GERAGHTY & MILLER, INC.

VERIFICATION STUDY

ASSESSMENT OF POTENTIAL GROUND-WATER POLLUTION AT NAVAL AIR STATION-JACKSONVILLE, JACKSONVILLE, FLORIDA

Prepared for

NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
Charleston, South Carolina

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INTRODUCTION

In August 1983, Geraghty & Miller, Inc., (G&M) was retained by the Naval Facilities Engineering Command, Southern Division (Navy) to provide hydrogeologic consulting services at the Naval Air Station (NAS) and Naval Fuel Depot (NFD), Jacksonville, Florida (see Figure 1). Specifically, G&M was to assist the Navy in performing Phase II (Confirmation Study) of the Navy Assessment and Control of Installation Pollutants (NACIP) program. This program is designed to identify contamination of Navy lands resulting from the past operations and to institute corrective measures as needed.

The NACIP program is divided into three phases. The first phase is the Initial Assessment Study (IAS) in which record searches and personal interviews are performed to collect and evaluate all evidence supporting the existence of a contamination problem at an installation. The second phase, the Confirmation Study, involves on-site investigations to confirm or refute the existence of contamination, and to quantify the extent of the problem if contamination is present. The third and final phase is the implementation of corrective actions and remedial measures to control or mitigate the contamination.

The Confirmation Study is further divided into two parts, verification and characterization. Initially, a verfication study is conducted to determine the presence or

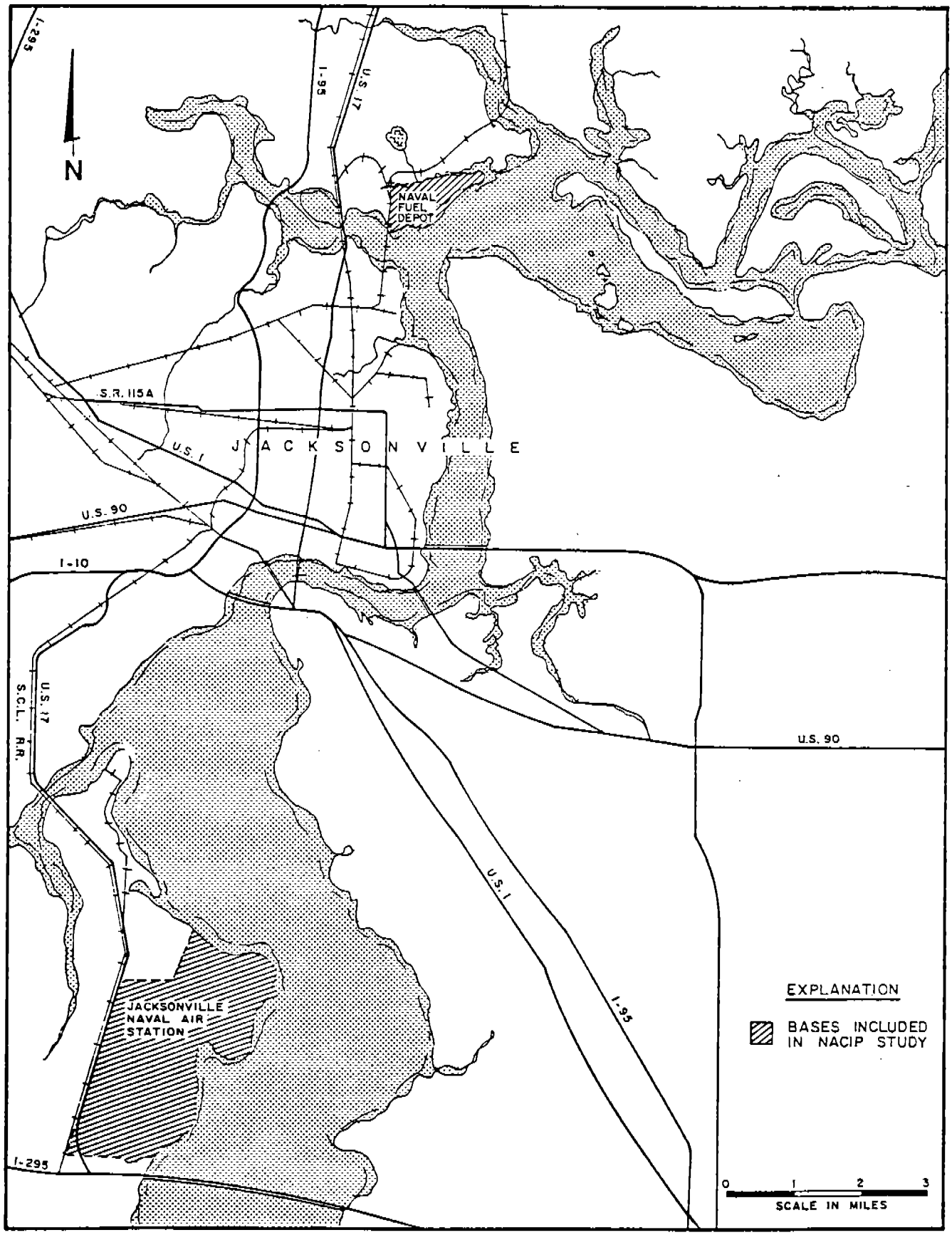

FIGURE 1. Location of the Naval Air Station (NAS) and Naval Fuel Depot (NFD), Jacksonville, Florida.

absence of contamination in the soil, surface water or ground water at each site. Based on these findings, the characterization study is then implemented at those sites requiring additional study to identify the nature and extent of the contamination.

A verification study was initiated in August 1983, in order to assess the potential environmental impacts of 13 sites previously identified in a report dated March 1983 entitled: "Initial Assessment Study of the Naval Air Station and Naval Fuel Depot, Jacksonville, Florida" (IAS). In October 1983, the FDER (Florida Department of Environmental Regulation) reviewed the IAS and a Plan-of-Action prepared for the verification study (August 15, 1983) and requested five (5) sites for additional investigation (four new sites and expanded scope of work for Site No. 29). Additionally, as a result of newly acquired information in March 1985, four new sites were added for consideration under the verification Study.

The results of the entire verification study (21 sites) and recommendations for further characterization at selected sites is presented in this report. The locations of the sites studied are shown in Figures 2 and 3 for the NAS and NFD, respectively. The site identification numbering system used in the IAS report has been retained for this report. Table 1 lists all the potential sites identified at the NAS and NFD including how they were identified, when recommended

verification, characterization, or remedial actions, and the current status.

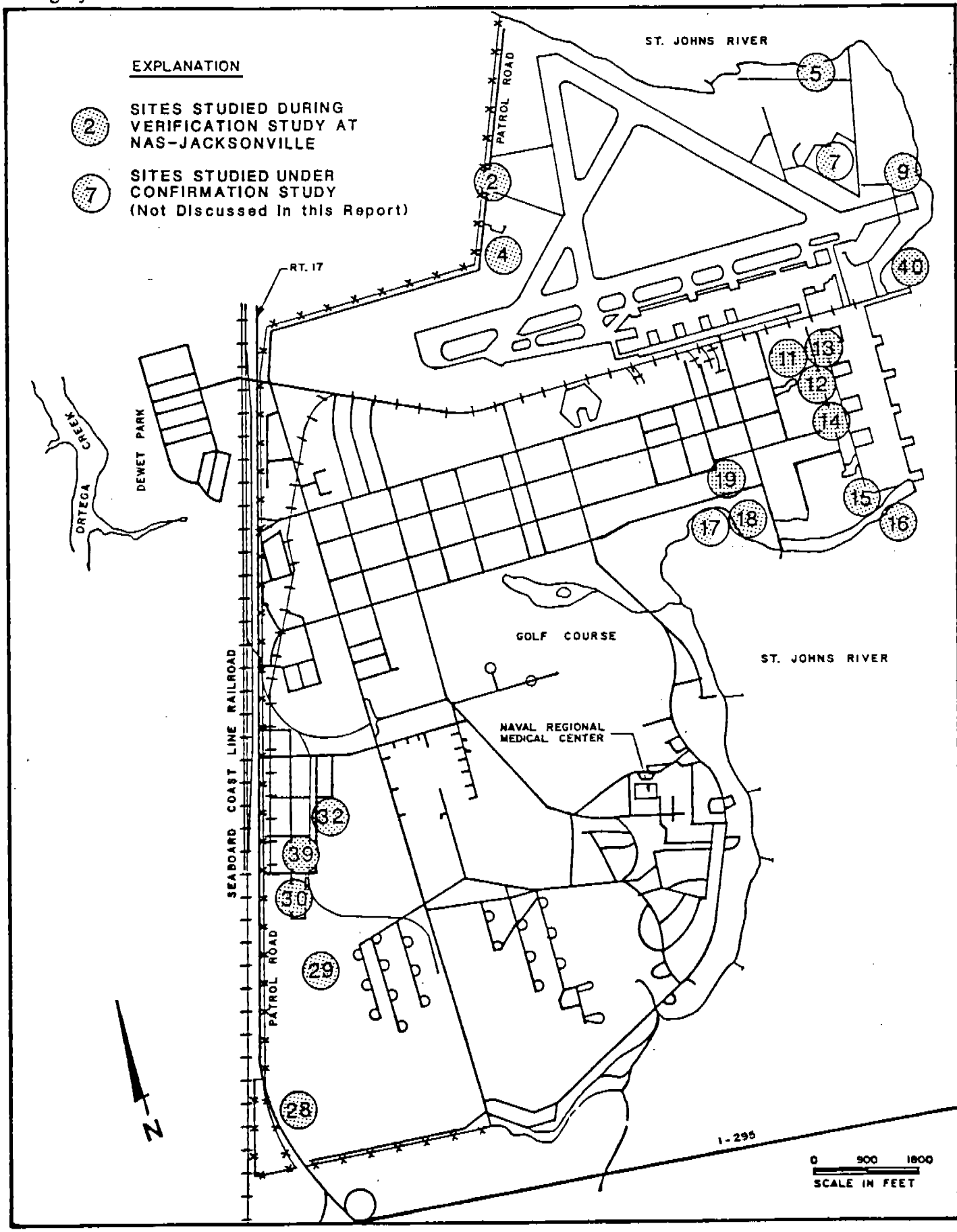

FIGURE 2. Location of the Sites Studied at the NAS, Jacksonville.

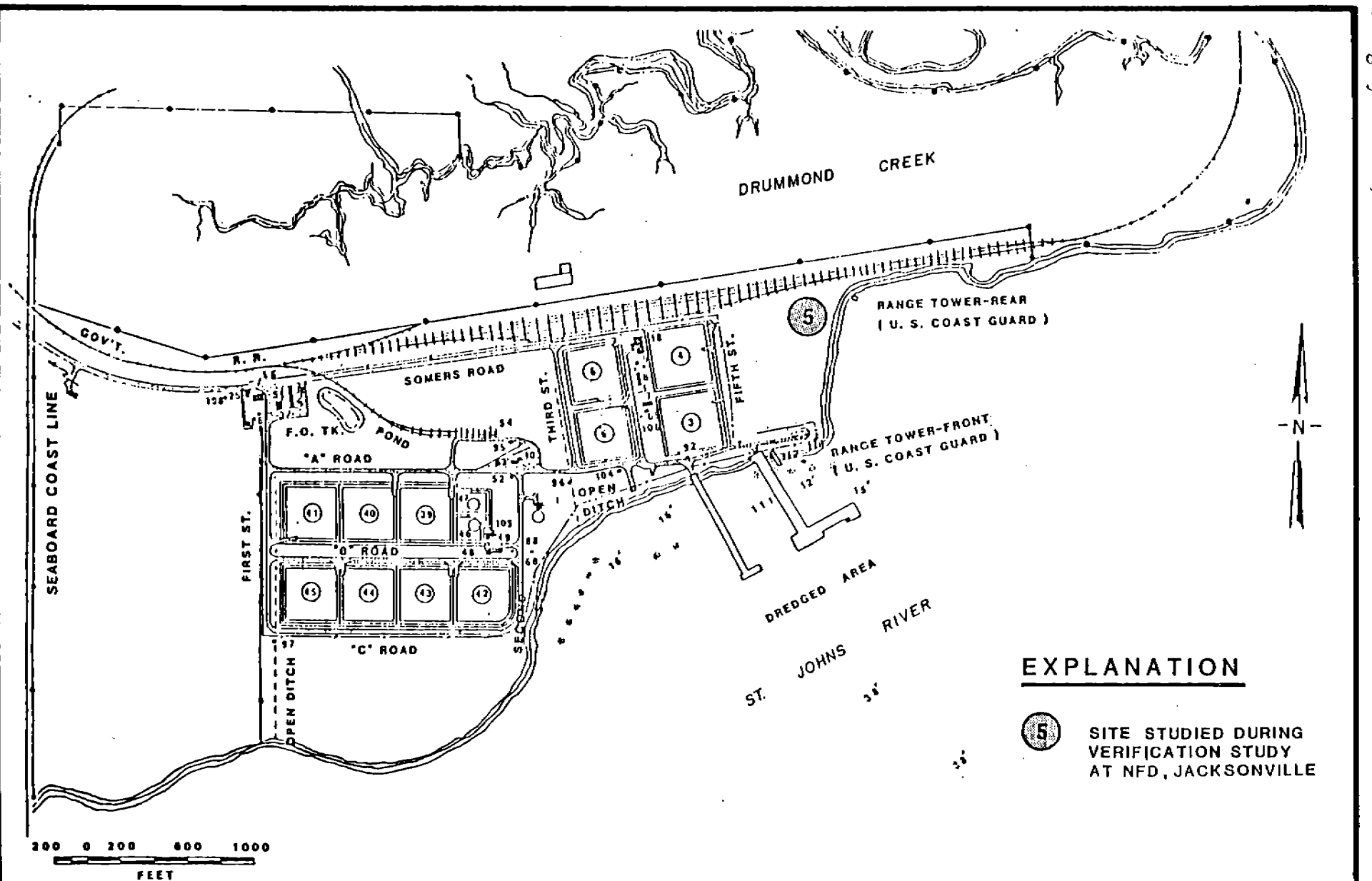

FIGURE 3. Location of the Site Studied at the NFD, Jacksonville.

TABLE 1. CURRENT STATUS OF ALL SITES IDENTIFIED AT THE NAS AND NFD

SITE NO.	IDENTIFIED BY	VERIFICATION RECOMMENDED BY	CHARACTERIZATION RECOMMENDED BY	REMEDIAL ACTION RECOMMENDED BY	CURRENT STA
NAS					
1	IAS[1/]	NR[2/]	-	-	Complete
2	IAS	FDER[3/]	NR	-	Complete
3	IAS	NR	-	-	Complete
4	IAS	IAS	NR	-	Complete
5	IAS	NAS-JAX	NR	-	Complete
6	IAS	NR	-	-	Complete
(7)	IAS	NAS-JAX	NAS-JAX	Characterization	Characteriza
8	IAS	NR	-	-	Complete
9	IAS	IAS	NR	-	Complete
10	IAS	NR	-	- 4/	Complete
(11)	IAS	IAS	Verification	NA	Characteriza
(12)	IAS	IAS	Verification	NA	Characteriza
13	IAS	FDER	NR	-	Complete
(14)	IAS	IAS	Verification	NA	Characteriza
(15)	IAS	IAS	Verification	NA	Characteriza
(16)	IAS	IAS	Verification	NA	Characteriz
17	IAS	IAS	NR	-	Closure Pla
18	IAS	FDER	NR	-	Complete
19	IAS	IAS	NR	-	Tanks to be abandoned by
20	IAS	NR	-	-	Complete
21	IAS	NR	-	-	Complete
22	IAS	NR	-	-	Complete
23	IAS	NR	-	-	Complete
24	IAS	NR	-	-	Complete
25	IAS	NR	-	-	Complete
26	NAS-JAX	Prior to NACIP	-	NAS-JAX	Remedial act
27	IAS	NR	-	-	Complete
(28)	IAS	NAS-JAX	Verification	NA	Characteriz
(29)	IAS	IAS	Verification	NA	Characteriz
(30)	IAS	IAS	Verification	NA	Characteriz
31	IAS	NR	-	-	Complete
(32)	IAS	FDER	Verification	NA	Characteriz
33	IAS	NR	-	-	Complete
34	IAS	NR	-	-	Complete
35	IAS	NR	-	-	Complete
36	IAS	NR	-	-	Complete
37	IAS	NR	-	-	Complete
38	IAS	NR	-	-	Complete
39	NAS-JAX	NAS-JAX	NR	-	Complete
40	NAS-JAX	NAS-JAX	NR	-	Complete
NFD					
1	IAS	NR	-	-	Complete
2	IAS	NR	-	-	Complete
3	IAS	NR	-	-	Complete
4	IAS	NR	-	-	Complete
5	IAS	IAS	Verification	NA	Characteriz

1/ IAS = Initial Assessment Study
2/ NR = Not recommended
3/ FDER = Florida Department of Environmental Regulation
4/ NA = Not applicable; site still under investigation

APPROACH

In evaluating the sites studied during the verification study, the overriding consideration was the risk to human health and the environment. The factors which were taken into account in preparing recommendations for further study at specific sites as outlined in Chapter 17-4.245(7)b, FAC (Florida Administrative Code) includes: (1) size of the contaminant plume, (2) toxicity of the contaminants and their concentrations, (3) rate and direction of plume movement in relation to sources of water supply, (4) rate of attentuation or dilution of the plume, (5) current and projected future use of adjacent ground and surface waters affected by the plume, and (6) costs of further study or clean-up in comparison to the benefits to the public of such actions.

For sites where characterization studies are recommended, the proposed programs of monitor-well installation and sampling are designed to provide sufficient data for determining the need for long-term monitoring or corrective action, and for the preliminary design of corrective measures, if necessary. For other sites, no further actions were recommended because of the limited benefits to the public in view of the costs for additional study or clean-up.

BACKGROUND

An IAS study was conducted at the NAS and NFD in 1982 and 1983. The IAS report, submitted to the Navy in March, 1983, described in detail the general naval activities that comprise the NAS and NFD complexes, the history of each facility and the general physical setting including the topography, climate, geology, soil and surface waters, and the waste types and disposal practices at the individual sites. Accordingly, this verification study report discusses these types of information only where it is enhanced by recently collected site-specific information or is necessary to clarify a particular action or recommendation at a site.

Study Sites

As previously discussed, ten sites at the NAS and one site at the NFD were concluded to pose a potential threat to human health and the environment upon completion of the IAS. After reviewing the IAS report, the FDER (Florida Department of Environmental Regulation) recommended four new sites for study, and additional work at a previously studied site. The Navy then added four sites for consideration based on information supplied by a former employee.

At the NAS, two sites recommended for a confirmation study in the IAS (Site Numbers 7 and 17) were previously studied and the findings presented in separate reports. A report discussing the findings and recommendations for

remedial actions at Gas Hill (Site No. 7) was submitted to the Navy in December, 1983. The other site, the glass bed waste pile (Site No. 17), initially was studied in conjunction with the verification study in August, 1983. Three sediment samples were collected at that time and analyzed for EP Toxicity for nine metals. A subsequent report was prepared entitled, "Closure Plan for the Spent Glass Bead Waste Pile, NAS-Jacksonville, Jacksonville, Florida." This report, submitted in April 1984, discussed the findings of the three sediment samples and outlined a program for final closure of the waste pile. Final closure of the waste pile included additional sediment sampling; the results of the additional sampling were included in a final closure report, "Closure Certification of the Spent Glass Bead Waste Pile."

Two active sites at NAS, the industrial waste sludge drying beds and the sewage treatment plant polishing ponds are currently under investigation as part of both Federal and State ground-water monitoring requirements. A ground-water monitoring system has been installed at the industrial waste sludge drying beds in compliance with the Resource Conservation and Recovery Act for interim status facilities; Section 265.91, Subpart F of the Code of Federal Regulations. In addition, a ground-water monitoring system has been installed at the polishing ponds for the sewage treatment plant in compliance with the ground-water monitoring requirements as stated in Chapter 17-4.245, FAC. Both of

these facilities have completed the first year of quarterly water-quality sampling from installed monitor wells; the laboratory results from the first year of sampling have been submitted to the FDER for each facility.

PROJECT SETTING

NAS Jacksonville

The NAS, shown in Figure 1, is located along the St. Johns River at Orange Park, approximately 9 miles south of the City of Jacksonville. In addition to housing and training facilities, the NAS primarily is responsible for monitoring and operating facilities to provide services and materials in support of aviation operations. There are several major tenants within its confines, the largest being the NARF (Naval Air Rework Facility). The NARF is a large industrial complex of 45 buildings and is responsible for maintenance, repair, and rework operations of various aircraft engines and frames.

The NAS has evolved since its inception in 1938 from a naval aviation training facility to its present command. During the course of its history there have been many activities in which hazardous materials have been handled, transferred and stored as part of the NAS operations. Basically, these hazardous materials are a result of NARF operations, fuel farms and gasoline service stations, fire-fighting training, and radiological operations (luminous aircraft dials and parts). Many of these activities are now inactive and are largely without records of past operations.

Until 1972, the NAS operated two domestic wastewater-treatment plants; the east side plant located south of the

east end of the main runway, and the west side plant located north of the west end of the main runway. In 1972, the east side plant was abandoned and the west side plant was expanded to handle 2.25 mgd (million gallons per day) and upgraded with an activated sludge digestion system. This plant receives both domestic and industrial wastes from the base. The industrial wastes are pretreated in an industrial wastewater-treatment plant, located near the west side plant, which became operational in 1981. Presently, the two west side plants treat all of the liquid wastes generated at the NAS not manifested for off-site disposal.

Solid wastes at the NAS are removed from the base by an independent refuse-collection contractor. At present, three inactive landfills (Site Nos. 9, 26, and 32) and one active organic (construction materials, wood and grass clippings) disposal area (Site No. 29) have been identified at the NAS. Two of the three inactive landfills (Site Nos. 9 and 32) were investigated during this study; Site No. 26 had been previously studied as reported by the IAS. The findings and recommendations of the study of the two inactive landfills (Site Numbers 9 and 32) and the active landfill (Site No. 29) are presented in the individual site evaluations in this report.

The IAS report identified 27 water wells at NAS. A recent water-well survey completed by NAS personnel, determined that 29 wells are present on the base (Figure 4).

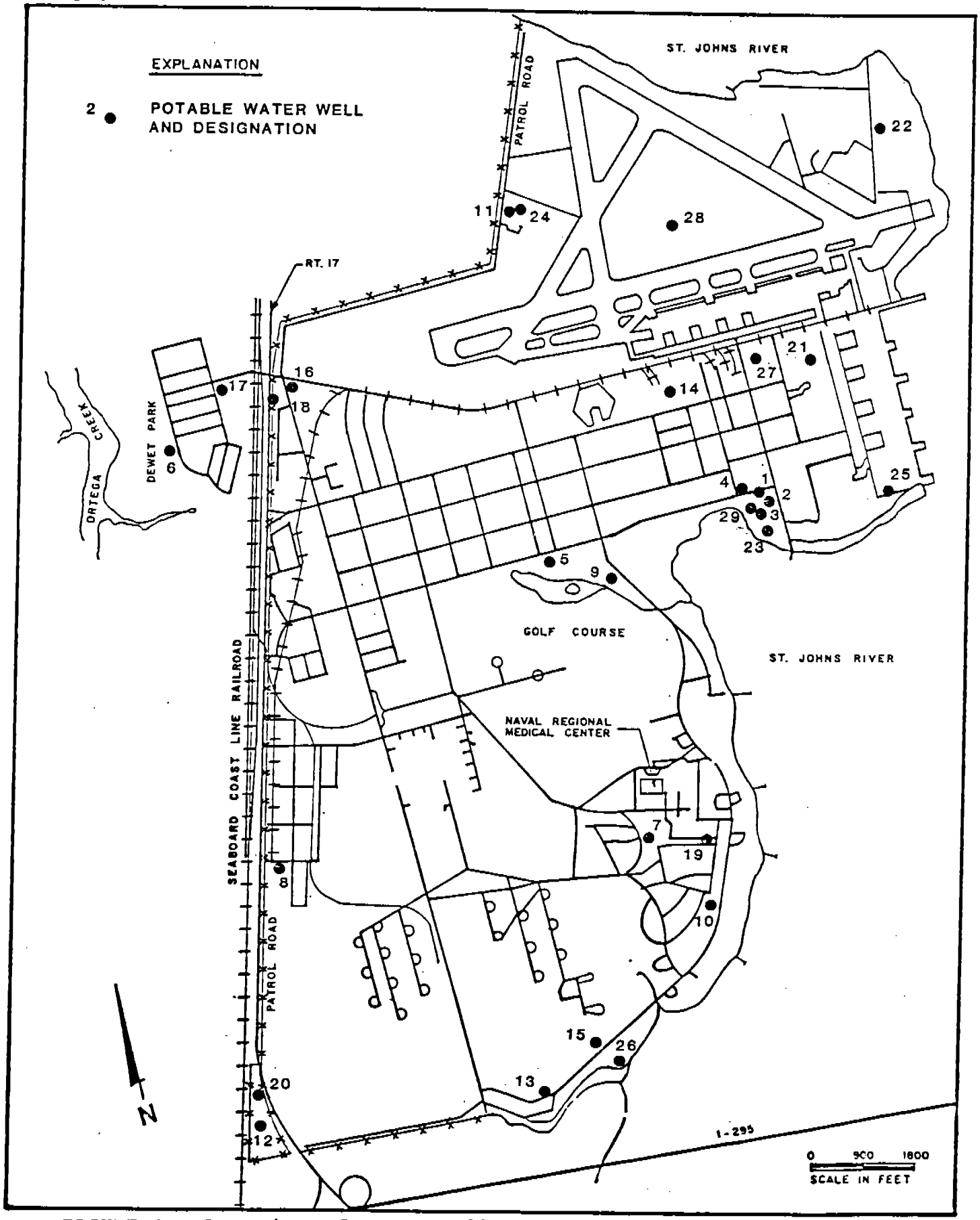

FIGURE 4. Location of Water Wells at the NAS, Jacksonville.

Information concerning the construction details and use of these wells is presented in Table 2. A new well (No. 29), installed in early 1984 at the NAS, is also included in this table.

Water-quality samples were collected on April 14, 1984, from two drinking-water wells, Number 4 and 7 located at water plants Number 1 and 4, respectively. The samples were analyzed by a independent laboratory for selected EPA (Environmental Protection Agency) priority pollutants including volatile organic compounds, acid and base neutral extractable compounds, EDB (1,2 dibromoethane) and Temik (brand name for Union Carbide's pesticide, aldicarb). The laboratory results, in addition to other water-quality results from samples collected by the Navy, are contained in Appendix A. The results show that all of these constituents are either below the detection limits or less than the drinking-water standards set forth in Chapter 17-22.104 FAC.

NFD

The NFD, located at the confluence of the St. Johns and Trout River, has always been used as a tank farm supplying various types of fuels to naval operations in the Jacksonville area. Initially, the storage capacity was approximately 280,000 barrels until 1951 when the Navy expanded the facility by 300 acres (271 acres were later transferred or sold by the Navy) and 600,000 barrels. Presently, the NFD supplies fuel oil to the Naval Station at

TABLE 2. CONSTRUCTION DETAILS AND USE OF WATER WELLS AT THE NAS

WELL DESIGNATION (PREVIOUS DESIGNATION)	DIAMETER (inches)	TOTAL DEPTH (feet)	CASING DEPTH (feet)	MAP GRID	WELL USE
1 (01)	8	708	463	12J	NIU[1/]
2 (1)	12	1215	380	12J	In use at Water Plant No. 1
3 (2)	12	1215	464	12J	NIU, area around well collapsed
4 (3, 2A)	26x18x12	1210	410	12J	In use at Water Plant No. 1
5 (4, 3)	12	1015	318	9J	In use at Water Plant No. 2
6 (5, 4)	12	988	400	3G	In use at Water Plant No. 3
7 (6, 5)	12	646	271	9)	In use at Water Plant No. 4 Hospital Supply Well
8 (7, 6)	10	1096	316	3N	Fire Protection
9 (8, 7)	6	500	250	9K	Golf Course Irrigation
10 (9, 8)	6	498	248	10P	NIU, previously used for hospital sprinklers
11 (10, 9)	6	500	120	9D	NIU, previously used for westside WWTP
12 (11, 10)	8	400	288	2R	Fire protection for salvage yard
13 (12, 11)	4	407	251	6J	Used in Radio Tower area
14 (13, 12)	6	?	95	11H	NIU, previously used for cooling water

TABLE 2. Continued

WELL DESIGNATION (PREVIOUS DESIGNATION)	DIAMETER (inches)	TOTAL DEPTH (feet)	CASING DEPTH (feet)	MAP GRID	WELL USE
15 (14, 13)	6	400	-	7R	NIU, capped prior to 1946
16 (15, 14)	4	400	-	5F	NIU, capped prior to 1946
17 (16, 15)	4	400	-	3F	NIU, capped
18 (17, 16)	3	400	-	5F	NIU, capped
19 (18, 17)	6	400	-	10O	NIU, capped
20	3	400	-	2R	NIU
21 (22)	2	-	-	14I	NIU
22 (19, 23)	2	101	-	16D	NIU
23 (24)	18	1200	350	12J	NIU-Water Plant No. 1
24 (25)	4	770	120	9D	Grey water at WWTP
25 (26)	12	-	-	15J	Make-up water for test cells
26 (23)	8	522	297	8R	NIU, operable USGS sampling point
27 (21)	8	160	115	13G	NIU, previously used for cooling water
28 (22)	-	-	-	12E	Crash Station
29	18x12	1223	441	12J	In use at Water Plant No. 1

1/ Not in use

Mayport, Florida, and aviation fuels to the NAS - Jacksonville via buried pipelines.

The NFD does not maintain housing, training, or support activities, as operation of this facility is not dependent on a large amount of manpower. Basically, only small amounts of solid wastes are generated at this base, and it is reported that past burning of this waste material at Site Number 5 ceased in 1967. An independent waste-collection contractor is responsible for removing all solid wastes from the facility.

With the exception of contaminated fuels, bottom sludges, and wash-water generated by infrequent tank cleaning, the NFD does not transport, store or dispose of any other hazardous wastes. The IAS report identified five sites which received past disposal of liquid wastes (sludge and wash water contaminated with tetra ethyl lead (TEL), off-specification fuel oil, and contaminated fuel oil). Domestic wastewater generated on-base is discharged to the Jacksonville sanitary sewer system.

Three deep wells are located at the NFD; two wells have been capped and one is currently used for the potable water supply. The location of these wells are provided in Figure 5.

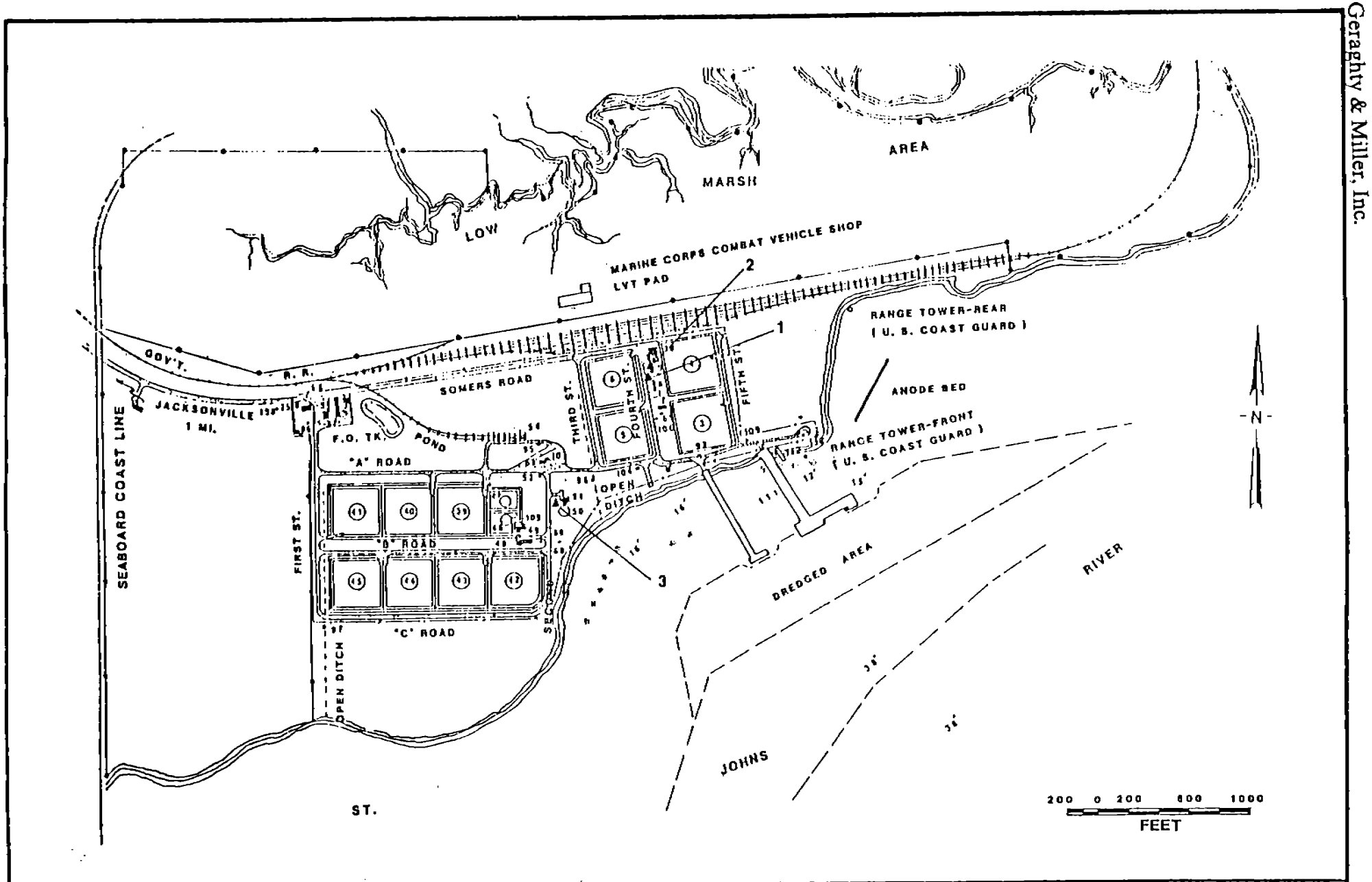

FIGURE 5. Location of Water Wells at NFD.

WORK PERFORMED

The work performed at the NAS and NFD proceeded according to three plan-of-action reports prepared in August and December, 1983 and November, 1984. Prior to beginning the field programs at each base, existing data and literature concerning the study areas were collected and reviewed. The field program at each base consisted of a drilling and testing program performed during three phases. The first phase, which studied the original 13 sites identified in the IAS, was conducted during August and September 1983, the second phase (including the four additional sites and expanded work at Site No. 29 recommended by FDER), was performed in March and April 1984 and the third phase (including sites recommended by a former Navy employee) was conducted in March, 1985. Each phase consisted of essentially the same activities; soil boring/monitor-well installation, water-level measurements, and sediment and water-quality sampling. The second phase also included water-quality sampling at two water-supply wells at the NAS. A hydrogeologist from Geraghty & Miller, Inc., was present at all times to supervise the drilling program, collect the sediment and water-quality samples, and gather water-level information. For the purposes of this report, the field programs will be discussed as one.

Soil Boring/Monitor-Well Installation

During drilling activities, 81 soil borings were drilled, 47 at NAS and 34 at NFD. The 34 soil borings at NFD, located within the boundary of Site No. 5, were installed to determine the horizontal and vertical extent of soil contamination by contaminated fuel oil reportedly disposed of in this area. Two of these borings were converted to monitor wells. The location map of these soil borings is contained in the site evaluation of NFD Site No. 5. The description of the lithologic logs for all of the soil borings are presented in Appendix B, Section 1.

Twenty-two shallow monitor wells were installed at 15 study sites at the NAS and 2 monitor wells were installed at one site at the NFD. The monitor-well locations at each particular site are shown in the individual site evaluations presented later in this report. Generally, the wells were similarly constructed; the construction details of a typical well are shown in Figure 6 and Table 3 lists the specific construction elements of each well.

Soil borings were initially drilled at each well location to determine the surficial geology. Continuous sediment samples were collected from land surface to the total depth of the borehole. The total depth and screen setting of each well was established by site-specific geologic characteristics. Upon completion of sampling to the desired depth, well casing, consisting of 2-inch-diameter PVC

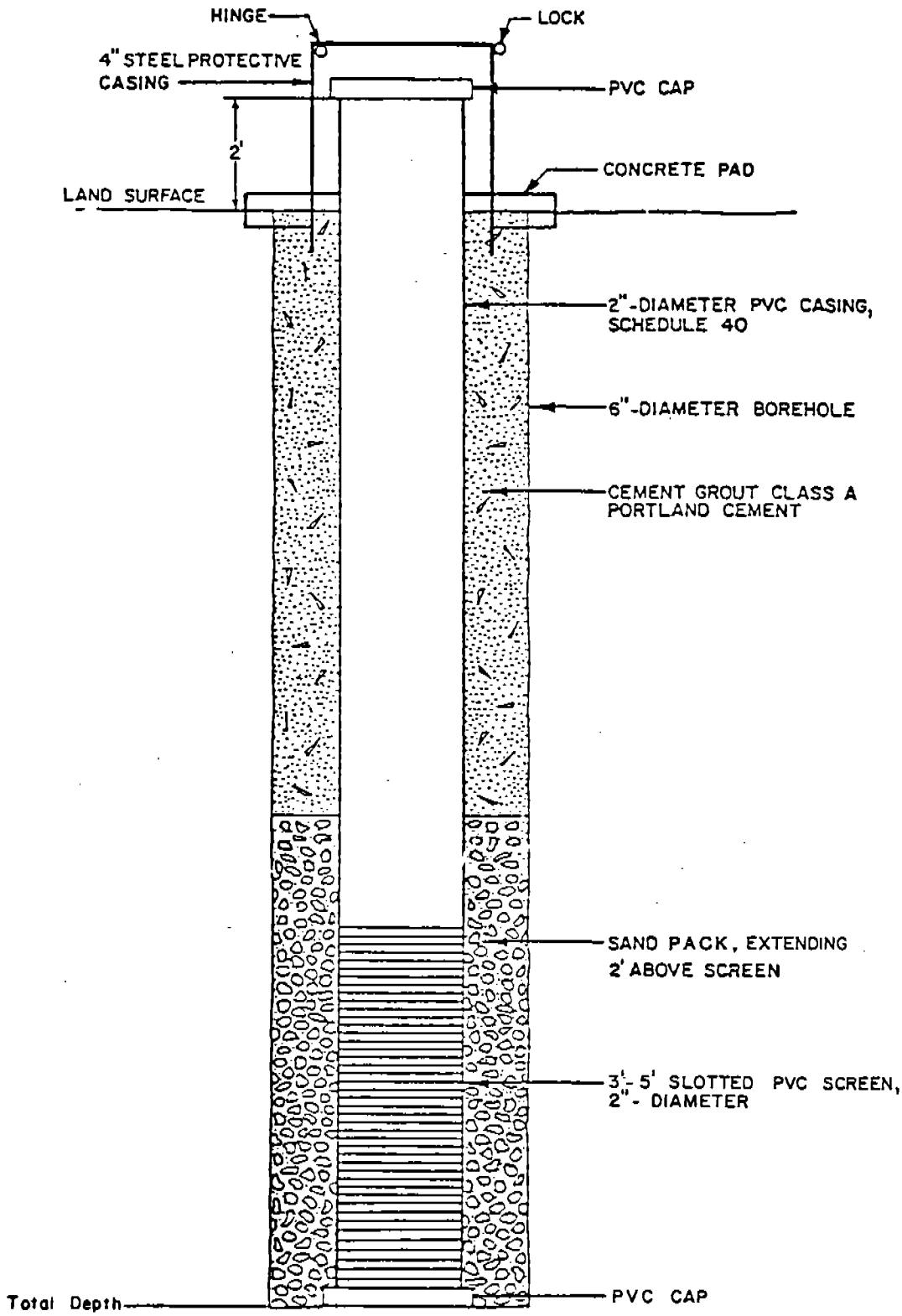

FIGURE 6. Schematic Diagram Showing the Construction Details of a Typical Monitor Well.

TABLE 3. CONSTRUCTION DETAILS OF INSTALLED MONITOR WELLS

MONITOR WELL NUMBER	TOTAL DEPTH (ft below land surface)	SCREEN SETTING (ft below land surface)	MEASURING POINT ELEVATION (ft msl)
NARF-1	10.0	7.0 - 10.0	11.99
NARF-2	16.0	13.0 - 16.0	14.78
NARF-3	10.5	7.5 - 10.5	12.26
NARF-4	11.5	8.5 - 11.5	8.84
NARF-5	10.5	7.5 - 10.5	7.17
NARF-6	9.0	6.0 - 9.0	10.72
NARFB-1	16.0	13.0 - 16.0	11.62
NAS2-1	11.5	6.5 - 11.5	-[1/]
NAS4-1	11.5	8.5 - 11.5	21.44
NAS4-2	11.5	8.5 - 11.5	18.83
NAS4-3	11.5	8.5 - 11.5	19.55
NAS5-1	15.0	15.0 - 10.0	-
NAS9-1	13.0	10.0 - 13.0	-
NAS13-1	12.5	7.5 - 12.5	8.35
NAS18-1	12.5	7.7 - 12.5	-
NAS28-1	15.0	15.0 - 10.0	-
NAS29-1	12.5	7.5 - 12.5	-
NAS29-2	12.5	7.5 - 12.5	-
NAS30-1	11.0	8.0 - 11.0	22.02
NAS30-2	10.0	7.0 - 10.0	21.08
NAS30-3	9.0	6.0 - 9.0	21.12
NAS32-1	12.0	6.0 - 12.0	
NFD-1	6.5	3.5 - 6.5	-
NFD-2	7.0	4.0 - 7.0	-

[1/] Blank space means measuring point elevation was not determined.

pipe with attached 3- to 5-ft (feet) of well screen, was inserted into the borehole. Fresh water was then circulated through the well casing and screen, and up through the annulus of the borehole, to clear the drilling fluid from the hole. After the return water was sufficiently clean, a graded silica sand was installed by the tremie method from the bottom of the well screen to 2 ft above the top of the well screen. The remaining annular space between the borehole and well casing was filled with a neat cement grout to land surface to prevent any surface-water infiltration. Following a minimum of 12 hours after the grout was emplaced, each well was developed by alternately swabbing and pumping the well for approximately one to two hours to ensure a clear discharge.

