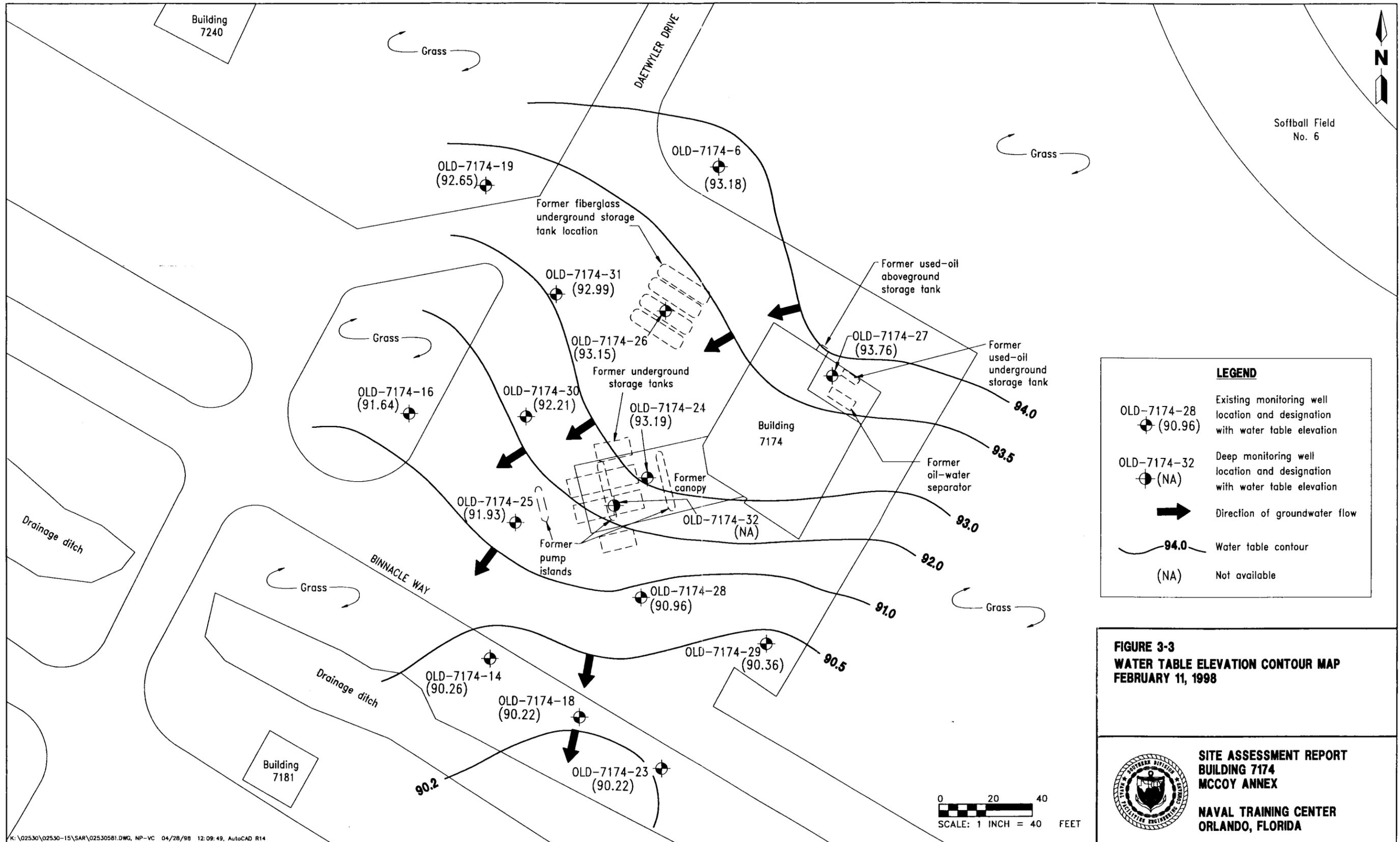
**LEGEND**

- OLD-7174-28 (91.84) Existing monitoring well location and designation with water table elevation
- OLD-7174-32 (NA) Deep monitoring well location and designation with water table elevation
- Direction of groundwater flow
- 94.0 Water table contour
- (NA) Not available

**FIGURE 3-2**  
**WATER TABLE ELEVATION CONTOUR MAP**  
**JANUARY 9, 1998**

**SITE ASSESSMENT REPORT**  
**BUILDING 7174**  
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**NAVAL TRAINING CENTER**  
**ORLANDO, FLORIDA**

