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Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Bob Martinez, Governor Dale Twachtmann, Secretary John Shearer, Assistant Secretary

Accepted 3-26-90
D. Rayfield, SISB
NFRAP

January 16, 1990

Ms. Dorothy Rayfield
United States Environmental
Protection Agency
Region IV
Superfund Branch
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: Phase 1 Site Screening
Investigation/PAR
[redacted]
FLD#981015621
5320 South Westshore Boulevard
Tampa, Hillsborough County, Florida

Dear Dorothy:

The site is a drain and sewer service facility located at 5320 South Westshore Boulevard, Tampa, Hillsborough County, Florida (Fig. 1) [2,5,6]. Liquid wastes, pumped from domestic septic tanks and Port-o-lets, were transported to the site and stored in 5 underground steel tanks [2,3,5,6,17,18]. The tanks were generally characterized as being in poor physical condition, with numerous reported ruptures [6,18]. The tanks were excavated and removed from the site prior to 1988 [5].

Industrial wastes, including oils and hydraulic fluids, were also transported to the site for disposal, however, these were discharged into an unlined pit [2,3,5,6,17,18]. The disposal pit is marked by a 6-8 ft. diameter deposit of sludges, measuring several inches in thickness [6]. A roadway leading to the oil pit has also been identified as a potential area of contamination due to spillage [2,5,6,17].

The aforementioned conditions were discovered by the FDER Southwest District and the Hillsborough County Environmental Protection Commission during a joint inspection conducted in 1983 [3,5,6]. The facility subsequently hired Professional Services Industries to sample the site for contamination [2,5,6], and an inspection was conducted sometime prior to 4/4/85 [6]. Results of the sampling

inspection revealed the presence of 1,2-dichloro propane (11 ppm) in sediment from the oil pit, and dichloromethane (41 ppb), 1,2-dichloropropane (1,810 ppb), benzene (2,540 ppb), dichloromethane (85 ppb), 1,2-dichloropropane (1,200 ppb), benzene (3,200 ppb), chlorobenzene (250 ppb), and ethyl benzene (150 ppb) in shallow groundwater surrounding the oil pit, and ethyl benzene (128 ppb) in shallow groundwater surrounding the buried tanks [6]. Heavy metals were not found in particularly high concentrations in sediments samples collected from the oil pit, or the road leading to the oil pit [6]. Groundwater samples were not subjected to heavy metals analyses [6].

On 1/4/88, the site was resampled by Brown and Associates, Inc., because of an FDER determination that the previous (1985) sampling investigation failed to meet QA/QC standards [2,5]. Results of the more recent investigation indicate that the upper 1 ft. of soil along the roadway to the oil pit is not contaminated by purgeable aromatics or halocarbons, but low levels of volatile organic compounds (VOC's) are present in some cases. Subsurface soil samples, collected from the roadway at the interface of the water table, contained (in ppb) chlorobenzene (2,500), 1,4-dichlorobenzene (150), xylenes (7,300), and undefined VOC's (over 1,000 ppm) [2]. Sediment samples collected from the oil pit contained (in ppb) chlorobenzene (79), 1,2-dichlorobenzene (120), 1,3-dichlorobenzene (57), 1,4-dichlorobenzene (110), ethyl benzene (3,200), and xylenes (26,000) in the upper 1 ft. of soil, and chlorobenzene (740), 1,3-dichlodichlorobenzene (140), 1,4-dichlorobenzene (140),ethyl benzene (6,100), and xylenes (32,000) in soil at the water table interface. None of the soil or sediment samples were EP-toxic [2] for heavy metals [2].

Sediment was also collected from a ditch that lies adjacent to the waste storage tanks. A sample collected from an upstream location, relative to the site, contained (in ppb) chlorobenzene (6.9) and toluene (10). A comparable sediment sample, collected generally downstream of the site, contained chlorobenzene (130), 1,3-dichlorobenzene (1.1), 1,4-dichlorobenzene (4.3), and toluene (4.7). The 2 ditch sediment samples were non-EP-toxic, and no VOC's were monitored [2].

The 1988 investigation also reconfirmed previously reported contamination of shallow groundwater at the site. Specifically, in the 1988 study, chlorobenzene (55), benzene (40), ethyl benzene (1.6), toluene (3.5), xylenes (13), and naphthalene (11) were detected in a sample collected from a monitoring well located in

the pit (MW-4), and chlorobenzene (8.5) and a high concentration of cadmium (.042) were detected (in ppm) in a monitoring well located upgradient of the pit (MW-3). Comparable samples collected from 2 monitoring wells located in the storage tank area (MW-2) and upgradient of the storage tank area (MW-1) were free from contamination [2].

The site is directly underlain by 23 ft. of fine grained to silty sand and 3.8 ft. of clayey sand, which collectively form the surficial aquifer [2]. The bottom of the surficial aquifer is bounded by a semi-confining layer, consisting of low permeability Miocene clays of the Hawthorn formation [2,8]. The semi-confining layer also serves the upper confining layer to subjacent limestones that probably represent the Tampa or lower Hawthorn formations. These limestones reportedly comprise the upper region of the Floridan aquifer [2,8]. The interface between the base of the semi-confining layer and the top of the Floridan aquifer occurs at approximately 31 ft. below land surface at the site [2]. However, geologic logs taken from local wells show that the top of the Floridan aquifer extends to within 10 ft. of land surface within a 2 mile radius of the site [10].

The site is located in an area of low to moderate recharge to the Floridan aquifer [17] and net annual precipitation is approximately 4 inches [4] . At least, 100 private and 3 community (serving 25 or more) wells are located within 3 miles of the site. The nearest potable well is located approximately 1,800 ft. south of the site (Fig. 1) [9,10,11,14].

The estimated 1 yr./24 hr. rainfall for the Tampa area is 4 inches [7]. Stormwater runoff generated onsite is generally directed into the ditch on the southern border of the site, then 1,300 ft. westward to Old Tampa Bay [2]. The bay is inhabited by the federally-designated, endangered West Indian Manatee [13], and is generally known to be an area in which recreational fishing is conducted [12]. Also, seagrass beds and mangroves are situated approximately 1,700 ft. west and 4,700 ft. southwest of the facility, respectively (Fig. 1) [13].

Although onsite conditions present a potential source of contamination for Old Tampa Bay, the volume of wastes attributable to the site and the population potentially affected by the site are low.

Additionally, the area is supplied with drinking water derived from wells and surface water intakes located more than 4 miles from the site [9,10,11,19,20,21]. Consequently, the site appears to warrant a no further action priority for CERCLA site inspection.

Sincerely,

Craig Feeny

Craig Feeny
Environmental Specialist II
Site Screening Superfund Subsection
Bureau of Waste Cleanup

CF/mlr

Enclosure

HAZARD RANKING SYSTEM SCORING SUMMARY

FOR

ROTO-ROOTER
EPA SITE NUMBER FLD981015061
TAMPA
HILLSBOROUGH COUNTY, FL
EPA REGION: 4

SCORE STATUS: IN PREPARATION

SCORED BY CHRIS FEEN
OF FDER
ON 01/05/90

DATE OF THIS REPORT: 01/12/90
DATE OF LAST MODIFICATION: 01/12/90

GROUND WATER ROUTE SCORE	:	25.00
SURFACE WATER ROUTE SCORE	:	10.84
AIR ROUTE SCORE	:	0.00
MIGRATION SCORE	:	10.10

HRS GROUND WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	NORM. VALUE	SCORE	
1. OBSERVED RELEASE	NO	0	0	
2. ROUTE CHARACTERISTICS				
DEPTH TO WATER TABLE	10 FEET			(REf. 10)
DEPTH TO BOTTOM OF WASTE	6 FEET			(REf. 6)
DEPTH TO AQUIFER OF CONCERN	2 FEET	3	6	
PRECIPITATION	4.0 INCHES			(REf. 4)
EVAPORATION	0.0 INCHES			
NET PRECIPITATION	4.0 INCHES	1	1	
PERMEABILITY	2.0X10-6 CM/SEC	0	0	(Ref. 2)
PHYSICAL STATE		3	3	(REf. 2,3)
TOTAL ROUTE CHARACTERISTICS SCORE:			10	
3. CONTAINMENT		3	3	(REf. 2,3,5,6)
4. WASTE CHARACTERISTICS				
TOXICITY/PERSISTENCE:LEAD			18	(REf. 2,6)
WASTE QUANTITY CUBIC YDS	0			
DRUMS	1			(Default)
GALLONS	0			
TONS	0			
TOTAL	0 CU. YDS	1	1	
TOTAL WASTE CHARACTERISTICS SCORE:			19	
5. TARGETS				
GROUND WATER USE		2	6	(Ref. 8-10,15,19,20)
DISTANCE TO NEAREST WELL	1600 FEET			(Fig. 1)(Ref. 9,10,11,14)
AND	MATRIX VALUE	20	20	
TOTAL POPULATION SERVED	450 PERSONS			(Ref. 9,10)
NUMBER OF HOUSES	100			(Ref. 9)
NUMBER OF PERSONS	75			(Ref. 9,10)
NUMBER OF CONNECTIONS	0			
NUMBER OF IRRIGATED ACRES	0			
TOTAL TARGETS SCORE:			26	

GROUND WATER ROUTE SCORE (Sgw) = 25.66

HRS SURFACE WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0
2. ROUTE CHARACTERISTICS			
SITE LOCATED IN SURFACE WATER	NO		
SITE WITHIN CLOSED BASIN	NO		
FACILITY SLOPE	0.0 %		
INTERVENING SLOPE	0.0 %	0	0
24-HOUR RAINFALL	4.0 INCHES	3	3
DISTANCE TO DOWN-SLOPE WATER	1300 FEET	2	4
PHYSICAL STATE	3		3
TOTAL ROUTE CHARACTERISTICS SCORE:			10
3. CONTAINMENT	3		3
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:LEAD			18
WASTE QUANTITY CUBIC YDS	0		
DRUMS	1		
GALLONS	0		
TONS	0		
TOTAL	0 CU. YDS	1	1
TOTAL WASTE CHARACTERISTICS SCORE:			19
5. TARGETS			
SURFACE WATER USE		2	6
DISTANCE TO SENSITIVE ENVIRONMENTS		3	6
COASTAL WETLANDS	1700 FEET		
FRESH-WATER WETLANDS	NONE		
CRITICAL HABITAT	1700 FEET		
DISTANCE TO STATIC WATER	> 3 MILES		
DISTANCE TO WATER SUPPLY INTAKE	> 3 MILES		
AND	MATRIX VALUE	0	0
TOTAL POPULATION SERVED	0		
NUMBER OF HOUSES	0		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	0		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			12

SURFACE WATER ROUTE SCORE (Sw) = 10.53

HRS AIR ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0

2. WASTE CHARACTERISTICS

REACTIVITY:

MATRIX VALUE

INCOMPATIBILITY

TOXICITY

WASTE QUANTITY CUBIC YARDS
DRUMS
GALLONS
TONS

TOTAL

TOTAL WASTE CHARACTERISTICS SCORE: N/A

3. TARGETS

POPULATION WITHIN 4-MILE RADIUS
0 to 0.25 mile
0 to 0.50 mile
0 to 1.0 mile
0 to 4.0 miles

DISTANCE TO SENSITIVE ENVIRONMENTS
COASTAL WETLANDS
FRESH-WATER WETLANDS
CRITICAL HABITAT

DISTANCE TO LAND USES
COMMERCIAL/INDUSTRIAL
FARM/FOREST/RESIDENTIAL
AGRICULTURAL LAND
PRIME FARMLAND
HISTORIC SITE WITHIN VIEW?

TOTAL TARGETS SCORE: N/A

AIR ROUTE SCORE (Sa) = 0.00

HAZARD RANKING SYSTEM SCORING CALCULATIONS
FOR
SITE: ROTO-ROOTER
AS OF 01/12/90

GROUND WATER ROUTE SCORE

ROUTE CHARACTERISTICS		10
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	19
TARGETS	X	26

= 14820 /57,330 X 100 = 25.85 = Sigw

SURFACE WATER ROUTE SCORE

ROUTE CHARACTERISTICS		10
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	19
TARGETS	X	12

= 6840 /64,350 X 100 = 10.63 = Sisw

AIR ROUTE SCORE

OBSERVED RELEASE 0 /35,100 X 100 = 0.00 = Siair

SUMMARY OF MIGRATION SCORE CALCULATIONS

	S	S02
GROUND WATER ROUTE SCORE (Sigw)	25.85	668.22
SURFACE WATER ROUTE SCORE (Sisw)	10.63	113.00
AIR ROUTE SCORE (Siair)	0.00	0.00
S02igw + S02isw + S02iair		781.22
√ (S02igw + S02isw + S02iair)		27.95
SIM = √ (S02igw + S02isw + S02iair)/1.73		16.16

2

CONTAMINATION ASSESSMENT REPORT
ROTO-ROOTER DRAIN AND SEWER SERVICE,
HILLSBOROUGH COUNTY, FLORIDA

prepared for

ROTO-ROOTER DRAIN AND SEWER SERVICE

November 1988

prepared by

M. P. BROWN & ASSOCIATES,INC.
Consulting Hydrogeologists, Geologists, and Engineers
8403 Benjamin Road, Suite D
Tampa, Florida 33634

BUREAU OF WASTE CLEANUP
Twin Towers

M.P. BROWN & ASSOCIATES, INC.

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CONTAMINATION ASSESSMENT REPORT AND ROTO-ROOTER DRAIN AND SEWER SERVICE, HILLSBOROUGH COUNTY, FLORIDA

INTRODUCTION

Purpose and Objective of the Investigation

In June 1987, Roto-Rooter Drain and Sewer Service of Florida authorized M.P. Brown & Associates, Inc., to proceed with a contamination assessment of the Roto-Rooter facility in Tampa, Florida. The investigation was deemed necessary due to suspected contamination from an oil disposal pit and from underground waste storage tanks. The objective of the study was to characterize conditions at the site by the following means:

1. Determine the direction and rate of surficial aquifer ground water flow.
2. Determine the horizontal and vertical extent of groundwater and/or soil contamination and ascertain which chemical constituents are present at the site.
3. Determine any immediate danger to the public health and whether immediate remedial measures are necessary to abate any imminent hazard.

This report presents the tasks which were performed to address the above objectives.

Background and History

Roto-Rooter Sewer and Drain Service operates a facility located at 5320 South West Shore Boulevard, Tampa, Florida. In 1983, the Florida Department of Environmental Regulation (FDER) determined, from site visits, that the potential for soil and groundwater contamination existed at the property. They requested that a contamination assessment be completed and filed with FDER. Roto-Rooter sewer and drain service retained Professional Service Industries, Inc. (PSI) to implement the contamination assessment at the site. Specific areas of investigation, determined by the FDER site visits, included the vicinity of five (5) underground waste storage tanks, the oil pit disposal area, and the road leading to the pit area.

In 1985, PSI completed their assessment, and after a review by the FDER Bureau of Operations, it was determined that contamination was present in soils and groundwater underlying the site. However, it was also determined that the assessment was below Quality Assurance/Quality Control (QA/QC) standards and that further investigation would be required. Therefore, a Contamination Assessment Plan (CAP) in conjunction with a Quality Assurance Project Plan (QAPP) was necessary for proper and thorough evaluation of the problem at the site.

In 1986, Roto-Rooter Sewer and Drain Service entered into a consent decree case No. 84-13410 with corrective actions to be taken at the Roto-Rooter facility.

In June 1987, Roto-Rooter was advised by the FDER to retain a competent hydrogeologic consulting firm to develop and implement a comprehensive CAP and a site-specific QAPP. M.P. Brown & Associates, Inc. was then retained to conduct a hydrogeologic investigation in order to prepare and implement the required CAP and QAPP for the facility.

Program Work Elements

M.P. Brown & Associates, Inc. collected and evaluated hydrogeologic data on a regional and site specific basis. Specific tasks completed during the investigation include:

1. Installed piezometers to determine the direction of horizontal groundwater flow.

2. Installed test borings to define site hydrostratigraphy and collect sediment samples for laboratory analysis.

3. Utilized a portable organic vapor analyzer to determine the area and vertical extent of volatile organic compounds in the soil.
4. Collected sediment samples for chemical analysis to determine the horizontal and vertical extent of soil contamination at the site.
5. Installed permanent water quality monitor wells.
6. Collected water samples for chemical analysis from the installed monitor wells to determine the horizontal extent of groundwater contamination.

Site Location and Physiography

The Roto-Rooter facility is located in the northeast one quarter of Section 8, Township 30S, Range 18E, as shown in Figure 1. The site is located in the geomorphic province of the Gulf Coastal Lowlands of the Mid-Peninsula Zone (White, 1970). A slight westward sloping land surface characterizes the area due to the close proximity to Old Tampa Bay located 1300 ft (feet) to the west. Land surface elevations range from 5 to 10 ft above msl (mean sea level). Natural surface drainage is to the west, toward Old Tampa Bay. Figure 2 is a site plan of the facility.

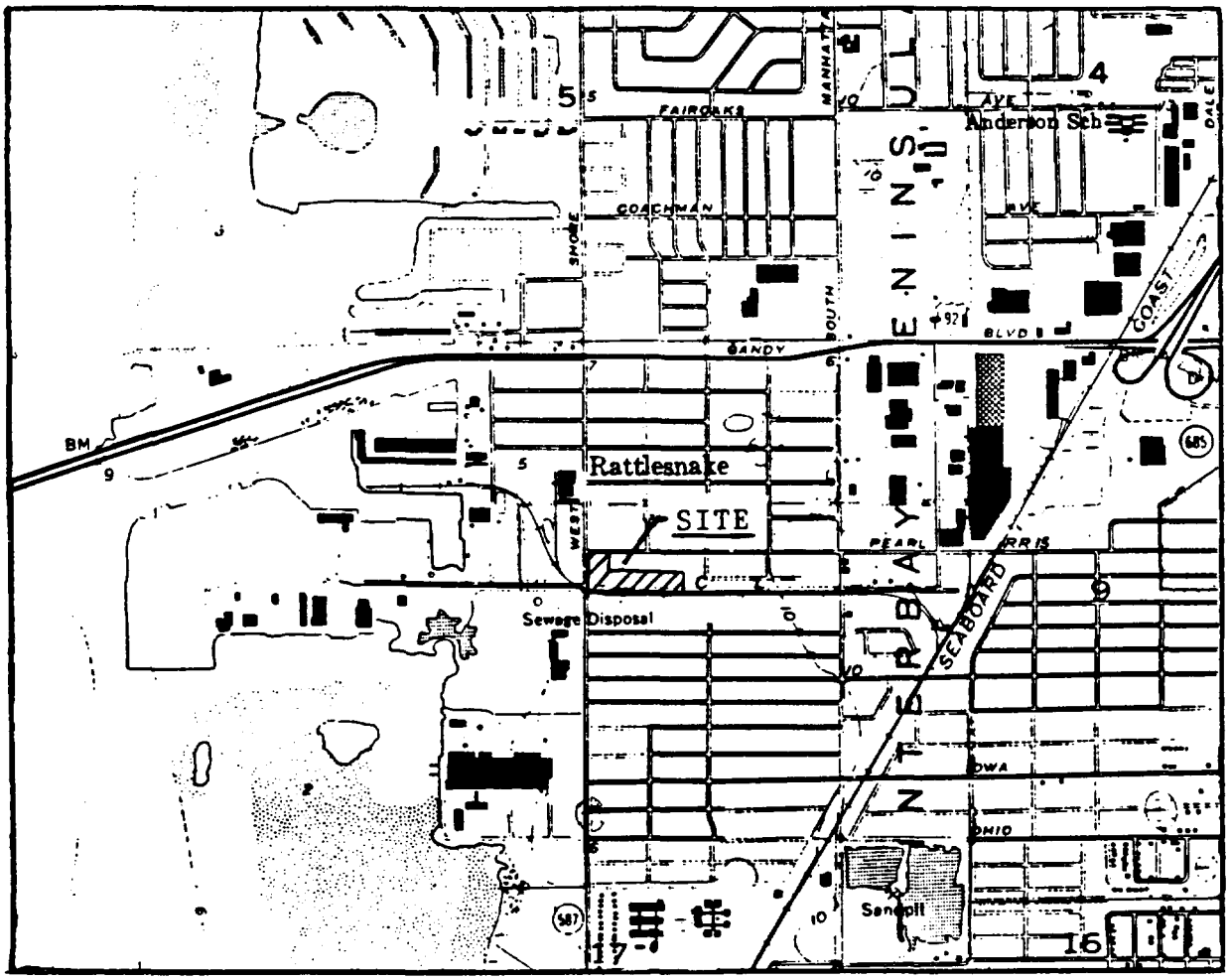


FIGURE 1. Map Showing Location of Roto-Rooter Drain and Sewer Service Facility, Hillsborough County, Florida

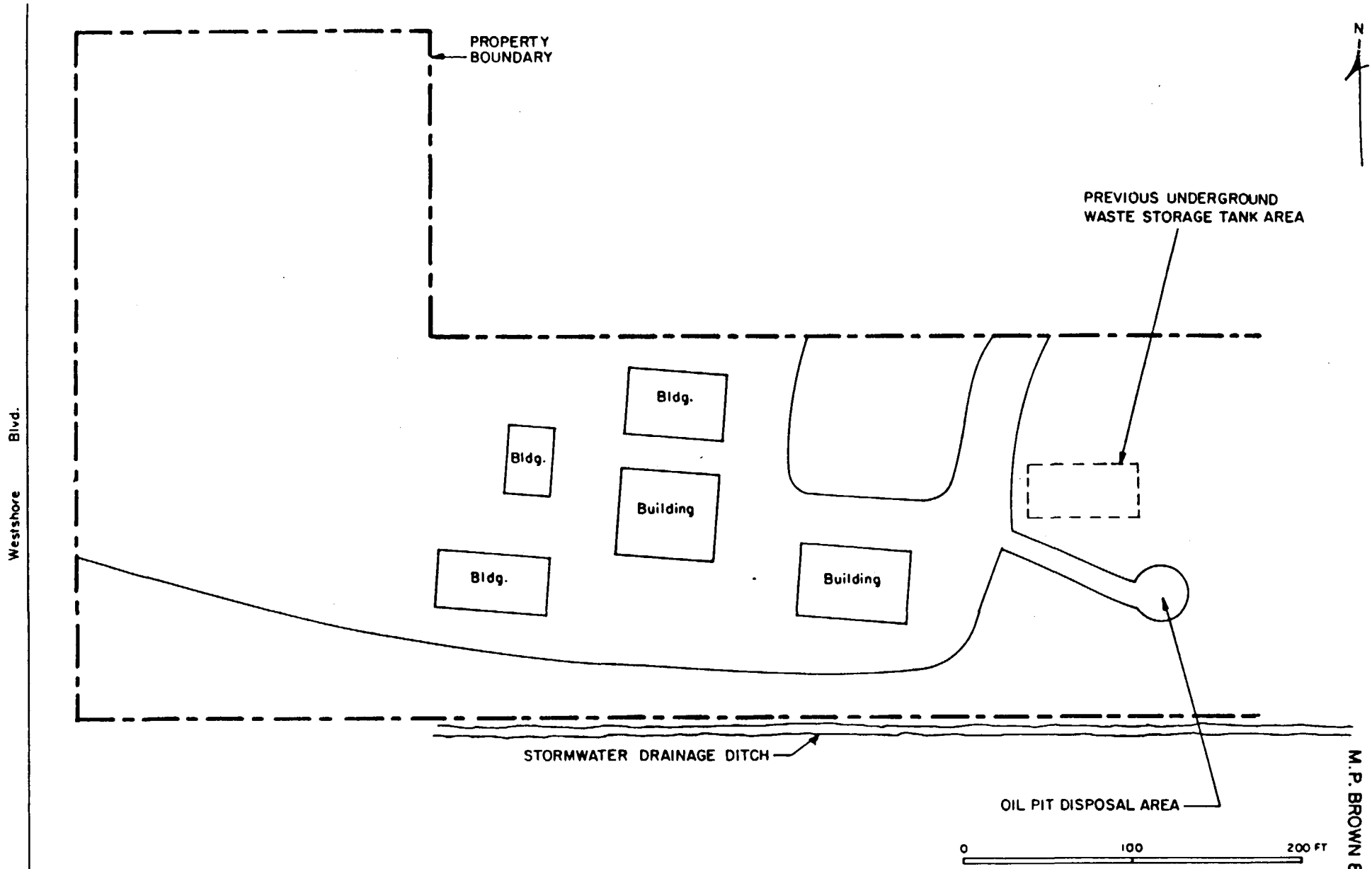


Figure 2. Site Plan of the Roto-Rooter Facility.

M.P. BROWN & ASSOCIATES, INC.

WORK PERFORMED

Installation of Shallow Temporary Piezometers

Temporary water level piezometers were installed on July 27, 1987, at the locations shown on Figure 3. The piezometers were installed into 4-inch-diameter boreholes drilled using the bucket auger method. Piezometer construction consisted of a 2-inch-diameter PVC casing with a slotted screen attached at the bottom. The annular space between the borehole and the piezometer was backfilled with uniformly graded 20-30 clean coarse grained quartz sand to land surface. Piezometer construction details were recorded and are presented in Table 1.

All piezometers were surveyed and referenced to a fixed datum. Water level measurements were taken from piezometers to establish groundwater flow direction (Table 2).

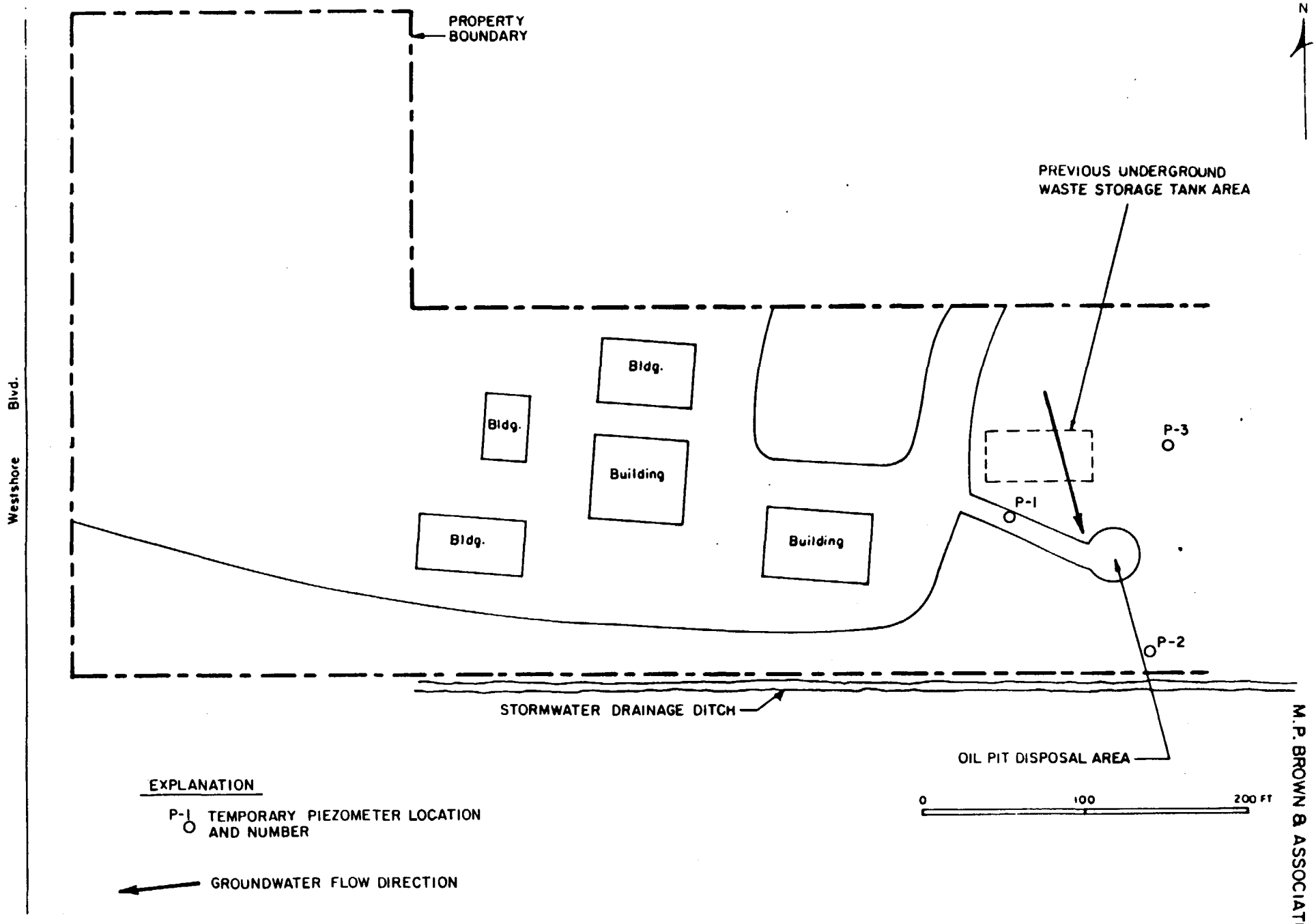


Figure 3. Location of Tempory Water Level Piezometer and Horizontal Groundwater Flow Direction.