Surveying

Upon completion of the monitor-well installation, a site survey was conducted to reference the water-level measuring points of each well (top of PVC well casing) to a common datum, mean sea level (msl). The survey, performed by a certified land surveyor (L.D. Bradley, Florida Certification No. 1380), was conducted at those sites having three or more monitor wells. The elevation of the top of the PVC well casing and ground-water elevations at each well are contained in Table 4.

TABLE 4. GROUND-WATER ELEVATIONS IN THE STUDY AREA
(All measurements in feet above mean sea level)

MONITOR WELL NUMBER	MEASURING PT ELEVATION (ft above msl)	DATE OF MEASUREMENT									
		9/8/83	9/9/83	9/10/83	9/11/83	3/8/84	3/12/84	4/17/84	7/10/85	10/18/84	5/10/85
NARF-1	11.99	2.6	-	2.84	2.73	3.01	3.09	-	-	-	-
NARF-2	14.78	3.53	-	-	3.53	3.56	3.62	-	3.48	4.10	2.78
NARF-3	12.26	3.22	-	-	3.22	3.15	3.20	-	2.86	3.84	2.59
NARF-4	8.84	1.22	-	-	1.24	0.95	0.85	-	1.08	1.97	1.14
NARF-5	7.17	1.94	-	-	1.93	2.03	2.03	-	2.01	2.91	1.51
NARF-6	10.72	-	-	3.87	3.87	4.32	4.31	-	4.25	3.89	3.56
NARFB-1	11.62	-	-	-	-	-	-		-	2.92	1.95
NAS13-1	9.04	-	-	-	-	-	-	-	-	4.37	4.20
NAS4-1	21.44	15.39	-	-	15.28	17.56	16.89	-	15.28	16.33	-
NAS4-2	18.83	13.91	-	-	14.43	16.51	15.87	16.22	-	-	-
NAS4-3	19.55	14.41	-	-	14.16	17.21	16.04	16.33	14.00	15.05	-
NAS4-6	19.26	-	-	-	-	-	13.10	13.84	11.96	12.53	-
NAS4-7	16.01	-	-	-	-	-	11.94	12.42	9.94	11.18	-
NAS4-8	15.17	-	-	-	-	-	9.98	11.18	9.40	9.29	-
NAS30-1	22.02	18.04	17.95	-	17.64	19.15	18.27	18.03	17.20	17.13	15.60
NAS30-2	21.08	-	16.03	-	16.17	18.05	17.34	-	16.31	16.30	14.66
NAS30-3	21.12	16.99	16.94	-	16.63	18.76	17.81	-	16.04	16.85	15.05

Sampling and Analysis

During the verification study, 24 ground water and 25 soil samples were collected by G&M personnel and analyzed by private laboratories for site-specific chemical compounds. To collect the ground-water samples, approximately three well volumes were initially removed from the well with either a peristaltic or centrifugal pump followed by well sampling with the peristaltic pump or a teflon bailer. Field measurements of temperature, pH, and specific conductance were made on the ground water at the time of sampling and are summarized in Table 1 of Appendix C. The sample containers were supplied (except for the volatile organic analyses) by an FDER approved laboratory; all containers requiring preservatives were prepared by the laboratory according to EPA Report Number 600/4-79-020. Additionally, the sample containers were stored on ice prior to delivery via air freight to the laboratory. The laboratory water-quality results are presented in Appendix C.

The 25 soil samples were obtained with either a split-spoon sampler, trowel or clam-shell dredge sampler (sediments in St. John's River at Site No. 39). The approximate location of the soil samples are shown in the site evaluations. These samples also were delivered via air freight to the laboratory within 48 hours from the time of sampling. The laboratory results for the soil analyses are presented with the water-quality data in Appendix C.

HYDROGEOLOGIC SYSTEM

Topography and Drainage

NAS Jacksonville

The NAS is located in southern Duval County on remnants of the Silver Bluff and Pamlico marine terraces, modified by stream erosion and by excavation and fill activities associated with construction of the NAS. Surface drainage is divided between eastward flow directly into the St. Johns River and westward flow toward the Ortega River. Surface drainage features and watershed divides are illustrated in Figure 7. Many surface-water features were constructed or modified to assist the natural drainage from the base. Also, much of the NAS is serviced by storm sewers that convey storm-water runoff to the St. Johns River.

The land surface elevations range from approximately 35 ft msl in an area just east of Site No. 29 to near 0 ft msl along the St. Johns River bordering the east and north sides of the base.

NFD

The NFD is located in north-central Duval County along the St. Johns River. The NFD is situated on a bar of sediments deposited by the fluvial processes of the river. Land-surface elevations are generally less than 10 ft msl and

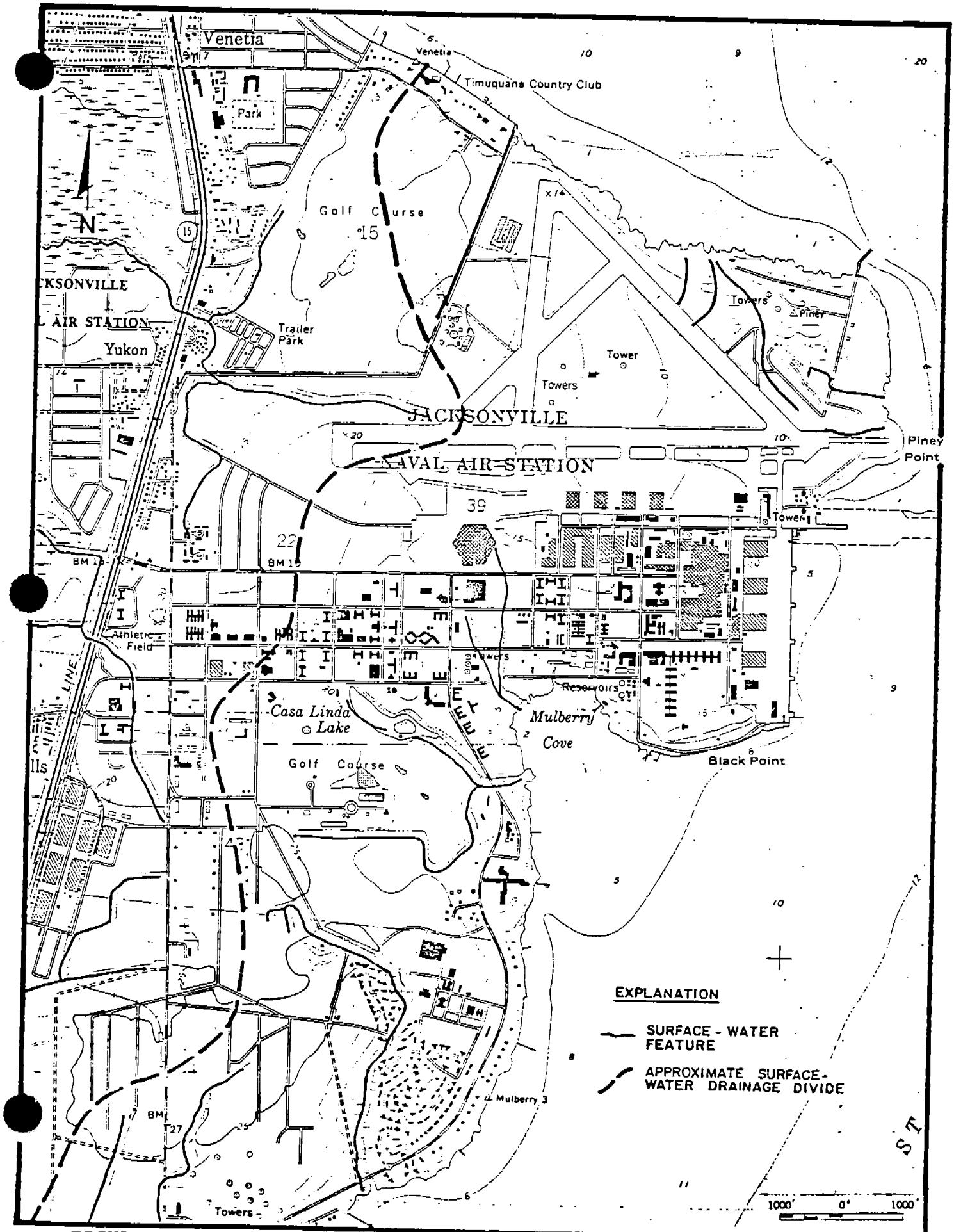

FIGURE 7. Surface-Water Features of the NAS, Jacksonville.

some of the outlying areas exist as tidal flats; alternately flooded and dry depending on the tidal cycles in the river.

The land holdings at the NFD are relatively small. Other than a few man-made ditches, most of the precipitation infiltrates directly into the veneer of medium to coarse-grained sand and shell deposits left by the river or moves to the St. Johns River via overland runoff. Drummond Creek, a small tributary to the St. Johns River sluggishly drains the northern side of the NFD. The surface-water drainage features and watershed divides are shown in Figure 8.

Geologic Framework

The geologic sequence of sediments underlying the NAS and NFD generally consists of unconsolidated deposits of sands, clays, and shell overlying a thick sequence of marine carbonate rocks. A composite geologic column, shown in Figure 9, was constructed from well logs from the area as well as published data. Basically, the water table or surficial aquifer is contained in the uppermost unconsolidated sediments which are generally a few tens of feet thick in the study area. The surficial sediments are underlain by silty clays, clays, and clayey sands of Pliocene and upper Miocene age. Beneath these is the Hawthorn Formation, which consists primarily of calcareous, phosphatic, sandy clays with occasional, thin lenses of sand, limestone, and dolostone. The Hawthorn Formation serves as a

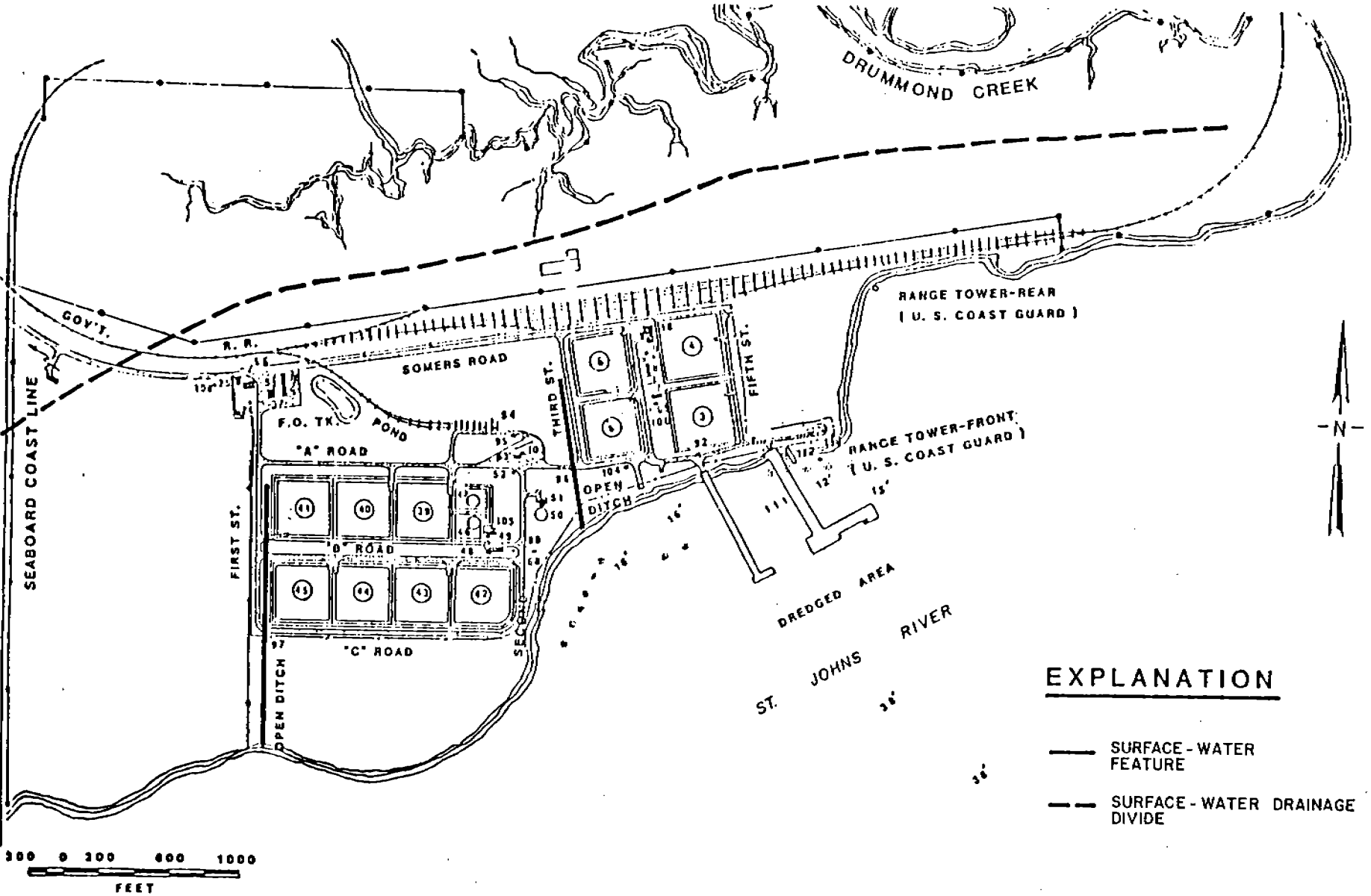

FIGURE 8. Surface-Water Features at the NFD, Jacksonville.

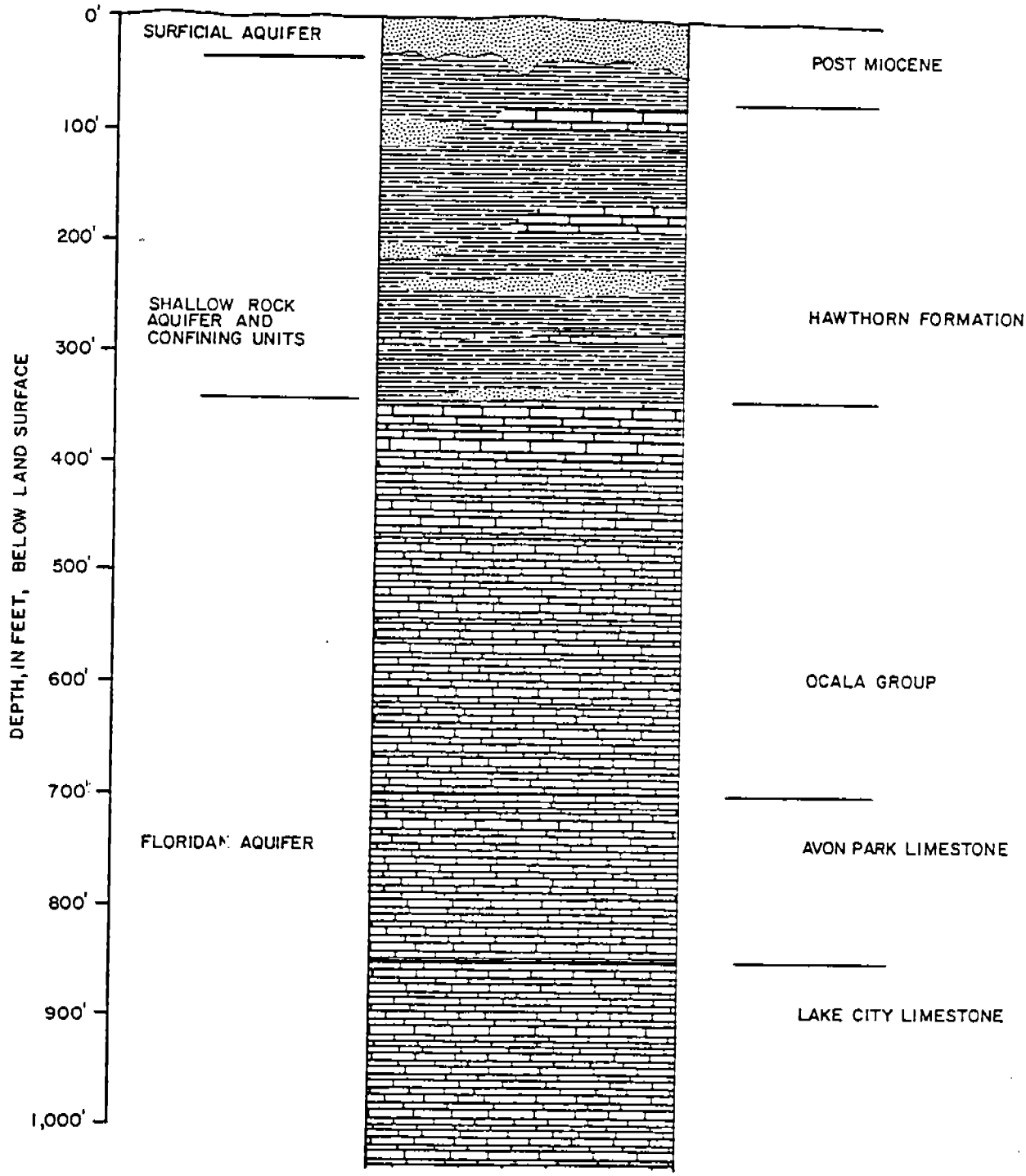

FIGURE 9. Generalized Geologic Column at the NAS, Jacksonville.

confining layer which separates the surficial aquifer from the underlying Floridan, although permeable sand and limestone layers within the confining clays form what is referred to as the secondary artesian aquifer or shallow rock aquifer.

The basal portion of the Hawthorn Formation generally coincides with the top of the Floridan aquifer which occurs at a depth of about 350 ft at the NAS, Jacksonville. The Floridan aquifer, a thick sequence of limestone and dolostone, consists in order of increasing depth, of the Ocala Group, Avon Park Limestone, and the Lake City Limestone. The Floridan aquifer is the prinicpal source of water supply for public and commercial uses in the area.

Ground-Water System

NAS Jacksonville

Surficial Aquifer

The surficial aquifer generally ranges from 10 to 30 ft in thickness and is comprised of unconsolidated sands, with varying amounts of silt and clay. These sediments are generally saturated with ground water from 3 to 8 ft below land surface and the ground water exists under water-table conditions. The surficial aquifer primarily is recharged by precipitation percolating into the permeable veneer of sand. Due to the presence of lower permeability, clayey sands and clays below the aquifer, ground-water movement in surficial

sediments primarily is horizontal. Basically, the shallow ground water moves from topographic highs to areas of discharge such as ditches, streams, rivers or surface-water bodies. Figure 10 shows the inferred direction of shallow ground-water flow at the NAS. In areas having three or more monitor wells, ground-water flow patterns have been established and are included in the individual site evaluations.

Figures 11, 12, and 13 are geologic cross-sections showing the uppermost sediments at the NAS. Most of the lithologic logs used to construct the cross-sections are from wells installed during the verification study and are presented in Appendix B, Section 1; other logs used are presented in Appendix B, Section 2. In some areas of the base, notably the NARF area, the surficial sand consists of hydraulically-filled dredge spoil from the St. Johns River. The vertical and horizontal hydraulic properties of the surficial sediments were determined at two locations at the NAS.

The horizontal hydraulic conductivity of the surficial aquifer was determined for the area north of Gannet Road in an investigation by Geraghty & Miller, Inc., (1980). In this study, transmissivities of 780 and 3600 gpd/ft (gallons per day per foot) were determined from pumping tests at two different well sites. Also, the vertical hydraulic conductivity was determined by laboratory permeability tests

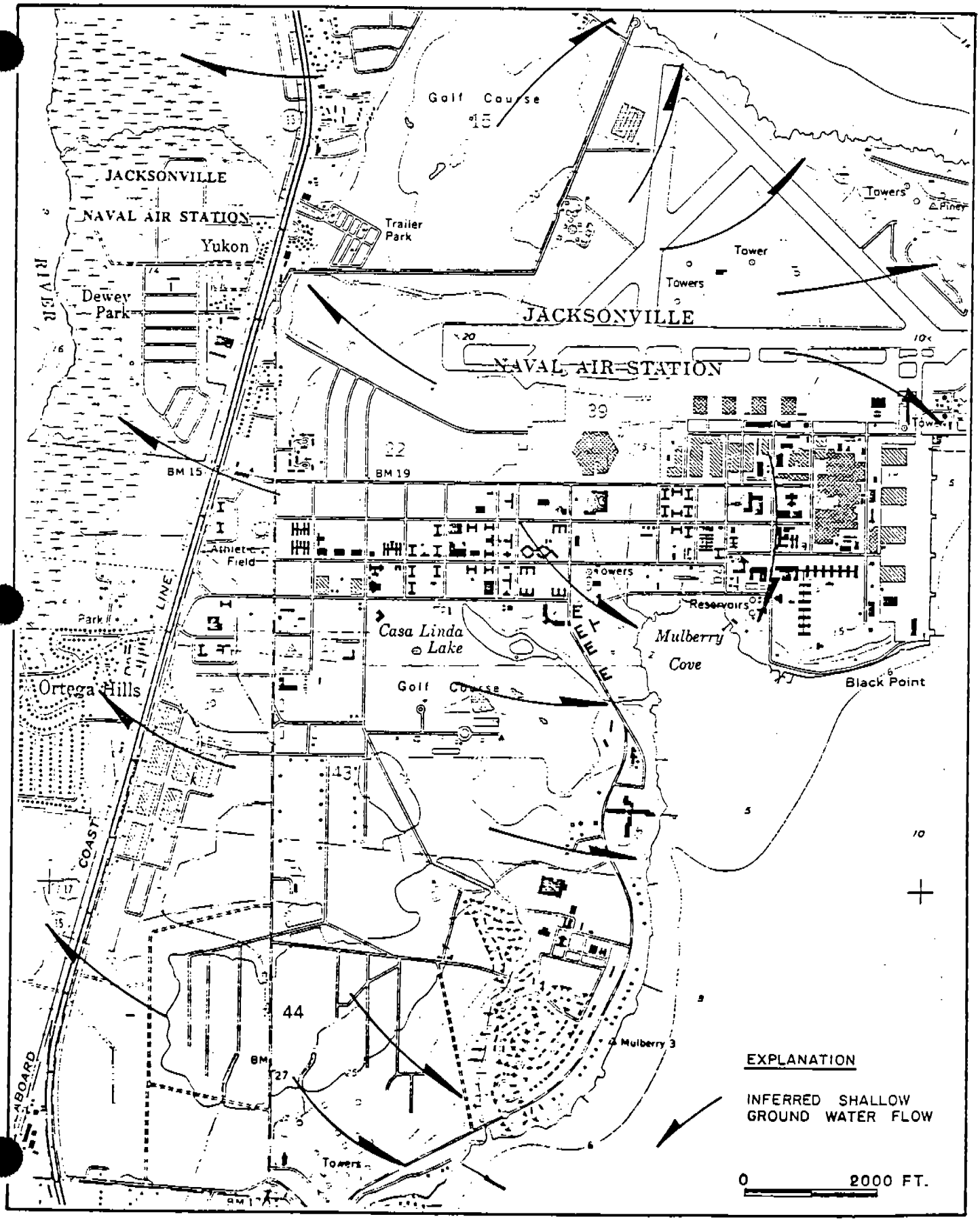

FIGURE 10. Generalized Direction of Shallow Ground-Water Flow at the NAS, Jacksonville.

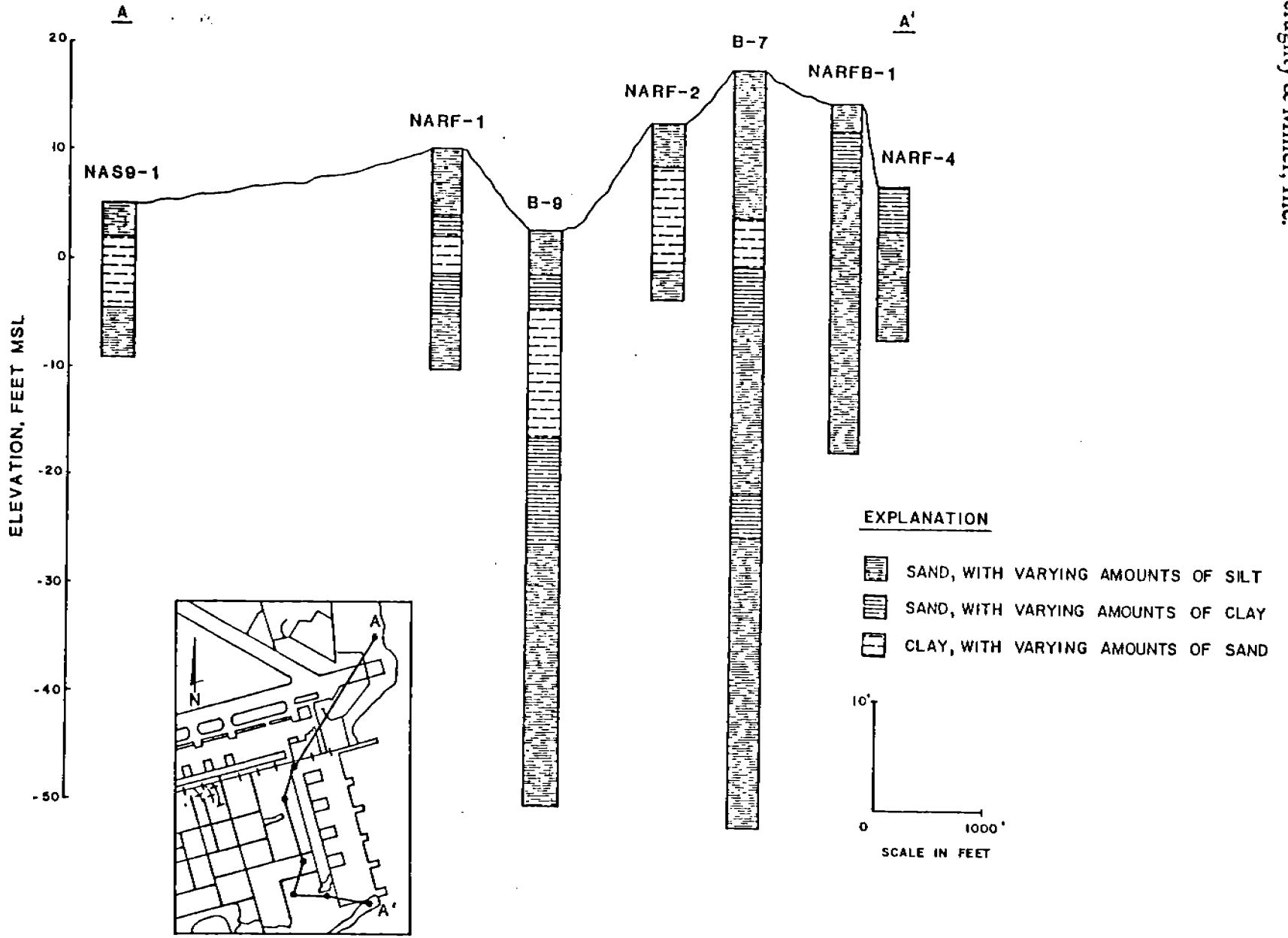

FIGURE 11. Geologic Cross-Section A-A' at the NAS, Jacksonville.

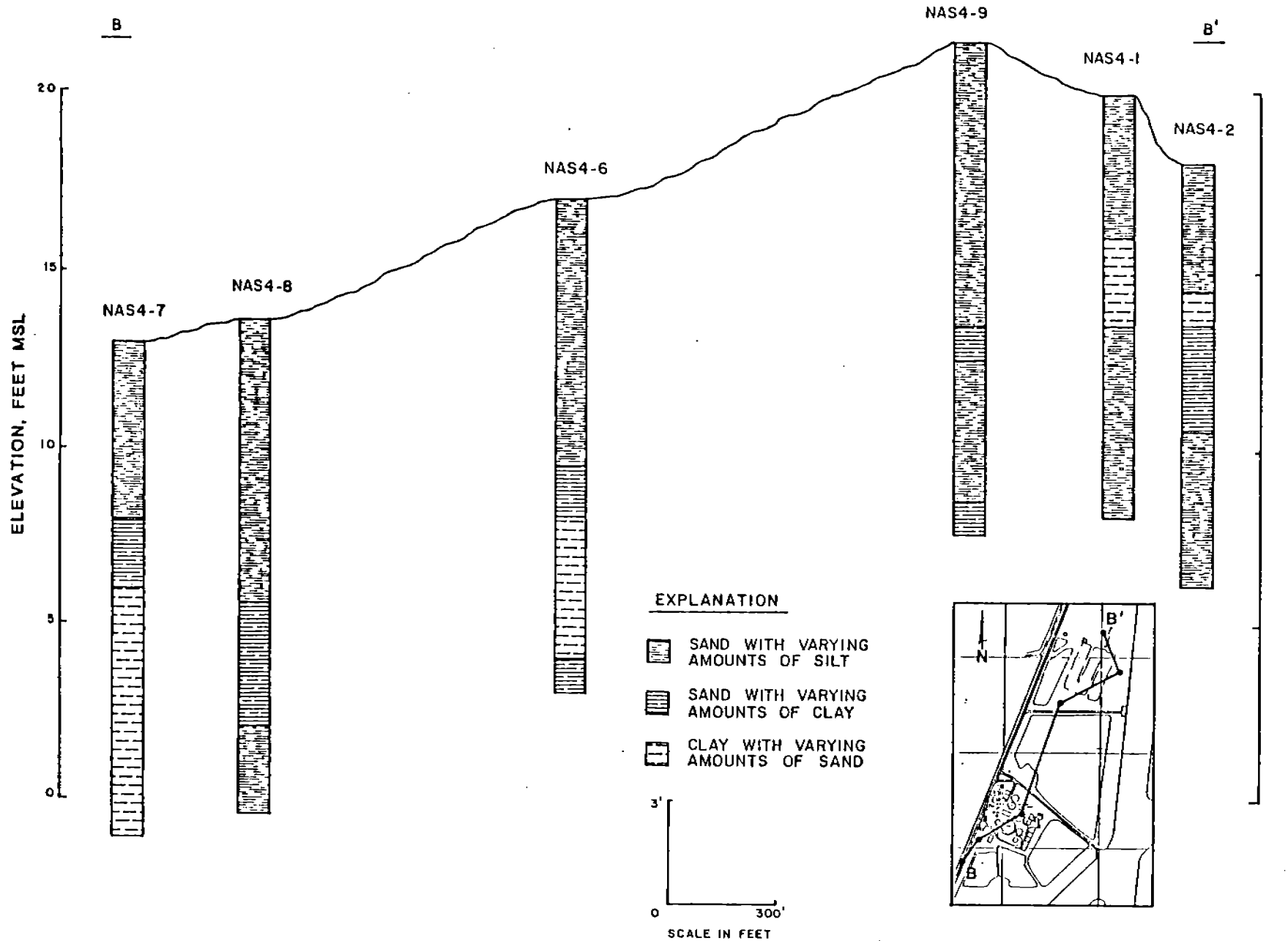

FIGURE 12. Geologic Cross-Section B-B' at the NAS, Jacksonville.

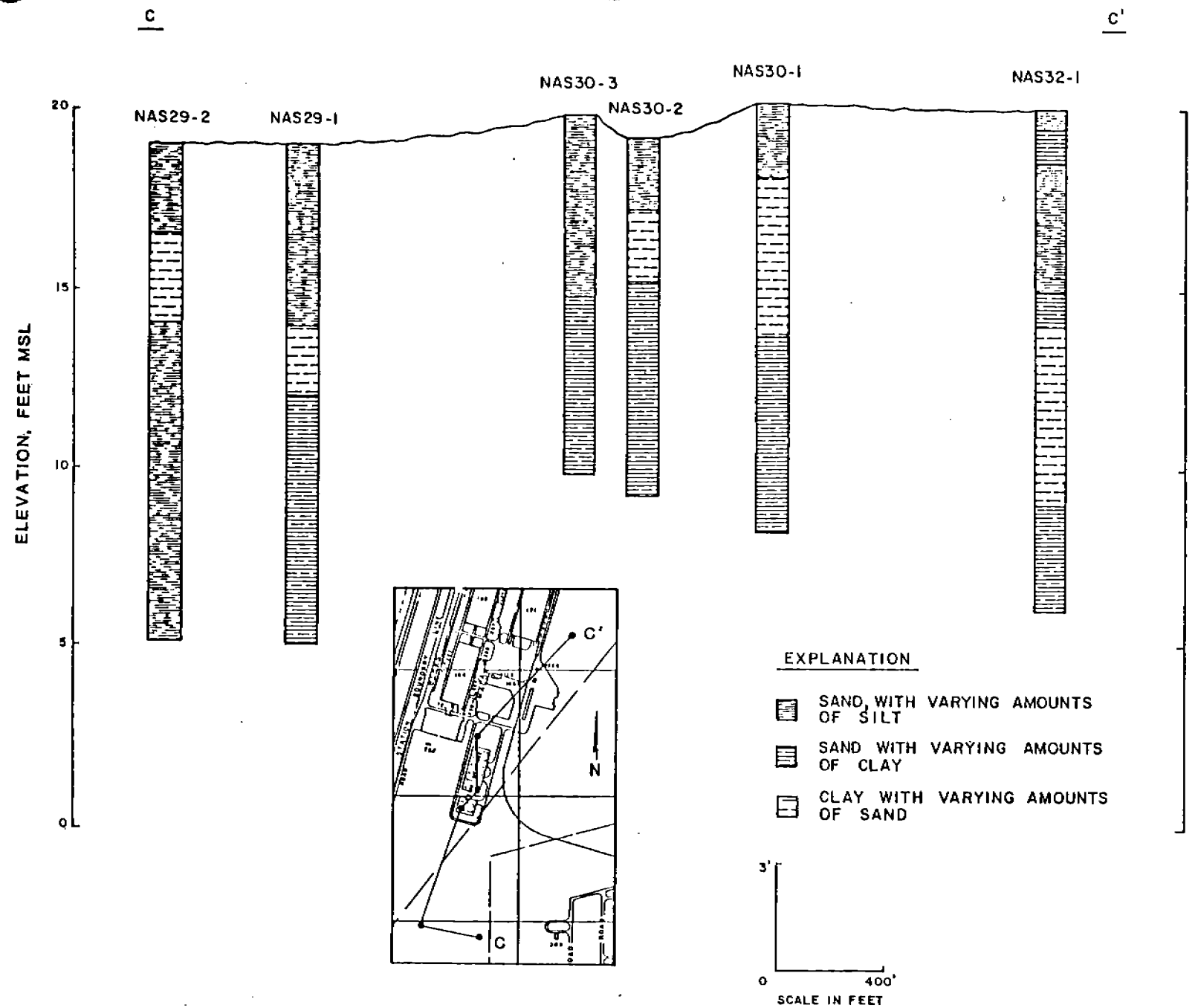

FIGURE 13. Geologic Cross-Section C-C' at the NAS, Jacksonville.

of undisturbed sediment samples collected at the wastewater treatment plant polishing pond and industrial sludge-drying beds. Table 5 lists the estimated hydraulic conductivities determined from these tests; the hydraulic conductivities ranged from 1.6×10^{-3} to 2.7×10^{-6} cm/sec (centimeters per second).

Shallow Rock Aquifer

The intermediate rock aquifer or secondary artesian aquifer consists of permeable beds of sand, shell, and limestone within the upper part of the Hawthorn Formation and basal portion of the undifferentiated sediments overlying the Hawthorn Formation. Figure 14 shows the generalized configurations of the top of the limestone unit of the shallow rock aquifer (Fairchild, 1972). Where present at the NAS, the limestone unit appears to be approximately 40 to 60 ft below land surface. However, two borings drilled at the NAS suggest that, if present, this aquifer may be deeper than regional data indicate. Soil boring B-7, which is shown is Figure 11, and boring S-4 (Appendix B, Section 2) were drilled to 70 ft and 50 ft, respectively, without encountering a shallow limestone layer.

The ground-water flow direction in this aquifer at the NAS is toward the east or the St. Johns River, as seen in the potentiometric map contained in the IAS report. The water-level elevations in the shallow rock aquifer appear to coincide with the water-level elevations in the water-table

TABLE 5. ESTIMATES OF VERTICAL PERMEABILITY AND TRANSMISSIVITY OF THE SHALLOW SEDIMENTS AT THE NAS

WELL NUMBER	LOCATION	WELL DEPTH	PERMEABILITY, k (cm/sec)[1/]	TRANSMISSIVITY T (gpd/ft)[2/]	DESCRIPTION
NAS4-5	Industrial WWTP Sludge drying beds	13.5	3.93×10^{-4}		Sand, fine, clayey, gray
NAS4-6	Domestic WWTP polishing pond	11.5	2.70×10^{-6}		Sand, fine, clayey, gray
NAS4-8	Domestic WWTP	12.5	2.87×10^{-5}		Sand, fine, silty, brown
DPW-1	Site No. 26	25		706.0	Interbedded clayey sands and clays
DPW-2	Site No. 26	30		3600.0	Sand, fine, very clayey gray

1/ cm/sec = centimeters per second

2/ gpd/ft = gallons per day per foot

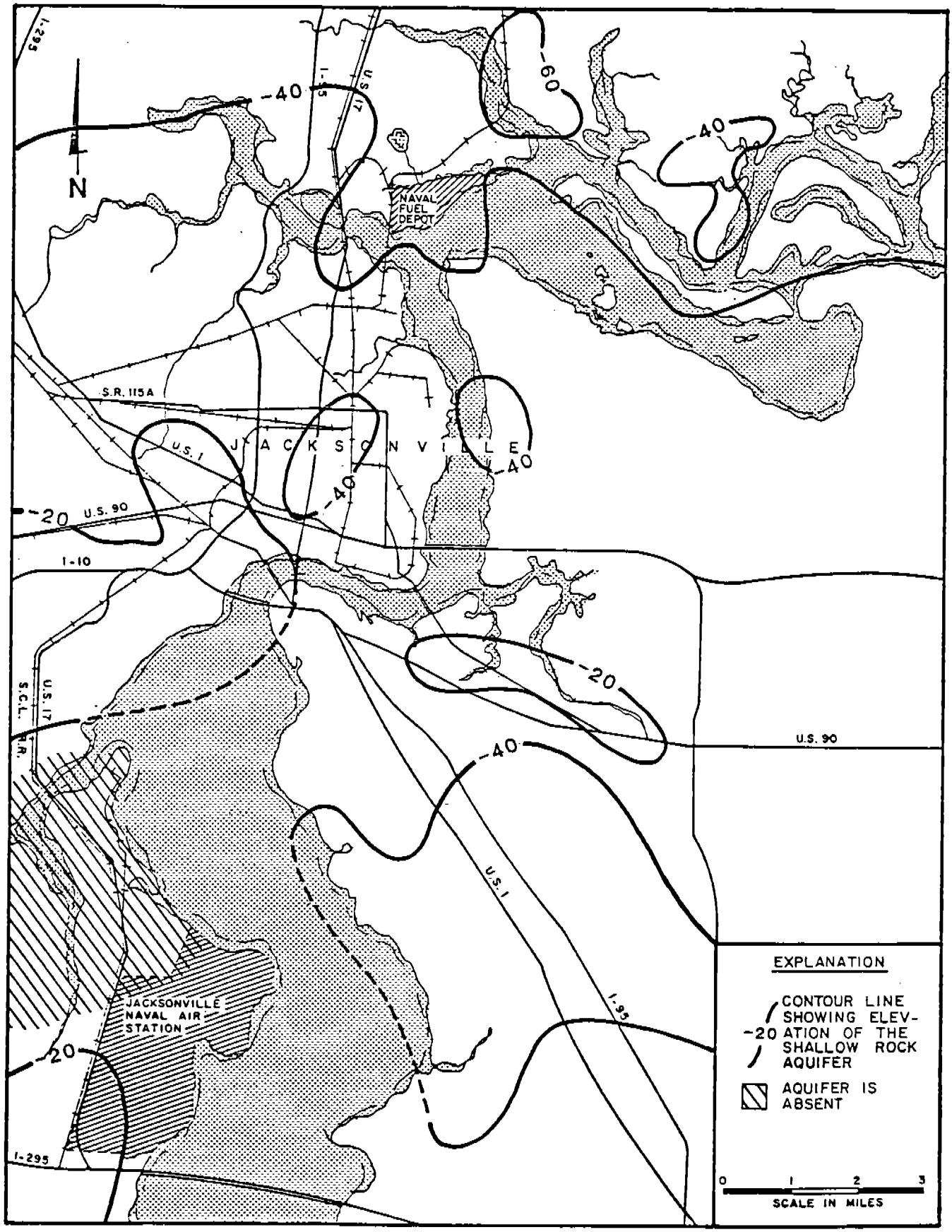

FIGURE 14. Configuration of the Top of the Shallow Rock Aquifer.

aquifer. During the year, however, the net hydraulic gradient may be either up or down depending on the season.

In general, the transmissivity of the shallow-rock aquifer is several hundred gallons per day per foot. Field studies performed by Causy and Phelps (1978) indicate that yields from the shallow-rock zone vary from place to place due to variations in the lithology.

Floridan Aquifer

The Floridan aquifer consists of over 1,000 ft of limestone and dolostone formations in descending order of age: Ocala Group, Avon Park Limestone, and the Lake City Limestone. The top of the Floridan aquifer occurs at about 350 ft below land surface at the NAS. As seen in Figure 15, the NAS is located near the center of low area in the potentiometric surface of the Floridan aquifer and because of this, it is difficult to predict the actual direction of ground-water movement. The potentiometric surface elevation in the vicinity at the NAS is about 30 ft above mean sea level, which explains why many of the wells tapping the Floridan aquifer at the NAS flow freely at land surface. Testing of the hydraulic characteristics of the Floridan aquifer have revealed coefficients of transmissivity ranging from 50,000 to over 1,000,000 gpd/ft. One well very near the NAS penetrated 703 ft of the Floridan aquifer and had a transmissivity of 1,100,000 gpd/ft (Leve, 1968).