0 20 40  
 SCALE: 1 INCH = 40 FEET



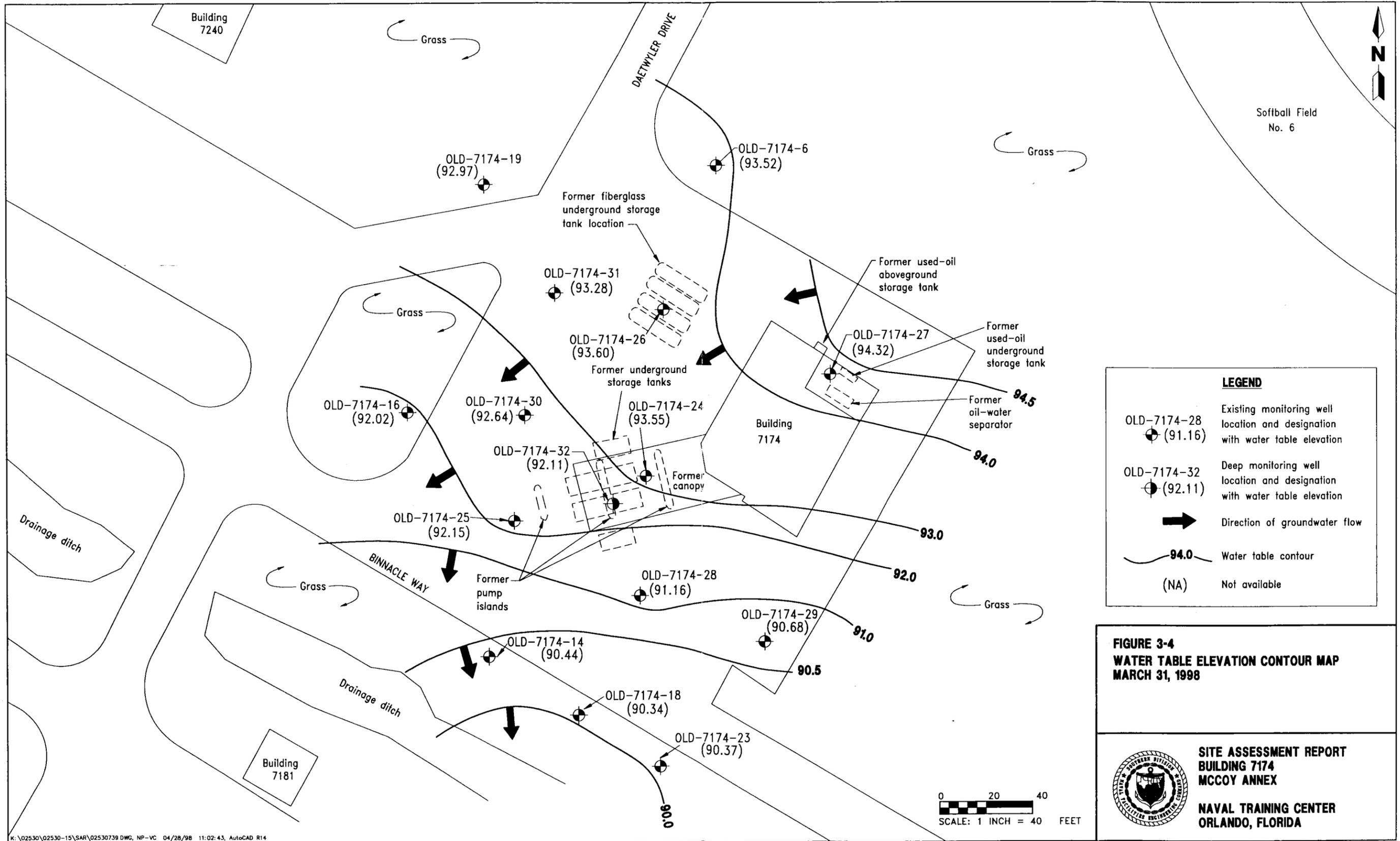
**LEGEND**

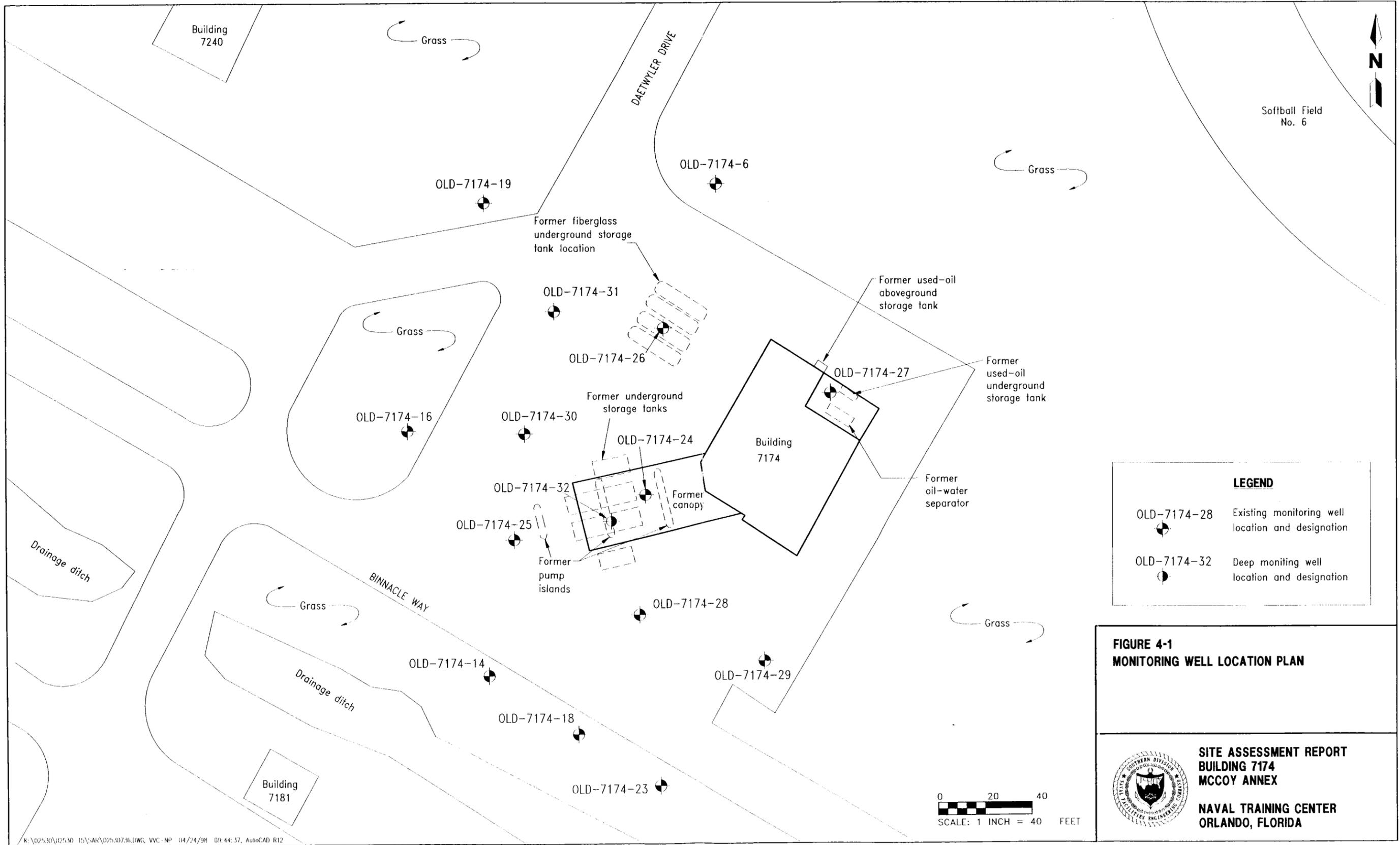
- OLD-7174-28 (90.96) Existing monitoring well location and designation with water table elevation
- OLD-7174-32 (NA) Deep monitoring well location and designation with water table elevation
- Direction of groundwater flow
- 94.0 Water table contour
- (NA) Not available

**FIGURE 3-3**  
**WATER TABLE ELEVATION CONTOUR MAP**  
**FEBRUARY 11, 1998**

**SITE ASSESSMENT REPORT**  
**BUILDING 7174**  
**MCCOY ANNEX**

**NAVAL TRAINING CENTER**  
**ORLANDO, FLORIDA**





**LEGEND**

	OLD-7174-28 Existing monitoring well location and designation
	OLD-7174-32 Deep monitoring well location and designation

**FIGURE 4-1  
MONITORING WELL LOCATION PLAN**

**SITE ASSESSMENT REPORT  
BUILDING 7174  
MCCOY ANNEX**  
**NAVAL TRAINING CENTER  
ORLANDO, FLORIDA**

0 20 40  
 SCALE: 1 INCH = 40 FEET

where:

V = velocity of groundwater flow in ft/day,  
K = hydraulic conductivity in ft/day,  
i = hydraulic gradient in ft/ft (unitless), and  
n = effective porosity in percent.

Because the predominant lithology underlying the site is fine-grained sand, an effective porosity of 35 percent or 0.35 was estimated for the underlying aquifer (Driscoll, 1986). The mean hydraulic conductivity calculated for the site is 2.25 ft/day, and the hydraulic gradient is  $1.27 \times 10^{-2}$  ft/ft. By substituting these values into the above equation, a groundwater flow velocity of 0.0816 ft/day (29.8 ft/year) is estimated for the site.

Transmissivity of the shallow aquifer underlying the site can be estimated from the relationship:

$$T = K \times H \quad (2)$$

where:

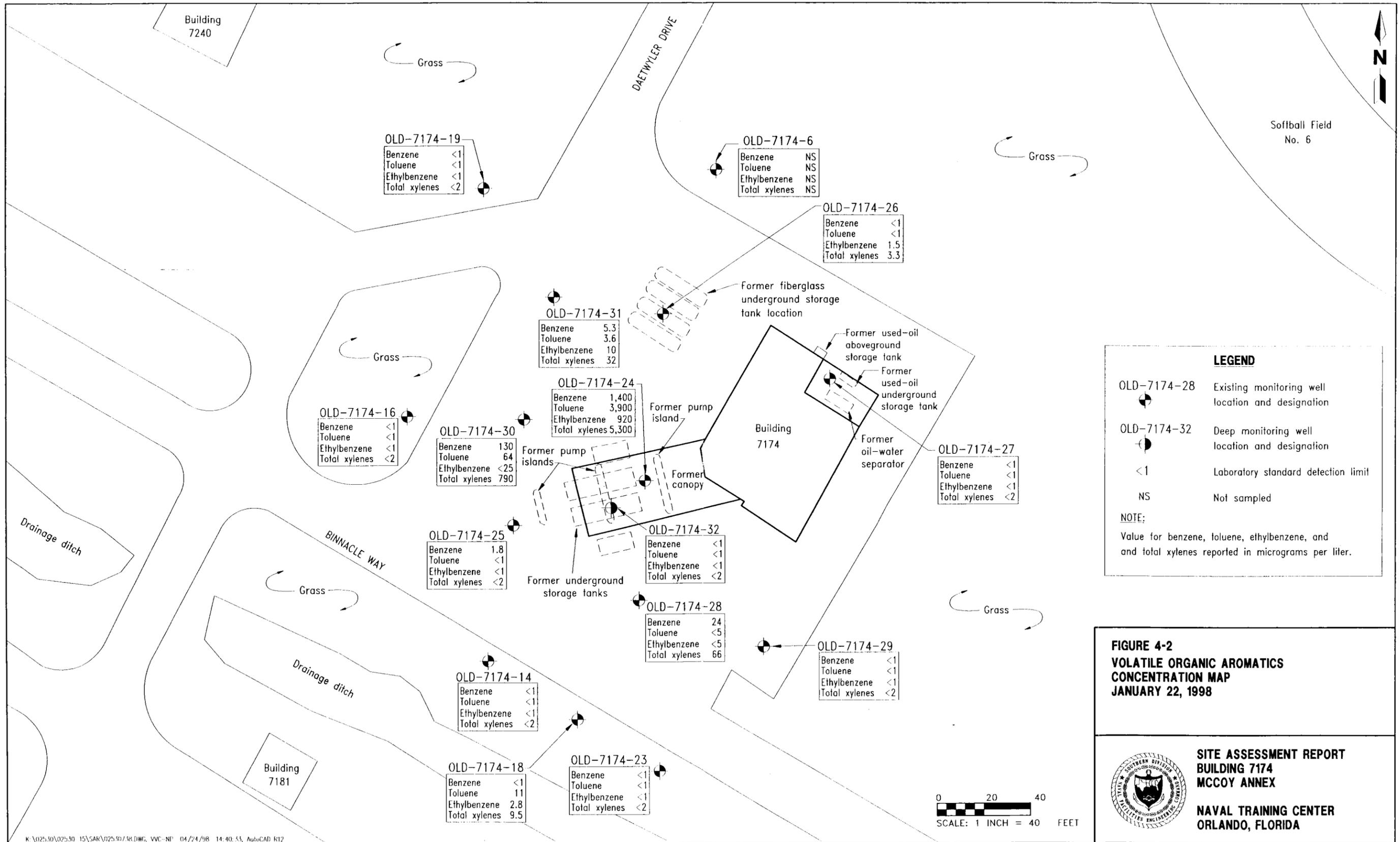
T = transmissivity in gallons per day per foot (gpd/ft)  
K = hydraulic conductivity in gallons per day per foot squared (gpd/ft<sup>2</sup>),  
and  
H = saturated thickness of the aquifer in feet.