TABLE 1. Piezometer Construction Details.

Piezometer Number	Total Depth (ft bls)	Casing Diameter (inches)	Screened Interval (ft bls)
P - 1	6.64	2.0	0-6.64
P - 2	7.5	2.0	0-7.5
P - 3	6.0	2.0	0.-6.0

Note: ft bls = feet below land surface

TABLE 2. Groundwater Elevation Data Collected from Installed Piezometers on July 27, and August 13, 1987.

Piezometer Number	Measuring Point Elevation (ft fixed datum)	Water Level (ft fixed datum) 7-27-87	8-13-87
P - 1	20.0	15.44	16.70
P - 2	20.3	14.85	15.72
P - 3	19.03	15.51	17.26

Note: ft fixed datum = elevation referenced to a fixed datum of 20 feet

Test Boring Installation

Two (2) test borings were installed to determine site hydrostratigraphy.(Figure 4). The test boring operation consisted of continuously coring the borehole by the split spoon method from land surface to the top of the uppermost limestone unit. Samples from the coring operation were collected and described in the field by an M.P. Brown & Associates, Inc. hydrogeologist. Lithologic descriptions of the test borings are contained in Appendix B. A shelby tube and two sediment samples from representative stratigraphic units were submitted for laboratory permeability tests and grain size analysis.

Immediately upon completion of a test boring, the open borehole was properly abandoned by placing Class I cement grout from the bottom of the borehole to land surface.

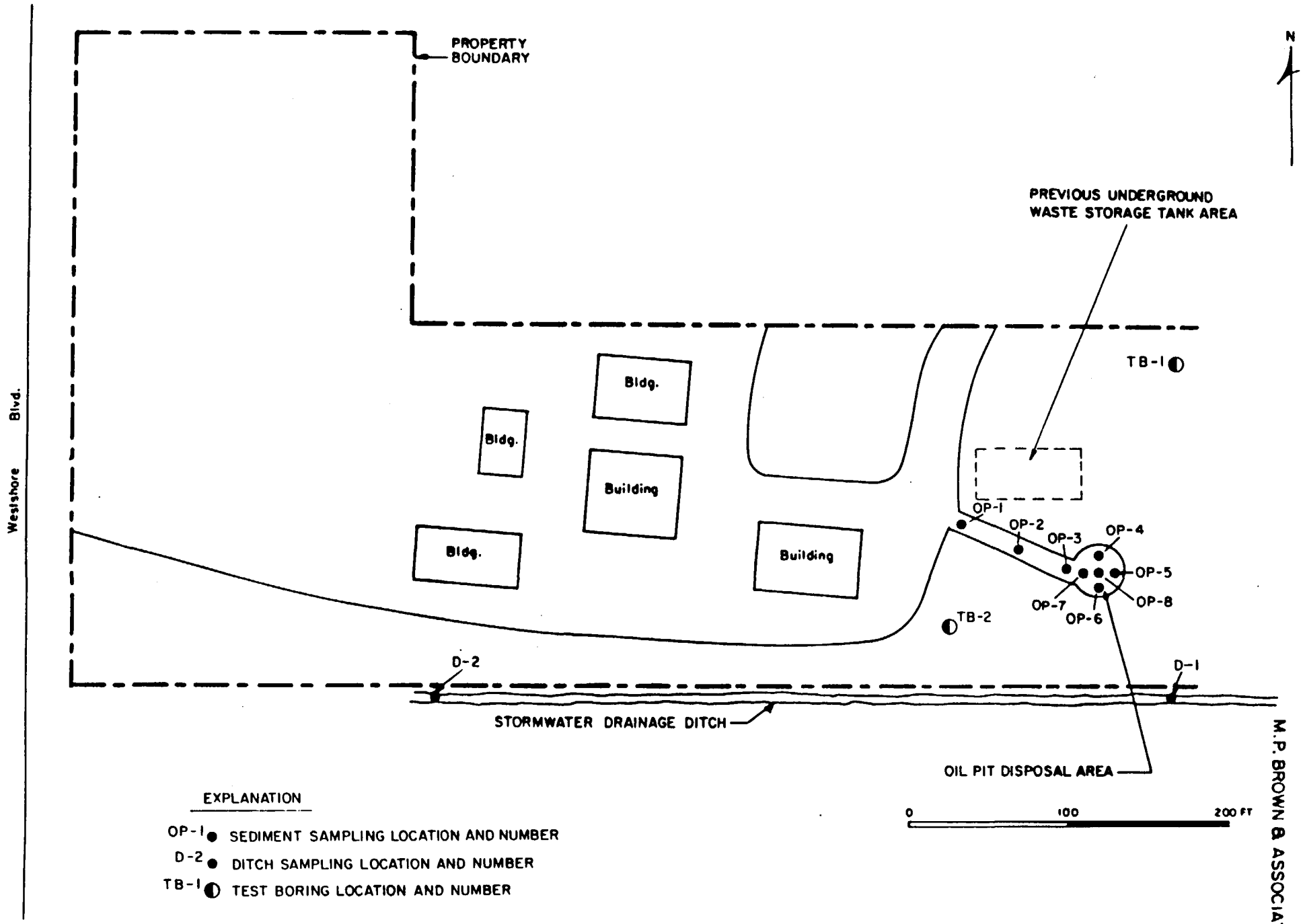


Figure 4. Location of Test Borings and Sediment Sampling Points.

Sediment Sampling Procedure

Sediment samples for chemical analysis were collected at the eight locations shown in Figure 4. Sampling points were located along the oil pit roadway (OP-1 through OP-3) and within the oil pit disposal area (OP-4 through OP-8). Sediment samples were collected at each sampling point from an interval of 6 inches to 12 inches below land surface (in bls) and at the soil/water interface. Samples were obtained by continuously coring to the water table with a stainless steel split spoon. Samples were collected, bottled and shipped to Southern Analytical Laboratories, Oldsmar, Florida using protocol provided in approved Quality Assurance Project Plan (QAPP) procedures. (M.P. Brown & Associates, Inc., 1987). Copies of the chain-of-custody and field forms are found in Appendix B.

Samples were described in the field by an M.P. Brown & Associates, Inc. hydrogeologist. Lithologic descriptions are contained in Appendix A.

Sediment samples were composited in the laboratory prior to chemical analysis. Samples from the oil pit area were combined and analyzed as one composite sample from 6 in. to 12 in. bls and one composite sample from the water table depth. Samples from the oil pit roadway were also combined and analyzed as one

composite sample from 6 in. to 12 in. bls and one composite sample from water table depth. In addition, sediment samples were collected with a stainless steel bucket auger from the stormwater drain ditch (Figure 4). These samples were collected at a depth from 2 in. to 6 in. bls in the ditch and analyzed as separate grab samples. Laboratory composite samples and chemical analysis parameters are summarized in Table 3.

Organic Vapor Analysis (Foxboro OVA-128) Survey

The Foxboro OVA-128 Organic Vapor Analyzer is a portable unit which utilizes a flame ionization detector sensitive to the presence of organic vapors. Organic vapors ionized by the hydrogen flame yield a current which is carried between detector electrodes. This current is proportionate to the organic concentration, and the meter response indicates total organic vapor concentrations expressed in ppm (parts per million) relative to a methane standard. The sensitivity ranges from 0.2 to 1000 ppm.

Sediment collected from sampling points OP-1 through OP-8 was field tested for organic vapors to assist in the preliminary definition of the vertical and horizontal extent of volatile organic compounds in the soil. OVA data indicates volatile organic compounds are concentrated around the oil pit disposal area (Table 4).

TABLE 3. Laboratory Chemical Analysis and Composite Sample Identification Numbers for Sediment Samples, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida.

Area	Composite Sample Nos.	Analytical Method Laboratory Analysis
Oil Pit Road	CS-1	8010,8020, EP Toxicity
Oil Pit Road	CD-1	8010,8020, EP Toxicity
Oil Pit Area	CS-2	8010,8020, EP Toxicity
Oil Pit Area	CD-2	8010,8020, EP Toxicity
*Stormwater Drainage Ditch	D-1, D-2	8010,8020, Total Lead

Note: EPA method 8010 = Analysis for Purgeable Halocarbons
EPA method 8020 = Analysis for Purgeable Aromatics
EPA Toxicity = Analysis for Arsenic, Barium, Cadmium, Lead, Mercury, Selenium, and Silver

* = Analyzed as separate grab samples

CS-1 = Composite sample from OP-1, OP-2 and OP-3 at an interval of .5 ft to 1.0 ft bls.

CD-1 = Composite sample from OP-1, OP-2 and OP-3 at the soil/water interface.

CS-2 = Composite sample from OP-4, OP-5, OP-6, OP-7 and OP-8 at an interval of .5 ft to 1.0 ft bls.

CD-2 = Composite sample from OP-4, OP-5, OP-6, OP-7 and OP-8 at the soil/water interface.

TABLE 4. Total Volatile Organic Vapor Measurements of Sediment Collected January 4, 1988.

Test Boring	Depth	Level (ppm)
OP - 1	.5-1.0 ft	-
	water table	>1000
OP - 2	.5-1.0 ft	5.4-8.4
	water table	16 - 10
OP - 3	.5-1.0 ft	6.8-8.8
	water table	0 - 0.2
OP - 4	.5-1.0 ft	5.6-6.2
	water table	> 1000
OP - 5	.5-1.0 ft	280-180
	water table	> 1000
OP - 6	.5-1.0 ft	2.2-2.2
	water table	> 1000
OP - 7	.5-1.0 ft	120-100
	water table	> 1000
OP - 8	.5-1.0 ft	380-400
	water table	> 1000

Note: ppm = parts per million

Monitor Well Installation

Four (4) monitor wells were installed at the facility in order to collect groundwater samples for chemical analysis (Figure 5).

Monitor well MW-1 was installed hydraulically upgradient, for the collection of background groundwater samples. Monitor well MW-2 was installed within the area of the previously existing underground waste storage tanks. Due to the close proximity of two of the areas under investigation and the groundwater flow direction, MW-3 was located downgradient from the previous tank area and upgradient from the oil disposal pit area. Monitor well MW-4 was installed within the area of the oil disposal pit. Boreholes for the monitor wells were drilled by the hollow stem auger method. All equipment used for monitor well installation was steam cleaned prior to use. This precautionary measure minimizes the potential of cross contamination between monitor wells. Samples collected during the drilling process were collected and summarized as lithlogic logs by an M.P. Brown & Associates, Inc. hydrogeologist (Appendix A).

A clean 10-ft. section of 2-in.-diameter, schedule 40 PVC, 0.01-in.-slotted screen was coupled with schedule 40 PVC, threaded casing and aligned in the borehole. The screened interval of each well was set to 2 feet above the present water table.

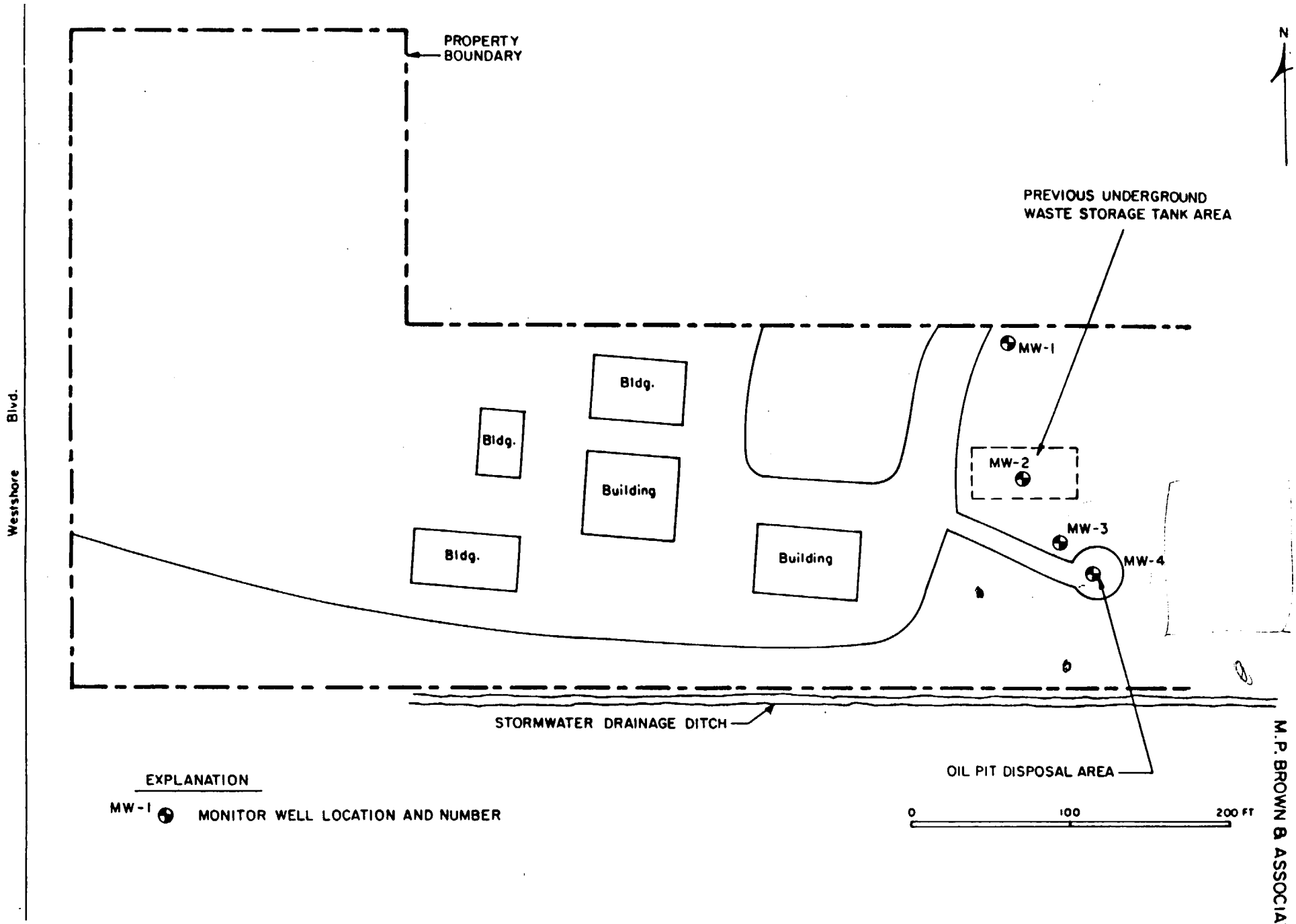


Figure 5. Location of Monitor Wells.

The well annulus was packed with washed 20-30 uniformly graded silica sand to two feet above the screened interval. The sand pack was tagged to assure the correct amount had been emplaced. A layer of bentonite, designed to prevent migration of cement grout into the sand pack, was emplaced and followed by Class I cement grout to land surface. A PVC slip cap and a well head protector with locking cover were used to seal wells and insure well integrity. After the cement grout has set for 24 hours, the well was developed by centrifugal pump until minimal turbidity was observed in samples collected from the monitor well. Monitor well construction details have been summarized in Table 5.
A diagram of monitor wells at the site is found in Figure 6.

TABLE 5. Monitor Well Construction Details.

Monitor Well Number	Total Depth (ft bls)	Casing Depth (ft bls)	Screened Interval (ft bls)
MW - 1	12.5	1.75	1.75 - 11.75
MW - 2	13.0	1.75	1.75 - 11.75
MW - 3	13.0	1.75	1.75 - 11.75
MW - 4	12.5	1.75	1.75 - 11.75

Note: ft bls = feet below land surface

casing and scree diameter = 2.0 in.

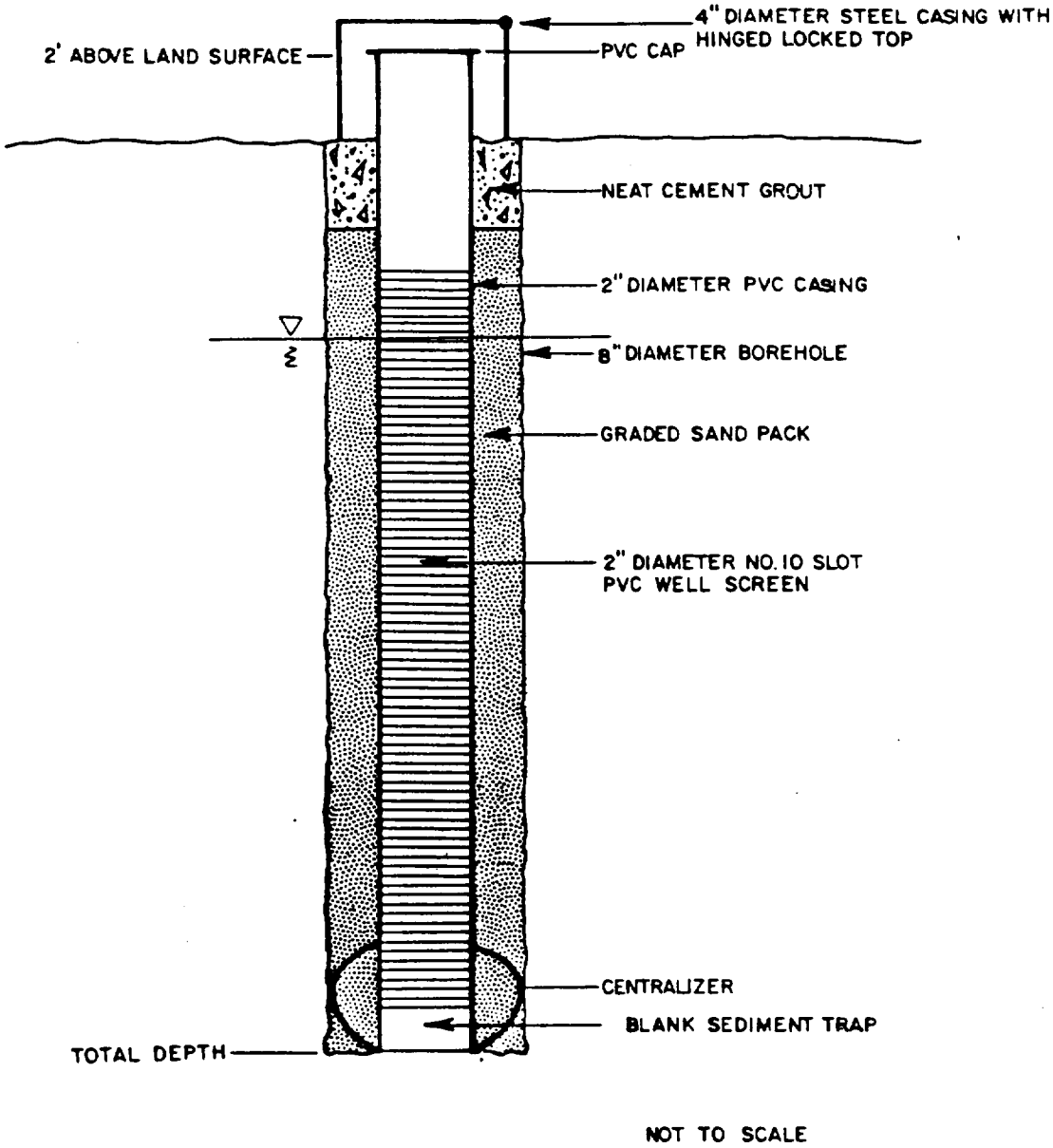


Figure 6. Monitor Well Construction Details.

Groundwater Sampling Procedure

Groundwater samples were collected from the four (4) monitor wells to establish background water quality and characterize contamination at the site.

Water samples were collected, bottled, preserved, and shipped to the Southern Analytical Laboratory, Oldsmar, Florida using approved QAPP procedures (M.P. Brown & Associates, Inc., 1987).

Prior to sample collection, three (3) well volumes were evacuated with a peristaltic pump to assure representative groundwater samples. A field determination of pH, temperature, and specific conductance was made at the time of sampling (Table 6). Field sample and chain-of-custody forms are contained in Appendix B. A summary of the groundwater chemical analysis is presented in Table 7.

TABLE 6. Field Analysis of Groundwater Samples Collected February 12, 1988.

Well Number	Specific Conductance (umhos/cm)	Temperature (°C)	pH
MW -1	450	17.0	5.26
MW-2	850	19.2	6.78
MW-3	950	20.2	6.54
MW-4	750	18.9	6.59

Note: °C = Degrees Celsius

umhos/cm = micromhos per centimeter

TABLE 7. Laboratory Chemical Analysis of Groundwater Samples Collected.

Monitor Well No.	Laboratory Analysis
MW - 1	EPA 601, 602, 610; Total Metals, Nitrogen Nitrate (N), Nitrogen Ammonia (N), Fecal Coliforms,
MW - 2	EPA 601, 602; Total Metals, Nitrogen Nitrate (N), Nitrogen Ammonia (N), Fecal Coliforms,
MW - 3	EPA 601, 602; Total Metals, Nitrogen Nitrate (N), Nitrogen Ammonia (N), Fecal Coliforms,
MW - 4	EPA 601, 602, 610; Total Metals,

Note: EPA method 601 = Analysis for Purgeable Halocarbons
EPA method 602 = Analysis for Purgeable Aromatics
EPA method 610 = Analysis for Polynuclear Aromatic Hydrocarbons
Total Metals = Analysis for arsenic, barium, cadmium, chromium, copper, iron, lead mercury, selenium, silver, and zinc.

HYDROGEOLOGICAL SETTING

Regional Hydrogeology

The hydrostratigraphic units present in the Tampa Bay area include a layer of undifferentiated surficial deposits and the Floridan Aquifer (Hickey, 1981). The sands and clays of the surficial unit range in thickness from a few feet near the coast to about 80 feet in the eastern part of Hillsborough County. The underlying Floridan Aquifer is comprised of a series of limestone and dolomite units which provide fresh water to the region. The primary water production zones, in descending order, are the Tampa Limestone, Suwannee Limestone, Ocala Limestone, and Avon Park Limestone.

The potentiometric surface of the Floridan Aquifer is ± 5 feet mean sea level (ft msl) (Barr and Lewelling, 1986). Groundwater flow is in a south to southwesterly direction, towards Old Tampa Bay.

Site Hydrostratigraphy

The composition of the surficial aquifer at the site was determined from test borings and is presented as a generalized hydrostratigraphic column in Figure 7. A fine grained sand to silty sand is present from land surface to about 23 ft bls. The stratigraphy grades from clayey sand to clay over an eight foot interval to about 31 ft bls. A friable limestone, representing the top of the Upper Floridan Aquifer, was found beneath the semi-confining clay layer.

A mean surficial sand zone hydraulic conductivity of 180 gpd/ft2 was computed from grain size analysis (Masch and Denny, 1966).

Vertical permeability of the semi-confining layer was determined to be 4 x 10 -4 gpd/ft2. Laboratory test results are contained in Appendix C.

Groundwater Flow

The rate and direction of groundwater flow is dependent upon the hydraulic conductivity and the hydraulic gradient. Horizontal groundwater flow direction at the site is to the south-southeast (Figure 3).

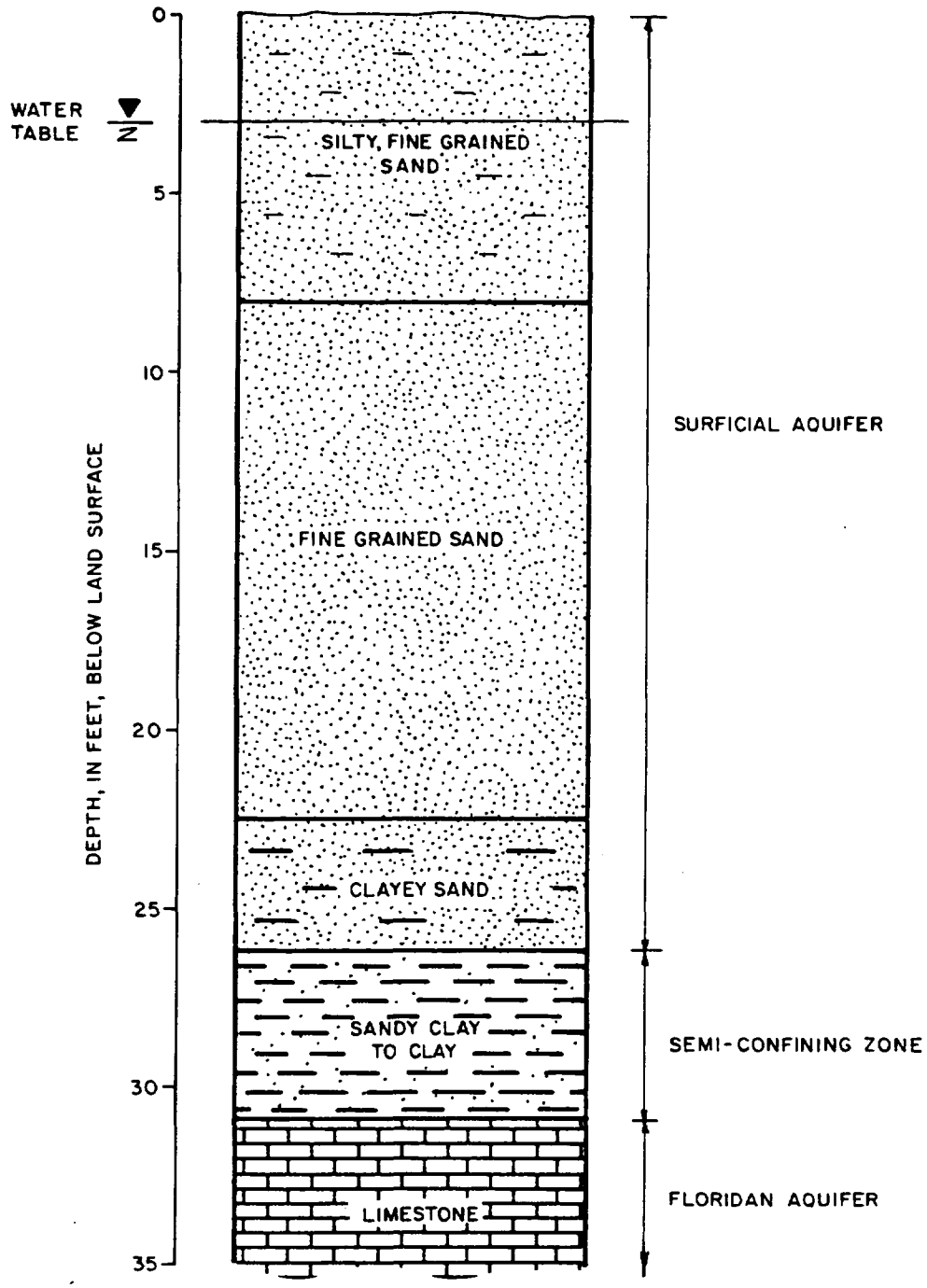


Figure 7. Generalized Hydrostratigraphic Column.

CONTAMINATION ASSESSMENT

Soil Chemical Analysis Results

Purgeable halocarbon compounds, purgeable aromatic compounds and metals detected in composite soil samples have been summarized in Table 8. Concentrations of metals were well below standards established for the determination of hazardous waste (U.S. CFR, 1986).

High concentrations of volatile organic compounds (VOC's) were detected in soil from the oil pit disposal area. A smaller number of VOC's were detected in the roadway leading to the oil pit. All sediment chemical analysis results are contained in Appendix D.

Groundwater Chemical Analysis Results

Purgeable halocarbon compounds, purgeable aromatic compounds, polynuclear aromatic hydrocarbon compounds, metals and nitrogen detected in groundwater samples is presented in Table 9.

Iron and cadmium were detected in excess of State of Florida Primary Drinking Water Standards. The sample from monitor well MW-1 showed background water quality at the site has a high concentration of iron.

TABLE 8. Summary of Compounds in Sediment Samples Collected January 4, 1988.