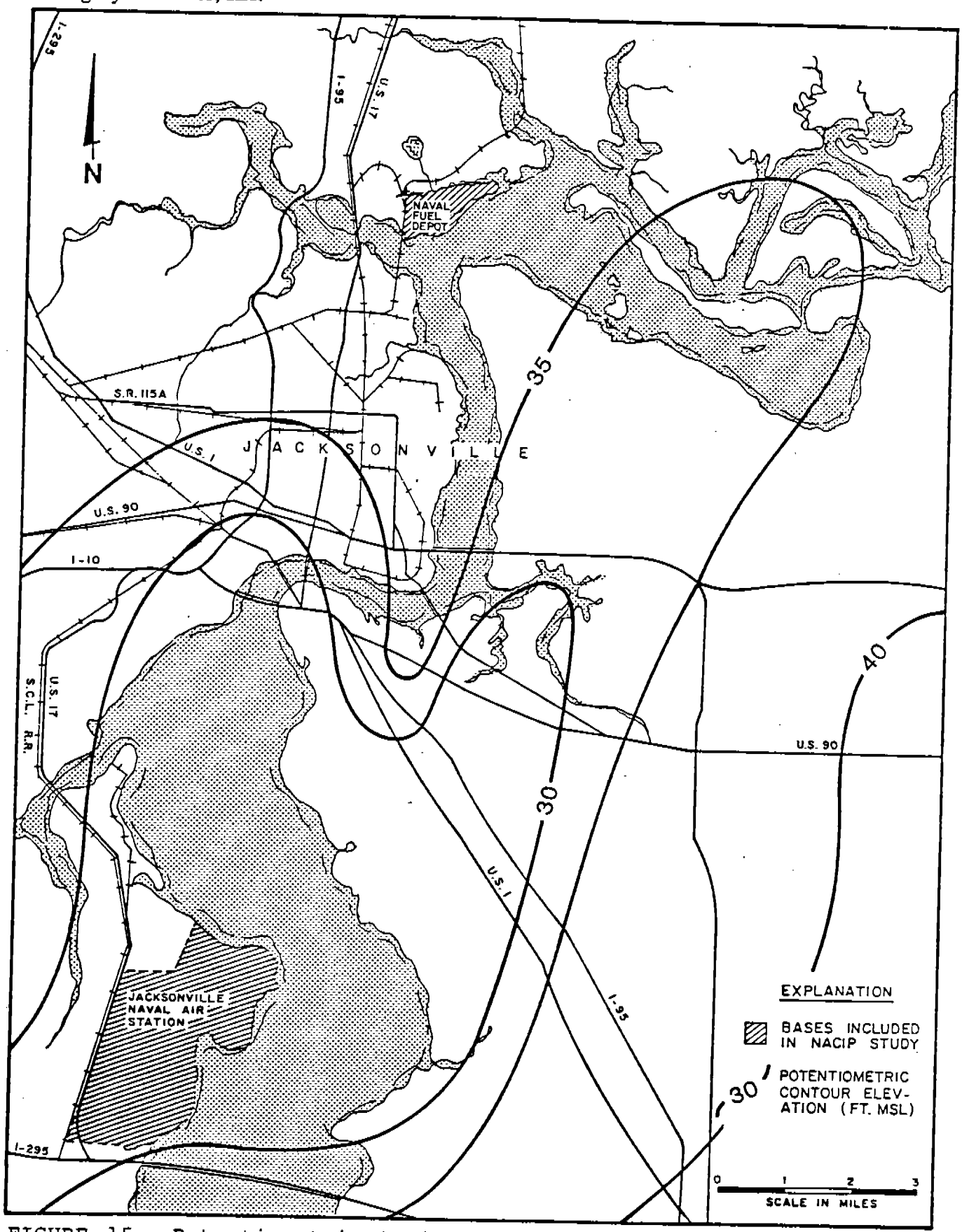

FIGURE 15. Potentiometric Surface of the Floridan Aquifer, September 1983.

All of the potable water wells at the NAS tap the Floridan aquifer. Each of these wells is free flowing indicating that the net upward hydraulic head between the Floridan aquifer and the shallower aquifers (shallow rock and surficial aquifers) may be as much as 20 ft. The upward hydraulic gradient combined with the thick confining bed precludes any significant downward migration of contaminants from the study sites.

NFD

Surficial Aquifer

The surficial aquifer at the NFD consists of approximately 30 to 40 ft of unconsolidated fine to medium-grained sands with varying amounts of silt and clay. The water table generally occurs within a few feet of land surface and may fluctuate with the tidal cycles in the St. Johns River near the shoreline. Much of the surficial sediments have been replaced by dredge and hydraulic fill operations.

The surficial aquifer is recharged by infiltrating precipitation. The shallow ground-water flows from topographic high areas to lower lying areas along Drummond Creek and the St. Johns River. Although the actual slope of the water table was not determined, based on the topography, the general ground-water flow direction is toward the south. The surficial aquifer is thin and generally not of

drinking-water quality; therefore it is seldom used in this area as a potable water supply.

Shallow Rock Aquifer

The shallow rock aquifer lies below the undifferentiated sediments at a depth ranging between 40 to 50 ft as seen in Figure 14. This is confirmed by on-site soil borings some of which were used to construct the geologic cross-section in Figure 16. Based on these soil borings, the shallow sands generally become coarser with depth. Once the limestone has been penetrated, alternating layers of soft marl and hard fractured limestone were encountered. The general direction of ground-water flow in the shallow rock aquifer in the vicinity of the NFD is south and southeast or toward the St. Johns River. As discussed earlier, the shallow rock aquifer is part of the upper Hawthorn Formation. The Hawthorn Formation within which the low permeability confining beds exist, is about 400 ft in thickness in the vicinity of the NFD.

Floridan Aquifer

The top of the Floridan aquifer at the NFD occurs at approximately 550 ft below land surface. Again, most large supply wells in the area withdraw water from this aquifer, including the potable water-supply well at the NFD. It is reported in the IAS that this well is free flowing at land

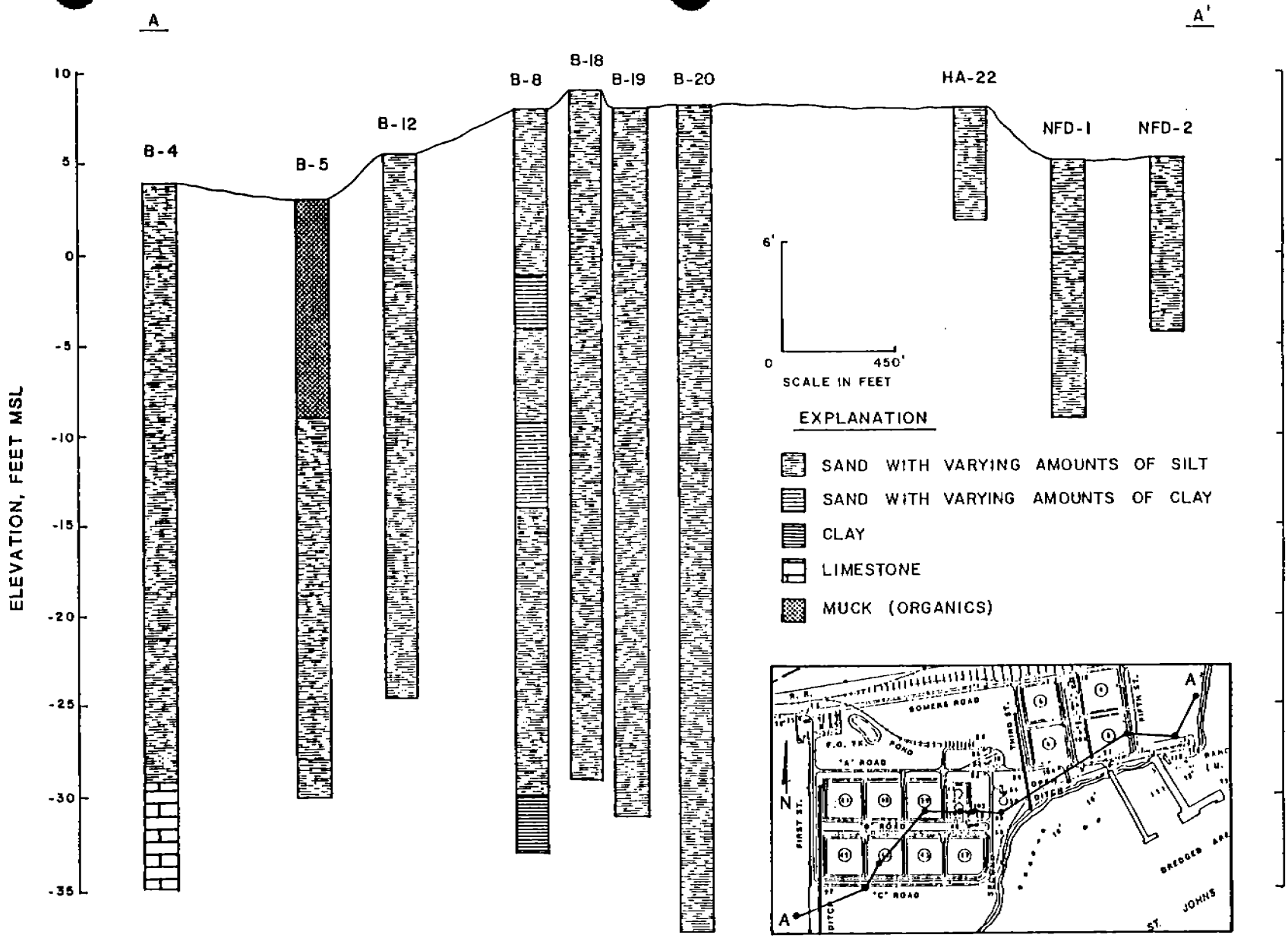

FIGURE 16. Geologic Cross-Section A-A' at the NFD, Jacksonville.

surface. The ground-water flow direction in the Floridan aquifer (Figure 15) is to the south.

FIRE FIGHTING AREA (SITE NO. 2)

Background

This site is located in the immediate vicinity north of the wastewater treatment plant as shown in Figure 17. It occupies an area approximately 100 by 100 ft and contains junk vehicles which are used for fire-fighting training. These vehicles are ignited with small quantities of jet fuel, JP-5, or waste oil.

Findings and Recommendations

A monitor well (NAS2-1) was installed at the fire-fighting training area at the approximate location shown in Figure 17. A water-quality sample was collected from this well and analyzed for pH in the field, and for pesticides, PCBs (polychlorinated biphenyls), and VOCs (volatile organic compounds) in two private water-quality laboratories. The results of these analyses, presented in Appendix C, Section 1, indicate that the ground water does not contain detectable concentrations of VOCs, pesticides, or PCBs. Based on these analyses, there is no imminent hazard to the environment or to public health, therefore no further study is recommended at this site.

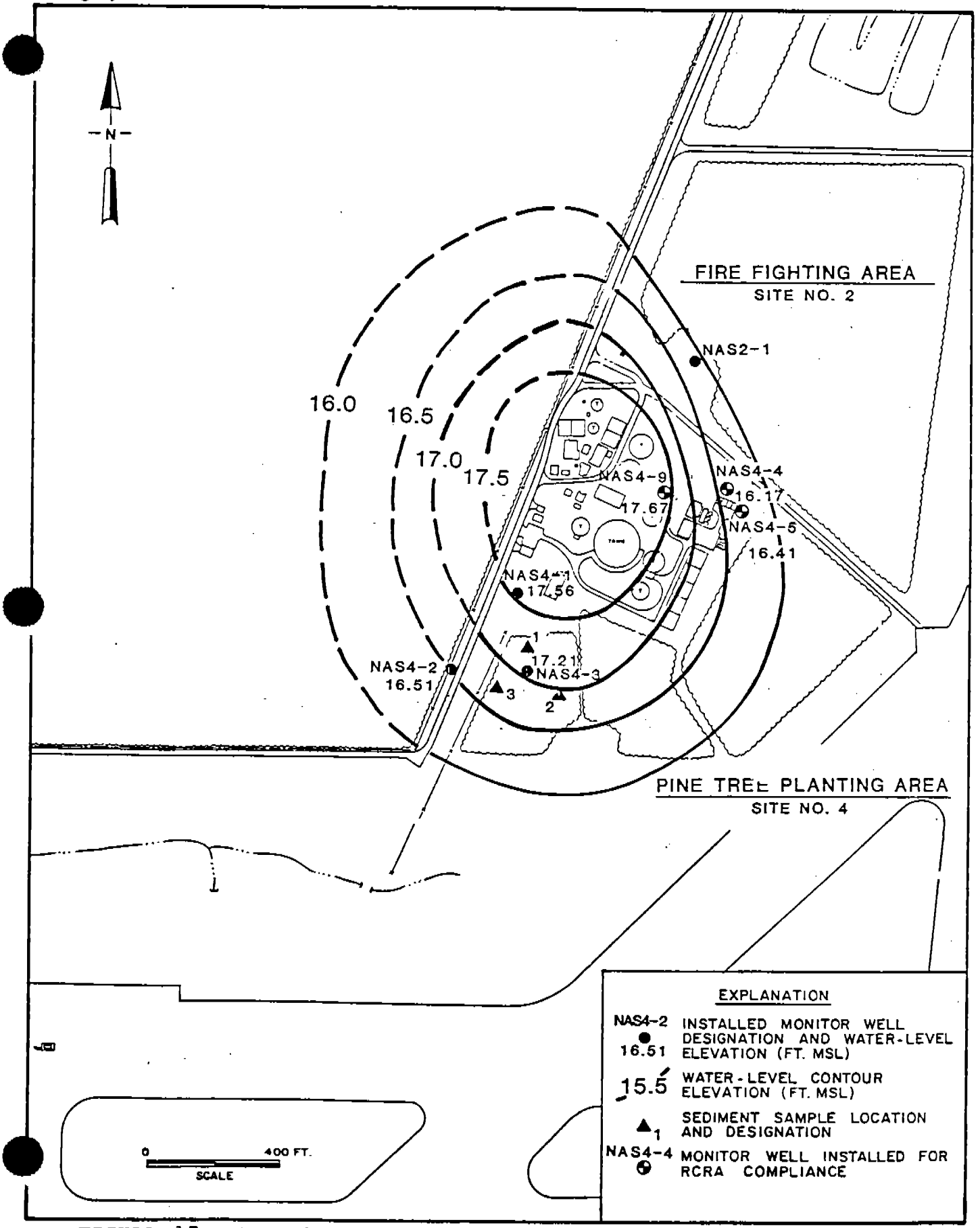

FIGURE 17. Locations of Installed Monitor Wells, Soil Samples, and Water-Table Contours (March 9, 1984) Collected at the Fire-Fighting Area (Site No. 2) and the Pine Tree Planting Area (Site No. 4).

PINE TREE PLANTING AREA (SITE NO. 4)

Background

This site is located approximately 200 ft southeast of the sewage treatment plant chemistry laboratory, Building No. 261L (Figure 17). The sewage treatment plant is located on a topographically high area along the northwestern boundary of the NAS. A small drainage ditch exists approximately 500 ft south of the site. This ditch generally contains water throughout the year suggesting that it receives discharges from the shallow ground-water system.

Until 1975, this area was reportedly used for the disposal of paint shavings, sewage sludge, asbestos, oil and other petroleum products. Inspection of the area during the IAS study yielded visual confirmation of paint shavings from the treatment plant settling basins, which were identified throughout a 1-acre area. Based on favorable EP Toxicity (Extraction Procedure) results, the sewage sludges generated at the sewage treatment plant are presently disposed of in the pine woods surrounding the site.

Findings and Recommendations

Three monitor wells (NAS4-1, NAS4-2, and NAS4-3) were installed at the locations shown in Figure 17. Water samples were collected from the wells and analyzed in the field for pH and specific conductance, and in a water-quality laboratory for VOCs, TOC (total organic carbon), cyanide, and

selected metals including cadmium, chromium, lead, and nickel. The results of these analyses are presented in Appendix C, Section 2. Three soil samples were collected at locations within the pine tree area and analyzed by EP Toxicity for eight primary drinking metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver) and nickel. The data shows that the levels of cyanide and dissolved metals in the ground water were below the detection limits. The TOC content was relatively low and ranged from 1.0 to 3.7 ppm (parts per million). Low concentrations of VOCs were detected in each of the wells including 9.1 ppb (parts per billion) of trans-1,2-dichloroethene, 1.1 ppb of tetrachloroethene, and 45 ppb of TCE (Trichloroethene) in well NAS4-2, and 15, and 0.7 ppb of TCE in wells NAS4-1, and NAS4-3, respectively.

The soil samples were collected from land surface to a depth of about 0.5 ft; the results, presented in Appendix C, Section 2, indicate that the concentrations of these constituents are well below the levels at which the soil would be considered a hazardous waste.

Water-level measurements, collected from the monitor wells prior to sampling, were combined with measurements collected in previously installed wells (NAS4-4, NAS4-5, NAS4-9), and used to compile the water-table contour map shown in Figure 17. A radial pattern of ground-water flow is evident with the center occuring approximately 500 ft north

of the site. The general shallow ground-water flow direction is toward the southwest in the immediate vicinity of the site. In addition, the nearest potable well, as identified by the IAS, is approximately six-tenths of a mile to the west.

Based on the data collected during the verfication study, this site does not appear to be an imminent hazard to the environment or to public health. Accordingly, it is recommended that no further investigation be conducted at this site.

SHORELINE FILL WEST OF PIER 142 (SITE NO. 5)

Background

This area, used in the 1940's, is approximately 200 ft wide by 600 ft long and located at the northern end of Catapult Road, as shown in Figure 18. Reportedly, paint shavings mixed with paint remover and solvents and radioactive paint, were deposited here during 1945 and 1946 and later covered with concrete rubble. The concrete rubble is presently visible at land surface throughout this site.

Findings and Recommendations

One monitor well (NAS5-1) was installed at the site and a water sample was collected and analyzed in the field for pH and specific conductance and in a water-quality laboratory for gross alpha, radium 226 and 228, VOCs, and selected metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. As shown in Appendix C, Section 3, the laboratory results for the eight selected metals were all below laboratory detection limits (except for barium, 0.28 milligrams per liter). Also, the VOCs were all below laboratory detection limits, and the radiological data show that gross alpha and radium 228 were below laboratory detection limits; radium 226 was 0.7 $\pm$ 0.1 pCi/l (picocuries per liter); and gross beta was 14 $\pm$ 3.1 pCi/l. Based on

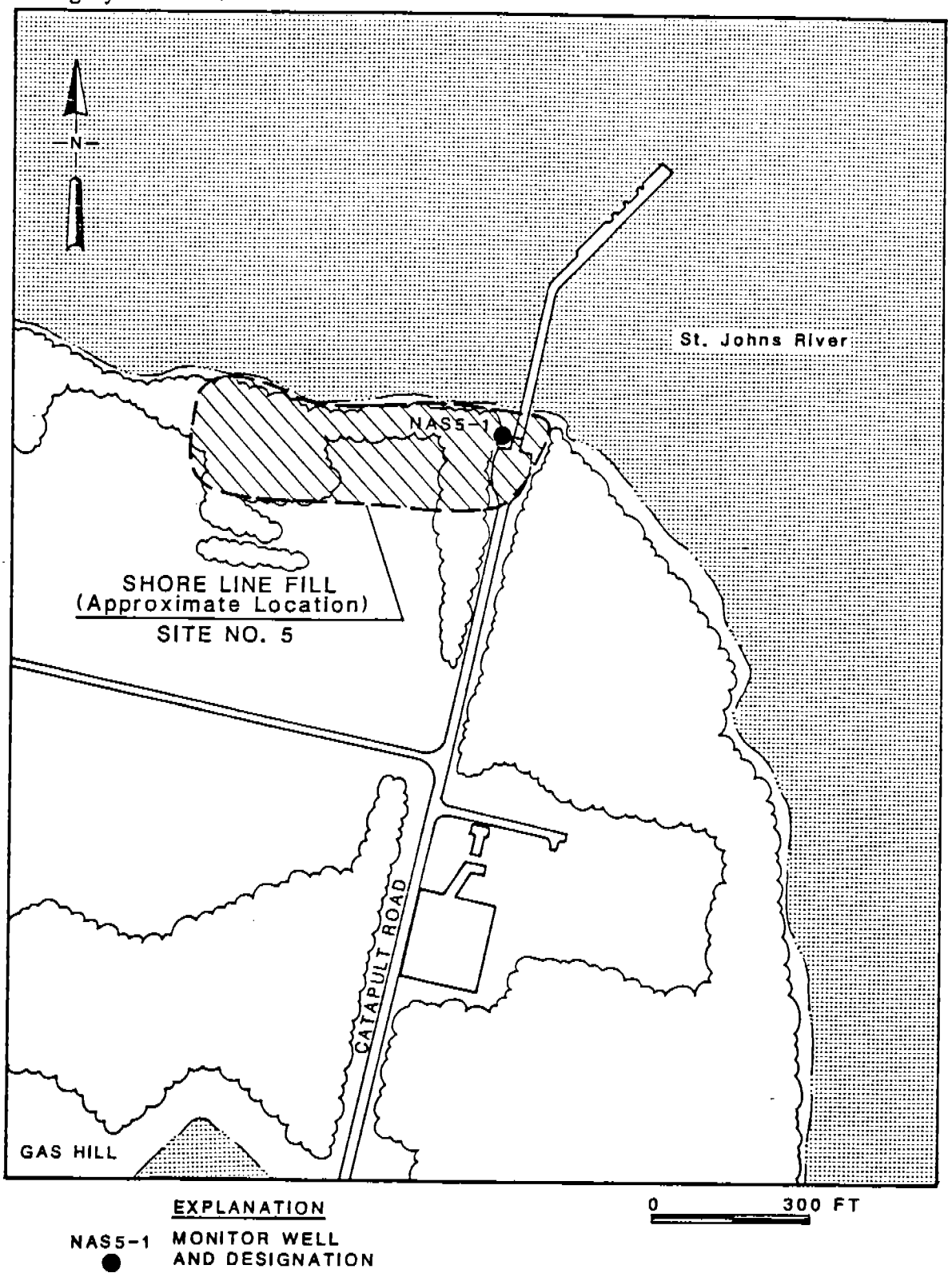

FIGURE 18. Location of Installed Monitor Well at the Shoreline Fill, West of Pier 142 (Site No. 5).

these results, there is no imminent hazard to human health or the environment; therefore, no further actions are proposed for this site.

OLD DISPOSAL AREA (SITE NO. 9)

Background

The old disposal area is located along the shoreline of the St. Johns River just north of the east side of the main east-west runway. The site (Figure 19), approximately 200 ft by 400 ft, was used as a disposal area for garbage, construction debris, and a few 55-gallon drums. This material was reportedly disposed of during the years of 1977 and 1978. Soils tests (destructive analysis) previously conducted in this area have shown high chromium levels, indicating that industrial wastes, such as chromium sludge, may have been disposed in this area.

Findings and Recommendations

One monitor well (NAS 9-1) was installed at the old disposal area, and a water sample was collected and analyzed in the field for pH and conductivity, and in a water-quality laboratory for cyanide, TOC, VOCs, and selected metals including cadmium, chromium, lead, and nickel. The laboratory results presented in Appendix C, Section 4, show that the ground water is of relatively good quality and that the levels of dissolved metals and cyanide were below the detection limit. Low concentrations of several VOCs were detected, including 1.2 ppb each of methylene chloride and trichloroethene, and 21 ppb of trans-1,2-dichloroethene.

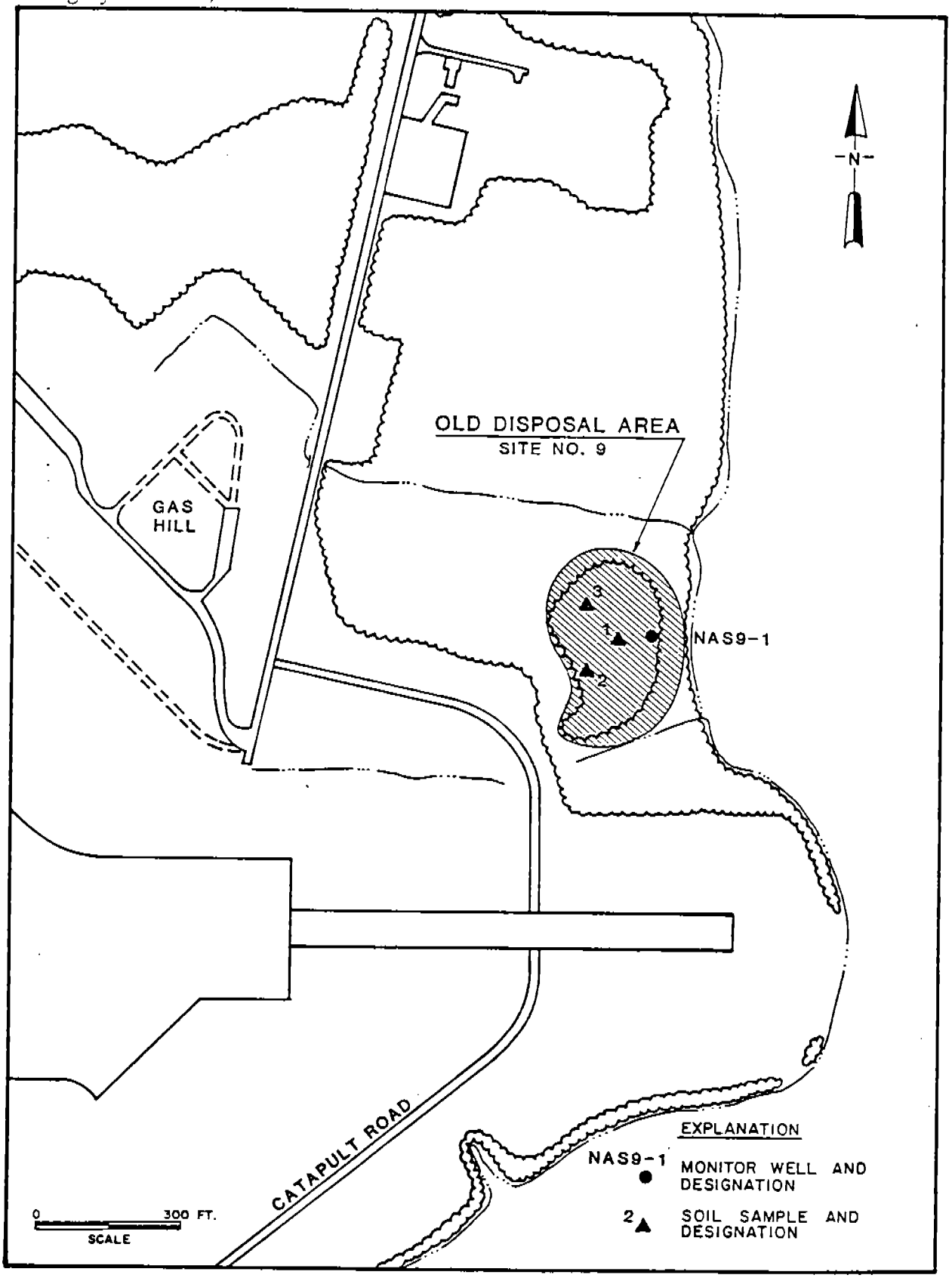

FIGURE 19. Location of Installed Monitor Well and Soil Samples Collected at the Old Disposal Area (Site No. 9).

The pH (6.9 units) is typical of the shallow ground water at the NAS, but the specific conductance at 1400 umhos/cm (micromhos/centimeter) appears to be influenced by the brackish water in the St. Johns River. The general direction of ground-water flow is toward the St. Johns River, which serves as a discharge point.

Three soil samples were also collected at selected locations in order to determine the leachable concentrations of metals discovered in the earlier test. The soil samples were analyzed by EP Toxicity for nine metals; the results (Appendix D, Section 3) show that the concentrations of these metals are well below the standards indicative of a hazardous waste.

Based on the data collected, this site does not pose an imminent hazard to human health or the environment; therefore, no further study is recommended for this site.

RADIUM PAINT WASTE DISPOSAL PIT (SITE NO. 13)

Background

The radium paint waste disposal area is located north of Building 167. A pit (Figure 20), approximately 40 x 50 x 0.75 ft, was used for the disposal of radioactive radium paint waste from aircraft instrument dial painting operations. Radium-226 was found to be a very effective material for imparting luminescence to the dials. The paint wastes, disposed of during World War II and continued into the 1950's, were mixed with the soil in the pit. The site was excavated in the late 1950's at which time surface radiation surveys showed this area was 3 to 5 mr/hr (millirems per hour) above background conditions. The excavated material was deposited at the radioactive waste fill area (Site No. 18).

Findings and Recommendations

One monitor well, NAS 13-1, was installed approximately in the center of the radium paint waste disposal area at the location shown in Figure 20. A water-quality sample was collected from this well and analyzed in the field for pH and in an approved laboratory for gross alpha. The laboratory analyses (Appendix C, Section 5) revealed a gross alpha concentration of 54 $\pm$ 7 pCi/l. A second sample was then collected and analyzed for VOCs, gross alpha and radium-226 and radium-228. These results show that the second sample

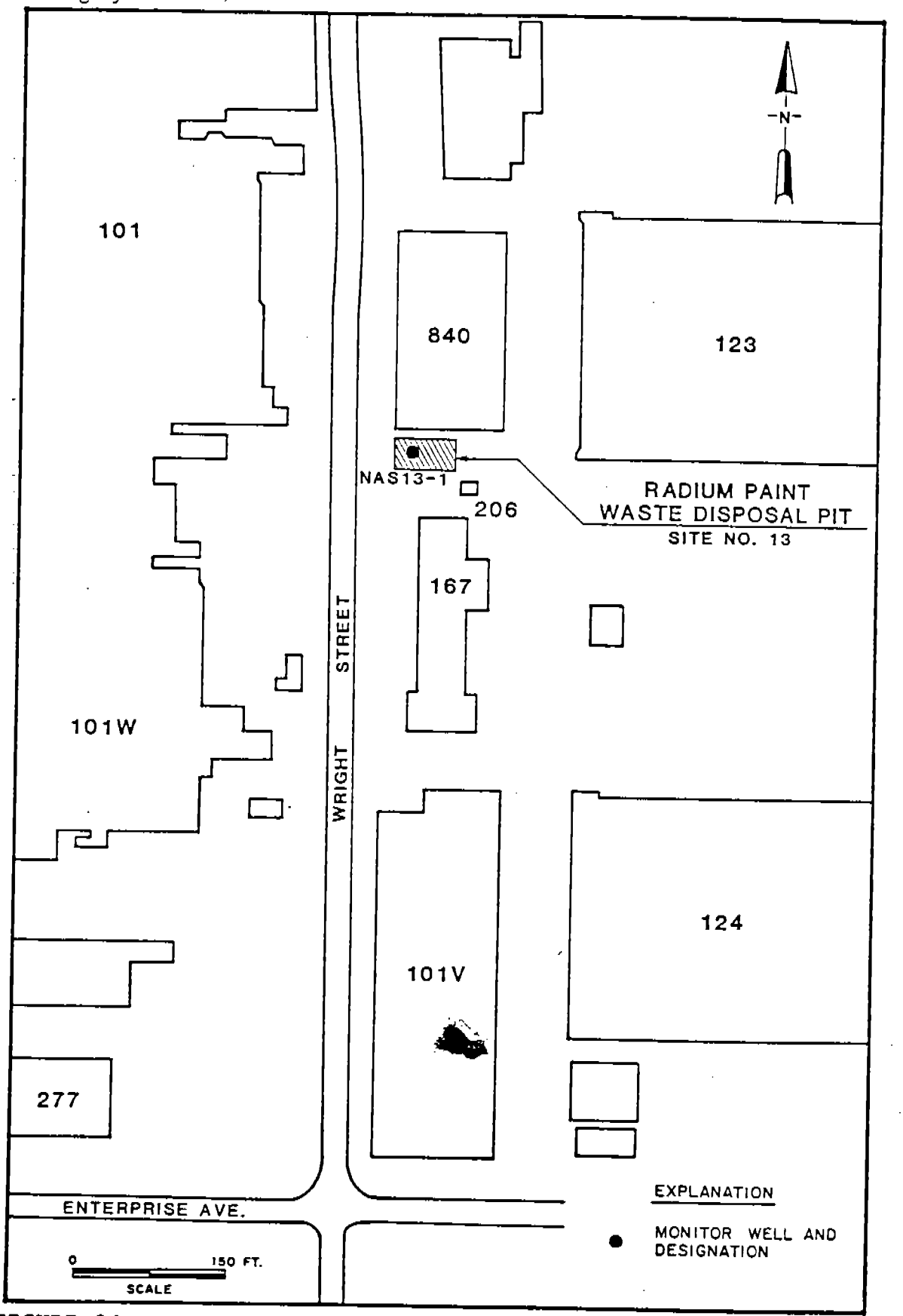

FIGURE 20. Location of the Monitor Well Installed at the Radium Paint Waste Disposal Pit (Site No. 13)

contained gross-alpha and gross-beta levels of 6±3 and 4±2 pCi/l, respectively. Further analyses of these samples indicated that the levels of radium 226 and radium 228 were 6±2 pCi/l and <1 pCi/l, respectively. The levels of VOCs in the well were less than the detection limits. The findings of the second sampling round show that only radium 226 in the shallow ground water slightly exceeds the FDER drinking-water standards (5 pCi/l), however, because this site does not pose an imminent hazard to human health or the evironment, no additional study is recommended for this site.

NARF AREA (SITES NOS. 11, 12, 14, 15, 16)

Background

The NARF (Naval Air Rework Facility) area is an industrialized area at the NAS located adjacent to the St. Johns River (Figure 21). The NARF is a major tenent command within the NAS assigned to maintain and operate facilities; perform a complete range of depot-level rework operations on designated naval aircraft, engines, their components, accessories, and equipment; provide engineering services in the development of changes in hardware design; and furnish technical services on aircraft maintenance and logistic problems. The NARF consists of a total of 45 buildings.

The site numbers above refer to specific buildings or areas inside the NARF that were determined to present a potential threat to the environment. For the purpose of this study, the 5 study areas in the NARF were treated as one due to their close proximity to one another.

Reportedly unauthorized disposal of waste solvents and other materials from the main hangar section of Building 101 (Site No. 11) occurred for many years. Approximately 2,000 gallons of solvents may have been disposed of over a 40-year period. Following a fire in 1975, it was thought that either disposal or exfiltration of waste solvents and other flammable liquids from deteriorated industrial sewer lines

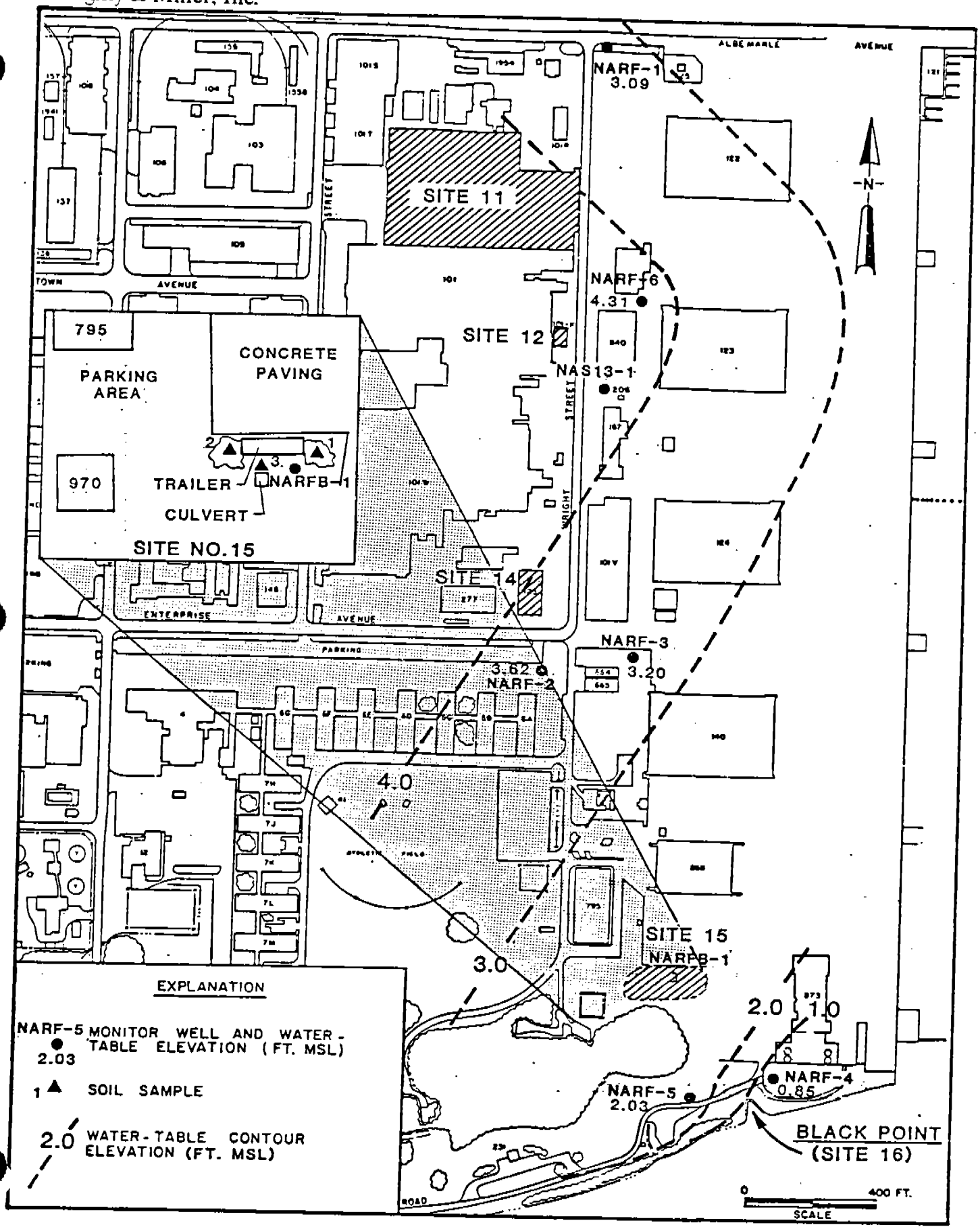

FIGURE 21. Locations of Installed Monitor Wells, Soil Samples and Water-Table Contours (March 12, 1984) in the NARF Area (Site Nos. 11, 12, 14, 15, and 16.

were responsible for the presence of these compounds in the ground.

The old test cell building (Site No. 12) is located at Building 101K, also shown in Figure 21. Reportedly, there are connections of the storm and sanitary sewers with the building roof drains and the industrial wastewater system. Basically, this area is used for the storage of various chemicals in 55-gallon drums. It has been reported that numerous leaks of chemicals from ruptured or rusty drums has occurred in this area.

The battery shop (Site No. 14) located in Building 125, contains a seepage pit where waste acids from lead-acid batteries were disposed. Approximately 100 gallons of waste were dumped annually from 1959 to 1982.

The solvent and paint disposal area (Site No. 15) is located along the eastern side of Building 970. The area is approximately 100 ft by 100 ft and was used for disposal of solvents and paint sludges as recently as 1978. Based on current operations, it is estimated that up to 2,000 gallons of these wastes were disposed of at this site annually for approximately 36 years.

The storm sewer (Black Point) runs along Buildings 101, 50, 795, and discharges at Black Point (Site No. 16). There has been a recurring discharge of JP-5 fuel and oil which were believed to come from a fuel tank overflow in the

vicinity of test cell 12, and possibly a variety of other sources in the NARF area. An oil boom was installed at the outfall to contain the oil. Over the years various chemical wastes from NARF were reportedly disposed of by discharge into the storm sewer system, which may have eroded the sewer pipe and leached into the ground.

Findings and Recommendations

Seven monitor wells were installed to investigate the presence or absence of chemical constituents in the ground water beneath the NARF area. The locations of these wells, which are designated as NARF-B1 and NARF-1 through NARF-6, are shown in Figure 21. Water samples were collected from each and analyzed in the field for pH and conductivity and in a laboratory for TOC, VOCs, cyanide, and selected metals, including cadmium, chromium, lead, and nickel. The results, (Appendix C, Section 6) show that: the concentrations of dissolved metals were below the detection level; cyanide ranged from below laboratory detection limits to 0.071 ppm (NARF-3); and TOC concentrations ranged from below detection limits (NARF-2) to 9.5 ppm (NARF-6). The pH and specific conductance measurements generally ranged from 5.5 to 6.8 and from 70 to 610 umhos/cm, respectively, except for NARF-1 (pH of 11.88 units and specific conductance of 2,010 umhos/cm), which is believed to be influenced by the grout used to plug the bottom of the borehole prior to setting the well casing.

The VOCs analyses show that some of these compounds are present in varying concentrations in each well. The concentrations of total VOCs in wells NARF-1, 2, 3, 5 were relatively low varying from 3.9 ppb (NARF-2) to 25.0 ppb (NARF-1). Relatively high levels of total VOCs were found, in the other three wells including 239.5 ppb in NARF-6, 1,930 ppb in NARF-4, and 242,780 ppb in NARF-B1. Analysis of a water sample from NAS13-1, which is also located in the NARF area showed that no VOCs were detected.

A total of eight VOCs were detected in the NARF wells of which 4 compounds comprised nearly 80% (percent) of all the VOC detections. These compounds are listed in decreasing frequency of detection; TCE, trans-1,2-dichloroethene, 1,1-dichlorethene, and 1,1,1-trichloroethane; TCE was detected in 7 of the 8 wells. Two other compounds, trans-1,2-dichloroethene and 1,1-dichloroethene are thought to be daughter compounds resulting from anaerobic biodegradation of TCE in the ground water. Therefore, at a particular location the concentrations of TCE relative to any of the daughter compounds may indicate the nearness to the original source of contamination. Two monitor wells, NARF-1 and NARF B-1, show concentrations of TCE significantly above the other detected compounds, these wells are either located at the suspected source (Site No. 11-NARF-1 and Site No. 15-NARF B-1), or very near and hydraulically downgradient from it.

The water-table contours as determined on March 12, 1984, illustrate the general ground-water flow directions. The water-level data collected from the wells shows that the water table is relatively flat and based on the existence of the sea wall along the eastern portion of the NARF, it is inferred that ground-water flow in the southern portion is primarily toward the south and in the northern portion toward the north.

Three soil samples were collected in the NARF area at the paint and sludge disposal area (Site 15). The samples were analyzed for EP Toxicity for the eight primary drinking-water metals and nickel. The results, presented in Appendix C, Section 6, show that the levels of these metals were generally low and each was below the levels at which it would be considered a hazardous waste.