After converting hydraulic conductivity to units of gpd/ft<sup>2</sup> and using the average saturated thickness of the aquifer (42 feet), a transmissivity value of 707 gpd/ft is estimated for the site. Storativity and specific yield for the aquifer underlying the site can be estimated at 0.2 and 10 to 35 percent, respectively (Driscoll, 1986).

**3.4 POTABLE WELL SURVEY.** A potable well survey for the surrounding area is included in the McCoy Annex CAR (ABB-ES, 1996). No active potable wells are reported in the site vicinity. Two potable wells, currently not in service, are located in the vicinity of the site, including WW-3, 0.3 mile north and WW-4, 0.4 mile northeast. Three other potable wells were recently abandoned near the site, including WW-5, 0.2 mile north; WW-2, 0.4 mile north; and WW-1, 0.7 mile north. In addition, two irrigation wells (WW-6, 1 mile northeast and WW-7, 1 mile south) are located near the site. See Figure 5-1, Potable and Irrigation Well Locations, of the McCoy Annex CAR (ABB-ES, 1996).

**3.5 SURFACE WATER.** There are no surface water bodies in the site vicinity. The nearest standing water is located in the drainage ditch running northwest to southeast, along Binnacle Way, approximately 50 feet south of the site.

wells OLD-7174-18 and OLD-7174-23 on January 23, 1998; and from the deep well OLD-7174-32 on March 18, 1998. Groundwater samples were analyzed for Chapter 62-770 FAC gasoline and kerosene analytical group, which includes the following USEPA methods: 504 (EDB), 601 (volatile halocarbons), 602 (VOA), 239.2 (total lead), 610 (PAH), and FL-PRO (TRPH). Laboratory analytical results for monitoring well OLD-7174-24 indicate the presence of several compounds at concentrations exceeding Chapter 62-770, FAC, Groundwater CTLs, including benzene (1400 micrograms per liter [ $\mu\text{g}/\ell$ ]), toluene (3900  $\mu\text{g}/\ell$ ), ethylbenzene (920  $\mu\text{g}/\ell$ ), total xylenes (5300  $\mu\text{g}/\ell$ ), TRPH (8.6 milligrams per liter), 1,2-dibromoethane (0.022  $\mu\text{g}/\ell$ ) and naphthalene (100  $\mu\text{g}/\ell$ ). Laboratory analytical results for monitoring well OLD-7174-25 indicate concentration of benzene at 1.8  $\mu\text{g}/\ell$ . Laboratory analytical results for monitoring well OLD-7174-28 indicate the concentrations of benzene at 24  $\mu\text{g}/\ell$  and total xylenes at 66  $\mu\text{g}/\ell$ . Laboratory analytical results for monitoring well OLD-7174-30 indicate concentration of benzene at 130  $\mu\text{g}/\ell$ , toluene 64  $\mu\text{g}/\ell$ , total xylenes at 790  $\mu\text{g}/\ell$  and naphthalene at 41  $\mu\text{g}/\ell$ . Laboratory analytical results for monitoring well OLD-7174-31 indicate concentration of benzene at 5.3  $\mu\text{g}/\ell$ , total xylenes at 32  $\mu\text{g}/\ell$  and naphthalene at 20  $\mu\text{g}/\ell$ . On March 18, 1998, the deep monitoring well OLD-7174-32 was sampled. Laboratory analytical results for the deep well indicate that all VOAs and PAHs were below laboratory standard detection limits. Figure 4-2 shows the distribution of VOAs on January 22, 1998, and Figure 4-3 shows the distribution of TRPH and naphthalene on January 22, 1998. Table 4-4 summarizes the groundwater laboratory analytical results. Water Sampling Log Forms are included in Appendix F. The groundwater and soil laboratory analytical reports are included in Appendix G.



OLD-7174-19

Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total xylenes	<2

OLD-7174-6

Benzene	NS
Toluene	NS
Ethylbenzene	NS
Total xylenes	NS

OLD-7174-26

Benzene	<1
Toluene	<1
Ethylbenzene	1.5
Total xylenes	3.3

OLD-7174-31

Benzene	5.3
Toluene	3.6
Ethylbenzene	10
Total xylenes	32

OLD-7174-16

Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total xylenes	<2

OLD-7174-30

Benzene	130
Toluene	64
Ethylbenzene	<25
Total xylenes	790

OLD-7174-24

Benzene	1,400
Toluene	3,900
Ethylbenzene	920
Total xylenes	5,300

OLD-7174-25

Benzene	1.8
Toluene	<1
Ethylbenzene	<1
Total xylenes	<2

OLD-7174-32

Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total xylenes	<2

OLD-7174-27

Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total xylenes	<2

OLD-7174-28

Benzene	24
Toluene	<5
Ethylbenzene	<5
Total xylenes	66

OLD-7174-29

Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total xylenes	<2

OLD-7174-14

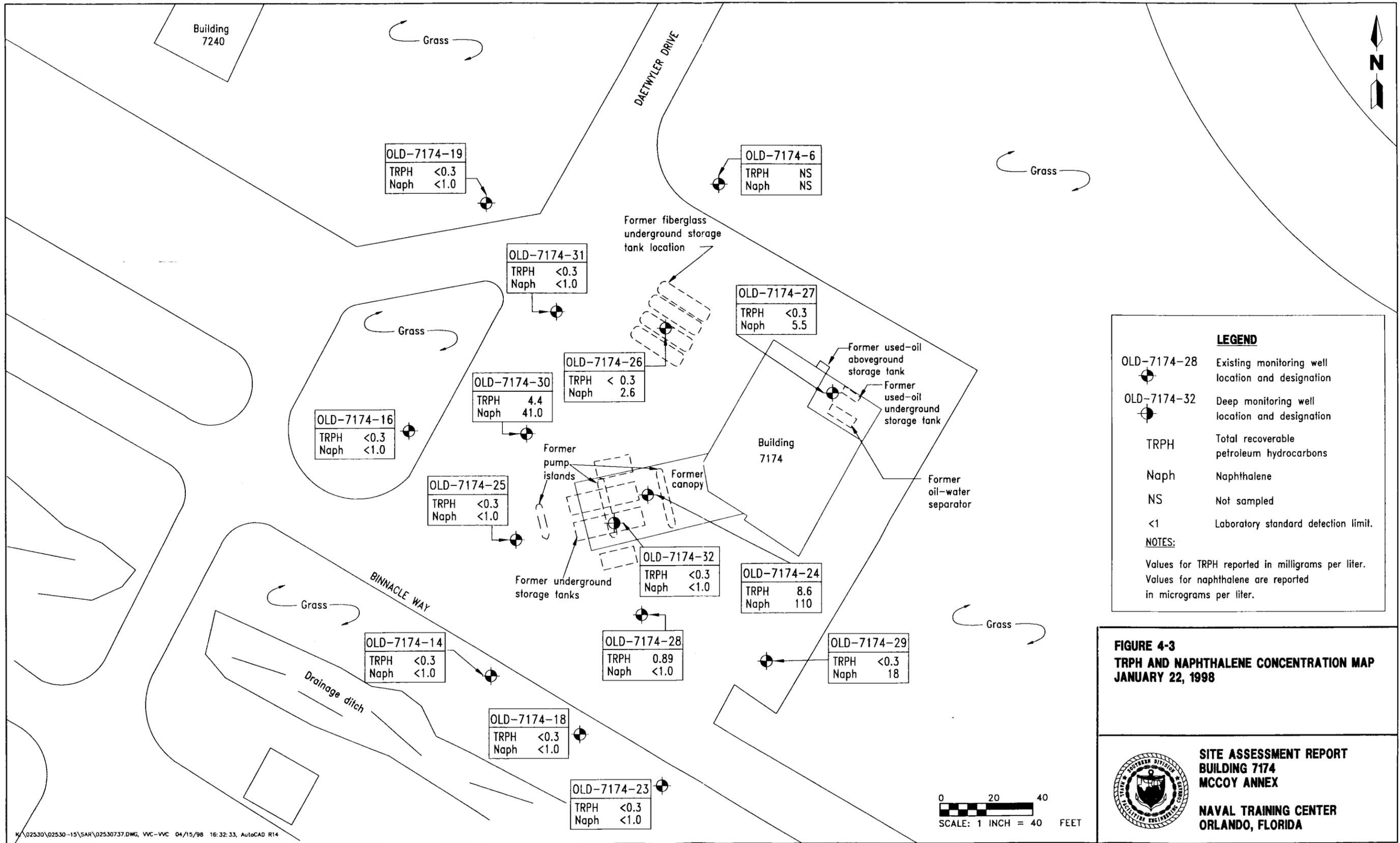
Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total xylenes	<2

