

**FINAL
WORK PLAN**

**PHASE I REMEDIAL INVESTIGATION
INSTALLATION RESTORATION PROGRAM
ACTIVITIES**

**NAVAL STATION ROOSEVELT ROADS
PUERTO RICO**

CONTRACT TASK ORDER 0007

Prepared For:

**DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND
*Norfolk, Virginia***

Under the:

**LANTDIV CLEAN Program
Contract N62470-89-D-4814**

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DECEMBER 15, 1992

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1-1
1.1 General Statement of the Objectives	1-1
1.2 Sites	1-1
1.3 Project Organization	1-4
2.0 SITE BACKGROUND AND PHYSICAL SETTING	2-1
2.1 History and Process of the Installation Restoration Program	2-1
2.2 Previous Investigations	2-2
2.3 Physical Setting	2-3
2.3.1 Climatology	2-3
2.3.2 Topography	2-5
2.3.3 Geology	2-5
2.3.4 Soils	2-6
2.3.5 Hydrology	2-7
2.3.6 Migration Potential	2-9
3.0 INITIAL EVALUATION	3-1
3.1 Site 1 - Quebrada Disposal Site, Vieques Island	3-1
3.2 Site 2 - Mangrove Disposal Site, Vieques Island	3-1
3.3 Site 5 - Army Cremator Disposal Site	3-1
3.4 Site 6 - Langley Drive Disposal Site	3-2
3.5 Site 7 - Station Landfill	3-2
3.6 Site 10 - Building 25 Storage Area	3-2
3.7 Site 13 - Tanks 212-217	3-3
3.8 Site 14 - Ensenada Honda Shoreline and Mangroves	3-4
3.9 Site 16 - Old Power Plant, Building 38	3-4
3.10 Site 18 - Building 128, Pest Control Shop, and Surrounding area	3-4
3.11 Site 21 - Building 121, Old Pesticide Storage Building	3-5
4.0 WORK PLAN RATIONALE	4-1
5.0 TECHNICAL APPROACH	5-1
5.1 Task 2 - Project Plans	5-1
5.1.1 Documents	5-1
5.1.2 Preliminary Site Visit	5-4
5.2 Task 4 - Field Investigations	5-5
5.2.1 Categories of the Field Investigation	5-6
5.2.2 Investigation Activities	5-7
5.2.3 Discussion	5-31
5.3 Task 7 - Site Characterization Report	5-48
5.3.1 Report of Activities	5-48
5.3.2 Findings	5-49
5.3.3 Technical Approach to the RFI	5-50
5.4 Task 8 - Meeting	5-50

TABLE OF CONTENTS
(Continued)

	<u>Page</u>
6.0 ADMINISTRATION	6-1
6.1 Task 1 - Project Management	6-1
6.2 Task 3 - Subcontract Procurement	6-1
6.3 Task 5 - Sample Analysis and Tracking	6-2
6.4 Task 6 - Data Evaluation	6-3
7.0 COMMUNITY RELATIONS	7-1
7.1 Task 9 - Community Relations Plan	7-1
7.2 Task 10 - Site Information and Photograph Album	7-2
8.0 SCHEDULE	8-1
 APPENDIX	
A Preliminary Report of Photo-Interpretation Study	

LIST OF FIGURES

<u>Number</u>		<u>Page</u>
1-1	Site Location Map Main Base	1-2
1-2	Site Location Map - Western Portion of Vieques Island	1-3
5-1	Sample Location Map - Site 1, Quebrada Disposal Site	5-11
5-2	Sample Location Map - Site 2, Mangrove Disposal Site	5-13
5-3	Sample Location Map - Site 5, Army Cremator Disposal Site	5-15
5-4	Sample Location Map - Site 6, Langley Drive Disposal Site	5-17
5-5	Sample Location Map - Site 7, Station Landfill	5-19
5-6	Sample Location Map - Site 10, Building 25 Storage Area	5-21
5-7	Sample Location Map - Site 14, Ensenada Honda Shoreline and Mangroves	5-23
5-8	Sample Location Map - Site 16, Old Power Plant, Building 38	5-25
5-9	Sample Location Map - Site 18, Pest Control Shop and Surrounding Areas	5-27
5-10-1	Site Location Map - Site 21	5-29
5-10-2	Sample Location Map - Site 21, Old Pesticide Storage Building 121 ..	5-30
8-1	Project Schedule	8-2

1.0 INTRODUCTION

This Work Plan presents the technical approach to conduct a Phase I Remedial Investigation (Phase I RI) at the U.S. Naval Station, Roosevelt Roads (NAVSTA Roosevelt Roads), Puerto Rico. The Work Plan addresses ten sites at NSRR (Figures 1-1 and 1-2). The approach described herein is in accordance with conditions presented in the Contract Number N62470-89-D-4814, Contract Task Order 0007, dated November 7, 1991 and amended variously by LANTDIV.

Associated project plans include:

- Sampling and Analysis Plan (SAP)
 - ▶ Part I - Field Sampling Plan (FSP)
 - ▶ Part II- Quality Assurance Project Plans (QAPP)
- Health and Safety Plan (HASP)
- Community Relations Plan (CRP) (included in this Work Plan as Section 7.0)

1.1 General Statement of the Objectives

The objectives of the Phase I RI are:

1. Verify the data collected during the Confirmation Study (CS) by developing a defensible database;
2. Collect limited data for preparation of a RCRA Facilities Investigation (RFI) at certain sites; and,
3. Provide usable and defensible data for the RFI.

1.2 Sites

The sites at NSRR addressed in this Work Plan are:

- Site 1 - Quebrada Disposal Site, Vieques Island
- Site 2 - Mangrove Disposal Site, Vieques Island
- Site 5 - Army Cremator Disposal Site

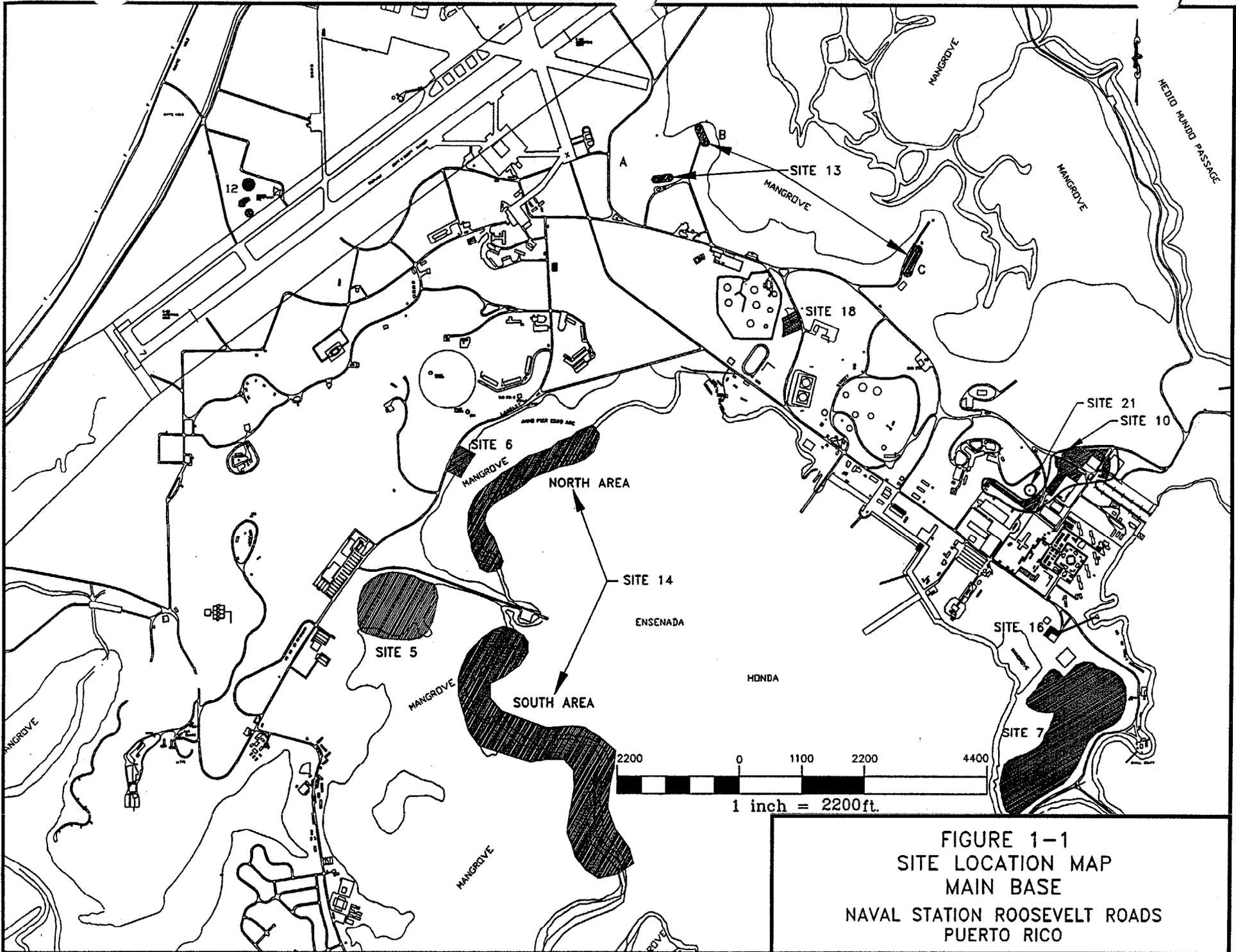


FIGURE 1-1
SITE LOCATION MAP
MAIN BASE
NAVAL STATION ROOSEVELT ROADS
PUERTO RICO

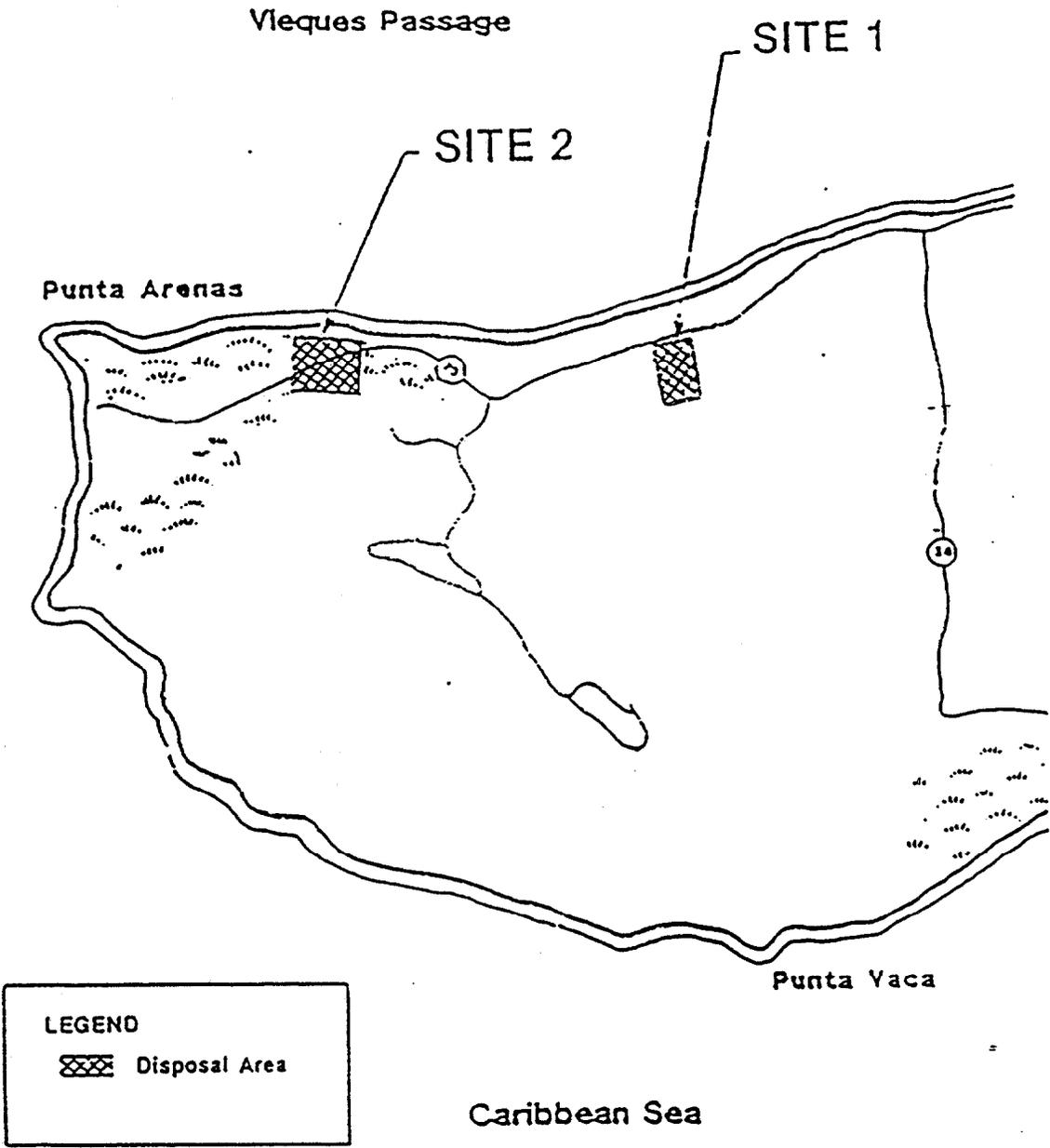


FIGURE 1-2
 SITE LOCATION MAP
 WESTERN PORTION OF VIEQUES ISLAND

NAVAL STATION ROOSEVELT ROADS
 PUERTO RICO

SOURCE: NEESA, 1984b; ESE, 1985.

- Site 6 - Langley Drive Disposal Site
- Site 7 - Station Landfill
- Site 10 - Building 25 Storage Area
- Site 13 - Tanks 212-217
- Site 14 - Ensenada Honda Shoreline and Mangroves
- Site 16 - Old Power Plant, Building 38
- Site 18 - Building 128, Pest Control Shop and Surrounding Area
- Site 21 - Building 121, Old Pesticide Storage

Sites 1 and 2 are on Vieques Island; all other sites are located on the main base.

1.3 Project Organization

The project organization consists of several tasks, both technical and administrative:

- | | |
|---------|---------------------------------------|
| Task 1 | Project Management |
| Task 2 | Project Plans |
| Task 3 | Subcontract Procurement |
| Task 4 | Field Investigation |
| Task 5 | Sample Analysis and Tracking |
| Task 6 | Data Evaluation |
| Task 7 | Reporting |
| Task 8 | Meeting |
| Task 9 | Community Relations Plan |
| Task 10 | Site Information and Photograph Album |

The tasks (2, 4, 7 and 8) dealing with the performance of the technical analysis of the Phase I RI are described in Section 5. The tasks (1, 3, 5 and 6) dealing with the administration of the project are described in Section 6. The tasks (9 and 10) dealing with administration and performance of the Community Relations Program for the project are described in Section 7.

2.0 SITE BACKGROUND AND PHYSICAL SETTING

2.1 History and Process of the Installation Restoration Program

In the past a variety of wastes have been generated and disposed at U.S. Navy installations. These wastes have ranged from domestic/municipal to industrial to military/explosive in character. While most of these materials are inert or innocuous, some are hazardous or toxic.

In 1975, the Department of Defense (DoD) began a program to assess past hazardous and toxic materials storage and disposal activities. The goal of this program, the DoD's Installation Restoration Program (IRP), is to address uncontrolled hazardous waste sites by mitigating hazards to health and welfare.

The realization that hazardous waste disposal practices may have adverse affects on human health and the environment was expressed by Congress in 1976, with the passage of the Resource Conservation and Recovery Act (RCRA). RCRA was legislated to manage the present and future disposal of hazardous wastes. In 1980, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) was passed to investigate and remedy problems resulting from past, formerly acceptable, hazardous waste management practices. "Superfund" is the term often used when CERCLA activities are conducted by the Environmental Protection Agency (EPA) or state agencies.

In 1981, the DoD's IRP was reissued, with additional responsibilities and authorities specified in CERCLA delegated to the Secretary of Defense. As a result the Navy initiated the Navy Assessment and Control of Installation Pollutants (NACIP) program to comply with the new DoD IRP requirements. The NACIP program utilized a three-phased approach, with an Initial Assessment Study (IAS), Confirmation and Characterization Studies, and Remedial Measures. In order to address the 1986 Superfund Amendments and Reauthorization Act (SARA), the Navy restructured the IRP to match the terminology and structure of the EPA program. The current IRP is entirely consistent with applicable state and federal environmental laws.

The IRP is currently initiated with a Preliminary Assessment/Site Investigation (PA/SI) to identify potential threats to human health or the environment. The next phase, Remedial Investigation (RI), is designed to analyze contaminants and evaluate possible contaminant

migration. Resulting data will provide an indication of the extent and rate of contamination migration as well as provide additional geologic and geohydrologic information.

If the RI data reveals a need for site remediation or cleanup, a Feasibility Study (FS) is initiated to evaluate alternatives that can achieve environmental standards considering technology, and time and budget factors. A variety of cleanup methods are considered. When an appropriate method is chosen, a Draft Record of Decision (ROD) is issued, explaining the rationale for the chosen remedial alternative. The public then has an opportunity to comment on the Draft ROD. The comments received are reviewed and new issues may be considered. After this public comment period, a final ROD is issued. Upon completion of the RI/FS phase and approval of the final ROD, the third phase, Remedial Design/Remedial Action (RD/RA), is initiated. The RD/RA phase consists of a detailed description of the cleanup alternative, preparation of construction specifications and implementation of the action.

2.2 Previous Investigations

As part of a Navy-wide program to manage past disposal sites, the Naval Assessment and Control of Installation Pollutants (NACIP), initiated in September 1980, NSRR was designated for an Initial Assessment Study (IAS) of its environment in March 1982 by the Naval Energy and Environmental Support Activity (NEESA), Port Hueneme, California.

The IAS was conducted in 1983 and 1984 by Greenleaf/Telesca Planners, Engineers, Architects (Miami, Florida) and Ecology and Environment (Buffalo, New York). The IAS consisted of a records search at various government agencies, national and regional archives, and USGS; an on-site survey; and personnel interviews. The study identified sixteen sites that warranted further study under the NACIP Program.

In May 1986, a Confirmation Study was performed by Environmental Science and Engineering (ESE) of Gainesville, Florida. Fifteen of the sixteen potentially contaminated sites identified in this IAS were investigated as part of this study; the last site had been cleaned up prior to this study. Two rounds of samples were collected from these sites by ESE. The Confirmation Study Report was completed by April 1988 and indicated that 14 sites required additional effort under the NACIP program.

In October 1990, a Scope of Work (SOW) for Installation Restoration (IR) Program Efforts at NSRR was released. This SOW was designed to direct investigative and remedial efforts at Sites 3, 8, 9, 15 and 16.

In June 1991, a second SOW and Work Plan under the IR program was released to guide the sampling and remedial efforts (outlined in this Work Plan) at Sites 1, 2, 5, 6, 7, 10, 13, 14, and 18, and to conduct a Site Investigation (SI) at a previously unidentified site (Site 21 - Building 121, Old Pesticide Storage). EPA Region II reviewed this Work Plan and made substantial comments. The comments generated were used to guide the development of the SOW outlined in this document. Primary among the numerous major and minor alterations to the technical approach made in response to EPA's comments are:

- The analytical suite of parameters for the various sites were upgraded to TCL/TAL to provide a more complete characterization of any contamination;
- The laboratory work is to be done in accordance with CLP protocols;
- Level IV data validation will be performed on most of the laboratory data; and
- Historical aerial photo interpretation will be done on a number of the sites to enhance the present understanding of where actual waste disposal activities took place.

All of EPA's comments were addressed in the appropriate volumes of the project plans.

2.3 Physical Setting

The physical setting of NSRR was documented in the 1984 IAS (NEESA Document 13-051). This information is summarized below.

2.3.1 Climatology

The climate of the Roosevelt Roads area is characterized as warm and humid, with frequent showers occurring throughout the year. A major factor affecting the weather is the pattern of trade winds associated with the Bermuda High, the center of which is in the vicinity of 30° North, 30° West. The prevailing wind direction reflects the easterly trade winds. The area receives a surface flow varying between the northeast to the southeast about 75 percent of the

year, and as much as 95 percent of the time in July when the easterly winds are strongest. The differential heating of the land and sea during the day tends to give a more northerly component to the flow on the northern side of the island and a more southerly component on the southern side. During the night, a land breeze causes a prevailing southeasterly flow in the north and a prevailing northeasterly flow over the southern coast. The mean annual wind velocity is 5.5 knots, with a minimum in November and a maximum in August. Gales associated with westward moving disturbances in the trade winds or hurricanes passing either north or south of the area have the highest probability of occurrence from June through October.

Uniform temperatures prevail, with small diurnal ranges as a result of insular exposure and the relatively small land areas. The warmest months are August and September, while the coolest are January and February. Mean annual maximum temperatures range from 82.0° in January to 88.2°F in August. The mean annual minimum temperatures vary from 64.0° in January to 73.2° in June. The highest maximum temperature recorded was 95°F, while the lowest minimum was 59°F. Rain usually occurs at least nine days in every month, with an average of 60 inches per year. A dry winter season occurs from December through April. About 22 thunderstorm days occur per year, with maximum frequencies of three days per month from May through October.

In late summer, the mean sky cover begins a steady decrease from a monthly maximum average of 6.5-tenths coverage in September to a minimum monthly average of 4.4-tenths coverage in February. From March through August, the monthly average clouds over increases steadily from 4.5- to 6.0-tenths coverage during the period. Over the open sea, a maximum of clouds (usually broken stratocumulus) occurs during early morning, with the skies clearing or becoming scattered with cumulus by afternoon. Completely clear or overcast skies are rare during daylight hours, while clear skies frequently occur at night.

The hurricane season is from mid-June through mid-September; maximum winds exceed 95 knots during severe hurricanes. An average of two tropical storms per year occur in the study area, one of which usually reaches hurricane intensity.

