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QUALITY ASSURANCE PROJECT PLAN FOR HYDROGEOLOGIC INVESTIGATION AND REMEDIATION OF AVIATION TURBINE FUEL JP-5 PIPELINE LEAK NAS PENSACOLA FL
09/01/1987
GERAGHTY & MILLER INC

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QUALITY ASSURANCE PROJECT PLAN FOR HYDROGEOLOGIC INVESTIGATION AND REMEDIATION OF JET FUEL LEAK AT THE NAVAL AIR STATION PENSACOLA, FLORIDA

G&M Project No. TO290JF1

GERAGHTY & MILLER, INC.
Ground-Water Consultants

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QUALITY ASSURANCE PROJECT PLAN FOR HYDROGEOLOGIC INVESTIGATION AND REMEDIATION OF JET FUEL LEAK AT THE NAVAL AIR STATION PENSACOLA, FLORIDA

G&M Project No. TO290JF1

Submitted to

FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION
Tallahassee, Florida

September 1987

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3.0 PROJECT DESCRIPTION

In October 1986, Geraghty & Miller, Inc., (G&M) was retained by the Naval Facilities Engineering Command, Southern Division (The Navy), to investigate potential hydrocarbon contamination at the Naval Air Station (NAS) in Pensacola, Florida, as shown in Figure 1. An 8-inch steel pipe that conveys aviation turbine fuel (JP-5) along Radford Boulevard reportedly was punctured by an outside contractor working near the McDonalds Restaurant (Figure 2).

The purpose of the investigation was to determine the occurrence and extent of hydrocarbon contamination in the subsurface. The meaning of the term hydrocarbon as used in this Project Quality Assurance Plan (QAPP) is defined in G&M's General QAPP for the hydrogeologic investigation of hydrocarbon contamination of ground water which is on file with the Quality Assurance Section of Florida Department of Environmental Regulation (FDER), Tallahassee, Florida.

In October 1986, JP-5 was observed seeping from the ground immediately adjacent to the south side of Radford Boulevard in front of the McDonald's Restaurant. A survey crew from the Navy Public Works Center (NPWC) excavated along the road in the area of the leak and discovered a partially disintegrated plug in the JP-5 pipeline. The pipe was then permanently repaired by NAS personnel and G&M was retained to investigate the leak. Initially, G&M personnel reviewed