Relatively high levels of VOCs were found primarily in two areas: (1) in the vicinity of the paint and sludge disposal area in the southeast portion of the NARF (Site 15), and (2) east of the central portion of hangar Building 101 (Site 11 and 12). It is recommended that five additional shallow monitor wells and one deeper monitor well (installed to the base of the surficial aquifer) be installed in the southeastern portion of the NARF, at the locations shown in Figure 22. These wells, in addition to existing wells NARF-4, NARF-5, and NARF-B1 would be sampled and analyzed for pH, specific conductance, and VOCs. Also, five shallow

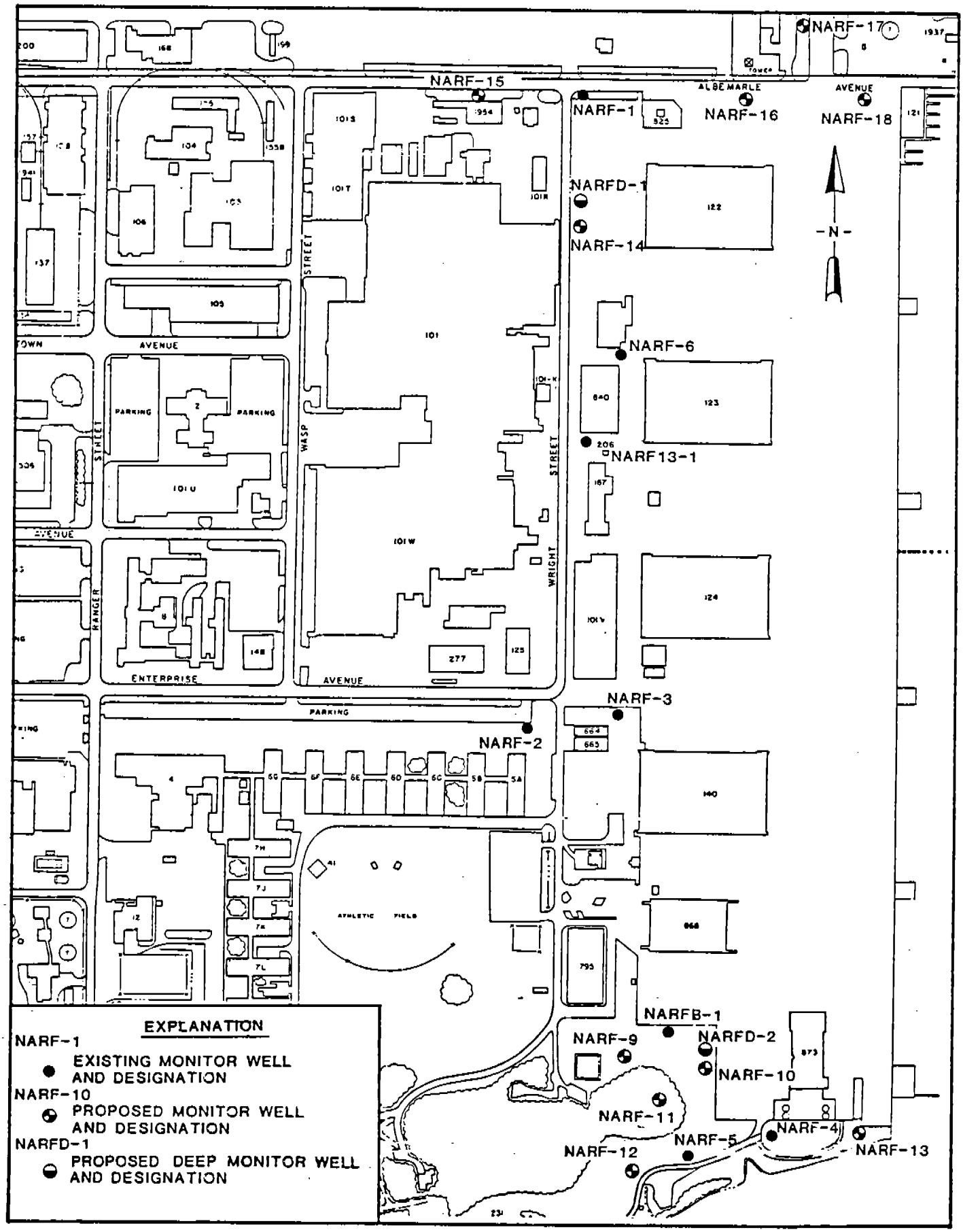

FIGURE 22. Locations of Proposed Monitor Wells in the NARF Area.

monitor wells and one deeper well should be installed in the northeast portion of the NARF at the approximate location shown in Figure 22 and these wells, along with wells NARF-1 and NARF-6 and an existing adjacent monitor well, NAS 13-1, be sampled and analyzed for pH, specific conductance, and VOCs. Additionally, four of the NARF wells (NARFB-1, NARF-10, NARF-6, and NARF-14) will be sampled for the remaining EPA priority pollutants including acid and base neutral extractable compounds, pesticides, PCBs (poly-chlorinated biphenyls), and metals.

Short-term pumping tests will be conducted on selected wells to determine the hydraulic characteristics of the surficial sediments. The new monitor wells and existing wells NARFB-1 and NAS13-1 will be surveyed by a professional land surveyor so that water-level elevations may be referenced to mean sea level and used to update the water-table contour map.

RADIOACTIVE WASTE FILL AREA (SITE NO. 18)

Background

The radioactive radium paint wastes, initially deposited at Site No. 13, were excavated along with the contaminated soil in the late 1950's and deposited near the shoreline in the vicinity of the present Marina No. 1. This area was originally at water level, but was built up 3 to 5 ft by the deposition of approximately 1,500 cubic feet of this fill material. The approximate boundaries of the fill area are shown in Figure 23.

Findings and Recommendations

One monitor well (NAS18-1) was installed in the radioactive waste fill area at the location shown in Figure 23. A water sample was collected and analyzed in the field for pH and in a private water-quality laboratory for gross alpha. The laboratory results (Appendix C, Section 7) show that the ground water has a gross alpha activity of 0 $\pm$ 3 pCi/l. Based on these data, the site does not appear to be an imminent hazard to human health or the environment; therefore, no further study is recommended for this site.

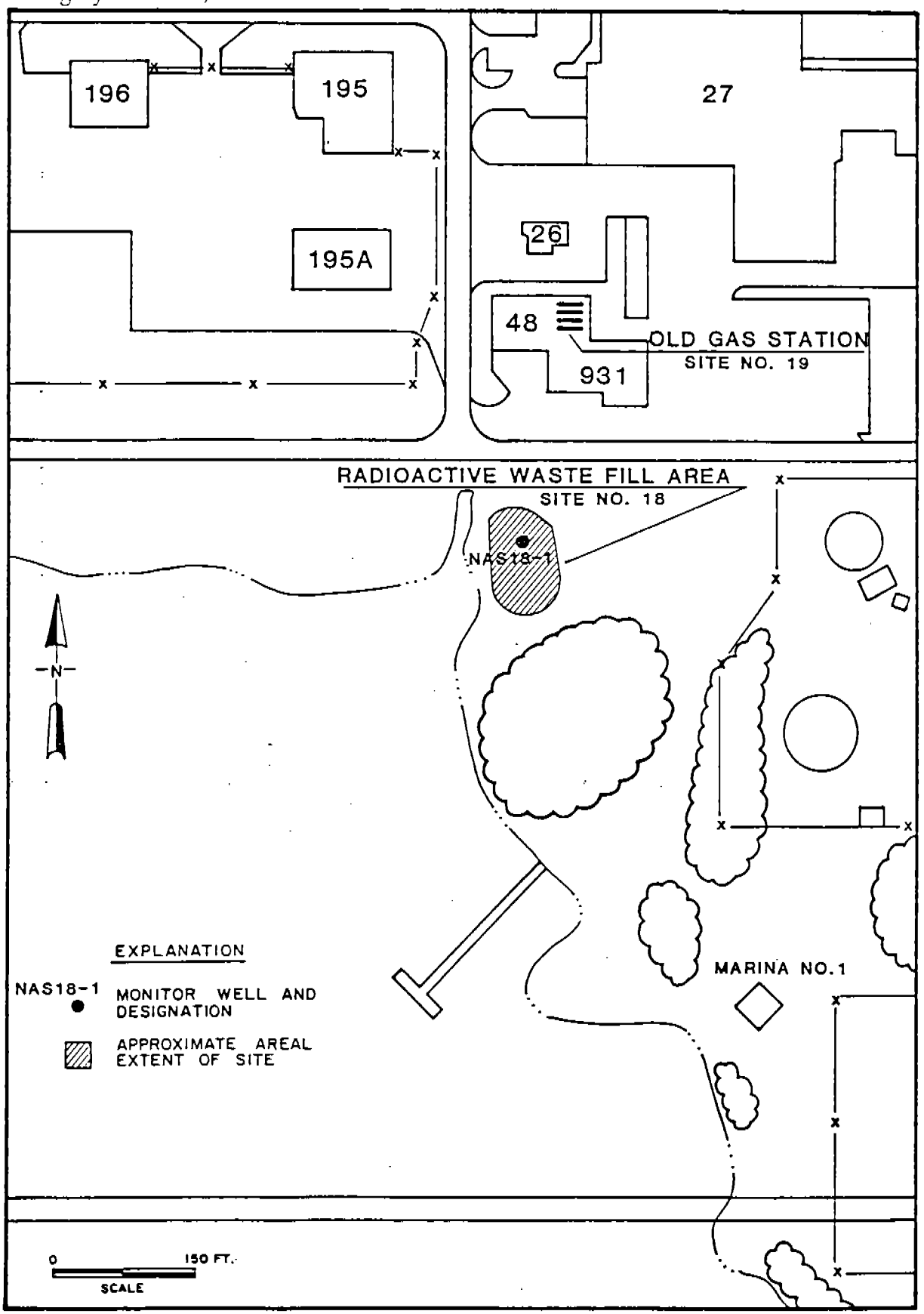

FIGURE 23. Location of the Monitor Well Installed at the Radioactive Waste Fill Area (Site No. 18) and Buried Storage Tanks at the Old Gas Station (Site No. 19)

OLD GAS STATION (SITE NO. 19)

Background

The old gasoline service station (Building 48) presently is used as the base garden center. When in operation, the old service station maintained four buried storage tanks each having a capacity of 10,000 gallons. The tanks are buried below the screened nursery at the garden center (Figure 23). The tanks were abandoned in early 1980 when the fire department completely filled each tank with water. At that time, no gasoline was observed discharging from the tanks. The buried fill pipes, cross-connecting lines and venting system were removed and capped. A visit to the garden center in September 1983 did not reveal the exact location of the buried tanks.

Recommendations

Although early discussions with Navy personnel indicated that the buried tanks were to be kept for emergency storage, it seems that they are now considered abandoned tanks. The FDER has promulgated new regulations as of September 1, 1984, concerning storage tanks (Chapter 17-61, FAC). According to this rule an abandoned tank means: (1) not intended to be returned to service, (2) has been out of service for three years, and (3) cannot be tested in accordance with the requirements of the rule. Additionally, a buried storage tank can only be abandoned by pumping the system free of

liquid and filling the tank with sand, concrete, or other inert material in lieu of removal of the tank. Therefore, it is recommended that the tanks be abandoned according to the FDER regulations. The water presently contained in the tanks should be discharged to the domestic wastewater treatment plant.

FIRE PIT (SITE NO. 28)

Background

This site was a former fire-fighting training area in which waste oil was placed in a pit and incinerated. The IAS Report did not recommend this site for a verification study, however, it was later added by the Navy as it reportedly was used as an oil disposal site during 1943 through 1946. Due to the presence of PCBs found in oil at the oil and solvent disposal pit site (Site No. 26), this site was also thought to receive oil that contained PCBs. Prior to beginning the verification work, the exact area thought to be Site No. 28 was field located by a retired Public Works Department employee (see Figure 24).

Findings and Recommendations

One monitor well (NAS28-1) was installed at the fire-fighting training area and a water sample was collected and analyzed in the field for pH and specific conductance and in a water-quality laboratory for PCBs and VOCs. A composite soil sample was also collected and analyzed in a laboratory for PCBs. The laboratory results presented in Appendix C, Section 8, show that the ground-water sample was free of all compounds with the exception of 4 ppb of TCE. The soil sample, which consisted of a composite sample from three locations (Figure 24), contained 103 ppm of PCBs.

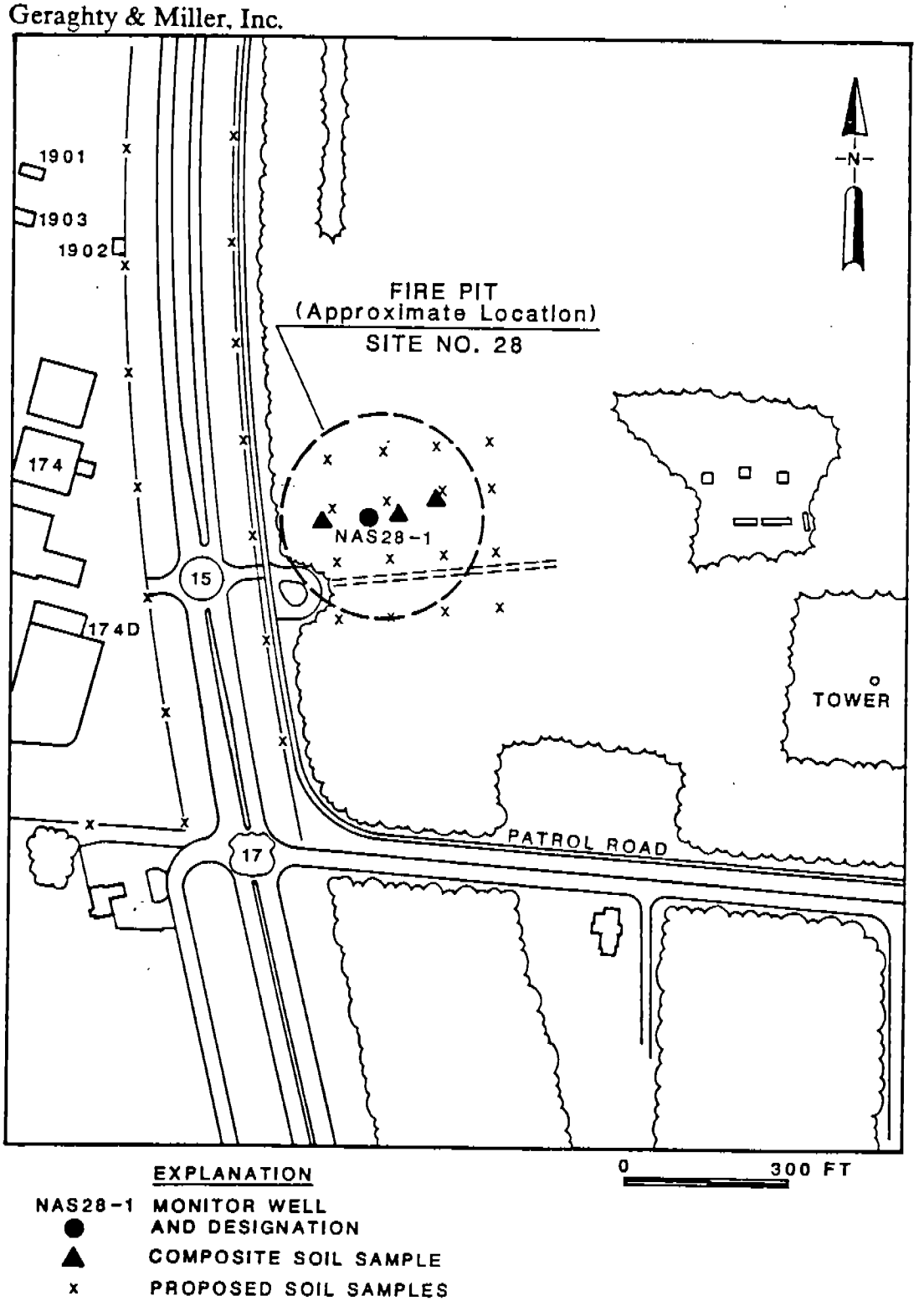

FIGURE 24. Locations of Installed Monitor Well and Soil Samples at the Fire Pit Area (Site No. 28).

In accordance with Section 17-34.02(k), FAC PCBs are defined as a chemical substance or substances (including soils and materials contaminated as a result of a spill) that contain 50 ppm (on a dry weight basis) or greater of PCBs. Above this level, the soil is considered to be a hazardous waste; therefore, it is recommended that additional soil samples be collected to define both the vertical and horizontal extent of the PCBs in the soils in this area. Initially, 16 sampling locations, shown in Figure 24, should be identified from which two soil samples would be collected at distinct depths, 0-2 ft and 3-5 ft below land surface. These soils will be analyzed for PCBs and the laboratory results will be used to determine the area where the soils are considered to be a hazardous waste.

ORGANIC DISPOSAL AREA (SITE NO. 29)

Background

The organic disposal area is located along the patrol road near the southwest corner of the NAS (Figure 25). This area has been used for the disposal of organic debris such as wood and grass clippings; however, during the IAS inspection of the site, crushed drums (approximately one dozen), construction debris, discolored soil piles, scrap metals, and PVC cases were present. The deposited material is graded on occasion in order to maintain truck access. Based on a topographic map, the organic disposal area appears to have been used as a borrow pit at one time.

Findings and Recommendations

Two monitor wells, NAS29-1 and NAS29-2, were installed at the organic disposal area at the locations shown in Figure 25. Water samples were collected and analyzed in the field for pH and in a water-quality laboratory for TOC, VOCs, cyanide, and selected metals, including antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc, and thallium. The laboratory results, presented in Appendix C, Section 9 show that the dissolved metal and cyanide levels were low; only copper (0.022 ppm) and zinc (0.066 ppm) were detected in NAS29-1, and zinc (0.016 ppm) in NAS29-2. Very low levels of VOCs were detected in both NAS29-1 (0.6 ppb of trans-1,2-

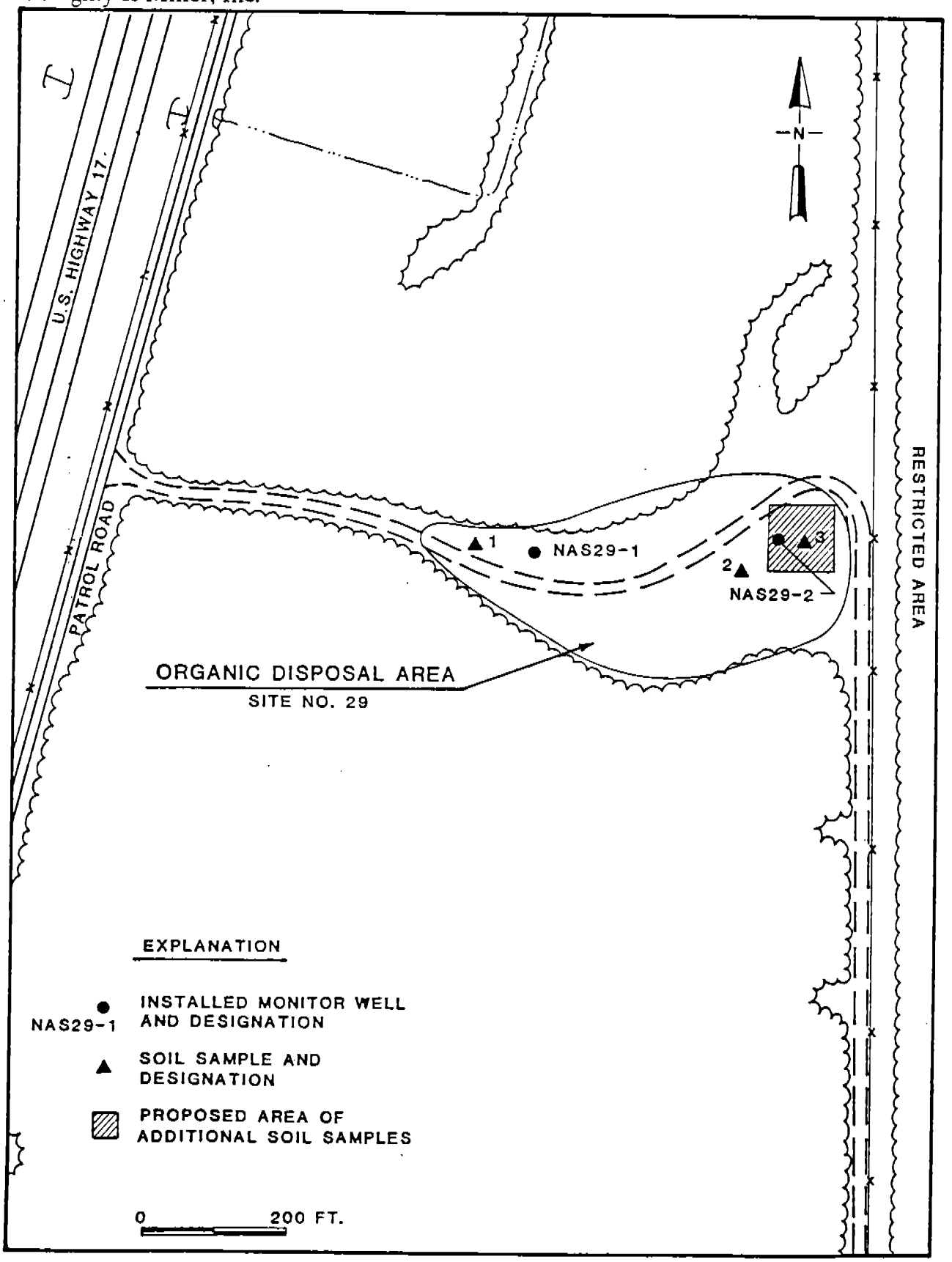

FIGURE 25. Locations of Installed Monitor Wells and Soil Samples at the Organic Disposal Area (Site No. 29).

dichloroethene and 0.4 ppb of 1,1,1-trichloroethane) and NAS29-2 (3.4 ppb of chloromethane). The TOC ranged from 2.8 mg/l (NAS29-2) to 20.5 mg/l (NAS29-1).

Three soil samples were collected from three small piles of what appeared to be blasting material, at the location shown in Figure 25. The soils were analyzed for EP Toxicity for metals, including arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and nickel. The results, also presented in Appendix C, Section 9, show that the levels for samples collected from two of the piles were well below the levels which would designate them as a hazardous waste. However, the cadmium content in the third sample, at 2.62 ppm, exceeds the EPA's standard; thus, this pile would constitute a hazardous waste.

A recent site visit was made to locate the pile that failed the EP Toxicity test. The site had been graded and the tainted soil could not be identified. As shown in Figure 25, monitor well NAS29-1 is located very near the original pile location. Apparently, the cadmium contained in that soil has not leached into the shallow ground water. It is recommended, however, that nine additional soil samples be collected in the vicinity of NAS29-1 and analyzed for EP Toxicity for cadmium.

OLD DRUM LOT (SITE NO. 30)

Background

The old drum lot, shown in Figure 26, was used for outdoor storage of unprotected drums containing raw products. Approximately 10,000 drums were stored on Marsden Matting (aircraft landing matting) from 1955 to 1967. Although there is no visible evidence of environmental impairment, it was reported that on occasion drums containing hazardous materials corroded and leaked their contents onto the ground. Surface soils in the area were tested previously for PCB contamination; the test results did not show PCB contamination.

Findings and Recommendations

Three monitor wells, NAS30-1, NAS30-2, and NAS30-3, were installed at the old drum lot at the locations shown in Figure 26. Water samples were collected and analyzed in the field for pH and specific conductance and in a water-quality laboratory for EPA's list of priority pollutants which includes 32 VOCs, 11 acid compounds, 45 base-neutral compounds, 18 pesticides, 7 PCBs, 13 metals, and cyanide. The laboratory results, (Appendix C, Section 10) show that two VOCs, trans-1,2-dichloroethene and trichloroethene, were detected in trace concentrations and only one base-neutral extractable compound was detected; well NAS30-2 showed a concentration bis (2-chloroethyl) ether at 54 ppb.

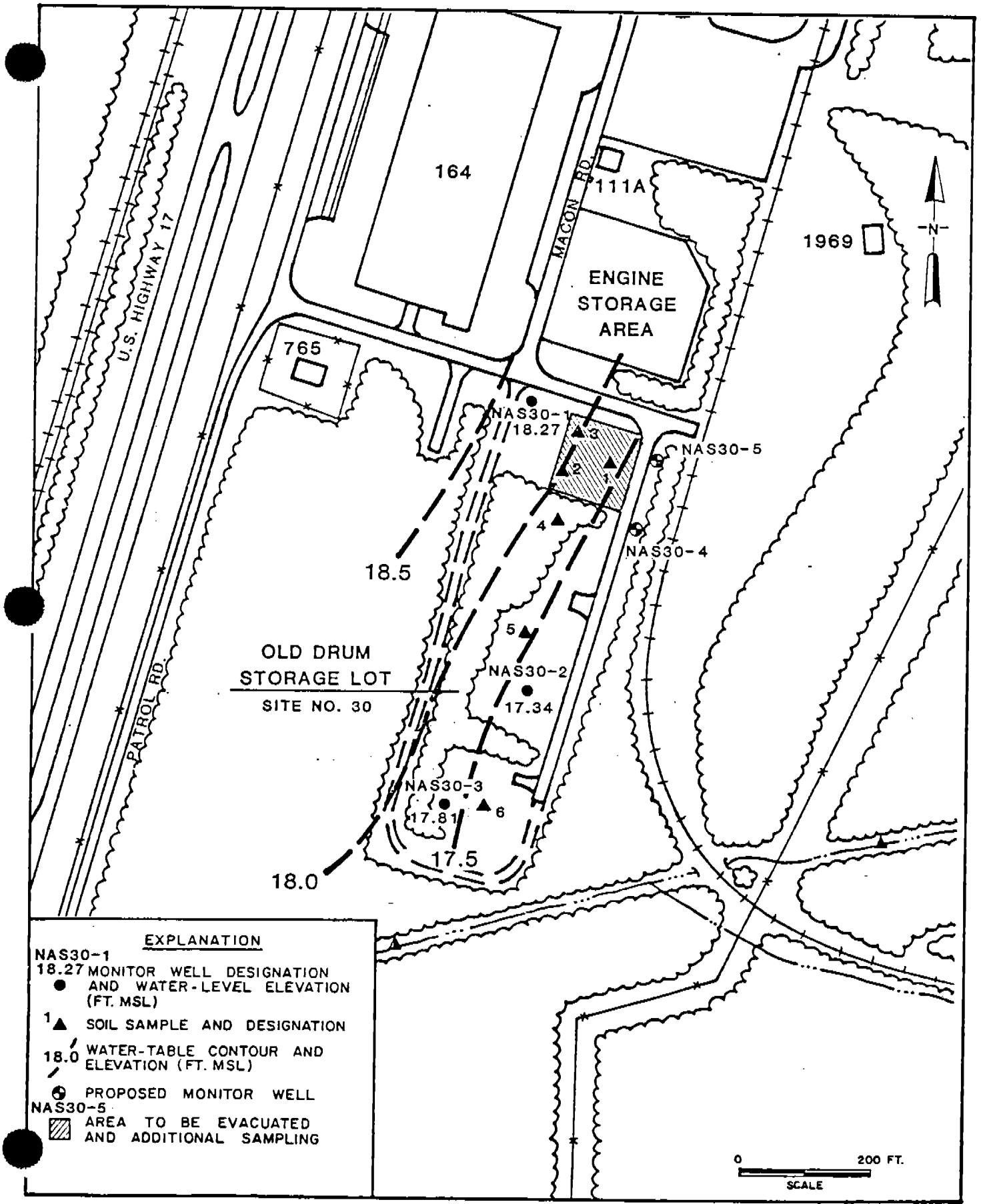

FIGURE 26. Locations of Installed Monitor Wells, Soil Samples, and Water-Table Contours (March 12, 1984) in the Old Drum Storage Lot (Site No. 30)

Most of the cyanide and dissolved metal levels were non-detectable, and all were well below FDER's primary drinking-water standards. Water-level measurements (Table 4) collected from the installed monitor wells on March 12, 1984, show that the general direction of shallow ground-water flow is to the southeast or toward a small drainage ditch.

Six soil samples were also collected at the locations shown in Figure 26 and analyzed for EP Toxicity for metals, including arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and nickel. The sampling procedures consisted of compositing four to six subsamples at given locations to produce a broader coverage of the area. The three soil samples (4, 5, 6) collected between the Marsden Matting show metal concentrations well below EPA criteria for identifying hazardous wastes. The other samples (1, 2, 3) collected immediately north of the drum storage area revealed levels of cadmium in the soil above the established levels for a hazardous waste.

As a result of the sampling, the Navy has contracted a hazardous-waste disposal contractor to remove the contaminated soil and dispose of it in a secure landfill.

It is recommended that a follow-up study be conducted in the excavated area to confirm the success of the clean-up operation and to ensure that the ground water has not been adversely affected by the disposal and removal operations. Six soil samples will be collected at this site and analyzed

for EP Toxicity for cadmium and lead. In addition, two additional monitor wells will be installed at the locations shown in Figure 26. Water samples will be collected from these and from existing monitor well NAS30-1 and analyzed for pH, specific conductance, VOCs, and FDER's primary drinking-water metals. Water levels will be measured and the elevations of the top of casings will be determined in order to delineate the direction of ground-water flow.

BASE LANDFILL (SITE NO. 32)

Background

The old base landfill, located northeast of Site No. 30 covers an area approximately two acres in size, as shown in Figure 27. This area was used during the 1960's for disposing of soil, refuse and construction debris and junk vehicles. A portion of this area is presently used for the collection (in dumpsters) of large household refuse, such as appliances. Also, a new building has been constructed (Building 144) north of the landfill for storage of hazardous wastes prior to disposal off-site.

Findings and Recommendations

One monitor well (NAS32-1) was installed at the base landfill at the location shown in Figure 27. A water sample was collected and analyzed in the field for pH and in a water-quality laboratory for TOC and VOCs. The results, which are presented in Appendix C, Section 11, show that the water had a TOC concentration of 60 ppm and only one VOC was detected, methylene chloride, at a concentration of 2.6 ppb.

Based on the TOC results, it is recommended that the monitor well NAS32-1 be analyzed for EPA's list of acid and base-neutral extractable compounds as well as field measurements for pH and specific conductance. If these

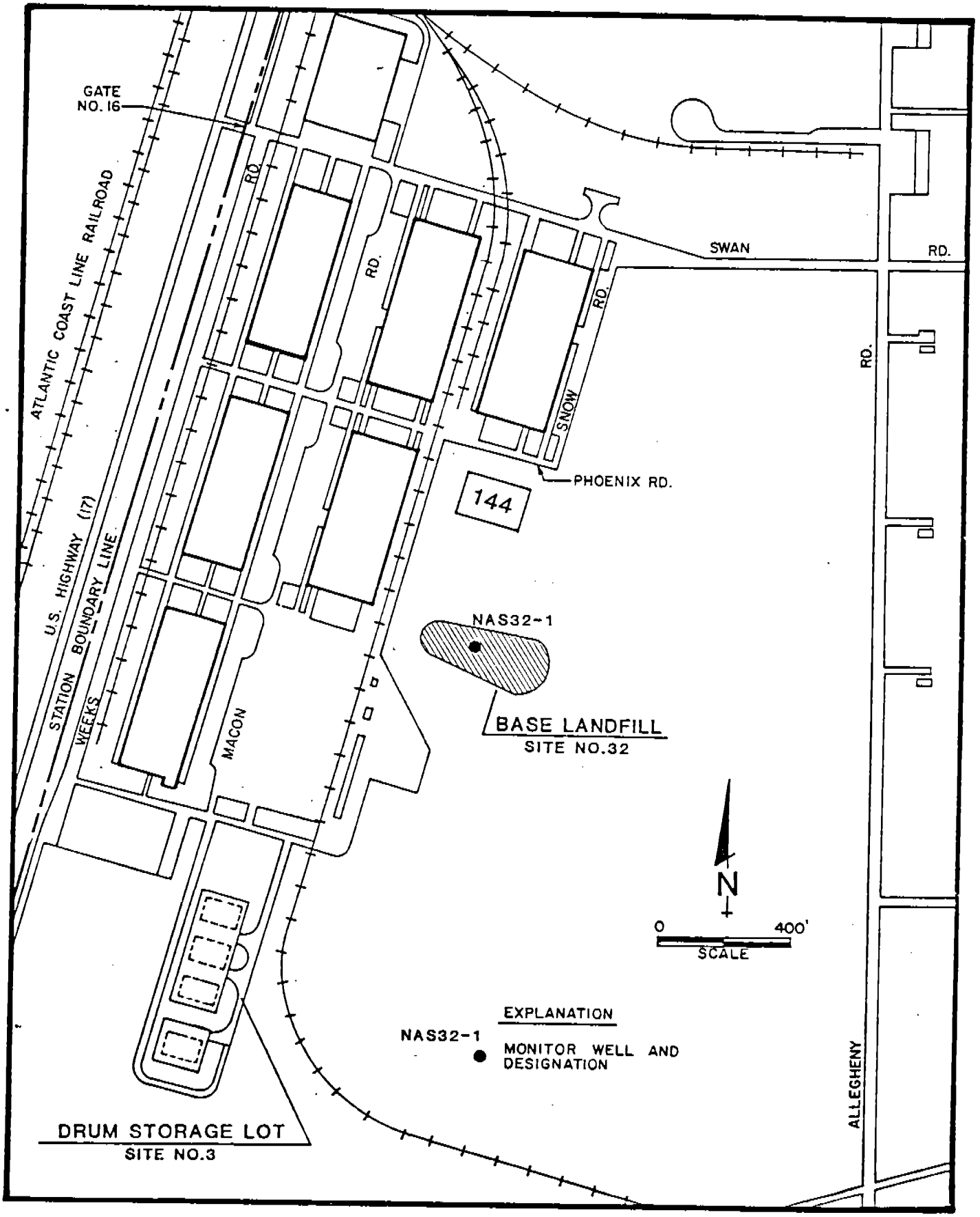

FIGURE 27. Location of the Monitor Well Installed at the Base Landfill (Site No. 32).

compounds are not detected or are detected in low concentrations, then it is suspected that the high TOC was due to organic matter naturally occuring in the soil.

TRANSFORMER BURIAL AREA (SITE NO. 39)

Background

A retired Public Works Department employee reported that hundreds of items of electrical gear consisting of old and new transformers (which may have contained PCB oils), were buried east of warehouse building No. 164 (shown in Figure 28) during the years 1943 through 1945. A 10-ft wide by 5-ft deep ditch, between the warehouse building and the railroad tracks to the east, was believed to have been the burial spot for the transformers.

Findings and Recommendations

Twenty-seven soil borings were installed to a depth of 10 ft in the area previously located by former Naval employees as being the burial area. The lithologic logs from these borings are presented in Appendix B, pages B-1.9 to B-1.17. Continuous split-spoon samples were collected and visually inspected in the field for electrical parts. In all of the borings, no evidence was found to indicate that anything may have been buried there. Based on the data collected, no further study is recommended for this site.

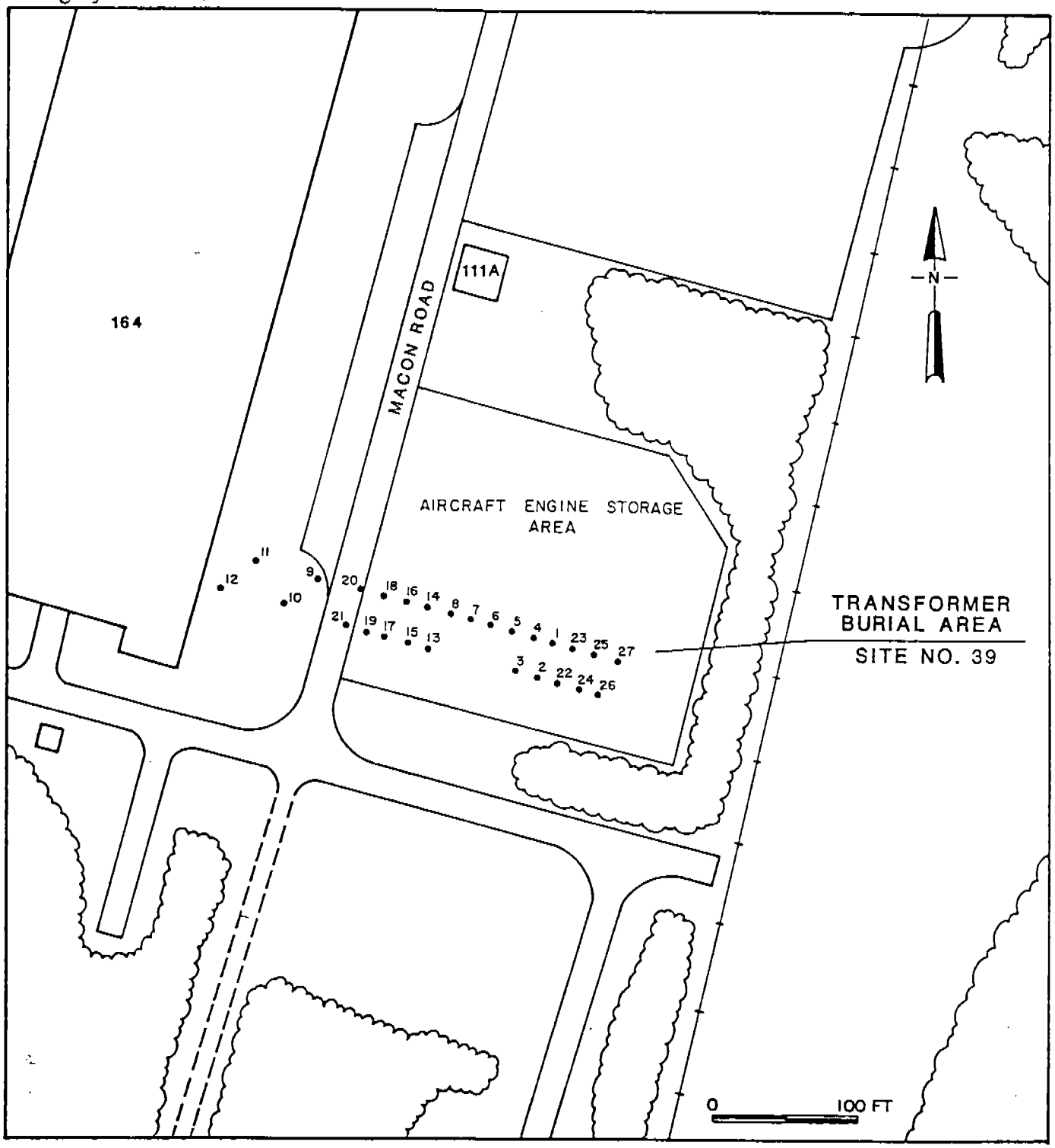

FIGURE 28. Locations of Soil Borings at the Suspected Transformer Burial Area (Site No. 39).

INDUSTRIAL WASTEWATER DISCHARGE AREA (SITE NO. 40)

Background

Prior to 1972, a wastewater treatment plant (east side plant) was located south of the east end of the main runway. Wastes reaching this plant were treated initially by settling (for paint chip removal) and skimming for removal of oils and solvents (disposed of at Site No. 26). Effluent from the settling/skimming operations were then treated in a trickling filter plant for discharge to the St. Johns River. Reportedly, the discharge to the river resulted in a build-up of sediments in the cove east of runway 27, as shown in Figure 29. The east side plant was removed from service in 1972 and the waste stream was diverted to the west side plant.

Findings and Recommendations

Four composite sediment samples were collected in the cove east of runway 27. Each composite sample was composed of sediments collected at the surface of the cove bottom and sediments down to a depth of 2 ft below the cove bottom. The surface sediments were collected with a clamshell-type dredge sampler and the deeper sediments were collected with a PVC pipe driven to the desired depth.

The results of the EP Toxicity analyses, presented in Appendix C, Section 12, show that the composite samples at

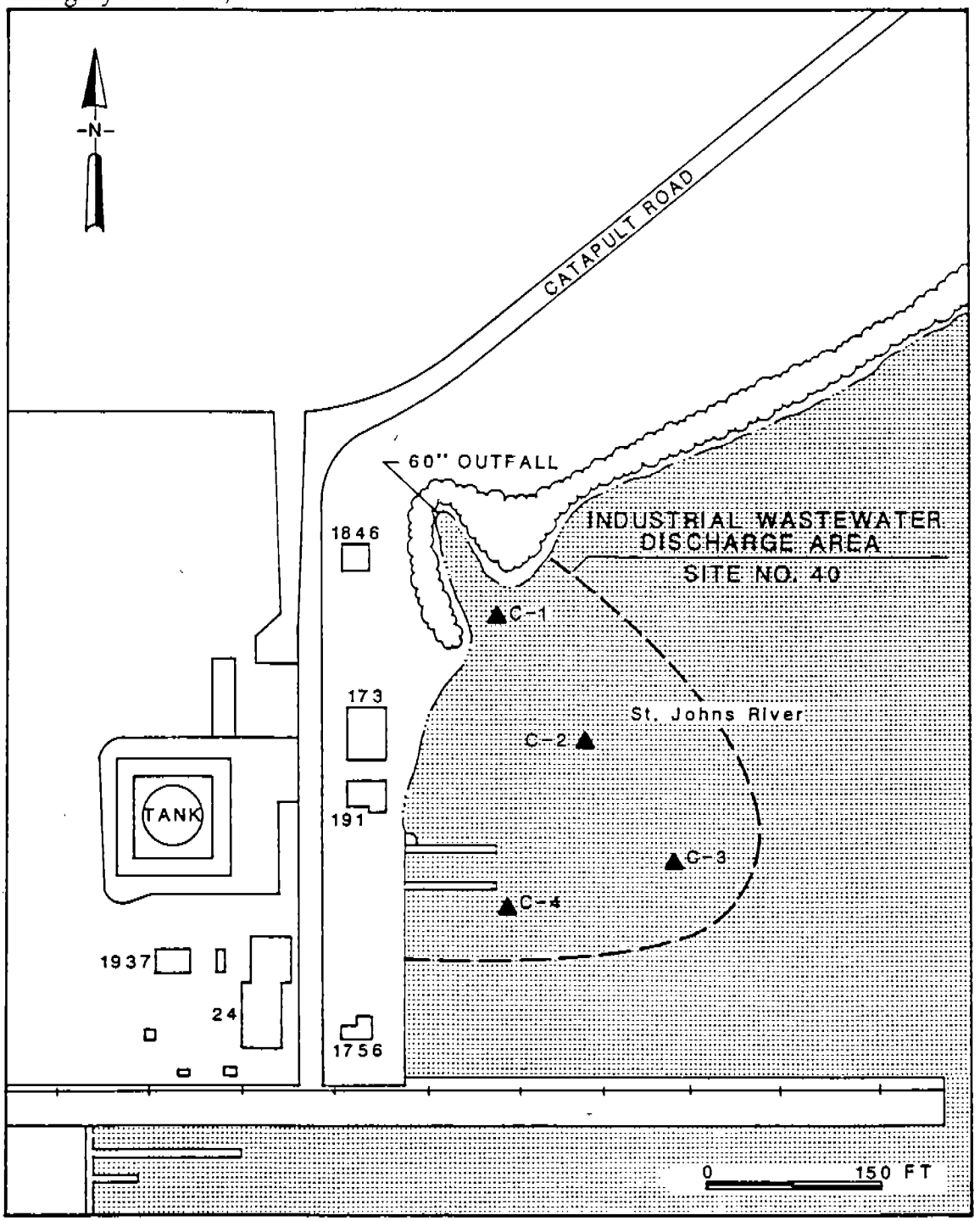

FIGURE 29. Locations of Sediment Samples at the Industrial Wastewater Discharge Area (Site No. 40).

each site were all below the laboratory detection limit; therefore, the sediments in this area are not classiified as a hazardous waste. Based on the data collected, this site does not pose an imminent threat to human health or the environment; therefore, no further action is proposed at this site.