2.3.2 Topography

The regional area of Roosevelt Roads consists of an interrupted, narrow coastal plain with small valleys extending from the Sierra de Luquillo range, which has been severely eroded by streams into valleys several hundreds of feet deep. Slopes of up to 60° are common.

In the immediate area of the station, elevations range from sea level to approximately 295 feet. Immediately to the north of the station boundary, the hills rise abruptly to heights of 800 to 1,050 feet above sea level, with the tallest peak located within two kilometers of the station boundary. There is a series of three hilly areas on the station, two of which separate the southern airfield area from the Port/Industrial, Housing, and Personnel Support areas. The third set of hills is in the Bundy area. These ridge lines not only separate sections of the station, but dictate the degree of allowable development. The ridge line south of the airfield provides an excellent barrier which effectively decreases the aircraft-generated noise which reaches the Unaccompanied Enlisted Personnel Housing areas to an acceptable level. Relief is low along the shoreline. Lagoons and mangrove swamps are common.

2.3.3 Geology

The underlying geology of the station area is predominantly volcanic (composed of lava and tuff), as well as sedimentary (rocks derived from discontinuous beds of limestone). These rocks all range in age from early Cretaceous to middle Eocene. The volcanic rocks and interbedded limestones have been complexly faulted, folded, metamorphosed, and variously intruded by dioritic rocks. This complex geological restructuring occurred sometime after the deposition of the limestone during the middle Tertiary, when Puerto Rico was separated from the other major Antillean Islands by block faulting and was arched, uplifted, and tilted to the northeast. Culebra, Vieques, and the Virgin Islands are part of the Puerto Rican block; they are separated from the main island simply because of the drowning that resulted from the tilting.

In addition to the predominant volcanic and sedimentary rock, the northwestern and western sectors of the base are underlain by unconsolidated alluvial and older deposits from the Quaternary period.

The primary geologic formations on and near NSRR are various beach deposits, alluvium, quartz diorite and granodiorite, quartz keratophyre, the Dagua Formation, and the Figuera Lava. The station is traversed by the Peña Pobre fault zone.

2.3.4 Soils

The soil associations found at the Naval Station are predominantly of two types typical of humid areas, namely the Swamps-Marshes Association and the Mabi-Rio-Arriba-Cayagua Association, as well as the Descalabrado-Guayama Association, which is typical of dry areas. In addition, isolated areas of the Caguabo-Mucara-Naranjito Association, the Coloso-Toa-Bajura Association, and the Jacana-Amelia-Fraternidad Association are found at the station.

The Swamps-Marshes and Mabi-Rio-Arriba-Cayagua associations cover over one half of the station's surface area and are equally distributed. The remaining area is covered primarily by the Descalabrado-Guayama and Caguabo-Mucara-Naranjito associations.

The Swamps-Marshes Association consists of deep, very poorly drained soils. This association is found in level or nearly level areas that are slightly above sea level but are wet, and when the tide is high, are covered or affected by saltwater or brackish water. The soils are sandy or clayey, and contain organic materials from decaying mangrove trees. They are underlain by coral, shells, and marl at varying depths. The high concentration of salt inhibits the growth of all vegetation except mangrove trees, and in small scattered patches, other salt-tolerant plants.

The Mabi-Rio-Arriba-Cayagua Association consists generally of deep, somewhat poorly drained and moderately well-drained, nearly level to moderately steep soils found on foot and side slopes, terraces, and alluvial fans. Soils of this association at the Naval Station are basically clayey, and are located predominantly in the areas surrounding Ofstie Field.

The Descalabrado-Guayama Association generally consists of shallow, well-drained, strongly sloping to very steep soils on volcanic uplands. Soils of this association are found primarily in the hilly areas located directly inland and adjacent to the soils of the Swamps-Marshes Association.

The Caguabo-Mucara-Naranjito Association consists generally of shallow and moderately deep, well-drained, sloping to very steep soils on volcanic uplands. This association consists of soils which formed in residual material that weathered from volcanic rocks. This association is represented at the Naval Station by soils of the Sabana series, which are found on the side slopes and the hilly terrain west of Langley Drive in the Fort Bundy area. These soils are

suited for pasture and woodland. Steep slopes, susceptibility to erosion, and depth to bedrock are the main limitations for farming and for recreation and urban areas.

The Coloso-Toa-Bajura Association consists of deep, moderately well drained to poorly drained, nearly level soils found on floodplains. This soil association extends along the western boundary of the station and around the airfield. The soils of this association formed in fine textured and moderately fine textured sediment of mixed origin on floodplains. The Coloso soils are deep and somewhat poorly drained; the Toa soils are deep and moderately well drained; and the Bajura soils and Maunabo soils are deep and poorly drained. The Reilly soils, also part of this association, are shallow to sand and gravel and are excessively drained; they lie adjacent to streams. The minor soils are Talante, Vivi, Fortuna, Vega Alta, and Vega Baja soils. The Talante, Vivi, Fortuna, and Vega Baja soils are found on floodplains, while the Vega Alta soils occupy slightly higher positions on terraces.

The Jacana-Amelia-Fraternidad Association consists generally of moderately deep and deep, well-drained and moderately well-drained, nearly level to strongly sloping soils on terraces, alluvial fans, and foot slopes. This association is represented at the Naval Station by soils of the Jacana series, which consist of moderately deep, well-drained soils found on the foot slopes and low rolling hills along Langley Drive and just east of the airfield. These soils formed in fine textured sediment and residuum derived from basic volcanic rocks.

2.3.5 Hydrology

The surface waters that flow across the northeastern plain of Puerto Rico, where the Naval Station is located, originate on the eastern slopes of the Sierra de Luquillo mountains. Surface runoff is channeled into various rivers and streams which eventually flow into the Caribbean Sea. The Daguao River and Quebrada Seca Stream (a tributary to Rio Daguao) collect surface waters from the hills immediately north of the station, and in periods of heavy rain, on-station flooding occurs. The Daguao-Quebrada Seca watershed comprises an area of approximately 7.6 square miles (4,900 acres), and the river falls some 700 feet from its source to sea level. Increased development in the Town of Ceiba, especially in areas adjacent to the station's northern boundary, has significantly increased the surface runoff reaching the station, causing ponding and erosion in the Boxer Drive area. Boxer Drive, for a major portion of its length, is subject to surface water flooding, as are Hangar 200 and AIMD Hangar 379 and adjacent apron areas.

In the low-lying shore areas, seawater flooding results from storms, wind, and abnormally high tides. The tidal ranges in the Roosevelt Roads area are rather small, with a maximum spring range of less than three feet. The tides are semidiurnal and have a usual range of about one foot in the main harbor of the Station.

Little information exists concerning the geohydrology of NSRR. The only known potential sources of groundwater are lenticular beds of clay, sand, and gravel, and rock fragments which occur at a depth of less than 30 meters. No wells have been developed on base from these layers. Some wells had been developed upgradient of the station in Ceiba, some three kilometers from base headquarters, but were abandoned due to high levels of salinity.

The quality of surface waters is variable, reflecting the drainage area through which the water flows. Generally, surface waters have high turbidities and bioorganics (naturally-occurring organics, such as decay products of vegetable and animal matter) due to the periodic heavy rains which can easily erode soils from steep slopes, exposed areas, and disturbed stream beds.

Water from alluvial aquifers along the coast of the Naval Station is of a calcium bicarbonate type, and has high concentrations of iron and manganese. The source of these minerals is unknown, but they may be derived from buried swamp or lagoon deposits.

A seawater-freshwater interface is present in the aquifers throughout the coastal areas of Puerto Rico, usually within a short distance inland of the coastline.

The Naval Station water treatment plant receives its raw water from the Rio Blanco through a 27-inch reinforced concrete pipe that replaced the old, open channel. The intake is located at the foot of the El Yunque rain forest. This buried raw water line traverses a distance of 14 miles from the intake to the station boundary. A raw water reservoir is located at the water treatment plant and has a 45-million gallon capacity. Additionally, there are two fire protection storage reservoirs with a total storage capacity of 520,000 gallons.

The base has been served for over 30 years by the present treatment facility. The plant (Building 88) has a capacity of 4.0 million gallons per day (mgd). Water flows by gravity into a 45 million gallon raw water storage basin from which the plant draws its supply at a rate of 1.3 mgd on the average. Treatment consists of prechlorination, coagulation sedimentation, filtration, and post-chlorination.

The single potable water supply system also provides water to all industrial operations at the facility. The water supply is low in hardness, and, therefore, is an excellent source for industrial uses, particularly in boiler operation and maintenance.

Three hundred acres are used for pasture near Gate 1, and are irrigated as needed. Extensive sprinkling of lawns and green areas is evident throughout the base.

2.3.6 Migration Potential

Contaminants at NSRR can migrate by surface runoff through the drainage ditches, by groundwater movement, and by tidal action in the mangrove swamps.

Surface runoff would occur throughout the series of drainage ditches, which empty either into the Rio Daguao watershed and from there into Vieques Passage, or into the mangroves that fringe Ensenada Honda and Puerca Bay.

Groundwater at Roosevelt Roads flows generally southeast, except in the areas of high ground on the peninsulas which constitute the Industrial Area, where Sites 7, 10 and 13 are located. In these areas, due to the steep slopes (as much as 40 percent), relatively shallow well-drained soils, and proximity of bedrock to the surface, subsurface groundwater migration will be in the downslope direction dictated by local topography. This will generally be to the north and northeast into the mangrove swamps and Puerca Bay, or to the south and southeast into Ensenada Honda.

3.0 INITIAL EVALUATION

The summary of precedent investigations is presented here for each discrete site.

3.1 Site 1 - Quebrada Disposal Site, Vieques Island

The site was used from the early 1960s to the late 1970s, with an area of about 500 by 20 feet and a depth of about 4 feet. The disposal volume has been estimated at about 1,500 cubic yards. The disposed materials at this site included general base refuse and industrial waste, with dispersal of the materials down this surface of the steep (60°) slope. The expected environmental concerns include (intermittent) surface water (as a transport mechanism rather than as an established environment), soil, and sediment. Human receptors are currently expected to be affected through consumption of fish caught near the discharge from this site, as well as through potential exposure to contaminated soil during recreational fishing. Endangered species such as the Caribbean manatee and the hawksbill, leatherback, green, and loggerhead sea turtles may also be affected by contamination at this site.

3.2 Site 2 - Mangrove Disposal Site, Vieques Island

This site was used during the 1960s and 1970s. The disposed materials at this site were general base refuse and industrial waste, estimated at about 800 cubic yards; some burning of this material apparently occurred. The expected environmental concerns include surface water (as an established environment), soil, and sediment. Human receptors are currently expected to be affected through consumption of fish caught at this site, as well as through potential exposure to contaminated soil during recreational fishing. Endangered species such as the Caribbean manatee and the hawksbill, leatherback, green, and loggerhead sea turtles may also be affected by contamination at this site. A large number of land crabs were observed occupying this site during the Preliminary Site Visit. A layer of tar or asphaltic oil was also found beneath a veneer of mud during the Preliminary Site Visit; this layer appeared to have had no discernible, adverse effect on the local environment.

3.3 Site 5 - Army Cremator Disposal Site

This site was used from the early 1950s to the early 1960s. The disposed materials at this site were general base refuse, municipal and industrial waste, and animal carcasses, estimated to total about 100,000 tons; some burning of this material apparently occurred. The expected

environmental concerns include surface water (as an established environment), groundwater, soil, and sediment. Human receptors are currently expected to be affected through consumption of fish caught at this site, as well as through potential exposure to contaminated soil during recreational fishing. The ecology of the Mangrove Swamp also may be affected by contamination at this site. No endangered species have been identified at this site, although the BRA will make a further investigation of this.

3.4 Site 6 - Langley Drive Disposal Site

This site was used from 1939 to 1959. The disposed materials at this site were general base refuse and industrial waste, estimated at about 1,700 cubic yards. The expected environmental concerns include surface water (as an established environment), groundwater, soil, and sediment. Human receptors are currently expected to be affected through consumption of fish caught offshore of this site, as well as through potential exposure to contaminated soil during recreational fishing. Endangered species such as manatees and sea turtles also may be affected by contamination at this site. As this site is also inhabited by a large land crab population, effects on these animals will be assessed.

3.5 Site 7 - Station Landfill

Since the 1960s, this site has been used as the station landfill. The site encompasses about 85 acres. The disposed materials at this site were general base refuse, and industrial and hazardous waste; currently only general base refuse is disposed at this landfill. The expected environmental concerns include surface water (as an established environment), groundwater, soil, and sediment. Human receptors are currently expected to be affected through recreational swimming and consumption of fish caught offshore at this site, as well as through potential exposure to contaminated soil during recreational fishing. Endangered species such as the West Indian manatee and several species of sea turtles may also be affected by contamination at this site. Potential exposure to fugitive dust from this site may also occur.

3.6 Site 10 - Building 25 Storage Area

Building 25 was used for temporary storage of material from the 1940s to 1979, when it collapsed. The site contains material within the collapsed building, around the building and in the immediate vicinity. The potential environmental concern is related to the scattering of debris during and after the collapse. This debris would now be considered dominantly an

industrial waste. There are no intact structures at this site which pose an environmental concern. There are some building construction activities currently underway at this site.

The expected environmental concerns include groundwater and soil. Human receptors are currently expected to be affected through dermal contact with soil and inhalation of particulates. Local wildlife may also be affected by soil contamination.

3.7 Site 13 - Tanks 212-217

The tanks were constructed of concrete in 1944 for the storage of AVGAS and were cleaned every five years. The following list indicates what is known regarding the various tanks:

- Tank 210 - 50,000 gal. AVGAS;
- Tank 211 - 50,000 gal. AVGAS;
- Tank 212 - 50,000 gal. formerly AVGAS, currently unleaded gas;
- Tank 213 - 50,000 gal. formerly AVGAS, currently unleaded gas;
- Tank 214 - 248,000 gal.
- Tank 215 - 245,000 gal.
- Tank 216 - 245,000 gal. formerly AVGAS, currently unleaded gas;
- Tank 217 - 247,000 gal. formerly DFM, currently JP-5.

Tanks 210 and 211 were abandoned in 1950 and had probably been cleaned only once. Tank cleaning normally resulted in removal of 800 to 1,250 gallons of leaded sludge per tank, disposed in pits adjacent to each tank. An estimated 30,000 to 50,000 gallons of leaded sludge were disposed over a 40-year period in pits. It is these sludge disposal pits which are the subject of the current investigation. The tank farm has active and inactive storage and dispensing facilities for fuels. The expected environmental concerns include surface water (as an established environment), groundwater, soil, and sediment. Human receptors are currently expected to be affected through consumption of fish caught in the harbor, as well as through potential exposure to contaminated soil. Potential inhalation exposure to vapors generated from the tanks also may occur. The ecology of the Mangrove Swamp area may also be affected by contamination at this site.

For the purposes of this investigation, Site 13 is divided into three areas: Area A (Tanks 212-213), Area B (Tanks 214-215), and Area C (Tanks 216-217) (Section 5.4.7).

3.8 Site 14 - Ensenada Honda Shoreline and Mangroves

The shoreline at this site had been subjected to a major, open-water spill of about 210,000 gallons of marine diesel fuel in 1981. The sediment and surface water matrices will be the principal indicators of adverse environmental effects. The location of the site at the tidal margin indicates that groundwater should not be a concern. Human receptors are currently expected to be affected through consumption of fish caught at this site, as well as potential exposure to contaminated sediment during recreational fishing. Ecological receptors include the manatee and sea turtle, as well as the endangered yellow-shouldered blackbird.

3.9 Site 16 - Old Power Plant, Building 38

The Old Power Plant, Building 38 was used as a 60 megawatt steam turbine facility that generated power from the early 1940s through 1949. From 1956 to 1964, transformer maintenance was performed at Building 38 by the Public Works Power Distribution Shop (Versar, 1992).

Versar, Inc. completed a Remedial Investigation/Feasibility Study (RI/FS) for this site in 1992. The results of the RI determined that concrete surfaces and sediment and soil surrounding the immediate area is contaminated with PCBs at concentrations exceeding ARARs. Surface water and wipe samples collected from the cooling water tunnel and UST manways indicate that these areas are also contaminated with PCBs.

Human receptors could be affected through consumption of fish caught at this site, as well as potential exposure to contaminated sediments during recreational fishing or swimming. The endangered species in this area also may be affected by contamination at this site.

3.10 Site 18 - Building 128, Pest Control Shop, and Surrounding Area

Building 128 served as the Pest Control Shop from the late 1950s to 1983. Spillage of pesticides occurred in and around the building during this time. Pesticide application equipment was cleaned over a storm drain discharging into a ditch behind the building. Excess pesticides were also discarded in this ditch. Currently, the building is no longer standing; with removal following excessive damage from a hurricane. The expected environmental concerns include surface water (as an established environment), groundwater, soil, and sediment. Human receptors are currently expected to be affected through

consumption of fish caught at the site, as well as through potential exposure to contaminated soil. Exposure to fugitive dust may also occur. The endangered species in this area also may be affected by contamination at this site.

3.11 Site 21 - Building 121, Old Pesticide Storage Building

This site had not been identified in the IAS, but had been listed in the RFA. This building was used from 1980 to 1988 for the storage of outdated pesticides. Building 121, Old Pesticide Storage, is suspected of materials handling losses of pesticides. The expected environmental concerns at this site include soil and the building itself. Human receptors are currently expected to be affected by contact with contaminated soil, as well as possible contact with the building interior. Fugitive dust from contaminated soil may also be a potential exposure pathway. The ecology in the area is also expected to be affected.

4.0 WORK PLAN RATIONALE

The overall objective of the Phase I RI is to fill information gaps and collect the site-specific data necessary to develop an initial evaluation of the characteristics of the environment at specific sites.

The investigation follows the pattern of RCRA/CERCLA site studies. The data and analyses developed during the Phase I RI will conform to the standards of acceptability and defensibility under both a RCRA-RFI and a CERCLA-RI. The project control documents follow the pattern of a CERCLA-RI, with Data Quality Objectives (DQO) established to meet the most defensible level of the RI process. The principal focus of the Phase I RI is the identification of the characteristics of the environment associated with past disposal practices at certain sites. The Phase I RI, while being in the format of a CERCLA investigation, provides an interim evaluation which can be used to scope an RFI.

5.0 TECHNICAL APPROACH

The technical approach to the Phase I RI includes:

- Task 2 Project Plans
- Task 4 Field Investigation
- Task 7 Reporting
- Task 8 Meeting

5.1 Task 2 - Project Plans

5.1.1 Documents

The project plans consist of the following documents:

- Work Plan (WP)
- Sampling and Analysis Plan (SAP), containing
 - ▶ Field Sampling Plan (FSP)
 - ▶ Quality Assurance Project Plan (QAPP)
- Health and Safety Plan (HASP)

This document presents the WP. The SAP, containing the FSP and QAPP, and the HASP appear in separate volumes. Two editions of these plans will be published: The Draft Edition and this Final Edition, which also contains the report (Appendix A) of the preliminary photo-interpretation.

The preparation of the following project plans is required for implementation of the Phase I RI as described in the Scope of Work: (1) a Work Plan; (2) a Sampling and Analysis Plan (which includes a Field Sampling Plan and a Quality Assurance Project Plan; (3) a Health and Safety Plan; (4) a Baseline Risk Assessment Plan; and (5) a Community Relations Plan. These Project Plans have been developed using the following guidance documents: "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," Interim Final, October 1988 (EPA/540/G-89/004), "Preparing Perfect Printout Plans", October 1989, EPA/600/9-89/087, and "Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program," June 1988 (NEESA 20.2-047B), as appropriate.

The purpose of these plans is to summarize and consolidate, into a concise format, the site background, project information requirements, sampling rationale and methods, quality assurance procedures and protocols, health and safety procedures, and detailed project-specific standard operating procedures. The content of each plan is discussed below.

5.1.1.1 Work Plan

This Work Plan presents a comprehensive approach for conducting the Phase I RI at all ten sites. It consists of the following elements:

- Introduction
- Site Background and Physical Setting
- Initial Evaluation
- Work Plan Rationale
- Supplementary Site Investigation Tasks

Three copies of the Work Plan will be submitted to LANTDIV; two additional copies will be submitted to NSRR.

5.1.1.2 Sampling and Analysis Plan

The Sampling and Analysis Plan consists of two component plans: (1) a Field Sampling Plan, and (2) a Quality Assurance Project Plan. These plans are discussed below. Three copies of the Field Sampling Plan/Quality Assurance Project Plan will be submitted to LANTDIV; two additional copies will be submitted to NSRR.

5.1.1.2.1 *Field Sampling Plan*

The Field Sampling Plan provides guidance for the field activities conducted in connection with the site investigations by defining the sampling and data-gathering rationale and methods. The Field Sampling Plan has been prepared using "Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA" (Interim Final), EPA/540/G-89/004 and will include discussions for each site of:

- **Site Background**
- **Sampling Objectives**
- **Sample Location and Frequency**
- **Sample Designation**
- **Sampling Equipment and Procedures**
- **Sample Handling and Analysis**
- **Contaminated Materials Handling**
- **Field Procedures**

5.1.1.2.2 *Quality Assurance Project Plan*

A Quality Assurance Project Plan (QAPP) has also been prepared as a component of the Sampling Plan. This plan specifies the procedures and protocols to be followed to assure data quality. This Plan has been prepared following EPA/540/G-89/004, EPA/600/9-89/087 and NEESA 20.2-047B, and includes the following elements:

- **Project Description**
- **Project Organization and Responsibilities**
- **QA Objectives for Measurement**
- **Sampling Procedures**
- **Sample Custody**
- **Calibration Procedures**
- **Analytical Procedures**
- **Data Reduction, Validation, and Reporting**
- **Internal Quality Control**
- **Performance and System Audits**
- **Preventive Maintenance**
- **Specific Routine Procedures Used to Assess Data Precision, Accuracy, and Completeness**
- **Corrective Actions**
- **Quality Assurance Reports to Management**

In addition to the QAPP, a Laboratory Quality Assurance Plan will be submitted to the Engineer-in-Charge (EIC) by the selected analytical laboratory. The laboratory selected for performance on this task will participate in any additional requirements of the Navy's laboratory approval process, as necessary. Acceptance of this laboratory by the Navy and

documentation that the laboratory has fulfilled the requirements of NEESA 20.2-047B are necessary prior to initiation of the Field Sampling Program. The laboratory selected for the performance of this task is American Environmental Network (AEN) of Columbia, Maryland.