Compound (ug/kg)	CS-1	CD-1	CS-2	CD-2	D-1	D-2
Chlorobenzene	ND	2500	79	740	6.9	130
1,2 Dichlorobenzene	ND	ND	120	ND	ND	ND
1,3 Dichlorobenzene	ND	ND	57	97	ND	1.1
1,4 Dichlorobenzene	ND	150	110	140	ND	4.3
Ethylbenzene	ND	ND	3200	6100	ND	ND
Xylenes	ND	7300	26,000	32,000	ND	ND
Toluene	ND	ND	ND	ND	10	4.7
Metals (mg/l)						
Arsenic	.002	.009	.003	.006	NA	NA
Barium	.4	ND	.2	ND	NA	NA
Cadmium	.11	ND	.04	ND	NA	NA
Lead	.10	ND	ND	ND	ND	ND

Note: ug/kg = micrograms per kilogram
mg/l = milligrams per liter
ND = Not Detected
NA = No Analysis

TABLE 9. Summary of Compounds Detected in Groundwater and Water Quality Standards

Metals and Inorganics (mg/l)	MW-1	MW-2	MW-3	MW-4	1Standard
Nitrate Nitrogen	.04	.04	.35	NA	10
Ammonia Nitrogen	.96	1.6	3.9	NA	NS
Arsenic	.002	.002	.002	.001	.05
Iron	5.0	1.6	.38	9.2	.3
Zinc	.05	.04	.07	.02	5
Cadmium	ND	ND	.042	ND	.01
Copper	ND	ND	.01	ND	1
Selenium	ND	ND	.001	ND	.01
Compound (ug/l)					
Chlorobenzene	ND	ND	8.5	55	NS
Benzene	ND	ND	ND	40	1.0
Ethylbenzene	ND	ND	ND	1.6	NS
Toluene	ND	ND	ND	3.5	NS
Xylenes	ND	ND	ND	13	NS
Naphthalene	ND	NA	NA	11	NS

Note: 1 = FDER Primary Drinking Water Standards
ug/l = micrograms per liter
mg/l = milligram per liter
NS = No Standard
ND = Not Detected
NA = No Analysis

No VOC's were detected in groundwater from MW-2, located within the previous underground waste storage tank area. Water samples from downgradient well MW-3 were found to contain cadmium and a low concentration of chlorobenzene. Therefore, it appears that underground storage tanks at the site did not leak and contaminate the groundwater. Groundwater contamination with VOC's appears to be concentrated in and around the oil pit disposal area. Benzene was detected at concentrations above the drinking water standard. All groundwater sample chemical analysis results are contained in Appendix D.

CONCLUSION

High concentrations of volatile organic compounds (VOC's) were detected in sediment samples collected from the oil pit disposal area. Relatively fewer VOC's were detected in soil from the oil pit roadway.

Groundwater contamination at the site was found almost exclusively in monitor well MW-4, located in the oil pit disposal area. The previous underground storage tank area appears to have had little or no effect on groundwater quality.

Remedial Action Recommendations

Based on this information, M.P. Brown & Associates, Inc. recommends installation of an additional monitor well downgradient from monitor well MW-4. Sampling of this additional well will allow additional definition of the horizontal extent of groundwater contamination of the site.

Despite high concentrations of volatile organic compounds detected in the soil, an extreme health risk is not anticipated. A soil boring will be installed within the oil pit area to collect samples for OVA analysis. OVA measurements will be used to determine the vertical extent of VOC contamination. Contaminated soil will be excavated and land farmed to permit

volatilization of organic compounds. The land farm will be located on Roto-Rooter property immediately to the east of the study area.

M.P. Brown & Associates, Inc. will complete a Remedial Action Plan (RAP) within 30 days of confirmation to proceed from the Florida Department of Environmental Regulation.

REFERENCES

Barr, G.L., and Lewelling, B.R., 1986, Potentiometric Surface of the Upper Floridan Aquifer, West-Central, Florida, May 1986, U.S. Geological Survey Open-File Report 86-409, map.

Florida Administrative Code, Chapter 17-22, Public Drinking Water Systems, 17-22.104.

Hickey, J.J., 1981, Hydrogeology, Estimated Impact, and Regional Well Monitoring of Effects of Subsurface Wastewater Injection Tampa Bay Area, Florida: U.S. Geological Survey Water Resources Investigations 80-118, 40 p.

Masch, F.D., and Denny, K.J., 1966, Grain Size Distribution and its Effect on the Permeability of Unconsolidated Sands, Water Resources Research 2, pp 665-667.

M.P. Brown & Associates, Inc., 1987, Contamination Assessment Plan, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida, 25pp.

M.P. Brown & Associates, Inc., 1987, Quality Assurance Project Plan for Roto-Rooter Drain and Sewer Service of Florida, Tampa, Florida.

United States Federal Government, 1986, Code of Federal Regulations, 40CFR 261.24.

White, W.A., 1970, The Geomorphology of the Florida Peninsula, Florida Bureau of Geology Bulletin No. 51, 164 pp.

Appendix A

Lithologic Log of Test Boring OP-1

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 1.0	Silty sand, quartz, dark brown, fine grained, well sorted, organics	1.0
1.0 - 2.5	Silty sand, quartz, brown, fine grained, well sorted, some organics	1.5
2.5 - 3.5	Sand, quartz, pale gray, fine grained, well sorted	1.0

Lithologic Log of Test Boring OP-2

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 1.0	Silty sand, quartz, dark brown, fine grained, well sorted, organics	1.0
1.0 - 2.5	Silty sand, quartz, brown, fine grained, well sorted, some organics	1.5
2.5 - 3.5	Sand, quartz, pale gray, fine grained, well sorted	1.0

Lithologic Log of Test Boring OP-3

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 1.0	Silty sand, quartz, dark brown, fine grained, well sorted, organics	1.0
1.0 - 2.5	Silty sand, quartz, brown, fine grained, well sorted, some organics	1.5
2.5 - 3.5	Sand, quartz, pale gray, fine grained, well sorted	1.0

Lithologic Log of Test Boring OP-4

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 1.0	Silty sand, quartz, dark brown, fine grained, well sorted, organics	1.0
1.0 - 2.5	Silty sand, quartz, brown, fine grained, well sorted, some organics	1.5
2.5 - 3.5	Sand, quartz, pale gray, fine grained, well sorted	1.0

Lithologic Log of Test Boring OP-5

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 1.0	Silty sand, quartz, dark brown, fine grained, well sorted, organics	1.0
1.0 - 2.5	Silty sand, quartz, brown, fine grained, well sorted, some organics	1.5
2.5 - 3.5	Sand, quartz, pale gray, fine grained, well sorted	1.0

Lithologic Log of Test Boring OP-6

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 1.0	Silty sand, quartz, dark brown, fine grained, well sorted, organics	1.0
1.0 - 2.5	Silty sand, quartz, brown, fine grained, well sorted, some organics	1.5
2.5 - 3.5	Sand, quartz, pale gray, fine grained, well sorted	1.0

Lithologic Log of Test Boring OP-7

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 1.0	Silty sand, quartz, dark brown, fine grained, well sorted, organics	1.0
1.0 - 2.5	Silty sand, quartz, brown, fine grained, well sorted, some organics	1.5
2.5 - 3.5	Sand, quartz, pale gray, fine grained, well sorted	1.0

Lithologic Log of Test Boring OP-8

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 1.0	Silty sand, quartz, dark brown, fine grained, well sorted, organics	1.0
1.0 - 2.5	Silty sand, quartz, brown, fine grained, well sorted, some organics	1.5
2.5 - 3.5	Sand, quartz, pale gray, fine grained, well sorted	1.0

Lithologic Log of Test Boring MW-1

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - .2	Root zone	.2
.2 - 1.5	Sand, quartz, gray, very fine to fine grained, subangular, well sorted, some silt and roots.	1.3
1.5 - 2.5	Silty sand, quartz, black, very fine to fine grained, organic rich, cohesive	1.0
2.5 - 7.5	Clayey sand, quartz, gray, very fine to fine grained, clean, cohesive	5.0
7.5 - 12.5	Sand, quartz, off white, very fine to fine grained, subangular, moderate sorted, clean	5.0

Lithologic Log of Test Boring MW-2

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 2.5	Fill material	2.5
2.5 - 8.0	Clayey sand, quartz, gray, very fine to fine grained, subangular to subrounded, clean, cohesive	5.5
8.0 - 13.0	Sand, quartz, off white, very fine to fine grained, subangular to subrounded, moderately sorted, clean	5.0

Lithologic Log of Test Boring MW-3

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 1.0	Fill material	1.0
1.0 - 3.5	Sand, quartz, white, fine grained, subangular to subrounded, well sorted clean	2.5
3.5 - 7.5	Sand, quartz, gray, very fine to fine grained, subangular to subrounded, slightly silty, some organics	4.0
7.5 - 13.0	Clayey sand, quartz, tan, very fine to fine grained, subangular to subrounded clean, cohesive	5.5

Lithologic Log of Test Boring MW-4

Depth Below Land Surface (Ft)	Description	Thickness Feet
0 - 5.0	Fill material	5.0
5.0 - 8.0	Sand, quartz, brown, fine grained, subangular to subrounded, well sorted clean, slightly silty, some organics	3.0
8.0 - 12.5	Sand, quartz, off white, fine grained, subangular to subrounded, well sorted, clean	

M.P. BROWN & ASSOCIATES, INC.

Lithologic Log Test Boring TB-1

Depth Below Land Surface (Ft)	Description	Thickness Feet
0.0 - 4.0	Sand, quartz, gray to black, medium to fine grained, subangular to subrounded, well sorted, some organic material	4.0
4.0 - 8.0	Silty sand, quartz, gray, medium to fine grained, subangular to subrounded, fair sorted	4.0
8.0 - 10.0	Silty sand, quartz, gray, medium to fine grained, subangular to subrounded, fair sorted, thin clay lens	2.0
10.0 - 21.0	Sand to silty sand, quartz, medium to fine grained, subangular to subrounded, fair to well sorted	11.0
21.0 - 24.0	Sand to clayey sand, quartz, gray, medium to fine grained, poor to fair sorted, slightly cohesive	3.0
24.0 - 27.0	Clayey sand to sandy clay, gray to brown, cohesive, ductile, fine grained, quartz sand throughout	3.0
27.0 - 30.0	Sandy clay to clay, dark gray to black, cohesive, ductile	3.0
30.0 - 33.5	Clay, dark gray, brown, ductile, cohesive	3.5
33.5	Limestone, gray, white, fossiliferous, friable	

M.P. BROWN & ASSOCIATES, INC.

Lithologic Log of Test Boring TB-2

Depth Below Land Surface (Ft)	Description	Thickness Feet
0.0 - 0.9	Silty sand, quartz, dark brown, fine grained, angular to subangular, well sorted	0.9
0.9 - 2.0	Silty sand, quartz, brown, fine grained, well sorted	1.1
2.0 - 3.0	Sand, quartz, white, fine grained, angular to subangular, well sorted	1.0
3.0 - 6.0	Silty sand, quartz, brown, fine grained, angular to subangular, well sorted, some white limestone, fill rock inclusion	3.0
6.0 - 14.0	Sand, quartz, pale brown to brown, fine grained, angular to subangular, well sorted	8.0
14.0 - 15.5	Sand, quartz, pale brown to white, fine grained, well sorted	1.5
15.5 - 24.0	Sand, quartz, brown, fine grained, angular to subangular, well sorted	8.5
24.0 - 24.5	Sand to clayey sand, dark brown, slightly cohesive	0.5
24.0 - 25.0	Clayey sand to sandy clay, dark brown, cohesive, ductile	0.5
25.0 - 31.8	Clay, dark brown, gray, cohesive, ductile	6.8
31.8	Limestone, gray, white, fossiliferous, pelecypods, friable	

Appendix B

SOUTHERN ANALYTICAL LABORATORIES, INC.

110A BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 33557 813-855-1844

SAMPLE TRANSMITTAL / CUSTODY RECORD

(Please fill out completely)

Client MP Brown & Assoc. Attention Evan Davis

Address [illegible] Suite D Tampa 33634

Phone [illegible] Project No.

Project Name [illegible]

Item No.	Lab No.	Number and Size of Containers	Description	Date Coll.	Time Coll.
1	OP-1 [illegible]	1	[illegible] analyze for [illegible] EPToxicity Metals	1/4/88	1315
2	OP-2 .5-1.0	1	" "		1340
3	OP-3 .5-1.0	1	" "		1405
4	OP-4 .5-1.0	1	" "		1427
5	OP-7	1	" "		1437
6	OP-6		" "		1455
7	OP-5		" " called		1510
8	OP-8		" "		1530
D-1	D-1		" " no EPToxic		1610
D-2	D-2		" " no EPToxic		1630
D-1	D-1		Lead by furnace		1610
D-2	D-2		" "		1635

Sampled By (Signature) [illegible] Affiliation M.P. Brown

Describe field collection and any special handling of samples

Additional Remarks D-1 & D-2 [illegible] samples
[illegible] composite samples (.5 to 1.0 ft)
[illegible] 7 & 8 composite samples (.5 to 1.0 ft)

Item No.	Relinquished By	Date	Time	Accepted By	Date	Time
	[illegible]	1/5/88	1434	[illegible]	1-5-88	1434

SAMPLE I.D. # MW-1 DATE 2-12-86 Team: Seed Works

Roto Rooter · H.Id - S.D Wet-277

SAMPLE SOURCE

- [x] Monitoring Well
- [ ] Supply Well
- [ ] Surface Water
- [ ] Pollution Source
- [ ] BLANK
- [ ] Other _____

WELL DATA

14.5 Well Depth (feet)
14.5 Casing Depth (feet)
2 Well Diameter (inches)
5.23 Water Level Depth (feet) (BTOC)
____ Casing Elev. (Ft. AMSL)
Well Position [ ] UP or [ ] DOWN GRADIENT [ ] UNKNOWN

I.D.

MW-1 Field/Lab I.D. #
MW-1 Well #

SAMPLE COLLECTION

Materials Encountered

- [ ] Stainless Steel
- [x] Teflon
- [x] Glass
- [ ] Steel
- [ ] Galvanized Steel
- [x] PVC
- [ ] PVC Glue
- [ ] Tygon
- [ ] Silicone
- [ ] Other _____

Pumping Method

- [ ] Bailed
- [x] Peristaltic
- [ ] Submersible
- [ ] Air-lift
- [ ] Nitrogen-lift
- [ ] Jet
- [ ] Centrifugal
- [ ] Other _____

Misc.

- [x] Sampled at well head
- [ ] Sampled thru tank
- [ ] Sampled from spigot
- [ ] Filtered sample
- [x] Well evacuated Liters Min.
- [x] Sampled via FDER standard procedures
- [x] Chain of custody sample

3 well vol. = 4.6 gal

FIELD PARAMETERS

5.26 pH
17.0 Temp. °C
450 Spec. Cond. umhos/cm
____ Sal. %
Measured by Robert D Peterson

SAMPLE PRESERVATION

- [x] Ice
- [x] HNO_3
- [x] H_2SO_4
- [ ] Other _____

SAMPLED BY Robert D Peterson

FIELD REPORT PREPARED BY Robert D. Peterson

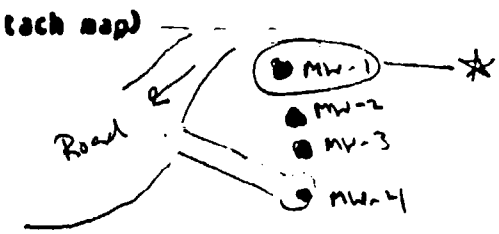
REMARKS

Time

Parameters
601/602 - 1030
- 1032
610 - 1040
Total Metals - 1047
Nitrogen Nitrate - 1048
Nitrogen Ammonia - 1048
Fecal Coliforms - 1050, 1051

Yellow color
Strong smell
H_2S

LOCATION (please attach map)



SAMPLE I.D. # MW-2 DATE 2-12-86 Team Sol Remiks

Roto Rooter Hold 9.0 Wet 2.42

SAMPLE SOURCE

- [x] Monitoring Well
- [ ] Supply Well
- [ ] Surface Water
- [ ] Pollution Source
- [ ] BLANK
- [ ] Other _____

WELL DATA

11.0 Well Depth (feet)
11.0 Casing Depth (feet)
2" Well Diameter (inches)
6.58 Water Level Depth (feet) (BTOC)
____ Casing Elev. (ft. AMSL)
Well Position [ ] UP or [ ] DOWN GRADIENT [ ] UNKNOWN

I.D.

MW-2 Field/Lab I.D. #
MW-2 Well #

SAMPLE COLLECTION

Materials Encountered

- [ ] Stainless Steel
- [x] Teflon
- [x] Glass
- [ ] Steel
- [ ] Galvanized Steel
- [x] PVC
- [ ] PVC Glue
- [ ] Tygon
- [ ] Silicone
- [ ] Other _____

Pumping Method

- [ ] Bailed
- [x] Peristaltic
- [ ] Submersible
- [ ] Air-lift
- [ ] Nitrogen-lift
- [ ] Jet
- [ ] Centrifugal
- [ ] Other _____

Misc.

- [x] Sampled at well head
- [ ] Sampled thru tank
- [ ] Sampled from spigot
- [ ] Filtered sample
- [x] Well evacuated Liters Min.
- [x] Sampled via FDER standard procedures
- [x] Chain of custody sample

3 well vol. = 2.2 gal

FIELD PARAMETERS

6.78 pH
19.2 Temp. °C
850 Spec. Cond. umhos/cm
____ Sal. %
Measured by Robert D. Peterson

SAMPLE PRESERVATION

- [x] Ice
- [x] HNO_3
- [x] H_2SO_4
- [ ] Other _____

SAMPLED BY
Robert D. Peterson

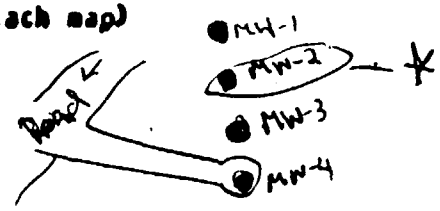
FIELD REPORT PREPARED BY
Robert D. Peterson

REMARKS

		Time	
Parameters	601/602	1212	Pale Yellow color
		1212	No smell
Total Metals		1214	
Nitrogen Nitrate		1215	
Nitrogen Ammonia		1215	
Fecal Coliforms		1216	

Field Blank 1145

LOCATION (please attach map)



SAMPLE I.D. # MW-3 DATE 2 12 80 Team S. Rennick

Roto Rooter Held 8.0 Wet 1.55

SAMPLE SOURCE

- [x] Monitoring Well
- [ ] Supply Well
- [ ] Surface Water
- [ ] Pollution Source
- [ ] BLANK
- [ ] Other _____

WELL DATA

14.9 Well Depth (feet)
14.9 Casing Depth (feet)
2" Well Diameter (inches)
6.45 Water Level Depth (feet) (BTOC)
____ Casing Elev. (Ft. AMSL)
Well Position [ ] UP or [ ] DOWN GRADIENT [ ] UNKNOWN

I.D.

MW-3 Field/Lab I.D. #
MW-3 Well #

SAMPLE COLLECTION

Materials Encountered

- [ ] Stainless Steel
- [x] Teflon
- [x] Glass
- [ ] Steel
- [ ] Galvanized Steel
- [x] PVC
- [ ] PVC Glue
- [ ] Tygon
- [ ] Silicone
- [ ] Other _____

Pumping Method

- [ ] Bailed
- [x] Peristaltic
- [ ] Submersible
- [ ] Air-lift
- [ ] Nitrogen-lift
- [ ] Jet
- [ ] Centrifugal
- [ ] Other _____

Misc.

- [x] Sampled at well head
- [ ] Sampled thru tank
- [ ] Sampled from spigot
- [ ] Filtered sample
- [x] Well evacuated Liters Min.
- [x] Sampled via FDER standard procedures
- [x] Chain of custody sample

3 well vol. = 4.2 Gal

FIELD PARAMETERS

6.54 pH
20.2 Temp. °C
950 Spec. Cond. umhos/cm
____ Sal. %
Measured by Robert D. Peterson

SAMPLE PRESERVATION

- [x] Ice
- [x] HNO_3
- [x] H_2SO_4
- [ ] Other _____

SAMPLED BY Robert D Peterson

FIELD REPORT PREPARED BY Robert D. Peterson

REMARKS

	Time
Parameters 601/602	-1407
	-1407
Total Metals	-1408
Nitrogen Nitrate	-1409
Nitrogen Ammonia	-1409
Fecal Coliforms	-1410, 1410

Yellow Color
No smell

LOCATION (please attach map)

Field Bank's 610 - 1300
601/602 - 1300
T-Metals - 1300
Fecal - 1300

SAMPLE I.D. # MW-4 DATE 2 12 80 Time [illegible]

Roto Rooter Hold 9.0 Wt 2.08

SAMPLE SOURCE

- [x] Monitoring Well
- [ ] Supply Well
- [ ] Surface Water
- [ ] Pollution Source
- [ ] BLANK
- [ ] Other _____

WELL DATA

14.4 Well Depth (feet)
14.4 Casing Depth (feet)
2" Well Diameter (inches)
6.92 Water Level Depth (feet)
____ Casing Elev. (ft. AMSL)

Well Position [ ] UP or [ ] DOWN GRADIENT [ ] UNKNOWN

I.D.

MW-4 Field/Lab I.D. #
MW-4 Well #

SAMPLE COLLECTION

Materials Encountered

- [ ] Stainless Steel
- [x] Teflon
- [x] Glass
- [ ] Steel
- [ ] Galvanized Steel
- [x] PVC
- [ ] PVC Glue
- [ ] Tygon
- [ ] Silicone
- [ ] Other _____

Pumping Method

- [ ] Bailed
- [x] Peristaltic
- [ ] Submersible
- [ ] Air-lift
- [ ] Nitrogen-lift
- [ ] Jet
- [ ] Centrifugal
- [ ] Other _____

Misc.

- [x] Sampled at well head
- [ ] Sampled thru tank
- [ ] Sampled from spigot
- [ ] Filtered sample
- [x] Well evacuated Liters Min.
- [x] Sampled via FDER standard procedures
- [x] Chain of custody sample

3 well vol = 3.7 gal

FIELD PARAMETERS

6.59 pH
18.9 Temp. °C
750 Spec. Cond. umhos/cm
____ Sal. %
Measured by Robert D. Peterson

SAMPLE PRESERVATION

- [x] Ice
- [x] HNO_3
- [x] H_2SO_4
- [ ] Other _____

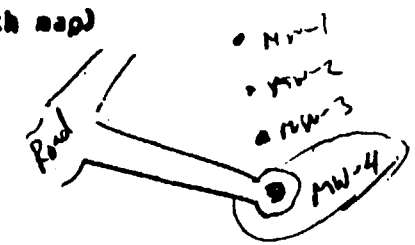
SAMPLED BY Robert D. Peterson

FIELD REPORT PREPARED BY Robert D. Peterson

REMARKS

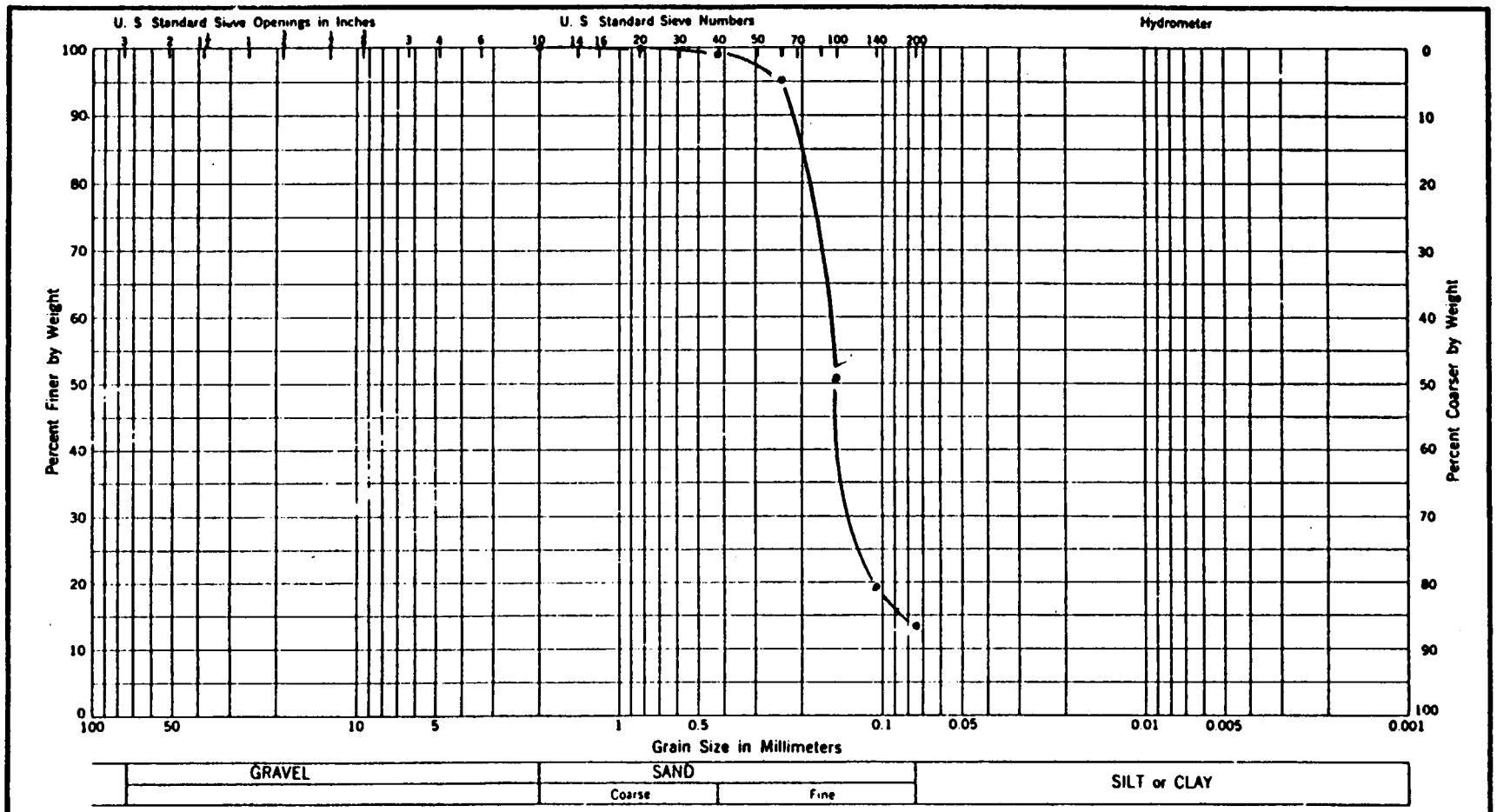
	Time	
Parameters 601/602	1523	
	1523	Smells of
610	1524	fuel
Total Metals	1525	
Field Blank	1500	

LOCATION (please attach map)



