THE JACKSONVILLE NAVAL AIR STATION AS A POTENTIAL LARGE POLLUTER OF THE ST. JOHNS RIVER

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Since 1984 the number of incidents of fish kills and fish disease on the east coast have increased dramatically. Also, hundreds of dead dolphins and turtles have appeared from New York to Florida. In 1984 a disease termed "ulceractive mycosis" occurred to an alarming extent in the St. Johns River at Jacksonville. At this same time the disease became widespread in Chesapeake Bay and in the Albemarle-Pamlico System in North Carolina.

Preliminary studies done at Jacksonville University have shown the diseased fish to be very high in metals, chlorinated hydrocarbons, petroleum, and phosphate. Some recent analyses for hydrocarbons indicate high part per million levels, consisting in some instances of oils similar to used engine oils.

Considering the diversity of the pollutants found in the fish, it was felt that a common source might be responsible, and the source considered most likely was the Jacksonville Naval Air Station. To determine if this was feasible, reports and other documents concerning the Navy's pollution problems were analyzed, and the results are presented in the following pages.

The Naval Air Station (NAS) in Jacksonville is located along the St. Johns River at Orange Park, about nine miles south of the downtown area (1). The station occupies 3800 acres on the west bank of the river (2). There are several major tenants, the

largest being the Naval Air Rework Facility (NARF), a large industrial complex of 45 buildings (1).

The environmental setting at NAS is characterized by geologic and hydrologic conditions favoring the movement of pollutants with groundwater, and migration of pollutants to the St. Johns River. The highly permeable sandy soils allow contaminants to rapidly migrate to the groundwater. The groundwater of the shallow aquifer is at a depth of less than 10 feet below most disposal sites. Most of the drainage for the eastern half of the NAS, including NARF, discharges directly into the St. Johns River. Drainage for the western half is to the Ortega River (2).

Over 150 species of fish have been identified in the St. Johns River system, many of which are early life stages of commercially important marine species. Studies by the Florida Department of Natural Resources show the system to be the most important nursery ground to the shrimp industry along the northeast Florida coast (2).

In 1975 the Department of Defense (DoD) began a program to identify and evaluate past hazardous waste disposal sites on DoD installations, and to control the migration of hazardous contaminants from old hazardous waste sites (3). As part of this program, the Department of the Navy contracted two consultants, Geraghty and Miller, and Hart and Associates, to carry out extensive studies and analyses to identify areas of concern to the NAS (1, 2, 4, 5, 6, 7, 8).

At NAS the operations which generate large quantities of hazardous wastes are generally confined to the NARF (2). The

NARF is responsible for maintenance, repair, and rework operations of various aircraft engines and frames (1).

One of the initial studies (1) pointed out 21 sites of possible contamination. Ten sites were concluded to pose a threat to human health and the environment (1,2). Many of the contaminated sites are within 300 meters of the river or ditches and storm drains that discharge into the river (2). The sites studied are shown in Figure 1 (6). The sites which appear to have a direct effect on the St. Johns River will be discussed separately as individual sites.

SITES # 1, 2, 3 (later renamed Site #26, as shown in Figure 1) - Disposal Pits South of the Golf Course- Serious contamination at NAS became apparent in 1978 when oil was discovered in a ditch which drains into the St. Johns River (4). The source of the oil was three abandoned oil pits shown in Figures 2 and 3.

Site 26 was used for disposal for several decades. The site received spent oil, paint shop residues, solvents, cold carbon remover (containing cresols), and liquid and solid waste residues (primarily metals) on a periodic basis. Borings done in 1980 discovered two oil plumes. One plume consisted of a 1.5-inch thick layer on the water table. The second plume consisted of emulsified oil. It was estimated that 70,000 to 125,000 gallons of oil was in the two plumes. Submerged water in this area contained 1.3 to 14.0 ppm of oil (4). Groundwater contaminated with volatile organic compounds moved 2,000 to 3,000 feet from the southwest position of the disposal area, and will eventually discharge into the river (2).