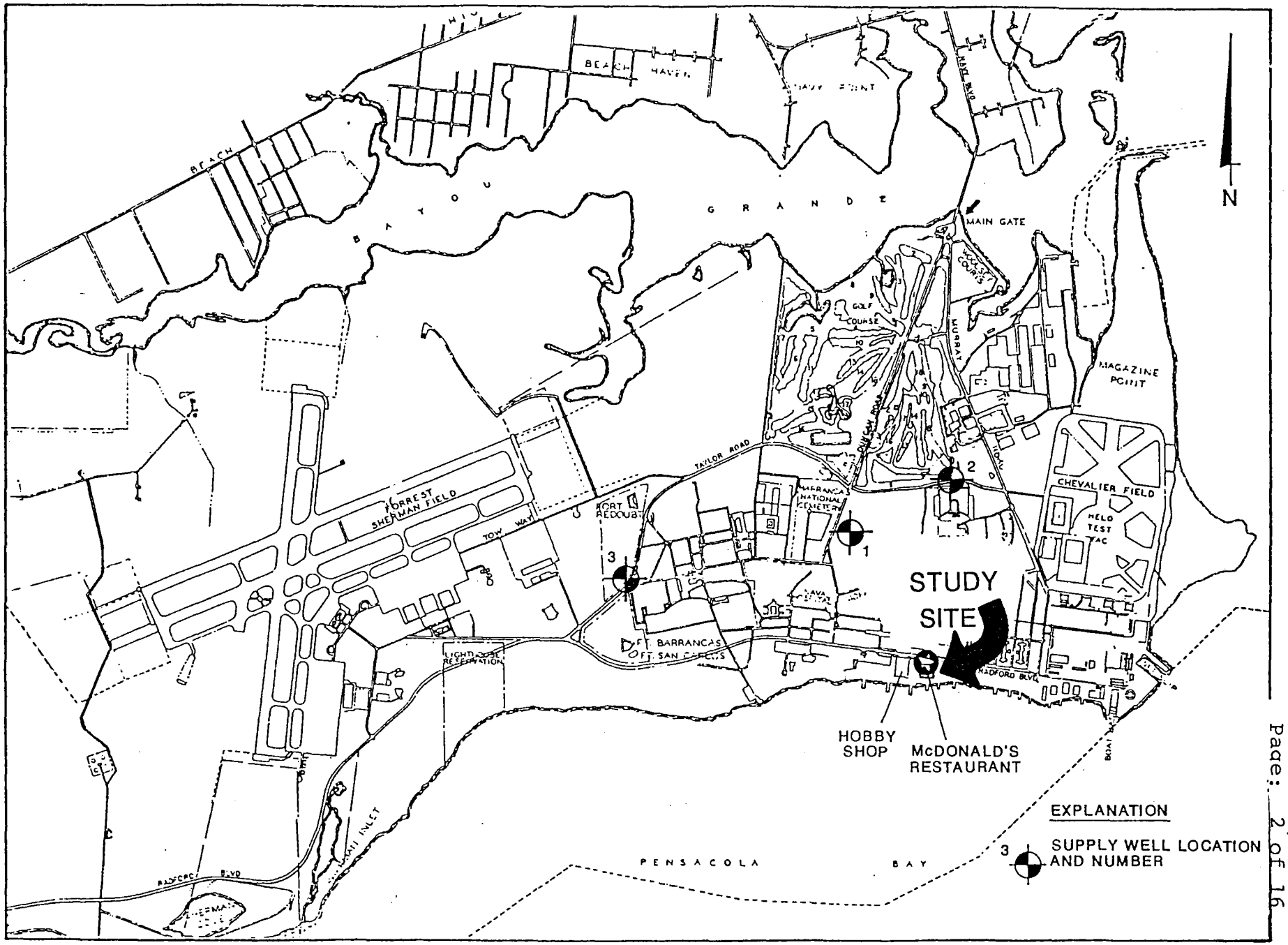

Figure 1. Location Map of Naval Air Station Site, Pensacola, Florida

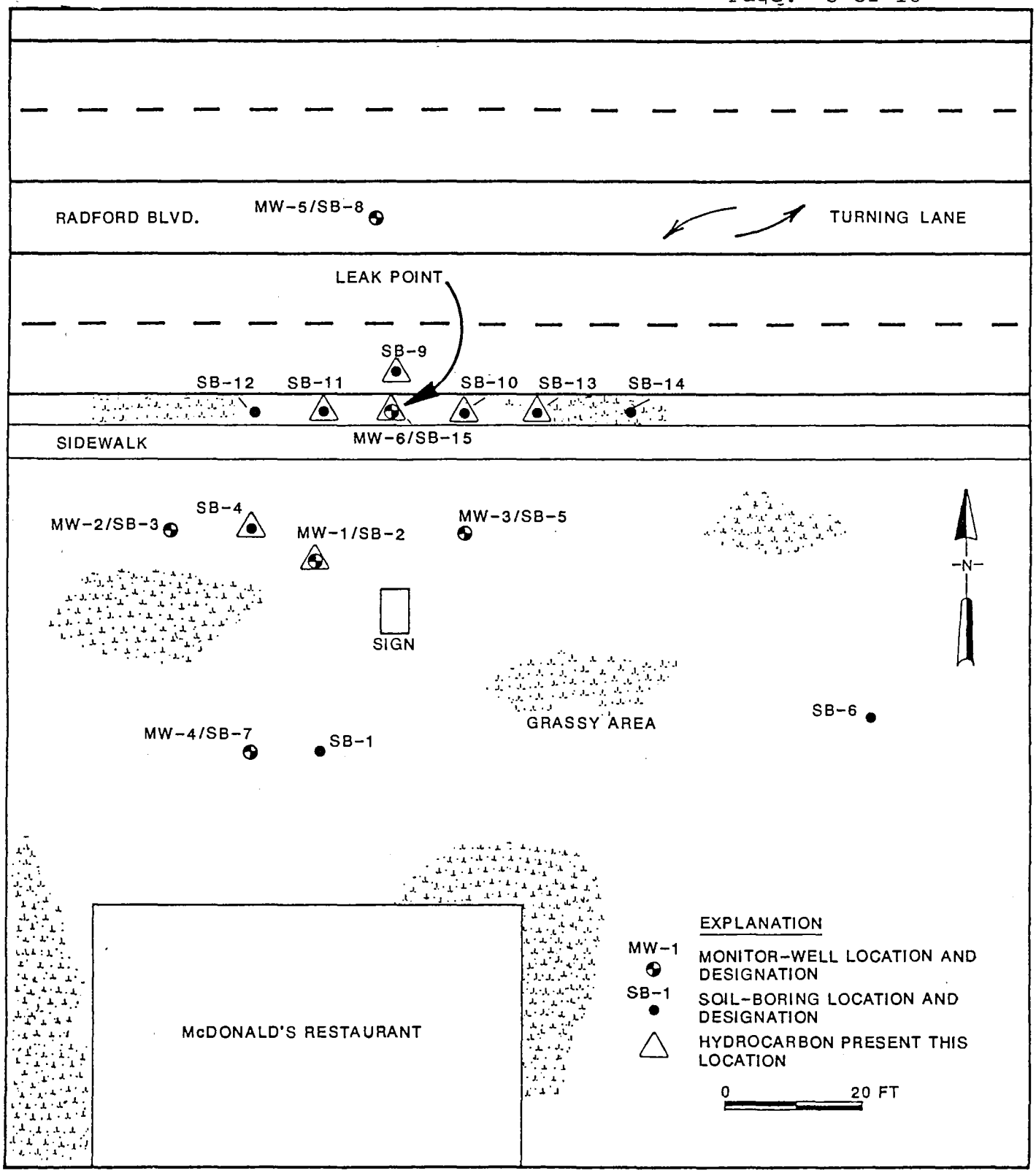

Figure 2. Location of Monitor Wells and Soil Borings

existing data about the site and gathered background information on the area. This included a review of the general geologic and hydrologic setting of the area surrounding the site. A site survey was also performed to determine the location of buried utilities in the area.