OLD-7174-18

Benzene	<1
Toluene	11
Ethylbenzene	2.8
Total xylenes	9.5

OLD-7174-23

Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total xylenes	<2



## 4.0 SITE ASSESSMENT RESULTS

4.1 SOIL CONTAMINATION. Forty-one hand-augered soil borings (SB-1 through SB-41) were advanced using a TerraProbe<sup>SM</sup> on December 2 and 3, 1997. Figure 2-1 shows the soil boring locations. One hundred and sixty-four soil samples were collected at discrete intervals for OVA analysis. A summary of OVA results is presented in Table 4-1.

Petroleum-impacted soil was encountered in hand-augered borings SB-1, SB-5, SB-7, SB-8, SB-9, SB-10, SB-11, SB-12, SB-18, SB-21, SB-22, SB-23, SB-26, SB-28, SB-29, SB-30, SB-34, SB-37, and SB-41 during field screening of the site. The concentrations of petroleum-impacted soil found in these borings are presented in Table 4-1.

Three composite soil samples were collected for laboratory analysis, including AB-22 (SB-22 from 4 to 6 feet bls); AB-12 (SB-12 from 2 to 4 feet bls); and AB-40 (SB-40 from 2 to 4 feet bls). The soil samples were analyzed using USEPA Methods 8020 and 8310 and FL-PRO. Laboratory analytical results for soil sample SS-22 indicate the presence of benzene concentrations that exceed laboratory standard detection limits (1.1 milligrams per kilogram [mg/kg]). All other concentrations were below the soil cleanup target levels (SCTLs). Laboratory analytical results for soil sample AB-12 and AB-40 were all below the SCTLs. A summary of the soil laboratory analytical results is presented in Table 4-2. In addition to the USEPA Methods for soil described above, soil samples AB-12 and AB-22 were analyzed using USEPA Method 1312, Synthetic Precipitation Leaching Procedures (SPLP), to compare leachate concentrations with applicable groundwater CTLs in Chapter 62-770, FAC, Table V<sup>a</sup>. Laboratory analytical results from the SPLP of soil sample AB-22 show total xylenes are at 1 mg/kg, which is above the SCTL for total xylenes of 0.3 mg/kg. The following parameters reported SPLP concentrations above laboratory standards detection limits: TRPH at 66 mg/kg, acenaphthene at 0.058 mg/kg, naphthalene at 0.17 mg/kg, toluene at 0.1 mg/kg, and ethylbenzene at 0.13 mg/kg. Table 4-3 summarizes the leachate concentrations reported by the laboratory. Appendix G contains the soil laboratory analytical reports and chain-of-custody form.

4.2 FREE-PRODUCT OCCURRENCE. During this investigation, no free product was reported at this site.

4.3 GROUNDWATER CONTAMINATION. Six shallow monitoring wells (OLD-7174-6, OLD-7174-14, OLD-7174-16, OLD-7174-18, OLD-7174-19 and OLD-7174-23) were installed during the original CA investigation. In addition, eight shallow monitoring wells (OLD-7174-24 through OLD-7174-31) were installed on January 5 and 6, 1998, and one deep well (OLD-7174-32) was installed at the site on March 5 and 6, 1998. These monitoring wells were installed to assess the groundwater flow direction and the horizontal and vertical extent of dissolved petroleum hydrocarbon contamination in the shallow aquifer. Locations of the monitoring wells are shown on Figure 4-1.

Groundwater samples were collected from monitoring wells OLD-7174-26 and OLD-7174-31 on January 20, 1998; from monitoring wells OLD-7174-16, OLD-7174-24, OLD-7174-25, OLD-7174-27, OLD-7174-28 and OLD-7174-29 on January 21, 1998; from monitoring wells OLD-7174-14 and OLD-7174-19 on January 22, 1998; from monitoring

**Table 4-1  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
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Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-1	0 to 2	10	8	2	Well-sorted fine-grained gray sand; no odor.
	2 to 4	900	< 1	900	Well-sorted fine-grained gray sand; strong odor.
	4 to 6	100	90	10	Well-sorted fine-grained brown to dark brown silty sand; strong odor.
	6 to 8	28	< 1	28	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-2	0 to 2	3	2	1	Well-sorted fine-grained gray sand; no odor.
	2 to 4	4	2	2	Well-sorted fine-grained gray sand; no odor.
	4 to 6	18	1	17	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	70	70	0	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-3	0 to 2	< 1	< 1	< 1	Well-sorted fine-grained gray sand; no odor.
	2 to 4	< 1	< 1	< 1	Well-sorted fine-grained gray sand; no odor.
	4 to 6	30	20	10	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	50	40	10	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
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Orlando, Florida

Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-4	0 to 2	<1	<1	<1	Well-sorted fine-grained gray sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained gray sand; no odor.
	4 to 6	20	<1	20	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	80	80	0	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-5	0 to 2	5	<1	5	Well-sorted fine-grained gray sand; no odor.
	2 to 4	20	5	15	Well-sorted fine-grained gray sand; no odor.
	4 to 6	100	90	10	Well-sorted fine-grained brown to dark brown silty sand; strong odor.
	6 to 8	900	150	750	Well-sorted fine-grained brown to dark brown silty sand; strong odor. Water table detected at 8 feet bls.
SB-6	0 to 2	<1	<1	<1	Well-sorted fine-grained gray sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained gray sand; no odor.
	4 to 6	20	10	10	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	90	90	<1	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
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Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-7	0 to 2	<1	<1	<1	Well-sorted fine-grained gray sand; no odor.
	2 to 4	100	90	10	Well-sorted fine-grained gray sand; no odor.
	4 to 6	200	50	150	Well-sorted fine-grained brown to dark brown silty sand; organic odor.
	6 to 8	120	100	20	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-8	0 to 2	5	<1	5	Well-sorted fine-grained gray sand; no odor.
	2 to 4	100	20	80	Well-sorted fine-grained gray sand; no odor.
	4 to 6	150	130	20	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	600	300	300	Well-sorted fine-grained brown to dark brown silty sand; strong odor. Water table detected at 8 feet bls.
SB-9	0 to 2	<1	<1	<1	Well-sorted fine-grained gray sand; no odor.
	2 to 4	400	150	250	Well-sorted fine-grained gray sand; strong odor.
	4 to 6	110	50	60	Well-sorted fine-grained brown to dark brown silty sand; organic odor.
	6 to 8	100	30	70	Well-sorted fine-grained brown to dark brown silty sand; organic odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
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Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-10	0 to 2	<1	<1	<1	Well-sorted fine-grained gray sand; no odor.
	2 to 4	30	8	22	Well-sorted fine-grained gray sand; no odor.
	4 to 6	90	20	70	Well-sorted fine-grained brown to dark brown silty sand; organic odor.
	6 to 8	300	300	0	Well-sorted fine-grained brown to dark brown silty sand; organic odor. Water table detected at 8 feet bls.
SB-11	0 to 2	5	<1	5	Well-sorted fine-grained gray sand; no odor.
	2 to 4	35	30	5	Well-sorted fine-grained gray sand; no odor.
	4 to 6	210	120	90	Well-sorted fine-grained brown to dark brown silty sand; organic odor.
	6 to 8	180	100	80	Well-sorted fine-grained brown to dark brown silty sand; organic odor. Water table detected at 8 feet bls.
SB-12	0 to 2	10	<1	10	Well-sorted fine-grained gray sand; no odor.
<sup>1</sup> (AB-12)	2 to 4	900	200	700	Well-sorted fine-grained gray sand; strong odor.
SB-12	4 to 6	>1000	500	500	Well-sorted fine-grained brown to dark brown silty sand; strong odor.
	6 to 8	250	130	120	Well-sorted fine-grained brown to dark brown silty sand; organic odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-13	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	<1	<1	<1	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	<1	<1	<1	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-14	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	<1	<1	<1	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	10	<1	10	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-15	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	<1	<1	<1	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	<1	<1	<1	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-16	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	<1	<1	<1	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	<1	<1	<1	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-17	0 to 2	10	2	8	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	10	2	8	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	5	<1	5	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	15	10	5	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-18	0 to 2	15	10	5	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	100	30	70	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	150	70	80	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	10	4	6	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
See notes at end of table.					