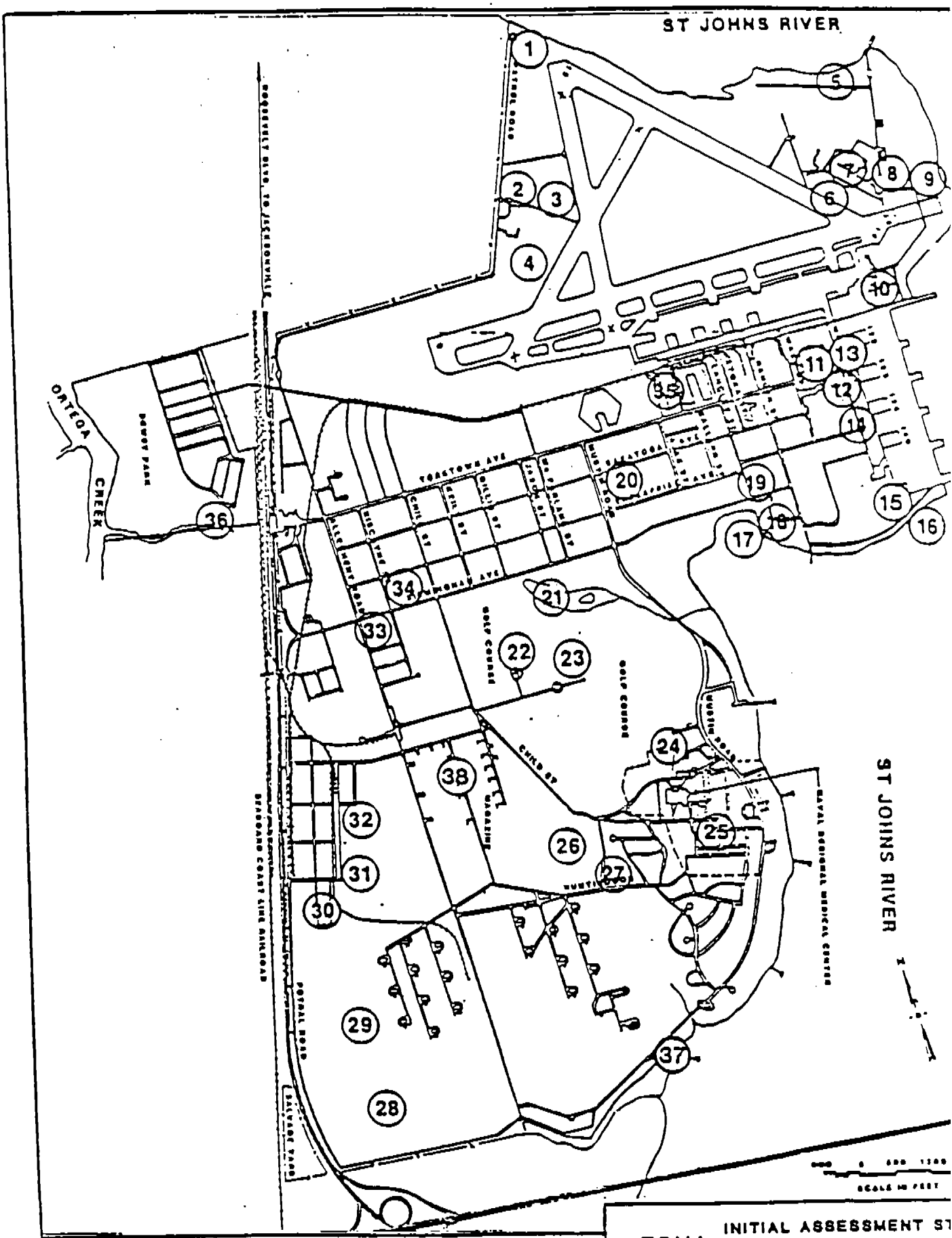

Figure 1. SPILL/DISPOSAL SITES IDENTIFIED BY IAS TEAM AT NAS JACKSONVILLE

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NAVAL AIR STATION
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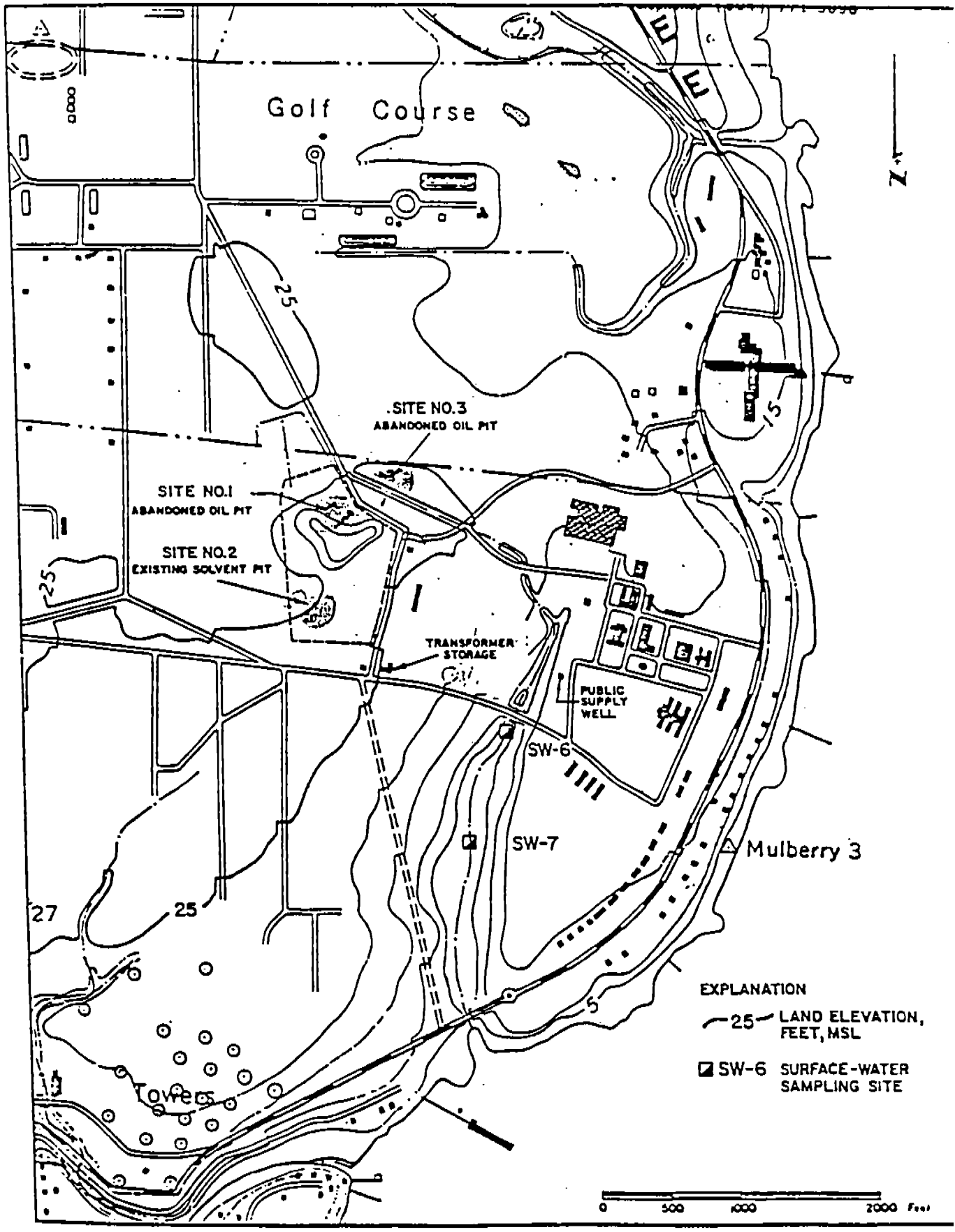

Figure 2. Location of the Surface-Water Sampling Points.