In November 1986, a soil boring/monitor-well installation program was initiated to better define the site hydrogeology and the extent of contamination. Fifteen soil borings (Figure 2) were drilled to depths ranging from 9.5 to 64 feet (ft) from which continuous split-spoon samples were collected. The samples were examined visually, by olfactory sense, and with two instruments: an ultraviolet light and a explosimeter (Gas-Trac NCX-5).

A clayey soil sample was collected from boring SB-6 (Figure 2) at a depth of 62 to 64 ft and sent to a soils laboratory for vertical permeability analysis, and a sand sample was collected from boring SB-4 at a depth of 6.5 ft to 11 ft for grain-size analysis. Laboratory analyses were used in recovery-system design.

Six of the borings (Figure 3) were converted to monitor wells in the vicinity of the site. The monitor wells were installed to obtain ground-water levels, measure hydrocarbon thicknesses, and to obtain water-quality samples. A water-level measuring point was established and marked at each monitor well on the top of the PVC well casing. The depth to water and the hydrocarbon thickness were measured in

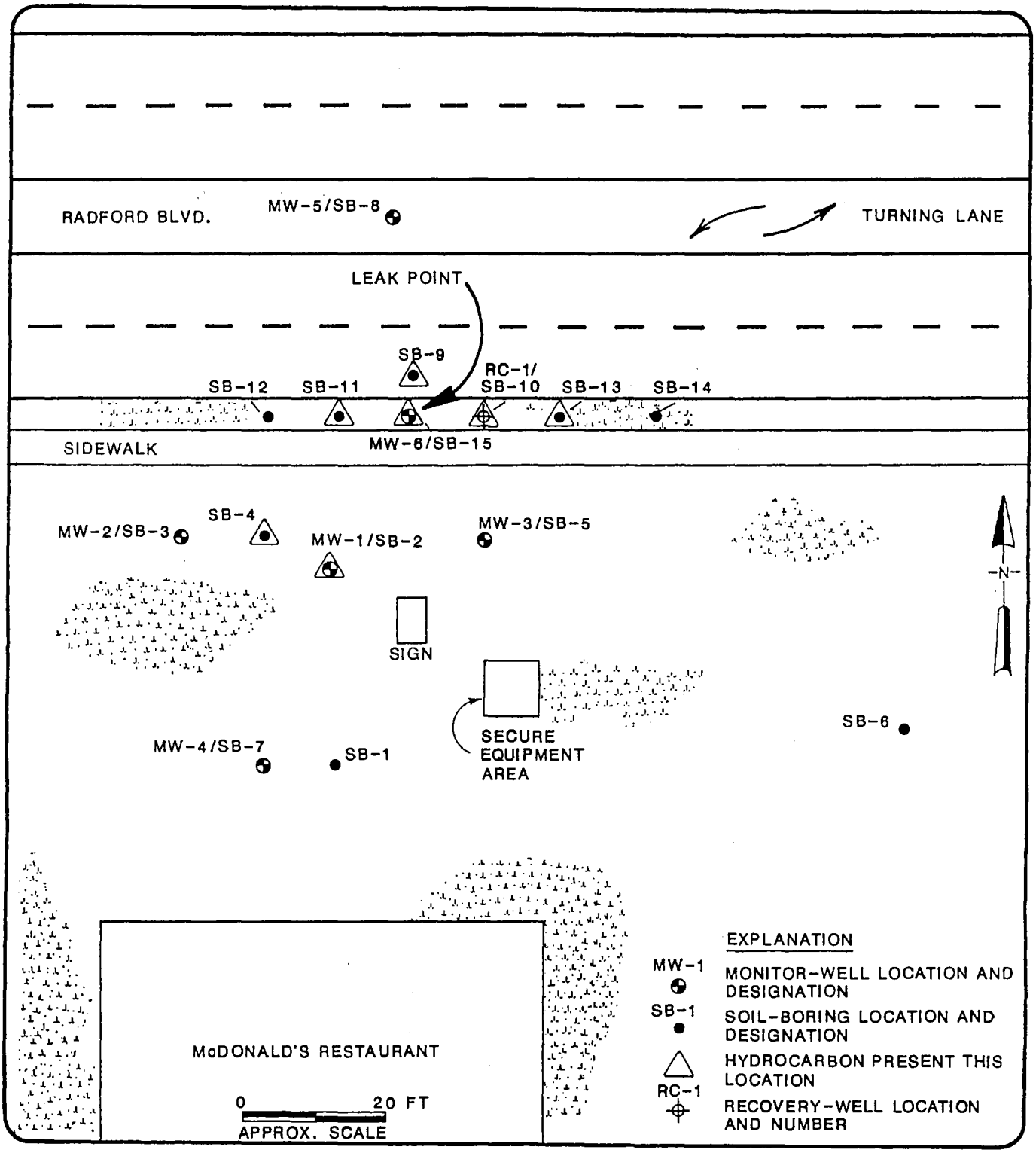

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Figure 3.