5.1.1.3 Health and Safety Plan

Baker presents separately a Health and Safety Plan to establish safety protocols applicable throughout the field investigation. This plan also does not identify safety protocols applicable to the analytical laboratory; these protocols should be covered by a laboratory-prepared health and safety plan. The principle elements of this plan include:

- The name of the site health and safety officer, and names of alternates responsible for site health and safety.
- A health and safety risk analysis for existing site conditions and for each task.
- Employee training.
- A description of the levels of personnel protection to be used for each task.
- Medical surveillance requirements.
- A description of the frequency and types of air monitoring.
- A description of the frequency and types of personal monitoring.
- A description of environmental sampling techniques and instrumentation.
- Site control measures.
- Decontamination procedures.
- Standard health and safety operating procedures.
- Contingency plan.
- Special operations, if applicable and anticipated, such as small boat operations and climbing activities.

Three copies of the Health and Safety Plan will be submitted to LANTDIV; two additional copies will be submitted to NSRR.

5.1.2 Preliminary Site Visit

Due to the limited descriptions of the expected sampling stations and their present condition, as reported in the Initial Assessment Study (1984) and Confirmation Study (1986), a detailed site reconnaissance was performed prior to the preparation of the project plans. The site visit

included an aerial survey, a ground reconnaissance and preliminary coordination for the field investigations.

The objectives of the site reconnaissance were three-fold: The aerial survey provided photographs recording site conditions for the Community Relations Program, and a visual reconnaissance of ground conditions not apparent from the land surface which may affect the field investigation activities. The ground reconnaissance helped confirm the location and condition (suitability for sampling) of existing monitoring wells; examined lanes of access to existing or planned data stations (monitoring wells or sampling stations for soil, surface water or sediment); and identified potential human and environmental receptors for evaluation during the risk assessment. Preliminary coordination efforts helped establish local support for lodging, transportation, and shipping; identified potential sources for locally contracted services; and defined the local medical support required by the Health and Safety Plan.

The reconnaissance specifically inventoried each monitoring well at Sites 6, 7, 13 and 18 to identify the current physical condition and suitability as a data station. This inventory included inspecting the security and integrity of the wellhead and casing, the depth of the well compared to the construction report, and the probable siltation of the screened interval.

5.2 Task 4 - Field Investigations

The Phase I RI will include:

- Mobilization/Demobilization
- Land Clearing
- Soil and Structure Sampling and Geophysical Surveying
- Groundwater Sampling
- Surface Water/Sediment Sampling
- Geohydrologic Study

This section describes each category of the field investigation, and presents the technical approach to the objectives. The indicated actions at each site for the Phase I RI of this project directly support the objectives, and can be coordinated with the evaluations of the Confirmation Study (CS).

5.2.1 Categories of the Field Investigation

5.2.1.1 Mobilization/Demobilization

Mobilization and demobilization consist of moving personnel and equipment to the study area, and returning those personnel and materials. The majority of the field investigation will be conducted by Baker (BEI) personnel; the participation of the only expected contractor for the field investigation, the land surveyor, is expected to be a minor effort. [Note: It was originally planned to use a local subcontractor for site clearing; however, NSRR will be able to provide this service.] Also included in this category are the various administrative and logistic functions directly related to support of personnel, and to provision and transport of materiel during the field operations.

5.2.1.2 Land Clearing

Review of conditions at Sites 1, 5 and 6 indicates that no valuable data stations could be occupied without clearing some of the densely grown vegetation. Other sites may display this impediment to a lesser extent.

5.2.1.3 Soil and Structure Sampling and Geophysical Surveying

Sampling of soil is available at all sites described below for the Phase I RI, except Sites 7, 13 and 14. A geophysical survey at Site 5 will attempt to identify the locations of the disposal trenches, preliminarily indicated in the initial photo-interpretation. Standard operating procedures (SOPs) for these activities are included in the FSP.

5.2.1.4 Groundwater Sampling

Suitable monitor wells for sampling of groundwater are expected at Sites 1, 5, 6, 7, and 18. SOP F104 - Groundwater Sample Acquisition, is included in the FSP. Selected monitoring wells will not be sampled if:

- The wells cannot be located because of vegetative growth.
- The wells no longer contain water due to drop in the water table elevation.

5.2.1.5 Surface Water/Sediment Sampling

Sediment sampling appears appropriate at Sites 2 and 14, and may also be productive at Sites 1, 16, and 18. Surface water samples will be collected at Site 16. SOP F105 - Surface Water and Sediment Sample Acquisition, is included in the FSP.

5.2.1.6 Geohydrologic Study

A geohydrologic study of the groundwater regime will be made in two components: Well-head tests and representation of groundwater flow.

5.2.1.6.1 *Well-Head Tests*

Tests for the Phase I RI will consist of slug-tests (rising and falling head) which will yield information for calculation of the local hydraulic conductivity. SOP F402 - Slug Testing, is included in the FSP.

5.2.1.6.2 *Representation of Groundwater Flow*

Measurements of water levels in the monitor wells of the study sites can be calculated (vertically and horizontally) from the survey data to provide a representation of the shape of the water table underlying a particular site. A minimum of one round of water levels will be collected at each site. This can further indicate the direction of flow of groundwater and possible preferential migration routes for contaminants. The usual result of this analysis is a groundwater contour map, with calculation of gradient from the streamlines represented on the map. Calculation of this gradient can be utilized (along with other information) to assess the rate of groundwater movement.

5.2.2 Investigation Activities

5.2.2.1 General Activities

In the execution of the Phase I RI, the expected activities that will apply to all sites are:

- Interpretation of historical aerial photographs according to Environmental Photo-Interpretation Center (EPIC) standards for RCRA/CERCLA investigations;

- Organization of the data available from the CS;
- Transfer of topographic mapping, land surveying and photo-interpretation information to Computer-Aided Drafting (CAD) files; and,
- Reporting.

Descriptions of these activities are provided in Section 5.4.3.

5.2.2.2 Site Activities

Actions, outlined below, at the specific sites will fall into two categories: Technical study and support. The technical studies comprise photo-interpretation, sampling of various environmental matrices, analysis of samples according to the appropriate protocols, reconnaissance of aquifer parameters (well-head tests for hydraulic conductivity), representation of the pattern of groundwater flow and geophysical surveying. Not all of these apply to each site (Section 5.4.1).

In general, sampling stations have been selected in the area at each site most likely to exhibit the greatest adverse effect of disposal. Therefore, analyses of these samples will provide either:

- A reasonable absence of concern for that site (if no significant concentrations of contaminants are found), or
- Identification of the specific compounds to be used in subsequent studies in indicating the extent and severity of contamination.

Support actions for each site appear according to site-specific requirements. The support activities are directly focussed on facilitating the technical study.

The technical and support activities at each site (Figures 5-1 through 5-9) are outlined in this section; a more detailed discussion appears in Section 5.2.3.2.

Note: The following abbreviations are used in the outline of the sampling program:

GW	groundwater	TCL	Target Compound List
S	soil	TAL	Target Analyte List
SW	surface water	TAR	asphaltic oil
SED	sediment	SVOC	TCL Semivolatile Organic Compounds
BG	background	NA	not applicable to CTO-0007

Site 1 - Quebrada Disposal Site, Vieques Island

The technical study for Site 1 includes:

Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	3	TCL/TAL
S	8=[4 stations x 2 samples/station]	TCL/TAL
SW	0	
SED	1	TCL/TAL
Background Samples		
BG-GW	0	
BG-S	3=[3x1]	Pest/PCB/TAL
BG-SW	0	
BG-SED	0	

Geohydrologic Program:

Well-Head tests
Flow Analysis

The support actions at this site include extensive land-clearing to provide access to the sampling stations, and surveying of the monitor wells.

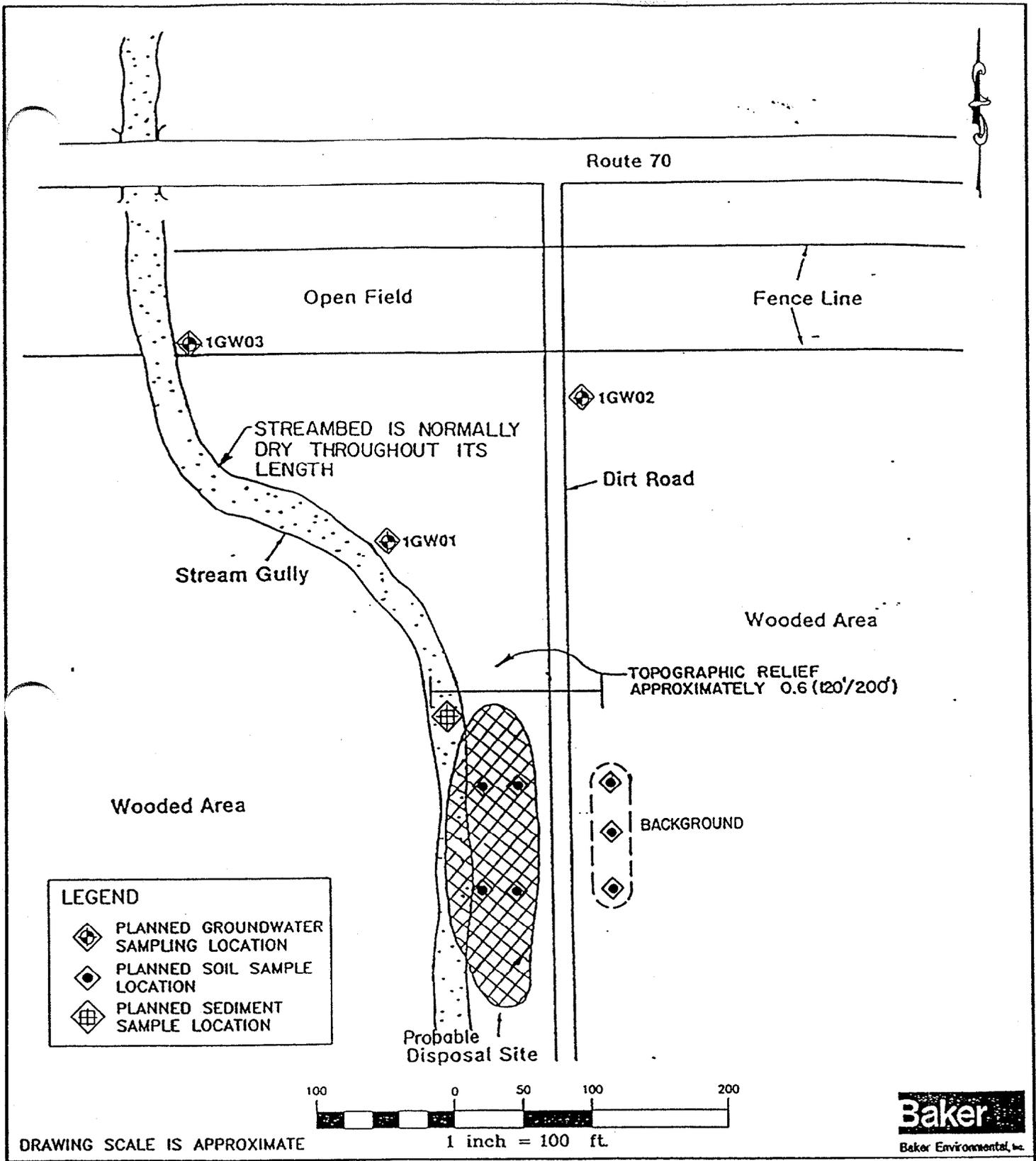


FIGURE 5-1
 SAMPLE LOCATION MAP
 SITE 1, QUEBRADA DISPOSAL SITE,
 VIEQUES ISLAND

NAVAL STATION ROOSEVELT ROADS
 PUERTO RICO

SOURCE: NEESA, 1984b; ESE, 1985.

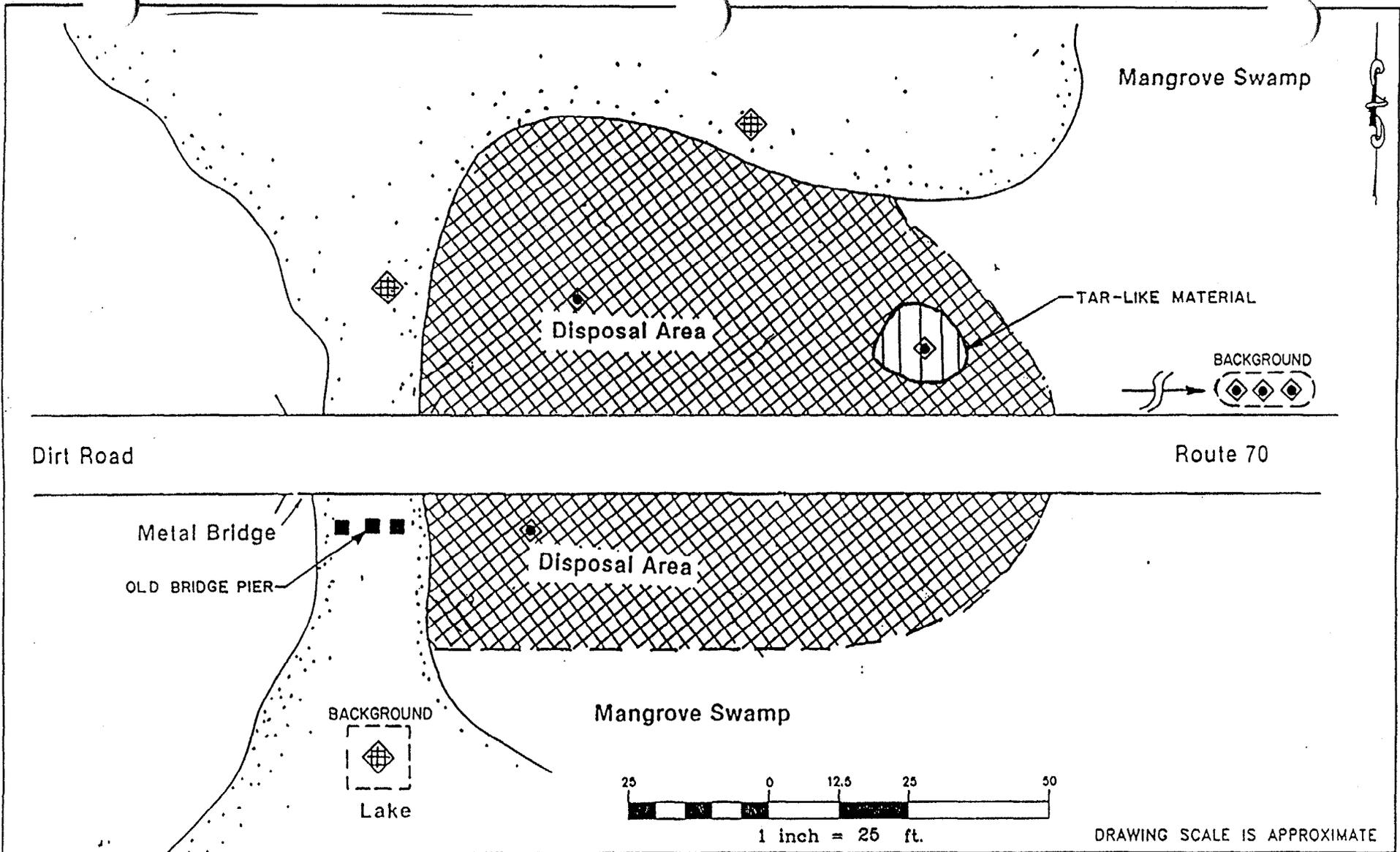
Site 2 - Mangrove Disposal Site, Vieques Island

The technical study for Site 2 includes:

Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	0	
S	6 = [3 stations x 2 samples/station]	TCL/TAL
SW	0	
SED	2	TCL/TAL
TAR	1	SVOC
Background Samples		
BG-GW	0	
BG-S	3 = [3x1]	Pest/PCB/TAL
BG-SW	0	
BG-SED	1	

Support for operation at this site will be those usually performed for investigation of the type, possibly supplemented by use of a small boat for collection of sediment samples.



5-13

FIGURE 5-2
 SAMPLE LOCATION MAP
 SITE 2, MANGROVE DISPOSAL SITE,
 VIEQUES ISLAND
 NAVAL STATION ROOSEVELT ROADS
 PUERTO RICO

SOURCE: ESE, 1985

LEGEND
 ◆ PLANNED SOIL
 SAMPLE LOCATION
 ◆ PLANNED SEDIMENT
 SAMPLE LOCATION

Site 5 - Army Cremator Disposal Area

The technical study for Site 5 will not be defined until the results of the limited photo-interpretation study are available. At present, there is no firm knowledge of the actual location of the disposal area; however, for interim planning, the technical study can be viewed as:

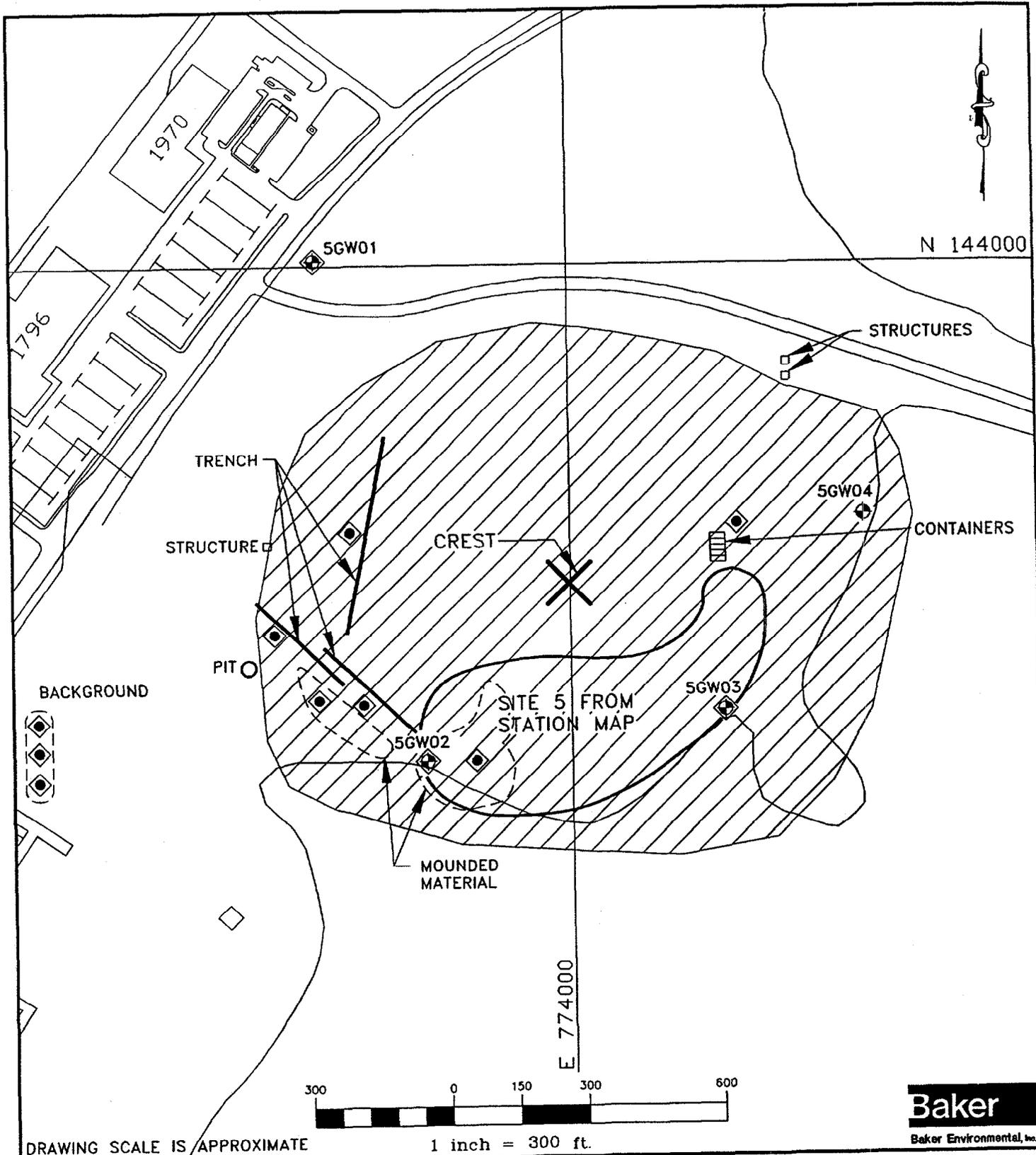
Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	2	TCL/TAL
S	12=[6 stations x 2 samples/station]	TCL/TAL
SW	0	
SED	0	
Background Samples		
BG-GW	1	Pest/PCB/TAL
BG-S	3=[3x1]	Pest/PCB/TAL
BG-SW	0	
BG-SED	0	

Geohydrologic Program:

Well-Head Tests
Flow Analysis
Geophysical Survey

The support actions at this site will probably include extensive land-clearing to provide access to the sampling stations, and surveying of the monitor wells.



DRAWING SCALE IS APPROXIMATE

1 inch = 300 ft.

Baker
Baker Environmental, Inc.