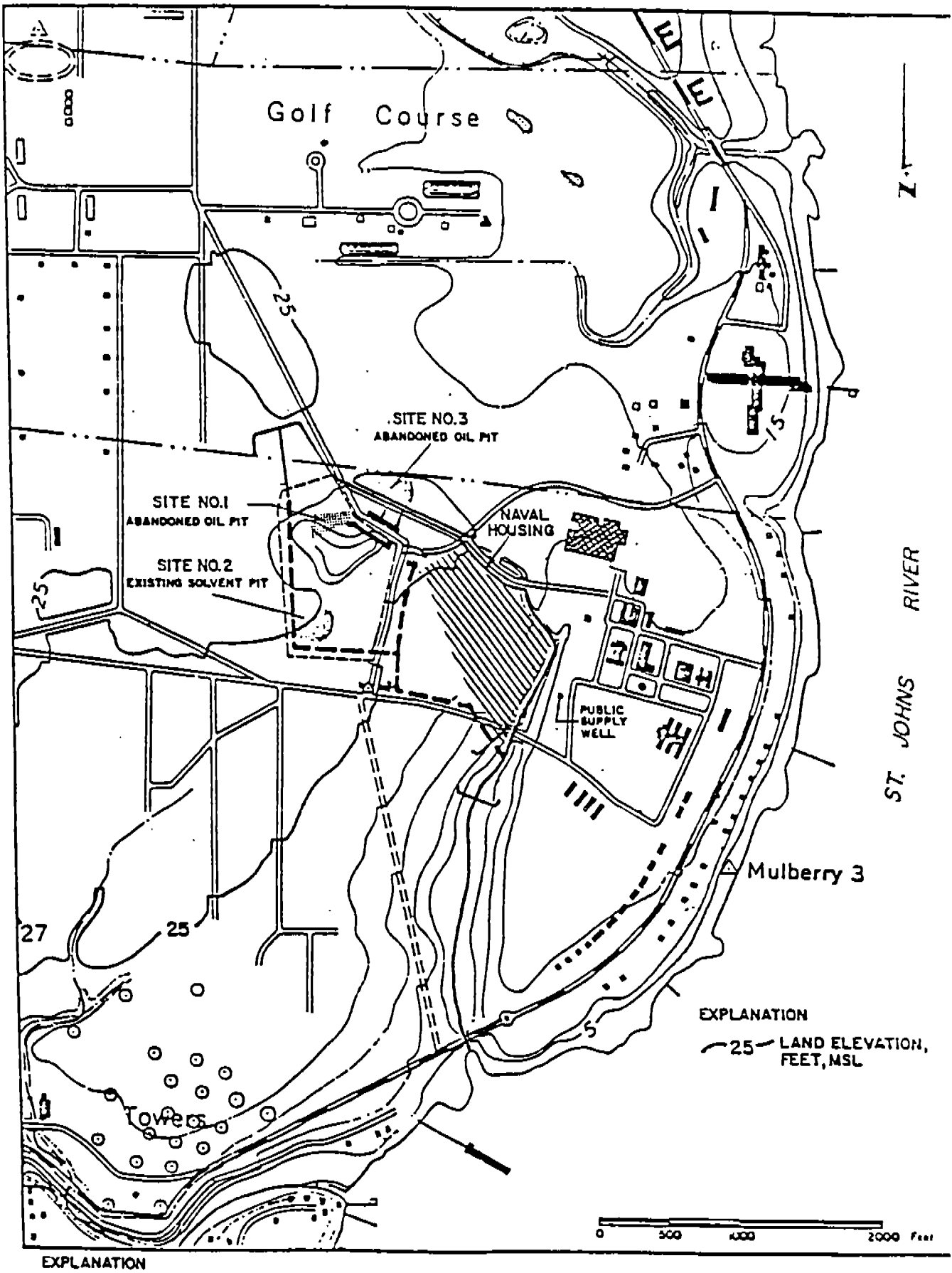
Golf Course
SITE NO.3
ABANDONED OIL PIT
SITE NO.1
ABANDONED OIL PIT
SITE NO.2
EXISTING SOLVENT PIT
NAVAL HOUSING
PUBLIC SUPPLY WELL
Mulberry 3
Towers
ST. JOHNS RIVER
25
27
5
15
EXPLANATION
25 LAND ELEVATION, FEET, MSL
0
500
1000
2000 Feet
EXPLANATION
EXISTING DITCH
PROPOSED "OIL" INTERCEPTOR DITCH
PROPOSED "SOLVENT" INTERCEPTOR DITCH
OVERFLOW WEIR

Figure 3.

Until about 1979-1980, organic compounds used for degreasing and paint-stripping were disposed of at this site. Compounds dumped included methylene chloride, methyl ethyl ketone, ethyl acetate, trichloroethylene, methyl isobutyl ketone, butyl acetate, and xylene (4).

For several decades about 1,100 gallons per week of cold carbon remover, degreasers, and paint shop wastes (containing heavy metal salts) were disposed of here. In 1980 it was predicted that these materials would move eastward and finally seep into the St. Johns River (4).

Analysis of groundwater from this site indicated levels as high as 50 ppb of arsenic, 67 ppm cadmium, 588 ppb chromium, 1,324 ppb lead, and 7.2 ppb mercury (4).

Also in the groundwater were oils containing PCBs. This water also discharges into ditches and the River. Two soil samples in the area showed 673 and 1,592 ppm of PCBs. These concentrations pose a health hazard (4).

The majority of NARF waste, and all of the sludge generated at other activities, was dumped into the slurry pit. Over many years wastes were dumped here from the following sources (2):

Component Finish Shop - This area generated about 225 gal of wastes per week.

Aircraft Finish Shop - This area generated about 115 gal of wastes each week, and this was dumped at Site #26 until 1978.

Cleaning Shop - Prior to 1979, wastes from this area were also dumped at Site #26. Materials included silicate stripper, sodium hydroxide, chromic acid, potassium permanganate, sodium dichromate, trichloroethane, methylene chloride, phosphoric acid,

cold carbon remover, etc.

Paint Shop - Until 1978 wastes went to Site #26. These included acetone, xylene, cellosolve, methyl ethyl ketone, toluene, trichloroethane, enamels, lacquers, zinc chromate primer, and thinners.

Site #4 - Pine tree planting Area - Used from 1968 to 1975, this area received wastes consisting of paint shavings, sewage sludge containing heavy metals, asbestos, oil and other petroleum products. Analysis of groundwater here in 1985 indicated ppb levels of chloroethylenes. This site is close to the River (1,2,5).