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
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Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-19	0 to 2	5	<1	5	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	30	20	10	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	50	<1	50	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	5	<1	5	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-20	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	5	<1	5	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	5	<1	5	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	10	5	5	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-21	0 to 2	10	<1	10	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	20	<1	20	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	100	<1	100	Well-sorted fine-grained brown to dark brown silty sand; organic odor.
	6 to 8	120	10	110	Well-sorted fine-grained brown to dark brown silty sand; organic odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
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Naval Training Center  
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Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-22	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	20	5	15	Well-sorted fine-grained gray to light brown sand; no odor.
<sup>1</sup> (AB-22)	4 to 6	>1000	<1	>1000	Well-sorted fine-grained brown to dark brown silty sand; strong odor.
SB-22	6 to 8	>1000	<1	>1000	Well-sorted fine-grained brown to dark brown silty sand; strong odor. Water table detected at 8 feet bls.
SB-23	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	10	<1	10	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	200	10	190	Well-sorted fine-grained brown to dark brown silty sand; strong odor.
	6 to 8	10	<1	10	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-24	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	100	90	10	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	10	<1	10	Well-sorted fine-grained brown to dark brown silty sand; organic odor.
	6 to 8	90	60	30	Well-sorted fine-grained brown to dark brown silty sand; organic odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

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Naval Training Center  
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Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-25	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	30	30	0	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	15	5	10	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	20	9	11	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-26	0 to 2	<1	<1	<1	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	20	15	5	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	100	20	80	Well-sorted fine-grained brown to dark brown silty sand; strong odor.
	6 to 8	20	15	5	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.
SB-27	0 to 2	5	<1	5	Well-sorted fine-grained gray to light brown sand; no odor.
	2 to 4	20	5	15	Well-sorted fine-grained gray to light brown sand; no odor.
	4 to 6	10	8	2	Well-sorted fine-grained brown to dark brown silty sand; no odor.
	6 to 8	10	<1	10	Well-sorted fine-grained brown to dark brown silty sand; no odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-28	0 to 2	210	120	90	Well-sorted fine-grained brown sand; no odor.
	2 to 4	>1000	130	870	Well-sorted fine-grained brown sand; strong odor.
	4 to 6	900	400	500	Well-sorted fine-grained light gray to dark gray silty sand; strong odor.
	6 to 8	>1000	180	820	Well-sorted fine-grained light gray to dark gray silty sand; strong odor. Water table detected at 8 feet bls.
SB-29	0 to 2	<1	<1	10	Well-sorted fine-grained brown sand; no odor.
	2 to 4	300	100	200	Well-sorted fine-grained brown sand; strong odor.
	4 to 6	230	20	210	Well-sorted fine-grained gray to dark gray silty sand; strong odor.
	6 to 8	120	50	70	Well-sorted fine-grained light gray to gray silty sand; no odor. Water table detected at 8 feet bls.
SB-30	0 to 2	5	<1	5	Well-sorted fine-grained brown sand; no odor.
	2 to 4	5	<1	5	Well-sorted fine-grained brown sand; no odor.
	4 to 6	90	<1	90	Well-sorted fine-grained gray to dark gray silty sand; no odor.
	6 to 8	130	<1	130	Well-sorted fine-grained gray to dark gray silty sand; no odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

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Orlando, Florida

Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-31	0 to 2	5	<1	5	Well-sorted fine-grained brown sand; no odor.
	2 to 4	5	<1	5	Well-sorted fine-grained brown sand; no odor.
	4 to 6	10	2	8	Well-sorted fine-grained light gray to dark gray silty sand; no odor.
	6 to 8	35	20	15	Well-sorted fine-grained light gray to dark gray silty sand; no odor. Water table detected at 8 feet bls.
SB-32	0 to 2	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	4 to 6	<1	<1	<1	Well-sorted fine-grained gray to dark gray silty sand; no odor.
	6 to 8	<1	<1	<1	Well-sorted fine-grained light gray to gray silty sand; no odor. Water table detected at 8 feet bls.
SB-33	0 to 2	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	4 to 6	<1	<1	<1	Well-sorted fine-grained gray to dark gray silty sand; no odor.
	6 to 8	<1	<1	<1	Well-sorted fine-grained gray to dark gray silty sand; no odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

Site Assessment Report  
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Orlando, Florida

Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-34	0 to 2	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	4 to 6	5	<1	5	Well-sorted fine-grained light gray to dark gray silty sand; no odor.
	6 to 8	>1000	500	500	Well-sorted fine-grained light gray to dark gray silty sand; strong odor. Water table detected at 7 feet bls.
SB-35	0 to 2	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	4 to 6	5	<1	5	Well-sorted fine-grained gray to dark gray silty sand; no odor.
	6 to 8	10	<1	10	Well-sorted fine-grained light gray to gray silty sand; no odor. Water table detected at 7 feet bls.
SB-36	0 to 2	5	<1	5	Well-sorted fine-grained brown sand; no odor.
	2 to 4	5	<1	5	Well-sorted fine-grained brown sand; no odor.
	4 to 6	5	<1	5	Well-sorted fine-grained gray to dark gray silty sand; no odor.
	6 to 8	5	<1	5	Well-sorted fine-grained gray to dark gray silty sand; no odor. Water table detected at 7 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

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Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-37	0 to 2	5	<1	5	Well-sorted fine-grained brown sand; no odor.
	2 to 4	35	5	30	Well-sorted fine-grained brown sand; no odor.
	4 to 6	250	<1	250	Well-sorted fine-grained light gray to dark gray silty sand; no odor.
	6 to 8	300	<1	300	Well-sorted fine-grained light gray to dark gray silty sand; no odor. Water table detected at 8 feet bls.
SB-38	0 to 2	5	<1	5	Well-sorted fine-grained brown sand; no odor.
	2 to 4	5	<1	5	Well-sorted fine-grained brown sand; no odor.
	4 to 6	5	<1	5	Well-sorted fine-grained gray to dark gray silty sand; no odor.
	6 to 8	5	<1	5	Well-sorted fine-grained light gray to gray silty sand; no odor. Water table detected at 8 feet bls.
SB-39	0 to 2	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	2 to 4	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	4 to 6	5	<1	5	Well-sorted fine-grained gray to dark gray silty sand; no odor.
	6 to 8	5	<1	5	Well-sorted fine-grained gray to dark gray silty sand; no odor. Water table detected at 8 feet bls.

See notes at end of table.

**Table 4-1 (Continued)  
Summary of Organic Vapor Analyses  
December 1997**

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Building 7174, McCoy Annex  
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Soil Boring Designation	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Total Hydrocarbons (ppm)	Comments
SB-40	0 to 2	5	<1	5	Well-sorted fine-grained brown sand; no odor.
<sup>1</sup> (AB-40)	2 to 4	5	<1	5	Well-sorted fine-grained brown sand; no odor.
SB-40	4 to 6	5	<1	5	Well-sorted fine-grained gray to dark gray silty sand; no odor.
	6 to 8	5	<1	5	Well-sorted fine-grained light gray to gray silty sand; no odor. Water table detected at 8 feet bls.
SB-41	0 to 2	<1	<1	<1	Well-sorted fine-grained brown sand; no odor.
	2 to 4	30	<1	30	Well-sorted fine-grained brown sand; no odor.
	4 to 6	80	20	60	Well-sorted fine-grained gray to dark gray silty sand; no odor.
	6 to 8	120	100	20	Well-sorted fine-grained gray to dark gray silty sand; no odor. Water table detected at 8 feet bls.

<sup>1</sup> Soil sample collected for laboratory analysis.

Notes: Readings for unfiltered samples are total hydrocarbon readings including methane; readings for filtered samples are methane only.

ppm = parts per million.

<1 = nondetectable limit for PortaFID II™.

bls = below land surface.

> = greater than.