NFD: OIL POND AND LAND SPREADING AREA (SITE NO. 5)

Background

The oil pond and land spreading area (Figure 30) is located along the St. Johns River at the east side of the NFD. The pond, originally 200 ft by 100 ft, is clearly identified due to the lack of vegetation in this area. The oil pond was excavated and diked in the 1950's, but a hurricane in 1964 damaged the dike which resulted in oil leaking out. Also, 5,000 gallons of JP-5 mixed with bottom sludge from tank cleaning operations were disposed of in this area prior to 1967. Through 1967, approximately 8,000 barrels of contaminated fuel oil from an aircraft carrier were disposed in this area along with trash and wood. The pond was filled with soil in 1965 and was graded at that time with heavy equipment. In 1971, the site was regraded causing the contaminated soils to be spread over on the present area approximately 100 ft by 500 ft.

Findings and Recommendations

Thirty-two soil borings were drilled in the oil pond area to determine the extent of contamination of both the soil and ground water. The borings were drilled to depths ranging between 4 and 14 feet below grade. The lithologic logs presented in Appendix B, Section 1 show the vertical extent of oil in the soil column at a particular site. Generally, most of the oil is tightly held by molecular

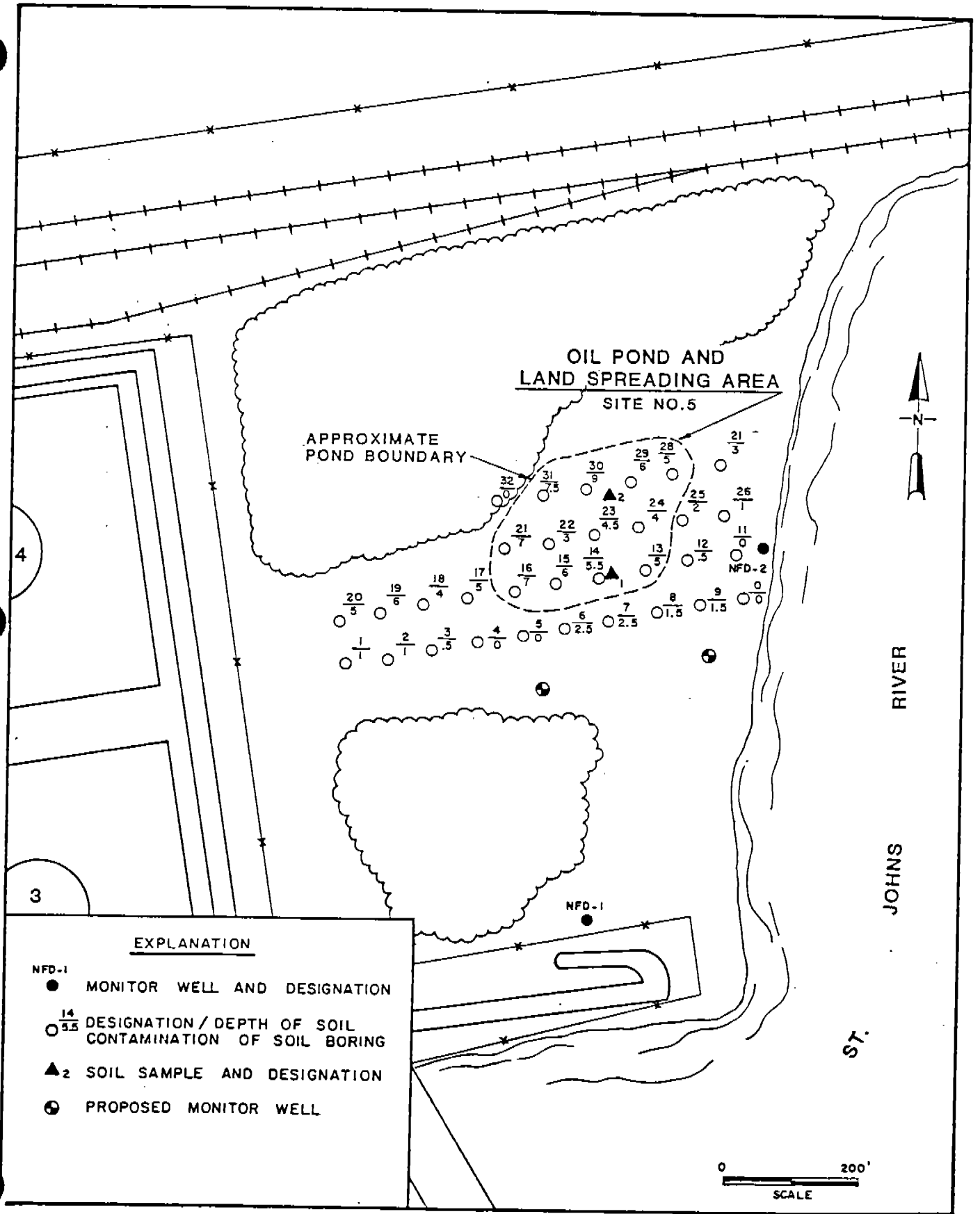

FIGURE 30. Locations of Installed Monitor Wells and Soil Samples at the Oil Pond and Land Spreading Area (Site No. 5-NFD)

attraction with the soil particles. The oil-covered soil extends below the water-table in many places; the water table occurs at a depth of approximately 4 ft below land surface.

The oil is very viscous, and is not likely to flow through the fine-grained sands at the NFD. There does not appear to be a floating plume of oil, rather the oil is held by the soil. The oil-saturated soil is, however, relatively widespread due to grading operations in this area.

Two soil samples were collected at locations shown in Figure 26 and analyzed in a laboratory for EP Toxicity for the nine metals discussed earlier. With the exception of barium (0.2 mg/l (milligrams per liter), in sample number 1, the leachable metals levels were below detection limits; therefore, all the values were well below the EPA's criteria for identifying a hazardous waste.

Two monitor wells were also installed at locations east and south of the oil pond area (Figure 25). Water-quality samples were collected from the wells and analyzed in the field for pH and specific conductance and in a private laboratory for metals (cadmium, chromium, lead, mickel), and VOCs. The laboratory results are presented in Appendix C, Section 13. The dissolved metal concentrations were all below laboratory detection limits and the total VOCs concentrations in NFD-1 were 1 ppb (1,1,1-trichloroethane at 0.7 ppb, and trichloroethene at .3 ppb); no VOCs were detected in NFD-2.

Based on the results of this study, it is proposed that two additional monitor wells be installed at the locations shown in Figure 30. The new wells will be installed near the outer edge of the spreading operations. The new and existing wells will be referenced to mean sea level by a professional land surveyor to determine the direction of ground-water flow in this area. Water-quality samples will be collected from the two new wells and NFD-2 and analzyed using a hydrocarbon scan (EPA Method 602) to determine the concentrations of relatively soluble aromatic hydrocarbons and a petroleum hydrocarbon scan to determine the presence or absence of dissolved fuels found in the ground water.

SUMMARY

During the verification study, 14 sites (5 sites in the NARF area were considered as 1) were studied due to their potential for adversely affecting the environment or human health. Appendix D contains a general location map of each study site and the individual site maps showing the location of installed monitor wells and soil and sediment sampling sites. Twelve of these sites are past disposal areas that have not received wastes in many years; at these locations much of the potential ground-water contaminants have been attenuated by the processes of biodegradation, evaporation, adsorption, dilution or dispersion. Six of the 14 study sites are recommended for further investigation in the characterization study. A summary of the recommended work plan for the characterization study at these sites is presented in Table 6.

Respectfully submitted,

GERAGHTY & MILLER, INC.

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December 1985
T9290GW2

TABLE 6. SUMMARY OF WORK PROPOSED FOR THE CHARACTERIZATION FOR THE NAS AND NFD

SITE & NUMBER	PROPOSED MONITOR WELLS	CHEMICAL ANALYSIS[1/] Ground-Water Samples	Soil Samples	COMMENTS
NAS				
NARP Area (11, 12, 14, 15, 16)	12	(18) VOCs AND (4) EPA priority pollutants in four wells		Define and delineate contaminant plume(s). Six existing wells will be resampled.
Organic Disposal Area (29)			(9) Cd.[3/]	Attempt to delineate location of hazardous material.
Old Drum Lot (30)	2	(3) VOCs[4/] (3) PDWM[4/]	(6) Cd, Pb[5/]	Evaluate effectiveness of soil removal. One existing well will be resampled.
Base Landfill (32)	resample existing well	(1) A & B/N extractables		Identify elevated TOC value.
Fire Pit (28)			(32) PCBs	Delineate horizontal and vertical extent of PCB in soil.
NFD				
Oil Pond and Land Spreading Area (5)	2	(3) BTX Scan[6/] petroleum hydrocarbons		Identify presence or absence and type of hydrocarbon in ground water. Two existing well will be resampled.

1/ Water-quality samples will be analyzed in the field for pH and specific conductance.

2/ VOCs = Volatile organic compounds.

3/ Cd = Cadmium, analyzed by extraction procedure (E.P. Toxicity).

4/ PDWM = Primary drinking-water metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver).

5/ Pb = Lead, analzyed by extraction procedure (E.P. Toxicity).

6/ BTX Scan = Benzene, toluene, xylene, (aromatic hydrocarbons)

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APPENDIX A

Laboratory Water-Quality Analyses of Potable Drinking-Water Wells (Nos. 4 and 7) at the NAS

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty and Miller - Tampa 3/ Report No.: 84-439

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] No. 4 8401959	No. 7 8401960
chloromethane			
dichlorodifluoromethane			
vinyl chloride			
chloroethane			
methylene chloride			
trichlorofluoromethane			
1,1-dichloroethene			
1,1-dichloroethane			
trans-1,2-dichloroethene			
chloroform			
1,2-dichloroethane			
1,1,1-trichloroethane			
carbon tetrachloride			
bromodichloromethane			
1,2-dichloropropane			
trans-1,3-dichloropropane			
trichloroethene			
dibromochloromethane			
1,1,2-trichloroethane			
cis-1,3 dichloropropene			
2-chloroethylvinyl ether			
bromoform			
1,1,2,2-tetrachloroethane			
tetrachloroethene			
chlorobenzene			
1,2 dibromoethane (EDB)			
Detection Limit		0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

N/A - Not analyzed

3/Results from G&M samples collected on April 13, 1984.

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geraghty and Miller - Tampa

Report No.: 84-439

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] No. 4 8401959	No. 7 8401960
ACID COMPOUNDS			
(21A) 2,4,6-trichlorophenol			
(22A) p-chloro-m-cresol			
(24A) 2-chlorophenol			
(31A) 2,4-dichlorophenol			
(34A) 2,4-dimethylphenol			
(57A) 2-nitrophenol			
(58A) 4-nitrophenol			
(59A) 2,4-dinitrophenol			
(60A) 4,6-dinitro-2-methylphenol			
(64A) pentachlorophenol			
(65A) phenol			
Detection Limit		2	2
BASE/NEUTRAL COMPOUNDS			
(1B) acenaphthene			
(5B) benzidine			
(8B) 1,2,4-trichlorobenzene			
(9B) hexachlorobenzene			
(12B) hexachloroethane			
(18B) bis (2-chloroethyl) ether			
(20B) 2-chloronaphthalene			
(25B) 1,2-dichlorobenzene			
(26B) 1,3-dichlorobenzene			
(27B) 1,4-dichlorobenzene			
(28B) 3,3'-dichlorobenzidine			
(35B) 2,4-dinitrotoluene			
(36B) 2,6-dinitrotoluene			
(37B) 1,2-diphenylhydrazine			
(39B) fluoranthene			
(40B) 4-chlorophenyl phenyl ether			
(41B) 4-bromophenyl phenyl ether			

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geraghty and Miller

Report No.: 84-439

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] No. 4 8401959	No. 7 8401960
BASE NEUTRAL COMPOUNDS (cont'd)			
(42B) bis (2-chloroisopropyl) ether			
(43B) bis (2-chloroethoxy) methane			
(52B) hexachlorobutadiene			
(53B) hexachlorocyclopentadiene			
(54B) isophorone			
(55B) naphthalene			
(56B) nitrobenzene			
(62B) N-nitrosodiphenylamine			
(63B) N-nitrosodipropylamine			
(66B) bis (2-ethylhexyl) phthalate			
(67B) benzyl butyl phthalate			
(68B) di-n-butyl phthalate			
(69B) di-n-octyl phthalate			
(70B) diethyl phthalate			
(71B) dimethyl phthalate			
(72B) benzo(a)anthracene			
(73B) benzo(a)pyrene			
(74B) benzo(b)fluoroanthene			
(75B) benzo(k)fluoroanthene			
(76B) chrysene			
(77B) acenaphthylene			
(78B) anthracene			
(79B) benzo(ghi)perylene			
(80B) fluorene			
(81B) phenanthrene			
(82B) dibenzo(a,h)anthracene			
(83B) ideno(1,2,3-cd)pyrene			
(84B) pyrene			
Detection Limit		2	2

[1]U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the limit of detection are listed as trace levels (TR).

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Results of Pesticide Analysis[1]

Client: Geraghty and Miller - Tampa

Report No.: 84-439

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] No. 4 8401959	No. 7 8401960
temik (aldicarb)			
aldicarb sulfoxide[3]			
aldicarb sulfone[3]			
Detection Limit		0.1	0.1

[1]U.S. EPA. 1980. Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samles. EPA-600/8-80-038. EPA/HERL, Research Triangle Park, NC.

[2]Concentrations less than the detection limit are left blank.

[3]Principal breakdown products of Temik.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B — Hospital Water Plant. Well #7. → Well Closest to Old Disposal Area

CERTIFICATE OF ANALYSIS OR TESTS

BASE NEUTRAL EXTRACTABLES

All Units ppb	CONCENTRATION	DETECTION LIMIT
Acenaphthene	BDL	10
Acenaphthylene	BDL	10
Anthracene	BDL	10
Benzo(a)anthracene	BDL	10
Benzo(b)fluoranthene	BDL	10
Benzo(k)fluoranthene	BDL	10
Benzo(a)pyrene	BDL	10
Benzo(g,h,i)perylene	BDL	25
Benzidine	BDL	10
Bis(2-chloroethyl)ether	BDL	10
Bis(2-chloroethoxy)methane	BDL	10
Bis(2-ethylhexyl)phthalate	BDL	10
Bis(2-chloroisopropyl)ether	BDL	10
4-Bromophenyl phenyl ether	BDL	10
Butyl benzyl phthalate	BDL	10
2-Chloronaphthalene	BDL	10
4-Chlorophenyl phenyl ether	BDL	10
Chrysene	BDL	10
Dibenzo(a,h)anthracene	BDL	25
Di-n-butylphthalate	BDL	10
1,3-Dichlorobenzene	BDL	10
1,4-Dichlorobenzene	BDL	10
1,2-Dichlorobenzene	BDL	10
3,3-Dichlorobenzidine	BDL	10

Respectfully submitted,

TECHNICAL SERVICES, INC.

By: [signature]

LABORATORY I.D. NO. 82145

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B — WC447

CERTIFICATE OF ANALYSIS OR TESTS

BASE NEUTRAL EXTRACTABLES

All Units ppb	CONCENTRATION	DETECTION LIMIT
Diethylphthalate	BDL	10
Dimethylphthalate	BDL	10
2,4-Dinitrotoluene	BDL	10
2,6-Dinitrotoluene	BDL	10
Dioctylphthalate	BDL	10
1,2-Diphenylhydrazine	BDL	10
F[illegible]ranthene	BDL	10
F[illegible]rene	BDL	10
Hexachlorobenzene	BDL	10
Hexachlorobutadiene	BDL	10
Hexachloroethane	BDL	10
Hexachlorocyclopentadiene	BDL	10
Indeno(1,2,3-cd)pyrene	BDL	25
Isophorone	BDL	10
Naphthalene	BDL	10
Nitrobenzene	BDL	10
N-Nitrosodimethylamine	BDL	10
N-Nitrosodi-n-propylamine	BDL	10
N-Nitrosodiphenylamine	BDL	10
Phenanthrene	BDL	10
Pyrene	BDL	10
2,3,7,8-Tetrachlorodibenzo-p-dioxin (Dioxin)	BDL	10
1,2,4-Trichlorobenzene	BDL	10

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey C. Gray, Jr.

LABORATORY I.D. NO. 82145

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
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JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B Well #7

CERTIFICATE OF ANALYSIS OR TESTS

ACID EXTRACTABLES

All Units ppb	CONCENTRATION	DETECTION LIMIT
2-Chlorophenol	BDL	10
2,4-Dichlorophenol	BDL	10
2,4-Dimethylphenol	BDL	10
2,4-Dinitrophenol	BDL	100
2-Methyl-4,6-Dinitrophenol	BDL	25
2-Nitrophenol	BDL	10
4-Nitrophenol	BDL	100
Pentachlorophenol	BDL	10
Phenol	BDL	10
2,4,6-Trichlorophenol	BDL	10

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey C. Gray, Jr.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B Well #7

CERTIFICATE OF ANALYSIS OR TESTS

PURGEABLES

All Units ppb	CONCENTRATION	DETECTION LIMIT
Acrolein	BDL	50
Acrylonitrile	BDL	50
Benzene	BDL	0.5
Bromodichloromethane	BDL	1
Bromoform	BDL	1
Bromomethane	BDL	1
Carbon tetrachloride	BDL	1
Chlorobenzene	BDL	1
Chloroethane	BDL	1
2-Chloroethylvinyl ether	BDL	1
Chloroform	BDL	1
Chloromethane	BDL	1
Dibromochloromethane	BDL	1
Dichlorodifluoromethane	BDL	1
1,1-Dichloroethane	BDL	1
1,2-Dichloroethane	BDL	1
1,1-Dichloroethene	BDL	1
1,2-Dichloroethene	BDL	1
1,2-Dichloropropane	BDL	1
cis-1,3-Dichloropropene	BDL	1
trans-1,3-Dichloropropene	BDL	1
Ethylbenzene	BDL	1
Methylene chloride	BDL	1
Tetrachloroethene	BDL	1
1,1,1-Trichloroethane	BDL	1
1,1,2-Trichloroethane	BDL	1
Trichloroethene	BDL	1
Trichlorofluoromethane	BDL	1
Toluene	BDL	1
Vinyl chloride	BDL	1
Xylene	BDL	1
Styrene	BDL	1

Respectfully submitted,

TECHNICAL SERVICES, INC.,

Harry C. Gray, Jr.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 587105

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B - Well #7

CERTIFICATE OF ANALYSIS OR TESTS

URGEABLES ll Units ppb	CONCENTRATION	DETECTION LIMIT
ichlorobenzene	BDL	1
,2-Dibromoethane (EDB)	BDL	0.02
,2-Dibromo-3-Chloropropane	BDL	1
ESTICIDES		
ll Units ppb		
ldrin	BDL	0.001
-BHC	BDL	0.001
-BHC	BDL	0.001
-BHC	BDL	0.001
-BHC	BDL	0.001
hlordane	BDL	0.005
,4'-DDD	BDL	0.005
,4'-DDE	BDL	0.005
,4'-DDT	BDL	0.005
ieldrin	BDL	0.005
ndosulfan I	BDL	0.002
ndosulfan II	BDL	0.002
ndosulfan Sulfate	BDL	0.010
thion	BDL	0.010
rithion	BDL	0.010
,p-DDT, DDE and DDD	BDL	0.005
edion	BDL	0.010
ndrin Aldehyde	BDL	0.005
eptachlor	BDL	0.001
eptachlor Epoxide	BDL	0.002
oxaphene	BDL	0.010
CB-1016	BDL	0.050
CB-1221	BDL	0.050

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey C. Gray, Jr.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B — Well #7

CERTIFICATE OF ANALYSIS OR TESTS

PESTICIDES All Units ppb	CONCENTRATION	DETECTION LIMIT
PCB-1232	BDL	0.050
PCB-1242	BDL	0.050
PCB-1248	BDL	0.050
PCB-1254	BDL	0.050
PCB-1260	BDL	0.050
Aldicarb	BDL	0.08
Diazinon	BDL	0.050
Malathion	BDL	0.050
[illegible]thion	BDL	0.020
[illegible]ion	BDL	0.1
Kelthane (Dicofal)	BDL	0.050

Supplemental Report

Respectfully submitted,

TECHNICAL SERVICES, INC.

Harris C. Gray, Jr.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 58705

July 10, 1984

Sample of WATER

Date Received April 30, 1984

For DIRECTOR OF ENVIRONMENTAL DIV., Attn: Mr. Bill Roche, Public Works Dept., Code 184, Box 5, NAS, Jacksonville, FL 32212

Marks: Call No. 2B45, Sample No. 410-B — Well 7.

CERTIFICATE OF ANALYSIS OR TESTS

Gross Alpha: <2 pCi/liter

Respectfully submitted,

TECHNICAL SERVICES, INC.

BY_____

LABORATORY I.D. NO 82145

TECHNICAL SERVICES, INC.
ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
105 STOCKTON STREET — P.O. BOX 52329
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 42209

September 15, 1981

Sample of POTABLE WATER

Date Received August 20, 1981

For Director of Utilities, Public Works Department, Box 5, Code 187, Naval Air Station, Jacksonville, Florida 32212

Marks: No. 1 Plant, Call No. P-014, 8/20/81
Wells #2 + #4

CERTIFICATE OF ANALYSIS OR TESTS

Primary Standards	
Arsenic, as As, mg/l	<0.004
Barium, as Ba, mg/l	<0.2
Cadmium, as Cd, mg/l	<0.002
Chromium, as Cr, mg/l	<0.01
Lead, as Pb, mg/l	0.037
Mercury, as Hg, mg/l	<0.0002
Selenium, as Se, mg/l	<0.01
Silver, as Ag, mg/l	<0.005
Nitrate, as N, mg/l	0.020
Fluoride, as F, mg/l	0.58
Turbidity, NTU	0.33
Lindane, mg/l	<0.00001
Methoxychlor, mg/l	<0.0001
Toxaphene, mg/l	<0.0002
2,4-D, mg/l	<0.0010
2,4-5 TP Silvex, mg/l	<0.0005
Endrin, mg/l	<0.00002
Secondary Standards	
Chloride, as Cl, mg/l	13.8
Color	1
Copper, as Cu, mg/l	<0.004
Corrosivity	Slightly corrosive
Foaming Agents, mg/l	0.001
Iron, as Fe, mg/l	<0.1
Manganese, as Mn, mg/l	<0.001
Odor	None
pH	7.29
Sulfate, as SO_4, mg/l	95
Total Dissolved Solids, mg/l	354
Zinc, as Zn, mg/l	0.036
Hydrogen Sulfide, mg/l	<0.1

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey C. Gray, Jr.

(Continued)

TECHNICAL SERVICES, INC.
ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
105 STOCKTON STREET — P.O. BOX 52329
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 42208

September 15 19

Sample of POTABLE WATER

Date Received August 20, 1981

For Director of Utilities, Public Works Department, Box 5, Code
Naval Air Station, Jacksonville, Florida 32212

Marks: No. 1 Plant, Call No. P-014, August 20, 1981

Wells #2 & #4
Combination

CERTIFICATE OF ANALYSIS OR TESTS

General

Total Hardness, as $CaCO_3$, mg/l	278
Total Alkalinity, as $CaCO_3$, mg/l	105
Non-Carbonate Hardness, as $CaCO_3$, mg/l	173
Bicarbonate, as HCO_3, mg/l	128
Calcium, as Ca, mg/l	61.8
Magnesium, as Mg, mg/l	29.9
Carbon Dioxide, as CO_2, mg/l	14
Bicarbonate, as $CaCO_3$, mg/l	105
Carbonate, as $CaCO_3$, mg/l	0
Hydroxide, as $CaCO_3$, mg/l	0
Sodium, as Na, mg/l	9.3
pHs	7.64
Stability Index	7.99
Saturation Index	-0.35
Interpretation	Slightly Corrosive

Respectfully submitted,

TECHNICAL SERVICES, INC.

By Harvey C. Gray, Jr.

By

APPENDIX B

SECTION 1

Lithologic Logs of Monitor Wells and Soil Borings Installed During Verification Study

LITHOLOGIC LOG OF MONITOR WELL NAS2-1

Description	Depth (ft)	Thickness (ft)
Sand, fine, gray to tan, oil stained from 1 - 1.5'	0 - 2	2.0
Sand, silty, fine, tan	2 - 6	4.0
Sand, clayey, fine, gray	6 - 10	4.0
Clay, sandy, gray	10 - 12.5	2.5
Sand, silty, fine, gray	12.5 - 14	1.5

LITHOLOGIC LOG OF MONITOR WELL NAS4-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, gray to tan, mixed with organics, iron stained	0 - 2	2
Sand, fine, tan	2 - 4	2
Clay, sandy, tan to gray, iron stained	4 - 6.5	2.5
Sand, slightly silty, fine, tan	6.5 - 12.0	5.5

LITHOLOGIC LOG OF MONITOR WELL NAS4-2

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to gray to brown, mixed with organics	0 - 3.5	3.5
Clay, sandy, gray to tan, iron stained	3.5 - 4.5	1.0
Sand, clayey, fine, brown to gray	4.5 - 7.5	3
Sand, fine, tan	7.5 - 12.0	4.5

LITHOLOGIC LOG OF MONITOR WELL NAS4-3

Description	Depth (ft)	Thickness (ft)
Sand, fine, white, mixed with organics....	0 - 3.5	3.5
Sand, clayey, fine, tan to gray, iron stained.....	3.5 - 5.5	2
Sand, slightly silty, fine, gray, some iron staining.....	5.5 - 12.0	6.5

LITHOLOGIC LOG FOR MONITOR WELL NAS5-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, brown, mixed with organics.....	0 - 2	2
Clay, sandy, gray, stiff, iron stained....	2 - 6	4
Sand, silty, fine-grained, gray.....	6 - 7	1
Clay, sandy, gray-green, stiff.....	7 - 8	1
Sand, silty, fine-grained, gray, mixed with shell fragments.....	8 - 16	8

LITHOLOGIC LOG OF MONITOR WELL NAS9-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown with pieces of concrete; fill material.....	0 - 2.5	2.5
Silt, black, organic.....	2.5 - 3.0	0.5
Clay, slightly sandy, gray, mixed with organics.....	3.0 - 9.5	6.5
Sand, silty, fine, tan to dark brown, mixed with organics.....	9.5 - 14.0	4.5

LITHOLOGIC LOG OF WELL NAS13-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown to white.....	0 - 2	2.0
Clay, sandy, brown, mixed with fine shells	2 - 3	1.0
Sand, silty, fine, white.....	3 - 6.5	3.5
Sand, clayey, fine, dark brown.....	6.5 - 8	1.5
Sand, silty, fine, brown to tan.....	8 - 10.5	2.5
Clay, sandy, green, layer of fine shell at 13' about 2" thick.....	10.5 - 14	3.5

LITHOLOGIC LOG OF MONITOR WELL NARF-1

Description	Depth (ft)	Thickness (ft)
Sand, fine, white, with road base at surface.....	0 - 6	6
Sand, slightly clayey, fine, gray, mixed with stringers of black, organic sand.....	6 - 8	2
Clay, slightly sandy, greenish-gray, soft, iron stained.....	8 - 11.5	3.5
Sand, fine, white.....	11.5 - 12.5	1
Sand, clayey, fine, dark brown, mixed with organics; peat.....	12.5 - 15.0	2.5
Sand, silty, fine, dark brown.....	15 - 20	5

LITHOLOGIC LOG OF MONITOR WELL NARF-2

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to gray, iron stained, mixed with gray to red clayey sand.....	0 - 4	4
Sand, very clayey, fine, tan to gray to red, iron stained, interbedded with gray to red, sandy clay.....	4 - 13.5	9.5
Sand, slightly clayey, fine, tan to red, iron stained with stringers of tan, sandy clay.....	13.5 - 16.0	2.5

LITHOLOGIC LOG OF MONITOR WELL NARF-3

Description	Depth (ft)	Thickness (ft)
nd, very clayey, fine, tan to gray to red; interbedded with tan, sandy clay.....	0 - 6	6
Sand, clayey, fine, tan to red, iron stained.....	6 - 7.5	1.5
Sand, fine, white.....	7.5 - 8.0	0.5
Sand, clayey, fine, tan to brown, iron stained.....	8 - 9	1
Clay, sandy, tan to red, firm.....	9 - 14	5

LITHOLOGIC LOG OF MONITOR WELL NARF-4

Description	Depth (ft)	Thickness (ft)
Sand, clayey, fine, tan to red.....	0 - 4	4
Sand, silty, fine, black to dark gray.....	4 - 5.5	1.5
Sand, slightly silty, fine, tan.....	5.5 - 10	4.5
Sand, silty, fine, gray, interbedded with stringers of green, sandy clay.....	10 - 12	2
Sand, fine, gray, mixed with organics.....	12 - 14	2

LITHOLOGIC LOG OF MONITOR WELL NARF-5

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown, mixed with organics.....	0 - 3	3
Sand, slightly clayey, fine, gray.....	3 - 4.5	1.5
Sand, fine, white to gray.....	4.5 - 6.0	1.5
Sand, slightly clayey, fine, gray.....	6 - 10	4

LITHOLOGIC LOG OF MONITOR WELL NARF-6

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone road base.....	0 - 0.5	0.5
Sand, silty, fine, brown, mixed with organics.....	0.5 - 8.5	7.0
Clay, sandy, gray, iron stained, mixed with organics.....	8.5 - 11.0	2.5

LITHOLOGIC LOG OF TEMPORARY WELL NARFB-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan, mixed with organics	0 - 2.5	2.5
Sand, clayey, fine, orange, iron stained	2.5 - 6.0	3.5
Sand, silty, fine, tan to orange, iron stained; odor of chemicals	6 - 32	26

LITHOLOGIC LOG FOR WELL NAS18-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown to gray, traces of clay	0 - 2	2.0
Sand, silty, fine, brown, zone of cemented sand at 4 ft, (shells at 6.5')	2 - 11	7.0
Sand, clayey, fine, gray, mixed with organics (wood)	11 - 12	1.0
Clay, sandy, gray	12 - 13	1.0
Sand, clayey, gray, mixed with organics	13 - 14	1.0

LITHOLOGIC LOG FOR MONITOR WELL NAS28-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, black to cream.	0 - 3	3
Clay, slightly sandy, orange, stiff	3 - 7.5	4.5
Sand, slightly clayey, fine-grained, gray to green	7.5 - 10	2.5
Sand, silty, fine-grained, tan to white, with stringers of green clay	10 - 14	4
Clay, slightly sandy, orange, stiff	14 - 15	1
Sand, slightly clayey, fine-grained, gray.	15 - 16	1

LITHOLOGIC LOG FOR WELL NAS29-1

Description	Depth (ft)	Thickness (ft)
Sand, fine, dark brown mixed with wood fragments.....	0 - 1	1.0
Sand, silty, fine, gray, with landfill material.....	1 - 5	4.0
Clay, sandy, tan to gray.....	5 - 7	2.0
Sand, clayey, fine, gray, layer of black organic matter at 10'.....	7 - 14	7.0

LITHOLOGIC LOG FOR WELL NAS29-2

Description	Depth (ft)	Thickness (ft)
Sand, medium, brown to gray.....	0 - 2.5	2.5
Clay, sandy, tan to orange.....	2.5 - 5	2.5
Sand, silty, fine, gray.....	5 - 14	9.0

LITHOLOGIC LOG OF MONITOR WELL NAS30-1

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black and gray, mixed with organics.....	0 - 2	2
Clay, sandy, gray to orange, iron stained, with stringers of fine, white sand.....	2 - 6.5	4.5
Sand, clayey fine, gray, interbedded with stringers of fine, white sand.....	6.5 - 8.0	1.5
Sand, clayey, fine, gray.....	8 - 12	4

LITHOLOGIC LOG OF MONITOR WELL NAS30-2

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with organics and limestone; fill material.....	0 - 1.5	1.5
Sand, fine, white.....	1.5 - 2.0	0.5
Clay, slightly sandy, gray, mixed with organics, iron stained.....	2 - 4	2
Sand, clayey, fine, gray.....	4 - 10	6

LITHOLOGIC LOG OF MONITOR WELL NAS30-3

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with organics and limestone.....	0 - 0.5	0.5
Sand, silty, fine, tan to dark brown.....	0.5 - 5.0	4.5
Sand, slightly clayey, fine, gray.....	5 - 10	5

LITHOLOGIC LOG FOR NAS32-1

Description	Depth (ft)	Thickness (ft)
Sand, fine, dark brown, mixed with organics.....	0 - .5	0.5
Sand, clayey, fine, gray.....	.5 - 1.5	1.0
Sand, fine, dark brown, some evidence of decaying matter at 2 - 3', trace of gray clay.....	1.5 - 5	3.5
Sand, clayey, dark brown.....	5 - 6	1.0
Clay, sandy, gray to green.....	6 - 11	5.0
Sand, clayey, gray.....	11 - 14	3.0

LITHOLOGIC LOG FOR SOIL BORING B-1 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, dark gray to gray, stiff, iron stained.....	2.5 - 6.0	3.5
Sand, silty, fine-grained, tan.....	6.0 - 7.0	1.0
Sand, clayey, fine-grained, gray-green....	7.0 - 12.0	5.0
Sand, silty, fine-grained, gray-green.....	12.0 - 16.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-2 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to gray..	0.5 - 2.5	2.0
Clay, sandy, gray-green, stiff, iron stained.....	2.5 - 6.0	3.5
Sand, silty, fine-grained, gray, iron stained.....	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-3 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, gray to gray-green, stiff....	2.5 - 6.0	3.5
Sand, clayey, fine-grained, gray-green, stiff.....	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-4 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, gray-green, stiff.....	2.5 - 6.0	3.5
Sand, clayey, fine-grained, gray-green....	6.0 - 8.0	2.0
Sand, silty, fine-grained, gray-green.....	8.0 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-5 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, gray-green, stiff.....	2.5 - 6.0	3.5
Sand, silty, fine-grained, gray.....	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-6 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to tan...	0.5 - 2.5	2.0
Clay, sandy, gray-green, stiff, iron stained.....	2.5 - 6.0	3.5
Sand, silty, fine-grained, gray, with stringers of gray clay lenses.....	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-7 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to gray..	0.5 - 5.0	4.5
Clay, sandy, gray-green, stiff, iron stained.....	5.0 - 6.0	1.0
Sand, silty, fine-grained, gray, iron stained.....	6.0 - 8.0	2.0
Sand, clayey, fine-grained, gray-green....	8.0 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-8 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, gray to tan....	0.5 - 5.0	4.5
Clay, sandy, gray to green-gray, stiff, iron stained.....	5.0 - 8.0	3.0
Sand, silty, fine-grained, tan, iron stained.....	8.0 - 9.0	1.0
Clay, sandy, orange, soft, iron stained...	9.0 - 9.5	0.5
Sand, clayey, fine-grained, gray, iron stained.....	9.5 - 10.0	0.5

LITHOLOGIC LOG FOR SOIL BORING B-9 (SITE B)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, gray to tan.....	0 - 6.0	6.0
Sand, clayey, fine-grained, gray.....	6.0 - 8.0	2.0
Sand, silty, fine-grained, gray.....	8.0 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-10 (SITE B)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, tan to gray....	0 - 5.0	5.0
Clay, very sandy, gray, stiff, iron stained.....	5.0 - 6.0	1.0
Sand, silty, fine-grained, gray to brown..	6.0 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-11 (SITE B)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, gray to brown..	0 - 6.0	6.0
Clay, sandy, gray, stiff, iron stained....	6 - 7.0	1.0
Sand, silty, fine-grained, gray.....	7 - 10.0	3.0

LITHOLOGIC LOG FOR SOIL BORING B-12 (SITE B)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine-grained, tan to gray, mixed with organics.....	0 - 7.0	7.0
Sand, clayey, fine-grained, gray.....	7 - 8.0	1.0
Sand, silty, fine-grained, cream.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-13 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 3.5	2.5
Clay, sandy, gray, soft, iron stained.....	3.5 - 8.0	4.5
Sand, slightly clayey, fine-grained, tan..	8.0 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-14 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 3.0	2.0
Clay, sandy, gray, firm.....	3 - 6.0	3.0
Sand, clayey, fine-grained, gray-green....	6 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-15 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 3.0	2.0
Clay, sandy, gray-green, firm.....	3 - 7.5	4.5
Sand, silty, fine-grained, gray.....	7.5 - 10.0	2.5

LITHOLOGIC LOG FOR SOIL BORING B-16 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 4.0	3.0
Clay, sandy, gray, stiff, iron stained....	4 - 7.0	3.0
Sand, silty, fine-grained, gray.....	7 - 10.0	3.0

LITHOLOGIC LOG FOR SOIL BORING B-17 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to cream.	1 - 5.0	4.0
Clay, sandy, gray, soft, iron stained.....	5 - 8.0	3.0
Sand, very silty, fine-grained, gray-green	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-18 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to gray..	1 - 5.5	4.5
Clay, sandy, gray-green, soft.....	5.5 - 8.0	2.5
Sand, silty, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-19 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 3.0	2.0
Clay, sandy, gray, soft, iron stained.....	3 - 6.0	3.0
Sand, clayey, fine-grained, gray-green, iron stained.....	6 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-20 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 4.0	3.0
Clay, sandy, gray, firm, iron stained.....	4 - 9.0	5.0
Sand, silty, fine-grained, gray.....	9 - 10.0	1.0

LITHOLOGIC LOG FOR SOIL BORING B-21 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, gray to tan....	0.5 - 4.0	3.5
Clay, sandy, gray-green, firm, mixed with organics.....	4 - 8.0	4.0
Sand, silty, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-22 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 3.0	2.0
Clay, sandy, gray-green, firm, iron stained.....	3 - 6.0	3.0
Sand, clayey, fine-grained, gray.....	6 - 8.0	2.0
Sand, very silty, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-23 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 3.0	2.0
Clay, sandy, gray, firm, iron stained, mixed with organics.....	3 - 5.5	2.5
Sand, silty, fine-grained, cream to gray..	5.5 - 10.0	4.5

LITHOLOGIC LOG FOR SOIL BORING B-24 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to tan...	1 - 3.0	2.0
Clay, sandy, gray, firm, iron stained.....	3 - 6.0	3.0
Sand, very silty, fine-grained, tan to gray.....	6 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-25 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to gray..	0.5 - 3.5	3.0
Clay, sandy, gray, firm, iron stained.....	3.5 - 6.0	2.5
Sand, very silty, fine-grained, tan to gray-green.....	6 - 10.0	4.0

LITHOLOGIC LOG FOR SOIL BORING B-26 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 1.0	1.0
Sand, silty, fine-grained, black to gray..	1 - 3.0	2.0
Clay, sandy, gray, firm, iron stained.....	3 - 8.0	5.0
Sand, clayey, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG FOR SOIL BORING B-27 (SITE B)

Description	Depth (ft)	Thickness (ft)
Asphalt and limestone base.....	0 - 0.5	0.5
Sand, silty, fine-grained, black to gray..	0.5 - 3.5	3.0
Clay, sandy, gray-green, iron stained.....	3.5 - 8.0	4.5
Sand, clayey, fine-grained, gray.....	8 - 10.0	2.0

LITHOLOGIC LOG OF MONITOR WELL NFD-1

Description	Depth (ft)	Thickness (ft)
Sand, fine to coarse, tan, with cemented sand below 2 feet.....	0 - 5.0	5.0
Sand, fine to medium, gray.....	5.0 - 6.5	1.5
Sand, silty, fine, dark brown to gray.....	6.5 - 11.0	4.5
Sand, fine, dark gray, with some organics.	11.0 - 14.0	3.0

LITHOLOGIC LOG OF MONITOR WELL NFD-2

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan to brown.....	0 - 2.0	2.0
Sand, silty, fine, gray to black, mixed with organics; pieces of wood.....	2.0 - 2.5	0.5
Sand, fine, gray.....	2.5 - 9.5	7.0

LITHOLOGIC LOG OF BORING B-1 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with oil..	0 - 1	1
Sand, fine, tan.....	1 - 4	3

LITHOLOGIC LOG OF BORING B-2 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with oil..	0 - 1	1.0
Sand, fine, tan.....	1 - 4.0	3.0

LITHOLOGIC LOG OF BORING B-3 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black, mixed with oil..	0 - 0.5	0.5
Sand, fine, tan.....	0.5 - 4.0	3.5

LITHOLOGIC LOG OF BORING B-4 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, black to brown.....	0 - 3	3
Sand, fine, light brown.....	3 - 6	3
Sand, silty, fine, dark brown.....	6 - 9	3