LEGEND

- ◆ PLANNED SURFACE SOIL SAMPLE LOCATION
- ◻ PLANNED GROUNDWATER SAMPLE LOCATION

FIGURE 5-3
SAMPLE LOCATION MAP
SITE 5, ARMY CREMATOR
DISPOSAL SITE

NAVAL STATION ROOSEVELT ROADS
PUERTO RICO

Site 6 - Langley Drive Disposal Area

The technical study for Site 6 will not be defined until the results of the limited photo-interpretation study are available. At present, there is no firm knowledge of the actual location of the disposal area; however, for interim planning, the technical study can be viewed as:

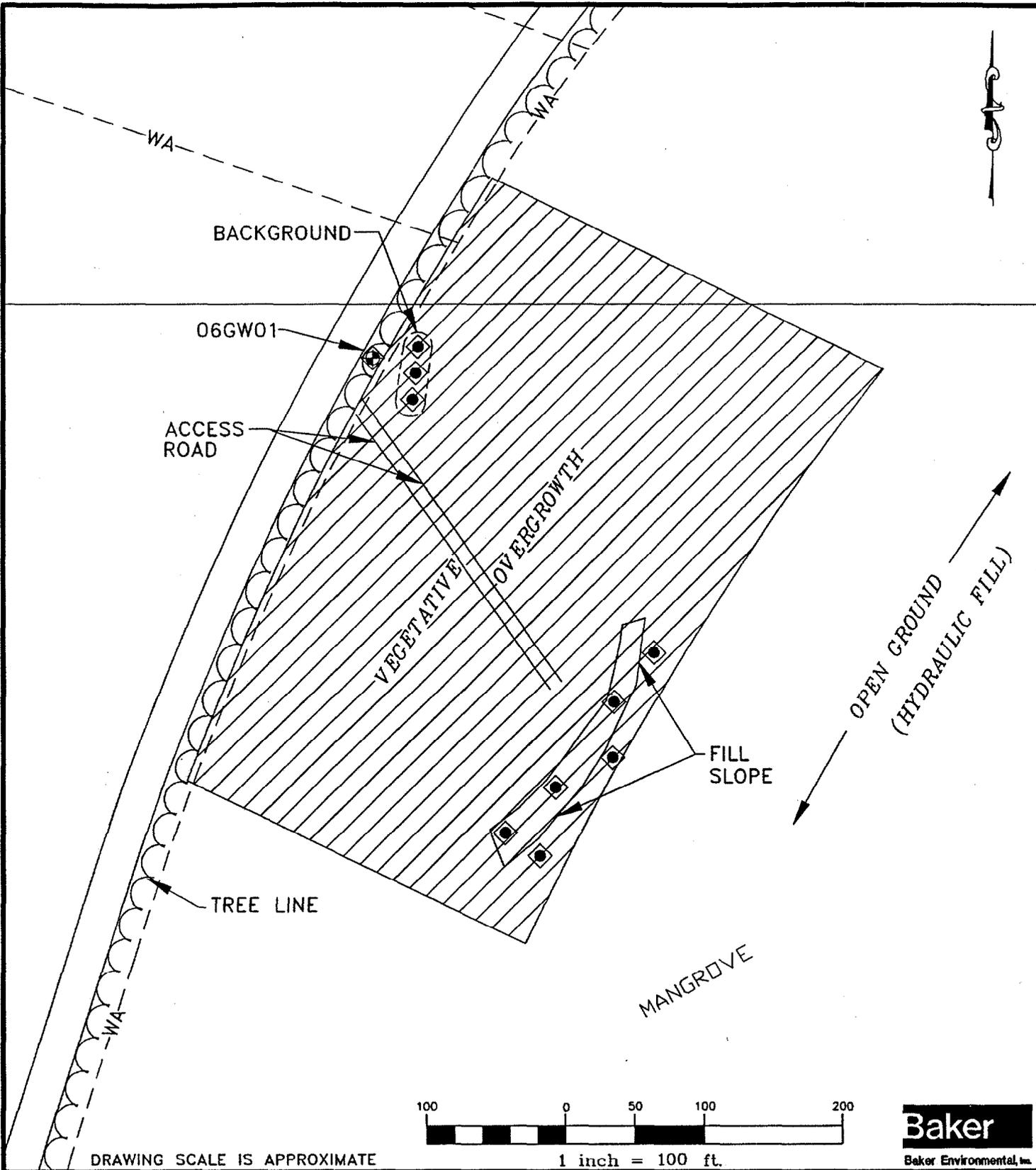
Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	0	
S	12=[6 stations x 2 samples/station]	TCL/TAL
SW	0	
SED	0	
Background Samples		
BG-GW	1	TCL/TAL
BG-S	3=[3x1]	Pest/PCB/TAL
BG-SW	0	
BG-SED	0	

Geohydrologic Program:

Well-Head Tests

The support actions at this site include extensive land-clearing to provide access to the sampling stations, and surveying of the monitor well.



LEGEND

- ◆ PLANNED SURFACE SOIL SAMPLE LOCATION
- ◆ PLANNED GROUNDWATER SAMPLING LOCATION

FIGURE 5-4
 SAMPLE LOCATION MAP
 SITE 6, LANGLEY DRIVE
 DISPOSAL SITE
 NAVAL STATION ROOSEVELT ROADS
 PUERTO RICO

Site 7 - Station Landfill

For the reasons indicated in Section 5.2.3.2, no technical study for Site 7 has been included in this program, although monitoring to support another program will be conducted:

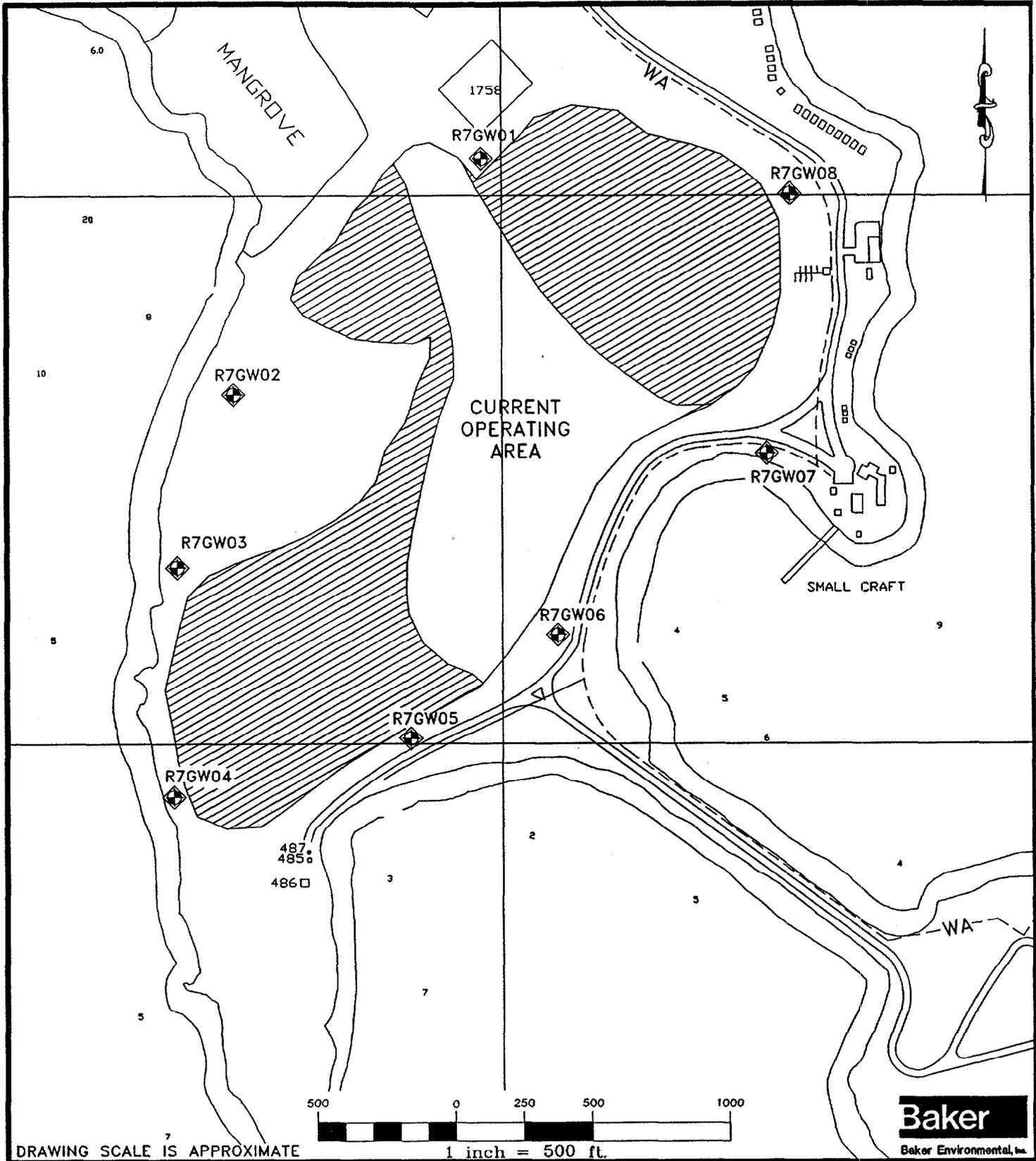
Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	7	TCL/TAL
S	0	
SW	0	
SED	0	
Background Samples		
BG-GW	1	TCL/TAL
BG-S	0	
BG-SW	0	
BG-SED	0	

Geohydrologic Program:

Well-Head Tests
Flow Analysis

The support action at this site includes surveying of the measuring points of the monitoring wells.



DRAWING SCALE IS APPROXIMATE

1 inch = 500 ft.

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LEGEND

R7GW03
 PROPOSED GROUNDWATER SAMPLE LOCATION

FIGURE 5-5
 SAMPLE LOCATION MAP
 SITE 7, STATION LANDFILL
 NAVAL STATION ROOSEVELT ROADS
 PUERTO RICO

SOURCE: LANTDIV., FEBRUARY 1992

Site 10 - Building 25 Storage Area

The technical study for Site 10 includes:

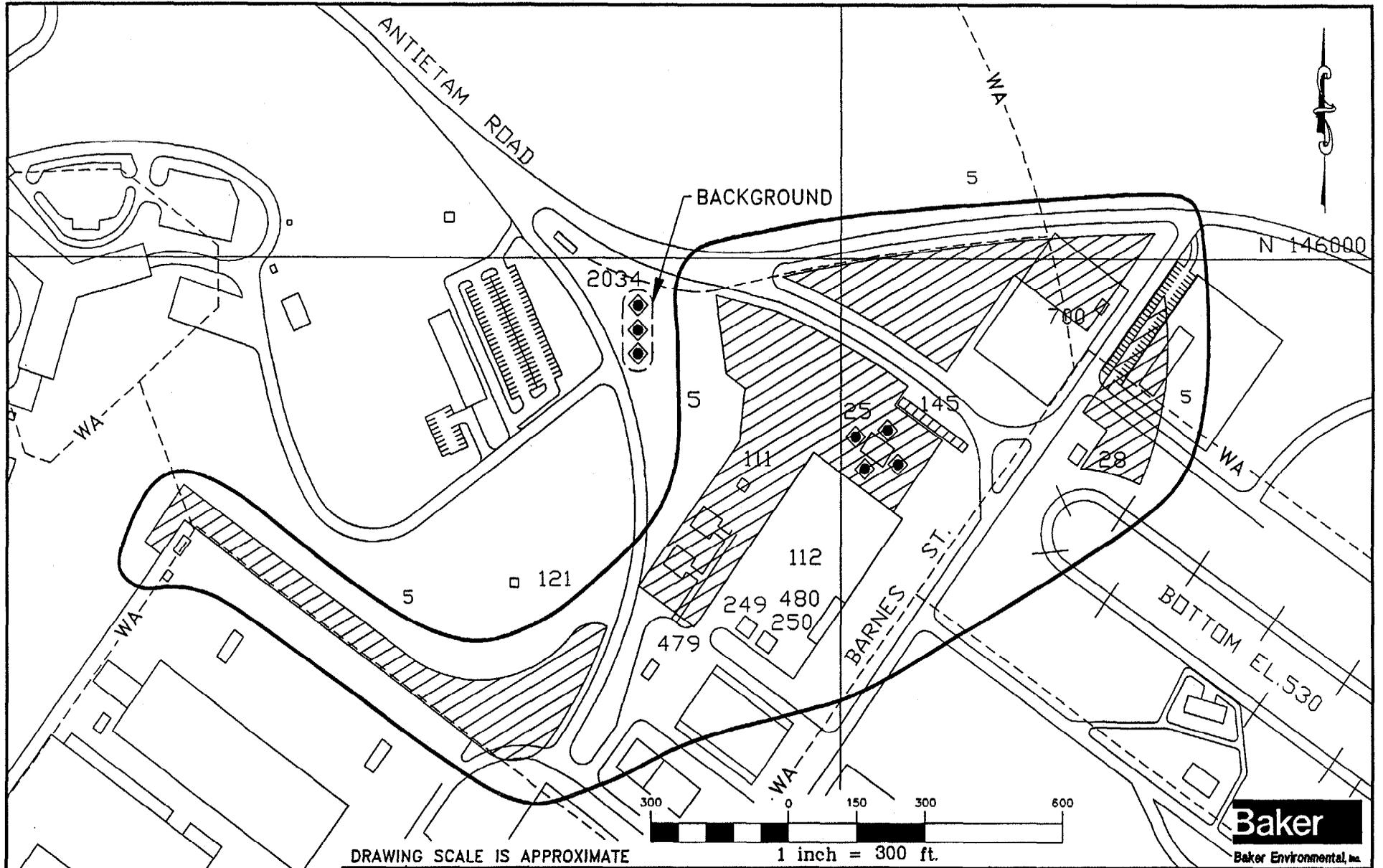
Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	0	
S	8=[4 stations x 2 samples/station]	TCL/TAL
SW	0	
SED	0	
Background Samples		
BG-GW	0	
BG-S	3=[3x1]	Pest/PCB/TAL
BG-SW	0	
BG-SED	0	

Geohydrologic Program:

Well-Head Tests
Flow Analysis

The support action at this site includes surveying of the monitor wells.



DRAWING SCALE IS APPROXIMATE

LEGEND

◆ PLANNED SURFACE SOIL SAMPLE LOCATION

FIGURE 5-6
 SAMPLE LOCATION MAP
 SITE 10, BUILDING 25
 STORAGE AREA
 NAVAL STATION ROOSEVELT ROADS
 PUERTO RICO

Site 13 - Tanks 210-217

For the reasons indicated in Section 5.2.3.2, no technical study for Site 13 has been included in this program.

Site 14 - Ensenada Honda Shoreline and Mangroves

The technical study for Site 14 includes:

Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	0	
S	0	
SW	0	
SED	4	TCL/TAL
Background Samples		
BG-GW	0	
BG-S	0	
BG-SW	0	
BG-SED	1	TCL/TAL

The support action at this site comprises the use of small boats to reach the sampling stations.

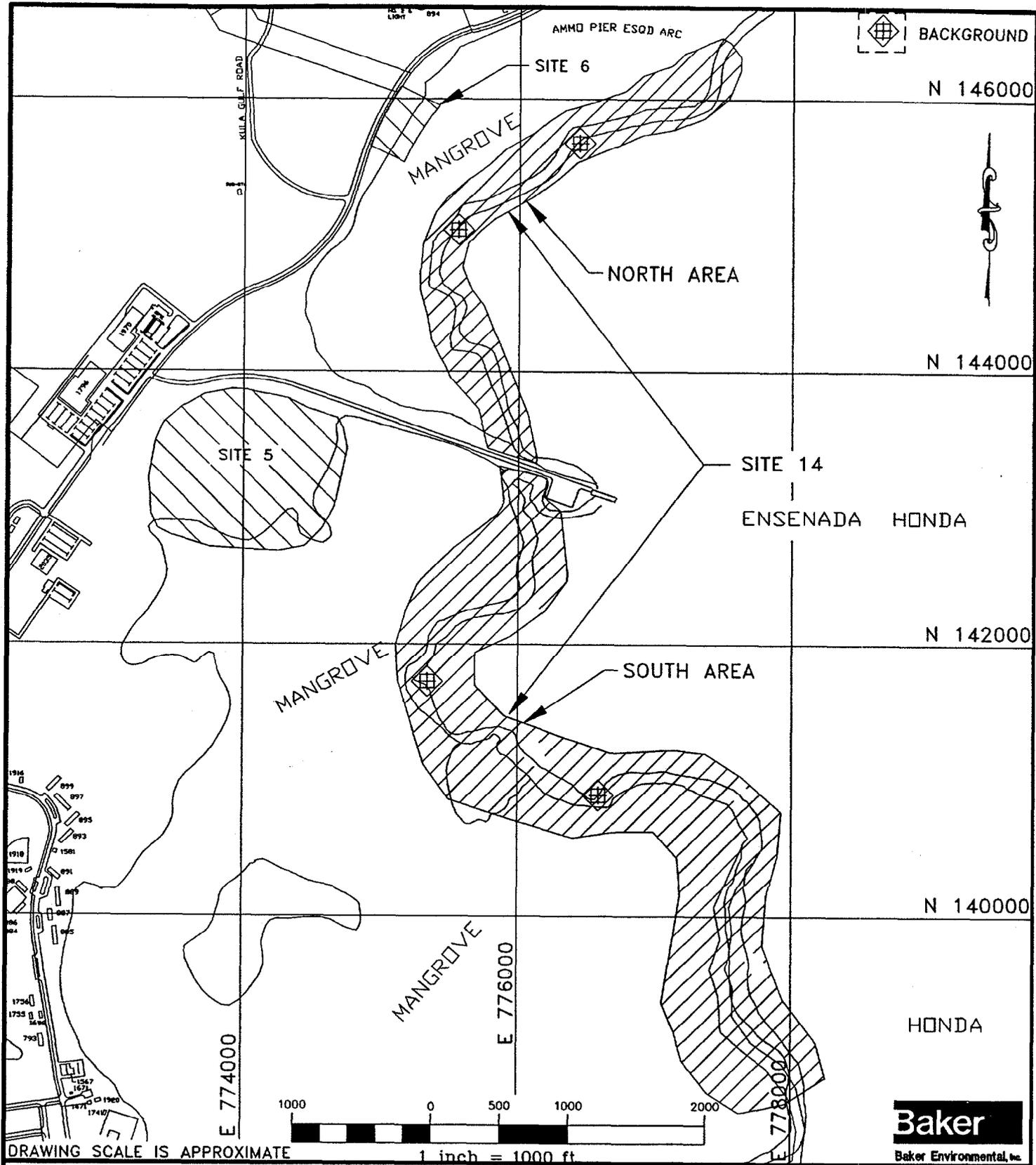


FIGURE 5-7
 SAMPLE LOCATION MAP
 SITE 14, ENSENADA HONDA
 SHORELINE AND MANGROVES
 NAVAL STATION ROOSEVELT ROADS
 PUERTO RICO

Site 16 - Old Power Plant, Building 38

The technical study for Site 16 includes:

Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	0	
S	0	
SW	7	Pest/PCB/SVOC
SED	8	Pest/PCB/SVOC
Background Samples		
BG-GW	0	
BG-S	0	
BG-SW	0	
BG-SED	0	

The support action at this site will most likely require the use of small boats to reach the sampling stations.