Location of Recovery System

CLIENT NAME:

Department of the Navy

each well using an electronic hydrocarbon (interface) probe. Depth to water measurements were converted to water-table elevations. Based on the measurements collected from November 1986 through May 1987, the general direction of ground-water flow in the shallow water-table aquifer appears to be to the south-southwest toward Pensacola Bay.

In November 1986, ground-water samples were collected from monitor wells MW-1, MW-2, MW-3, MW-4, and MW-5 and submitted to a laboratory with an FDER approved QAPP. The samples were analyzed for dissolved aromatic hydrocarbons (AH) by Environmental Protection Agency (EPA) Method 602 and for polynuclear aromatic hydrocarbons (PNA) by EPA Method 610. All analyses were below method detection limits (BMDL).

In April 1987, monitor wells MW-1, MW-2, MW-3, MW-4, and MW-5 were resampled and analyzed by the same methods. Monitor well MW-6 was not sampled because it contained 0.06 ft of liquid-phase hydrocarbon. Results of the latest laboratory analyses indicate that dissolved aromatic hydrocarbons were present in monitor wells MW-1, MW-2, MW-4, and MW-5. Monitor well MW-1 contained 1 ug/L (microgram per liter) of benzene and 3 ug/L of ethyl benzene; MW-2 contained 7 ug/L of benzene and 6 ug/L of ethyl benzene; and MW-4 contained 2 ug/L of benzene. PNA compounds were BMDL for all samples.

The primary objective of this investigation is to design a remedial program to remove the liquid-phase hydrocarbon in the subsurface, which is the source of the dissolved aromatic hydrocarbons, and to reduce the dissolved hydrocarbon concentrations in the ground water to FDER acceptable levels.

3.1 SCOPE OF WORK

The scope of work for this investigation will consist of the following:

3.1.1 Remedial Action Plan

A Remedial Action Plan (RAP) for remediation of the contaminated ground water at NAS-Pensacola has been submitted to FDER. The plan is described in Section 3.0, pages 3 and 4, of G&M's Generic B Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

Basically, the objectives of the RAP consist of three components: (1) removal of the liquid-phase hydrocarbon, (2) removal or treatment of the dissolved hydrocarbons in the ground water, and (3) disposal of the recovered ground water. To achieve these objectives, a recovery system employing the most technologically advanced method available was designed to rapidly remove the liquid-phase hydrocarbon and reduce the dissolved hydrocarbon concentrations to levels acceptable by the state.

3.2 DESIGNATED TASKS

In order to accomplish the objectives of the RAP, the tasks G&M will perform include: (1) recovery system installation, (2) sample collection and analysis, and (3) data analysis and presentation for intended end use of data.

3.2.1 Recovery-System Installation

Installation of the recovery system will consist of: (1) recovery-well installation, (2) hook-up to the sanitary sewer, and (3) system start-up verification. A single recovery well will be installed near the leak site (Figure 3). The well will be developed for approximately one hour to ensure a sand-free discharge and then will be equipped with two total fluids pumps to extract both ground water and liquid-phase hydrocarbons separately. Water removed from the well during development will be discharged to the sanitary sewer. The recovery system is designed so that JP-5 recovered from the recovery well will be discharged to a product storage tank and the recovered ground water will be discharged into the sanitary sewer.

3.2.2 Sample Collection, Analysis, and Recovery-System Monitoring

The ground-water quality and the quality of the recovery-system effluent will be routinely monitored by G&M to assess the efficacy of the remedial measures. The analyses to be performed will measure the concentrations of

the purgeable aromatic hydrocarbons specified by FDER corrective actions for hydrocarbon contamination of ground water. These components are: benzene, toluene, xylenes, ethyl benzene, total aromatic hydrocarbons as detected by EPA Method 602, and PNAs by EPA Method 610. Additionally, water-level measurements in the monitor wells and the recovery well will be routinely obtained to determine the direction of ground-water movement in the study area.

Samples for the water-quality analysis of the recovered ground water will be collected from the recovery system once a week for the first month and monthly thereafter. All samples will be analyzed for purgeable aromatic hydrocarbons by EPA Method 602. In addition, one sample per quarter will be analyzed for PNAs by EPA Method 610.

Five monitor wells (MW-1, MW-2, MW-3, MW-4, and MW-5) also will be sampled and analyzed on a quarterly basis for purgeable aromatic hydrocarbons by EPA Method 602 and for PNAs by EPA Method 610. All samples will be maintained on ice, transported using standard chain-of-custody forms, and analyzed by Pioneer Laboratory, Inc., of Pensacola, Florida, in accordance with required water-analyses methods. G&M will measure and record temperature, pH, and specific conductance of water samples at the time of collection.