Appendix C

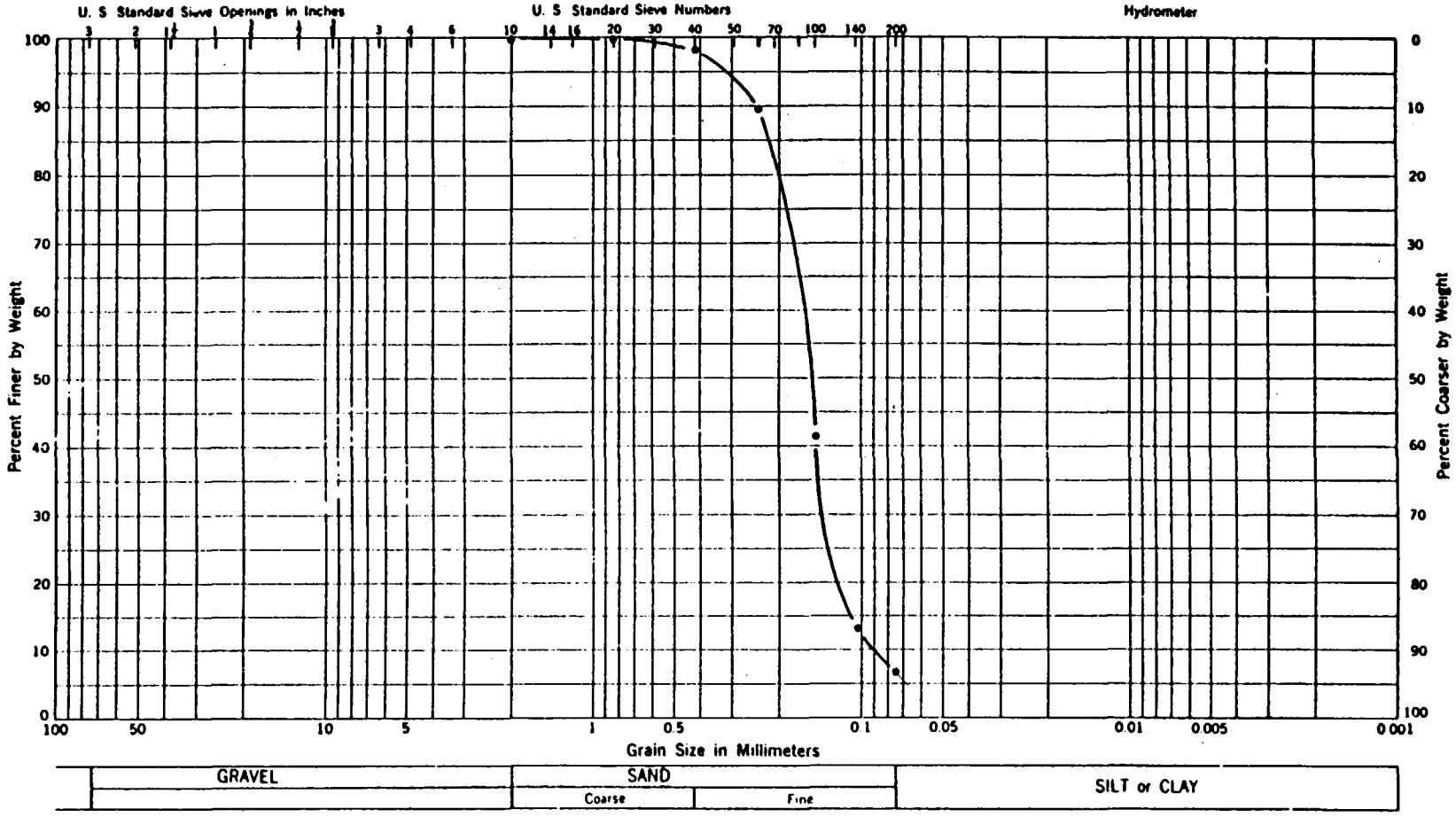
DRIGGERS ENGINEERING SERVICES, INC.
Clearwater, Florida



Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
TB1	6.0-8.0'					Grayish brown, slightly
						clayey SAND (SC)

CLIENT: M.P. Brown and Assoc., Inc.
PROJECT: Roto-Rooter Project
FILE: L871263, Report 1

DRIGGERS ENGINEERING SERVICES, INC.
Clearwater, Florida



Number	Depth	Natural Moisture	L. L.	P. L	P. I.	Classification
TB2	16.0-18.0'					Brown, very slightly clayey SAND (SP-SC)

CLIENT: M.P. Brown & Assoc., Inc.
PROJECT: Roto-Rooter Project
FILE: L871263, Report 1

TEST DATA FORM
CONSTANT HEAD PERMEABILITY TEST

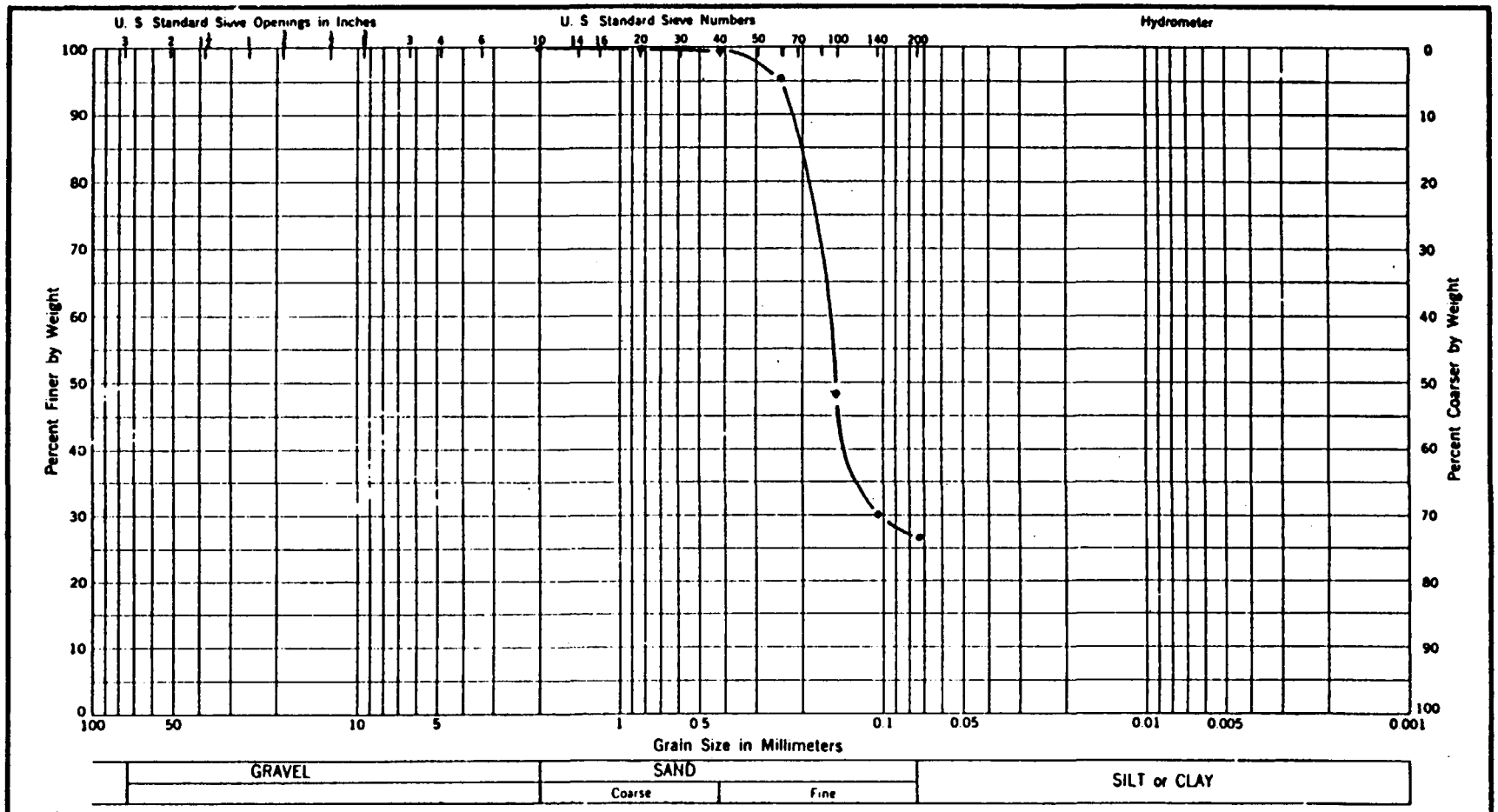
Sample No.: TB-1 Sample Depth: 28.0 to 30.0 feet

Sample Description: Dark gray, clayey SAND (SC)

Test Results

Permeability $K = 1.9 \times 10^{-8}$ cm/sec
Wet Unit Weight = 119.2 pcf
Dry Unit Weight = 93.2 pcf
Original Moisture Content = 27.2%
Sieve Analysis (-200) 26.6%

DRIGGERS ENGINEERING SERVICES, INC.
Clearwater, Florida



Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
TB1	28.0-30.0'					Dark gray clayey SAND (SC)

CLIENT: M. P. Brown & Assoc., Inc.
PROJECT: Roto-Rooter Project
FILE: L871263, Report 1

Appendix D

SOUTHERN ANALYTICAL LABORATORIES, INC.
110A BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 34677 813-855-1844

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: Composite #1 - MPB OP-1, 1/2-1', 1/4/88, 1315
MPB OP-2, 1/2-1', 1/4/88, 1340
MPB OP-3, 1/2-1', 1/4/88, 1405
SAL Sample Nos.: 80597-01, 02, 03
Date Received: 1/5/88

Purgeable Halocarbons - EPA Method 8010

Bromodichloromethane	< 1.0	1,2-Dichloroethane	< 1.0
Bromoform	< 1.0	1,1-Dichloroethene	< 1.0
Bromomethane	< 1.0	trans-1,2-Dichloroethene	< 1.0
Carbon tetrachloride	< 1.0	1,2-Dichloropropane	< 1.0
Chlorobenzene	< 1.0	cis-1,3-Dichloropropene	< 1.0
Chloroethane	< 1.0	trans-1,3-Dichloropropene	< 1.0
2-Chloroethylvinyl ether	< 1.0	Methylene chloride	< 1.0
Chloroform	< 1.0	1,1,2,2-Tetrachloroethane	< 1.0
Chloromethane	< 1.0	Tetrachloroethene	< 1.0
Dibromochloromethane	< 1.0	1,1,1-Trichloroethane	< 1.0
1,2-Dichlorobenzene	< 1.0	1,1,2-Trichloroethane	< 1.0
1,3-Dichlorobenzene	< 1.0	Trichloroethene	< 1.0
1,4-Dichlorobenzene	< 1.0	Trichlorofluoromethane	< 1.0
Dichlorodifluoromethane	< 1.0	Vinyl chloride	< 1.0
1,1-Dichloroethane	< 1.0		

Note: All results reported in ug/kg, dry basis

Francis Daniels
Francis I. Daniels
Laboratory Director

Environmental Lab No. E84129

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: Composite #1 - MPB OP-1, 1/2-1', 1/4/88, 1315
MPB OP-2, 1/2-1', 1/4/88, 1340
MPB OP-3, 1/2-1', 1/4/88, 1405
SAL Sample Nos.: 80597-01, 02, 03
Date Received: 1/5/88

Parameter	Units	Composite No. 1
EP Toxicity (40 CFR 261.24)		
Arsenic	mg/l*	0.002
Barium	mg/l	0.4
Cadmium	mg/l	0.11
Chromium	mg/l	< 0.05
Lead	mg/l	0.10
Mercury	mg/l	< 0.0004
Selenium	mg/l	< 0.002
Silver	mg/l	< 0.02

* in extract

Purgeable Aromatics - EPA Method 8020

Benzene	< 1.0	1,4-Dichlorobenzene	< 1.0
Chlorobenzene	< 1.0	Ethylbenzene	< 1.0
1,2-Dichlorobenzene	< 1.0	Toluene	< 1.0
1,3-Dichlorobenzene	< 1.0	Xylenes	< 1.0

Note: All results reported in ug/kg, dry basis

Francis Daniels
Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: Composite #3 - MPB OP-1, Water Table, 1/4/88, 0945
MPB OP-2, Water Table, 1/4/88, 1030
MPB OP-3, Water Table, 1/4/88, 1040
SAL Sample Nos.: 80597-09 through 11
Date Received: 1/5/88

Purgeable Halocarbons - EPA Method 8010

Bromodichloromethane	< 50	1,2-Dichloroethane	< 50
Bromoform	< 50	1,1-Dichloroethene	< 50
Bromomethane	< 50	trans-1,2-Dichloroethene	< 50
Carbon tetrachloride	< 50	1,2-Dichloropropane	< 50
Chlorobenzene	**2,500**	cis-1,3-Dichloropropene	< 50
Chloroethane	< 50	trans-1,3-Dichloropropene	< 50
2-Chloroethylvinyl ether	< 50	Methylene chloride	< 50
Chloroform	< 50	1,1,2,2-Tetrachloroethane	< 50
Chloromethane	< 50	Tetrachloroethene	< 50
Dibromochloromethane	< 50	1,1,1-Trichloroethane	< 50
1,2-Dichlorobenzene	< 50	1,1,2-Trichloroethane	< 50
1,3-Dichlorobenzene	< 50	Trichloroethene	< 50
1,4-Dichlorobenzene	**150**	Trichlorofluoromethane	< 50
Dichlorodifluoromethane	< 50	Vinyl chloride	< 50
1,1-Dichloroethane	< 50		

Note: All results reported in ug/kg, dry basis

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: Composite #3 - MPB OP-1, Water Table, 1/4/88, 0945
MPB OP-2, Water Table, 1/4/88, 1030
MPB OP-3, Water Table, 1/4/88, 1040
SAL Sample Nos.: 80597-09 through 11
Date Received: 1/5/88

Parameter	Units	Composite No. 3
EP Toxicity (40 CFR 261.24)		
Arsenic	mg/l*	0.009
Barium	mg/l	< 0.2
Cadmium	mg/l	< 0.01
Chromium	mg/l	< 0.05
Lead	mg/l	< 0.10
Mercury	mg/l	< 0.0004
Selenium	mg/l	< 0.002
Silver	mg/l	< 0.02

* in extract

Purgeable Aromatics - EPA Method 8020

Benzene	< 500	1,4-Dichlorobenzene	< 500
Chlorobenzene	**2,500**	Ethylbenzene	< 500
1,2-Dichlorobenzene	< 500	Toluene	< 500
1,3-Dichlorobenzene	< 500	**Xylenes**	**7,300**

Note: All results reported in ug/kg, dry basis

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: Composite #2 - MPB OP-4, 1/2-1', 1/4/88, 1427
MPB OP-5, 1/2-1', 1/4/88, 1510
MPB OP-6, 1/2-1', 1/4/88, 1455
MPB OP-7, 1/2-1', 1/4/88, 1437
MPB OP-8, 1/2-1', 1/4/88, 1530
SAL Sample Nos.: 80597-04 through 08
Date Received: 1/5/88

Purgeable Halocarbons - EPA Method 8010

Bromodichloromethane	< 50	1,2-Dichloroethane	< 50
Bromoform	< 50	1,1-Dichloroethene	< 50
Bromomethane	< 50	trans-1,2-Dichloroethene	< 50
Carbon tetrachloride	< 50	1,2-Dichloropropane	< 50
Chlorobenzene	**79**	cis-1,3-Dichloropropene	< 50
Chloroethane	< 50	trans-1,3-Dichloropropene	< 50
2-Chloroethylvinyl ether	< 50	Methylene chloride	< 50
Chloroform	< 50	1,1,2,2-Tetrachloroethane	< 50
Chloromethane	< 50	Tetrachloroethene	< 50
Dibromochloromethane	< 50	1,1,1-Trichloroethane	< 50
1,2-Dichlorobenzene	**120**	1,1,2-Trichloroethane	< 50
1,3-Dichlorobenzene	**57**	Trichloroethene	< 50
1,4-Dichlorobenzene	**110**	Trichlorofluoromethane	< 50
Dichlorodifluoromethane	< 50	Vinyl chloride	< 50
1,1-Dichloroethane	< 50		

Note: All results reported in ug/kg, dry basis

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: Composite #2 - MPB OP-4, 1/2-1', 1/4/88, 1427
MPB OP-5, 1/2-1', 1/4/88, 1510
MPB OP-6, 1/2-1', 1/4/88, 1455
MPB OP-7, 1/2-1', 1/4/88, 1437
MPB OP-8, 1/2-1', 1/4/88, 1530
SAL Sample Nos.: 80597-04 through 08
Date Received: 1/5/88

Parameter	Units	Composite No. 2
EP Toxicity (40 CFR 261.24)		
Arsenic	mg/l*	0.003
Barium	mg/l	0.2
Cadmium	mg/l	0.04
Chromium	mg/l	< 0.05
Lead	mg/l	< 0.10
Mercury	mg/l	< 0.0004
Selenium	mg/l	< 0.002
Silver	mg/l	< 0.02

* in extract

Purgeable Aromatics - EPA Method 8020

Benzene	< 500	1,4-Dichlorobenzene	< 500
Chlorobenzene	< 500	**Ethylbenzene**	**3,200**
1,2-Dichlorobenzene	< 500	Toluene	< 500
1,3-Dichlorobenzene	< 500	**Xylenes**	**26,000**

Note: All results reported in ug/kg, dry basis

Francis Daniels
Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: Composite #4 - MPB OP-4, Water Table, 1/4/88, 1130
MPB OP-5, Water Table, 1/4/88, 1250
MPB OP-6, Water Table, 1/4/88, 1050
MPB OP-7, Water Table, 1/4/88, 1110
MPB OP-8, Water Table, 1/4/88, 1315
SAL Sample Nos.: 80597-12 through 16
Date Received: 1/5/88

Purgeable Halocarbons - EPA Method 8010

Bromodichloromethane	< 50	1,2-Dichloroethane	< 50
Bromoform	< 50	1,1-Dichloroethene	< 50
Bromomethane	< 50	trans-1,2-Dichloroethene	< 50
Carbon tetrachloride	< 50	1,2-Dichloropropane	< 50
Chlorobenzene	**740**	cis-1,3-Dichloropropene	< 50
Chloroethane	< 50	trans-1,3-Dichloropropene	< 50
2-Chloroethylvinyl ether	< 50	Methylene chloride	< 50
Chloroform	< 50	1,1,2,2-Tetrachloroethane	< 50
Chloromethane	< 50	Tetrachloroethene	< 50
Dibromochloromethane	< 50	1,1,1-Trichloroethane	< 50
1,2-Dichlorobenzene	< 50	1,1,2-Trichloroethane	< 50
1,3-Dichlorobenzene	**97**	Trichloroethene	< 50
1,4-Dichlorobenzene	**140**	Trichlorofluoromethane	< 50
Dichlorodifluoromethane	< 50	Vinyl chloride	< 50
1,1-Dichloroethane	< 50		

Note: All results reported in ug/kg, dry basis

Francis Daniels

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: Composite #4 - MPB OP-4, Water Table, 1/4/88, 1130
MPB OP-5, Water Table, 1/4/88, 1250
MPB OP-6, Water Table, 1/4/88, 1050
MPB OP-7, Water Table, 1/4/88, 1110
MPB OP-8, Water Table, 1/4/88, 1315
SAL Sample Nos.: 80597-12 through 16
Date Received: 1/5/88

Parameter	Units	Composite No. 4
EP Toxicity (40 CFR 261.24)		
Arsenic	mg/l*	0.006
Barium	mg/l	< 0.2
Cadmium	mg/l	< 0.01
Chromium	mg/l	< 0.05
Lead	mg/l	< 0.10
Mercury	mg/l	< 0.0004
Selenium	mg/l	< 0.002
Silver	mg/l	< 0.02

* in extract

Purgeable Aromatics - EPA Method 8020

Benzene	< 500	1,4-Dichlorobenzene	< 500
Chlorobenzene	**740**	**Ethylbenzene**	**6,100**
1,2-Dichlorobenzene	< 500	Toluene	< 500
1,3-Dichlorobenzene	< 500	**Xylenes**	**32,000**

Note: All results reported in ug/kg, dry basis

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: MPB D-1, 1/4/88, 1610
SAL Sample No.: 80597-17
Date Received: 1/5/88

Purgeable Halocarbons - EPA Method 8010

Bromodichloromethane	< 1.0	1,2-Dichloroethane	< 1.0
Bromoform	< 1.0	1,1-Dichloroethene	< 1.0
Bromomethane	< 1.0	trans-1,2-Dichloroethene	< 1.0
Carbon tetrachloride	< 1.0	1,2-Dichloropropane	< 1.0
Chlorobenzene	**6.9**	cis-1,3-Dichloropropene	< 1.0
Chloroethane	< 1.0	trans-1,3-Dichloropropene	< 1.0
2-Chloroethylvinyl ether	< 1.0	Methylene chloride	< 1.0
Chloroform	< 1.0	1,1,2,2-Tetrachloroethane	< 1.0
Chloromethane	< 1.0	Tetrachloroethene	< 1.0
Dibromochloromethane	< 1.0	1,1,1-Trichloroethane	< 1.0
1,2-Dichlorobenzene	< 1.0	1,1,2-Trichloroethane	< 1.0
1,3-Dichlorobenzene	< 1.0	Trichloroethene	< 1.0
1,4-Dichlorobenzene	< 1.0	Trichlorofluoromethane	< 1.0
Dichlorodifluoromethane	< 1.0	Vinyl chloride	< 1.0
1,1-Dichloroethane	< 1.0		

Note: All results reported in ug/kg, dry basis

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: MPB D-1, 1/4/88, 1610
SAL Sample No.: 80597-17
Date Received: 1/5/88

Purgeable Aromatics - EPA Method 8020

Benzene	< 1.0	1,4-Dichlorobenzene	< 1.0
Chlorobenzene	**6.9**	Ethylbenzene	< 1.0
1,2-Dichlorobenzene	< 1.0	**Toluene**	**10**
1,3-Dichlorobenzene	< 1.0	Xylenes	< 1.0

Note: All results reported in ug/kg, dry basis

Additional Parameter

Lead, Total (Graphite Furnace)*	< 0.05	mg/kg, dry basis

*Analyzed by Lab No. E84059

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: MPB D-2, 1/4/88, 1630
SAL Sample No.: 80597-18
Date Received: 1/5/88

Purgeable Halocarbons - EPA Method 8010

Bromodichloromethane	< 1.0	1,2-Dichloroethane	< 1.0
Bromoform	< 1.0	1,1-Dichloroethene	< 1.0
Bromomethane	< 1.0	trans-1,2-Dichloroethene	< 1.0
Carbon tetrachloride	< 1.0	1,2-Dichloropropane	< 1.0
Chlorobenzene	**130**	cis-1,3-Dichloropropene	< 1.0
Chloroethane	< 1.0	trans-1,3-Dichloropropene	< 1.0
2-Chloroethylvinyl ether	< 1.0	Methylene chloride	< 1.0
Chloroform	< 1.0	1,1,2,2-Tetrachloroethane	< 1.0
Chloromethane	< 1.0	Tetrachloroethene	< 1.0
Dibromochloromethane	< 1.0	1,1,1-Trichloroethane	< 1.0
1,2-Dichlorobenzene	< 1.0	1,1,2-Trichloroethane	< 1.0
1,3-Dichlorobenzene	**1.1**	Trichloroethene	< 1.0
1,4-Dichlorobenzene	**4.3**	Trichlorofluoromethane	< 1.0
Dichlorodifluoromethane	< 1.0	Vinyl chloride	< 1.0
1,1-Dichloroethane	< 1.0		

Note: All results reported in ug/kg, dry basis

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 7, 1988
Project No. 80597

LABORATORY REPORT

Project: Analysis of Soil Samples - Roto Rooter
Sample Description: MPB D-2, 1/4/88, 1630
SAL Sample No.: 80597-18
Date Received: 1/5/88

Purgeable Aromatics - EPA Method 8020

Benzene	< 1.0	1,4-Dichlorobenzene	4.3
Chlorobenzene	130	Ethylbenzene	< 1.0
1,2-Dichlorobenzene	< 1.0	Toluene	4.7
1,3-Dichlorobenzene	1.1	Xylenes	< 1.0

Note: All results reported in ug/kg, dry basis

Additional Parameter

Lead, Total (Graphite Furnace)	< 0.05	mg/kg, dry basis

Francis Daniels
Francis I. Daniels
Laboratory Director

APR 17 REC'D

SOUTHERN ANALYTICAL LABORATORIES, INC.
110A BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 34677 813-855-1844

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-1, 2/12/88, 1030
SAL Sample No.: 80662-01
Date Received: 2/12/88

Parameter	Units	MW-1
Nitrate Nitrogen	mg/l as N	0.04
Ammonia Nitrogen	mg/l as N	0.96
Fecal Coliforms	Counts/100ml	< 1
Total Metals		
Arsenic	mg/l	0.002
Barium	mg/l	< 0.1
Cadmium	mg/l	< 0.005
Chromium	mg/l	< 0.02
Copper	mg/l	< 0.01
Iron	mg/l	5.0
Lead	mg/l	< 0.02
Mercury	mg/l	< 0.0004
Selenium	mg/l	< 0.001
Silver	mg/l	< 0.01
Zinc	mg/l	0.05

Francis I. Daniels
Laboratory Director

Environmental Lab No. E84129

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-1, 2/12/88, 1030
SAL Sample No.: 80662-01
Date Received: 2/12/88

Purgeable Halocarbons - EPA Method 601

Bromodichloromethane	< 1.0	1,2-Dichloroethane	< 1.0
Bromoform	< 1.0	1,1-Dichloroethene	< 1.0
Bromomethane	< 1.0	trans-1,2-Dichloroethene	< 1.0
Carbon tetrachloride	< 1.0	1,2-Dichloropropane	< 1.0
Chlorobenzene	< 1.0	cis-1,3-Dichloropropene	< 1.0
Chloroethane	< 1.0	trans-1,3-Dichloropropene	< 1.0
2-Chloroethylvinyl ether	< 1.0	Methylene chloride	< 1.0
Chloroform	< 1.0	1,1,2,2-Tetrachloroethane	< 1.0
Chloromethane	< 1.0	Tetrachloroethene	< 1.0
Dibromochloromethane	< 1.0	1,1,1-Trichloroethane	< 1.0
1,2-Dichlorobenzene	< 1.0	1,1,2-Trichloroethane	< 1.0
1,3-Dichlorobenzene	< 1.0	Trichloroethene	< 1.0
1,4-Dichlorobenzene	< 1.0	Trichlorofluoromethane	< 1.0
Dichlorodifluoromethane	< 1.0	Vinyl chloride	< 1.0
1,1-Dichloroethane	< 1.0		

Note: All results reported in ug/l

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-1, 2/12/88, 1030
SAL Sample No.: 80662-01
Date Received: 2/12/88

Purgeable Aromatics - EPA Method 602

Benzene	< 1.0	1,4-Dichlorobenzene	< 1.0
Chlorobenzene	< 1.0	Ethylbenzene	< 1.0
1,2-Dichlorobenzene	< 1.0	Toluene	< 1.0
1,3-Dichlorobenzene	< 1.0	Xylenes	< 1.0

Note: All results reported in ug/l

Francis Daniels

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-1, 2/12/88, 1030
SAL Sample No.: 80662-01
Date Received: 2/12/88

Polynuclear Aromatic Hydrocarbons - EPA Method 610

Acenaphthene	< 1.0	Chrysene	< 1.0
Acenaphthylene	< 1.0	Dibenzo(a,h)anthracene	< 1.0
Anthracene	< 1.0	Fluoranthene	< 1.0
Benzo(a)anthracene	< 1.0	Fluorene	< 1.0
Benzo(a)pyrene	< 1.0	Indeno(1,2,3-cd)pyrene	< 1.0
Benzo(b)fluoranthene	< 1.0	Naphthalene	< 1.0
Benzo(ghi)perylene	< 1.0	Phenanthrene	< 1.0
Benzo(k)fluoranthene	< 1.0	Pyrene	< 1.0

Note: All results reported in ug/l

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-2, 2/12/88, 1212
SAL Sample No.: 80662-02
Date Received: 2/12/88

Parameter	Units	MW-2
Nitrate Nitrogen	mg/l as N	0.04
Ammonia Nitrogen	mg/l as N	1.6
Fecal Coliforms	Counts/100ml	< 1
Total Metals		
Arsenic	mg/l	0.002
Barium	mg/l	< 0.1
Cadmium	mg/l	< 0.005
Chromium	mg/l	< 0.02
Copper	mg/l	< 0.01
Iron	mg/l	1.6
Lead	mg/l	< 0.02
Mercury	mg/l	< 0.0004
Selenium	mg/l	< 0.001
Silver	mg/l	< 0.01
Zinc	mg/l	0.04

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-2, 2/12/88, 1212
SAL Sample No.: 80662-02
Date Received: 2/12/88

Purgeable Halocarbons - EPA Method 601

Bromodichloromethane	< 1.0	1,2-Dichloroethane	< 1.0
Bromoform	< 1.0	1,1-Dichloroethene	< 1.0
Bromomethane	< 1.0	trans-1,2-Dichloroethene	< 1.0
Carbon tetrachloride	< 1.0	1,2-Dichloropropane	< 1.0
Chlorobenzene	< 1.0	cis-1,3-Dichloropropene	< 1.0
Chloroethane	< 1.0	trans-1,3-Dichloropropene	< 1.0
2-Chloroethylvinyl ether	< 1.0	Methylene chloride	< 1.0
Chloroform	< 1.0	1,1,2,2-Tetrachloroethane	< 1.0
Chloromethane	< 1.0	Tetrachloroethene	< 1.0
Dibromochloromethane	< 1.0	1,1,1-Trichloroethane	< 1.0
1,2-Dichlorobenzene	< 1.0	1,1,2-Trichloroethane	< 1.0
1,3-Dichlorobenzene	< 1.0	Trichloroethene	< 1.0
1,4-Dichlorobenzene	< 1.0	Trichlorofluoromethane	< 1.0
Dichlorodifluoromethane	< 1.0	Vinyl chloride	< 1.0
1,1-Dichloroethane	< 1.0		

Note: All results reported in ug/l

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-2, 2/12/88, 1212
SAL Sample No.: 80662-02
Date Received: 2/12/88

Purgeable Aromatics - EPA Method 602

Benzene	< 1.0	1,4-Dichlorobenzene	< 1.0
Chlorobenzene	< 1.0	Ethylbenzene	< 1.0
1,2-Dichlorobenzene	< 1.0	Toluene	< 1.0
1,3-Dichlorobenzene	< 1.0	Xylenes	< 1.0