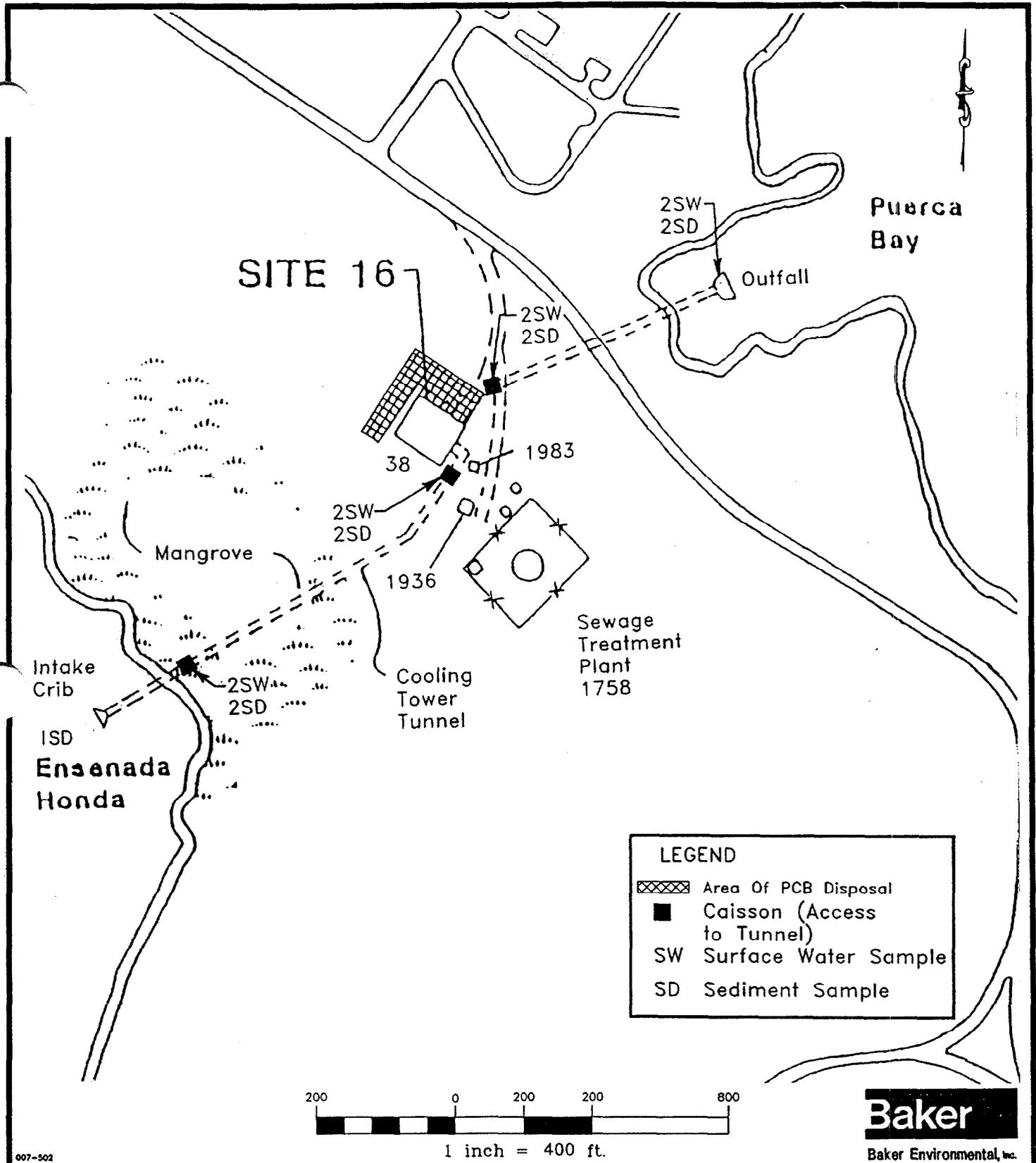


FIGURE 5-8
 SAMPLE LOCATION MAP - SITE 16
 OLD POWER PLANT, BUILDING 38

NAVAL STATION ROOSEVELT ROADS
 PUERTO RICO

SOURCE: VERSAR, INC. (1992)

Site 18 - Pest Control Shop and Surrounding Area

The technical study for Site 18 includes:

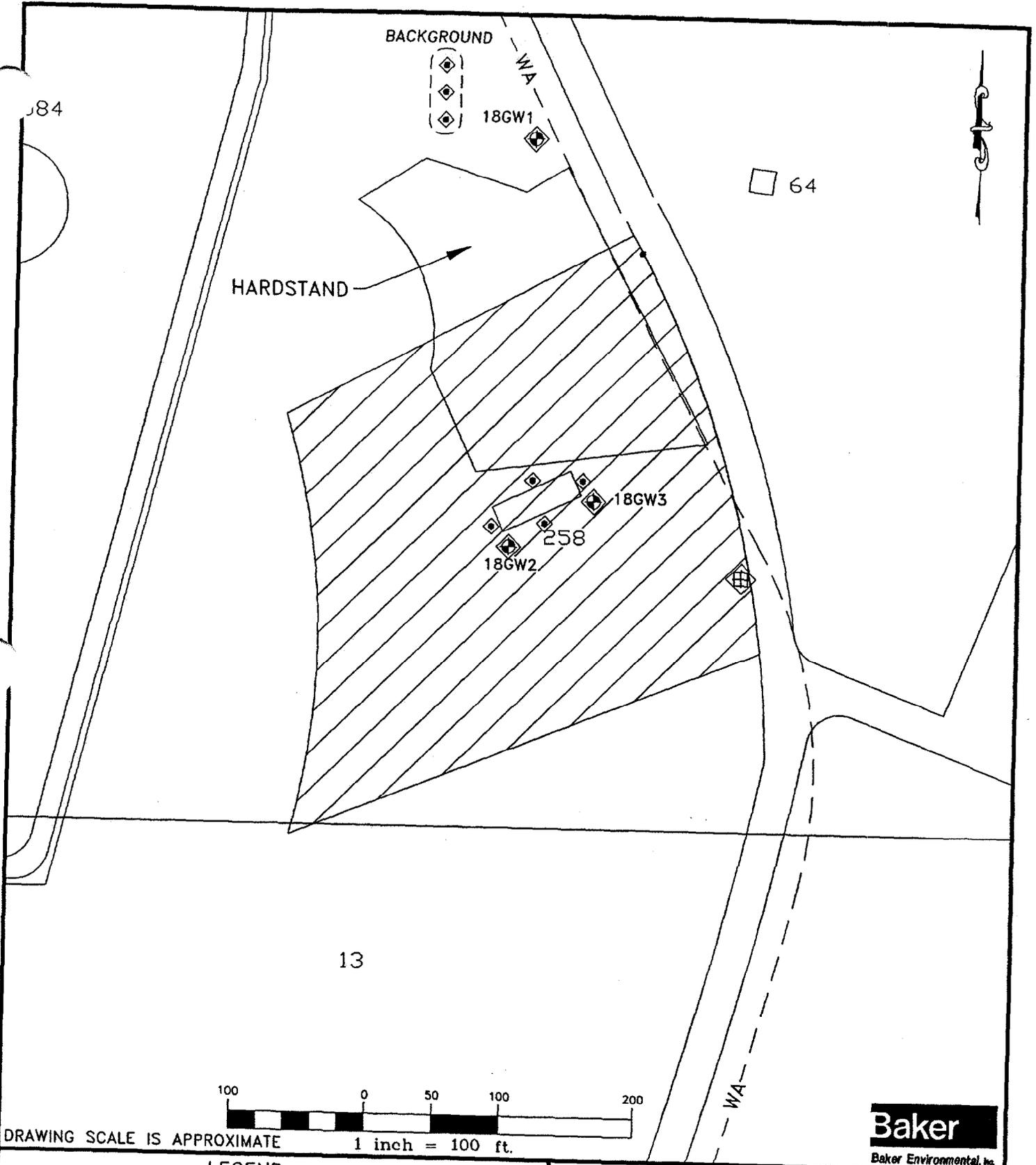
Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	2	TCL/TAL
S	8=[4 stations x 2 samples/station]	TCL/TAL
SW	1	TCL/TAL
SED	1	TCL/TAL
Background Samples		
BG-GW	1	TCL/TAL
BG-S	3=[3x1]	TCL/TAL/Pest/PCB
BG-SW	0	
BG-SED	0	

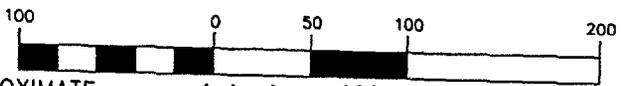
Geohydrologic Program:

Well-Head Tests
Flow Analysis

The support action at this site includes surveying of the monitor wells.



DRAWING SCALE IS APPROXIMATE



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LEGEND

- 18GW1 PLANNED GROUNDWATER SAMPLE LOCATION WELL
- PLANNED SURFACE WATER/SEDIMENT SAMPLE LOCATION
- PLANNED SURFACE SOIL SAMPLE LOCATION

SOURCE: LANTDIV., FEBRUARY 1992

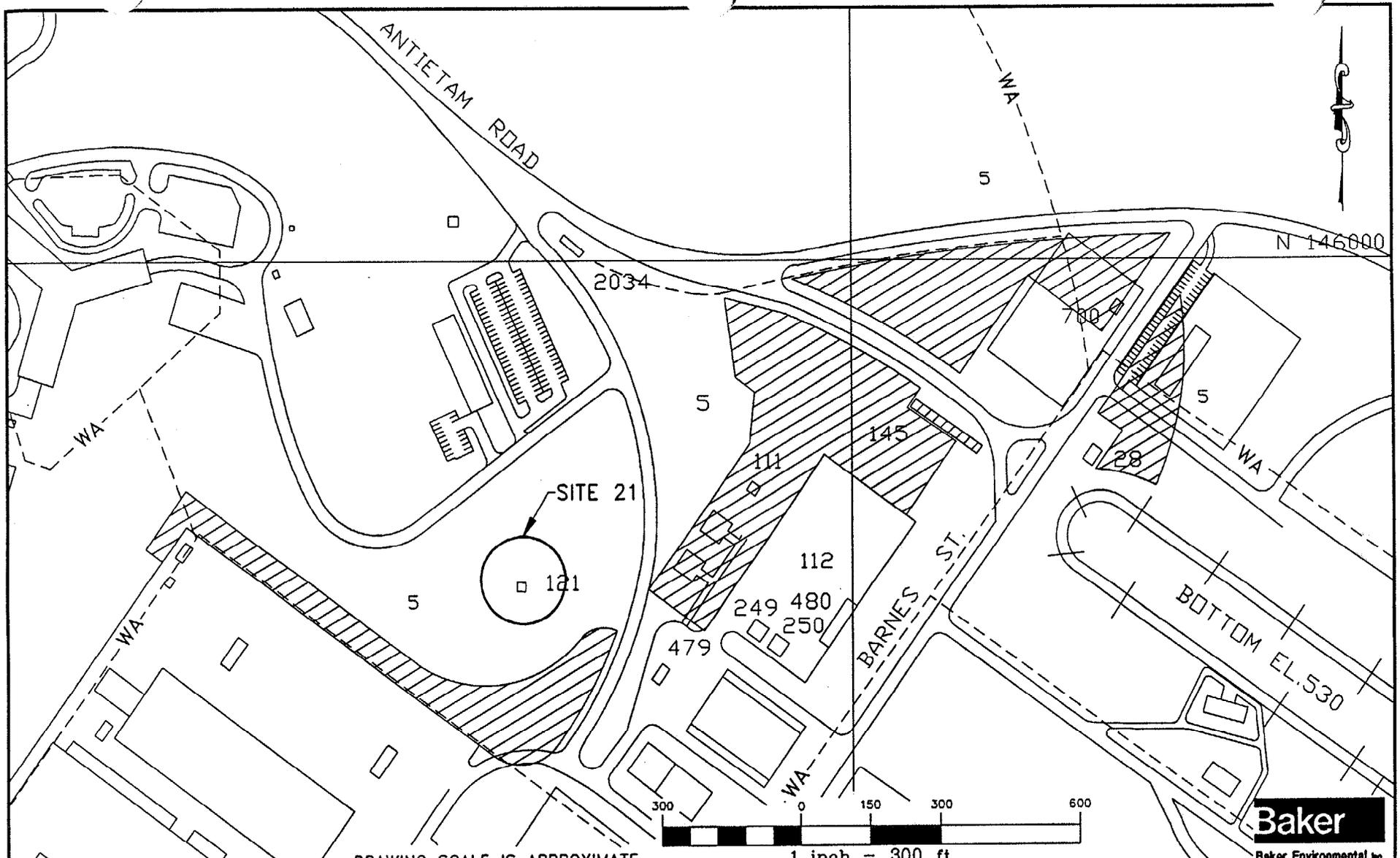
FIGURE 5-9
SAMPLE LOCATION MAP
SITE 18, PEST CONTROL SHOP
AND SURROUNDING AREAS
NAVAL STATION ROOSEVELT ROADS
PUERTO RICO

Site 21 - Old Pesticide Storage Building 121

For the reasons indicated in Section 5.2.3.2, no technical study for Site 21 has been included in this program; however, a sequence of sampling and analysis has been designed to support another program:

Sampling Program:

<u>Matrix</u>	<u>Number</u>	<u>Sequence</u>
Investigation Samples		
GW	0	
S	10=[5 stations x 2 samples/station]	NA
SW	0	
SED	0	
CHIP	3	NA
Background Samples		
BG-GW	0	
BG-S	1	NA
BG-SW	0	
BG-SED	0	



DRAWING SCALE IS APPROXIMATE

1 inch = 300 ft.

Baker
Baker Environmental, Inc.

FIGURE 5-10-1
SITE LOCATION MAP
SITE 21

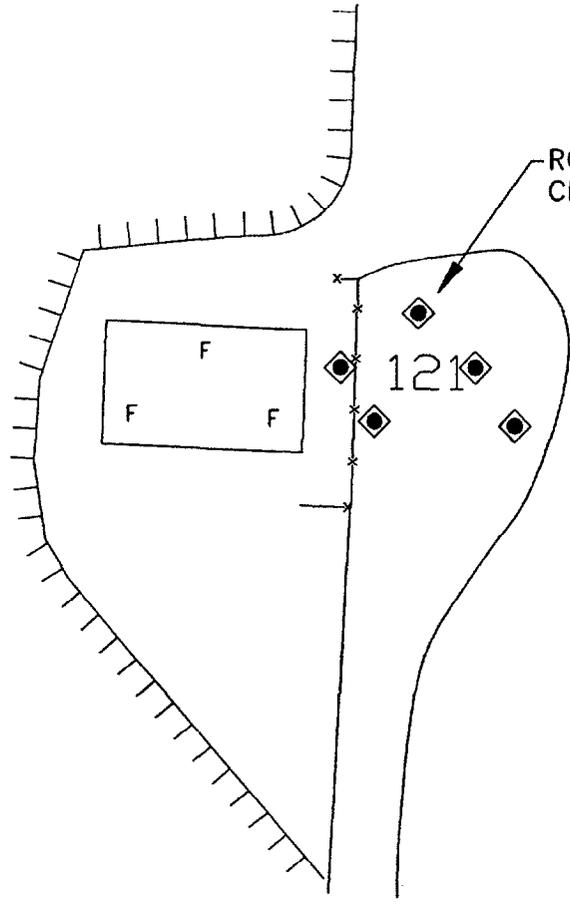
NAVAL STATION ROOSEVELT ROADS
PUERTO RICO



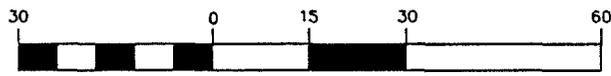
BACKGROUND



RISING
TERRAIN



ROAD AND
CLEARING



DRAWING SCALE IS APPROXIMATE

1 inch = 30 ft.

Baker
Baker Environmental, Inc.

LEGEND

- F PLANNED FLOOR CHIP SAMPLE LOCATION
- PLANNED SOIL SAMPLING LOCATION

FIGURE 5-10-2
 SAMPLE LOCATION MAP
 SITE 21, OLD PESTICIDE
 STORAGE BUILDING 121
 NAVAL STATION ROOSEVELT ROADS
 PUERTO RICO

SOURCE: LANTDIV., FEBRUARY 1992

5.2.3 Discussion

5.2.3.1 General

The EPA has indicated that the sites at the Naval Ammunition Facility, Vieques Island (NAF-V) will be considered separately from those on the main base. Accordingly, this WP has been constructed to allow Sites 1 and 2 to be administered and reported separately from the remainder. The most economical approach, however, to the field studies and to the analysis of data is to combine the efforts into concurrent action; this approach has been utilized in this WP.

5.2.3.2 Field Program

The discussion presented in this section for each site indicates the reasoning behind the development of the recommended sampling scheme for this WP.

Site 1 - Quebrada Disposal Site, Vieques Island

Investigation Program

The investigation for Site 1 includes sampling the groundwater from the existing three wells, sampling soil from four stations within the expected area of disposal, and sampling one sediment station along the ravine carrying storm-water from the site. Final positioning of the stations (other than groundwater) depends on coordinating ground conditions with the results of the limited analysis of aerial photographs. The monitor wells will be assessed for integrity, measured for water level, have reconnaissance well-head tests performed and have an initial representation of the groundwater flow pattern prepared.

Support Program

The support activities for the investigations at Site 1 include land-clearing and surveying of the monitor wells. Land-clearing is required at this site due to the impassable overgrowth of groundcover; no suitable stations for soil sampling can be reached at the present time.

Notes

The wells will be inspected before measurement or sampling to assess suitability as data stations; 1GW03, in particular, was heavily damaged during a hurricane and may not be usable. The analytical results of groundwater quality from 1GW02 may be used as characterization of background conditions, provided no synthetic organic compounds are detected. The background samples for soil will be taken in a representative geologic terrane upslope from the road above the disposal area. Surface water is not expected to be present, as no permanent streams are found on Vieques Island and the ravine near the site is occupied only intermittently by storm-water runoff. The sediment station will be located immediately downslope in the ravine from the probable edge of the disposal area; no background station is available due to the proximity of the site to the head of the ravine.

Site 2 - Mangrove Disposal Site, Vieques Island

Investigation Program

Six samples of soil will be obtained from three stations within the area of expected disposal. No surface water sample will be taken. Two sediment samples will be obtained. One sample of an asphaltic oil or tar will be taken (with one duplicate) at a soil station.

Support Program

No special support actions are anticipated at this site. A small boat may be needed at the sediment sampling location.

Notes

Groundwater is not expected to be a concern at this site, considering the high water-table and the rapid exchange of water with the adjacent tidal lagoons. One soil station will be co-located with the tar station to indicate the possible vertical distribution of synthetic organic compounds. The background soil stations will be on another, similar sandbar parallel to the shoreline. Surface water does not appear to be of concern at this site due to the high volume of tidal exchange in the lagoons adjacent to the site. The sediment stations will be near the middle of the north and west edges of the disposal area to minimize the effects of transport by tidal wash. The background sediment station will be inland of the bridge at the site.

Site 5 - Army Cremator Disposal Area

Investigation Program

The sampling program will assess groundwater from two of the existing wells, and soil at six stations within the area of disposal indicated by the limited photo-interpretation. No surface water or sediment samples are planned. The monitor wells will be measured for water level, have reconnaissance well-head tests performed and have an initial representation of the groundwater flow pattern prepared. A geophysical survey will be conducted to attempt a ground identification of the location of the disposal area.

Support Program

The support actions at this site will include extensive land-clearing to provide access to the sampling stations, and surveying of the monitor wells.

Notes

The notation of disposal features on Figure 5-3 reflects the preliminary findings of the photo-interpretation (Appendix A). Only two of the existing wells, 5GW02 and 5GW03 are expected to lie within the disposal area; sampling of these are included in the field program. Well 5GW01 will be the background station for this site. The background soil stations will be in a representative terrane southwest of Site 5. Surface water does not appear to be a direct concern of this site, since no established streams or ponds are present and since the adjacent body of water is tidal with a low residence time. Sediment may be a direct concern of this site, but is addressed in the provisions for the adjacent Site 14.

Site 6 - Langley Drive Disposal Area

Investigation Program

The sampling program will assess groundwater from the one existing well, and soil at six stations within the area of disposal indicated by the limited photo-interpretation. No surface water or sediment samples are planned.

Support Program

The support actions at this site will include extensive land-clearing to provide access to the sampling stations, and surveying of the monitor well.

Notes

The notation of the disposal feature on Figure 5-4 reflects the preliminary findings of the photo-interpretation (Appendix A). The one monitor well at this site is upgradient of the expected disposal location; analysis of water quality at this station can be used for general reference of site conditions with respect to inorganic and synthetic organic compounds. The background soil stations will be in a representative terrain near the well. Surface water does not appear to be of direct concern of this site, since no established streams or ponds are present and since the adjacent body of water is tidal with a low residence time. Sediment may be a direct concern of this site, but is addressed in the provisions for the adjacent Site 14. With only one well available in this area, analysis of groundwater flow is not possible; however, the well will be surveyed for reference and will have a reconnaissance well-head test performed.

Site 7 - Station Landfill

No general study is proposed for this site since the landfill is active. This site is being monitored under another program. However, a monitoring round will be included in the Phase I RI, to consist of (1) sampling of each well for TCL/TAL analysis, (2a) conducting well-head tests for calculation of the hydraulic conductivity and (2b) taking water level measurements for construction of a groundwater contour map.

Site 10 - Building 25 Storage Area

Investigation Program

No groundwater sampling at this site is planned. Four soil stations will be sampled around the approximate perimeter of Building 25. There will be no surface water and sediment stations.

Support Program

The support action at this site includes only surveying of the monitor wells.

Notes

The wells at this site are apparently not in positions to reflect any possible adverse effects associated with routine disposal practices in the area of Building 25. The locations selected for the soil stations will provide information in the area where the greatest adverse effect associated with the routine disposal practices around Building 25 should be present. One background soil sample will be taken in a representative terrain upslope of the general storage areas of Site 10. Surface water and sediment are not found within the area.

Site 13 - Tanks 210-217

No general study will be made at this site. These areas should probably be considered part of the UST program, referred to that program and removed from the RFI by negotiation. The potential concerns at the site are the sludge pits reportedly associated with the tanks. The actual locations of these pits are not known. The photo-interpretations performed for the RFI are designed to indicate the probable presence and locations of the pits. Further consideration not associated with the UST program should be made only after analysis of the aerial photographs.

Site 14 - Ensenada Honda Shoreline and Mangroves

Investigation Program

No groundwater, soil or surface water sampling is planned at this site. Four stations will be used for sampling sediments within the fringe of the mangrove.

Support Program

The mangrove fringe is not accessible by means other than small boat. Accordingly, sea-kayaks supported by a motor-launch will be used in obtaining sediment samples.

Notes

Since the site is inundated by tidal water, groundwater and soil are not matrices of concern. The exchange of surface water is sufficiently high that a meaningful analysis of surface water quality cannot be made. The sediment of the mangrove swamp accumulates discharge from the adjacent Sites 5 and 6, as well as from other sources; the results of the analyses of sediment at Site 14 can likely be used to indicate the general effects of Sites 5 and 6 on the environment. The sediment samples will be taken from a depth of 0.5 to 1.0 meters with the stations located as far into the mangrove (about 10 meters) as the kayaks can advance, where accumulation of contaminants can most likely be found.

Site 16 - Old Power Plant, Building 38

Investigation Program

No groundwater or soil sampling is planned at this site. Surface water/sediment samples will be collected from access points along the cooling water tunnel. These access points include:

- Intake crib (one sediment sample)
- Caisson on intake line, immediately off the shoreline (two surface water/sediment samples)
- Caisson on intake line nearest building (two surface water/sediment samples)
- Caisson on discharge line nearest building (two surface water/sediment samples)
- Outfall crib (one surface water/sediment sample)

Support Program

A motor launch will be used in obtaining surface water/sediment samples from offshore locations.

Notes

Samples from this site will be collected and analyzed as part of the Phase I RI, although the results of samples will not be reported under this project. These results will be submitted to LANTDIV with a separate site-specific report.

Site 18 - Pest Control Shop and Surrounding Area

Investigation Program

Two groundwater samples will be taken from the (apparently) downgradient wells 18GW2 and 18GW3. Four soil samples will be taken at two stations on the perimeter of the removed Building 258. One surface water/sediment sample from a drainage ditch will be analyzed. The monitor wells will be measured for water level, have reconnaissance well-head tests performed and have an initial representation of the groundwater flow pattern prepared.

Support Program

The support action at this site includes only surveying of the monitor wells.

Notes

Well 18GW1 will serve as the background station for groundwater. The locations selected for the soil stations will provide information in the areas most likely to indicate any adverse effect associated with Building 258. The background soil samples will be taken upslope of well 18GW1 in a representative terrane. The surface water/sediment station will be at the downgradient edge of Site 18.