All of the field work will be supervised by personnel from G&M. Specific sampling protocol are described in

Section 6.0, "Sampling Procedures," and the required water-analyses methods for hydrocarbon contamination cases are addressed in Section 9.0, "Analytical Procedures."

The number of samples to be collected for this project is dependent on the duration of the remedial action. Remedial measures will continue until the dissolved hydrocarbons in the ground water are reduced to acceptable concentrations and all of the liquid-phase hydrocarbon is removed from the recovery well and monitor wells. Assuming the length of operation of the recovery system is one year, 24 ground-water samples, 4 field blanks, and 4 sampler rinsates will be collected and analyzed by EPA Method 610; 35 ground-water samples, 19 field blanks, and 4 sampler rinsates also will be collected and analyzed by EPA Method 602. A summary of these samples is presented in Table 1. It should be noted that field blanks and sampler rinsates will be submitted with each batch of samples at a frequency of 1 per 20 samples (5%). Table 2 lists the total number of samples to be analyzed by parameter.

3.2.3 Data Analyses and Presentation and Intended End Use of Data

The ground-water quality analyses from the recovery-well discharge will be used to evaluate the progress of the ground-water remediation. The quarterly ground-water quality analyses from the monitor wells and recovery well will be used to evaluate the efficacy of the recovery system and to

Table 1. Summary of Sample Quantity

Sample Location	Recovery System		Monitor Wells		Total	
Method of Analysis:	602	610	602	610	602	610
Ground-Water:	15	4	20	20	35	24
Field Blanks:	15	4	none[1/]		15	4
Sampler Rinsates:	none[2/]		4	4	4	4
Total:					54	32

1/ Monitor well samples will be collected quarterly but simultaneous with collection of recovery system samples. Field blanks also will be prepared and all samples (monitor well samples, recovery well samples, and field blanks) will be submitted to the laboratory at the same time.

2/ Sampler rinsates are not required because recovery system samples are collected from a spigot; no sampling equipment is involved.

TABLE 2. SAMPLING AND ANALYSIS SUMMARY

MATRIX			PARAMETER
GROUND WATER	SURFACE WATER	SOIL	
			VOLATILE ORGANICS
			Acrolein
			Acrylonitrile
54			Benzene
			Bromoform
			Carbon Tetrachloride
54			Chlorobenzene
			Chlorodibromomethane
			Chloroethane
			2-Chloroethyl vinyl ether
			Chloroform
			Dichlorobromomethane
			1,1-Dichloroethane
			1,2-Dichloroethane
			1,1-Dichloroethylene
			1,2-Dichloropropane
			1,3-Dichloropropylene
54			Ethylbenzene
			Ethylene Dibromide (EDB)
			Methyl bromide
			Methyl chloride
			Methylene chloride

Table 2.(Cont'd)

MATRIX			PARAMETER
GROUND WATER	SURFACE WATER	SOIL	
			1,1,2,2-Tetrachloroethane
			Tetrachloroethylene
54			Toluene
			1,2-trans-Dichloroethylene
			1,1,1-Trichloroethane
			1,1,2-Trichloroethane
			Trichloroethylene
			Vinyl Chloride
54			Xylene
54			1,2 Dichlorobenzene
54			1,3 Dichlorobenzene
54			1,4 Dichlorobenzene

Table 2. (Cont'd)

MATRIX			PARAMETER
GROUND WATER	SURFACE WATER	SOIL	
			BASE/NEUTRAL EXTRACTABLE ORGANICS
32			Acenaphthene
32			Acenaphthylene
32			Anthracene
			Benzidine
32			Benzo(a)anthracene
32			Benzo(b)fluoranthene
32			Benzo(a)pyrene
			3,4-Benzofluoranthene
32			Benzo(ghi)perylene
32			Benzo(k)fluoranthene
			bis(2-Chloroethoxy)methane
			bis(2-Chloroethyl) ether
			bis(2-Chlorisopropyl)ether
			bis(2-Ethylhexyl)phthalate
			4-Bromophenyl phenyl ether
			Butyl benzyl phthalate
			2-Chloronaphthalene
			4-Chlorophenyl phenyl ether
32			Chrysene
32			Dibenzo(a,h)anthracene
			1,2-Dichlorobenzene
			1,3-Dichlorobenzene
			1,4-Dichlorobenzene
			3,3-Dichlorobenzidine

Table 2. (Cont'd)

MATRIX			PARAMETER
GROUND WATER	SURFACE WATER	SOIL	
			Diethyl phthalate
			Dimethyl phthalate
			Di-n-butyl phthalate
			2,4-dinitrotoluene
			2,6-dinitrotoluene
			Di-n-octyl phthalate
			1,2-diphenylhydrazine
32			Fluoranthene
32			Fluorene
			Hexachlorobenzene
			Hexachlorobutadiene
			Hexachlorocyclopentadiene
			Hexachloroethane
32			Indeno(1,2,3-c,d)pyrene
			Isophorone
32			Naphthalene
			Nitrobenzene
			N-Nitrosodimethylamine
			N-Nitrosodi-n-propylamine
			N-Nitrosodiphenylamine
32			Phenanthrene
32			Pyrene
			1,2,4-Trichlorobenzene

determine when remedial actions may be modified or discontinued. The actual duration of ground-water recovery operations will be dependent on removing the liquid-phase hydrocarbon and reducing the dissolved hydrocarbon concentrations to acceptable levels.