Note: All results reported in ug/l

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-3, 2/12/88, 1407
SAL Sample No.: 80662-03
Date Received: 2/12/88

Parameter	Units	MW-3
Nitrate Nitrogen	mg/l as N	0.35
Ammonia Nitrogen	mg/l as N	3.9
Fecal Coliforms	Counts/100ml	< 1
Total Metals		
Arsenic	mg/l	0.002
Barium	mg/l	< 0.1
Cadmium	mg/l	0.042
Chromium	mg/l	< 0.02
Copper	mg/l	0.01
Iron	mg/l	0.38
Lead	mg/l	< 0.02
Mercury	mg/l	< 0.0004
Selenium	mg/l	0.001
Silver	mg/1	< 0.01
Zinc	mg/l	0.07

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-3, 2/12/88, 1407
SAL Sample No.: 80662-03
Date Received: 2/12/88

Purgeable Halocarbons - EPA Method 601

Bromodichloromethane	< 1.0	1,2-Dichloroethane	< 1.0
Bromoform	< 1.0	1,1-Dichloroethene	< 1.0
Bromomethane	< 1.0	trans-1,2-Dichloroethene	< 1.0
Carbon tetrachloride	< 1.0	1,2-Dichloropropane	< 1.0
Chlorobenzene	**8.5**	cis-1,3-Dichloropropene	< 1.0
Chloroethane	< 1.0	trans-1,3-Dichloropropene	< 1.0
2-Chloroethylvinyl ether	< 1.0	Methylene chloride	< 1.0
Chloroform	< 1.0	1,1,2,2-Tetrachloroethane	< 1.0
Chloromethane	< 1.0	Tetrachloroethene	< 1.0
Dibromochloromethane	< 1.0	1,1,1-Trichloroethane	< 1.0
1,2-Dichlorobenzene	< 1.0	1,1,2-Trichloroethane	< 1.0
1,3-Dichlorobenzene	< 1.0	Trichloroethene	< 1.0
1,4-Dichlorobenzene	< 1.0	Trichlorofluoromethane	< 1.0
Dichlorodifluoromethane	< 1.0	Vinyl chloride	< 1.0
1,1-Dichloroethane	< 1.0		

Note: All results reported in ug/l

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-3, 2/12/88, 1407
SAL Sample No.: 80662-03
Date Received: 2/12/88

Purgeable Aromatics - EPA Method 602

Benzene	< 1.0	1,4-Dichlorobenzene	< 1.0
Chlorobenzene	8.5	Ethylbenzene	< 1.0
1,2-Dichlorobenzene	< 1.0	Toluene	< 1.0
1,3-Dichlorobenzene	< 1.0	Xylenes	< 1.0

Note: All results reported in ug/l

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-4, 2/12/88, 1523
SAL Sample No.: 80662-04
Date Received: 2/12/88

Parameter	Units	MW-4
Total Metals		
Arsenic	mg/l	0.001
Barium	mg/l	< 0.1
Cadmium	mg/l	< 0.005
Chromium	mg/l	< 0.02
Copper	mg/l	< 0.01
Iron	mg/l	9.2
Lead	mg/l	< 0.02
Mercury	mg/l	< 0.0004
Selenium	mg/l	< 0.001
Silver	mg/l	< 0.01
Zinc	mg/l	0.02

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-4, 2/12/88, 1523
SAL Sample No.: 80662-04
Date Received: 2/12/88

Purgeable Halocarbons - EPA Method 601

Bromodichloromethane	< 1.0	1,2-Dichloroethane	< 1.0
Bromoform	< 1.0	1,1-Dichloroethene	< 1.0
Bromomethane	< 1.0	trans-1,2-Dichloroethene	< 1.0
Carbon tetrachloride	< 1.0	1,2-Dichloropropane	< 1.0
Chlorobenzene	55	cis-1,3-Dichloropropene	< 1.0
Chloroethane	< 1.0	trans-1,3-Dichloropropene	< 1.0
2-Chloroethylvinyl ether	< 1.0	Methylene chloride	< 1.0
Chloroform	< 1.0	1,1,2,2-Tetrachloroethane	< 1.0
Chloromethane	< 1.0	Tetrachloroethene	< 1.0
Dibromochloromethane	< 1.0	1,1,1-Trichloroethane	< 1.0
1,2-Dichlorobenzene	< 1.0	1,1,2-Trichloroethane	< 1.0
1,3-Dichlorobenzene	< 1.0	Trichloroethene	< 1.0
1,4-Dichlorobenzene	< 1.0	Trichlorofluoromethane	< 1.0
Dichlorodifluoromethane	< 1.0	Vinyl chloride	< 1.0
1,1-Dichloroethane	< 1.0		

Note: All results reported in ug/l

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-4, 2/12/88, 1523
SAL Sample No.: 80662-04
Date Received: 2/12/88

Purgeable Aromatics - EPA Method 602

Benzene	40	1,4-Dichlorobenzene	< 1.0
Chlorobenzene	55	Ethylbenzene	1.6
1,2-Dichlorobenzene	< 1.0	Toluene	3.5
1,3-Dichlorobenzene	< 1.0	Xylenes	13

Note: All results reported in ug/l

Francis I. Daniels
Laboratory Director

M. P. Brown & Associates, Inc.
P. O. Box 152464
Tampa, Florida 33684

March 31, 1988
Project No. 80662

LABORATORY REPORT

Project: Analysis of Monitor Well Samples - Roto Rooter, Tampa, FL
Sample Description: Monitor Well, MW-4, 2/12/88, 1523
SAL Sample No.: 80662-04
Date Received: 2/12/88

Polynuclear Aromatic Hydrocarbons - EPA Method 610

Acenaphthene	< 1.0	Chrysene	< 1.0
Acenaphthylene	< 1.0	Dibenzo(a,h)anthracene	< 1.0
Anthracene	< 1.0	Fluoranthene	< 1.0
Benzo(a)anthracene	< 1.0	Fluorene	< 1.0
Benzo(a)pyrene	< 1.0	Indeno(1,2,3-cd)pyrene	< 1.0
Benzo(b)fluoranthene	< 1.0	Naphthalene	11
Benzo(ghi)perylene	< 1.0	Phenanthrene	< 1.0
Benzo(k)fluoranthene	< 1.0	Pyrene	< 1.0

Note: All results reported in ug/l

Francis I. Daniels
Laboratory Director

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

For Routing To Other Than The Addressee	
To _____	Location _____
To _____	Location _____
To _____	Location _____
From _____	Date _____

TO: Kirk Johnson, Southwest District

THROUGH: James J. Crane, Bureau of Waste Cleanup

FROM: A. M. Stodghill, Bureau of Waste Cleanup

DATE: December 19, 1988

SUBJECT: Contamination Assessment Report Roto-Rooter Drain and Sewer Service, Hillsborough County

---

After reviewing the contamination assessment report (CAR) prepared by M.P. Brown and Associates, Inc., it is determined that the proposed land farming procedure may be a viable method of remediation. However, a detailed RAP, with exact land farming procedures, should be submitted to DER for approval before actual work is initiated.

Land farming does not address the groundwater contamination problem. The proposed additional monitor well will aid in further delineation of the extent of the contamination, but this does not address remediation of groundwater contamination either. Also, because of the close proximity of the site to Old Tampa Bay, an additional monitor well should be installed west of the oil disposal area.

A remedial action plan for the groundwater contamination could be developed at this time. However, it may be wiser to proceed with the land farming process and develop a monitor only plan for the ground water at this point in time. The exact location and areal extent of the land farming site must be determined. Additional monitor wells must be installed around the land farming site. Suggested monitor well locations are shown on the enclosed figure. Other monitor wells may be needed, depending on the land farming design, procedures and extent. If after land farming and monitoring there is not a marked improvement of the groundwater quality and resolution of groundwater standards violations, then remedial actions to abate the groundwater contamination should be implemented.

Should you have comments on this review or require further assistance, please do not hesitate to contact me at your convenience.

AS/ew

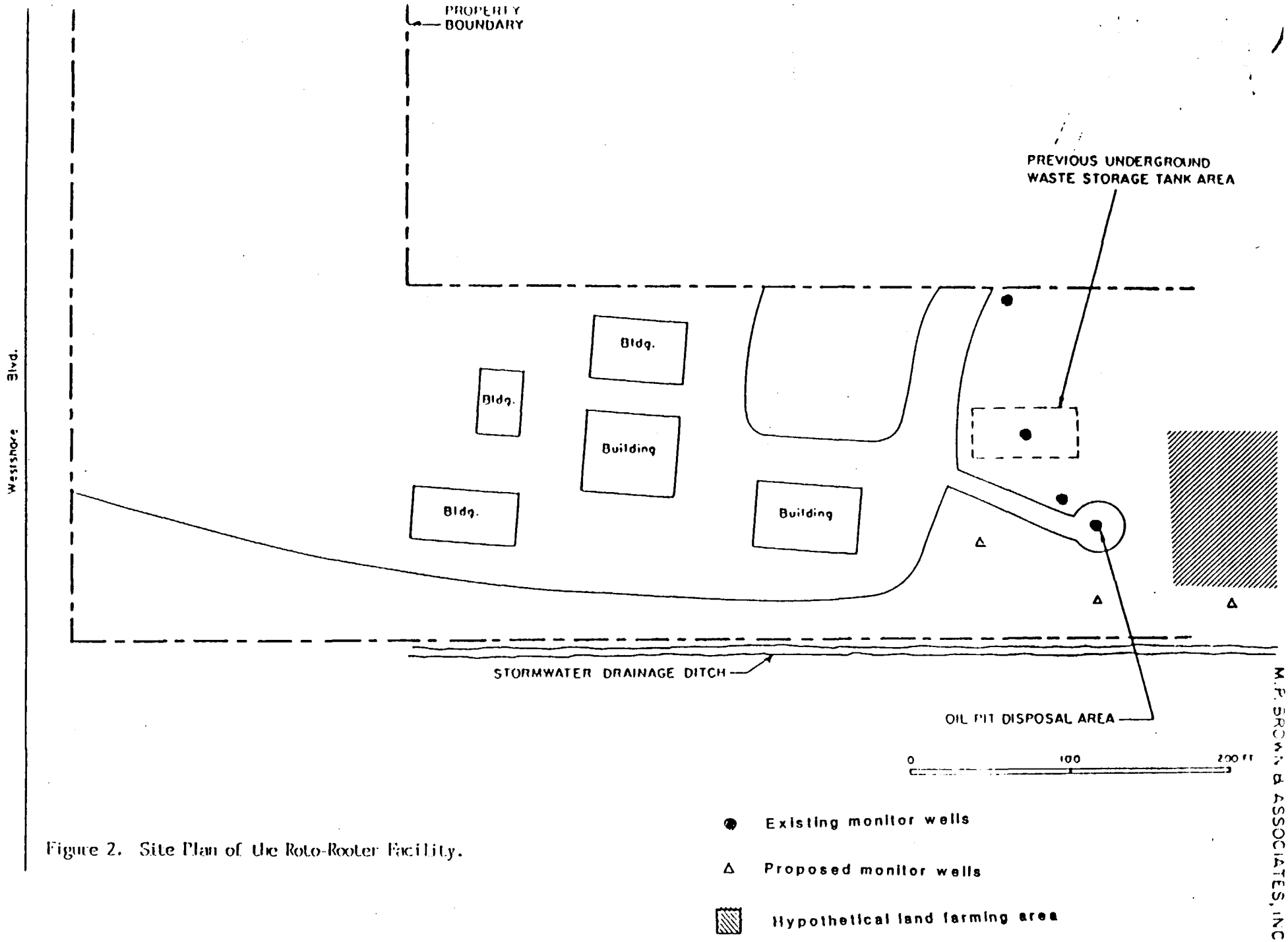


Figure 2. Site Plan of the Roto-Rooter Facility.

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

For Routing To Other Than The Addressee	
To _____	Location: _____
To _____	Location: _____
To _____	Location: _____
From _____	Date _____

TO: Kirk Johnson, Southwest District

THROUGH: James J. Crane, Bureau of Waste Cleanup JJC

FROM: A. M. Stodghill, Bureau of Waste Cleanup JJC for AS.

DATE: December 15, 1988

SUBJECT: Contamination Assessment Report Roto-Rooter Drain and Sewer Service, Hillsborough County

---

After reviewing the contamination assessment report (CAR) prepared by M.P. Brown and Associates, Inc., it is determined that the proposed land farming procedure is a viable method of remediation. However, a detailed report, with exact land farming procedures, should be submitted to DER for approval before actual work is initiated.

Land farming does not address the groundwater contamination problem. The proposed additional monitor well will aid in further delineation of the extent of the contamination, but this does not address remediation of groundwater contamination either. Also, because of the close proximity of the site to Old Tampa Bay, an additional monitor well should be installed west of the oil disposal area.

A remediation plan for groundwater contamination could be developed at this time. However, it may be wiser to proceed with the land farming process and simply monitor the ground water for a period of time. If after land farming and monitoring there is not a marked improvement of the groundwater quality and the violations of groundwater standards for cadmium, iron and benzene persist, then remedial actions to abate the groundwater contamination should be implemented.

Should you have comments on this review or require further assistance, please do not hesitate to contact me at your convenience.

AS/ew

Howell 3

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHWEST DISTRICT

7601 HIGHWAY 301 NORTH
TAMPA, FLORIDA 33610-9544

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

WILLIAM K. HENNESSEY
DISTRICT MANAGER

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

January 12, 1983

Mr. Frank Smith
Roto-Rooter Sewer and
Drain Service
P.O. Box 13627
Tampa, FL 33681

WARNING NOTICE #29-82-12-264

Re: Unauthorized disposal of waste oil materials - Section 8, Township 30 South, Range 18 East, Hillsborough County

Dear Mr. Smith:

Recent inspection of Roto-Rooter property off Westshore Boulevard by members of the Department and the Hillsborough County Environmental Protection Commission has determined the following violations of Chapter 403, Florida Statutes, and the regulations promulgated thereunder as follows:

You have caused or allowed the indiscriminant dumping of waste oils and oily sludges on the ground surface for the purpose of disposal without benefit of treatment or containment thereof thereby threatening State ground and surface water resources contrary to Chapter 403.087, 403.161, Florida Statutes and Section 17-7.04(5), Florida Administrative Code.

You have caused or allowed the storage of domestic waste materials and sludges in below ground tanks which are in poor condition, and which may be endangering local public health and safety as well as State ground and surface waters contrary to Chapter 403.087, Florida Statutes.

You have caused or allowed the discharge of domestic waste sludges in such a manner that adjacent surface waters may be impacted, contrary to Chapter 403.087, Florida Statutes and Section 17-7.04(3)(c), Florida Administrative Code.

Chapter 403.061, Florida Statutes empowers the Department to promulgate regulations and require permits for disposal activities of this type which are expected to impact State ground and surface waters. Chapter 403.087, Florida Statutes and Section 17-7.04(5), Florida Administrative Code contain the specific requirement that such approval be obtained prior to the initiation of disposal activities. Chapter 403.161, Florida Statutes describes failure to obtain approval prior to disposal as a specific violation of Chapter 403 and describes the civil and/or criminal penalties for which you may be liable.

You are advised to immediately cease all activity contributing to this violation. You are further advised that work already complete may be subject to restoration orders.

The attached sheet will describe the sampling program discussed in the field. Please respond to this Notice, in writing, by January 26, 1983 indicating: a) your plans to comply with the cited rules and statutes; and; b) the date the suggested sampling for analysis will occur; and c) the laboratory retained to perform the sampling and analysis; and d) the anticipated date the results will be complete.

Please address your response and any questions to Mr. Clabe Polk of the District Enforcement office.

Sincerely,

R. Craig McArthur
Enforcement Supervisor

CRP/err

Attachment

cc: W.K. Hennessey
Jeanie Williamson, OGC
Steve Boyes
Dick Powell
Coleen O'Sullivan, HCEPC
City of Tampa, Bureau of Minimum Standards

ATTACHMENT "A"

Rota-Rooter site evaluation sampling

Part I - Waste Oil disposal, back lot

(A) two waste oil disposal areas were located on the property, near the back. One was a pit containing oil and oil sludges and the other was along the road to the oil pit.

(B) samples:

(1) Oil pit sludges: (composite)

(a) volatile organics
(b) base-neutral extractables
(c) acid extractables
(d) EP-toxicity

(2) Soil beneath oil pit:

(a) base-neutral extractables
(b) acid extractables

(3) Groundwater near oil pit: (3 points, 20 feet radius from center of pit)

(a) volatile organics
(b) pH
(c) conductivity

(4) Roadway oil disposal (soil composite)

(a) base-neutral extractables
(b) acid extractables
(c) EP-toxicity

Part II - Port-a-Let Holding Tanks:

Shallow groundwater samples shall be taken by portable sandpoint or by P.V.C. Well point at five different locations arranged radically and at twenty feet from the buried tanks.

Groundwater analysis:

(a) BOD_5
(b) T.O.C.
(c) Volatile organics
(d) NO_3 -N
(e) NH_4 -N
(f) Fecal coliform
(g) pH
(h) conductivity

Part III - Surface Water (ditch bordering property to south)

Two sample points shall be established:

(1) at least 50 feet upstream of Roto-Rooter property

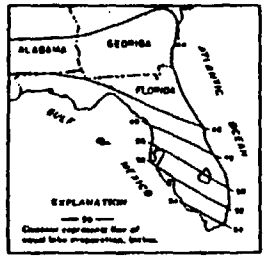
(2) at the Southwest corner of Roto-Rooter property

Analysis:

(a) BOD_5
(b) pH
(c) conductivity
(d) Dissolved Oxygen
(e) Fecal coliform
(f) T.S.S.

Part IV - Quality Control

The laboratory selected shall provide a statement of quality control procedures in effect, and those procedures as a minimum, shall be consistent with EPA-600/4-79-019 Handbook for Analytical Quality Control in Water and Wastewater Laboratories, U.S. EPA March 1979.



AVERAGE ANNUAL LAKE EVAPORATION

THE DIFFERENCE BETWEEN RAINFALL AND POTENTIAL EVAPORATION IN FLORIDA

By
F. W. Visher and G. H. Hughes

Prepared by
UNITED STATES GEOLOGICAL SURVEY
in cooperation with the
BUREAU OF GEOLOGY
FLORIDA DEPARTMENT OF NATURAL RESOURCES
TALLAHASSEE, FLORIDA
1969
SECOND EDITION 1970

Rainfall in Florida is generally abundant, but may occasionally be little opportunity to control or direct the use of a large part of the total rainfall. Evaporation from land, water and plant surfaces has been cut on much of the rainfall. Evaporation of the amount and avail variation of rainfall is one of all evaporative factors is a necessary factor in appraising the outflow of water from an area. Outflow is the total surface and ground water flow from an area, and is equal to the difference between rainfall on an area and actual evaporation from an area.

Present technology does not permit accurate determination of evaporation from large areas of diversified soils and vegetation where the availability of water may differ and vary both in time and in space. Thus, outflow is not determined directly, but is evaluated by determining the unaccounted outflow that results from the excess rainfall in the area. Such an approach results in possible error in areas where the total weather surface is well-defined surface channels. In Florida, however, many areas are underlain by permeable limestone aquifers which transmitted surficial drainage divides and which accumulate large quantities of water underground. Even though part of the water is transmitted through aquifers may reappear as springs or springs of water downstream, the area as process of recharge of the underground water cannot be determined, and can all of the underground flow be determined but with certainty. Thus, every analyzed land must be used to evaluate the outflow of an area. Thus evaluation which represents a common basis for approximating outflow losses or area is the difference between rainfall and potential evaporation.

Outflow from an area can equal the difference between rainfall and potential evaporation only if water is unrestricted continuously available over the entire surface of the area. In Florida, some drainage areas are largely occupied by lakes or swamps. Furthermore, the rainfall pattern in Florida tends to maintain the general availability of water generally in accord with the evaporation demand. Rainfall occurs during convectionally active events throughout the year and is usually greatest during the warm months of the year, when evaporation demand is greatest, and least during the cold months, when evaporation demand is least. Consequently, in Florida the total distribution of outflow should be greatly similar to the distribution of the difference between rainfall and potential evaporation—large where the difference between rainfall and potential evaporation is large, and small where the difference is small.

Outflow cannot be less than the difference between rainfall and potential evaporation because, by definition, potential evaporation represents the maximum amount of water that can leave the area by this process. If rainfall exceeds potential evaporation, outflow can equal to an amount at least equal to the difference between the two. Although the difference between rainfall and potential evaporation may not define precisely the outflow from an area, it does indicate the lower limit of outflow from an area.

Potential evaporation herein is considered equivalent to evaporation occurring upwards from a moist water surface of little thermal mass; thus, the yearly potential evaporation for an area essentially equals evaporation from natural lakes within the area. The two may differ seasonally because most lakes have some capacity to store energy temporarily without their domestic it immediately by evaporation, as either heat transfer processes, as would a wet surface having an appreciable thermal mass. Nevertheless, yearly lake evaporation provides a useful estimate of potential evaporation because within a year energy, storage, and advection are balanced.

The areal distribution of potential evaporation in Florida was least must be from a map of lake evaporation in the United States by Kohler, Nordenson, and Baker (1959, plate 3). The lake evaporation map provides a regional estimate of average yearly lake evaporation during the period 1946-55. At two evaporation stations in Florida (Orlando and Belle Glade Experiment station), average evaporation for the period 1946-55 was virtually the same as for a longer period 1946-65; thus, evaporation for the period 1946-55 probably provides a representative long-term average for Florida.

The general reliability of the evaporation map has not been widely tested in Florida because few determinations of lake evaporation have been made since the map became available. One such determination, based on mass transfer techniques similar to those described by Harbeck (1962), was made during 1963 at Lake Hearne in central Florida (Stark and others, 1966). Measured lake evaporation at Lake Hearne was 53 inches compared to an average of 49 inches shown by the evaporation map for the general area involved.

During 1963, rainfall in central Florida was about 20 percent less than normal. Such a large deficiency in rainfall should be accompanied by a relative increase in air temperature, all of which would tend to a relative increase in air temperature, all of which would tend to increase evaporation. Consequently, lake evaporation during 1963 was probably greater than the long-term average for the area. The difference between the two values is within the range of probable yearly variation at a particular lake.

The values shown by the evaporation map depend on meteorological factors such as solar radiation, wind movement, air temperature, and humidity, all of which are theoretically related to lake evaporation. Thus, the values are applicable to individual lakes as long as the lakes are typically exposed to wind movement, a requirement met by most large lakes in Florida. The same evaporation may not be met by most small lakes surrounding with a tree screen that may be at the bottom of deep sinkhole depressions or that may be sheltered removed by hill and dense vegetation.

Yearly potential evaporation varies only slightly compared to yearly rainfall which in many areas of Florida ranges from about 50 percent greater than normal to about 50 percent less than normal. Although some of the excess rainfall of wet years may be carried over to dry years to be stored as lake or as a shallow water table, much of the excess rainfall flows out of the area and does not remain available for evaporation in subsequent years. Similarly, but to a lesser extent, during dry years, the energy represented by potential evaporation that cannot be used because of a lack of water during a dry year is not stored but lost rather is dissipated. Because the yearly and seasonal fluctuations between the supply and demand of water has occasionally been not considered by storage, the average outflow of a year tends to be greater than the difference between average rainfall and average potential evaporation—substantial outflow can occur during a year when rainfall may be much less than the yearly potential evaporation.

The topography and geology of an area also affect the outflow to derive from the difference between rainfall and potential evaporation. Of prime importance are the slope of the land surface, the type of vegetation present, and the permeability of the soil and underlying materials. Those factors which cause the rainfall to be rapidly concentrated into streams and drained from the area, such as steep land slopes and poorly permeable soils, for example, tend to make outflow greater than the difference between rainfall and potential evaporation. Permeable soils which permit water to quickly reach a deep water table than lands occupying or storage may tend to make outflow appear than the difference between rainfall and potential evaporation partly because of the water does not remain on or near the land surface to evaporate. Features which promote ponding and operation of a pump or plants, such as flat land with surface depressions, tend to reduce outflow and make it more closely equal to the difference between rainfall and potential evaporation.

The accompanying map shows the approximate areal distribution of the difference between yearly rainfall and yearly potential evaporation for Florida. Rainfall data used were for the most part U.S. Weather Bureau normal rainfall values for the period 1931-60. For stations where "normal" values were lacking, the average rainfall for the period of record at the station was used; however, all stations included have at least 20 years of record.

Average yearly rainfall varies appreciable in Florida—ranging from about 60 inches at Miami Beach in south Florida to about 60 inches at Fort Walton Beach in north Florida—but the variation in the difference between rainfall and potential evaporation is considerably less than the variation in rainfall. Average yearly potential evaporation decreases only slightly and somewhat uniformly from 54 inches in south Florida to about 46 inches in north Florida, as shown on the small map map. Consequently, on the average and large map, the lowest rainfall values occur in the southern or far western part of the peninsula, where potential evaporation exceeds rainfall. Thus, to maintain to potential evaporation. The map does not accommodate the data for all but a few rainfall stations but the configuration of the isopleths is not especially or adequately defined in several areas of the state. As additional rainfall data become available, the configuration of the isopleths may be more well defined. Thus the map should be interpreted only in terms of broad areas where the average difference between rainfall and potential evaporation can be reasonably well established.

As mapped, rainfall exceeds the potential evaporation over most of Florida, but the difference varies greatly. The distribution of the difference is proportional to lower values with outflow, which also varies appreciably across the state. However, no simple or direct relation between the two is apparent. The effect of other hydrologic and geologic variables is great enough in some areas to obscure the effect of the difference between rainfall and potential evaporation on outflow.

The greatest difference between rainfall and potential evaporation occurs in the peninsular area of south Florida, where the greatest outflow in the state occurs and where the difference is from 15 to 18 inches. Surface runoff averages about 20 inches over streams basins that is entirely or almost entirely within the peninsular area west of the Chattahoochee River. This area is well drained by a network of streams whose basins are every drained enhance to portions or other parts of Florida. Much of the area is covered by sandy material of variable thickness which readily passes rainfall to the shallow water table, which in turn maintains the high base flow of the streams. An aquifer underlying the shallow sand aquifer in this area ensures that some of the outflow of the area appears in streams.

In northwest Florida, the difference between rainfall and potential evaporation varies from 3 to 9 inches or about half that for the peninsular area. In the part of the northwest Florida basin area that extends or almost extends to northwest Florida, surface runoff averages about 19 inches. Large parts of northwest Florida are swampy and evaporation losses are about equal to precipitation or evaporation. On the other hand, large areas are not swampy and have no defined network of surface drainage. Much of the rainfall on these areas apparently reaches downward to the water table and reaches the more throughgoing streams without large evaporation losses.

Over a large part of central Florida, the difference between rainfall and potential evaporation is from 3 to 9 inches. In the northwestern part of this area, including principally Lake County and the northern half of Polk County, there are numerous lakes and swamps. Thus, for most of this area, evaporation and transpiration should approach the evaporation potential and runoff should approach zero. Although the difference between the rainfall and potential evaporation, Surface runoff from this area is measured by many streams in the valleys Withlacoochee River, the Little Withlacoochee River, and the Oklawaha River, averages about 7 inches. Outflow is contributed greatly about the surface runoff—as well as a substantial amount from the Floridan Aquifer Prude [illegible] that the [illegible] which has spots or [illegible] in central Florida, the large to the Floridan is under pressure rather [illegible] conditions. Thus, outflow from this part of central Florida may be about 8 inches.

This same general area of central Florida is drained to the south by the Peace River. The Peace River basin is an area of recharge for the Floridan Aquifer, but area must not be taught the water can reverse discharge from the Floridan Aquifer. Surface runoff from the basin averages about 13 inches at the main downstream gaging station, which probably represents the outflow from the basin, however, at the upstream 30 percent of the basin where most of the surface runoff, formal outflow runoff and averages about 10 inches. Thus, from the same general area where the difference between rainfall and potential evaporation is from 3 to 9 inches, outflow ranges from 7 inches to a maximum outflow to about 13 inches or a maximum outflow. Part of this difference is probably due to a lower actual evaporation from lakes and swamps in the northern portion.

In the northeastern part of the state, which includes the Suwannee River basin, Lake Okeechobee, and the Everglades, the difference between rainfall and potential evaporation ranges from less than zero in the western part to 12 inches in the eastern part. The terrain in this part of the state is so flat that, for the few streams which are identified, drainage basins are for the most part undefined. Thus, the outflow from the area for the region cannot be evaluated easily in terms of rainfall per unit area.