Site 21 - Old Pesticide Storage Building 121

No general study is planned for this site. A RCRA Closure Permit Application has been made for this area; therefore, further action depends on the disposition of that application. Samples will be collected and analyzed as part of the Phase I RI, although the results of analyses will not be reported under this project; these results will be turned over to another program administered by LANTDIV.

5.2.3.3 Technical Investigations

The technical investigations for the Phase I RI fall into the following major categories: Photo-interpretation; wellhead tests; representation of groundwater flow; sampling and analysis; and geophysical investigation.

5.2.3.3.1 *Photo-Interpretation*

A detailed interpretation of historical aerial photographs will be performed for each of the sites addressed by this project. This interpretation will be performed by a private contractor in a fashion similar to the EPIC analyses of the EPA for CERCLA/RCRA sites.

The interpretation will extend to the historical limit of coverage, attempting for each site an analysis of relevant physical features, disposal locations and practices, and changes through time. Detailed descriptions of these concerns are highly desirable in providing the rationale for future investigation techniques, and in illustrating the findings and recommendations at the sites. These descriptions are notably absent from the existing reports on the sites.

Analysis by photo-interpretation is especially useful at Sites 1, 5 and 6, for which are no reliable indications in the site reports of the locations of disposal at these sites. Field reconnaissance on the ground and from aircraft has similarly been unable to find the disposal areas. A limited investigation by photo-interpretation has been made prior to development of this WP, specifically for the purpose of identifying the specific ground relevant to the project.

5.2.3.3.2 *Well-Head Tests*

Geohydrologic tests for this project will consist of slug-tests (rising and falling-head) for calculation of the local hydraulic conductivity. This technique is well represented in environmental investigations as a general or reconnaissance characterization of the aquifer across the area of a study site. Calculation of the hydraulic conductivity provides a basis for estimation of the rate of flow of groundwater, and, to a lesser extent, on the probable rate of transport and area of distribution of contaminants in the groundwater.

5.2.3.3.3 *Representation of Groundwater Flow*

Measurements of water levels in the monitor wells at the study sites can be calculated (vertically and horizontally) from the survey data to provide a representation of the shape of the water table underlying a particular site. A minimum of one round of water level measurements will be collected. This can further indicate the direction of flow of groundwater and the possible areal distribution of contaminants in the groundwater.

The usual result of this analysis is a groundwater contour map, with calculation of gradient from the streamlines represented on the map. Calculation of this gradient contributes to the representation of the rate of groundwater movement and likely contaminant transport directions.

5.2.3.3.4 *Sampling and Analysis*

Groundwater, soil and sediment are the environmental matrices generally relevant to the Phase I RI of this project and to the preparation for the RFI. These matrices will be sampled variously at different sites, depending on site conditions. Additionally, at particular sites, other matrices will be added (specifically, tar from the asphaltic layer at Site 2 and structural samples from the interior of Building 121 at Site 21, although the data from Site 21 will be reported by others). Analyses will be made as described in Section 3.3.

5.2.3.3.5 *Geophysical Survey*

Geophysical surveying applies specifically to Site 5. There are indications that the burial trenches at the site would not be recognized at the surface, even after land clearing. An electromagnetic induction geophysical survey (SOP F702 - included in the FSP) will attempt to identify location and extent of the trench locations, coordinated with the locations indicated by the limited photo-interpretation. Some difficulty in the interpretation of the geophysical survey is expected, however, from the rock underlying the knoll (iron-rich diorite) and from the native soil (natural oxides of metals and other iron-bearing minerals).

5.2.3.4 Support of Investigations

The main support for the technical investigations comprises: Land navigation; surveying; land clearing; high-angle climbing; small boat operations; computer mapping; and correlation of analytical data.

5.2.3.4.1 *Land Navigation*

The land navigation planned for the Phase I RFI will be conducted using GPS (Global Positioning System) receivers, as a base-station and a remote station. Due to the modulation of this system by the Department of Defense, the horizontal resolution of paired receivers is about one meter, the resolution of a single receiver being about 100 meters. The one-meter resolution is sufficient for surveying the horizontal position of the data stations in this project.

Review of the existing reports and inquiry at NSRR have found no indication of coordination, either horizontal or vertical, of any of the data stations, including the monitor wells. This absence makes reference of the data stations to physical features of the site difficult or impossible (essentially making some of the existing data irrelevant until horizontal coordination can be made); it also makes interpretation of the groundwater regime virtually impossible.

At least some of the data stations are improperly represented on the maps of the available reports: Wells at Sites 7 and 10 are not at the positions indicated on those maps. The available maps actually represent unscaled sketches from which no detailed planning or calculation can be made. Accurate maps are required for the purposes of this project and for an RFI.

Mapping control can be established by a line survey or by GPS mapping. While horizontal control can be established most accurately by a line survey, the accuracy acceptable to this project and to an RFI can be achieved by GPS mapping. Given the terrain and conditions of the sites addressed by CTO-0007 (numerous stations and stations on steep slopes, in heavy vegetation or on open water), the level of effort of a line survey would be prohibitive in complexity, cost and schedule. The GPS mapping is expected to represent a considerable increase in efficiency and decrease in cost over a line survey.

Lastly, the navigation receiver makes possible guided movement to specific coordinates on the ground. This is particularly important at Sites 1, 5 and 6, where only the calculated locations from the photo-interpretation can be used to find the actual disposal areas.

5.2.3.4.2 Surveying

While the GPS receiver is suitable for horizontal control of the positions of the data stations, and can be used where land surveying would be difficult or impossible (the slope at Site 1 and the offshore stations at Site 14), GPS does not provide the accuracy and precision of vertical control require for interpretation of groundwater flow. To meet this need, a licensed surveyor will record the elevation of each well used in this project to 0.01 feet accuracy against a standard Station, Commonwealth or Federal datum.

5.2.3.4.3 Land Clearing

Review of conditions at Sites 1, 5 and 6 indicates that no valuable data stations could be occupied without clearing the densely grown vegetation. Other sites may display this impediment to a lesser extent.

At Site 1, the vegetation on the steep slope (where disposal apparently occurred and sampling is, therefore, necessary) must be cut. Normally, heavy machinery could be used. However, since the disposal of materials at Site 1 was apparently across, rather than beneath the land surface, scarification by heavy equipment is undesirable at this site.

The preliminary indications of the photo-interpretation seem to be that the disposal area of Site 5 is remote from the two remaining hardstands, on the reverse side of the knoll. Access to this area will be possible only after clearing of the area. The distance involved is much greater than that at Site 1, indicating that clearing by hand is infeasible. However, use of heavy equipment is acceptable, since the apparent practice of disposal by burial rather than by surface scattering at Site 5, makes preservation of the land surface during sampling relatively unimportant.

Site 6 may require similar preparation as Site 5.

5.2.3.4.4 High-Angle Climbing

The difficulties at Site 1 are compounded by the steepness of the slope, with approximately 120 feet of drop over about 200 feet of horizontal distance. This inclination makes it difficult to attempt normal "walking access", sampling operations. Accordingly, provisions have been made for descent and ascent of the high-angle slope using belaying gear. Proper use by trained individuals of this system of ropes, anchors and harnesses makes execution of the sampling possible.

5.2.3.4.5 Small-Boat Operations

Access to the sampling stations at Site 14 is possible by small boats having easy handling and a shallow draft. These boats will be used in the fringe of the mangrove, no more than about 10 meters from open water. In particular, sea-kayaks will be used for sampling, while a motor-launch will be used for support and transit. A small dinghy may also be used for the sediment sampling at Site 2.

5.2.3.4.6 Computer Mapping

The maps of the study sites available from the existing reports are unscaled sketches, having value for illustration only. Detailed planning or analysis cannot be made from these representations.

The general areas of the relevant sites have been extracted from the Station's surveyed base map and placed into a computer mapping file. The locations of data stations from the GPS records and the land surveyor's report will be superposed on these maps. The computer maps will then be used to represent information relevant to each site, including characterizations of the chemical environment and of the groundwater regime.

5.2.3.4.7 Correlation of Analytical Data

There is a considerable amount of data available from the chemical analyses of the previous studies. The most economical means of providing this coordination is the correlation of the data for each site by computer file. This requires loading of the data from the CS and from this project into a single program.

5.3 Task 7 - Site Characterization Report

The final document for the Phase I RI of this project will comprise:

1. A report of activities;
2. A discussion of findings for the facility and the sites; and,
3. A presentation of the recommended technical approach to the negotiation for the RFI and to the Statement of Work for the RFI.

The report format will generally conform to guidance presented in "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," Interim Final, October 1988 (EPA/540/G-87/004).

5.3.1 Report of Activities

The report of activities will indicate the technical investigations engaged during this project, and the significant actions supporting those studies. The technical investigations:

1. Detailed photo-interpretation for Sites 1, 2, 5, 6, 7, 10, 13, 14, 18 and 21;
2. Sampling of representative environmental media at certain sites;
3. Analysis of samples for representative sequences of organic and inorganic species; and,
4. Measurements leading to analysis of the geohydrologic regime (particularly: well-head tests for hydraulic conductivity and calculation of the groundwater elevation) at sites with accessible monitor wells.

The significant support activities, in addition to normal administrative and logistic functions, are expected to be:

1. Horizontal control of data stations by land navigation receiver;
2. Vertical control of the measuring points for geohydrologic data by land surveying;

3. Limited or extensive land-clearing at certain sites; and,
4. Small-boat operations for sampling at Site 14.

5.3.2 Findings

The findings of this project will probably contain, depending on the derived information:

1. Summarized and full documentation of the chemical analyses for this project;
2. Summarization, in the same format as the data of this project, of the relevant chemical data from the CS;
3. Identification of the presence or absence of significant, adverse effects on human health or the environment at each site studied;
4. Selection of a limited list of indicator compounds for use in further investigation at those sites showing significant adverse effects from contamination;
5. Details of the relevant aerial photographs and overlays from the photo-interpretation indicating past locations of disposal, disposal practices and probable paths of influence from the disposal areas;
6. Mapping by CAD (Computer-Aided Drafting) of the sites, including surveyor's data and coordination from the land navigation receiver;
7. Analyses of the geohydrologic regime, including gradient, flow-path and probable rate of flow; and,
8. Analysis of the usefulness of and on the disposition of wells at particular sites, or on additions to the monitoring plan.

5.3.3 Technical Approach to the RFI

The findings of this project will indicate the options available for:

1. Negotiation of the RFI; and,
2. Finalization of an efficient and economical RFI addressing
 - a. only particular sites showing some concern of adverse effects from past disposal,
and
 - b. Only the contaminants reliably indicating the presence and extent of those effects.

The latter finding will be used to prepare the outline of the Statement of Work founding the RFI.

5.4 Task 8 - Meeting

One conference between LANTDIV and NSRR personnel should be held at the offices of BEI. The expected duration of this meeting should be three work-days. The entire technical performance of this project will be reviewed, and preparations made for the negotiation of the RFI.

6.0 ADMINISTRATION

The administration of this project includes:

- Task 1 - Project Management
- Task 3 - Subcontract Procurement
- Task 5 - Sample Analysis and Tracking
- Task 6 - Data Evaluation

6.1 Task 1 - Project Management

The project management task involves such activities as daily technical support and oversight, budget and schedule review and tracking, preparation and review of invoices, manpower resources planning and allocation, and coordination with LANTDIV, the Activity and subcontractors.

Project management will also involve the preparation of monthly progress reports.

No Technical Review Committee meeting is anticipated to be a part of this program.

The project team identified for the Phase I RI is:

- | | |
|---------------------------|---------------------|
| ● Activity Coordination | Thomas Fuller, P.G. |
| ● Project Management | John Barone, P.G. |
| ● Endangerment Assessment | Lynn Srinivasan |
| ● Community Relations | Melissa Davidson |

These persons will deal directly with each other in performance of the project, and with their counterparts in LANTDIV and at the Activity.

6.2 Task 3 - Subcontract Procurement

The only subcontracts applicable to the Phase I RI are for photo-interpretation, analytical services, translation and surveying. This task will also include the preparation and solicitation of bid specifications, evaluation of bids and procurement of subcontractors.

6.3 Task 5 - Sample Analysis and Tracking

Sample analysis will be performed by a chemical laboratory approved by NEESA. In general, Quality Control Level D, equivalent to Contract Laboratory Program (CLP) procedures, will be employed and reported where possible; otherwise, applicable techniques and control procedures will be used:

- **Soil and Sediment (except Site 21)**
 - ▶ **CLP Volatile Organic Compounds (VOC)**
 - ▶ **CLP Semivolatile Organic Compounds (SVOC)**
 - ▶ **CLP Pesticides and Polychlorinated Biphenyl Compounds (P/PCB)**
 - ▶ **CLP Metals (TAL)**
 - ▶ **CLP Percent Moisture**
 - ▶ **Total Organic Compounds (TOC)(sediment only)**

- **Soil and Structural Chip (Site 21) (SW846 analytical methods)**
 - ▶ **TCLP-P (Toxic Compound Leaching Procedure - Pesticides)**
 - ▶ **TCLP-H (Toxic Compound Leaching Procedure - Herbicides)**
 - ▶ **As (total Arsenic)**
 - ▶ **CN (total Cyanide)**
 - ▶ **Ethylene Bromide**
 - ▶ **Zn (total Zinc)**

- **Water**
 - ▶ **CLP Volatile Organic Compounds (VOC)**
 - ▶ **CLP Semivolatile Organic Compounds (SVOC)**
 - ▶ **CLP Pesticides and Polychlorinated Biphenyl Compounds (P/PCB)**
 - ▶ **CLP Metals (TAL)**

All aqueous samples indicated for analysis of metals will have both the total and dissolved fractions run.

Field parameters of groundwater quality will be taken:

1. During measurement of water levels:
 - ▶ Water level
 - ▶ Temperature - T
 - ▶ Specific conductance - SC

2. During sampling:
 - ▶ Water level
 - ▶ Temperature - T
 - ▶ Specific conductance - SC
 - ▶ Hydrogen ion activity - pH

Soil samples will be taken by hand auger, unless otherwise required by site conditions. Soil stations will each, unless otherwise required by site conditions, have two samples taken: One from a depth of 0.25 to 0.5 meters and one from 0.5 to 1.0 meters. Background soil samples will be taken from three stations having one sample each (from a depth of 0.5 to 1.0 meters); multiple analyses are required to establish the statistical range for variation across the soil and rock types of the Station and NAF-V. The variations of soils, either from the differing parent rocks or from the differing depositional environments, require separate stations at each site for background samples.

Duplicate samples will be taken according to the distribution of original samples across the facility rather than at each station.

6.4 Task 6 - Data Evaluation

Data evaluation will include review of the reports from the analytical laboratory and validation of the results reported. The quality control will generally be considered at Level D, as indicated in Section 3.3.

7.0 COMMUNITY RELATIONS

7.1 Task 9 - Community Relations Plan

The existing Draft Community Relations Plan (CRP) will be revised according to the comments received from the government, and a Final Draft bi-lingual version will be supplied for review. The current CRP was designed to address the hazardous waste sites under CERCLA community relations guidance. Subsequent to the conversion of sites to the RCRA format, the Final Draft CRP format will be modified accordingly. The Final Draft CRP will be forwarded to LANTDIV/Activity for further distribution and review. Upon receipt of comments to the Final Draft CRP, Baker will modify the document and issue the bi-lingual Final CRP.

Information collected from the community relations interviews will be used to revise the Draft Community Relations Plan (CRP). Information concerning the eight Baker sites will be added to the CRP. The CRP will address the following:

- Site history and background descriptions for all sites at NSRR.
- Summary of key technical information gathered at each site.
- History of community involvement.
- Analysis of community concerns based on interviews.
- Community relations objectives and responsibilities.
- Recommended community relations activities for community involvement and information exchange.
- Schedule of community relations activities.
- A listing of interested parties (mailing list).
- Points of contact for further information.
- Proposed information repository and public meeting locations.

A Draft, Final Draft, and Final CRP will be prepared by Baker. The Final Draft CRP will be provided in both Spanish and English to ensure the accuracy of the bilingual Final CRP.

As directed by LANTDIV, Baker will update the CRP on an as-needed basis. This effort is not included in this CTO.

7.2 Task 10 - Site Information and Photograph Album

A Site Information Photograph Album will be prepared. A general information section will include a two-page summary of the Navy's IR Program and conversion from CERCLA to RCRA with a site map depicting all sites of concern to date (15). Each site-specific section will contain an 8" x 10" color photograph of the site that represents current conditions and a one- to two-page description of the efforts to date at that site. The Draft Photograph Album will be submitted for comments. The Final Draft and Final version will be bi-lingual editions. The Final Draft Photograph Album will be supplied to LANTDIV/Activity for further distribution and review. Three additional sets of the Final Site Photograph Albums will be submitted: one set to the Engineer-in-Charge at LANTDIV, and two sets to the NSRR Environmental Engineer.

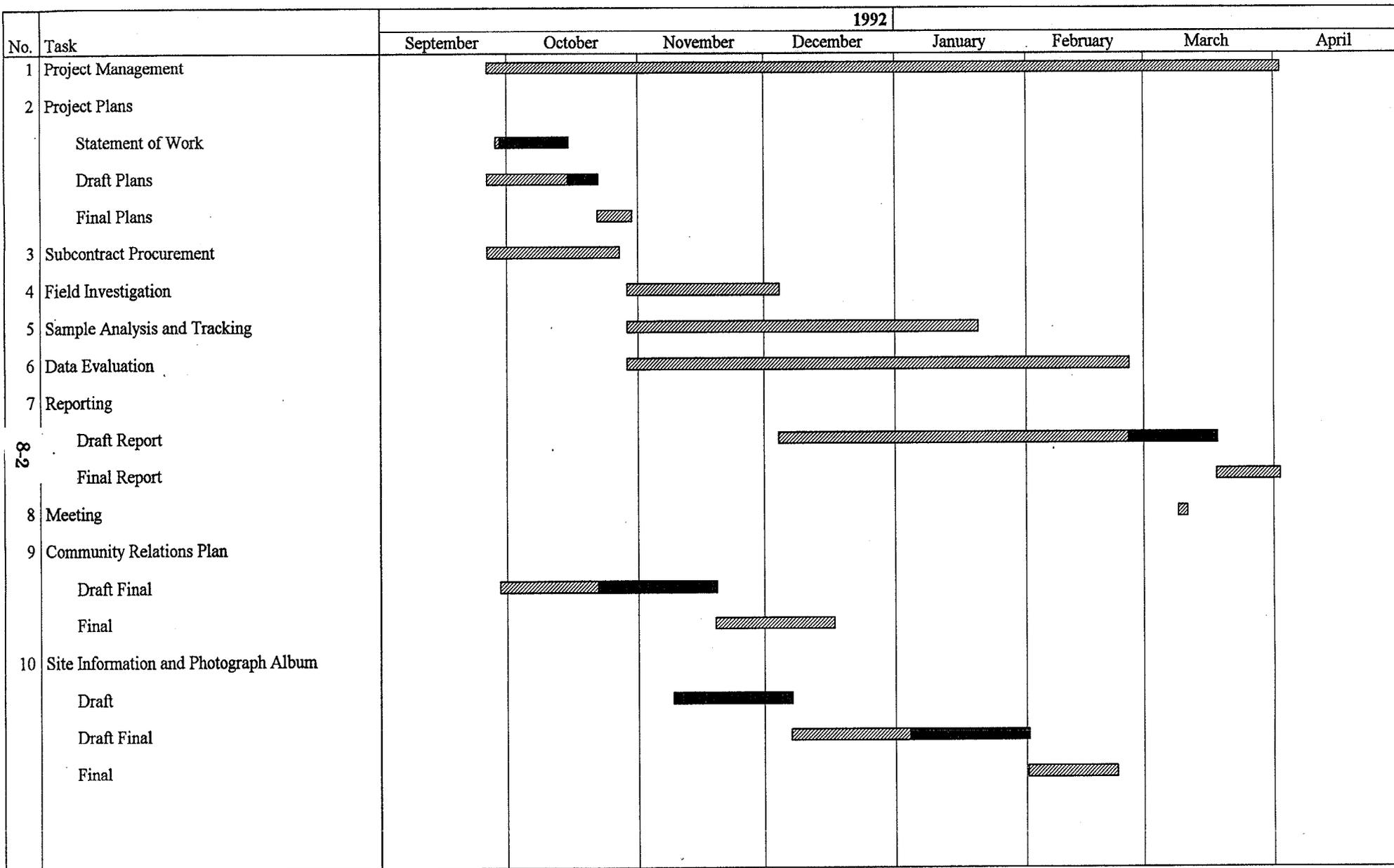
8.0 SCHEDULE

This project will be performed according to the schedule identified below:

<u>Date</u>	<u>Performance Requirement</u>
September 29, 1992	SoW and FP due at LANTDIV
October 12, 1992	Begin Draft Photograph Album
October 15, 1992	Draft Plans due at LANTDIV and NSRR
October 22, 1992	Comments due from LANTDIV and NSRR
October 22, 1992	Submit Draft Final CRP
October 29, 1992	Begin field program
October 30 1992	Final Plans due at LANTDIV and NSRR
November 9, 1992	Submit Draft Photograph Album
November 19, 1992	Comments on Draft Final CRP
November 20, 1992	Nominal end of field program
December 4, 1992	Last acceptable end of field program
December 7, 1992	Comments on Draft Photograph Album
December 17, 1992	Submit Final CRP
January 4, 1993	Completed receipt of analytical results
January 4, 1993	Submit Draft Final Photograph Album
January 20, 1993	Completed receipt of validated data
February 1, 1993	Comments on Draft Final Photograph Album
February 22, 1993	Submit Final Photograph Album
February 25, 1993	Draft Report sent to LANTDIV and NSRR
March 18, 1993	Comments on Draft Report sent from LANTDIV and NSRR
April 2, 1993	Final Report sent to LANTDIV and NSRR

A breakdown of project performance by task and by month is shown on Figure 8-1.