Site #5 - Shoreline Fill, West of Pier 142 - This area is shown in Figure 4. Garbage, construction debris, and a number of 55-gallon drums were disposed of here during 1977-1978 (1). Soil tests in 1983 showed high chromium levels, possibly due to chromium sludge (5). Water tests indicated ppb levels of methylene chloride and other chlorinated hydrocarbons. This site is on the shoreline of the St. Johns and the general direction of groundwater flow is toward the River, which serves as a discharge point (1).

Site #9 - Old Disposal Area - This area is shown in Figure 5. Garbage, construction debris, and a number of 55-gallon drums were disposed of here during 1977-1978 (1). Soil tests in 1983 showed high chromium levels, possibly due to chrimium sludge (5). Water tests indicated ppb levels of methylene chloride and other chlorinated hydrocarbons. This site is on the shoreline of the St. Johns and the general direction of groundwater flow is toward

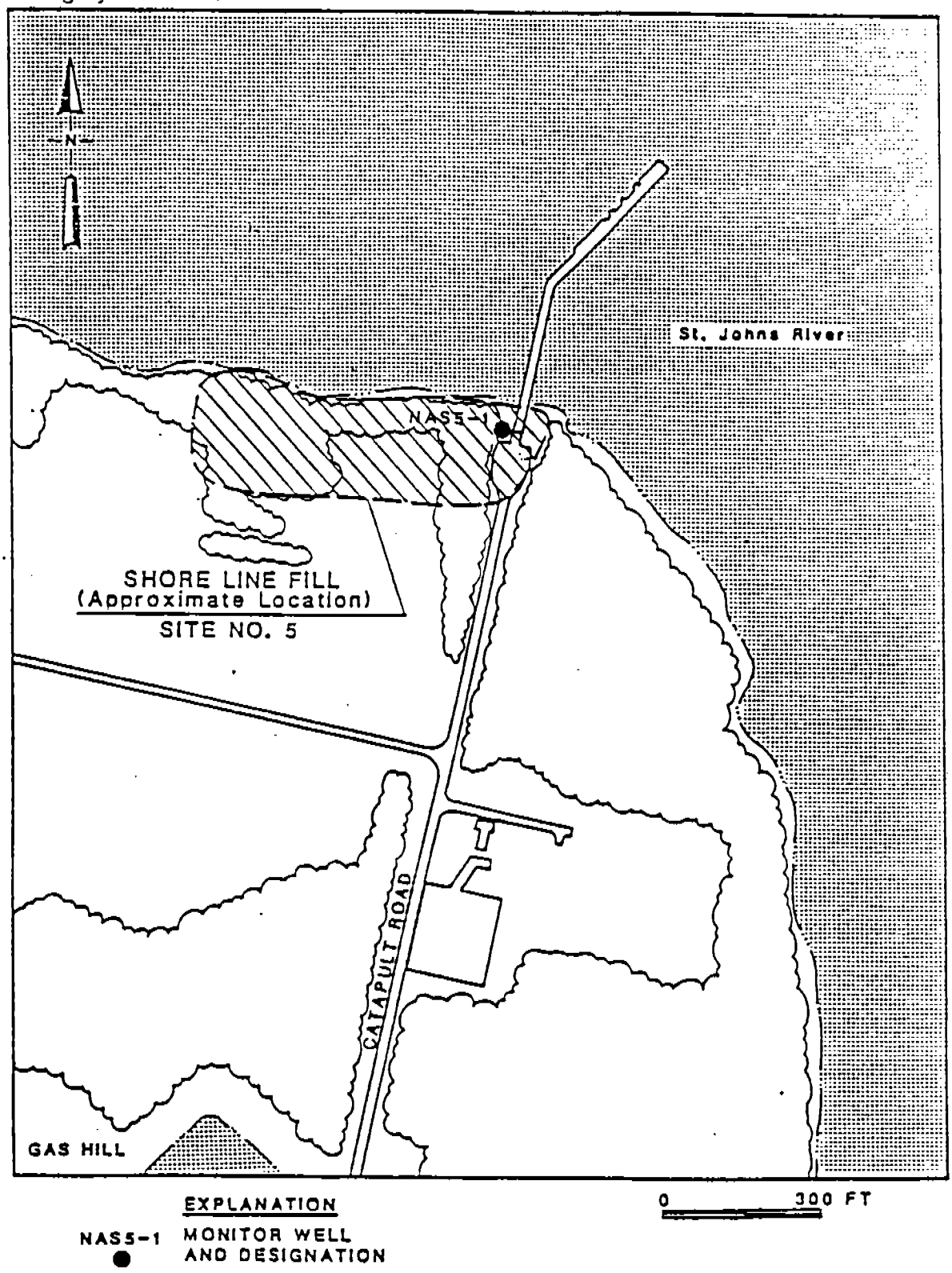

Figure 4. Location of Installed Monitor Well at the Shoreline Fill, West of Pier 142 (Site No. 5).