LITHOLOGIC LOG OF BORING B-5 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, gray to brown.....	0 - 3.5	3.5
Peat.....	3.5 - 4.0	0.5
Sand, silty, fine, reddish-brown.....	4 - 8	4
Sand, clayey, fine, gray.....	8 - 14	6

LITHOLOGIC LOG OF BORING B-6 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, brown, mixed with oil.....	0 - 2.5	2.5
Sand, fine, brown.....	2.5 - 4.5	2
Peat.....	4.5 - 5.0	0.5
Sand, silty, fine, reddish-brown.....	5 - 6	1
Sand, clayey, fine, gray.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-7 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, brown, mixed with oil.....	0 - 2.5	2.5
Sand, fine, tan.....	2.5 - 5.0	2.5
Sand, silty, fine, brown, mixed with organics; pieces of wood.....	5 - 6	1
Sand, clayey, fine, gray, with stringers of gray, sandy clay.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-8 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, brown, mixed with oil.....	0 - 1.5	1.5
Sand, fine, brown.....	1.5 - 3.5	2
Sand, clayey, fine, gray.....	3.5 - 6.0	2.5
Sand, silty, fine, gray.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-9 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, brown, mixed with oil.....	0 - 1.5	1.5
Sand, fine, tan.....	1.5 - 6.0	4.5
Sand, silty, fine, gray.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-10 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan to brown, no oil.....	0 - 2.5	2.5
Sand, fine, tan.....	2.5 - 5.5	3
Sand, silty, fine, reddish-brown.....	5.5 - 7.5	2
Sand, silty, fine, gray.....	7.5 - 14.0	6.5

LITHOLOGIC LOG OF BORING B-11 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, dark brown.....	0 - 1.5	1.5
Sand, fine to coarse, tan to brown.....	1.5 - 6.0	4.5
Sand, clayey, fine, gray.....	6 - 7	1
Sand, silty, fine, gray.....	7 - 14	7

LITHOLOGIC LOG OF BORING B-12 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, mixed with oil.....	0 - 1.5	1.5
Sand, silty, fine, tan to brown.....	1.5 - 5.0	3.5
Sand, fine, tan.....	5 - 6	1
Sand, silty, fine, gray.....	6 - 14	8

LITHOLOGIC LOG OF BORING B-13 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown, mixed with oil and roots.....	0 - 5.5	5.5
Sand, silty, fine, reddish-brown.....	5.5 - 6.5	1
Sand, clayey, fine, gray.....	6.5 - 7.5	1
Sand, silty, fine, gray.....	7.5 - 14.0	6.5

LITHOLOGIC LOG OF BORING B-14 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 5.5	5.5
Sand, silty, fine, dark brown.....	5.5 - 7.0	1.5
Sand, clayey, fine, gray; strong odor of petroleum.....	7.0 - 8.5	1.5
Sand, silty, fine, gray.....	8.5 - 14.0	5.5

LITHOLOGIC LOG OF BORING B-15 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 6	6
Sand, silty, fine, tan to brown; strong odor of petroleum.....	6 - 9	3
Sand, silty, fine, gray.....	9 - 14	5

LITHOLOGIC LOG OF BORING B-16 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan.....	0 - 1.5	1.5
Sand, silty, fine, dark brown to gray, mixed with oil.....	1.5 - 7.0	5.5
Sand, silty, fine, reddish-brown.....	7 - 9	2
Sand, clayey, fine, gray.....	9 - 11	2
Sand, silty, fine, gray.....	11 - 14	3

LITHOLOGIC LOG OF BORING B-17 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan to dark brown.....	0 - 1.5	1.5
Sand, silty, fine, dark brown to black, mixed with oil.....	1.5 - 5.0	3.5
Sand, silty, fine, gray to reddish-brown..	5 - 7	2
Sand, silty, fine, gray.....	7 - 14	7

LITHOLOGIC LOG OF BORING B-18 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to dark brown, mixed with oil.....	0 - 4	4
Sand, silty, fine, dark brown, mixed with organics, roots, and peat.....	4 - 5.5	1.5
Sand, fine, brown.....	5.5 - 7.0	1.5
Sand, silty, fine, reddish-brown.....	7 - 14	7

LITHOLOGIC LOG OF BORING B-19 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to black, mixed with oil.....	0 - 6	6
Sand, silty, fine, gray to brown; strong odor of petroleum.....	6 - 7.5	1.5
Sand, silty, fine, reddish-brown.....	7.5 - 14.0	6.5

LITHOLOGIC LOG OF BORING B-20 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, tan to black, mixed with oil.....	0 - 5	5
Sand, silty, fine, reddish-brown.....	5 - 7	2
Sand, silty, fine, gray.....	7 - 10	3

LITHOLOGIC LOG OF BORING B-21 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 7	7
Sand, silty, fine, tan to reddish-brown...	7 - 14	7

LITHOLOGIC LOG OF BORING B-22 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 3	3
Sand, fine, tan.....	3 - 4	1
Sand, silty, fine, dark brown to brown....	4 - 14	10

LITHOLOGIC LOG OF BORING B-23 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 4.5	4.5
Sand, silty, fine, reddish-brown to gray..	4.5 - 9.0	4.5
Sand, clayey, fine, gray.....	9 - 10	1
Sand, silty, fine, gray.....	10 - 14	4

LITHOLOGIC LOG OF BORING B-24 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 4	4
Sand, silty, fine, brown.....	4 - 6.5	2.5
Sand, clayey, fine, gray.....	6.5 - 8.5	2
Sand, silty, fine, gray.....	8.5 - 13.5	5

LITHOLOGIC LOG OF BORING B-25 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 2	2
Sand, silty, fine, reddish-brown.....	2 - 4.5	2.5
Sand, clayey, fine, gray.....	4.5 - 7.0	2.5
Sand, silty, fine, gray.....	7 - 14	7

LITHOLOGIC LOG OF BORING B-26 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown, mixed with oil..	0 - 1	1
Sand, fine to coarse, tan; fill material..	1 - 4.5	3.5
Sand, silty, fine, reddish-brown.....	4.5 - 6.0	1.5
Sand, clayey, fine, gray.....	6 - 7	1
Sand, silty, fine, gray.....	7 - 8.5	1.5

LITHOLOGIC LOG OF BORING B-27 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 3	3
Sand, silty, fine, brown.....	3 - 5	2
Sand, clayey, fine, gray.....	5 - 6.5	1.5
Sand, silty, fine, gray.....	6.5 - 10.0	3.5

LITHOLOGIC LOG OF BORING B-28 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 5	5
Sand, silty, fine, brown.....	5 - 8.5	3.5
Sand, clayey, fine, gray.....	8.5 - 11.0	2.5
Sand, silty, fine, gray.....	11 - 13	2

LITHOLOGIC LOG OF BORING B-29 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 6	6
Sand, silty, fine, reddish-brown.....	6 - 8.5	2.5
Sand, clayey, fine, gray.....	8.5 - 13.0	4.5

LITHOLOGIC LOG OF BORING B-30 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown to black, mixed with oil.....	0 - 9	9
Sand, silty, fine, reddish-brown.....	9 - 11	2
Sand, clayey, fine, gray.....	11 - 14	3

LITHOLOGIC LOG OF BORING B-31 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown, mixed with oil.....	0 - 7.5	7.5
Sand, silty, fine, reddish-brown.....	7.5 - 11.0	3.5
Sand, clayey, fine, gray.....	11 - 14	3

LITHOLOGIC LOG OF BORING B-32 (NFD, SITE 5)

Description	Depth (ft)	Thickness (ft)
Sand, fine, tan.....	0 - 7	7
Sand, silty, fine, reddish-brown.....	7 - 11	4
Sand, clayey, fine, gray.....	11 - 14	3

SECTION 2

Lithologic Logs of Wells and Soil Borings at the NAS and NFD Used for the Geologic Cross-Sections

Lithologic Log of Well S-4

Description	Depth (ft)	Thickness (ft)
No recovery.....	0 - 5	5
Sand, slightly clayey, very fine to fine-grained, white, red, orange, black and gray; assorted fill material.....	5 - 7	2
No recovery.....	7 - 10	3
Sand, slightly clayey, very fine to fine-grained, gray, dark-gray and brown.....	10 - 12	2
No recovery.....	12 - 15	3
Sand, very fine to fine-grained, light-tan to white and brown.....	15 - 17	2
No recovery.....	17 - 20	3
Sand, very fine to fine-grained, clean and pure, white and some orange.....	20 - 22	2
Sand, very fine-grained, tan.....	22 - 30	8
Sandy clay, gray, with some shell fragments, sand, very fine-grained, silty.....	30 - 50	20

LITHOLOGIC LOG FOR WELL NAS4-6

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, dark brown to gray.....	0 - 7.5	7.5
Sand, clayey, gray.....	7.5 - 9	1.5
Clay, sandy, gray.....	9 - 13	4.0
Sand, clayey, gray.....	13 - 14	1.0

LITHOLOGIC LOG FOR WELL NAS4-7

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, gray to gray.....	0 - 5	5.0
Sand, clayey, fine, gray.....	5 - 7	2.0
Clay, sandy, gray.....	7 - 14	7.0

LITHOLOGIC LOG FOR WELL NAS4-8

Description	Depth (ft)	Thickness (ft)
Sand, silty, fine, brown to gray, some clay from fill material.....	0 - 8.0	8.0
Sand, clayey, fine, green.....	8 - 11.5	3.5
Sand, silty, fine, green.....	11.5 - 14	2.5

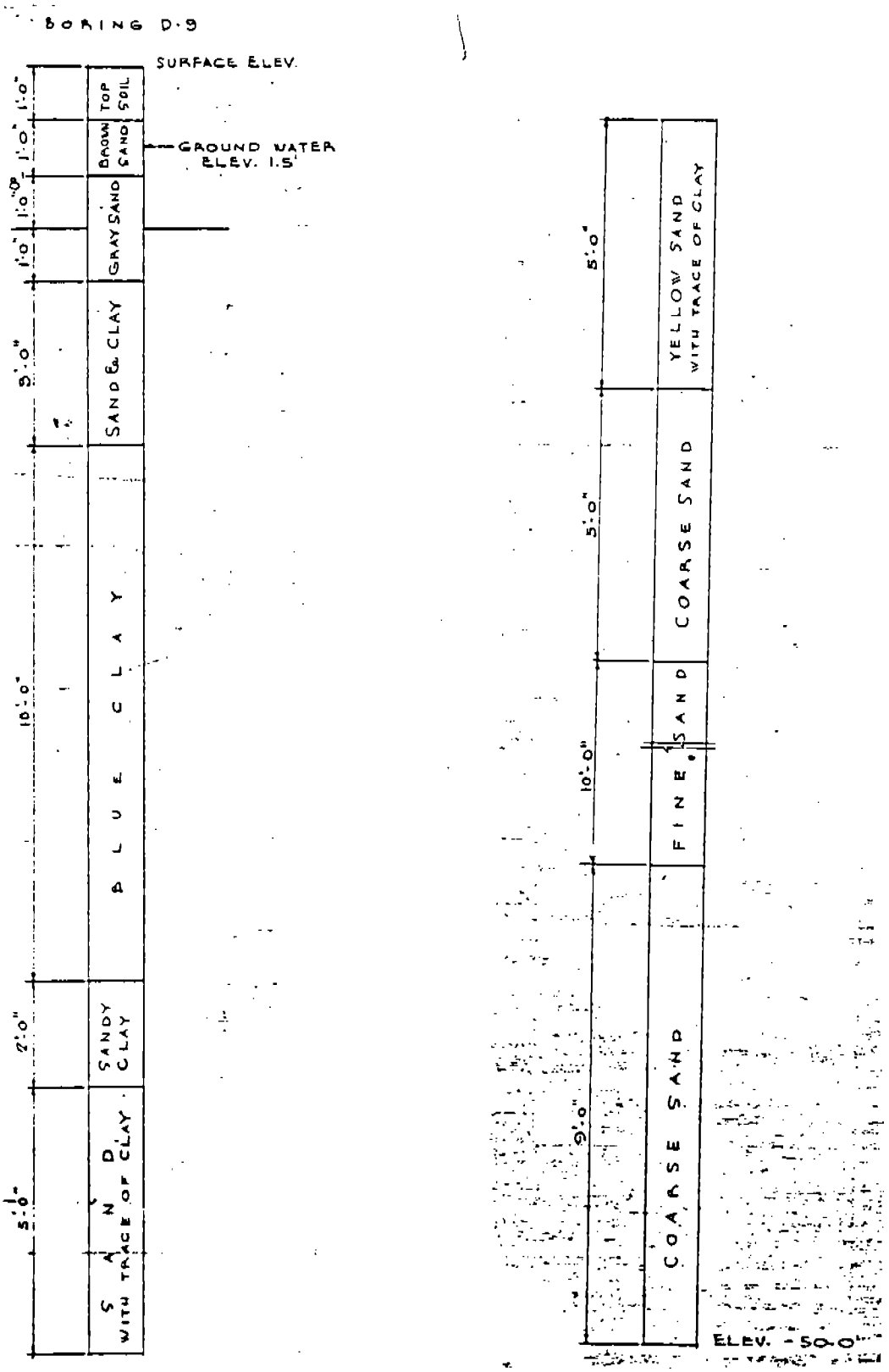
Table Lithologic Log of Well B -7[1]

DEPTH IN FEET	N	MATERIAL DESCRIPTION
0		BROWN TOPSOIL - GRASS
2	9	REDDISH YELLOW SANDY CLAY, W/TRACE OF ORGANICS, STIFF, MOIST
4	19	BROWN FINE SAND, POORLY GRADED, FIRM, MOIST
6	9	BROWN TO WHITE FINE SAND, POORLY GRADED, LOOSE, MOIST
8	7	
10	6	
12		W.L. ▼ 11.6' 3-18-81
14	15	YELLOWISH RED TO GRAY, SLIGHTLY SANDY CLAY, STIFF, WET
16		
18		
20	16	BROWN CLAYEY, FINE SAND, POORLY GRADED, FIRM, MOIST
22		
24	53	WHITE TO YELLOW, FINE SAND, POORLY GRADED, DENSE, TO VERY DENSE, WET
26		
28		
30	35	
32		
34	24	VERY PALE BROWN FINE SAND, POORLY GRADED, VERY FIRM, WET
36		
38		
40	13	WHITE FINE SAND, W/ TRACE OF CLAY, POORLY GRADED, FIRM, WET
42		
44	26	GRAY FINE SAND, POORLY GRADED, VERY FIRM, WET
46		
48		
50	39	GRAY FINE SAND, POORLY GRADED, DENSE, WET
52		
54	72	VERY PALE BROWN FINE SAND, POORLY GRADED, VERY DENSE, WET
56		
58		
60	72	
62		
64	68	VERY PALE BROWN FINE SAND, POORLY GRADED, VERY DENSE, WET
66		
68		
70	87	BORING TERMINATED @ 70.0'

BORING B-7
N 2,140,680
E 288,095
TOP EL. 18.0
DATE: 3-18-81

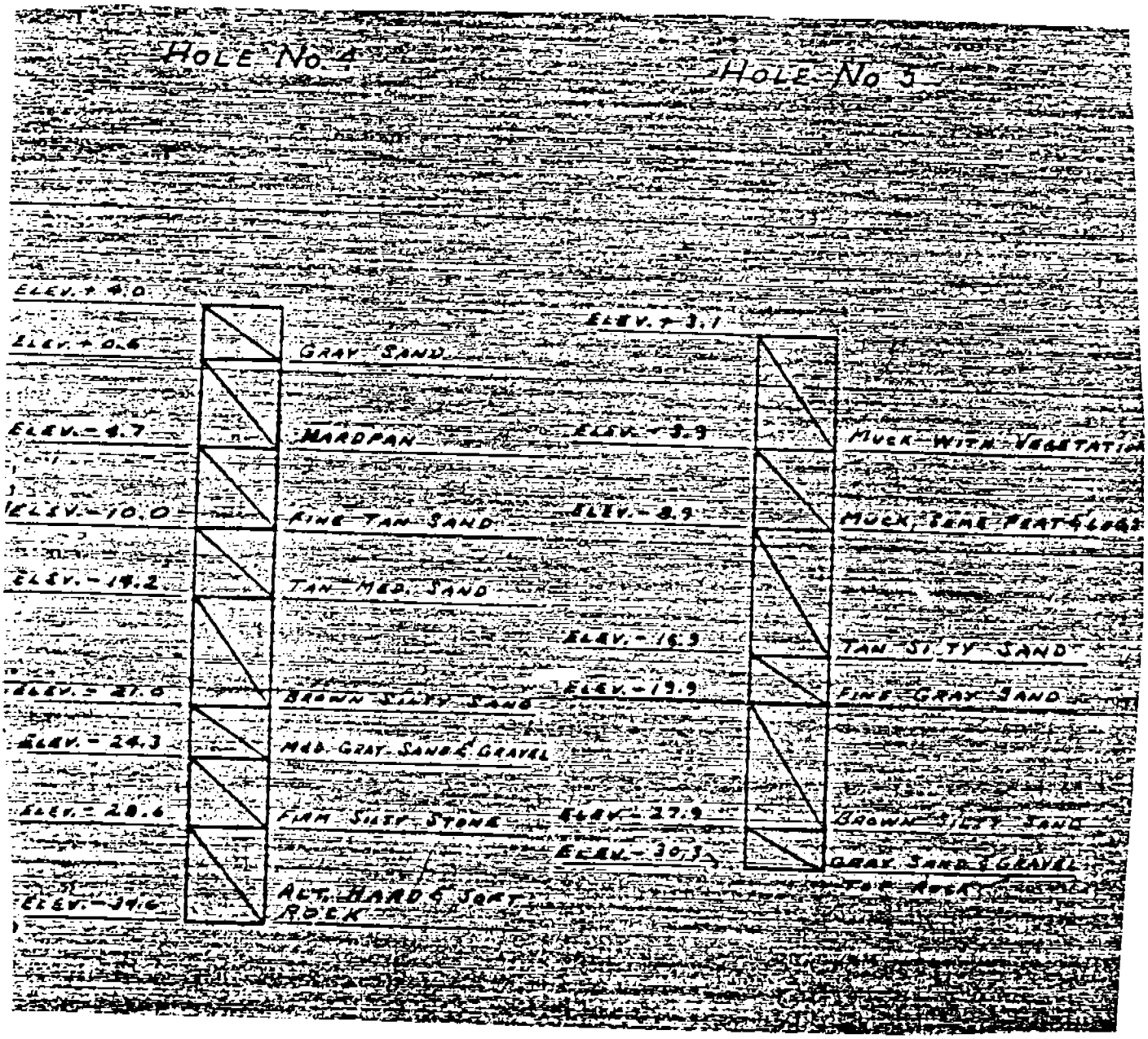
[1]Source: Burns & McDonnell, Kansas City, 1982

Lithologic Log of Soil Boring D-7[1/]



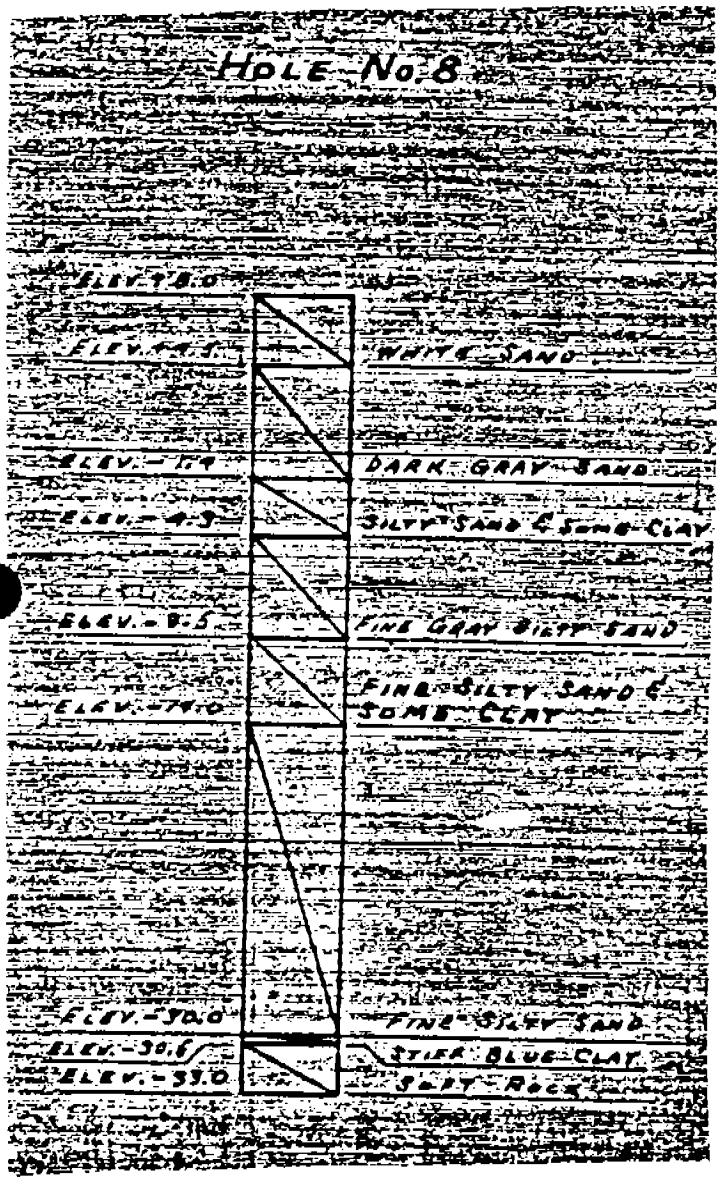
[1/]Source: Robert and Company, Inc., Architects and Engineers, Atlanta, GA, 1940.

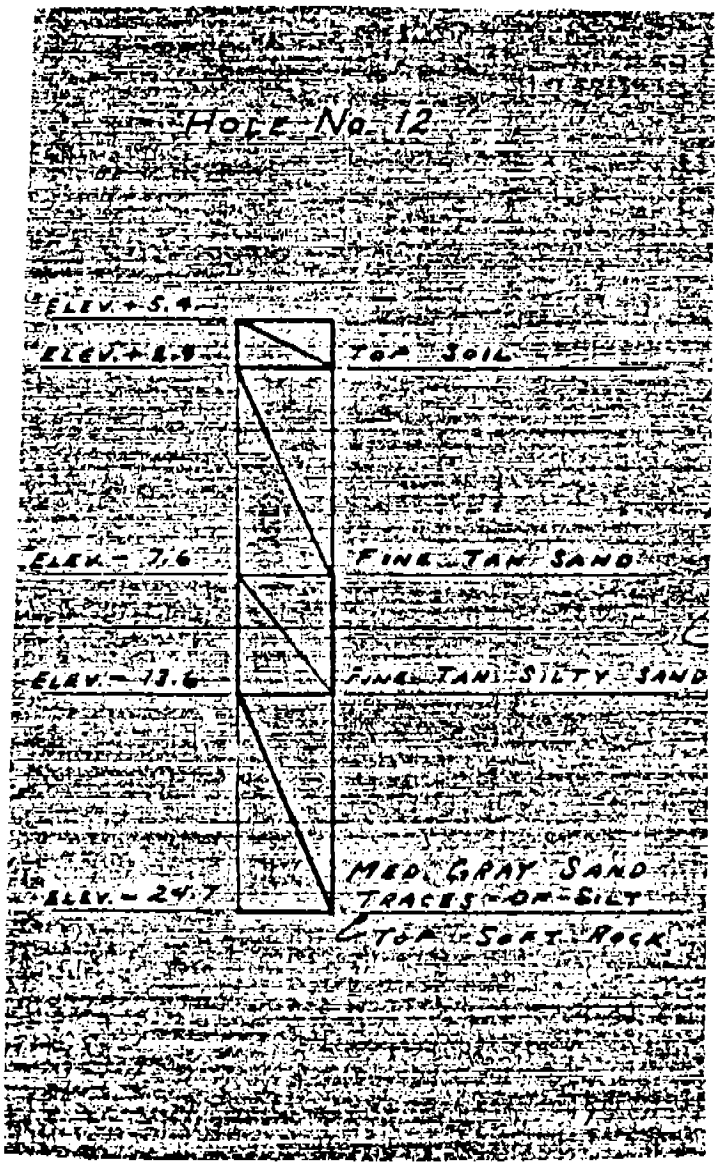
Lithologic Log of Soil Boring No. 4 and No. 5[1/]



[1/]Source: District Public Works Office DPW Drawing No. NAJX-136.

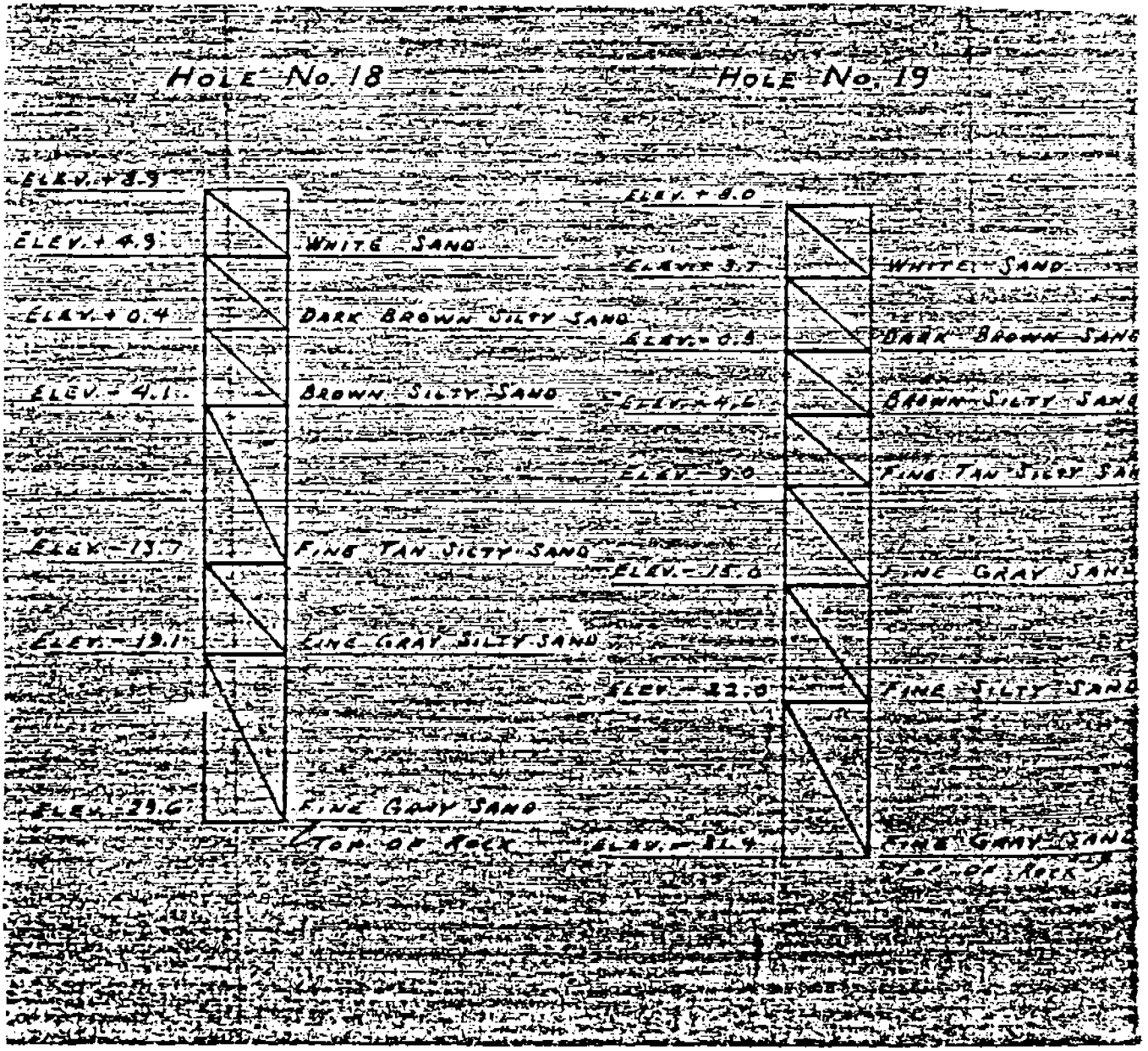
Lithologic Log of Soil Boring Nos. 8 and 12[1/]





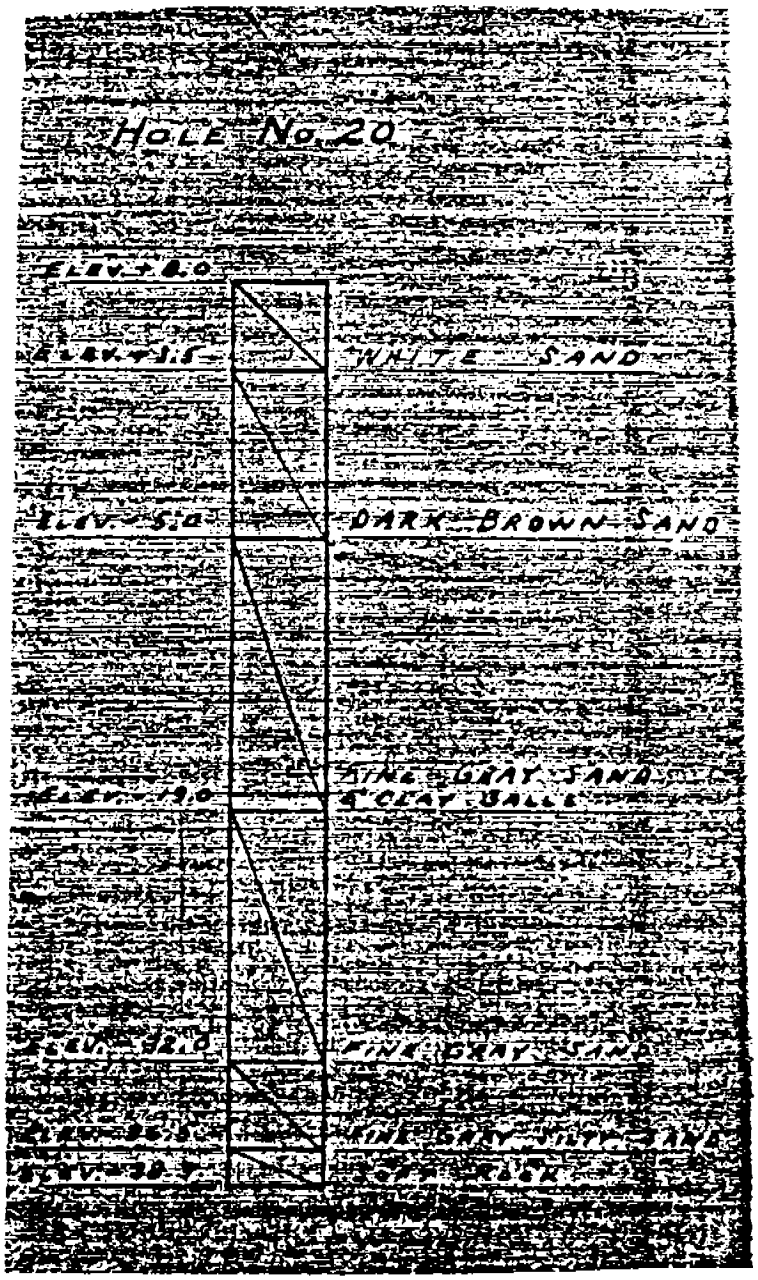
1/Source: District Public Works Office, DPW Drawing No. NAJX-136

Lithologic Log of Soil Boring Nos. 18 and 19[1/]



[1/]Source: District Public Works Office, DPW Drawing No. 136

Lithologic Log of Soil Boring No. 20[1/]



[1/]Source: District Public Works Office, DPW Drawing No. 136.

LITHOLOGIC LOG OF SOIL BORING HA-22[1/]

Description	Depth (ft)	Thickness (ft)
Fine sand, trace silt, dark gray, moist (SP).....	0 - 6	6

1/ Source: Brevard Engineering, Cape Canaveral, FL, 1975, NAVFAC Drawing No. 5039448

APPENDIX C

Laboratory Water-Qualaity and Sediment Analysis Results For Individual Sites

TABLE 1. WATER-QUALITY PARAMETERS MEASURED IN THE FIELD

WELL NUMBER	TEMPERATURE (C)	pH (Units)	SPECIFIC CONDUCTANCE (umhos/cm)	DATE SAMPLED MO.-DAY-YR
NAS2-1	18	5.93	-	4-16-84
NAS4-1	26	5.23	75	9-11-83
NAS4-2	26	6.07	310	9-11-83
NAS4-3	24	5.52	110	9-11-83
NAS5-1	22	7.49	600	5-16-85
NAS9-1	24	6.90	1400	9-10-83
NAS13-1	25	6.18	-	4-15-84
NARF-1	29	11.88	2010	9-11-83
NARF-2	28	5.51	70	9-10-83
NARF-3	31	6.07	360	9-10-83
NARF-4	26	6.81	610	9-10-83
NARF-5	27	6.17	550	9-10-83
NARF-6	30	6.35	400	9-10-83
NARFB-1	28	6.73	610	9-10-83
NAS18-1	19	6.75	-	4-15-84
NAS28-1	20	6.68	260	4-3-85
NAS29-1	26	6.38	-	4-17-84
NAS29-2	19	6.28	-	4-17-84
NAS30-1	25	5.37	145	9-11-83
NAS30-2	27	6.13	420	9-11-83
NAS30-3	27	6.10	290	9-11-83
NAS32-1	16.5	6.71	-	4-17-84
NFD-1	28	7.61	430	9-9-83
NFD-2	28	5.60	110	9-9-83

SECTION 1

Fire-Fighting Area
Site No. 2

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty and Miller - Tampa

Report No.: 84-448

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NAS-2-1 / 8402010
chloromethane		
dichlorodifluoromethane		
vinyl chloride		
chloroethane		
methylene chloride		
trichlorofluoromethane		
1,1-dichloroethene		
1,1-dichloroethane		
trans-1,2-dichloroethene		
chloroform		
1,2-dichloroethane		
1,1,1-trichloroethane		
carbon tetrachloride		
bromodichloromethane		
1,2-dichloropropane		
trans-1,3-dichloropropane		
trichloroethene		
dibromochloromethane		
1,1,2-trichloroethane		
cis-1,3 dichloropropene		
2-chloroethylvinyl ether		
bromoform		
1,1,2,2-tetrachloroethane		
tetrachloroethene		
chlorobenzene		
Detection Limit		0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Pesticides and PCBs (Method 608[1])

Client: Geraghty and Miller - Tampa

Report No.: 84-448

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] NAS-2-1 / 8402010
PESTICIDES AND PCBs		
(89P) aldrin		
(90P) dieldrin		
(91P) chlordane		
(92P) 4,4'-DDT		
(93P) 4,4'-DDE		
(94P) 4,4'-DDD		
(95P) endosulfan-alpha		
(96P) endosulfan-beta		
(97P) endosulfan sulfate		
(98P) endrin		
(99P) endrin aldehyde		
(100P) heptachlor		
(101P) heptachlor epoxide		
(102P) BHC-alpha		
(103P) BHC-beta		
(104P) BHC-delta		
(105P) BHC-gamma (lindane)		
(106P) PCB - 1242		
(107P) PCB - 1254		
(108P) PCB - 1221		
(109P) PCB - 1232		
(110P) PCB - 1248		
(111P) PCB - 1260		
(112P) PCB - 1016		
(113P) toxaphene		
Detection Limit		0.1

[1]U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

SECTION 2

Pine Tree Planting Area
Site No. 4

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NAS-4-1 8308120	NAS-4-2 8308121	NAS-4-3 8308122
chloromethane				
dichlorodifluoromethane				
vinyl chloride				
chloroethane				
methylene chloride				
trichlorofluoromethane				
1,1-dichloroethene				
1,1-dichloroethane				
trans-1,2-dichloroethene			9.1	
chloroform				
1,2-dichloroethane				
1,1,1-trichloroethane				
carbon tetrachloride				
bromodichloromethane				
1,2-dichloropropane				
trans-1,3-dichloropropane				
trichloroethene		15	45	0.7
dibromochloromethane				
1,1,2-trichloroethane				
cis-1,3 dichloropropene				
2-chloroethylvinyl ether				
bromoform				
1,1,2,2-tetrachloroethane				
tetrachloroethene			1.1	
chlorobenzene				
Detection Limit		0.1	0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CONCENTRATION OF METALS & CYANIDES

Concentration (ppm)

Client ID	CAA ID	Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Si	Ag	Tl	Zn	Cyanide	Total Organic Carbon
NAS4-1	8308120	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	1.0
NAS4-2	8308121	-----	-----	-----	<0.010	<0.25	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	3.7
NAS4-3	8308122	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	1.0

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

SEP 21 1983

LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700360
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NAS 4-1 PINE TREE AREA	08/26	13082056		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.1	mg/l
M098 Cadmium, leachable (Cd)			< 0.005	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 4-2 PINE TREE AREA	08/26	13082057		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.1	mg/l
M098 Cadmium, leachable (Cd)			0.009	mg/l
M148 Chromium, leachable (Cr)			0.02	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			0.0016	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 4-3 PINE TREE AREA 1425	08/26	13082058		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.3	mg/l
M098 Cadmium, leachable (Cd)			0.036	mg/l
M148 Chromium, leachable (Cr)			0.02	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l

SECTION 3

Shoreline Fill West of Pier 142
Site No. 5

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 5-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
ACROLEIN	< 50	µg/l
ACRYLONITRILE	< 50	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	< 1	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 5-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : VOC'S BY EPA METHOD 624		UNITS
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 5-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
ARSENIC	< 0.005	mg/l
BARIUM	0.28	mg/l
CADMIUM	< 0.01	mg/l
CHROMIUM, TOTAL	< 0.01	mg/l
LEAD	< 0.01	mg/l
MERCURY	< 0.1	µg/l
SELENIUM	< 0.005	mg/l
SILVER	< 0.01	mg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully submitted,

Lawrence J. Korn
Laboratory Supervisor

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 5-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : RADIOACTIVE ANALYSIS		UNITS
GROSS ALPHA	< 2.3	pCi/l
GROSS BETA	14±3.1	pCi/l
RADIUM 226	0.7±0.1	pCi/l
RADIUM 228	< 0.8	pCi/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

SECTION 4

Old Disposal Area
Site No. 9

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Compound	Sample ID: NAS-9-1 CAA ID: 8308123 Concentration ug/l (ppb)[2]
chloromethane	
dichlorodifluoromethane	
vinyl chloride	
chloroethane	
methylene chloride	1.2
trichlorofluoromethane	
1,1-dichloroethene	
1,1-dichloroethane	
trans-1,2-dichloroethene	21
chloroform	
1,2-dichloroethane	
1,1,1-trichloroethane	
carbon tetrachloride	
bromodichloromethane	
1,2-dichloropropane	
trans-1,3-dichloropropane	
trichloroethene	1.2
dibromochloromethane	
1,1,2-trichloroethane	
cis-1,3 dichloropropene	
2-chloroethylvinyl ether	
bromoform	
1,1,2,2-tetrachloroethane	
tetrachloroethene	
chlorobenzene	
Detection Limit	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CONCENTRATION OF METALS & CYANIDES

Concentration (ppm)

Client ID	CAA ID	Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Si	Ag	Tl	Zn	Cyanide	Total Organic Carbon
NAS9-1	8308123	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	17.

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: BERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700380
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NAS 9-1 OLD DISPOSAL AREA 1240	08/24	13082061		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.2	mg/l
M098 Cadmium, leachable (Cd)			0.028	mg/l
M148 Chromium, leachable (Cr)			0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 9-2 OLD DISPOSAL AREA 1247	08/26	13082062		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.2	mg/l
M098 Cadmium, leachable (Cd)			0.17	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 9-3 OLD DISPOSAL AREA 1255	08/26	13082063		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			0.002	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			0.071	mg/l
M148 Chromium, leachable (Cr)			0.02	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l

SECTION 5

Radium Paint Waste Disposal Pit
Site No. 13

Results of Radiological Analyses (Method 900.0)[1]

Constituent	Concentration pCi/l Client ID: NAS 13-1 CAA ID: 8402014
Gross alpha activity	54±7

[1]U.S. EPA. 1980. Procedures for Measurement of Radioactivity in Drinking Waters. EPA 600/4-80-032. EPA/EMSL, Cincinnati, Ohio. August, 1980.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 61244

September 21, 1984

Sample of WATER

Date Received August 31, 1984

For GERAGHTY & MILLER, P.O. Box 271173, Tampa, FL 33688
Attn: Mr. Fred Sequiti

Marks: NAS-13-1

CERTIFICATE OF ANALYSIS OR TESTS

METHOD 601 - All Units ppb	CONCENTRATION	DETECTION LIMIT
Bromodichloromethane	BDL	1.0
Bromoform	BDL	1.0
Bromomethane	BDL	1.0
Carbon Tetrachloride	BDL	1.0
Chlorobenzene	BDL	1.0
Chloroethane	BDL	1.0
2-Chloroethylvinyl Ether	BDL	1.0
Chloroform	BDL	1.0
Chloromethane	BDL	1.0
Dibromochloromethane	BDL	1.0
1,2-Dichlorobenzene	BDL	1.0
1,3-Dichlorobenzene	BDL	1.0
1,4-Dichlorobenzene	BDL	1.0
Dichlorodifluoromethane	BDL	1.0
1,1-Dichloroethane	BDL	1.0
1,2-Dichloroethane	BDL	1.0
1,1-Dichloroethene	BDL	1.0
Trans-1,2-Dichloroethene	BDL	1.0
1,2-Dichloropropane	BDL	1.0
Cis-1,3-Dichloropropene	BDL	1.0
Trans-1,3-Dichloropropene	BDL	1.0
Methylene Chloride	BDL	1.0
1,1,2,2-Tetrachloroethane	BDL	1.0
Tetrachloroethene	BDL	1.0
1,1,1-Trichloroethane	BDL	1.0
1,1,2-Trichloroethane	BDL	1.0
Trichloroethene	BDL	1.0
Trichlorofluoromethane	BDL	1.0
Vinyl Chloride	BDL	1.0

BDL = Below Detection Limit

Respectfully submitted,

LABORATORY I.D. NO. 82145

C-4.2

TECHNICAL SERVICES, INC.