Recovery operations will begin following FDER approval of the RAP and completion of the recovery-system installation. Routine water-quality sampling of the recovery system and monitor wells will provide an on-going account of the recovery operations.

4.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The overall project organization is described in Section 4.0, pages 1 through 4, of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida. The following conditions and modifications are included for this site-specific Project QA Plan:

- Project Organization Chart (Figure 4)
- Overall Project Coordinator
- Project Manager for G&M

The overall Project Coordinator for the investigation will be Mr. Mike Green, Environmental Engineer, Naval Facilities Engineering Command. Mr. Green is located in Charleston, South Carolina, and will function as liaison between the Navy, G&M, and the FDER. The G&M Project Manager will be Mr. Peter J. Lacko, who will be involved, along with the Project Officer, in the site investigation, quality assurance program, data analysis, report preparation, and meetings. He also will be responsible for coordinating and managing the subcontractor, supervision of the field operations, and the maintenance of budgetary controls throughout the investigation. G&M's QA Officer for this project will be Mr. Charles W. Ankerberg, who will be responsible for liaison between G&M, the laboratory, and the FDER QA officers. He also will be responsible for G&M data validation, laboratory contracts, QA audits, and reports.

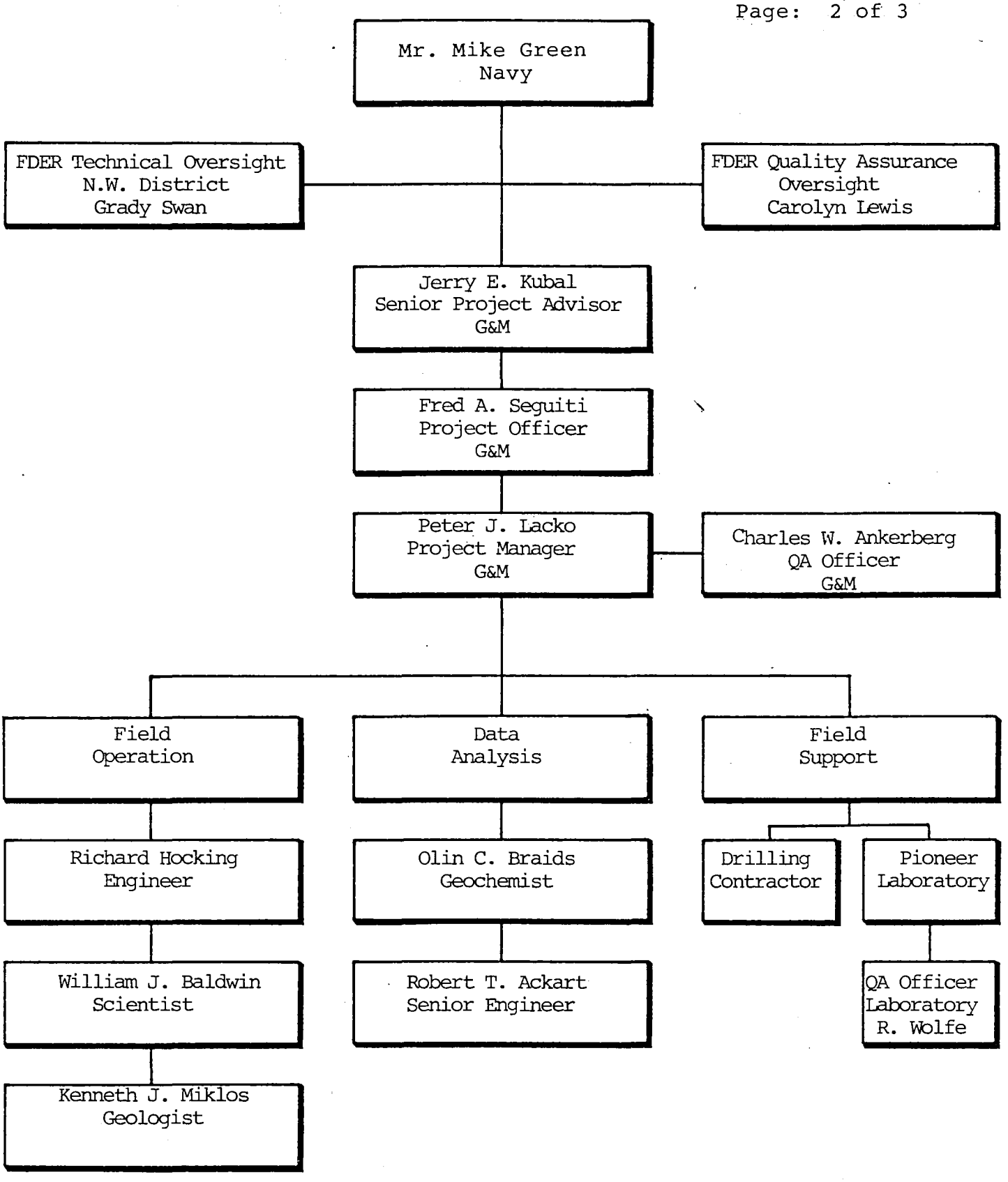

Figure 4. Organizational Chart

Field personnel actually supervising the installation of the monitor wells and recovery well and who will collect all ground-water samples will be Richard Hocking (engineer), William Baldwin (scientist), and Kenneth J. Miklos (geologist). All of these personnel are based in the G&M Tampa office.

The organizational chart for Pioneer Laboratory, Inc., is contained in Section 4.0, Figure 4-1, of the generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

5.0 QA OBJECTIVES

The quality assurance objectives for G&M are described in Section 5.0, pages 1 through 6, of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

The quality assurance objectives for Pioneer Laboratory, Inc., for the matrices and parameters analyzed in this project are described in Section 5.0, pages 2, 5, 6, and 7, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

6.0 SAMPLE PROCEDURES