**Table 4-2  
Summary of Soil Analytical Results  
December 9, 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Parameter	Direct Exposure Soil Cleanup Target Levels <sup>1</sup>		Soil Sample and Sample Date		
	Residential	Industrial	AB-12 12/9/97	AB-22 12/9/97	AB-40 12/9/97
Benzene	1.1	1.5	<0.005	1.1	<0.005
Toluene	300	2,000	<0.005	28	<0.005
Ethylbenzene	240	240	<0.005	18	<0.005
Total xylenes	290	290	<0.005	140	<0.005
MTBE	350	6,100	<0.05	7.2	<0.05
TRPH	350	2,500	17	190	<0.011
Acenaphthene	2,300	22,000	<0.022	<0.022	<0.022
Acenaphthylene	1,100	11,000	<0.022	<0.022	<0.022
Benzo(a)pyrene	0.1	0.5	0.017	0.01	<0.0043
Benzo(g,h,i)perylene	2,300	45,000	<0.011	<0.011	<0.011
Benzo(b)fluoranthene	1.4	5	0.016	0.014	<0.0043
Benzo(k)fluoranthene	15	52	<0.011	<0.011	<0.011
Chrysene	140	490	0.024	0.017	<0.0043
Benzo(a)anthracene	1.4	5.1	0.0085	0.0071	<0.0043
Fluoranthene	2,800	45,000	0.037	0.025	<0.011
Fluorene	2,100	24,000	<0.011	<0.011	<0.011
Indeno(1,2,3-cd)pyrene	1.5	5.2	<0.011	<0.011	<0.011
Dibenz(a,h)anthracene	0.1	0.5	<0.022	<0.022	<0.022
Naphthalene	1,000	8,600	<0.022	<0.022	<0.022
Phenanthrene	1,900	29,000	<0.01	<0.011	<0.0043
Anthracene	19,000	290,000	<0.0044	<0.0044	<0.0043
Pyrene	2,200	40,000	0.055	0.033	<0.0011
1,2-Dichloroethane	0.6	0.9	NA	NA	NA

<sup>1</sup> Cleanup target levels for residential and industrial exposure as defined in Table IV of Chapter 62-770, Florida Administrative Code.

Notes: All concentrations in milligrams per kilogram.

< = less than.

MTBE = methyl tert-butyl ether.

TRPH = total recoverable petroleum hydrocarbons (by Florida petroleum residual organics analysis).

NA = not available.

**Table 4-3  
Summary of Soil Leachate Analytical Results  
December 9, 1997**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Parameter	Groundwater Cleanup Target Levels for Resource Protection <sup>1</sup>	Soil Sample and Sample Date	
	Leachability	AB-12 12/9/97	AB-22 12/9/97
Benzene	0.007	<0.001	1.1
Toluene	0.4	<0.001	28
Ethylbenzene	0.4	<0.001	18
Total xylenes	0.3	<0.002	140
MTBE	0.2	<0.01	7.2
TRPH	340	<6	190
Acenaphthene	4	<0.06	<0.012
Acenaphthylene	22	<0.06	0.058
Benzo(a)pyrene	7.8	<0.00012	<0.0024
Benzo(g,h,i)perylene	13,000	<0.0003	<0.0006
Benzo(b)fluoranthene	9.8	<0.00012	<0.0024
Benzo(k)fluoranthene	25	<0.0003	<0.0006
Chrysene	80	<0.00012	<0.0024
Benzo(a)anthracene	2.9	<0.00012	<0.0024
Fluoranthene	550	<0.0003	<0.0006
Fluorene	87	<0.0003	<0.0006
Indeno(1,2,3-cd)pyrene	28	<0.0003	<0.0006
Dibenz(a,h)anthracene	14	<0.0006	<0.0012
Naphthalene	1	<0.0006	0.17
Phenanthrene	120	<0.0024	0.00017
Anthracene	2,000	<0.00012	<0.0024
Pyrene	570	<0.0003	<0.0006
1,2-Dichloroethane	0.02	NA	NA

<sup>1</sup> Cleanup target levels for residential and industrial exposure as defined in Table IV of Chapter 62-770, Florida Administrative Code.

Notes: All concentrations in milligrams per kilogram.

< = less than.

MTBE = methyl tert-butyl ether.

TRPH = total recoverable petroleum hydrocarbons (by Florida-Petroleum Residual Organics analysis).

NA = not available.

**Table 4-4  
Summary of Groundwater Analytical Results**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Parameter	Chapter 62-770 FAC Target Cleanup Levels <sup>1</sup> (ppb)	Monitoring Well and Sample Date			
		OLD-7174-MW-6 1/22/98	OLD-7174-MW-14 1/22/98	OLD-7174-MW-16 1/21/98	OLD-7174-MW-18 1/23/98
Benzene	1*	NS	<1	<1	<1
Toluene	40*	NS	<1	<1	11
Ethylbenzene	30*	NS	<1	<1	2.8
Total xylenes	20*	NS	<2	<2	9.5
MTBE	35	NS	<10	<10	<10
1,2-Dibromoethane (EDB)	0.02*	NS	<0.020	<0.020	<0.020
Total lead	15*	NS	<0.005	<0.005	<0.005
TRPH (mg/l)	5	NS	<0.3	<0.3	<0.3
Acenaphthene	20	NS	<1	<1	<1
Acenaphthylene	210	NS	<1	<1	<1
Benzo(a)pyrene	0.2*	NS	<0.2	<0.2	<0.2
Benzo(g,h,i)perylene	210	NS	<0.5	<0.5	<0.5
Benzo(b)fluoranthene	0.2	NS	<0.2	<0.2	<0.2
Benzo(k)fluoranthene	0.5	NS	<0.5	<0.5	<0.5
Chrysene	5	NS	<0.2	<0.2	<0.2
Benzo(a)anthracene	0.2	NS	<0.2	<0.2	<0.2
Fluoranthene	280	NS	<0.5	<0.5	<0.5
Fluorene	280	NS	<0.5	<0.5	<0.5
Indeno(1,2,3-cd)pyrene	0.2	NS	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	0.2	NS	<1	<1	<1
Naphthalene	20	NS	<1	<1	<1
Phenanthrene	210	NS	<0.2	<0.2	<0.2
Anthracene	2,100	NS	<0.2	<0.2	<0.2
Pyrene	210	NS	<0.5	<0.5	<0.5

Please see notes at end of table.

**Table 4-4 (Continued)**  
**Summary of Groundwater Analytical Results**

Site Assessment Report  
 Building 7174, McCoy Annex  
 Naval Training Center  
 Orlando, Florida

Parameter	Chapter 62-770 FAC Target Cleanup Levels <sup>1</sup> (ppb)	Monitoring Well and Sample Date			
		OLD-7174-MW-19 1/22/98	OLD-7174-MW-23 1/23/98	OLD-7174-MW-24 1/21/98	OLD-7174-MW-25 1/21/98
Benzene	1*	<1	<1	1400	1.8
Toluene	40*	<1	<1	3900	<1
Ethylbenzene	30*	<1	<1	920	<1
Total xylenes	20*	<2	<2	5300	<2
MTBE	35	<10	<10	<500	<10
1,2-Dibromoethane (EDB)	0.02*	<0.020	<0.020	0.022	<0.020
Total lead	15*	<0.005	<0.005	<0.005	<0.005
TRPH (mg/l)	5	<0.3	<0.3	8.6	<0.3
Acenaphthene	20	<1	<1	<1	<1
Acenaphthylene	210	<1	<1	39	<1
Benzo(a)pyrene	0.2*	<0.2	<0.2	<0.2	<0.2
Benzo(g,h,i)perylene	210	<0.5	<0.5	<0.5	<0.5
Benzo(b)fluoranthene	0.2	<0.2	<0.2	<0.2	<0.2
Benzo(k)fluoranthene	0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	5	<0.2	<0.2	<0.2	<0.2
Benzo(a)anthracene	0.2	<0.2	<0.2	<0.2	<0.2
Fluoranthene	280	<0.5	<0.5	<0.5	<0.5
Fluorene	280	<0.5	<0.5	0.83	<0.5
Indeno(1,2,3-cd)pyrene	0.2	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	0.2	<1	<1	<1	<1
Naphthalene	20	<1	<1	110	<1
Phenanthrene	210	<0.2	<0.2	<0.2	<0.2
Anthracene	2,100	<0.2	<0.2	<0.2	<0.2
Pyrene	210	<0.5	<0.5	<0.5	<0.5

Please see notes at end of table.