By Harvey C. Gray, Jr.

TECHNICAL SERVICES, INC.

ENVIRONMENTAL CONSULTANTS — INDUSTRIAL CHEMISTS
OFFICE 2471 SWAN ST. — P.O. BOX 52329
LABORATORIES 103-107 STOCKTON STREET
JACKSONVILLE, FLORIDA 32201
(904) 353-5761

Laboratory No. 61244

September 21, 1984

Sample of WATER

Date Received September 4, 1984

For GERAGHTY & MILLER, P.O. Box 271173, Tampa, FL 33688
Attn: Mr. Fred Sequiti

Marks: NAS-13-1

CERTIFICATE OF ANALYSIS OR TESTS

Radium 226, pCi/liter: 6 ± 2

Radium 228, pCi/liter: <1

Gross Alpha, pCi/liter: 6 ± 3

Gross Beta, pCi/liter: 4 ± 2

Respectfully submitted,

TECHNICAL SERVICES, INC.

BY Harvey C. Gray, Jr.

LABORATORY I.D. NO. 82145

SECTION 6

NARF Area
Site Nos. 11, 12, 14, 15, 16

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Compound	Sample ID: NARF-1 CAA ID: 8308114	NARF-2 8308 115	NARF-3 8308 116	NAEF-4 8308117	NARF-5 8308118
	Concentration ug/l (ppb)[2]				
chloromethane					
dichlorodifluoromethane					
vinyl chloride				270	
chloroethane					
methylene chloride	0.6		1.8		
trichlorofluoromethane					
1,1-dichloroethene	0.3		0.2	12	
1,1-dichloroethane					
trans-1,2-dichloroethene	0.4		2.2	1470	7.6
chloroform					
1,2-dichloroethane					
1,1,1-trichloroethane	0.7		0.5	6.2	
carbon tetrachloride					
bromodichloromethane					
1,2-dichloropropane					
trans-1,3-dichloropropane					
trichloroethene	23	3.9	6.1	170	4.9
dibromochloromethane					
1,1,2-trichloroethane					
cis-1,3 dichloropropene					
2-chloroethylvinyl ether					
bromoform					
1,1,2,2-tetrachloroethane					
tetrachloroethene				1.8	
chlorobenzene		3.9	11.0		
Detection Limit	0.1	0.1	0.1	0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Compound	Sample ID: NARF-6 CAA ID: 8308119	Concentration ug/l (ppb)[2] NARF-B1 8308113
chloromethane		
dichlorodifluoromethane		
vinyl chloride		
chloroethane		
methylene chloride		
trichlorofluoromethane		
1,1-dichloroethene	16	53,500
1,1-dichloroethane		
trans-1,2-dichloroethene	190	8000
chloroform	5.5	
1,2-dichloroethane		
1,1,1-trichloroethane	22	25,500
carbon tetrachloride		
bromodichloromethane		
1,2-dichloropropane		
trans-1,3-dichloropropane		
trichloroethene	6.0	155,300
dibromochloromethane		
1,1,2-trichloroethane		
cis-1,3 dichloropropene		
2-chloroethylvinyl ether		
bromoform		
1,1,2,2-tetrachloroethane		
tetrachloroethene		480
chlorobenzene		
Detection Limit	0.1	100

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CONCENTRATION OF METALS & CYANIDES

Client ID	CAA ID	Concentration (ppm)														
		Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Si	Ag	Tl	Zn	Cyanide	Total Organic Carbon
NARFB-1	8308113	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	
NARF-1	8308114	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	0.007	3.9
NARF-2	8308115	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	0.010	<1.0
NARF-3	8308116	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	0.071	3.3
NARF-4	8308117	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	6.6
NARF-5	8308118	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	3.2
NARF-6	8308119	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	9.5

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700380
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NAS 15-1 PAINT & SLUDGE DISPOSAL AREA	08/26	13082064		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.1	mg/l
M098 Cadmium, leachable (Cd)			0.15	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			1.66	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 15-2 PAINT & SLUDGE DISPOSAL AREA	08/26	13082065		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.3	mg/l
M098 Cadmium, leachable (Cd)			0.041	mg/l
M148 Chromium, leachable (Cr)			0.02	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 15-3 PAINT & SLUDGE DISPOSAL AREA	08/26	13082066		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.3	mg/l
M098 Cadmium, leachable (Cd)			< 0.005	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l

SECTION 7

Radioactive Waste Fill Area
Site No. 18

Results of Radiological Analyses (Method 900.0)[1]

Constituent	Concentration pCi/l Client ID: CAA ID:	NAS18-1 8402015
Gross alpha activity		0±3

[1]U.S. EPA. 1980. Procedures for Measurement of Radioactivity in Drinking Waters. EPA 600/4-80-032. EPA/EMSL, Cincinnati, Ohio. August, 1980.

SECTION 8

Fire Pit
Site No. 28

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

June 4,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS 28-1		UNITS
ACRYLONITRILE	< 50	µg/l
POLYCHLORINATED BIPHENYLS	< 1.0	µg/l
TOLUENE	< 1	µg/l
CHLOROMETHANE	< 1	µg/l
BROMOMETHANE	< 1	µg/l
DICHLORODIFLUOROMETHANE	< 1	µg/l
VINYL CHLORIDE	< 1	µg/l
CHLOROETHANE	< 1	µg/l
METHYLENE CHLORIDE	< 1	µg/l
TRICHLOROFLUOROMETHANE	< 1	µg/l
1,1-DICHLOROETHENE	< 1	µg/l
1,1-DICHLOROETHANE	< 1	µg/l
TRANS-1,2-DICHLOROETHENE	< 1	µg/l
CHLOROFORM	< 1	µg/l
1,2-DICHLOROETHANE	< 1	µg/l
1,1,1-TRICHLOROETHANE	< 1	µg/l
CARBON TETRACHLORIDE	< 1	µg/l
BROMODICHLOROMETHANE	< 1	µg/l
1,2-DICHLOROPROPANE	< 1	µg/l
TRANS-1,3-DICHLOROPROPENE	< 1	µg/l
TRICHLOROETHENE	4	µg/l
DIBROMOCHLOROMETHANE	< 1	µg/l
1,1,2-TRICHLOROETHANE	< 1	µg/l
CIS-1,3-DICHLOROPROPENE	< 1	µg/l
2-CHLOROETHYLVINYL ETHER	< 1	µg/l

Enviropact. Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

June 4,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS 28-1		UNITS
BROMOFORM	< 1	µg/l
1,1,2,2-TETRACHLOROETHANE	< 1	µg/l
TETRACHLOROETHENE	< 1	µg/l
CHLOROBENZENE	< 1	µg/l
BENZENE	< 1	µg/l
ETHYL BENZENE	< 1	µg/l
TOTAL XYLENES	< 1	µg/l
1,2-DIBROMO-3-CHLOROPROPANE	< 1	µg/l
,2-DICHLOROPROPENE	< 1	µg/l
STYRENE	< 1	µg/l

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS 28-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : PCB ANALYSIS		UNITS
POLYCHLORINATED BIPHENYLS	< 1.0	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

Enviropact, Inc.
Environmental Consulting and Analysis

4790 N.W. 157th Street
Hialean, Florida 33014
Telephone: (305) 620-1700
Fla. Wats: (800) 432-9706

1437

GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:PROJECT # T290GW2

Collected By: YOUR REP.

REPORT OF ANALYSIS : NAS 28-1 SOIL		UNITS
POLYCHLORINATED BIPHENYLS	103	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

SECTION 9

Organic Disposal Area
Site No. 29

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty and Miller - Tampa

Report No.: 84-448

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NAS-29-1 8402016	NAS-29-2 8402017
chloromethane			3.4
dichlorodifluoromethane			
vinyl chloride			
chloroethane			
methylene chloride			
trichlorofluoromethane			
1,1-dichloroethene			
1,1-dichloroethane			
trans-1,2-dichloroethene		0.6	
chloroform			
1,2-dichloroethane			
1,1,1-trichloroethane		0.4	
carbon tetrachloride			
bromodichloromethane			
1,2-dichloropropane			
trans-1,3-dichloropropane			
trichloroethene			
dibromochloromethane			
1,1,2-trichloroethane			
cis-1,3 dichloropropene			
2-chloroethylvinyl ether			
bromoform			-
1,1,2,2-tetrachloroethane			
tetrachloroethene			
chlorobenzene			
Detection Limit		0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

Results of Trace Element Analyses

Constituent	Client ID: NAS 29-1 CAA ID: 8402016	NAS 29-2 8402017
Sb (mg/l)	<0.005	<0.005
As (mg/l)	<0.005	<0.005
Be (mg/l)	<0.010	<0.010
Cd (mg/l)	<0.001	<0.001
Cr (mg/l)	<0.005	<0.005
Cu (mg/l)	0.022	<0.005
Pb (mg/l)	<0.005	<0.005
Hg (mg/l)	<0.0002	<0.0002
Ni (mg/l)	<0.005	<0.005
Se (mg/l)	<0.005	<0.005
Ag (mg/l)	<0.001	<0.001
Tl (mg/l)	<0.005	<0.005
Zn (mg/l)	0.066	0.016
Cyanide (mg/l)	<0.010	<0.010

Results of Total Organic Carbon Analyses

Client ID	CAA ID	TOC mg/l (ppm)
NAS 29-1	8402016	20.5
NAS 29-2	8402017	2.8

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700300
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION	NUS SAMPLE NO	RESULTS	UNITS
NAS 29-1 LARGE PILE OF WOOD & SANDY MATL 08/26	13082070		
M275 EP TOXICITY PACKAGE			
M033 Arsenic, leachable (As)		< 0.001	mg/l
M048 Barium, leachable (Ba)		< 0.1	mg/l
M098 Cadmium, leachable (Cd)		0.084	mg/l
M148 Chromium, leachable (Cr)		0.04	mg/l
M208 Lead, leachable (Pb)		< 0.03	mg/l
M258 Mercury, leachable (Hg)		< 0.0002	mg/l
M293 Selenium, leachable (Se)		< 0.002	mg/l
M308 Silver, leachable (Ag)		0.02	mg/l
S910 EP Toxicity Extraction			
M278 Nickel, leachable (Ni)		0.10	mg/l
NAS 29-2 PILE OF WOOD & SANDY MATERIAL 08/26	13082071		
M275 EP TOXICITY PACKAGE			
M033 Arsenic, leachable (As)		0.009	mg/l
M048 Barium, leachable (Ba)		0.2	mg/l
M098 Cadmium, leachable (Cd)		0.016	mg/l
M148 Chromium, leachable (Cr)		< 0.01	mg/l
M208 Lead, leachable (Pb)		< 0.03	mg/l
M258 Mercury, leachable (Hg)		< 0.0002	mg/l
M293 Selenium, leachable (Se)		< 0.002	mg/l
M308 Silver, leachable (Ag)		< 0.01	mg/l
S910 EP Toxicity Extraction			
M278 Nickel, leachable (Ni)		< 0.03	mg/l
NAS 29-3 PILE OF WOOD & SANDY MATERIAL 08/26	13082072		
M275 EP TOXICITY PACKAGE			
M033 Arsenic, leachable (As)		< 0.001	mg/l
M048 Barium, leachable (Ba)		0.1	mg/l
M098 Cadmium, leachable (Cd)		2.62	mg/l
M148 Chromium, leachable (Cr)		< 0.01	mg/l
M208 Lead, leachable (Pb)		< 0.03	mg/l
M258 Mercury, leachable (Hg)		< 0.002	mg/l
M293 Selenium, leachable (Se)		< 0.002	mg/l
M308 Silver, leachable (Ag)		< 0.01	mg/l
S910 EP Toxicity Extraction			
M278 Nickel, leachable (Ni)		< 0.03	mg/l

SECTION 10

Old Drum Storage Lot
Site No. 30

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 624[1])

Client: Geraghty & Miller, Inc. Project No.: 83-792

Date Samples Received: September 14, 1983 Reported by: EC

Date Analysis Completed: September 16, 1983 Checked by: DAF

Compound	Sample ID: / CAA ID:	Concentration (ug/l)[2] NAS-30-1 8308125	NAS-30-2 8308 126	NAS-30-3 8308 127
(2v) acrolein				
(3v) acrylonitrile				
(4v) benzene				
(6v) carbon tetrachloride				
(7v) chlorobenzene				
(10v) 1,2-dichloroethane				
(11v) 1,1,1,-trichloroethane				
(13v) 1,1-dichloroethane				
(14v) 1,1,2-trichloroethane				
(15v) 1,1,2,2-tetrachloroethane				
(16v) chloroethane				
(19v) 2-chloroethylvinyl ether				
(23v) chloroform				
(29v) 1,1-dichloroethylene				
(30v) trans-1,2-dichloroethylene			TR	
(32v) 1,2-dichloropropane				
(33v) trans-1,3-dichloropropene				
cis-1,3-dichloropropane				
(38v) ethylbenzene				
(44v) methylene chloride				
(45v) chloromethane				
(46v) bromomethane				
(47v) bromoform				
(48v) bromodichloromethane				
(49v) fluorotrichloromethane				
(50v) dichlorodifluoromethane				
(51v) chlorodibromomethane				
(85v) tetrachloroethylene				
(86v) toluene				
(87v) trichloroethylene			TR	
(88v) vinyl chloride				

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than 1 ug/l are not detected and are left blank. Concentrations between 1 and 9 ug/l are listed as trace levels (TR).

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geraghty & Miller (Jacksonville Project) Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by: EC

Date Analysis Completed: September 28, 1983 Checked by: DF

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] NAS 30-1 8308125	NAS 30-2 8308126	NAS 30-3 8308127
ACID COMPOUNDS				
(21A) 2,4,6-trichlorophenol				
(22A) p-chloro-m-cresol				
(24A) 2-chlorophenol				
(31A) 2,4-dichlorophenol				
(34A) 2,4-dimethylphenol				
(57A) 2-nitrophenol				
(58A) 4-nitrophenol				
(59A) 2,4-dinitrophenol				
(60A) 4,6-dinitro-2-methylphenol				
(64A) pentachlorophenol				
(65A) phenol				
Detection Limit		2	2	2
BASE/NEUTRAL COMPOUNDS				
(1B) acenaphthene				
(5B) benzidine				
(8B) 1,2,4-trichlorobenzene				
(9B) hexachlorobenzene				
(12B) hexachloroethane				
(18B) bis (2-chloroethyl) ether			54	
(20B) 2-chloronaphthalene				
(25B) 1,2-dichlorobenzene				
(26B) 1,3-dichlorobenzene				
(27B) 1,4-dichlorobenzene				
(28B) 3,3'-dichlorobenzidine				
(35B) 2,4-dinitrotoluene				
(36B) 2,6-dinitrotoluene				
(37B) 1,2-diphenylhydrazine				
(39B) fluoranthene				
(40B) 4-chlorophenyl phenyl ether				
(41B) 4-bromophenyl phenyl ether				

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geraghty & Miller (Jacksonville Project) Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: September 28, 1983 Checked by:

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] NAS 30-1 8308125	NAS 30-2 8308126	NAS 30-3 8308127
BASE NEUTRAL COMPOUNDS (cont'd)				
(42B) bis (2-chloroisopropyl) ether				
(43B) bis (2-chloroethoxy) methane				
(52B) hexachlorobutadiene				
(53B) hexachlorocyclopentadiene				
(54B) isophorone				
(55B) napnthalene				
(56B) nitrobenzene				
(62B) N-nitrosodiphenylamine				
(63B) N-nitrosodipropylamine				
(66B) bis (2-ethylhexyl) phthalate				
(67B) benzyl butyl phthalate				
(68B) di-n-butyl phthalate				
(69B) di-n-octyl phthalate				
(70B) diethyl phthalate				
(71B) dimethyl phthalate				
(72B) benzo(a)anthracene				
(73B) benzo(a)pyrene				
(74B) benzo(b)fluoroanthene				
(75B) benzo(k)fluoroanthene				
(76B) chrysene				
(77B) acenaphthylene				
(78B) anthracene				
(79B) benzo(ghi)perylene				
(80B) fluorene				
(81B) phenanthrene				
(82B) dibenzo(a,h)anthracene				
(83B) ideno(1,2,3-cd)pyrene				
(84B) pyrene				
Detection Limit		2	2	2

[1]U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the limit of detection are listed as trace levels (TR).

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentration of Pesticides and PCB's (Method 608[1])

Client: Geraghty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by: SRD

Date Analysis Completed: September 29, 1983 Checked by: DAF

Compound	Sample ID: / CAA ID:	Concentration - ug/l (ppb)[2] NAS 30-1 8308125	NAS 30-2 8308126	NAS 30-3 8308127
PESTICIDES AND PCB's				
(89P) aldrin				
(90P) dieldrin				
(91P) chlordane				
(92P) 4,4'-DDT				
(93P) 4,4'-DDE				
(94P) 4,4'-DDD				
(95P) endosulfan-alpha				
(96P) endosulfan-beta				
(97P) endosulfan sulfate				
(98P) endrin				
(99P) endrin aldehyde				
(100P) heptachlor				
(101P) heptachlor epoxide				
(102P) BHC-alpha				
(103P) BHC-beta				
(104P) BHC-delta				
(105P) BHC-gamma (lindane)				
(106P) PCB - 1242				
(107P) PCB - 1254				
(108P) PCB - 1221				
(109P) PCB - 1232				
(110P) PCB - 1248				
(111P) PCB - 1260				
(112P) PCB - 1016				
(113P) toxaphene				
Detection Limit		1	1	1

[1]U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times detection limit are listed as trace levels (TR).

CONCENTRATION OF METALS & CYANIDES

Concentration (ppm)

Client ID	CAA ID	Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Si	Ag	Tl	Zn	Cyanide	Total Organic Carbon
NAS30-1	8308125	<0.005	<0.005	<0.01	<0.010	<0.025	<0.010	<0.05	<0.0002	<0.025	<0.005	<0.010	<0.005	0.030	<0.005	
NAS30-2	8308126	<0.005	<0.005	<0.01	<0.010	<0.025	<0.010	<0.05	<0.0002	<0.025	<0.005	<0.010	<0.005	<0.010	<0.005	
NAS30-3	8308127	<0.005	<0.005	<0.01	<0.010	<0.025	0.023	<0.05	<0.0002	<0.025	<0.005	<0.010	<0.005	<0.010	<0.005	

NUS CORPORATION

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5350 Campbells Run Road
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REMIT TO:
Park West Two
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LAB ANALYSIS REPORT

CLIENT NAME: BERGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700350
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NAS 30-1 SANDPILE 0725	08/26	13082073		
M275 EP TOXICITY PACKAGE				
M033 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.2	mg/l
M098 Cadmium, leachable (Cd)			3.53	mg/l
M148 Chromium, leachable (Cr)			0.23	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			0.0005	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NAS 30-2 SANDPILE 0835	08/26	13082074		
M275 EP TOXICITY PACKAGE				
M033 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			2.67	mg/l
M148 Chromium, leachable (Cr)			0.01	mg/l
M208 Lead, leachable (Pb)			2.55	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			1.22	mg/l
NAS 30-3 SANDPILE 0840	08/26	13082075		
M275 EP TOXICITY PACKAGE				
M033 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			3.56	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			0.55	mg/l

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LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 700380
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NAS 30-4 DRUM STORAGE AREA 0905	08/26	13082076		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			0.089	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			0.087	mg/l
M143 Chromium, leachable (Cr)			0.06	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			0.02	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			0.14	mg/l
NAS 30-5 DRUM STORAGE AREA 0915	08/26	13082077		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			0.037	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			0.015	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			0.02	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			0.09	mg/l
NAS 30-6 DRUM STORAGE AREA 0925	08/26	13082078		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			0.008	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			0.040	mg/l
M148 Chromium, leachable (Cr)			0.03	mg/l
M208 Lead, leachable (Pb)			0.11	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			0.02	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			0.14	mg/l

SECTION 11

Base Landfill
Site No. 32

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geraghty and Miller - Tampa

Report No.: 84-448

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NAS-32-1 8402018
chloromethane		
dichlorodifluoromethane		
vinyl chloride		
chloroethane		
methylene chloride		2.6
trichlorofluoromethane		
1,1-dichloroethene		
1,1-dichloroethane		
trans-1,2-dichloroethene		
chloroform		
1,2-dichloroethane		
1,1,1-trichloroethane		
carbon tetrachloride		
bromodichloromethane		
1,2-dichloropropane		
trans-1,3-dichloropropane		
trichloroethene		
dibromochloromethane		
1,1,2-trichloroethane		
cis-1,3 dichloropropene		
2-chloroethylvinyl ether		
bromoform		
1,1,2,2-tetrachloroethane		
tetrachloroethene		
chlorobenzene		
Detection Limit		0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

Results of Total Organic Carbon Analyses

Client ID	CAA ID	TOC mg/l (ppm)
NAS 32-1	8402018	60

SECTION 13

Oil Pond and Land Spreading Area
NFD: Site No. 5

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Concentrations of Volatile Organic Compounds (Method 601[1])

Client: Geragnty & Miller, Inc. Report No.: 83-792

Date Samples Received: September 14, 1983 Reported by:

Date Analysis Completed: October 2, 1983 Checked by:

Compound	Sample ID: / CAA ID:	Concentration ug/l (ppb)[2] NFD-1 8303124	NFD-2 8308129
chloromethane			
dichlorodifluoromethane			
vinyl chloride			
chloroethane			
methylene chloride			
trichlorofluoromethane			
1,1-dichloroethene			
1,1-dichloroethane			
trans-1,2-dichloroethene			
chloroform			
1,2-dichloroethane			
1,1,1-trichloroethane		0.7	
carbon tetrachloride			
bromodichloromethane			
1,2-dichloropropane			
trans-1,3-dichloropropane			
trichloroethene		0.3	
dibromochloromethane			
1,1,2-trichloroethane			
cis-1,3 dichloropropene			
2-chloroethylvinyl ether			
bromoform			
1,1,2,2-tetrachloroethane			
tetrachloroethene			
chlorobenzene			
Detection Limit		0.1	0.1

[1]U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2]Concentrations less than the detection limit are left blank.

CONCENTRATION OF METALS & CYANIDES

Concentration (ppm)

Client ID	CAA ID	Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Si	Ag	Tl	Zn	Cyanide	Total Organic Carbon
NFD-1	8308124	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	<0.005	
NFD-2	8308129	-----	-----	-----	<0.010	<0.025	-----	<0.05	-----	<0.025	-----	-----	-----	-----	-----	

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LAB ANALYSIS REPORT

CLIENT NAME: GERAGHTY & MILLER, INC
ADDRESS: P. O. BOX 271173
TAMPA, FL 33688

NUS PROJECT NO: 70035C
NUS CLIENT NO: 891604

REPORT DATE: 09/14/83

ATTENTION: MR. PETER PALMER

DATE RECEIVED: 08/29/83

SAMPLE IDENTIFICATION		NUS SAMPLE NO	RESULTS	UNITS
NFD 5-1 OIL POND & LAND SPREADING 1630	08/26	13082059		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			0.2	mg/l
M098 Cadmium, leachable (Cd)			< 0.005	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l
NFD 5-2 OIL POND & LAND SPREADING 1645	08/26	13082060		
M275 EP TOXICITY PACKAGE				
M038 Arsenic, leachable (As)			< 0.001	mg/l
M048 Barium, leachable (Ba)			< 0.1	mg/l
M098 Cadmium, leachable (Cd)			< 0.005	mg/l
M148 Chromium, leachable (Cr)			< 0.01	mg/l
M208 Lead, leachable (Pb)			< 0.03	mg/l
M258 Mercury, leachable (Hg)			< 0.0002	mg/l
M298 Selenium, leachable (Se)			< 0.002	mg/l
M308 Silver, leachable (Ag)			< 0.01	mg/l
S910 EP Toxicity Extraction				
M278 Nickel, leachable (Ni)			< 0.03	mg/l

APPENDIX D

General Location Map and Individual Site Plan for Each Site Studied During Verification Phase

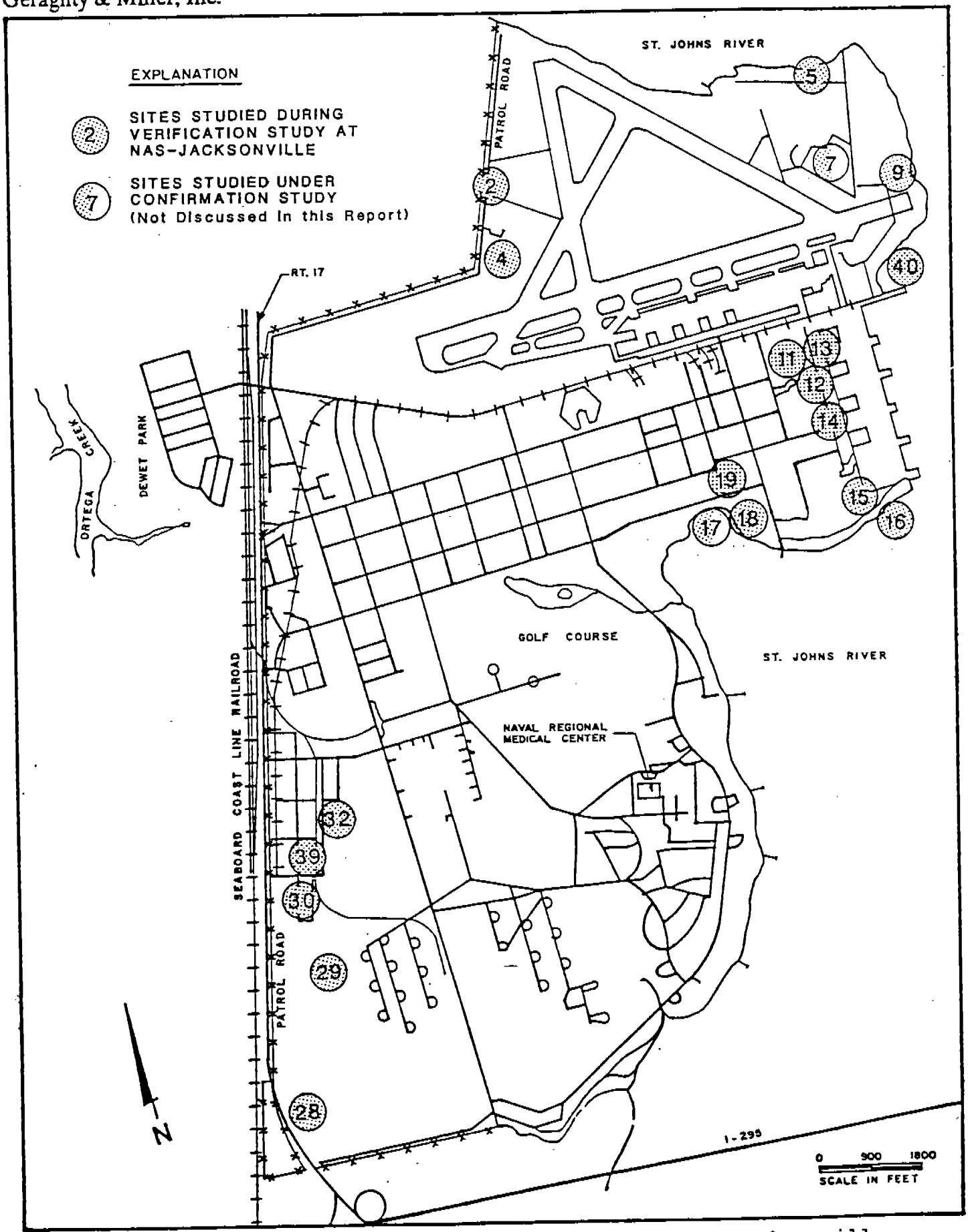

FIGURE 2. Location of the Sites Studied at the NAS, Jacksonville.

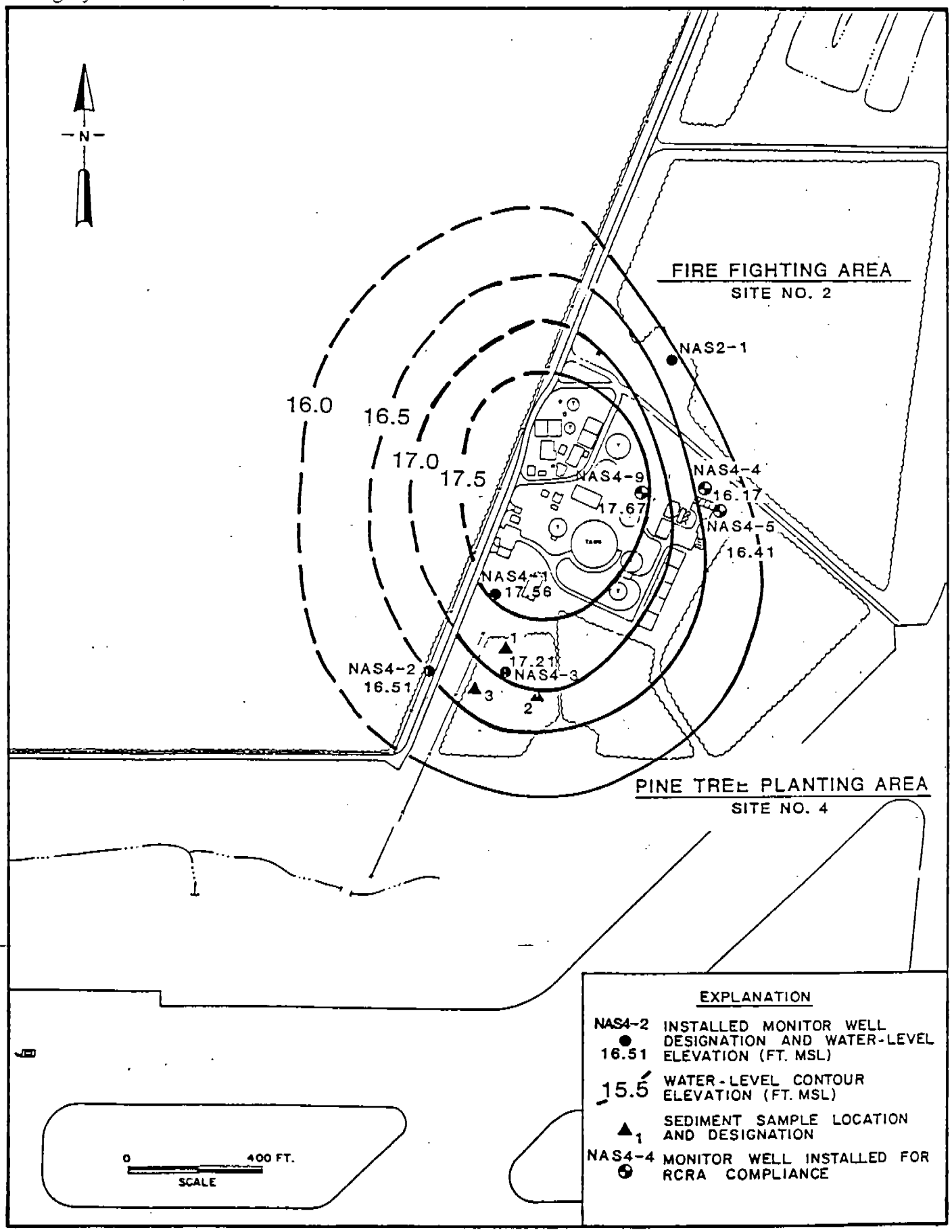

FIGURE 17. Locations of Installed Monitor Wells, Soil Samples, and Water-Table Contours (March 9, 1984) Collected at the Fire-Fighting Area (Site No. 2) and the Pine Tree Planting Area (Site No. 4).

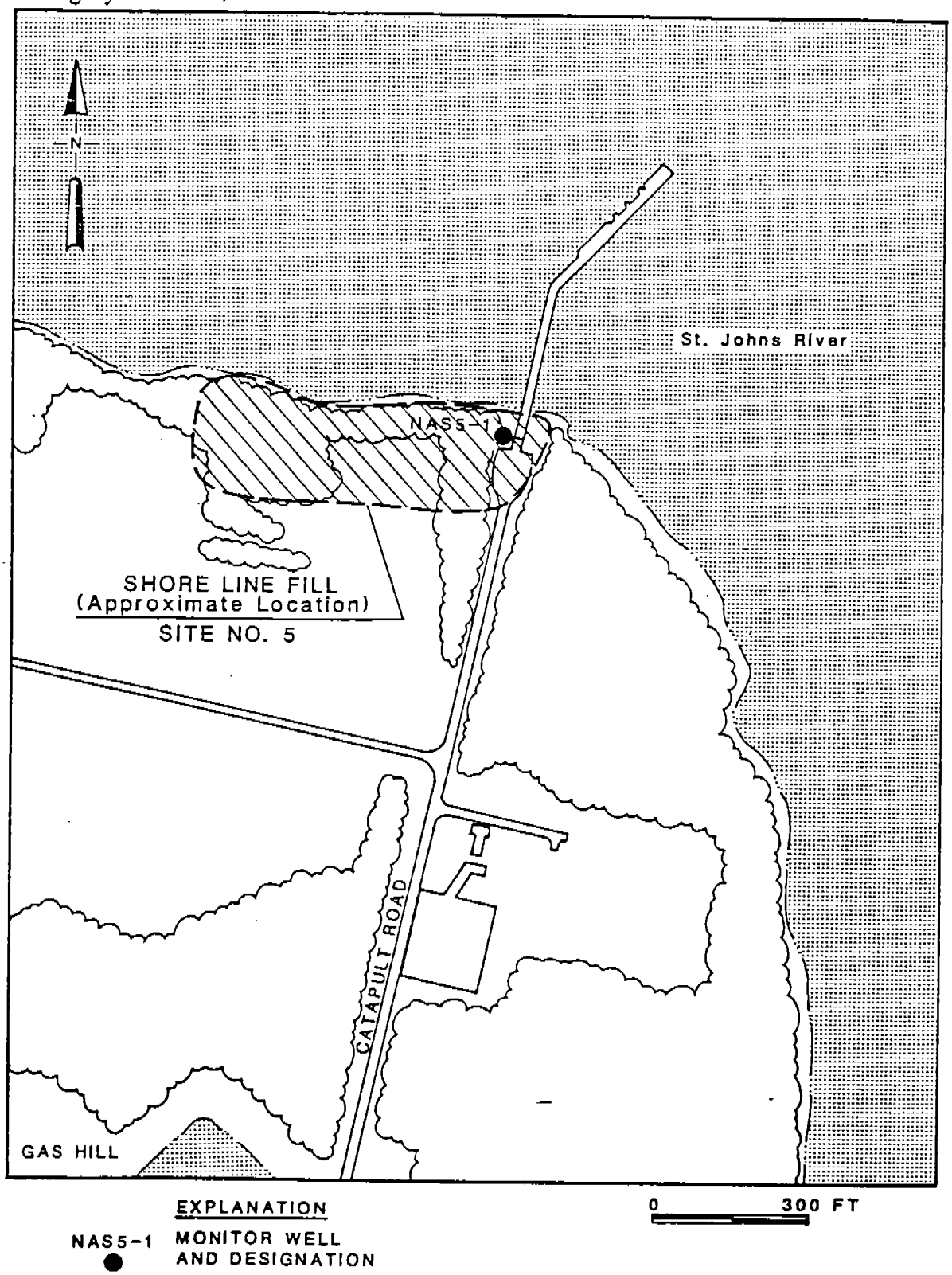

FIGURE 18. Location of Installed Monitor Well at the Shoreline Fill, West of Pier 142 (Site No. 5).

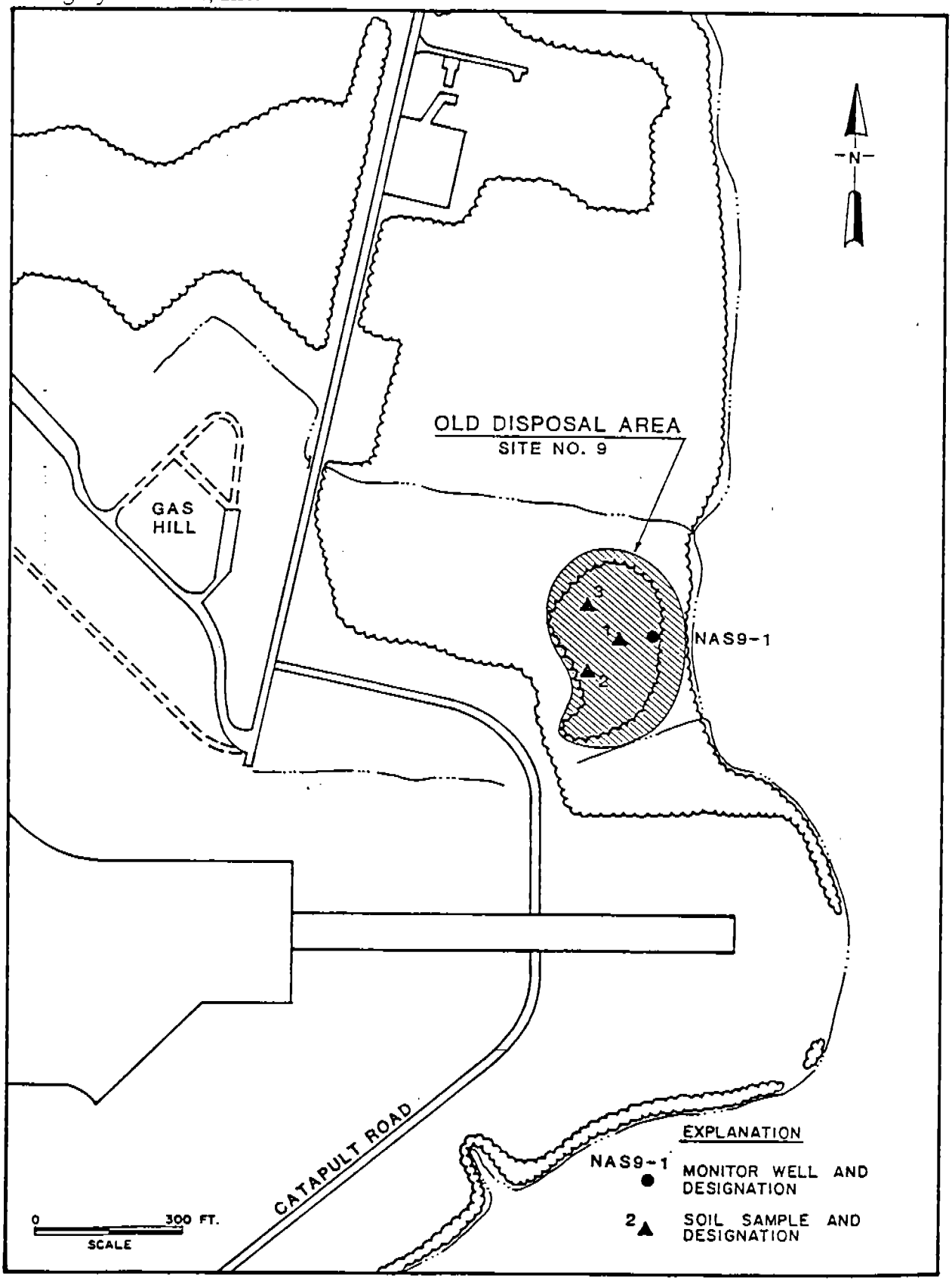

FIGURE 19. Location of Installed Monitor Well and Soil Samples Collected at the Old Disposal Area (Site No. 9).