Outflow from a other portion of the state was found to be always greater than the difference between rainfall and potential evaporation; consequently, that value gives an upper limit to the outflow from part of the area. The difference between rainfall and the difference was greater where surface drainage by streams was efficient and where lakes and swamps were generally absent, and least where drainage was poor and where lakes and swamps were prominent. Outflow from the panhandle and lake country in south Florida was established to be 5 inches for all other areas the difference between rainfall and potential evaporation ranged from 1 to 5 inches. The difference should be appropriately less for the northern part of the state where the availability of water to evaporate is much more complete for the whole area. Thus, for northern Florida, outflow probably does not exceed the difference between rainfall and potential evaporation by more than 3 inches.

Annual outflow cannot be determined directly from the map, but rainfall, the map portrays the maximum outflow from an area. Actual outflow will almost always exceed the evaporation, because basin characteristics and variations in rainfall limit the availability of water for evaporation.

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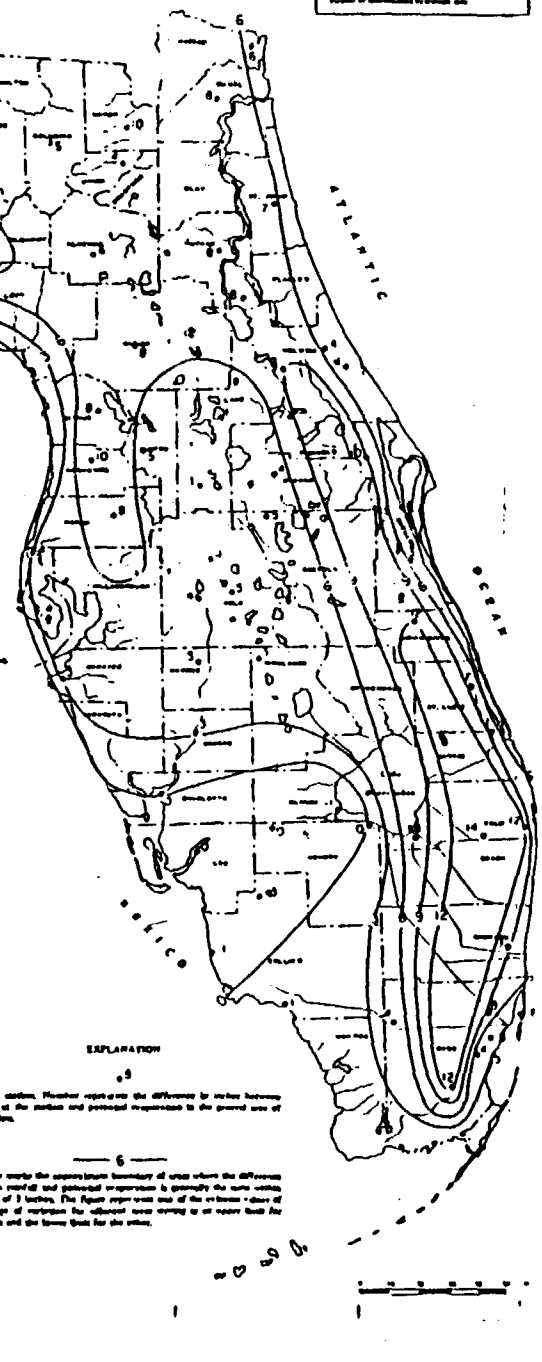

EXPLANATION

Rainfall station. Number represents the difference between rainfall and the average potential evaporation in the general area of the station.

6

The line marks the approximate boundary of areas where the difference between rainfall and potential evaporation is generally the same within a range of 3 inches. The figure represents one of the extreme values of the range of variation the adjacent areas varying to an extent both for the area and the lower limit for the other.

D. E. R.

AUG 2 1 1987

SOUTH WEST DISTRICT
TAMPA

CONTAMINATION ASSESSMENT PLAN, ROTO-ROOTER DRAIN AND SEWER SERVICE, HILLSBOROUGH COUNTY, FLORIDA

prepared for

ROTO-ROOTER DRAIN AND SEWER SERVICE

August 1987

prepare by

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CONTAMINATION ASSESSMENT PLAN, ROTO-ROOTER DRAIN AND SEWER SERVICE, HILLSBOROUGH COUNTY, FLORIDA

INTRODUCTION

Objectives of the Contamination Assessment Plan

In June 1987, Roto-Rooter Drain and Sewer Service of Florida authorized M.P. Brown & Associates, Inc., to proceed with the preparation of a contamination assessment plan (CAP) and quality assurance/quality control plan (QA/QC) for the Roto-Rooter facility in Tampa, Florida. The study is necessary due to suspected contamination from an oil disposal pit and from underground waste storage tanks. The objectives of the plan are provided in the Florida Department of Environmental Regulation (FDER) consent order case No. 84-13410 and are as follows:

1. Locate the source, if present, of said contamination and characterize the contaminant plume constituents.
2. Determine the horizontal and vertical extent, if any, of groundwater and/or soil contamination.
3. Determine any immediate danger to the public health and whether immediate remedial measures are necessary to abate any imminent hazard.

This report presents the tasks which will be performed to address the above objectives.

Background and History

Roto-Rooter Sewer and Drain Service operates a facility located at 5320 South West Shore Boulevard, Tampa, Florida. In 1983, the Florida Department of Environmental Regulation (FDER) determined, from site visits, that the potential for soil and groundwater contamination existed at the property. They requested that a contamination assessment be completed and filed with the FDER. Roto-Rooter Sewer and Drain Service retained Professional Service Industries, Inc. (PSI) to implement the contamination assessment at the site. Specific areas of investigation, determined by the FDER site visits, included five (5) underground waste storage tanks, the oil pit disposal area, and the road leading to the pit area.

In 1985, PSI completed their assessment, and after a review by the FDER Bureau of Operations, it was determined that contamination was present in soils and groundwater underlying the site. However, it was also determined that the assessment was below QA/QC standards and that further investigation would be required. Therefore, a contamination assessment plan (CAP) in conjunction with a quality assurance/quality control plan (QA/QC) was necessary for proper and thorough evaluation of the problem at the site.

In 1986, Roto-Rooter Sewer and Drain Service entered into a consent decree case No. 84-13410 with corrective actions to be taken at the Roto-Rooter facility.

In June 1987, Roto-Rooter Drain and Sewer Service was advised by the FDER to retain a competent hydrogeologic consulting firm to develop

and implement a comprehensive contamination assessment plan and a site-specific quality assurance/quality control plan. M.P. Brown & Associates, Inc. was then retained to conduct a hydrogeologic investigation in order to prepare and implement the required CAP and QA/QC plan for the facility.

Program Work Elements

M.P. Brown & Associates, Inc. will collect and evaluate hydrogeologic data on a regional and site specific basis. Specific tasks to be completed during the investigation include:

1. Prepare an inventory of private water supply wells within a 0.25-mile radius of the site; locate potential sources of groundwater degradation.
2. Install piezometers to determine the direction of horizontal groundwater flow.
3. Install test borings to define site hydrostratigraphy, collect sediment samples for laboratory analysis and to allow in-situ measurements of total organic vapors.
4. Utilize a portable organic vapor analyzer to determine the areal extent of potential soil and groundwater contamination.
5. Install permanent water quality monitor wells.
6. Collect water samples from the installed monitor wells to determine the vertical and horizontal extent of groundwater contamination.
7. Collect sediment samples in areas of contamination to determine proper disposal methodology.
8. Conduct surficial aquifer testing to determine the hydraulic characteristics of the surficial aquifer and underlying confining zone.

Site Location and Physiography

The Roto-Rooter facility is located in the northeast one quarter of Section 8, Township 30S, Range 18E, as shown in Figure 1. The site is located in the geomorphic providence of the Gulf Coastal Lowlands of the Mid-Peninsula Zone (White, 1970). A slight westward sloping land surface characterizes the area due to the close proximity to Old Tampa Bay located 1300 ft (feet) to the west. Land surface elevations range from 5 to 10 ft above msl (mean sea level). Natural surface drainage is to the west, toward Old Tampa Bay.

A site visit was conducted by M.P. Brown & Associates, Inc. on July 23, 1987, to evaluate its present condition. Upon arrival, it was noted that the area of the oil pit and roadway to the oil pit had become densely vegetated with tall grass and shrubbery. No apparent layer of sludge or visible evidence of contamination were observed. In addition, the underground waste storage tanks under investigation had been excavated and removed. Figure 2 is a site plan of the facility.

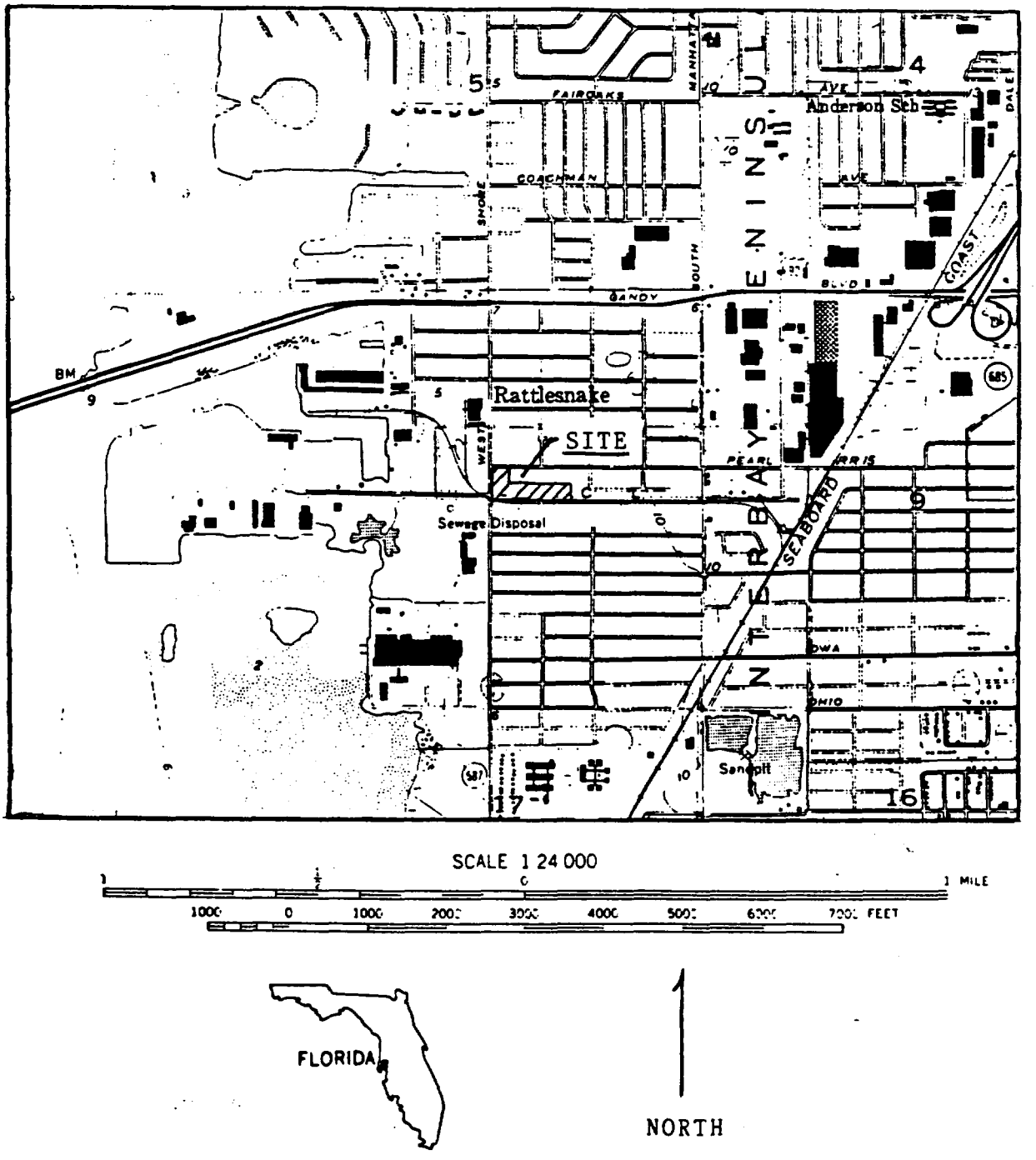

FIGURE 1. Map Showing Location of Roto-Rooter Drain and Sewer Service Facility, Hillsborough County, Florida

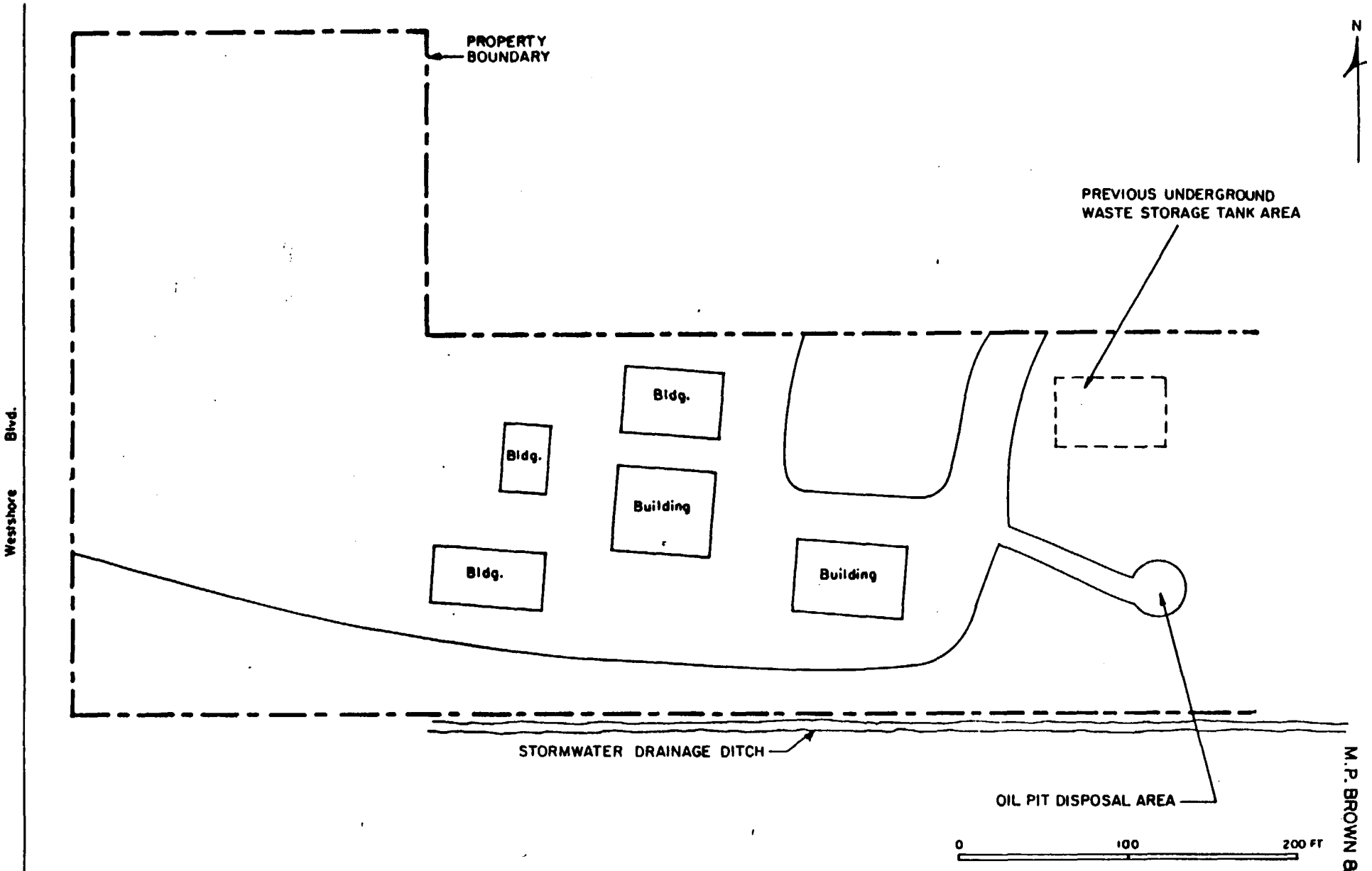

FIGURE 2. Site Plan of the Roto-Rooter Facility, Roto-Rooter Drain and Sewer Service Facility, Hillsborough County, Florida

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INVESTIGATION TO BE PERFORMED IN THE FIELD

Inventory of Water Supply Wells

A detailed inventory of existing private water supply and irrigation wells within a 0.25-mile radius of the Roto-Rooter site will be compiled. A building-by-building field survey will be conducted by M.P. Brown & Associates, Inc., supplemented with South West Florida Water Management District (SWFWMD) computer listings of well construction details and water use data. In addition, potential groundwater pollution sources will be cataloged. A map showing the location of water wells and potential pollution sources will be prepared. A table providing pertinent information will be keyed to the map.

Installation of Shallow Temporary Piezometers

Temporary water level piezometers were installed on July 27, 1987, at the locations shown in Figure 3, the piezometers were installed to determine the surficial aquifer water table elevations and the horizontal groundwater flow direction. The piezometers were installed into 4-inch-diameter boreholes drilled using the bucket auger method. Piezometer construction consisted of a 2-inch-diameter PVC casing with a slotted screen attached at the bottom. The annular space between the borehole and the piezometer was backfilled with uniformly graded 20-30 clean coarse grained quartz sand to land surface. Construction

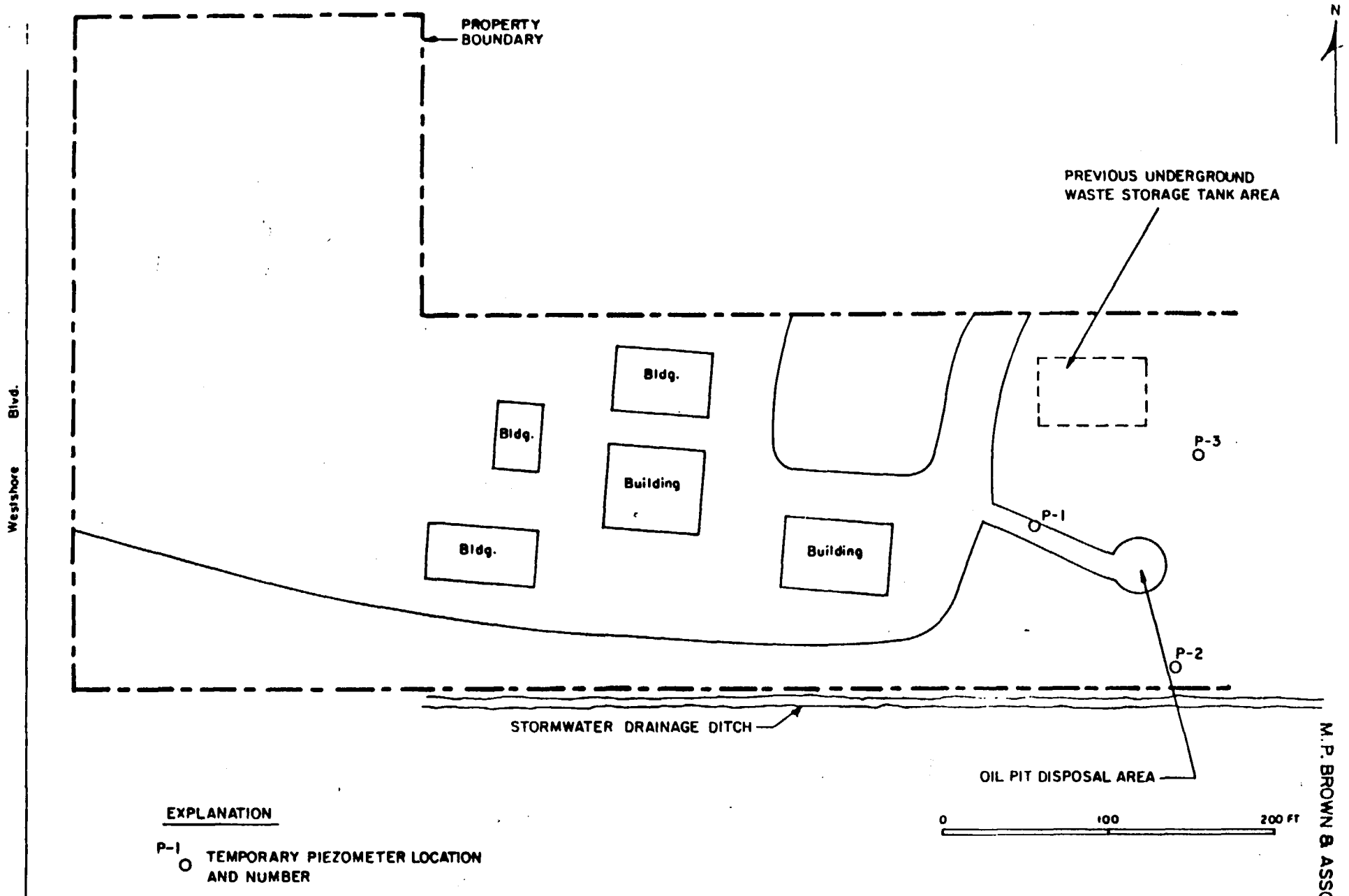

FIGURE 3. Location of Temporary Water Level Piezometers, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida

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details were recorded pertaining to total depth and screened intervals of the installed piezometers and are presented in Table 1. All piezometers were surveyed and referenced to a fixed datum. Water level measurements were collected to establish the water table elevations, referenced to the fixed datum. Groundwater level data is presented in Table 2. The calculated direction of horizontal groundwater flow is shown in Figure 4. Additionally, subsurface sediments were continuously examined and described by an M.P. Brown & Associates, Inc. hydrogeologist and the lithologic descriptions recorded in the field during the piezometer installation.

Test Boring Installation

Test borings will be installed at locations shown in Figure 5. The borings will be used to determine the site hydrostratigraphy, to collect soil samples for hydraulic and chemical laboratory analysis, and to establish the potential vertical and horizontal extent of groundwater and soil contamination.

Two series of test borings will be installed at the facility. The first series will include two (2) deep test borings for the purpose of determining the site hydrostratigraphy. The second series will include shallow hollow stem auger borings installed to conduct an organic vapor field survey and to collect sediment samples for chemical analysis. These borings are addressed in the following section.

TABLE 1. Piezometer Construction Details, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida

Piezometer Number	Total Depth (ft bls)	Casing Diameter (inches)	Screened Interval (ft bls)
P - 1	6.64	2.0	0 - 6.64
P - 2	7.5	2.0	0 - 7.5
P - 3	6.0	2.0	0 - 6.0

Note: ft bls = feet below land surface

TABLE 2. Groundwater Level Data Collected from Installed Piezometers on July 27, and August 13, 1987, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida

Piezometer Number	Measuring Point Elevation (ft fixed datum)	Water Level (ft fixed datum) 7-27-87	8-13-87
P - 1	20.0	15.44	16.70
P - 2	20.3	14.85	14.45
P - 3	19.03	15.51	18.53

Note: ft fixed datum - elevations referenced to a fixed datum of 20 feet

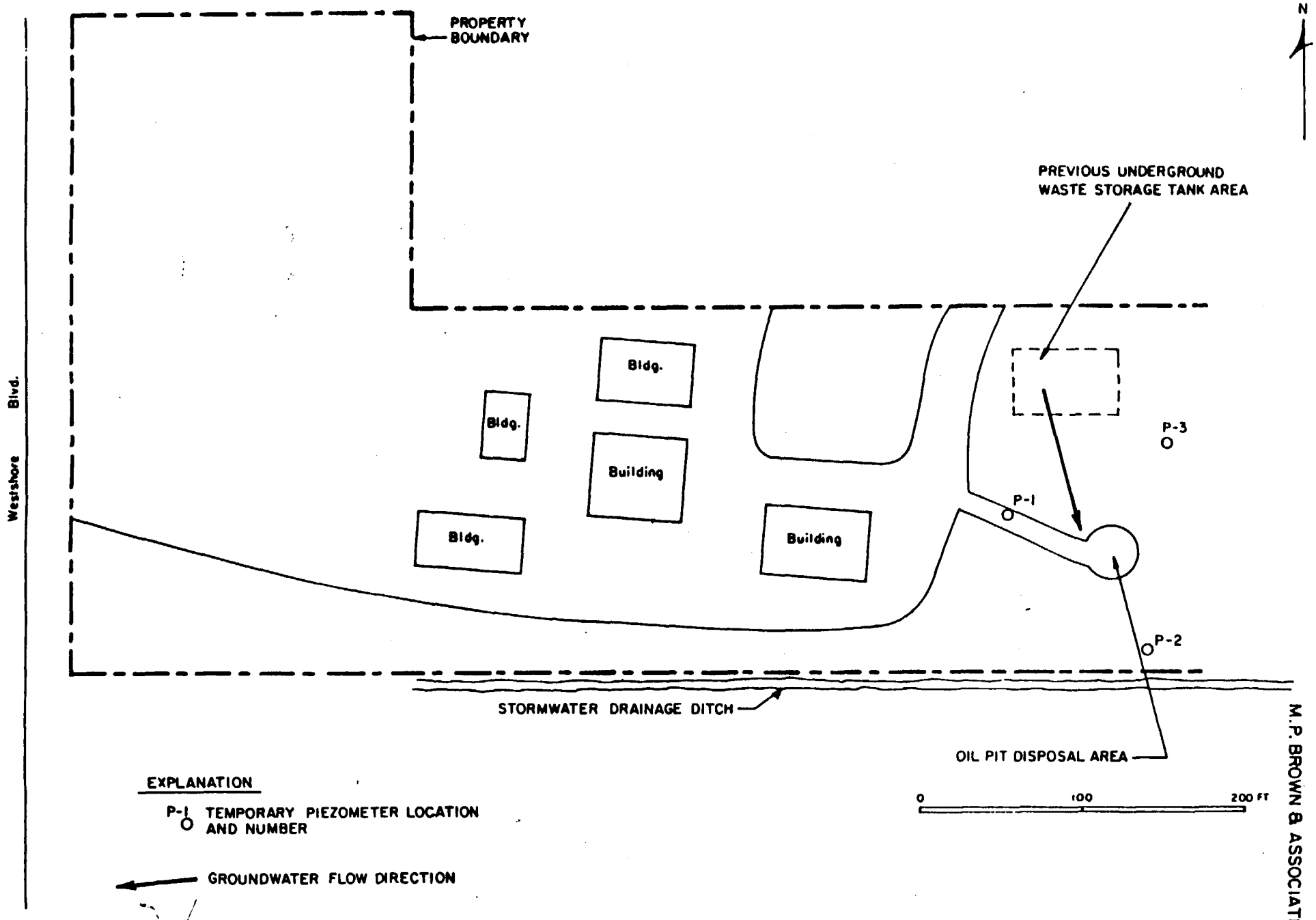

FIGURE 4. Horizontal Groundwater Flow Direction, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida

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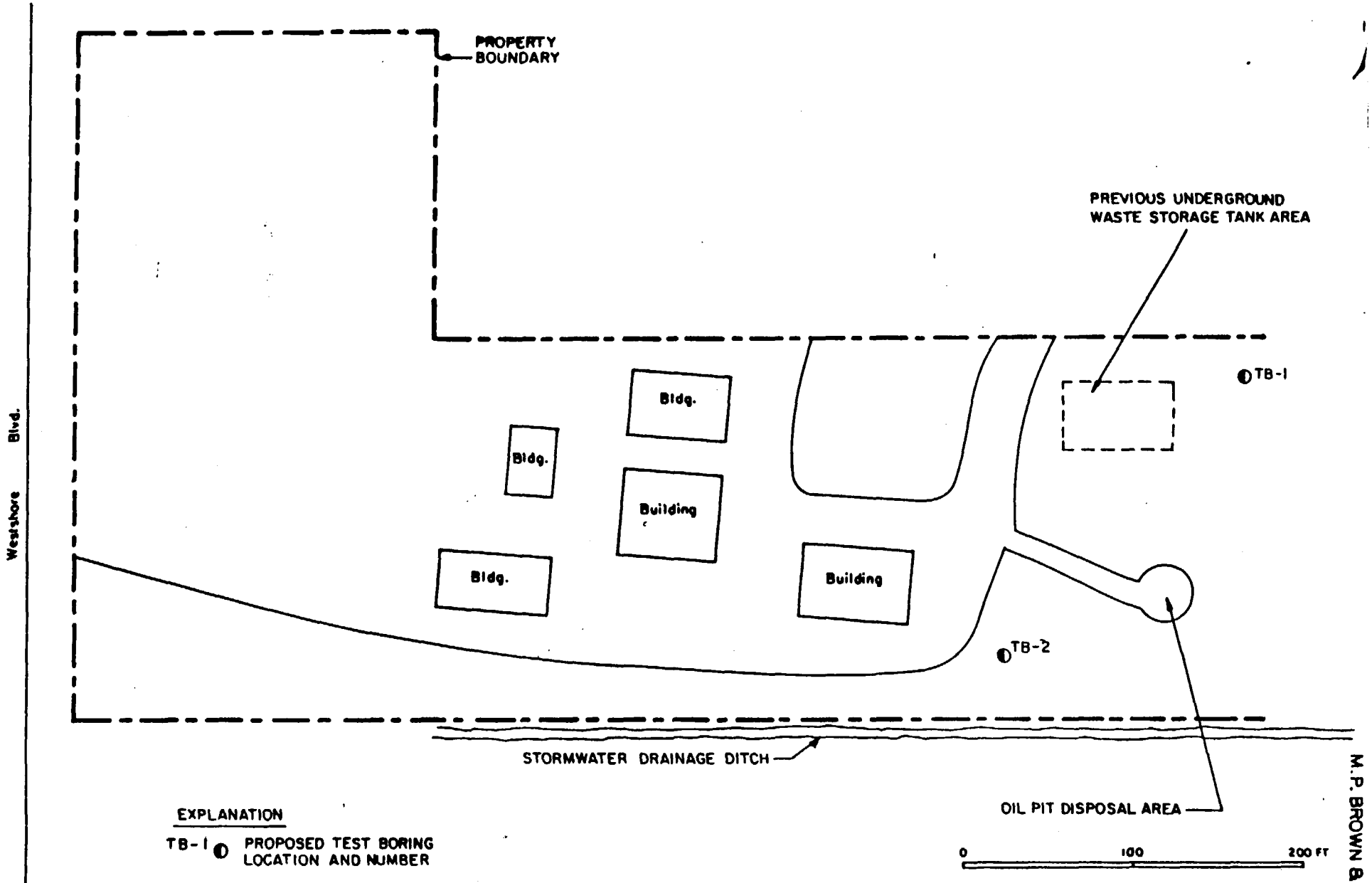

FIGURE 5. Proposed Locations of Test Borings, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida

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The deep test boring operation consists of continuously coring the borehole by the split spoon method from land surface to the top of the uppermost limestone unit. Shelby tube samples will be collected from representative sections below land surface for laboratory permeability tests and grain size analysis.