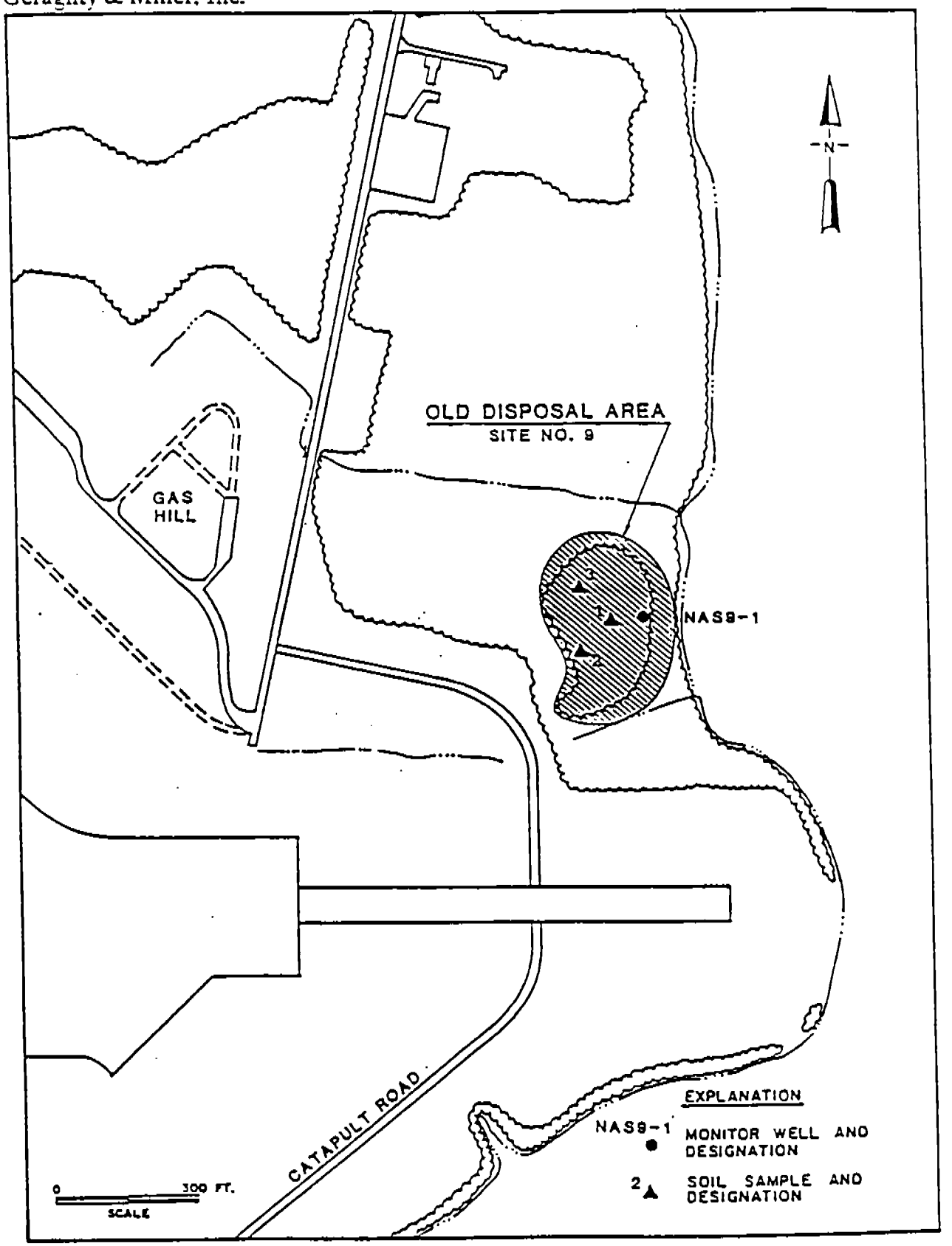

Figure 5. Location of Installed Monitor Well and Soil Samples Collected at the Old Disposal Area (Site No. 9).

the river, which serves as a discharge point (1).

Site #15 - Solvent and Paint Sludge Disposal Area - Located on the St. Johns, this site is shown, together with several others, in Figure 6. This area is characterized by large amounts of hazardous materials and conditions conducive to migration offsite (2). This area was used for the disposal of solvents and paint sludges as recently as 1978. It is estimated that up to 200 gal of these wastes annually were disposed of here for about 36 years (1).

Site #17 - Glass Bead Disposal Area - This area is located 10 to 15 feet form the shoreline, in the St. Johns River, and is shown in Figure 7. This area was used for the disposal of spent glass beads used in the abrasive blasting operations of NARF. Disposal started in 1965 and ended in 1981. A visible "glass bead bar" can be seen in the water. About 150 tons per year were disposed of here. The beads contain cadmium, chromium, nickel, and lead and are considered to be hazardous waste (5).

Site #18 - Radioactive Waste Fill Area - The radioactive radium paint wastes, initially deposited at Site #13 (located north of Building 167) were excavated along with contaminated soil in the late 1950's, and were transported and dumped here. This site, which is at the shoreline, near Marina #1 (1), is shown in Figure 8.

Site #40 - Industrial Wastewater Discharge Area - Prior to 1972, effluent from a wastewater treatment plant was discharged into the River at this site. This area is shown in Figure 9.

The remaining sites to be examined receive input from several sources and shall be considered individually.