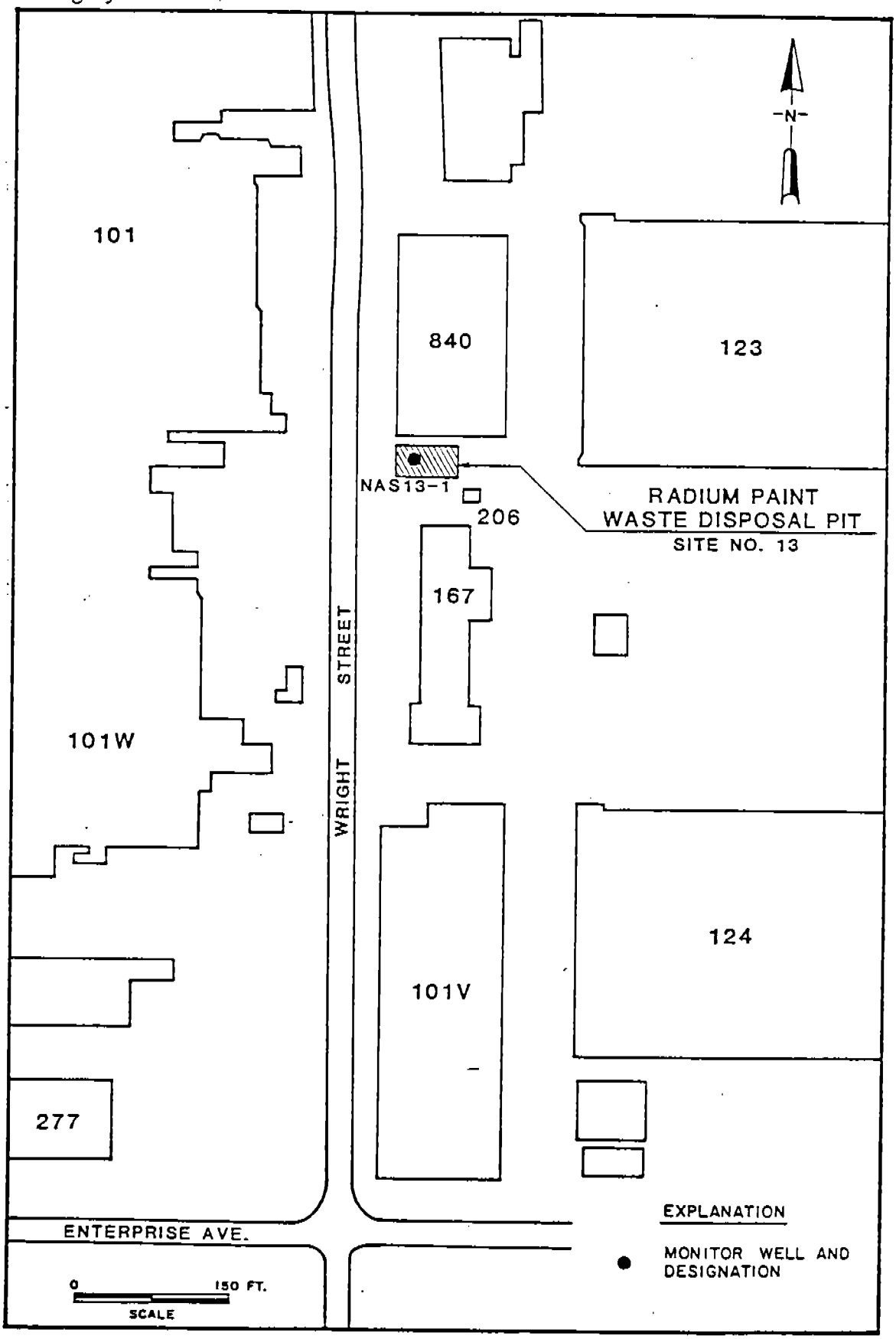

FIGURE 20. Location of the Monitor Well Installed at the Radium Paint Waste Disposal Pit (Site No. 13)

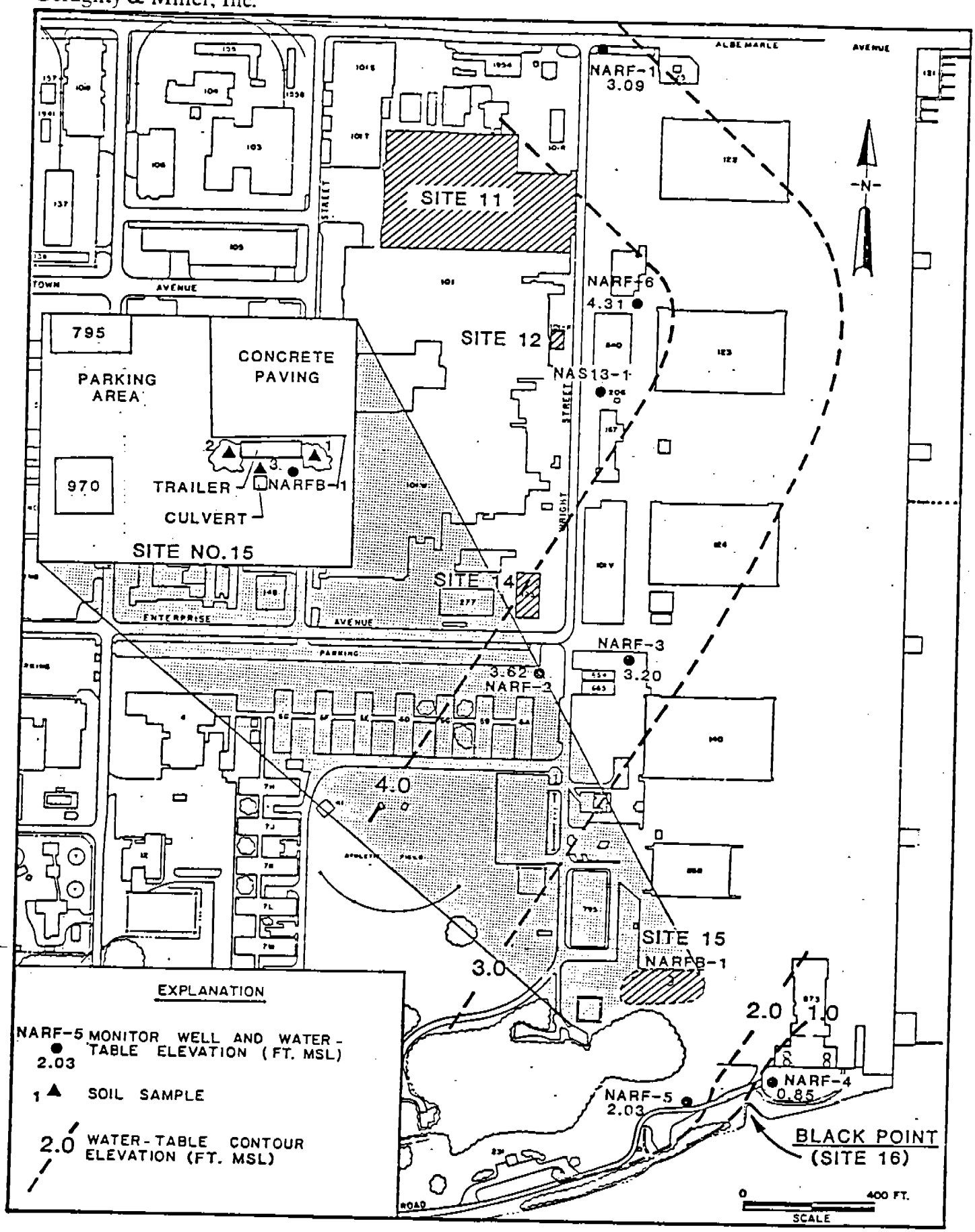

FIGURE 21. Locations of Installed Monitor Wells, Soil Samples and Water-Table Contours (March 12, 1984) in the NARF Area (Site Nos. 11, 12, 14, 15, and 16.

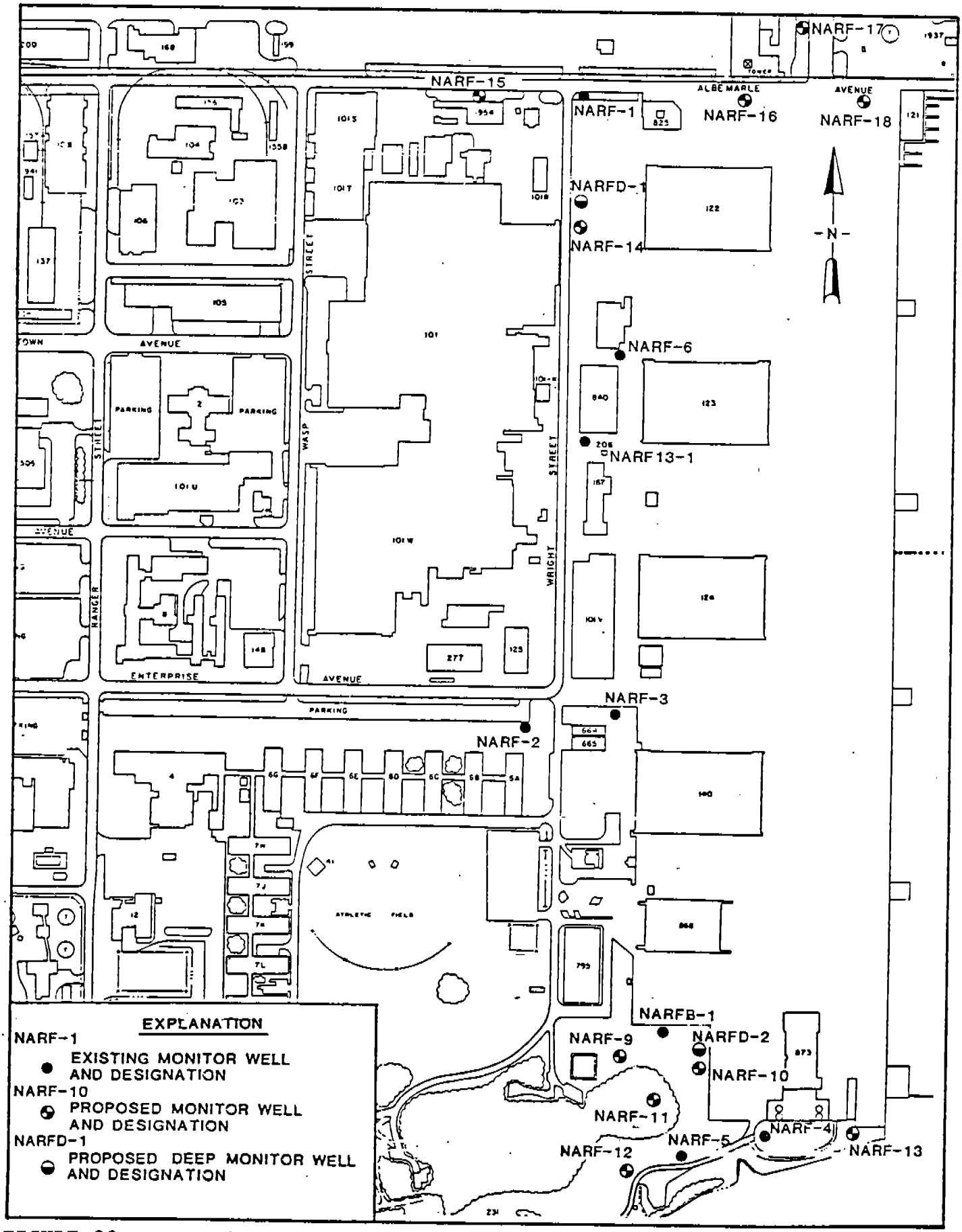

FIGURE 22. Locations of Proposed Monitor Wells in the NARF Area.

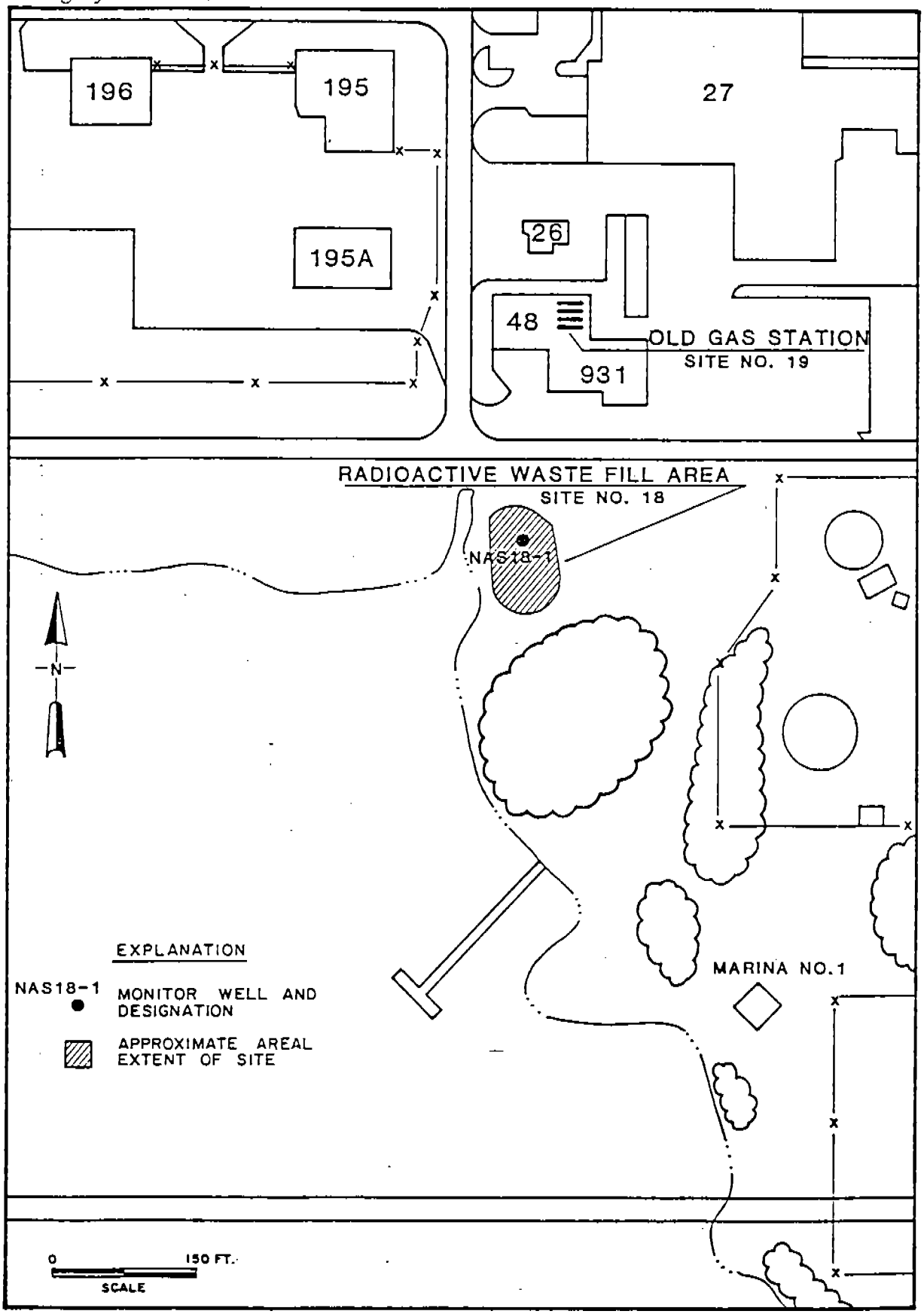

FIGURE 23. Location of the Monitor Well Installed at the Radioactive Waste Fill Area (Site No. 18) and Buried Storage Tanks at the Old Gas Station (Site No. 19)

Geraghty & Miller, Inc.

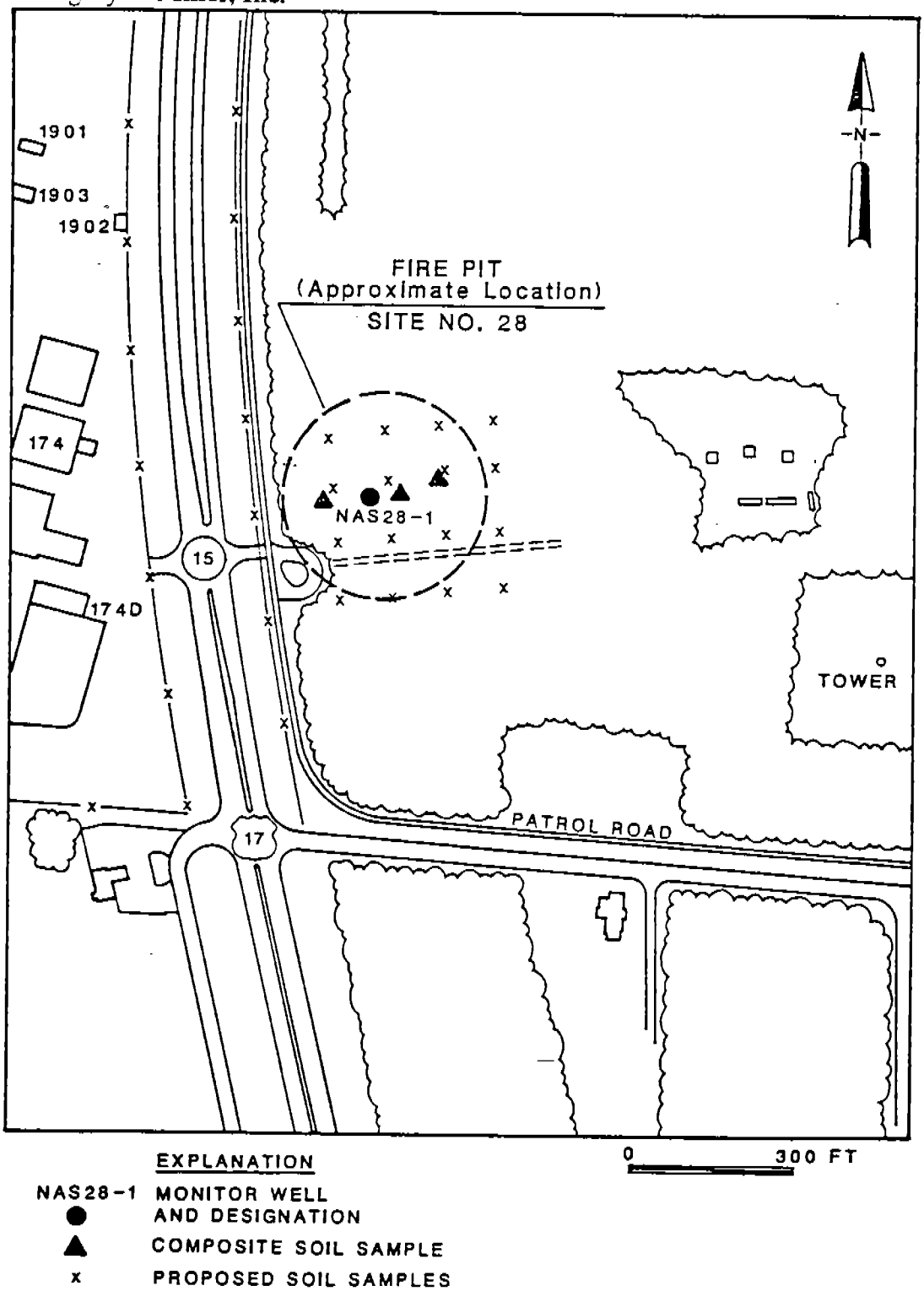

FIGURE 24. Locations of Installed Monitor Well and Soil Samples at the Fire Pit Area (Site No. 28).

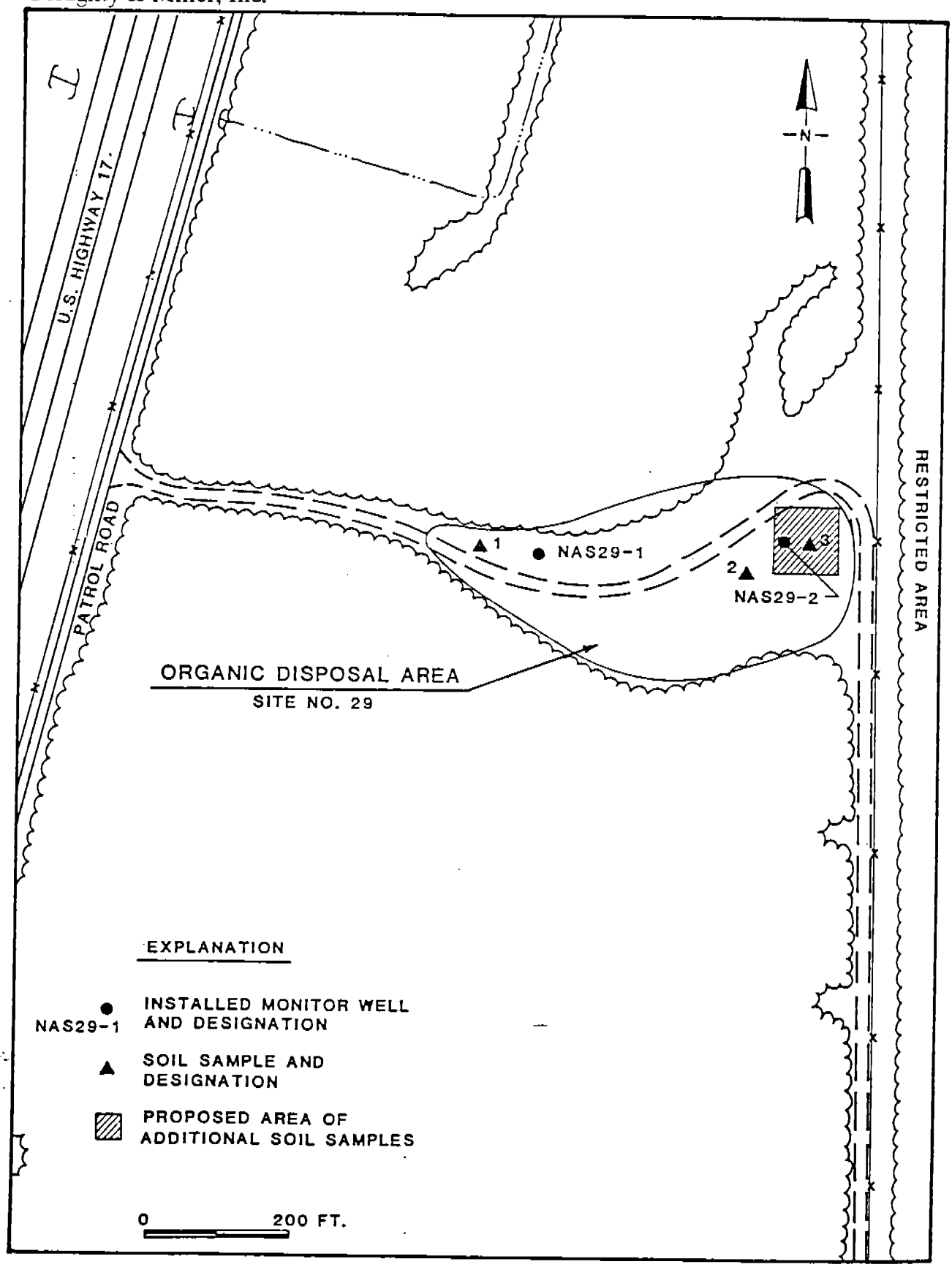

FIGURE 25. Locations of Installed Monitor Wells and Soil Samples at the Organic Disposal Area (Site No. 29).

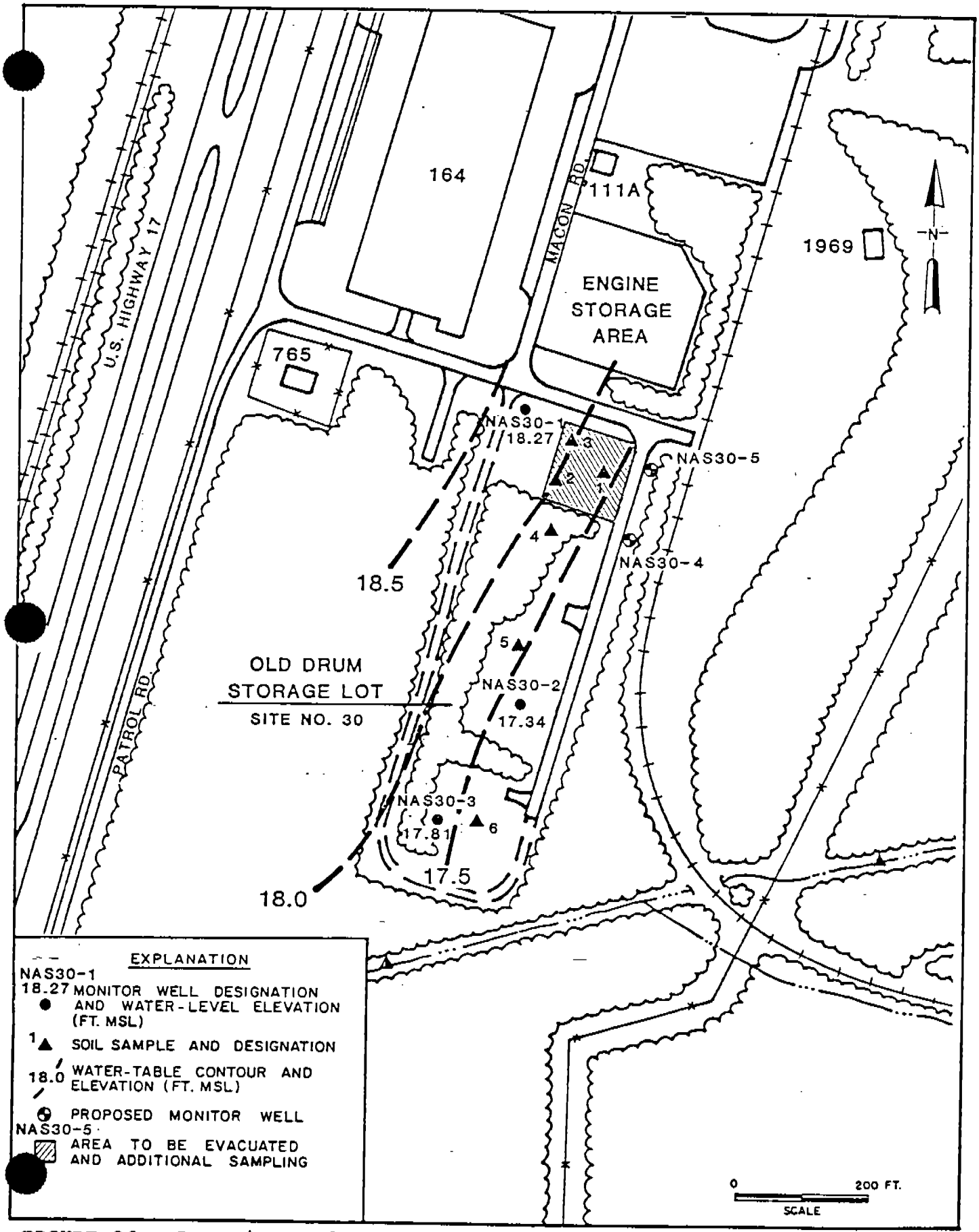

FIGURE 26. Locations of Installed Monitor Wells, Soil Samples, and Water-Table Contours (March 12, 1984) in the Old Drum Storage Lot (Site No. 30)

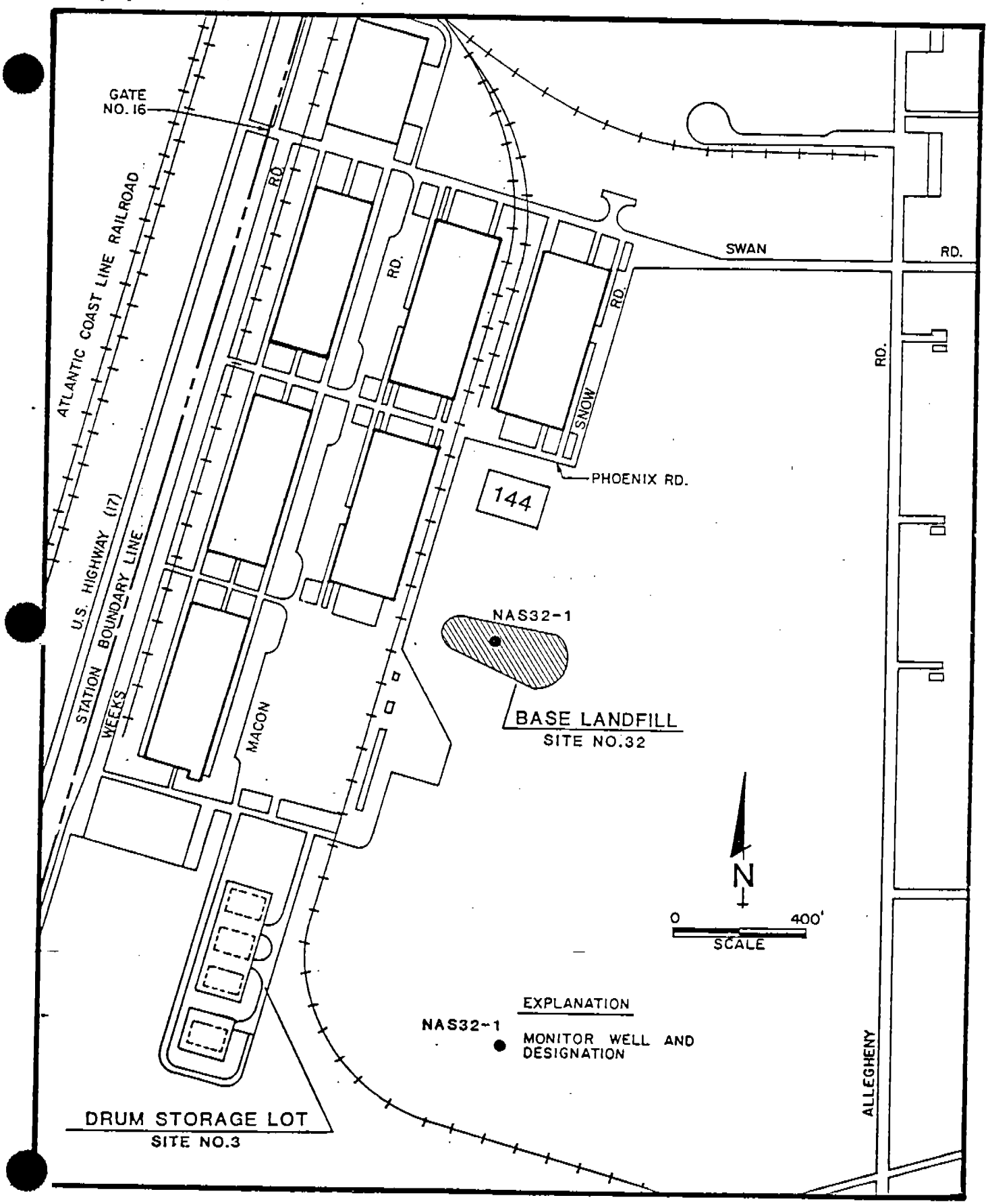

FIGURE 27. Location of the Monitor Well Installed at the Base Landfill (Site No. 32).

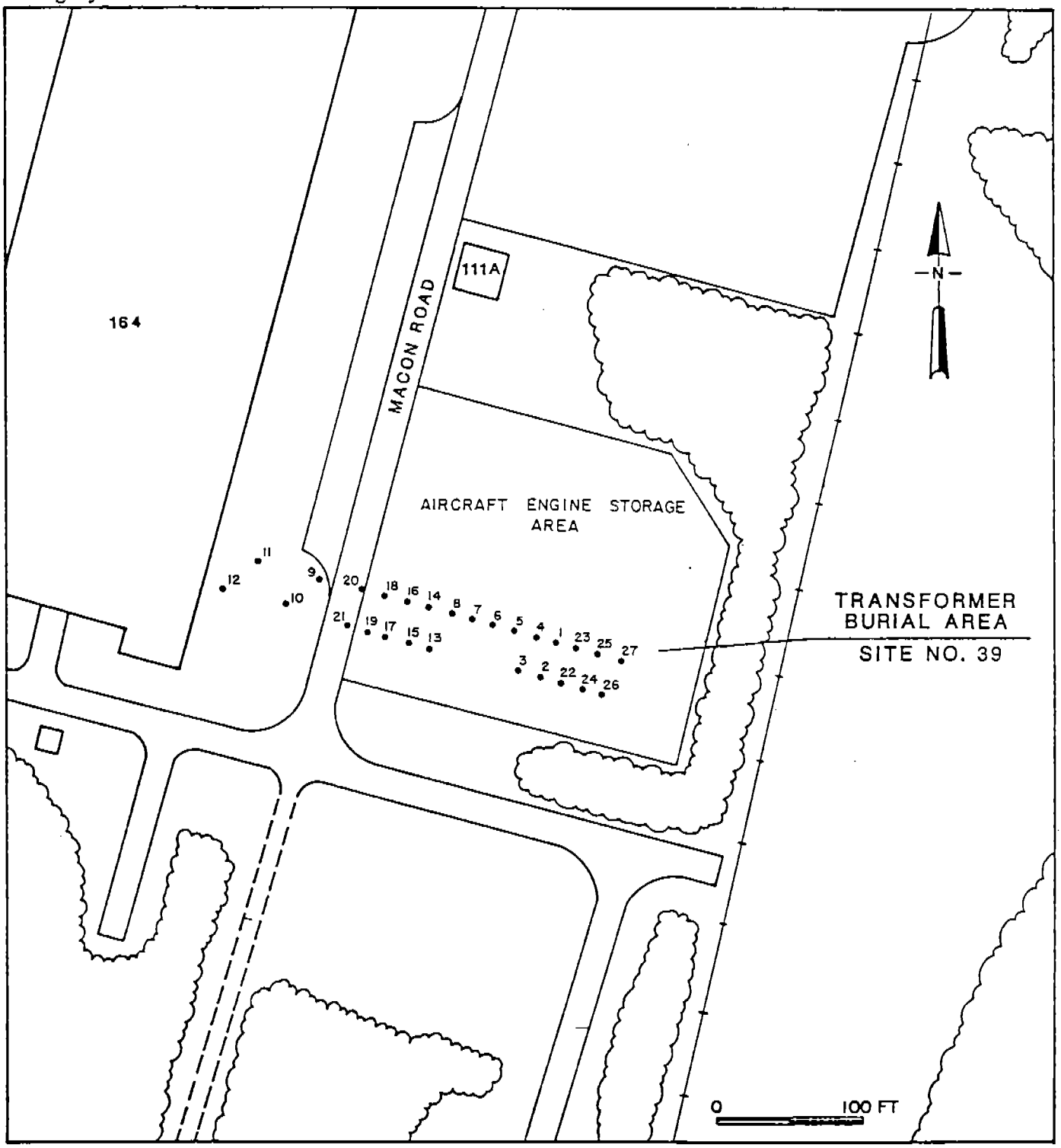

FIGURE 28. Locations of Soil Borings at the Suspected Transformer Burial Area (Site No. 39).

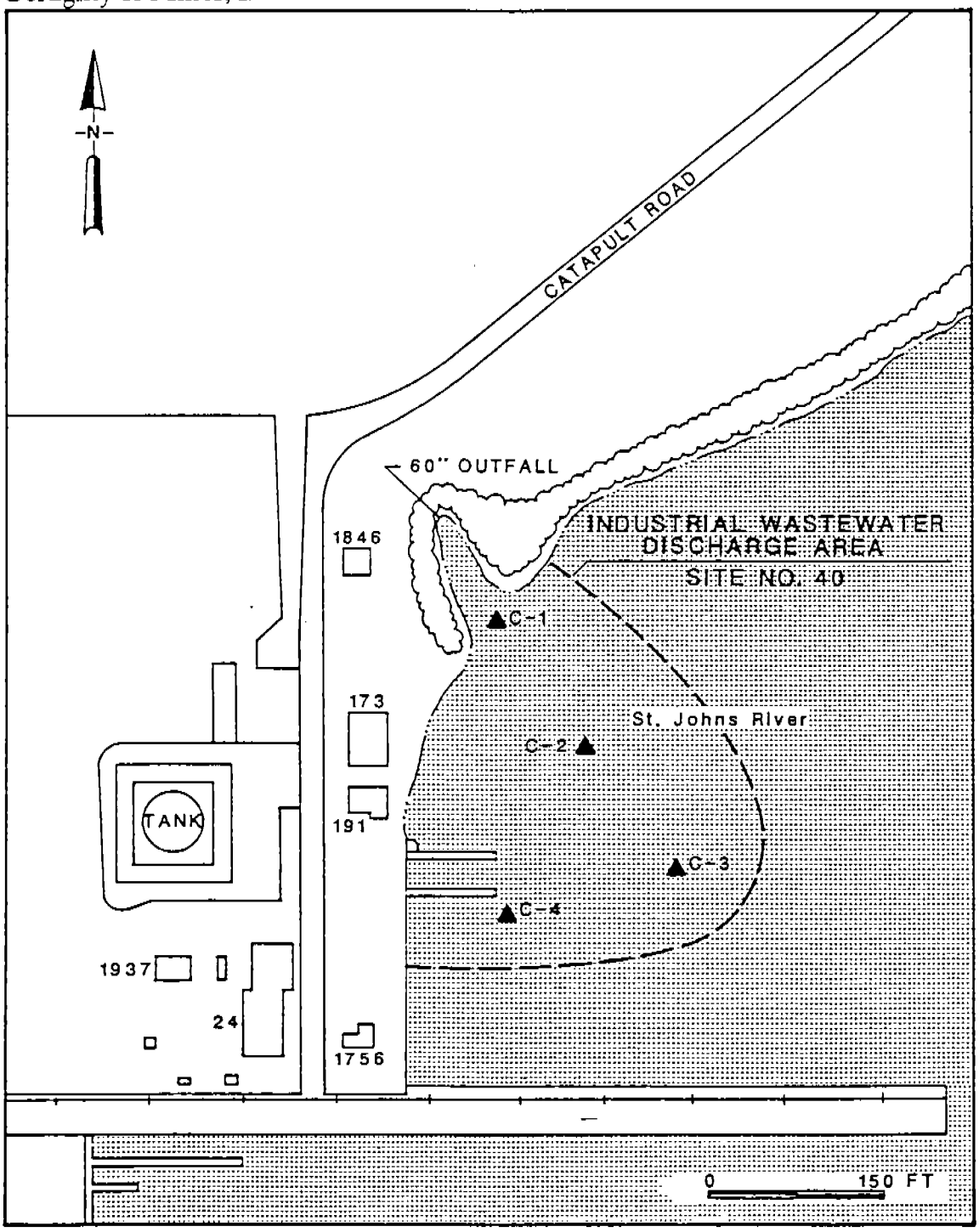

FIGURE 29. Locations of Sediment Samples at the Industrial Wastewater Discharge Area (Site No. 40).

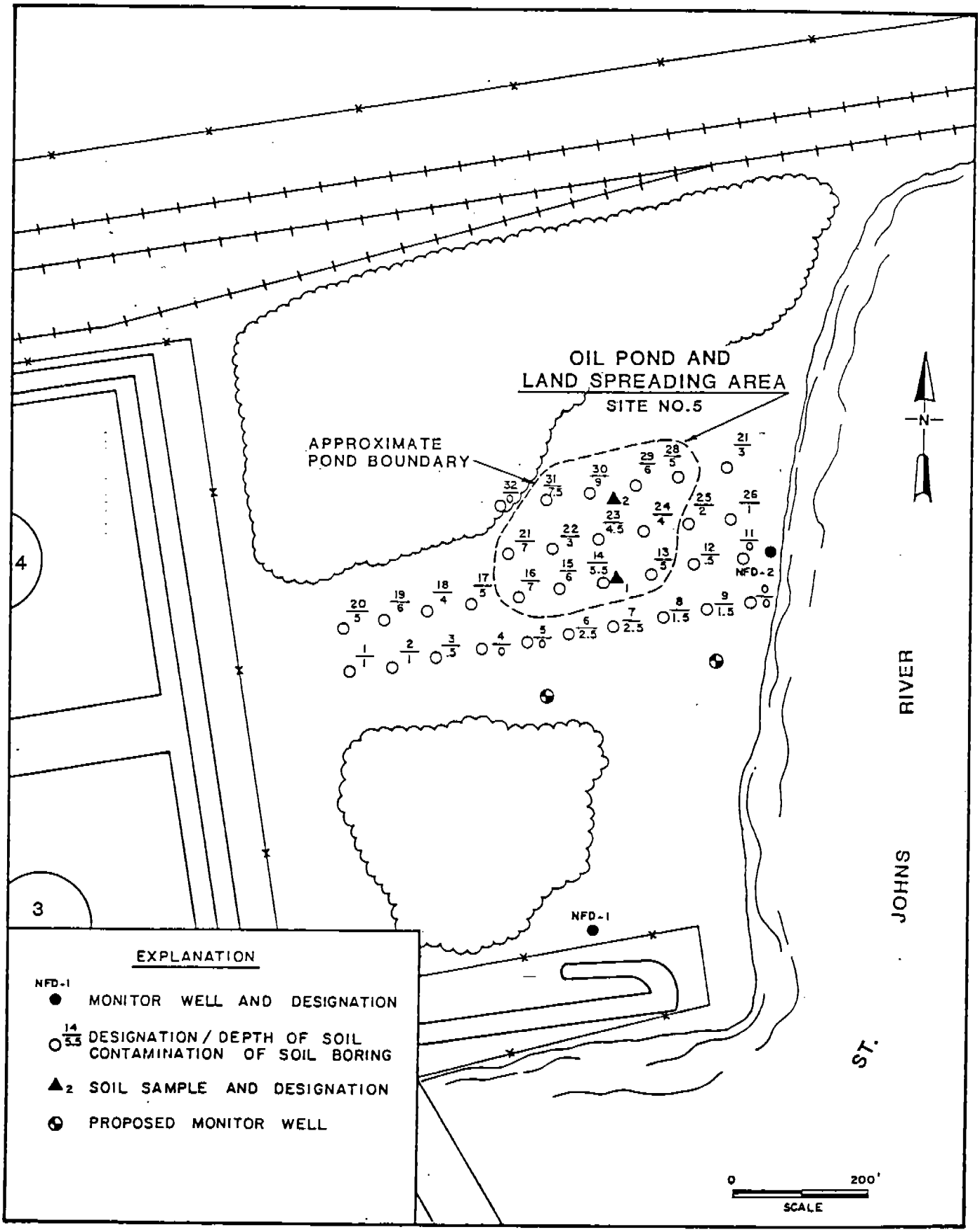

FIGURE 30. Locations of Installed Monitor Wells and Soil Samples at the Oil Pond and Land Spreading Area (Site No. 5-NFD)

SECTION 12

Industrial Wastewater Discharge Area
Site No. 40

Enviropact, Inc.
Environmental Consulting and Analysis

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GERAGHTY & MILLER, INC.
2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS C-1

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
CHROMIUM-E.P.TOXIC	< 0.1	ppm
ARSENIC-E.P.TOXIC	< 0.015	ppm
BARIUM-E.P.TOXIC	< 0.1	ppm
MERCURY-E.P.TOXIC	< 0.015	ppm
CADMIUM-E.P.TOXIC	< 0.1	ppm
SELENIUM-E.P.TOXIC	< 0.1	ppm
SILVER-E.P.TOXIC	< 0.1	ppm
LEAD-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor

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Environmental Consulting and Analysis

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2700 P.G.A. BLVD.
SUITE 104
PLM.BCH.GDNS.,FL 33410

August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS C-2

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
CHROMIUM-E.P.TOXIC	< 0.1	ppm
ARSENIC-E.P.TOXIC	< 0.015	ppm
BARIUM-E.P.TOXIC	< 0.1	ppm
MERCURY-E.P.TOXIC	< 0.015	ppm
CADMIUM-E.P.TOXIC	< 0.1	ppm
SELENIUM-E.P.TOXIC	< 0.1	ppm
SILVER-E.P.TOXIC	< 0.1	ppm
LEAD-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

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August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS C-3

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
CHROMIUM-E.P.TOXIC	< 0.1	ppm
ARSENIC-E.P.TOXIC	< 0.015	ppm
BARIUM-E.P.TOXIC	< 0.1	ppm
MERCURY-E.P.TOXIC	< 0.015	ppm
CADMIUM-E.P.TOXIC	< 0.1	ppm
SELENIUM-E.P.TOXIC	< 0.1	ppm
SILVER-E.P.TOXIC	< 0.1	ppm
LEAD-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn
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August 6,1985
Report 13670

LAB I.D. 86119

Sample Received: 4/05/85
Sample Designation:NAS C-4

Collected By: YOUR REP.

REPORT OF ANALYSIS : METALS		UNITS
CHROMIUM-E.P.TOXIC	< 0.1	ppm
ARSENIC-E.P.TOXIC	< 0.015	ppm
BARIUM-E.P.TOXIC	< 0.1	ppm
MERCURY-E.P.TOXIC	< 0.015	ppm
CADMIUM-E.P.TOXIC	< 0.1	ppm
SELENIUM-E.P.TOXIC	< 0.1	ppm
SILVER-E.P.TOXIC	< 0.1	ppm
LEAD-E.P.TOXIC	< 0.1	ppm

Analyses made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Lawrence J. Korn

Lawrence J. Korn
Laboratory Supervisor