Immediately upon completion of the test borings, the open boreholes will be abandoned by placing Class I cement grout from the bottom of the borehole to land surface.

Organic Vapor Analysis (Foxboro OVA-128) Survey

A survey will be conducted at the facility using a Foxboro OVA-128 Organic Vapor Analyzer to assist in the preliminary definition of the vertical and horizontal extent of specific volatile organic compounds in the contaminant plume.

The Foxboro OVA-128 Organic Vapor Analyzer is a portable unit which utilizes a flame ionization detector sensitive to the presence of organic vapors. Organic vapors ionized by the hydrogen flame yield a current which is carried between detector electrodes. This current is proportionate to the organic concentration, and the meter response indicates total organic vapor concentrations expressed in ppm (parts per million) relative to a methane standard. The sensitivity ranges from 0.02 to 1000 ppm.

The hollow stem auger method will be used to drill to the soil/water interface. Borings will be installed in the vicinity of the oil pit disposal area, in the roadway leading to the oil pit (Figure 6).

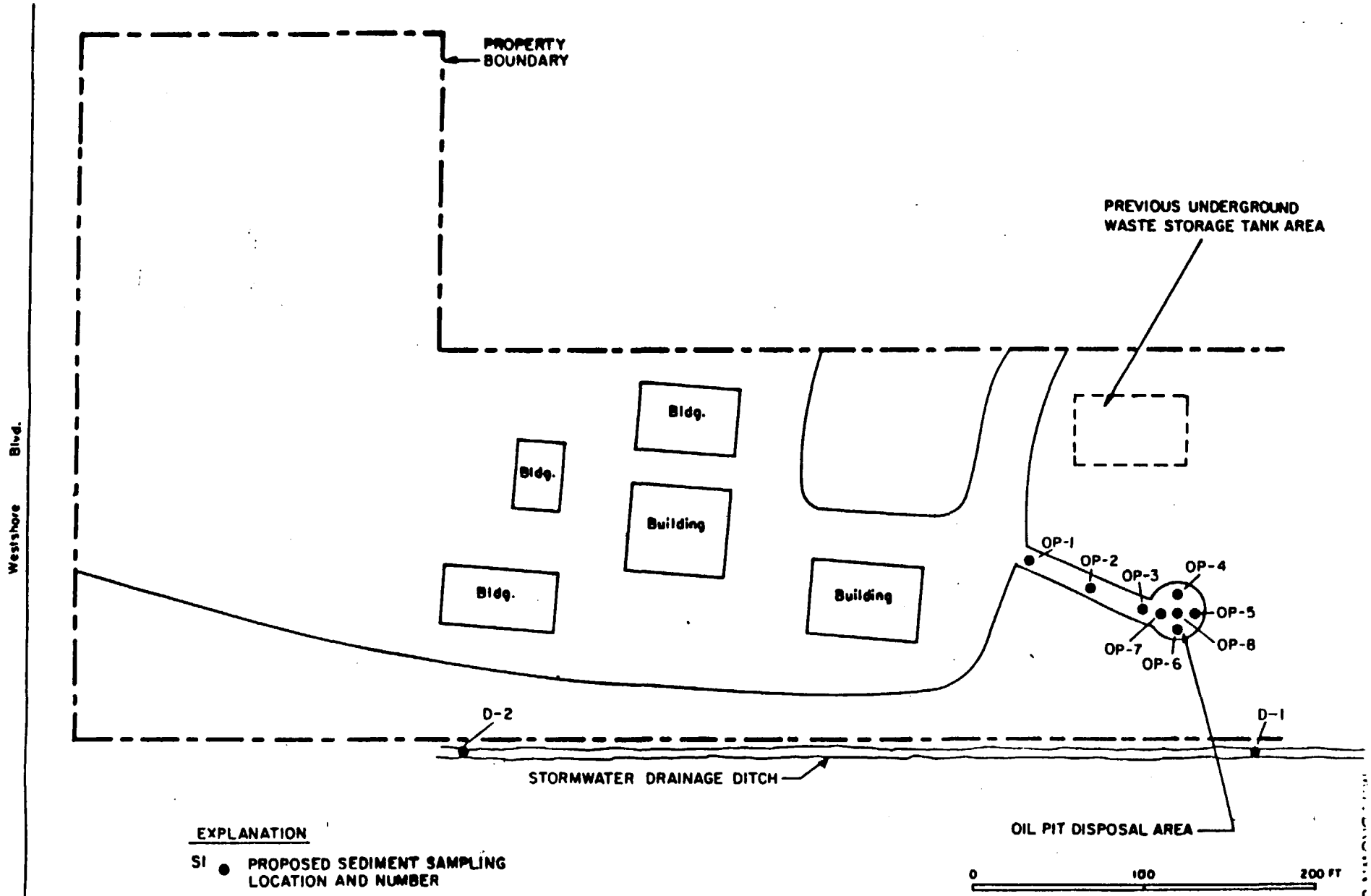

FIGURE 6. Proposed Location of Sediment Sampling, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida

Representative sediment samples will be collected for laboratory composites at a depth from 6 to 12 in. (inches) below land surface. Samples will also be collected at the soil/water interface and analyzed for the presence of volatile organic vapors utilizing the Foxboro OVA-128 analyzer. These sediment samples will also be subjected to chemical analysis.

Monitor Well Installation

Four (4) monitor wells will be installed at the facility in order to collect groundwater samples for chemical analysis. Figure 7 presents the proposed locations of the wells, and Figure 8 presents the proposed monitor well construction details. Monitor well MW-1 will be installed hydraulically upgradient and will be used for the collection of background groundwater samples. Monitor well MW-2 will be installed within the area of the previously existing underground waste storage tanks. Monitor well MW-3 will be installed hydraulically downgradient from the previous tank area. Due to the close proximity of two of the areas under investigation and the groundwater flow direction, MW-3 will be located so that it may also be used as an upgradient well for the oil disposal pit area. Monitor well MW-4 will be installed within the area of the oil disposal pit. Monitor well construction details and screened intervals for the wells will be recorded on the field at the time of installation.

An M.P. Brown & Associates, Inc. hydrogeologist will collect formation cutting and describe them in the field. The boreholes will be drilled by the hollow stem auger method. All drill stems, screens, casings, and equipment used to install the monitor wells will be steam cleaned

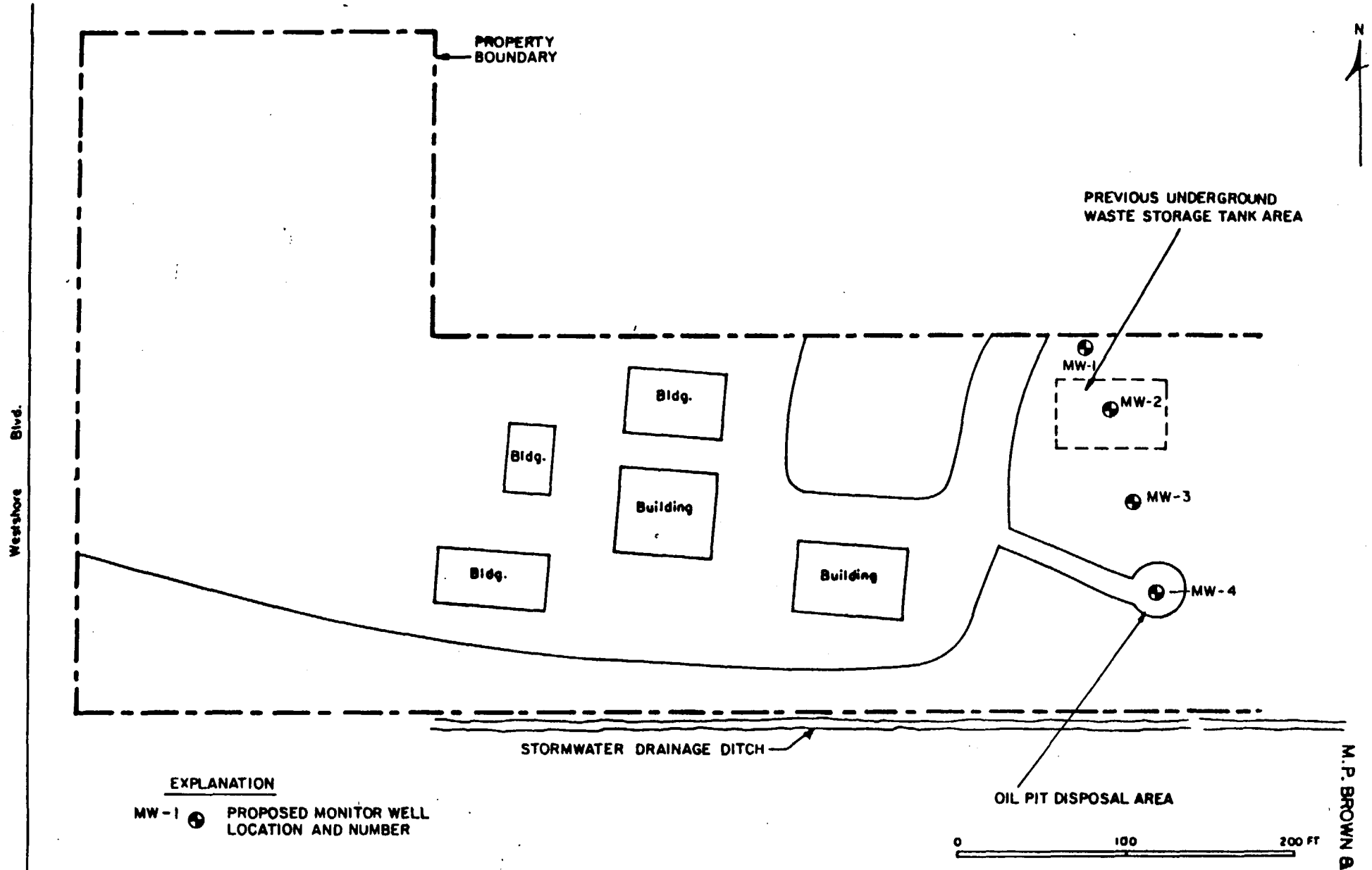

FIGURE 7. Proposed Locations of Monitor Wells, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida

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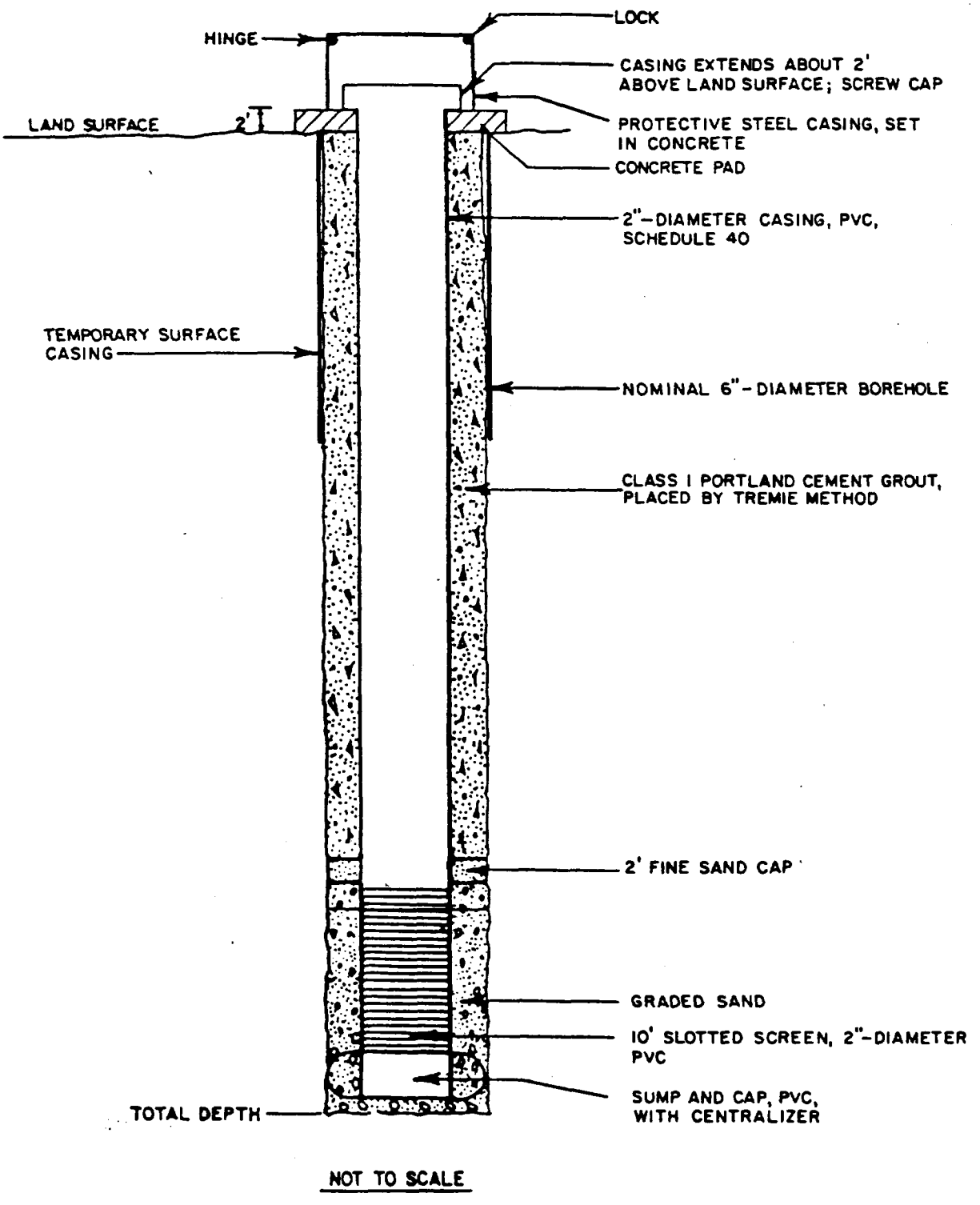

FIGURE 8. Monitor Well Construction Details, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida

prior to insertion into the borehole to insure that representative water samples can be collected without cross contamination between boreholes. A clean 10-ft section of 2-in.-diameter, schedule 40 PVC, 0.01-in. slotted well screen will be inserted into the borehole and a 2-in.-diameter, schedule 40 PVC, threaded casing will be installed above the screen to land surface.

After the casing and screen are aligned and set in the borehole, the screen will be sand packed with washed 20-30 clean uniformly graded silica sand. The sand will then be tagged to insure the correct amount is emplaced. A 1 ft fine grain silica sand cap designed to prevent migration of cement grout into the sand pack will then be emplaced over the coarser sand pack, and a neat, Class I cement grout will be poured from the top of the fine grained sand cap to land surface. A PVC slip cap will be used to seal the top of the well casing, and a well head protector with locking cap will be installed over the exposed well head to insure well integrity. After the cement grout has set for 24 hours, the well will be developed by centrifugal pump until minimal turbidity is observed in samples collected from the monitor well.

Aquifer Hydraulic Testing Procedures

In order to quantitatively define the rate of horizontal groundwater flow within the surficial aquifer, a slug test and a steady state pumping test will be conducted.

Slug Test

The injection type test or slug test consists of the introduction of 5 gals (gallons) of clean potable water into a test well. Water level measurements are made before and immediately after the injection using a hand held engineer's tape or data recorder. The consequent decline in the water level is then measured over the appropriate time period until the initial water level is attained. The field data is then plotted on single semi-logarithmic paper, indicating the fall in the water level within the test well on the logarithmic scale and time on the arithmetic scale. These data are then processed and calculated to attain a hydraulic conductivity for the surficial aquifer at the site. Values are reported as gallons per day per square foot (gpd/ft^2).

Steady State Pumping Test

The steady state method involves the pumping of a test well at a known discharge rate while simultaneously monitoring the induced cone of depression around the test well. Monitoring of the cone of depression is accomplished with the aid of two piezometers located at different radii from the test well. Initial static water levels are recorded for the two observation piezometers. With the initiation of the test, the fall in water level is recorded with time within each observation piezometer. The test well is pumped until a steady state is achieved in the observation piezometers, or approximately after two to three hours.

The collected data are then processed and calculated to give the transmissivity and the hydraulic conductivity for the surficial aquifer at the site. Values for transmissivity and hydraulic

conductivity are reported as gallons per day per foot (gpd) and as gallons per day per square foot (gpd/ft^2), respectively.

SAMPLING LOCATIONS AND PARAMETERS

Sediment Sampling

Sediment samples will be collected at a depth from 6 to 12 in. below land surface and at the soil/water interface at the locations shown in Figure 6. These include the oil pit area, and the road leading to the oil pit area. In addition, sediment samples will be collected from the stormwater drainage ditch at the eastern and western property boundaries. These samples will be collected at a depth from 2 to 6 in. below land surface in the ditch. Composites will be made by the analytical laboratory from collected samples for the oil pit area, and the road leading to the oil pit area. Samples collected from the stormwater drainage ditch will be analyzed as grab samples. Laboratory analysis parameters for the collected sediment samples are presented in Table 3.

Groundwater Sampling

Groundwater samples will be collected from the four (4) proposed monitor wells located in the oil pit area and the excavated underground storage tank area as presented previously in Figure 7. Laboratory chemical analysis parameters for the collected groundwater samples are given in Table 4.

TABLE 3. Laboratory Chemical Analysis and Composite Sample Identification Numbers for Sediment Samples to be Collected, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida

Area	Composite Sample Nos.	Sample Interval	Analytical Method Laboratory Analysis
Oil Pit Area	OP-4, OP-5, OP-6, OP-7, OP-8	6-12 in. W.T.	601, 602, EP Toxicity
Oil Pit Road	OP-1, OP-2, OP-3,	6-12 in. W.T.	601, 602, EP Toxicity
*Stormwater drainage ditch	D-1, D-2	2-6 in.	601, 602, Lead

Note: EPA method 601/602 = analysis for Volatile Organic Compounds
EPA method 625 = analysis for Base Neutral/Acid Extractable compounds
EPA Toxicity = Analysis for Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, and Silver
* = Analyzed as separate grab samples
W.T. = Sample collected at soil/water interface

TABLE 4. Laboratory Chemical Analysis for Groundwater Samples to be Collected from Proposed Monitor Wells, Roto-Rooter Drain and Sewer Service, Hillsborough County, Florida.

Monitor Well No.	Laboratory Analysis (EPA Method No.)
MW - 1	601, 602, 610, Total Metals, Nitrogen Nitrate (N), Nitrogen Ammonia (N), Fecal Coliforms, *pH, *Conductivity, *Temperature
MW - 2	601, 602, Total Metals, Nitrogen Nitrate (N), Nitrogen Ammonia (N), Fecal Coliforms, *pH, *Conductivity, *Temperature
MW - 3	601, 602, Total Metals, Nitrogen Nitrate (N), Nitrogen Ammonia (N), Fecal Coliforms, *pH, *Conductivity, *Temperature
MW - 4	601, 602, 610, Total Metals, *pH *Conductivity, *Temperature

Note: EPA method 601/602 = Analysis for volatilve organic compounds
EPA method 610 = Polynuclear Aromatic Hydrocarbons
* = Field parameters
Total Metals = Analysis for arsenic, barium, cadium, chromium, copper, iron, lead, mercury, selenium, silver, and zinc.

All sediment and groundwater samples will be collected in such a manner as to preserve their original physical form and chemical composition, as well as to prevent cross-contamination or changes in concentrations of the materials to be analyzed. All sampling procedures are given in the QA/QC.

REFERENCES

Florida Department of Environmental Regulation, 1981, Supplement A to Standard Operating Procedures and Quality Assurance Manual (Draft): Tallahassee Solid Waste Division.

Freeze, A.R., and Cherry, J.A., 1979, Groundwater, Prentice-Hall, Inc.

Professional Service Industries, Inc., April 4, 1985, Soil and Groundwater Investigative Study, Prepared for Roto-Rooter Drain and Sewer Service Facility, Tampa, Florida.

U.S. Environmental Protection Agency, 1984, CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule, Part VIII, U.S. EPA.

U.S. Environmental Protection Agency, 1980, Standard Operating Procedures and Quality Assurance Manual (Draft): Water Surveillance Branch Region IV, U.S. EPA Manual.

Soil and Groundwater Investigative Study

Prepared For:

Roto-Rooter Drain and Sewer Service Facility
Tampa, Florida

April 4, 1985

Professional Service Industries, Inc.
Florida Testing Division

Professional Service Industries, Inc.
Analytical Services Division

April 4, 1985

D.E.R.

APR 17 1985

SOUTHWEST DISTRICT
TAMPA

Roto-Rooter
Drain & Sewer Service
P.O. Box 13627
Tampa, FL 33681

Attention: Mr. Frank Smith

Dear Mr. Smith:

Professional Service Industries, Inc. is pleased to submit this report for the sampling and analysis of soil boring and shallow groundwater samples at the Roto-Rooter facility located off Westshore Blvd. in Tampa, FL.

All sampling and laboratory analysis were carried out as per the requirements set forth by Mr. Clabe Polk of the Southwest district office of the State of Florida Department of Environmental Regulation.

Site Inspection

Upon inspection of the property by a representative of PSI, the following observations were made:

1) Of the five partially buried underground storage tanks, two had been excavated and placed above ground since the DER's last inspection. The three remaining tanks were found to be in poor physical condition, with numerous ruptures in them.

2) The "road" to the oil disposal area did not appear to be affected by any spillage which may have occurred when trucks took their wastes back to the oil pit disposal area. Vegetation appeared relatively healthy along this route.

3) The oil pit disposal area had a layer of tar-like sludges in the center of it. These sludges were several inches thick and spread out to a radius of approximately 3-4 feet.

It is these three areas of interest in which the DER had required sampling and analysis.

Monitor Well Installation and Soil Sampling

Composite soil samples were taken via a split spoon sampler mounted on a drill rig. Samples were taken at two-foot intervals to a depth of ten feet both directly beneath the oil pit sludges and at an appropriate point along the road to the disposal pit. (see figure 1)

Monitor Wells were installed to a depth of ten feet with the final two feet being screened. Their installation was performed by a hollow stem auger rig. Casings are of threaded 2" diameter P.V.C.

Three wells were installed around the partially underground storage tanks and three wells around the oil pit disposal area. Wells were arranged in a radial manner around each area of concern, at a distance of twenty feet. (see figure 1)

Groundwater Flow Direction

A surveying crew was sent to the site to determine groundwater elevations. (see appendix 1) Although a detailed analysis is beyond the scope of this report, the elevations obtained indicate the groundwater flow to be in an east southeasterly direction.

Water Sampling

Groundwater sampling was performed following monitor well development, five days after well installation. Samples were obtained via a properly prepared teflon bailer. The ditch bordering the south boundary of the property was also of interest. Water flow direction was determined to be in a westerly direction along the ditch. Grab samples were taken at the southeast corner of the property (upstream of the property) and at the point farthest west along the property before entering into an inaccessible culvert.

Discussion of Laboratory Test Results

The following is an overview of the laboratory test results obtained on both soil and water samples. All analyses were performed in strict accordance to the proper test methodologies.

The surface water samples were obtained by grab sampling methods. A comparison of laboratory test data indicate no significant differences in surface water quality at the time of sampling. The only notable difference was in fecal coliform bacteria, which can be accounted for by wildlife inhabiting the area. It should be noted that stormwater run-off could affect surface water quality considerably, because of the Port-a-Let units located directly adjacent to the ditch. Since sampling was performed under dry climate conditions, the effects of stormwater run-off would not appear in test results.

The oil pit disposal area appears to have a significant amount of inorganic metals contamination. The surface soil sample contains contaminant levels approaching 100 times the maximum contaminant levels allowable for water quality criteria according to 17-22.104 of the FAC. Organic contaminants were found to be very minimal. It is recommended that further sampling and EP Toxicity analysis be performed to determine the depth and extent of inorganic metals contamination.

The roadway to the oil pit was of concern because it was suspected that some wastes may have been spilled along this path. Analysis for total metals contamination of a soil composite to a depth of ten feet yielded test results that support the suspicion of spills. Further sampling and EP Toxicity analysis is recommended for this area as well.

Groundwater contamination potential was of interest around both the underground storage tanks and the oil pit area. Groundwater surrounding both areas was found to be contaminated. At monitor wells 1,2 & 3 (around the storage tanks), both volatile organic contaminants and elevated nutrient and bacteria levels were found to be present. This would indicate leakage from the tanks, certainly possible due to their overall poor condition. Monitor well 1 exhibited higher volatile organics contamination than

the other wells, possibly due to the fact that it is located right next to a road used by trucks hauling wastes.

Monitor wells 4,5 & 6 (surrounding the oil pit area), were determined to contain volatile organic contaminants with MW-4 displaying much less contamination than MW-5 or MW-6. Specific Conductivity data substantiates this interpretation.