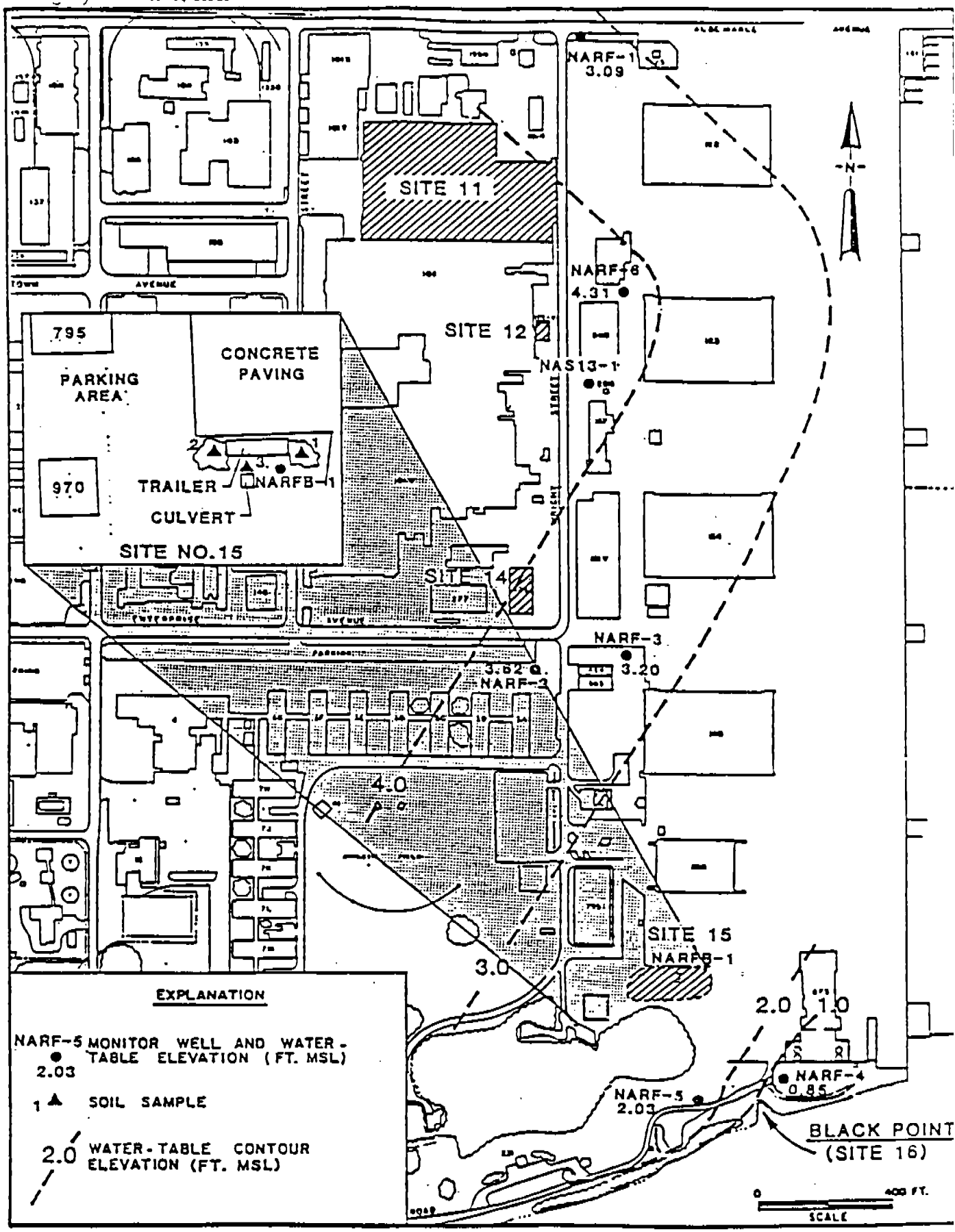

Figure 6. Locations of Installed Monitor Wells, Soil Samples and Wat Table Contours (March 12, 1984) in the NARF Area (Site Nos 11, 12, 14, 15, and 16.