**Table 4-4 (Continued)  
Summary of Groundwater Analytical Results**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Parameter	Chapter 62-770 FAC Target Cleanup Levels <sup>1</sup> (ppb)	Monitoring Well and Sample Date			
		OLD-7174-MW-26 1/21/98	OLD-7174-MW-26D 1/23/98	OLD-7174-MW-27 1/21/98	OLD-7174-MW-28 1/21/98
Benzene	1*	<1	<1	<1	24
Toluene	40*	<1	<1	<1	<5
Ethylbenzene	30*	1.5	1.5	<1	<5
Total xylenes	20*	3.3	3.3	<2	66
MTBE	35	<10	<10	<10	<50
1,2-Dibromoethane (EDB)	0.02*	<0.020	<0.020	<0.20	<0.020
Total lead	15*	<0.005	<0.005	<0.005	0.08
TRPH (mg/l)	5	<0.3	<0.3	<0.3	0.89
Acenaphthene	20	<2	<2	<2	<1
Acenaphthylene	210	<2	<2	<2	<1
Benzo(a)pyrene	0.2*	0.4	<0.4	<0.4	<0.2
Benzo(g,h,i)perylene	210	<1	<1	<1	<0.5
Benzo(b)fluoranthene	0.2	<0.4	<0.4	<0.4	<0.2
Benzo(k)fluoranthene	0.5	<1	<1	<1	<0.5
Chrysene	5	<0.4	<0.4	<0.4	<0.2
Benzo(a)anthracene	0.2	<0.4	<0.4	<0.4	<0.2
Fluoranthene	280	<1	<1	<1	<0.5
Fluorene	280	<1	<1	<1	<0.5
Indeno(1,2,3-cd)pyrene	0.2	<1	<1	<1	<0.5
Dibenz(a,h)anthracene	0.2	<2	<2	<2	<1
Naphthalene	20	2.6	2.6	5.5	<1
Phenanthrene	210	1.7	1.7	2.9	<0.2
Anthracene	2,100	<0.4	<0.4	<0.4	<0.2
Pyrene	210	<1	<1	<1	<0.5

Please see notes at end of table.

**Table 4-4 (Continued)  
Summary of Groundwater Analytical Results**

Site Assessment Report  
Building 7174, McCoy Annex  
Naval Training Center  
Orlando, Florida

Parameter	Chapter 62-770 FAC Target Cleanup Levels <sup>1</sup> (ppb)	Monitoring Well and Sample Date			
		OLD-7174-MW-29 1/21/98	OLD-7174-MW-30 1/21/98	OLD-7174-MW-31 1/20/98	OLD-7174-MW-32 3/18/98
Benzene	1*	<1	130	5.3	<1
Toluene	40*	<1	64	3.6	<1
Ethylbenzene	30*	<1	<25	10	<1
Total xylenes	20*	<2	790	32	<2
MTBE	35	<10	<250	<10	<10
1,2-Dibromoethane (EDB)	0.02*	<0.020	<0.020	<0.020	<0.02
Total lead	15*	0.36	<0.005	<0.005	0.02
TRPH (mg/ℓ)	5	<0.3	4.4	<0.3	<0.3
Acenaphthene	20	<1	<4	<1	<1
Acenaphthylene	210	<1	10	5.4	<1
Benzo(a)pyrene	0.2*	<0.2	<0.8	<0.2	<0.2
Benzo(g,h,i)perylene	210	<0.5	<2	<0.5	<0.5
Benzo(b)fluoranthene	0.2	<0.2	<0.8	<0.2	<0.2
Benzo(k)fluoranthene	0.5	<0.5	<2	<0.5	<0.5
Chrysene	5	<0.2	<0.8	<0.2	<0.2
Benzo(a)anthracene	0.2	<0.2	<0.8	<0.2	<0.2
Fluoranthene	280	<0.5	<2	<0.5	<0.5
Fluorene	280	<0.5	<2	<0.5	<0.5
Indeno(1,2,3-cd)pyrene	0.2	<0.5	<2	<0.5	<0.5
Dibenz(a,h)anthracene	0.2	<1	<4	<1	<1
Naphthalene	20	18	41	20	<1
Phenanthrene	210	<0.2	<0.8	0.89	<0.2
Anthracene	2,100	<0.2	<0.8	<0.2	<0.2
Pyrene	210	<0.5	<2.0	<0.5	<0.5

<sup>1</sup> Asterisk denotes target cleanup levels as provided in Chapter 62-520 or 62-550, FAC.

Notes: All concentrations in micrograms per liter, unless otherwise noted.

FAC = Florida Administrative Code.

ppb = parts per billion.

NS = not sampled; dry well.

< = less than.

MTBE = methyl tert-butyl ether.

EDB = ethylene dibromide.

TRPH = total recoverable petroleum hydrocarbons (reported as Florida petroleum residual organics).

mg/ℓ = milligrams per liter.

## 5.0 SOURCE OF HYDROCARBONS

5.1 HYDROCARBON TYPE AND MASS DISTRIBUTION. The hydrocarbon type formerly stored at this facility was leaded and/or unleaded gasoline and used oil. The laboratory analytical data and the type of product previously stored on site support this assessment. Based on the findings of this investigation, the petroleum mass is found sorbed to the soil in the unsaturated zone, and dissolved in groundwater. To estimate the mass of hydrocarbons sorbed to soil, the impacted areas were divided in two. Area 1 had OVA readings of 50 ppm or greater and Area 2 had OVA readings of 1,000 ppm or greater. Using laboratory analytical results for soil sample AB-12 and estimating the area with OVA readings of 50 ppm or greater in Area 1, a total mass of hydrocarbons sorbed to the soil was calculated. Area 1, with petroleum impact to soil of 50 ppm or greater, is approximately 11,309 square feet. The vertical extent in Area 1 was assessed to be from 2 to 8 feet bls. Using laboratory analytical results for soil sample AB-22 and estimating Area 2 with OVA readings of 1,000 ppm or greater, a total mass of hydrocarbons sorbed to the soil was calculated. Area 2, with petroleum impact to soil of 1,000 ppm or greater, is approximately 2,100 square feet. The vertical extent in Area 2 is from 0 to 8 feet bls. Based on this information, the volume of impacted soil in Area 1 is estimated to be 55,254 cubic feet (2,046 yd<sup>3</sup>). The total hydrocarbon mass in soil in Area 1 is estimated to be 44 kilograms (kg). The volume of impacted soil in Area 2 is estimated to be 16,800 cubic feet (622 yd<sup>3</sup>). The total hydrocarbons in soil in Area 2 is estimated to be 304 kg. Therefore, the total hydrocarbon in both areas is 348 kg. The total hydrocarbon mass dissolved in groundwater is estimated to be 13.6 kg. Mass distribution calculations are presented in Appendix H.

5.2 SOURCE OF HYDROCARBON PLUME. The suspected source of the hydrocarbons in the groundwater and the soil is the product lines from the former abandoned in-place USTs. Petroleum discharges could be attributed to overfill and/or overfills while filling the former USTs.

5.3 MECHANISM OF TRANSPORT. The groundwater flow at the site is directed toward the southeast, where the drainage canal crosses Binnacle Way. The drainage influences groundwater flow in the surficial aquifer of the study area.

## 6.0 CONCLUSIONS AND RECOMMENDATIONS

There are approximately 348 kg of hydrocarbons sorbed to the soil and 13.6 kg of hydrocarbons dissolved in the groundwater at the former USTs area. Based on the results of this investigation, ABB-ES recommends the preparation of an RAP.

7.0 PROFESSIONAL REVIEW CERTIFICATION

This document, *Site Assessment Report, Building 7174, McCoy Annex, Naval Training Center, Orlando, Florida*, has been prepared under the direction of a professional geologist registered in the State of Florida. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice. This assessment is based on the geologic investigation and associated information detailed in the text and appended to this report or referenced in public literature. Recommendations are based upon interpretations of the applicable regulatory requirements, guidelines, and relevant issues discussed with regulatory personnel during the site investigation. If conditions that differ from those described are determined to exist, the undersigned geologist should be notified to evaluate the effects of any additional information on this assessment or the recommendations made in this report. This report meets the criteria set forth in Chapter 492 of the Florida Statutes with regard to good professional practices as applied to Chapter 62-770, FAC. This SAR was developed for the Building 7174 site at the McCoy Annex, NTC, Orlando, in Orlando, Florida, and should not be construed to apply to any other site.