Fig. 1
Phase I Remedial Investigation
CTO-0007 - Project Manager: John Barone



Project: CTO-0007

Actual Time [Solid Black Bar] *LANTDIV review [Solid Black Bar]
Planned Time [Hatched Bar]

APPENDIX A
PRELIMINARY REPORT OF
PHOTO-INTERPRETATION STUDY



Geo Decisions, Inc.

118 Boalsburg Road
P.O. Box 1028
Lemont, PA 16851
(814) 234-8625

20 Bush Lane
Ithaca, NY 14850
(607) 257-0790

**AIRPHOTO ANALYSIS OF SUSPECTED
WASTE DISPOSAL SITES IN AND NEAR
ROOSEVELT ROADS NAVAL RESERVE**

Preliminary Report

Submitted to:

**Baker Environmental, Inc.
420 Rouser Road
Coraopolis, PA 15108**

September 28, 1992

INTRODUCTION

This report presents airphoto analyses of three suspected waste disposal sites in or near the Roosevelt Roads Naval Reserve in Puerto Rico. The locations of these sites are depicted in Figures 1 and 2. The focus of the analyses was to note the nature and location of historical changes, particularly with respect to waste disposal activities, in or adjacent to each of the three sites. As part of the analyses, GDI assessed features and conditions including, but not necessarily limited to: 1) observable waste disposal activities, 2) locations of pertinent structures, 3) distance to sensitive receptors (e.g., inhabited areas, wetlands, surface waters, etc.), 4) adjacent land use/cover, and 5) indications of vegetative stress and other similar damage characteristics.

Historical black-and-white photographs from 1951, 1958, 1959, 1964, 1967, 1972, and 1977 were analyzed for this report. Descriptions of these photographs are provided in Table 1. Results of the analyses for each site are annotated on copies of site maps provided by Baker Environmental. A list of the annotations used for the map overlays is given in Table 2.

RESULTS OF AIRPHOTO ANALYSES

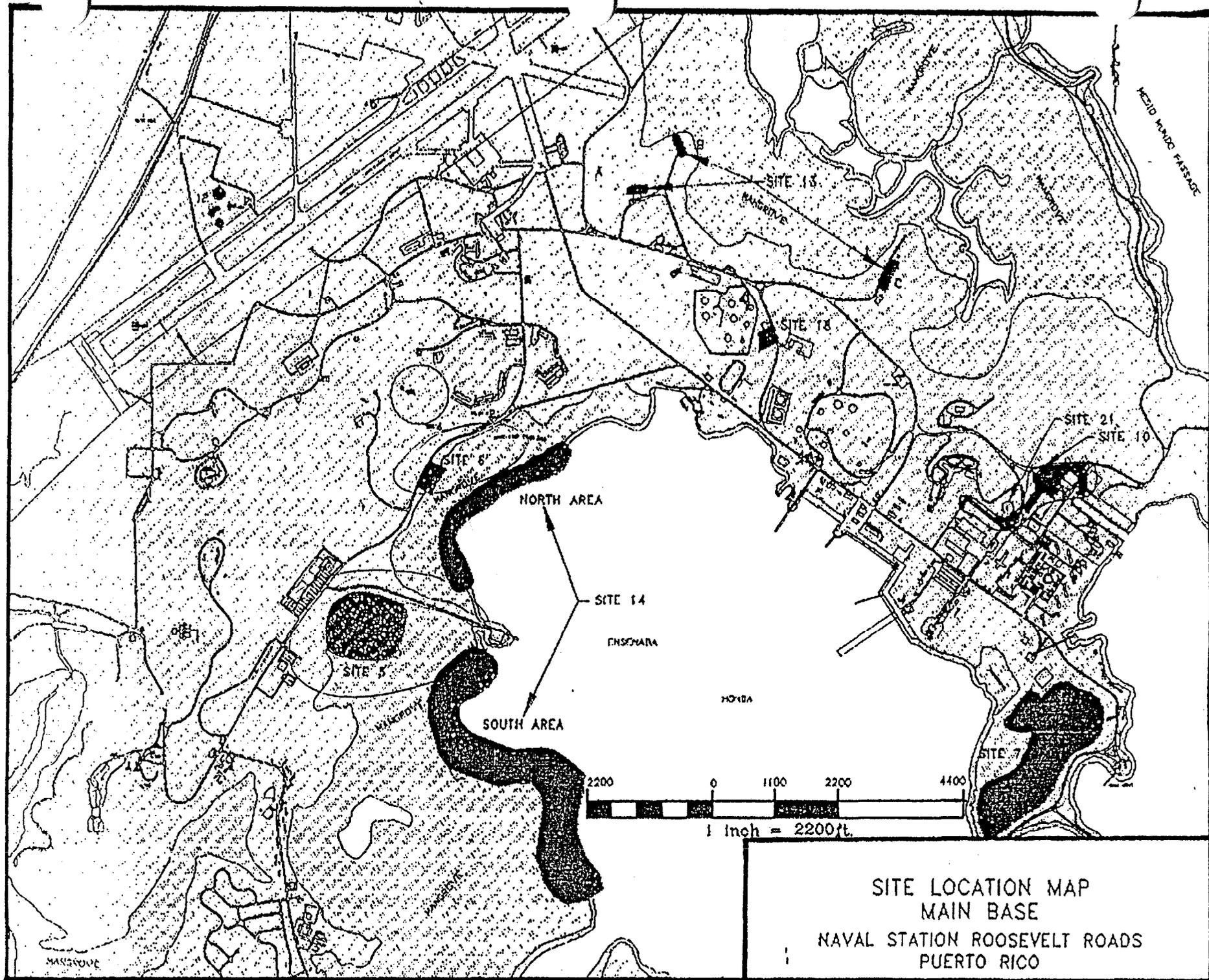
Site 1

No activity could be observed on 1959 airphotos acquired over this site. However, the access road appeared to be used frequently. In March of 1967, a few buildings would be seen in the general vicinity of the hatched area depicted in Figure 3. Several impoundments immediately west of these buildings appeared to contain liquid. On the 1972 photos, a cleared area with light-toned material (probably debris of some kind) were visible. These same features, with little change, were also evident on the 1977 aerial photos of the site.

Site 5

In January of 1951, a trench with associated vehicle (denoted as "V") were visible near an access road as depicted in Figure 4. The bottom of this trench appeared dark in tone, suggesting the presence of possible wet or burned material. The northern portion of the site (denoted as "DA/FILL") was disturbed and covered with a large amount of earthen material. A structure (S) was visible in a cleared area near an access road, and a large portion of the area was vegetated.

Figure 1.



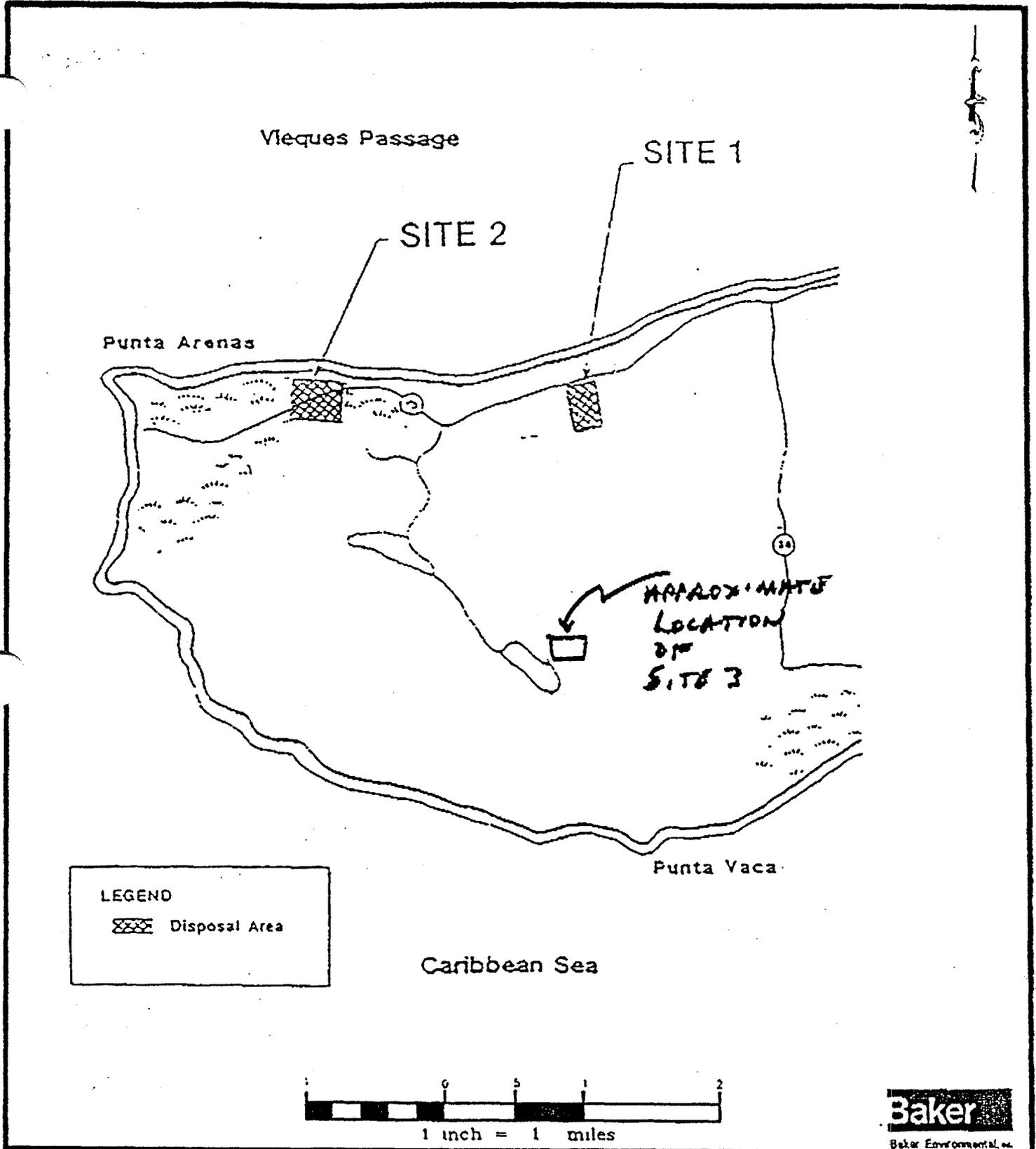


Figure 2.

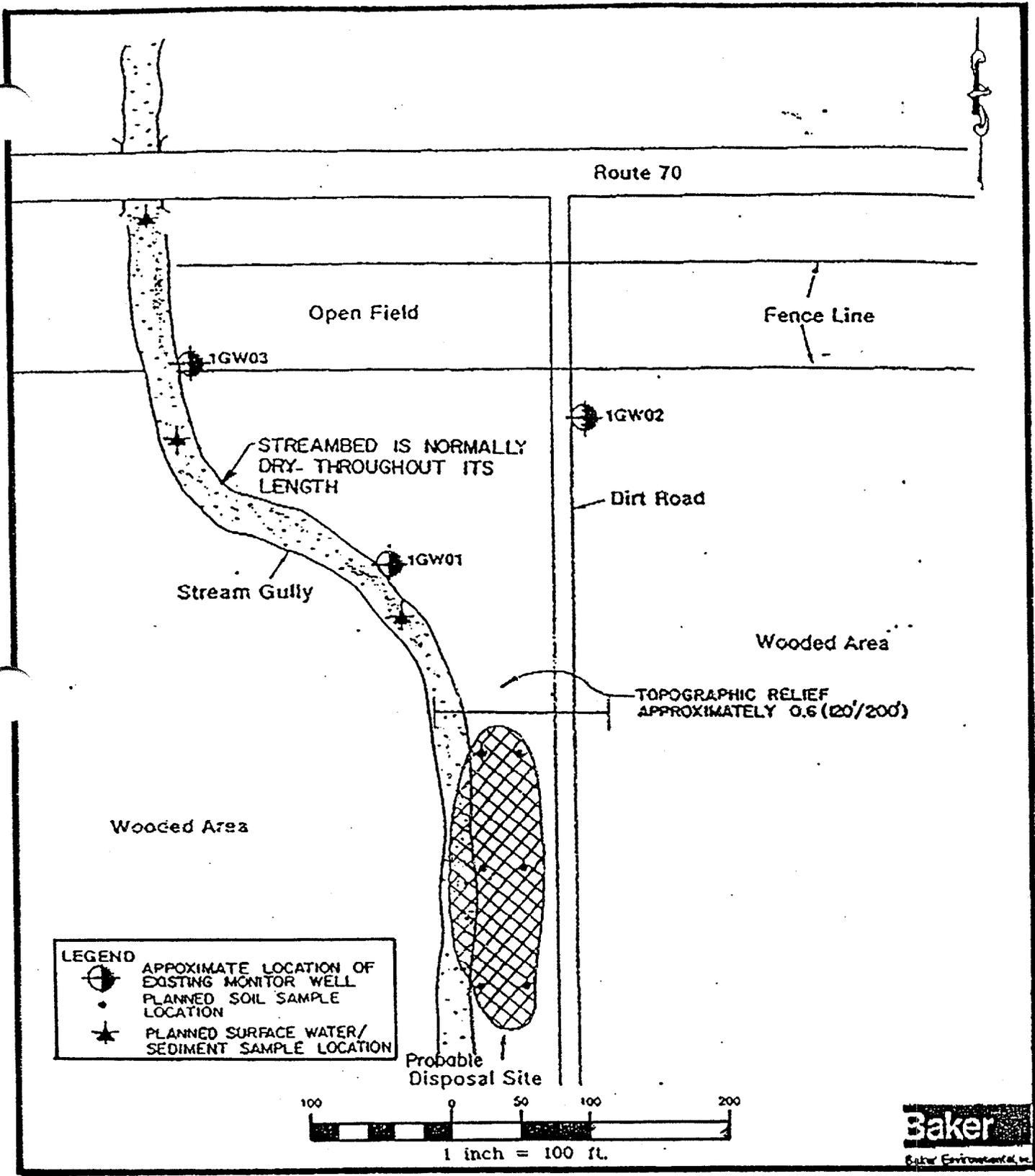
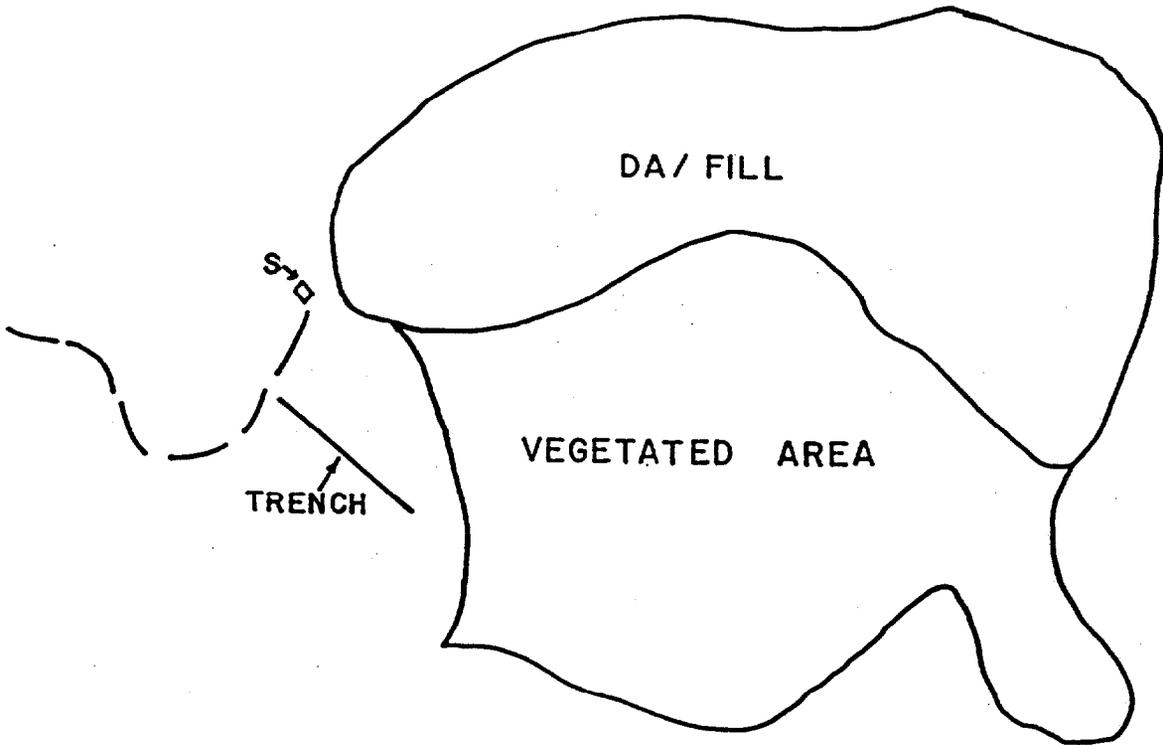


Figure 3.

SITE 5



JANUARY 8, 1951

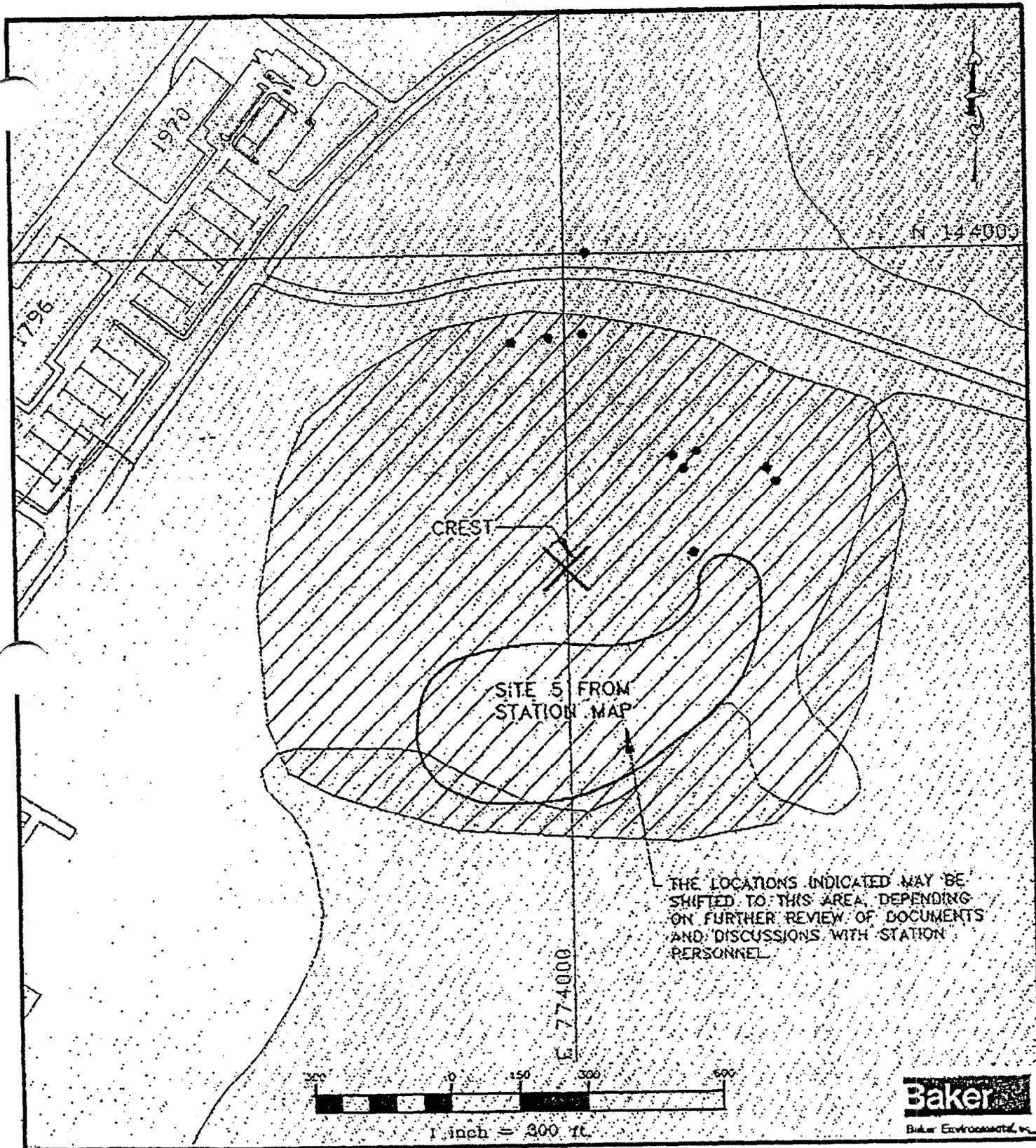


Figure 4.

On aerial photographs taken June 18, 1958, a deep trench is visible in the eastern portion of the site (see Figure 5). The mounded material along the southwest side of the trench possibly came from its excavation. A fire can be seen burning in the northern end of the trench, and an access road leads to the southern end. An area of light-toned mounded material is visible on the southern side of the access road, opposite the trench. The rest of Site 5 appears to be a fill area.

Only part of the site could be seen on aerial photos obtained on October 29, 1958. The approximate extent of the photo coverage is annotated on the overlay to Figure 6. Possible containers can be seen at the base of the fill area directly north of a large mound of light-toned material. The containers are rectangular in shape and appear to be tightly grouped. Two buildings can be seen next to an access road to the north.

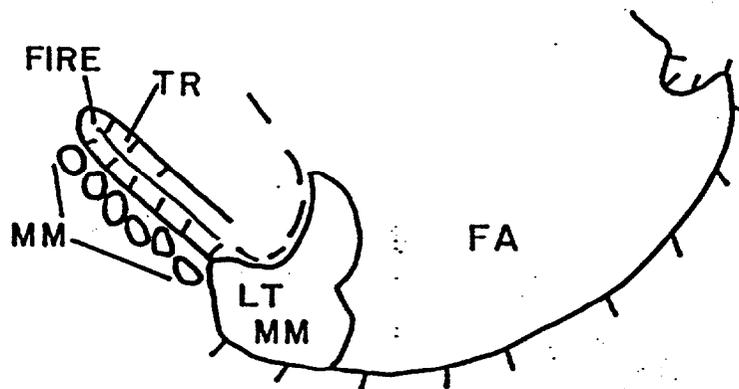
In the 1964 aerial photos over the area, the access road is still visible (see Figure 7). The trench noted in 1951 is now gone, and a new trench or ditch is visible south of the access road. A fill area with exposed surface debris is now evident in the general vicinity of the old trench. Also, a drainage channel leading from this fill area to the bay (Ensenada Honda) is visible in the 1964 photos.