SITE NOS. 17 AND 19

GLASS BEAD DISPOSAL AREA
AND OLD GAS STATION SITE

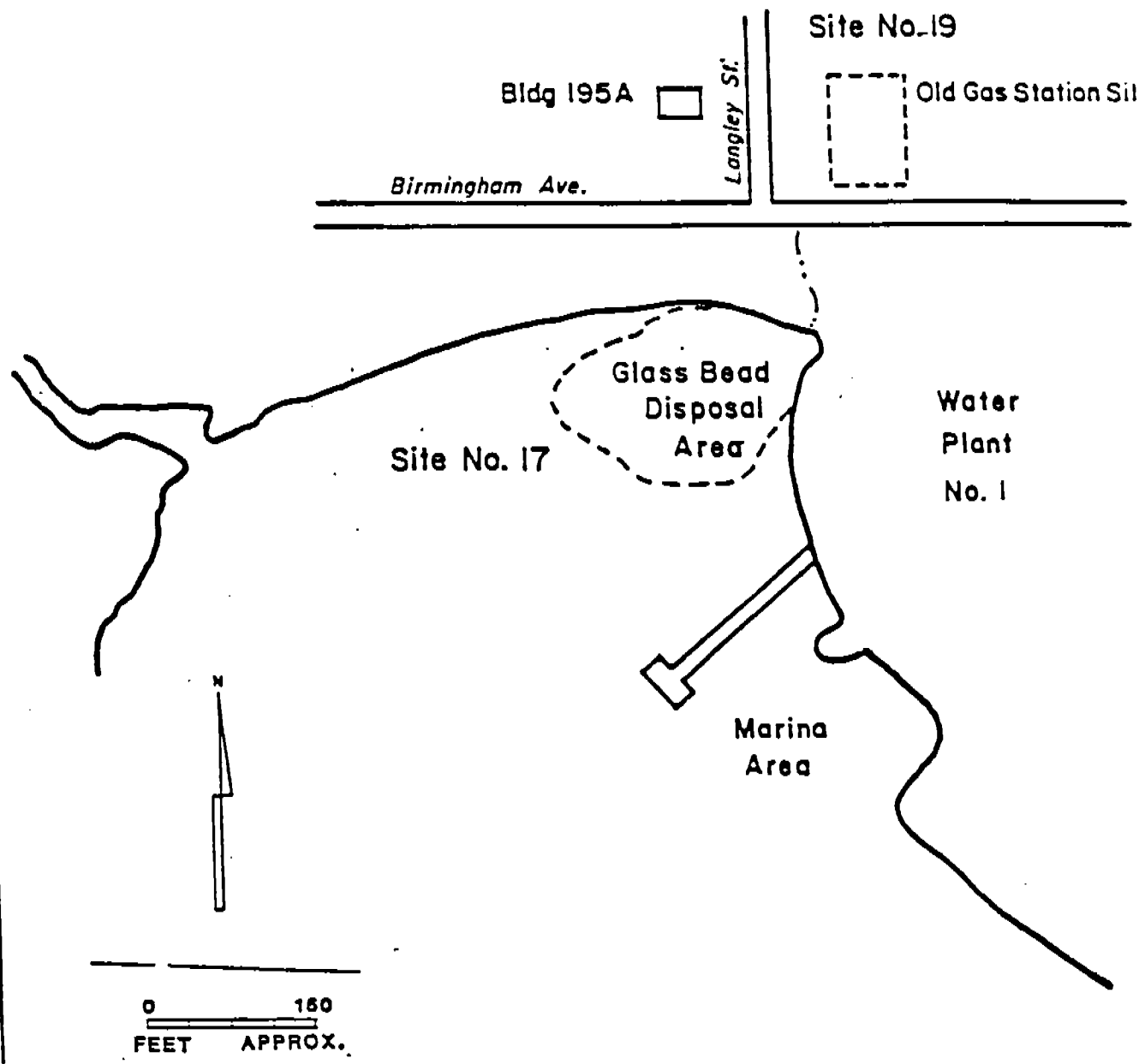

Figure 7. SITE 17 GLASS BEAD DISPOSAL AREA

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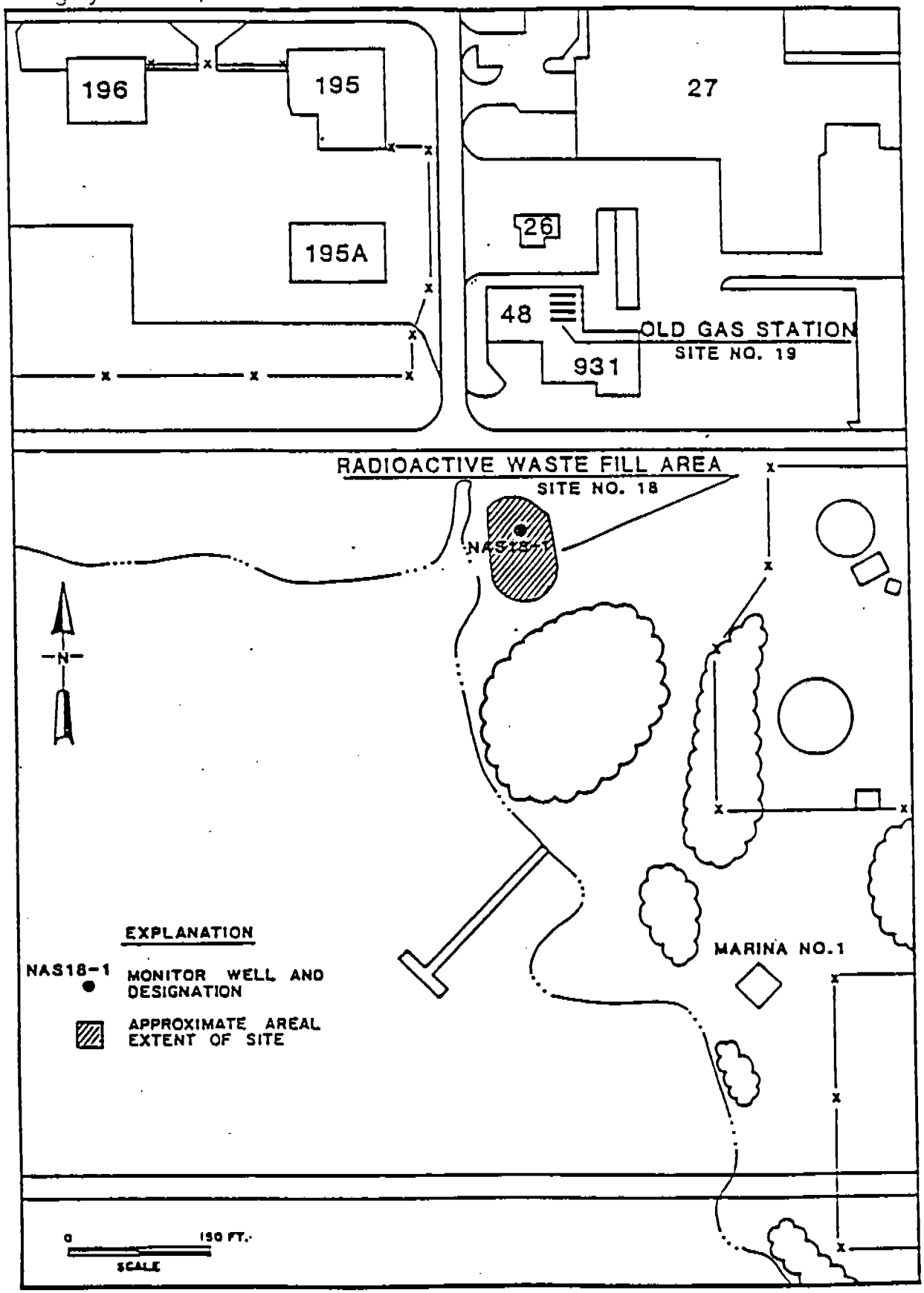

Figure 8. Location of the Monitor Well Installed at the Radioactive Waste Fill Area (Site No. 18) and Buried Storage Tanks at the Old Gas Station (Site No. 19)