The sample procedures used by G&M are described in Section 6.0, pages 1 through 4, of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida. A summary of measurement parameters, number of samples, and sample matrices is presented in Table 2.0, Section 3.0.

Pioneer Laboratory, Inc., will not be involved in the collection of samples. Sample containers appropriate for the analyses to be conducted will be provided to G&M by Pioneer.

7.0 SAMPLE CUSTODY PROCEDURES

The sample custody procedures used by G&M are described in Section 7.0, pages 1 through 3, of the General Quality Assurance Plan on file with the QA Section of the FDER Tallahassee, Florida.

The sample custody procedures used by Pioneer Laboratory, Inc., for the samples submitted for analysis are described in Section 7.2, pages 6 through 11, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

The calibration procedures and frequency used by G&M are described in Section 8.0 of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

The calibration procedures and frequency for Pioneer Laboratory, Inc., are described in Section 8.0, pages 1, 12, 14, 15, 17, 18, 21, 22, and 23, and Attachment 1 of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

9.0 ANALYTICAL PROCEDURES

The analytical procedures used in this investigation by G&M are described in Section 9.0 of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

Table 3 indicates the test methods selected by G&M to be followed by the laboratory. The analytical procedures used by Pioneer Laboratory, Inc., that are compatible with those methods specified in Table 3 are described in Section 9.0, pages 2, 3, 4, 5, and 6, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

Table 3. Selected Test Methods for Analysis of Ground-Water and Surface-Water Samples

Volatile Organics

	Acrolein
	Acrylonitrile
602	Benzene
	Bromoform
	Carbon Tetrachloride
602	Chlorobenzene
	Chlorodibromomethane
	Chloroethane
	2-Chloroethyl vinyl ether
	Chloroform
	Dichlorobromomethane
602	1,2-Dichlorobenzene
602	1,3-Dichlorobenzene
602	1,4-Dichlorobenzene
	1,1-Dichloroethane
	1,2-Dichloroethane
	1,1-Dichloroethylene
	1,2-Dichloropropane
	1,3-Dichloropropylene
	Ethylene Dibromide
602	Ethylbenzene
	Methyl bromide
	Methyl chloride
	Methylene chloride
	1,1,2,2-Tetrachloroethane
	Tetrachloroethylene
	Toluene
	1,2-trans-Dichloroethylene
	1,1,1-Trichloroethane
	1,1,2-Trichloroethane
	Trichloroethylene
	Vinyl Chloride
602	Xylene

Acid Extractable Organics

	1-chlorophenol
	2,4-Dichlorophenol
	2,4-Dimethylphenol
	4,6-Dinitro-o-cresol
	2,4-Dinitrophenol
	2-Nitrophenol
	4-Nitrophenol
	p-chloro-m-cresol
	Pentachlorophenol
	Phenol
	2,4,6-Trichlorophenol