By 1977 the site had completely re-vegetated, and no additional activity could be observed.

Site 6

In 1951, much of the hatched area depicted in Figure 8 was cleared, and filling activity was evident on aerial photographs taken at that time. An access road could be seen leading to a fill face, and some kind of material, possibly debris, appeared to be located along the bottom edge of the fill face. On the 1964 photos, the same features evident in 1951 and 1958 (with the exception of the possible debris) were still visible. By 1977 no activity could be seen, and the site had completely re-vegetated.

SITE 5



TR - Trench

MM - Mounded Material

LT - Light-toned

JUNE 18, 1958

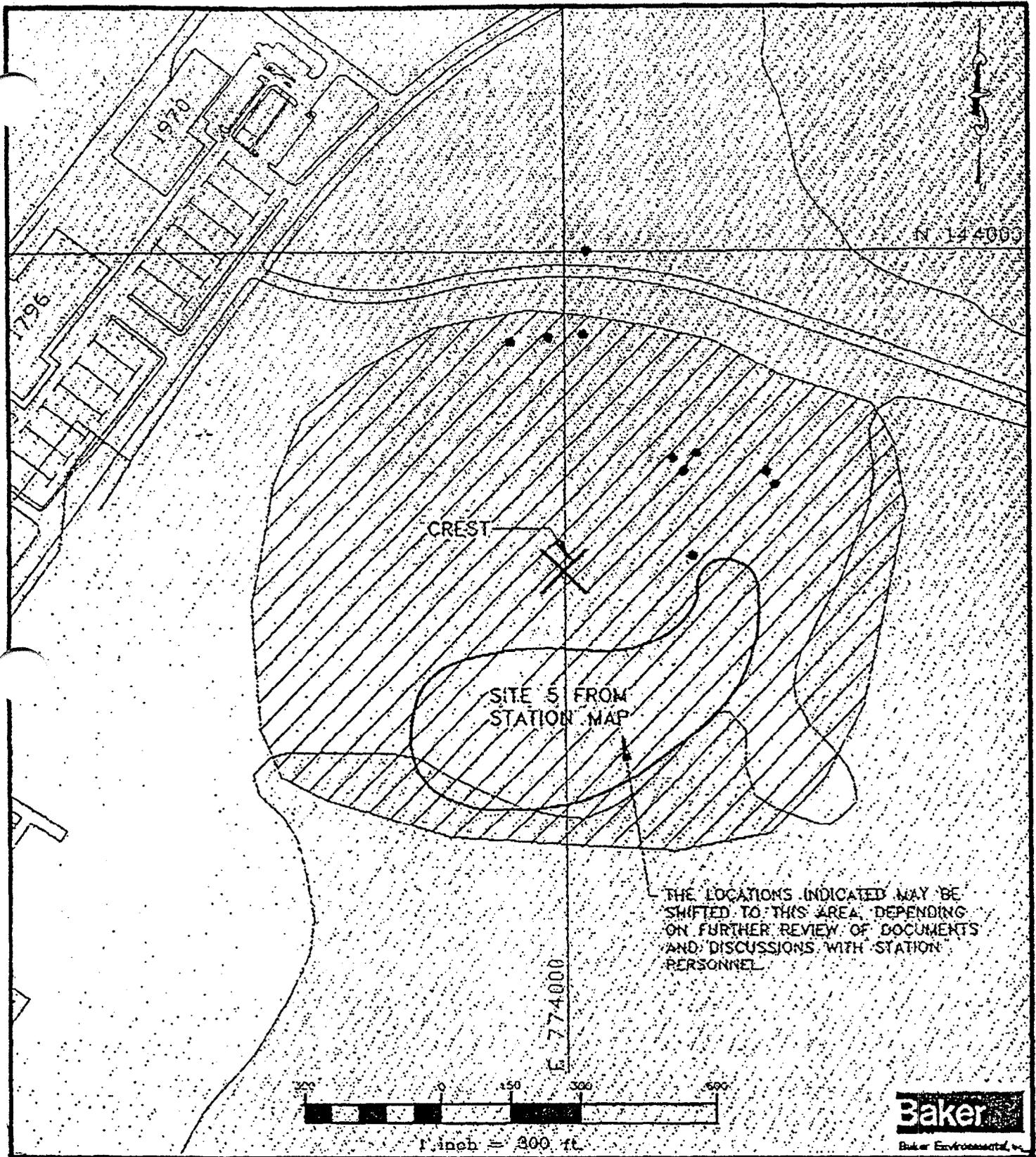
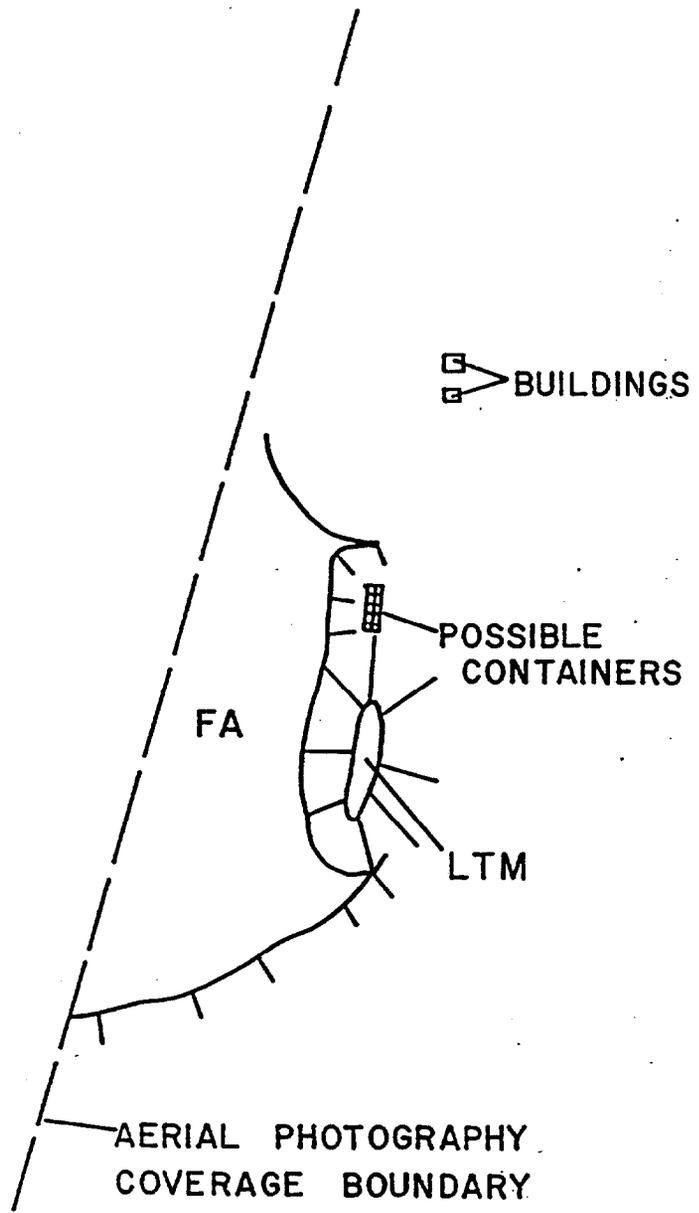


Figure 5.

SITE 5



LTM - Light toned material

OCTOBER 29, 1958

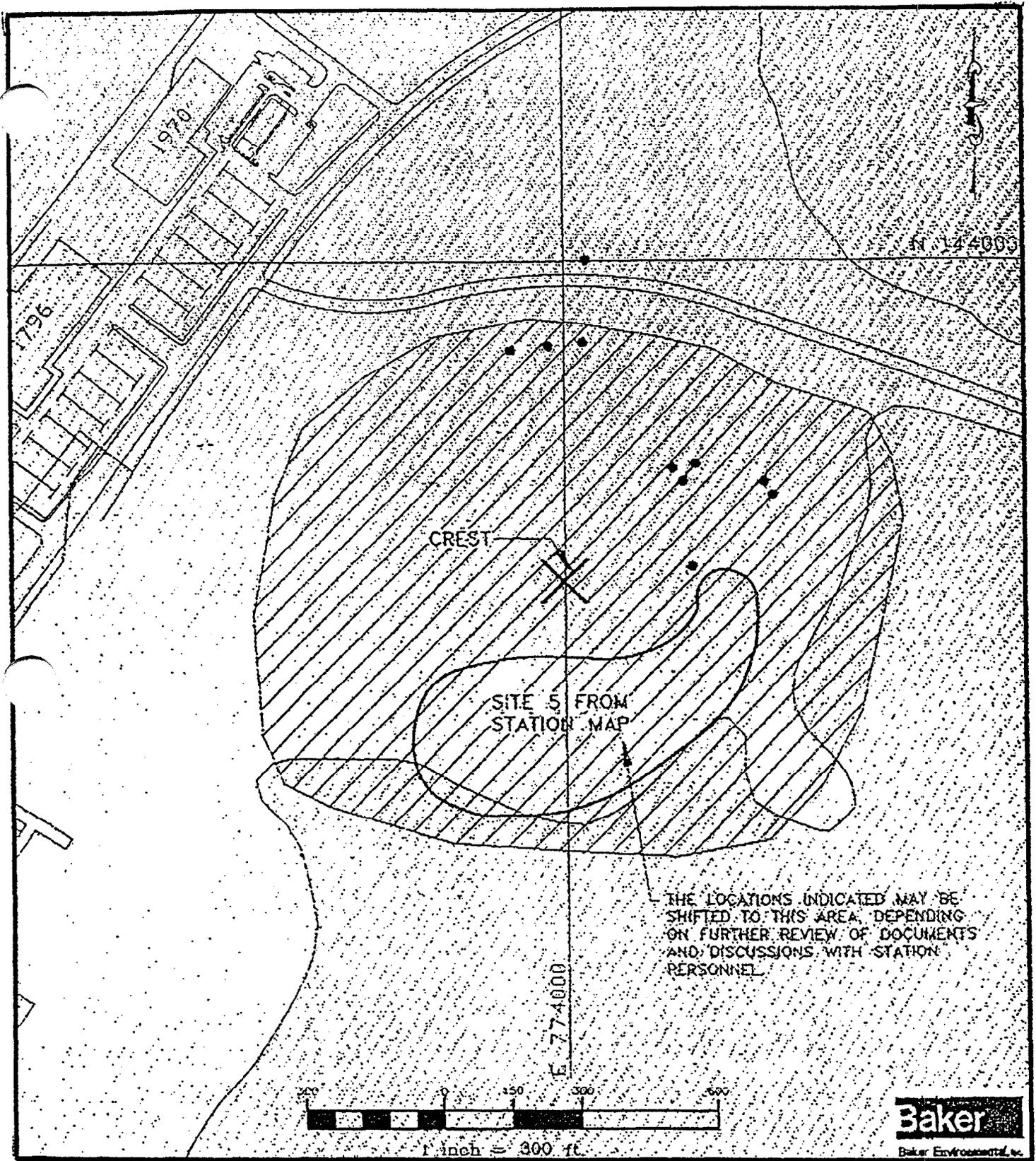


Figure 6.

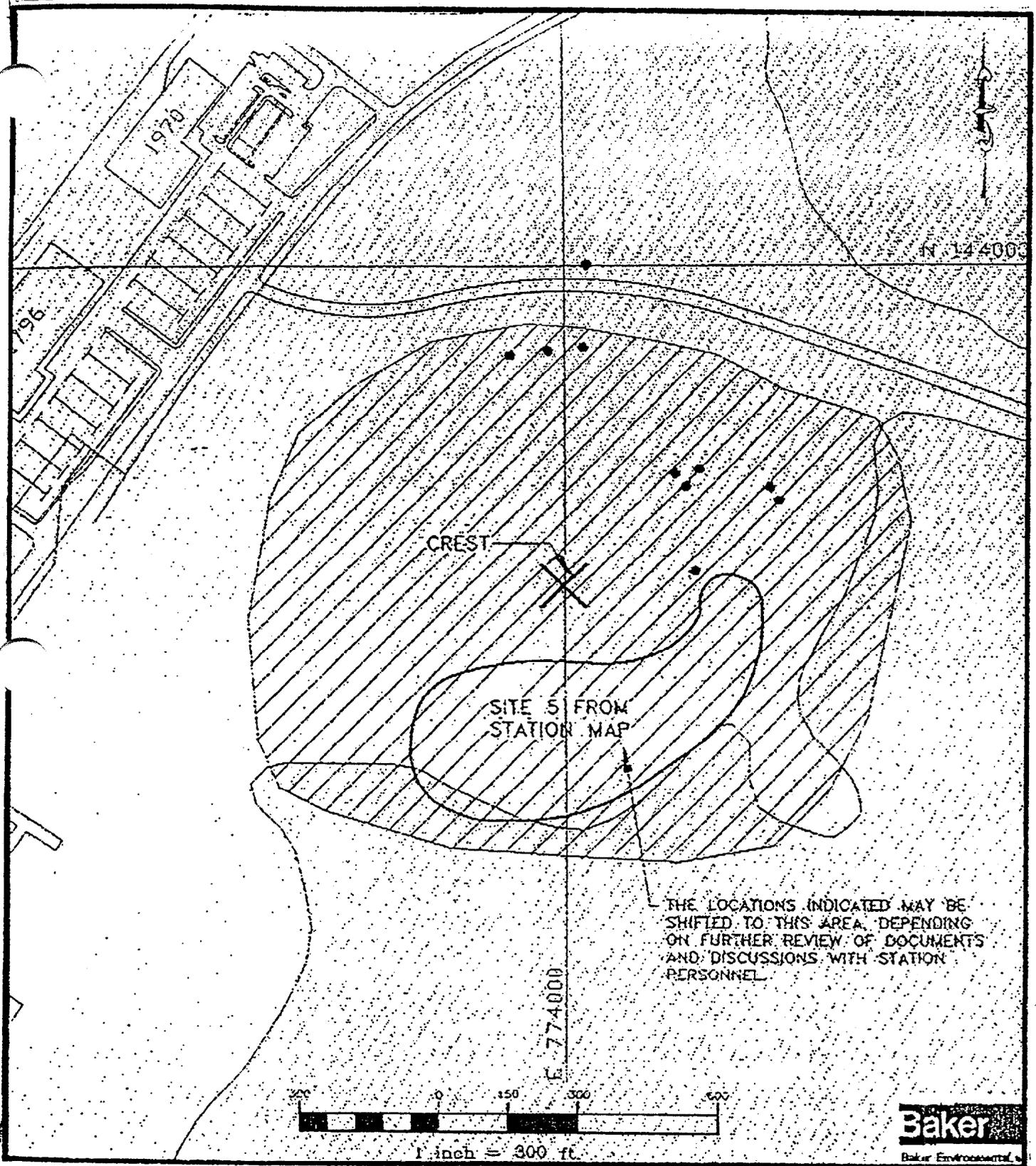
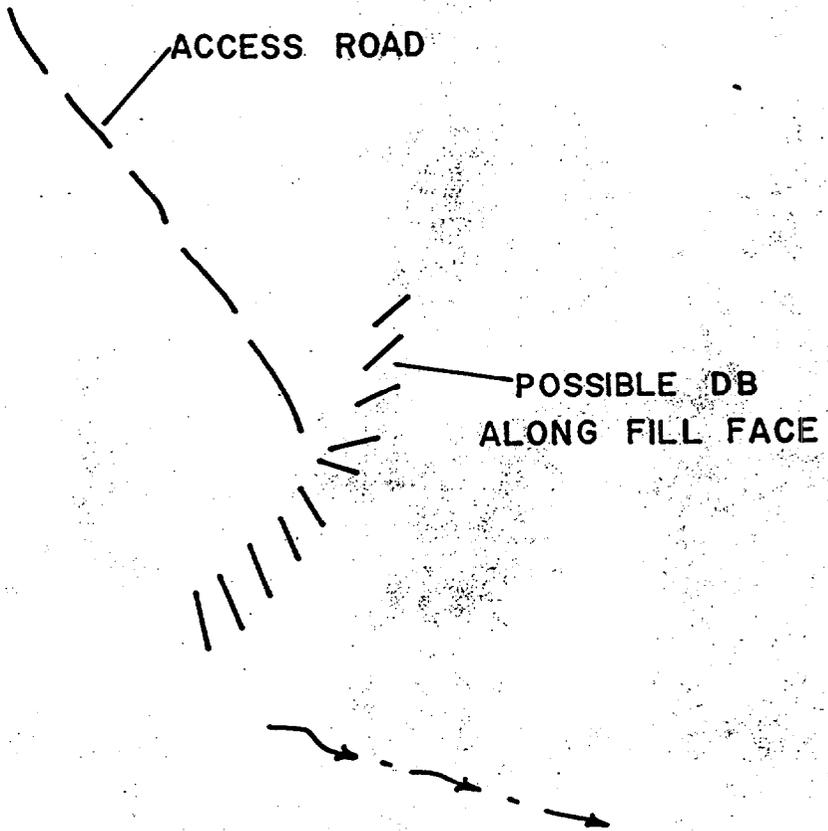


Figure 7.

SITE 6



JANUARY 8, 1951

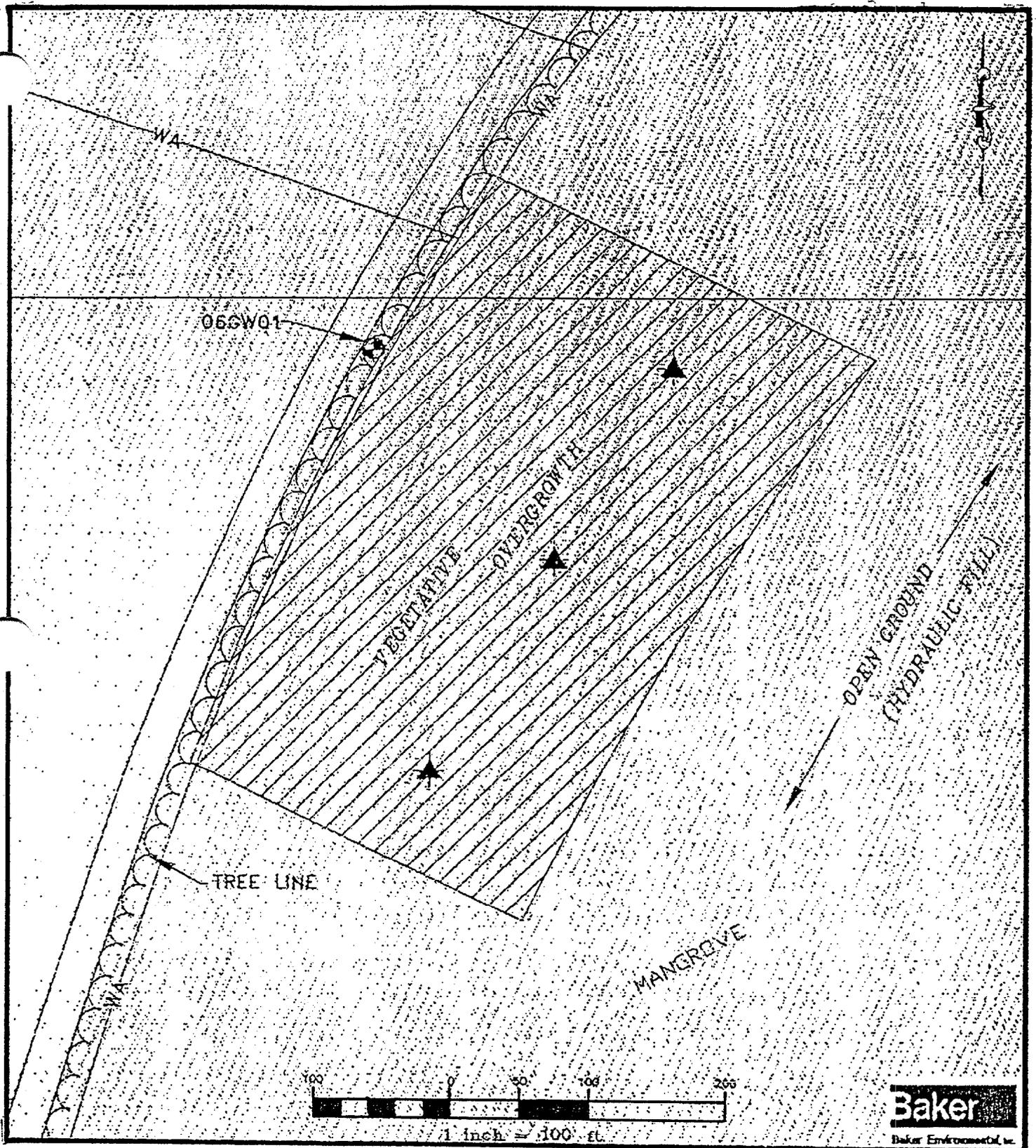


Figure 8.

Table 1. Airphoto Descriptions

<u>Site</u>	<u>Date</u>	<u>Source</u>	<u>Scale</u>	<u>Project</u>	<u>Frames</u>
5 & 6	1951	USGS		GS-LR-7	149,150
5 & 6	1958	DIA		H02277	10-13
1	1959	DIA		H02303	29-31
5 & 6	1959	DIA		H002300	9,9A,10,10A
5 & 6	1964	ASCS		ELT-11DD	93-95
1	1967	ASCS		ELT-22DD	164-166
1	1972	Unknown			
5 & 6	1977	NOS		77E	6268,6269,6232, 6233

Table 2. Map Annotations

DB - Debris
LT - Light-toned Material
FA - Fill Area
MM - Mounded Material
S - Structure/Building
TR - Trench
CL - Cleared Area