Manuel Alonso  
Professional Geologist  
P.G. No. 0001256

6/30/98

Date

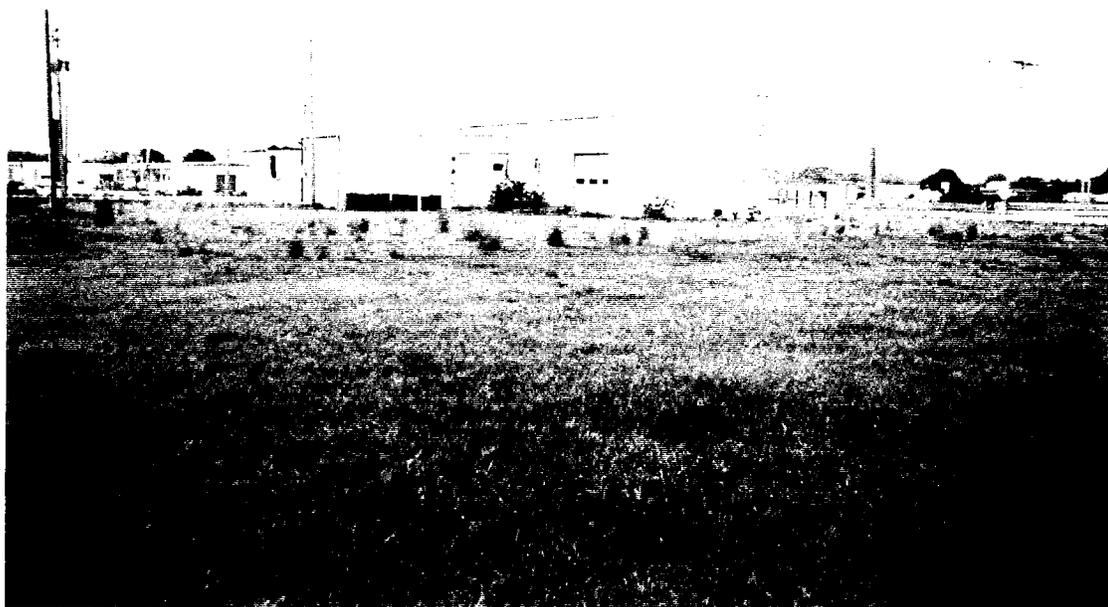
## REFERENCES

- ABB Environmental Services, Inc. (ABB-ES). 1993. *Remedial Action Plan, McCoy Annex, Naval Training Center, Orlando, Florida*. Prepared for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), North Charleston, South Carolina (April).
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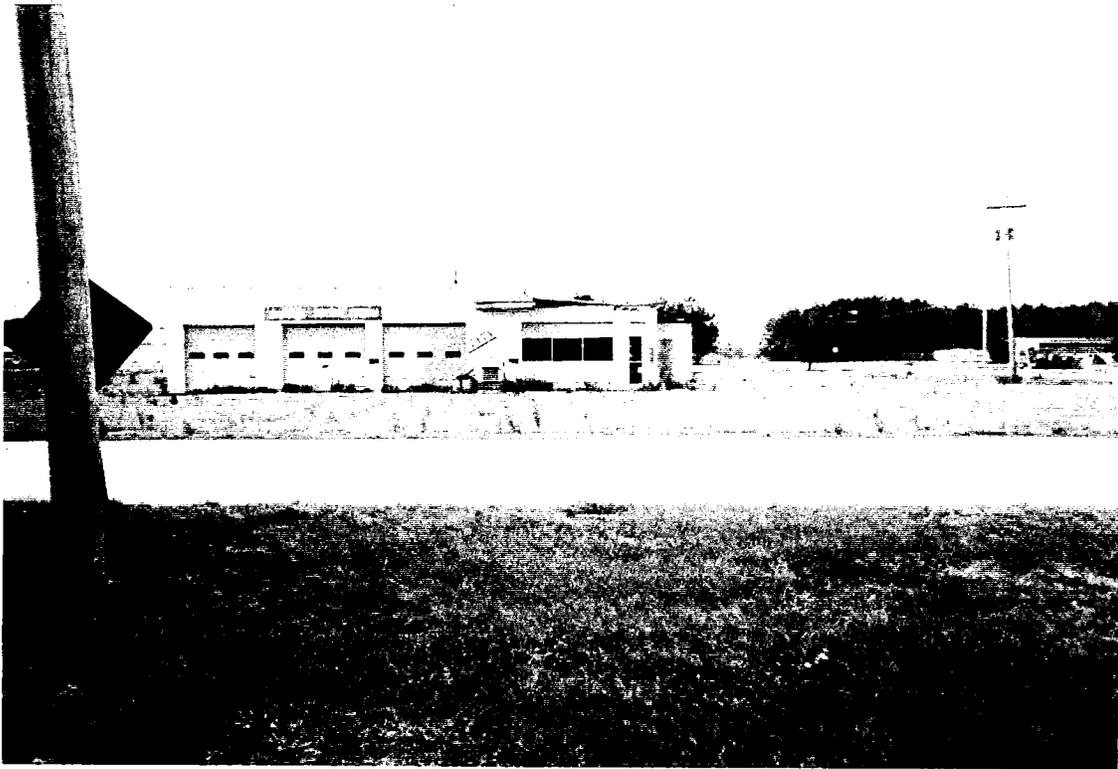
**APPENDIX A**  
**SITE PHOTOGRAPHS**



Photograph 1: View of former USTs area at Building 7174, facing west.



Photograph 2: View of former USTs area at Building 7174, facing southwest.



Photograph 3: View of former USTs area at Building 7174, facing east.



Photograph 4: View of former USTs area at Building 7174, facing southeast.

**APPENDIX B**

**INITIAL REMEDIAL ACTION/TANK CLOSURE ASSESSMENT REPORT**

**INITIAL REMEDIAL ACTION  
TANK CLOSURE ASSESSMENT REPORT  
BUILDING 7174  
McCOY ANNEX**

**NAVAL TRAINING CENTER  
ORLANDO, FLORIDA**

**Unit Identification Code: N65928**

**Contract No.: N62467-89-D-0317/107**

**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**

**Nick Ugolini, Code 1843, Engineer-in-Charge**

**October 1997**

# Department of Environmental Protection

Lawton Chiles  
Governor

Twin Towers Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Virginia B. Wetherell  
Secretary

May 26, 1998

Mr. Nick Ugolini  
Code 184 (PVC)  
Southern Division  
Naval Facilities Engineering Command  
2155 Eagle Drive  
P.O. Box 190010  
North Charleston, South Carolina 29419-9010

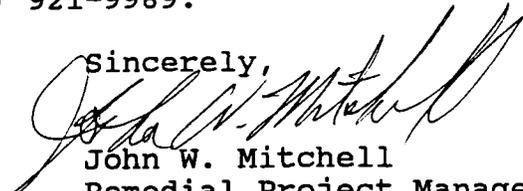
RE: Site Assessment Report, Building 7174, McCoy Annex  
Naval Training Center Orlando, Florida  
FDEP #488840202

Dear Mr. Ugolini:

The Bureau of Waste Cleanup has reviewed the Site Assessment Report (SAR) dated April 1998 (received May 5, 1998), submitted for this site and concur with the proposal to submit a Remedial Action Plan. We found all the documents submitted to date to be adequate to meet the site assessment requirements of Rules 62-770.600, Florida Administrative Code (F.A.C.). Therefore, you must now submit a Remedial Action Plan (RAP) in accordance with Rule 62-770.700, F.A.C. In addition, when analyzing SPLP results, results should be in  $\mu\text{g}/\text{l}$  and compared to the groundwater target cleanup levels.

If I can be of any further assistance with this matter, please contact me at (904) 921-9989.

Sincerely,



John W. Mitchell  
Remedial Project Manager

cc: Wayne Hansel, Navy SouthDiv  
John Kaiser, ABB, Orlando  
Bob Cohose, Bechtel, Knoxville  
Nancy Rodriguez, USEPA Region IV  
Gary Whipple, NTC Orlando  
Steve McCoy, Brown and Root, Oak Ridge  
Bill Bostwick, FDEP Central District

TJB



JJC



ESN



cc:manuel Alonso



July 14, 1998

Document No.:02530085

Commanding Officer  
Southern Division  
Naval Facilities Engineering Command  
Mr. Nick Ugolini, Code 1843  
2155 Eagle Drive  
N. Charleston, SC 29406

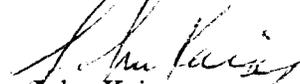
**Subject: Site Assessment Report (SAR) for Buliding 7174  
McCoy Annex  
NTC, Orlando, Florida  
CTO 107, Contract No.: N62467-89-D-0317/107**

Dear Mr. Ugolini

Enclosed is the Site Assessment Report (SAR) for Building 7174, McCoy Annex, NTC Orlando, Florida. This SAR is submitted as the Final SAR.

Should you have any question regarding this letter, please contact the undersigned at (407) 895-8845.

Very Truly Yours,  
**ABB ENVIRONMENTAL SERVICES, INC.**

  
John Kaiser  
Installation Manager

  
Manuel Alonso, P.G.  
Senior Geologist

JPK/MB/lak

cc: Wayne Hansel, Code 18B7, Southern Division  
Lt. Gary Whipple, NTC Orlando  
Mark Zill, NTC Orlando  
John Mitchell, FDEP  
City of Orlando via Wayne Hansel  
File Copy (2 enc)

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