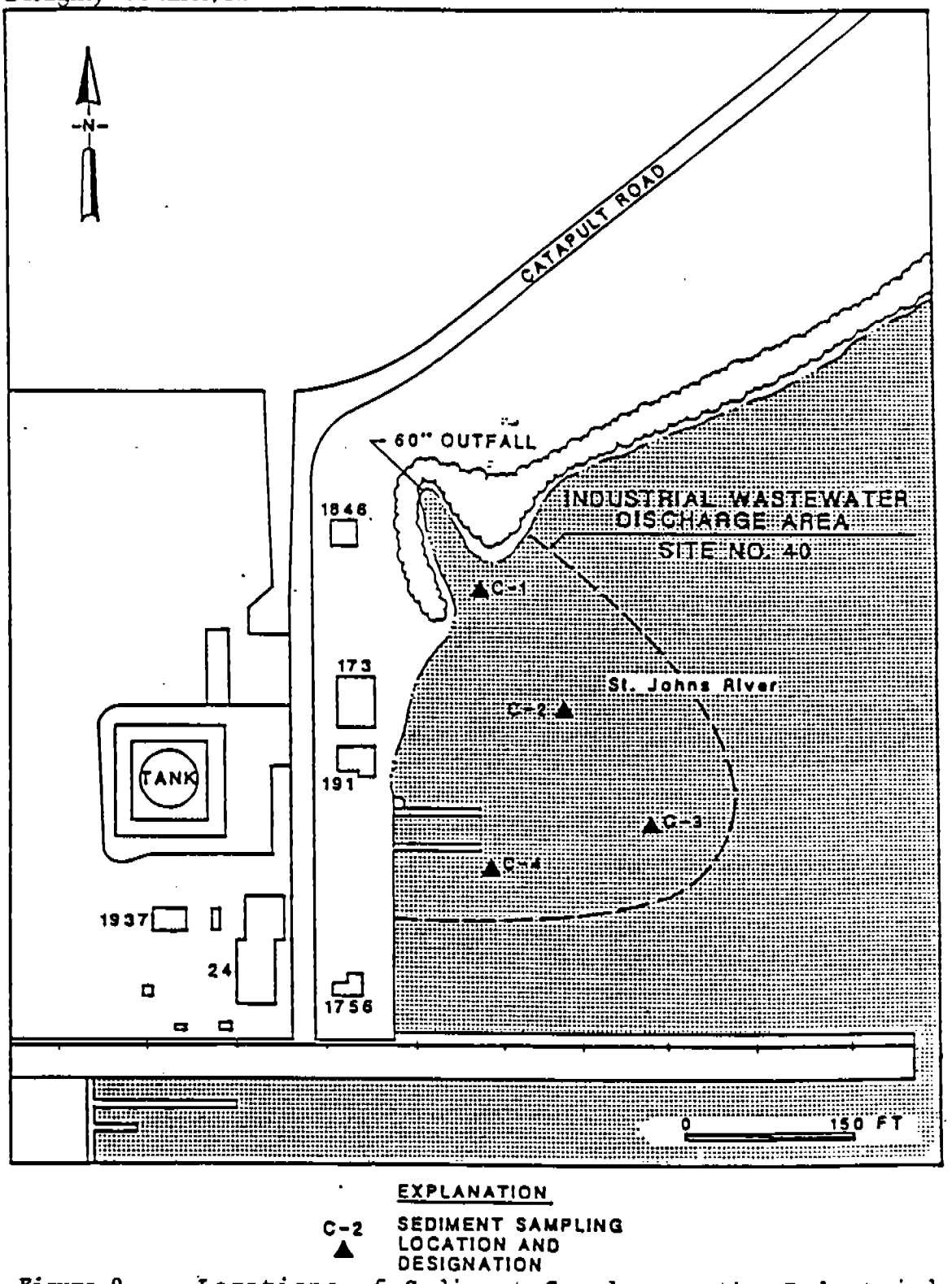

Figure 9. Locations of Sediment Samples at the Industrial Wastewater Discharge Area (Site No. 40).

(A) Storm Sewer Discharge, Black Point, Site #16

This storm sewer runs along Buildings 101, 50, and 795 and is shown in Figure 6. Over the years many chemical wastes were disposed of by discharge into this storm sewer system (2).

There has been a recurring discharge of JP-5 and oil, probably coming from a variety of NARF sources. An oil boom was installed in the River in 1983 to contain the oil (5).

Over many years various chemical wastes from NARF were disposed of by discharge into the storm sewer system. This eventually eroded the sewer and chemicals leached into the ground (5). Migration of such wastes to the St. Johns River poses a threat to fish, waterfowl, and manatees (2).

Specific areas which discharged into the storm sewer system follow:

Component Stripping and Cleaning Shop - Stripper and solvent wastes were discharged to the storm sewer for about 32 years, ending in 1972 (2).

Old Test Cell Building (Building 101k, Site #12) - At this site interconnection of the storm, sanitary, and industrial sewer systems occurred. Numerous spills (one 55-gal. drum per week) of chemicals (waste oil, fuel, and solvents) were reported. The concern at this site is the potential contamination of the St. Johns River due to migration of these hazardous materials into the storm sewer. Specifically, wastes containing heavy metals may possibly contaminate the River (2).

(B) Wastewater Treatment Plants

Until 1961, there were no industrial wastewater treatment

facilities at NAS. The majority of NARF waste, and all of the sludge generated at other activities, was dumped into the slurry pit at Site #26 (2).

In 1988 the NAS produced about 1.5 million gallons per day of domestic wastewater, and 0.85 million gallons per day of industrial wastewater (3). The basis of the wastewater treatment facility is an activated sludge system. Operations within the industrial pretreatment portion of the plant include pH adjustment, cyanide removal, and settling. Sludges removed from operations are dried, containerized, and disposed of in an approved landfill. Wastewater discharges enter the St. Johns River (3).

On December 9-11, 1986, the EPA noted that there is a direct discharge of industrial wastewater to the domestic wastewater treatment plant when the industrial wastewater treatment plant's capacity is exceeded. The wastewater contains hazardous wastes (9).

In April 1987, the Bio-Environmental Services Division issued a notice to the NAS advising them that the domestic wastewater treatment plant was exceeding the allowable limits for discharge into the River. This included oil, nickel, greases, and chromium. Apparently, the wastewater treatment plant is not working, and has not been working for a number of years (10).

An inspection of the industrial drying beds on 30 September 1987 revealed industrial sludge to be "laying all over the ground, drum covers ... off ... and drums ... overflowing with hazardous waste" (11).

Specific areas which discharge into the industrial sewer systems are as follows:

Cleaning and Plating Facility (Building 794) - This site has been operational since 1985. Rinse water from cyanide, chrome, and acid sumps is directed to the industrial treatment plant. The effluent is pH adjusted and is then pumped to the domestic sewage treatment plant, after which the effluent is discharged into the River (12).

Component Stripping and Cleaning Shop - Paint strippers, including methylene chloride, cresylic acid, trichloroethane, butyl acetate and naphtha are used. Spent materials are discharged into floor drains, eventually entering the industrial wastewater system (2).

Aircraft Stripping Shop - This operation generates 17 drums per week of methylene chloride as well as cresylic acid, cellulose acetate, and butyrate thinner. Also, chromium, phenol, and cyanide are generated. All wastes enter the floor drains and are treated at the industrial wastewater plant. In a six-month period, the shop discharges about 1.5 tons of chromium, 26 tons of phenol, and 171 pounds of cyanide (2).

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8. Department of Defense, Installation Restoration Program, April 4, 1983.

9. Letter from Department of the Navy, NAS Jacksonville (from Al Valeri) to Ernie Frey, FDER.

10. Minutes of the Meeting of the Bio-Environmental Protection Board (Jacksonville), January 11, 1988.

11. Memorandum from Director, Utilities Division to Sewage Plant Operators (R. P. LeVasseur).

12. Notice of Violation from FDER to NAS, February 13, 1986.

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