Base/Neutral Extractable Organics

610	Acenaphthene
610	Acenaphthylene
610	Anthracene
	Benzidine
610	Benzo(a)anthracene
610	Benzo(a)pyrene
	3,4-Benzofluoranthene
610	Benzo(ghi)perylene
610	Benzo(k)fluoranthene
	bis(2-Chloroethoxy)methane
	bis(2-Chloroethyl) ether
	bis(2-Chlorisopropyl)ether
	bis(2-Ethylhexyl)phthalate
	4-Bromophenyl phenyl ether
	Butyl benzyl phthalate
	2-Chloronaphthalene
	4-Chlorophenyl phenyl ether
610	chrysene
610	dibenzo(a,h)anthracene
	1,2-dichlorobenzene
	1,3-dichlorobenzene
	1,4-dichlorobenzene
	3,3'-dichlorobenzidine
	diethyl phthalate
	dimethyl phthalate
	di-n-butyl phthalate
	2,4-dinitrotoluene
	2,6-dinitrotoluene
	di-n-octyl phthalate
	1,2-diphenylhydrazine
610	Fluoranthene
610	Fluorene
	hexachlorobenzene
	hexachlorobutadiene
	hexachlorocyclopentadiene
	hexachloroethane
610	indeno(1,2,3-c,d)pyrene
	isophorone
610	naphthalene
	nitrobenzene
	N-Nitrosodimethylamine
	N-Nitrosodi-n-propylamine
	N-Nitrosodiphenylamine
610	Phenanthrene
610	Pyrene
	1,2,4-Trichlorobenzene
	2,3,7,8-Tetrachloro-dibenzo-p-dioxin

Table 3. (Continued)

Pesticides/PCBs

_____ Aldrin
_____ alpha - BHC
_____ beta - BHC
_____ gamma - BHC
_____ delta - BHC
_____ Chlordane
_____ 4,4'-DDT
_____ 4,4'-DDE
_____ 4,4'-DDD
_____ Dieldrin
_____ alpha-Endosulfan
_____ beta-Endosulfan
_____ Endosulfan sulfate
_____ Endrin
_____ Endrin aldehyde
_____ Heptachlor
_____ Heptachlor epoxide
_____ PCB - 1242
_____ PCB - 1254
_____ PCB - 1221
_____ PCB - 1232
_____ PCB - 1248
_____ PCB - 1260
_____ PCB - 1016
_____ Toxaphene

Metals

_____ Antimony
_____ Arsenic
_____ Beryllium
_____ Cadmium
_____ Chromium
_____ Copper
_____ Lead
_____ Mercury
_____ Nickel
_____ Selenium
_____ Silver
_____ Sodium
_____ Thallium
_____ Zinc

Miscellaneous

_____ Cyanides, total

References: "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA 600/4-82-057, July 1982.

"Methods for Chemical Analysis of Water and Wastes", EPA 600/4-79-020, March 1979.

10.0 DATA REDUCTION, VALIDATION, AND REPORTING

The data reduction, validation, and reporting procedures used by G&M are described in Section 10.0 of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

The data reduction, validation, and reporting procedures used by Pioneer Laboratory, Inc., are described in Section 10.0, pages 1, 23, 24, 72, 73, 74, 76, 77, and 78, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

11.0 INTERNAL QUALITY CONTROL CHECKS

The internal quality control checks used by G&M are described in Section 11.0 of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

A trip blank for volatile organic compounds (VOCs) as determined by EPA Method 602 will be analyzed at a frequency of one per sample cooler. The trip blank will be analyzed only if the analysis of the field blank reveals detectable compounds.

Sampler rinsates and field blanks will be prepared and analyzed as described in Section 3.2.2, page 9.

The internal quality control checks applied by Pioneer Laboratory, Inc., are described in Section 11.0, pages 1, 2, 3, 7, 8, and 17 through 23, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

12.0 PERFORMANCE AND SYSTEM AUDITS

The performance and system audits used by G&M are described in Section 12.0 of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

The performance and system audits performed by Pioneer Laboratory, Inc., are described in Section 12.0, pages 1 through 4, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

A systems audit of Pioneer Laboratory, Inc., was conducted by the G&M Project QA Officer on June 8, 1987. The results of that audit are acceptable and are on file at G&M's Tampa office.

13.0 PREVENTIVE MAINTENANCE

The preventive maintenance procedures used by G&M are described in Section 13.0 of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

The preventive maintenance procedures used by Pioneer Laboratory, Inc., are described in Section 13.0, pages 1 through 3, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

14.0 ASSESSMENT OF DATA PRECISION, ACCURACY, AND COMPLETENESS

The assessment of data precision, accuracy, and completeness used by G&M are described in Section 14.0 of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

The procedures used by Pioneer Laboratory, Inc., to assess data precision, accuracy, and completeness are described in Section 14.0, pages 1 and 2, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

15.0 CORRECTIVE ACTION

The corrective action procedures used by G&M are described in Section 15.0 of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

The corrective action procedures used by Pioneer Laboratory, Inc., are described in Section 15.0, pages 1 through 14, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

16.0 QUALITY ASSURANCE REPORT TO MANAGEMENT

Internal QA reports and reports to the FDER by G&M are described in Section 16.0 of the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

Quality assurance reports to management by Pioneer Laboratory, Inc., are described in Section 16.0, pages 1 through 12, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

17.0 PERSONNEL QUALIFICATIONS

Resumes of project personnel by G&M are included in the General Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.

The qualifications of Pioneer Laboratory, Inc., personnel are stated in Section 17.0, pages 1 through 17, of the laboratory's Generic Quality Assurance Plan on file with the QA Section of the FDER, Tallahassee, Florida.