I hope that this discussion has provided you with a good overview of both the present and potential sources of environmental contamination at this site.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Steven G. Packard

Steven G. Packard
Manager, Chemical Laboratory

SGP:ha

Professional Service Industries, Inc.
Analytical Services Division

Roto-Rooter
Drain & Sewer Service
P.O. Box 13627
Tampa, FL 33681

April 4, 1985
Proj. No. 27-385-53021

Attention: Mr. Frank Smith

LABORATORY REPORT

VOLATILES: PRIORITY POLLUTANTS

PARAMETER	SAMPLE DESCRIPTION (mg/kg) Oil Pit	DETECTION LIMIT ppm (mg/kg)
Chloromethane	BDL	10
Bromomethane	BDL	10
Vinyl Chloride	BDL	1
Chloroethane	BDL	10
Dichloromethane	BDL	10
Trichlorofluormethane	BDL	10
1,1-Dichloroethene	BDL	10
1,1-Dichloroethane	BDL	3
Trans-1,2-Dichloroethene	BDL	10
Chloroform	BDL	10
1,2-Dichloroethane	BDL	10
1,1,1-Trichloroethane	BDL	10
Carbon Tetrachloride	BDL	3
Bromodichloromethane	BDL	10
1,2-Dichloropropane	11	10
Trans-1,3-Dichloropropene	BDL	10

BDL - Below Detection limit

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LABORATORY REPORT

VOLATILES (cont.): PRIORITY POLLUTANTS

PARAMETER	SAMPLE DESCRIPTION (mg/kg) Oil Pit	DETECTION LIMIT ppm (mg/kg)
Trichloroethene	BDL	3
Benzene	BDL	1
Chlorodibromomethane	BDL	10
1,1,2-Trichloroethane	BDL	10
Cis-1,3-Dichloropropene	BDL	10
2-Chlrorethyl Vinyl Ether	BDL	10
Bromoform	BDL	10
Tetrachloroethene	BDL	3
1,1,2,2-Tetrachloroethane	BDL	3
Toluene	BDL	10
Chlorobenzene	BDL	10
Ethyl Benzene	BDL	10
1,3-Dichlorobenzene	BDL	10
1,2-Dichlorobenzene	BDL	10
1,4-Dichlorobenzene	BDL	10

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Attention: Mr. Frank Smith

LABORATORY REPORT

BASE/NEUTRAL EXTRACTABLES: PRIORITY POLLUTANTS

PARAMETER	SAMPLE DESCRIPTION (mg/kg) Oil Pit	Boring #1	Boring #2	DETECTION LIMIT ppm (mg/kg)
N-nitrosodimethylamine	BDL	BDL	BDL	10
bis(2-chloroethyl)ether	BDL	BDL	BDL	10
1,3-dichlorobenzene	BDL	BDL	BDL	10
1,4-dichlorobenzene	BDL	BDL	BDL	10
1,2-dichlorobenzene	BDL	BDL	BDL	10
bis(2-chloroisopropyl)ether	BDL	BDL	BDL	10
hexachloroethane	BDL	BDL	BDL	10
N-nitroso-di-n-propylamine	BDL	BDL	BDL	10
nitrobenzene	BDL	BDL	BDL	10
isophorone	BDL	BDL	BDL	10
bis(2-chloroethoxy)methane	BDL	BDL	BDL	10
1,2,4-trichlorobenzene	BDL	BDL	BDL	10
naphthalene	BDL	BDL	BDL	10
hexachlorobutadiene	BDL	BDL	BDL	10
hexachlorocyclopentadiene	BDL	BDL	BDL	10
2-chloronaphthalene	BDL	BDL	BDL	10
acenaphthylene	BDL	BDL	BDL	10
dimethyl phthalate	BDL	BDL	BDL	10
2,6-dinitrotoluene	BDL	BDL	BDL	10
acenaphthene	BDL	BDL	BDL	10

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LABORATORY REPORT

BASE/NEUTRAL EXTRACTABLES (cont.): PRIORITY POLLUTANTS

PARAMETER	SAMPLE DESCRIPTION (mg/kg) Oil Pit	Boring #1	Boring #2	DETECTION LIMIT ppm (mg/kg)
2,4-dinitrotoluene	BDL	BDL	BDL	10
diethylphthalate	BDL	BDL	BDL	10
fluorene	BDL	BDL	BDL	10
4-chlorophenyl phenyl ether	BDL	BDL	BDL	10
N-nitrosodiphenylamine	BDL	BDL	BDL	10
1,2-diphenyl hydrazine	BDL	BDL	BDL	10
4-bromophenyl phenyl ether	BDL	BDL	BDL	10
hexachlorobenzene	BDL	BDL	BDL	10
phenanthrene	BDL	BDL	BDL	10
anthracene	BDL	BDL	BDL	10
di-n-butyl phthalate	BDL	BDL	BDL	10
fluoranthene	BDL	BDL	BDL	10
benzidine	BDL	BDL	BDL	10
pyrene	BDL	BDL	BDL	10
butyl benzyl phthalate	BDL	BDL	BDL	10
benzo(a)anthracene	BDL	BDL	BDL	10
3,3'-dichlorobenzidine	BDL	BDL	BDL	10
chrysene	BDL	BDL	BDL	10
bis(2-ethylhexyl)phthalate	BDL	BDL	BDL	10
di-n-octylphthalate	BDL	BDL	BDL	10

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LABORATORY REPORT

BASE/NEUTRAL EXTRACTABLES (cont.): PRIORITY POLLUTANTS

PARAMETER	SAMPLE DESCRIPTION (mg/kg) Oil Pit	Boring #1	Boring #2	DETECTION LIMIT ppm (mg/kg)
benzo(b)fluoranthene	BDL	BDL	BDL	10
benzo(k)fluoranthene	BDL	BDL	BDL	10
benzo(a)pyrene	BDL	BDL	BDL	10
indeno(1,2,3-c,d)pyrene	BDL	BDL	BDL	10
dibenzo(a,h)anthracene	BDL	BDL	BDL	10
benzo(g,h,i)perylene	BDL	BDL	BDL	10

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Proj. No. 27-385-53021

Attention: Mr. Frank Smith

LABORATORY REPORT

VOLATILES: PRIORITY POLLUTANTS

PARAMETER	SAMPLE DESCRIPTION (ug/l) MW 1	MW 2	MW 3	DETECTION LIMIT ppb (ug/l)
Chloromethane	BDL	BDL	BDL	10
Bromomethane	BDL	BDL	BDL	10
Vinyl Chloride	BDL	BDL	BDL	1
Chloroethane	BDL	BDL	BDL	10
Dichloromethane	41	BDL	14	10
Trichlorofluormethane	BDL	BDL	BDL	10
1,1-Dichloroethene	BDL	BDL	BDL	10
1,1-Dichloroethane	BDL	BDL	BDL	10
Trans-1,2-Dichloroethene	BDL	BDL	BDL	10
Chloroform	BDL	BDL	BDL	10
1,2-Dichloroethane	BDL	BDL	BDL	3
1,1,1-Trichloroethane	BDL	BDL	BDL	10
Carbon Tetrachloride	BDL	BDL	BDL	3
Bromodichloromethane	BDL	BDL	BDL	10
1,2-Dichloropropane	1,810	57	86	10
Trans-1,3-Dichloropropene	BDL	BDL	BDL	10

BDL - Below Detection Limit

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Attention: Mr. Frank Smith

LABORATORY REPORT

VOLATILES (cont.): PRIORITY POLLUTANTS

PARAMETER	SAMPLE DESCRIPTION (ug/l) MW 1	MW 2	MW 3	DETECTION LIMIT ppb (ug/l)
Trichloroethene	BDL	BDL	BDL	3
Benzene	2,540	BDL	BDL	1
Chlorodibromomethane	BDL	BDL	BDL	10
1,1,2-Trichloroethane	BDL	BDL	BDL	10
Cis-1,3-Dichloropropene	BDL	BDL	BDL	10
2-Chlrorethyl Vinyl Ether	BDL	BDL	BDL	10
Bromoform	BDL	BDL	BDL	10
Tetrachloroethene	BDL	BDL	BDL	3
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	3
Toluene	BDL	BDL	BDL	10
Chlorobenzene	BDL	BDL	BDL	10
Ethyl Benzene	128	BDL	BDL	10
1,3-Dichlorobenzene	BDL	BDL	BDL	10
1,2-Dichlorobenzene	BDL	BDL	BDL	10
1,4-Dichlorobenzene	BDL	BDL	BDL	10

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Attention: Mr. Frank Smith

LABORATORY REPORT

VOLATILES: PRIORITY POLLUTANTS

PARAMETER	SAMPLE DESCRIPTION (ug/l) MW 4	MW 5	MW 6	DETECTION LIMIT ppb (ug/l)
Chloromethane	BDL	BDL	BDL	10
Bromomethane	BDL	BDL	BDL	10
Vinyl Chloride	BDL	BDL	BDL	1
Chloroethane	BDL	BDL	BDL	10
Dichloromethane	BDL	50	85	10
Trichlorofluormethane	BDL	BDL	BDL	10
1,1-Dichloroethene	BDL	BDL	BDL	10
1,1-Dichloroethane	BDL	BDL	BDL	10
Trans-1,2-Dichloroethene	BDL	BDL	BDL	10
Chloroform	BDL	BDL	BDL	10
1,2-Dichloroethane	BDL	BDL	BDL	3
1,1,1-Trichloroethane	BDL	BDL	BDL	10
Carbon Tetrachloride	BDL	BDL	BDL	3
Bromodichloromethane	BDL	BDL	BDL	10
1,2-Dichloropropane	38	1,200	530	10
Trans-1,3-Dichloropropene	BDL	BDL	BDL	10

BDL - Below Detection Limit

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LABORATORY REPORT

VOLATILES (cont.): PRIORITY POLLUTANTS

PARAMETER	MW 4	MW 5	MW 6	DETECTION LIMIT ppb (ug/l)
Trichloroethene	BDL	BDL	BDL	3
Benzene	BDL	3,200	1,900	1
Chlorodibromomethane	BDL	BDL	BDL	10
1,1,2-Trichloroethane	BDL	BDL	BDL	10
Cis-1,3-Dichloropropene	BDL	BDL	BDL	10
2-Chlrorethyl Vinyl Ether	BDL	BDL	BDL	10
Bromoform	BDL	BDL	BDL	10
Tetrachloroethene	BDL	BDL	BDL	3
1,1,2,2-Tetrachloroethane	BDL	BDL	BDL	3
Toluene	BDL	BDL	BDL	10
Chlorobenzene	BDL	214	250	10
Ethyl Benzene	BDL	115	150	10
1,3-Dichlorobenzene	BDL	BDL	BDL	10
1,2-Dichlorobenzene	BDL	BDL	BDL	10
1,4-Dichlorobenzene	BDL	BDL	BDL	10

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LABORATORY REPORT

Parameter \ Sample Description		Oil Pit	Boring #1		
Arsenic	mg/l	< 0.01	0.01		
Barium	mg/l	6.7	0.8		
Cadmium	mg/l	0.63	0.07		
Chromium	mg/l	3.7	0.33		
Lead	mg/l	28	2.0		
Mercury	mg/l	0.013	0.005		
Selenium	mg/l	< 0.005	< 0.005		
Silver	mg/l	0.05	< 0.01		
Sodium	mg/l	11	2		
Copper	mg/l	15	0.59		
Iron	mg/l	740	30		
Manganese	mg/l	4.1	1.1		
Zinc	mg/l	23	2.8		
Date Sampled		2/07/85	2/07/85		
Date Received		2/08/85	2/08/85		

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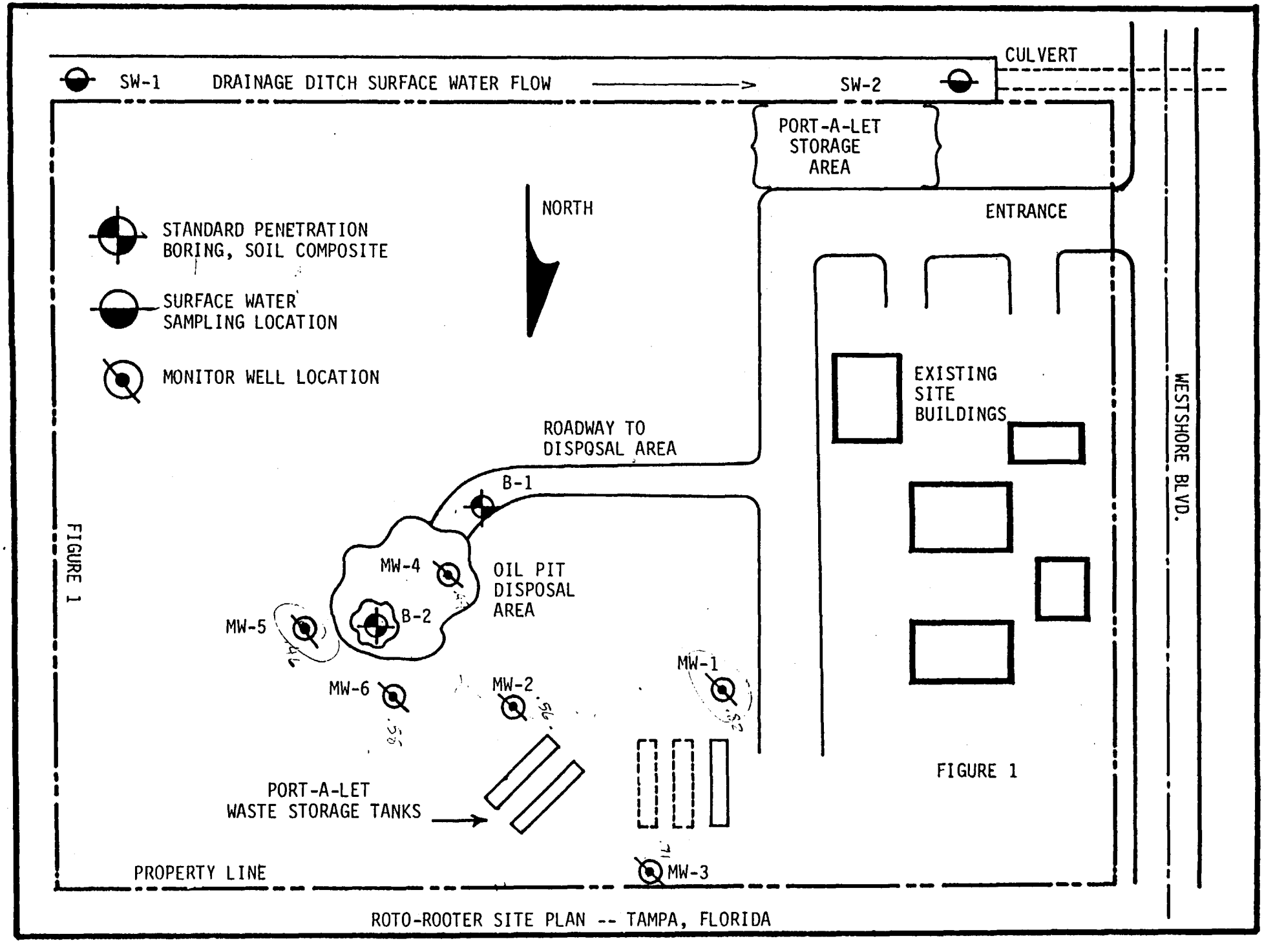
LABORATORY REPORT

Parameter \ Sample Description		MW 1	MW 2	MW 3	MW 4
Biochemical Oxygen Demand	mg/l	3.5	1.5	1.8	—
Total Organic Carbon	mg/l	64	61	79	—
Ammonia Nitrogen	mg/l as $CaCO_3$	18	7.0	10.2	—
Nitrate	mg/l N	0.05	0.05	0.05	—
Fecal Coliforms	Counts/100 ml	< 1	1,000	450	—
pH	Units	7.1	7.1	7.0	6.9
Specific Conductance	Umhos/cm	600	710	770	480
Sampled By		PSI/KAH	PSI/KAH	PSI/KAH	PSI/KAH
Date Sampled		2/13/85	2/13/85	2/13/85	2/13/85
Date Received		2/13/85	2/13/85	2/13/85	2/13/85

Steven G. Packard
Manager, Chemical Laboratory



ROTO-ROOTER SITE PLAN -- TAMPA, FLORIDA

Appendix I - Results of Groundwater Elevation Survey

Location	Elevation*
MW-1	90.82 ft.
MW-2	90.56 ft.
MW-3	90.71 ft.
MW-4	90.49 ft.
MW-5	90.46 ft.
MW-6	90.58 ft.

*Elevations were obtained assuming a height of surveying instrument equal to 100.00 feet.

Professional Service Industries, Inc.
Analytical Services Division

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LABORATORY REPORT

Parameter \ Sample Description	MW 5	MW 6	Southwest Ditch	Southeast Ditch
Biochemical Oxygen Demand mg/l	—	—	1.7	1.0
Dissolved Oxygen mg/l	—	—	10.0	9.3
Total Suspended Solids mg/l	—	—	8.5	7.0
Fecal Coliforms Counts/100 ml	—	—	300	1,700
pH Units	7.0	7.0	7.5	7.5
Specific Conductance Umhos/cm	1,300	1,400	260	220
Sampled By	PSI/KAH	PSI/KAH	PSI/KAH	PSI/KAH
Date Sampled	2/13/85	2/13/85	2/13/85	2/13/85
Date Sampled	2/13/85	2/13/85	2/13/85	2/13/85

Steven G. Packard
Manager, Chemical Laboratory

LABORATORY QUALITY CONTROL

Certifications

Professional Service Industries, Inc. is certified by the State of Florida Department of Health and Rehabilitative Services for potable water analysis. The Laboratory I.D. Number is 84218. The laboratory also participates in State of Florida and EPA proficiency studies. It is also approved by the Department of Environmental Regulation (Laboratory I.D. Number EL-097).

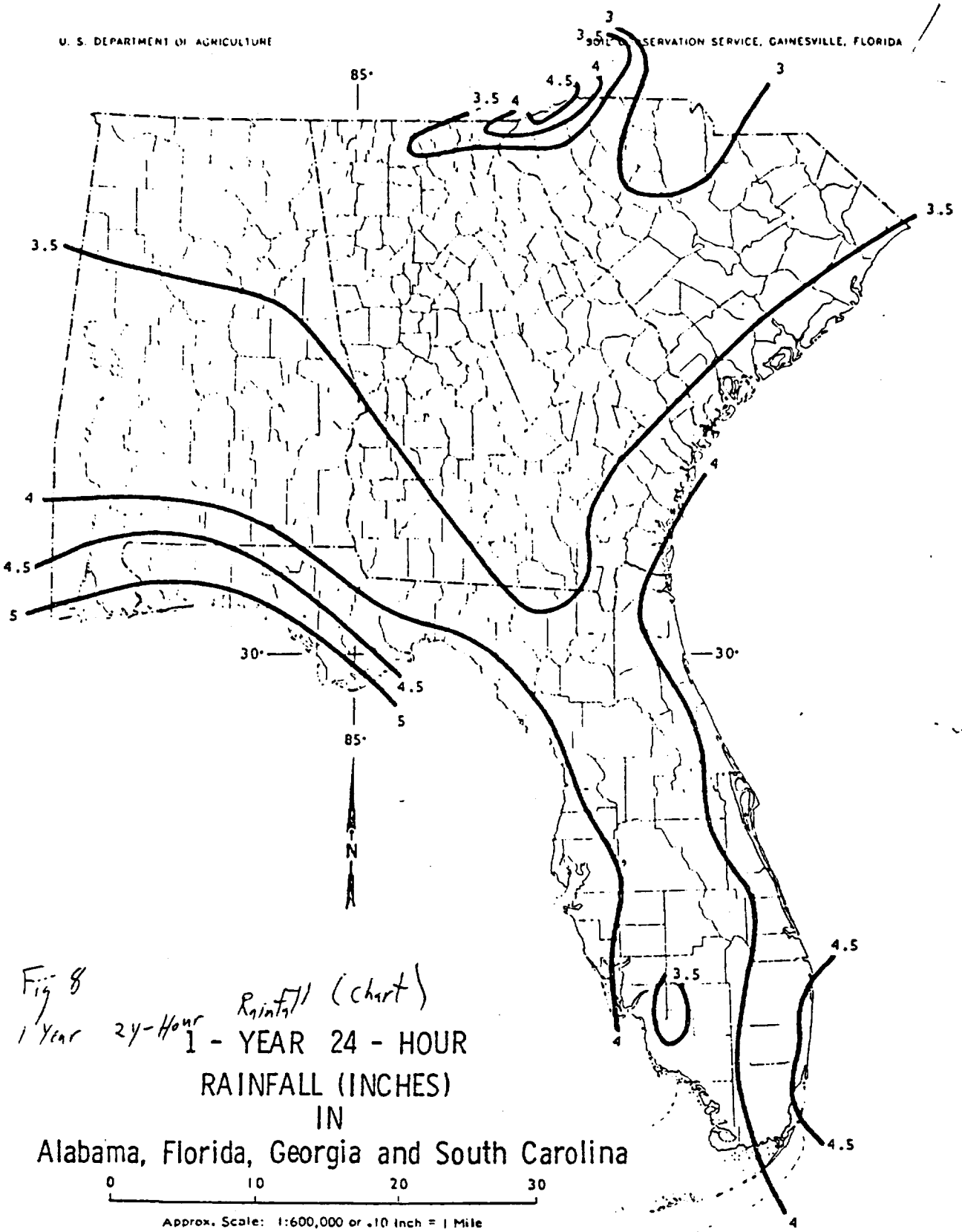
Quality Assurance Program Summary

PSI maintains a stringent quality control program which conforms to guidelines established by the Florida Department of Health and Rehabilitative Services and Section 10D-41 of the Florida Administrative Code. The program encompasses all facets of sampling, sample handling, preservation, analysis, reporting and administration.

Duplication, spiking, and analysis of reference samples are incorporated into the analytical routine to insure precision and accuracy.

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE, GAINESVILLE, FLORIDA



Reference Fig 8
1 Year 24-Hour Rainfall (chart)

1 - YEAR 24 - HOUR RAINFALL (INCHES) IN Alabama, Florida, Georgia and South Carolina

0 10 20 30

Approx. Scale: 1:600,000 or .10 inch = 1 Mile

Ref: Technical Paper No. 40, Weather Bureau

USDA SCS-FORT WORTH, TEX. 1973

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STATE OF FLORIDA
STATE BOARD OF CONSERVATION

FLORIDA GEOLOGICAL SURVEY
Robert O. Vernon, Director

REPORT OF INVESTIGATIONS NO. 25

WATER RESOURCES OF HILLSBOROUGH COUNTY, FLORIDA

By
C. G. Menke, E. W. Meredith, and W. S. Wetterhall
U. S. Geological Survey

Prepared by the
UNITED STATES GEOLOGICAL SURVEY
in cooperation with the
FLORIDA GEOLOGICAL SURVEY,
HILLSBOROUGH COUNTY,
and the
CITY OF TAMPA

TALLAHASSEE, FLORIDA
1961

GEOLOGY

is underlain by sedimentary rocks ranging
3,000 feet in the northeast to about 13,000
aplin, 1951). These sediments, which rest
ist of sandstone, anhydrite, and dolomite
by limestone, dolomite, clay, and sand of

feet of the Cenozoic section is used as a
ounty. Only two water wells over 1,000
d during the investigation.
controlled by economy and by depth to
ical reasons, a well is finished at the
a given yield at a given drawdown is
well, for most purposes, must also be
water. In the northeastern part of the
water is probably more than 4,000 feet
naximum depth of a fresh-water well in
it 4,000 feet. At this depth the entire
ave been penetrated.
e geologic formations and their properties
Oldsmar limestone of Eocene age to the
and clays at the surface. This section is
f the formations that are economically
water in the county.
e age in the county were laid down in
sition. During deposition of sediments,
ward to the southwest. This resulted in
that direction. The forces resulting from
long with regional forces associated with
peninsular arch, warped the beds down-
e stresses were relieved by faulting. The
's is the result of these structural changes.
e the existence of many faults, some with
cal displacement. Additional data are
mit these faults.
ken and dip to the southwest, wells of
will penetrate older formations in the
west. Most of the deep wells in the
produce water principally from
whereas those in the central-
commonly produce from

TABLE 2. Summary of Geologic Formations from Bottom of Oldsmar Limestone to the Ground Surface

Series	Formation	Thickness	Character of material	Water supply	Aquifer	Water level
Pleistocene and Recent	Undifferentiated	0-150	Sand, clay, and marl.	Sand yields up to 200 gpm in some areas and generally 5 to 10 gpm to driven wells less than 40 feet deep. Clay and marl do not yield usable quantities of water to wells.	Water table aquifer	Water level generally less th 10 feet. Water table follo topography in a subdu manner.
Pliocene						
Miocene	Hawthorn formation	0-250	Clay, sand, and limestone. Limestone, near bottom of formation, is white to gray, soft, sandy, and porous.	Limestone member yields up to 200 gpm.	Shallow artesian aquifer	Piezometric surface not fined. Water level is gener higher than that of near wells in principal arte aquifer.
	Tampa limestone	80-100	White, cream, and gray, hard to soft, sandy limestone. Many molds of pelecypods and gastropods.	Yields up to 1,000 gpm. Supplies most domestic and commercial wells in county.	Principal artesian	Piezometric surface shown figures 48 and 49.
Oligocene	Suwannee limestone		White, yellow, and light brown, soft to hard, dense, fine-grained limestone with chert lenses to 25 feet thick.			
Eocene	Ocala group[1]: Crystal River formation (Puri, 1957) Williston formation (Puri, 1957) Inglis limestone	90-300	Yellow-gray and brown soft, almost pure limestone. Mostly foraminiferal coquinas in pasty limestone matrix.	Rarely used for water supply because of low transmissibility.		
	Avon Park limestone	200+	Soft, chalky, cream to brown limestone containing beds of foraminiferal coquina and zones of brown to dark brown, hard, crystalline dolomitic limestone. Locally contains some gypsum.	Principal source of supply for wells yielding more than 500 gpm. Yield exceeds 5,000 gpm in some wells.		
	Lake City limestone	500				
	Oldsmar limestone	900	Fragmental dolomitic limestone with lenses of chert, thin shale beds, and some gypsum.	Not used for water supplies but is potential source of fresh water in north-central and northeastern part of county.		
Paleocene	Cedar Keys limestone	Not known	Not known	Not used. Potential use not known.		

[1]The Ocala group used here accords to the terminology of the Florida Geological Surve

SOUTH FORK LITTLE MANATEE RIVER

The largest tributary to the Little Manatee River is South Fork Little Manatee River. It drains approximately 40 square miles of land in Manatee and 1 square mile in Hillsborough County. The stream flows northwestward into Hillsborough County, flowing at an average rate of 30 mgd. The South Fork Little Manatee River flows into the Little Manatee River about 21 miles above the river's mouth and 2 miles above the point where the Little Manatee River flows across the Hillsborough-Manatee county line into Manatee County.

OTHER STREAMS

Numerous other streams drain the remaining 110 square miles of land not covered in the discussion of tributaries to the Little Manatee River. These streams contribute on the average about 90 mgd to the river or about one-half the flow at the mouth.

PEACE RIVER BASIN

The Peace River drains about 4 square miles of land in the southeastern corner of Hillsborough County. The river flows southward to Charlotte Harbor and the Gulf of Mexico. The area in Hillsborough County contributing water to the Peace River is mainly swampland that lies 130 to 145 feet above the sea.

GROUND WATER

Part of the rain that falls on the earth moves downward through the ground to the zone of saturation to become ground water. The ground water then moves laterally along the hydraulic gradient to discharge points such as springs, wells, or the sea. The materials through which the water moves in usable quantities is known as an *aquifer*. Where water in the aquifer is at atmospheric pressure and is free to rise, the water occurs under nonartesian conditions and the water surface is referred to as the *water table*. Where relatively impermeable beds restrict the vertical movement of water in a completely saturated aquifer, the water occurs under artesian conditions, and the surface described by the elevations to which water will rise in wells tapping the aquifer is referred to as the piezometric surface. Artesian conditions exist when the water is under greater than atmospheric pressure or when the water

will rise above the top of the aquifer where tapped. Where the piezometric surface is lower than the water table, the water may move downward from the monartesian aquifer into the artesian aquifer. Where the water table is lower than the piezometic surface, water may move upward from the artesian aquifer into the nonartesian aquifer or to flowing wells and springs. Ground water in Hillsborough County occurs under both artesian and nonartesian conditions.

WATER-TABLE AQUIFER

The undifferentiated surface sands and clays generally contain water under water-table conditions in Hillsborough County, but artesian conditions may occur locally. The water in the aquifer is derived from local rainfall, and the water table is only a few feet below the ground surface.

Wells deriving water from the sand are constructed by driving a screened well point into the saturated zone or, on the high "prairies," by sinking a pipe to the top of a layer of hardpan and chiselling a hole through the handpan into the underlying sand. The well is then pumped until the water is clear. Drive-point wells are generally less than 20 feet deep and yield about 5 gpm.

The wells developed below the hardpan are usually from 8 to 16 feet deep and may yield more than 200 gpm where the hardpan is sufficiently thick and strong to allow development of large cavities under it.

Generally water is not available in desirable quality or quantity from the water-table aquifer, and it is not a very important source of supply in the county.

SHALLOW ARTESIAN AQUIFER

Wells developed in the sand and limestone beds of the Hawthorn formation in the southern half of the county yield up to about 500 gpm of water of relatively poor quality. The advantages of developing wells in this aquifer are that shallower wells and less expensive pumps are required if only small to moderate yields of water are needed. The saving effected could offset the advantage of having better quality water from the deeper aquifers. The aquifer in the Hawthorn formation, though important in Polk County, is of minor importance throughout the small area of Hillsborough County in which it occurs.

PRINCIPAL ARTESIAN AQUIFER

The principal artesian aquifer includes the units described by Stringfield (1936, p. 124-128) and the Floridian aquifer of Parker (1955, p. 188-189). Parker (op. cit.) includes the Lake City limestone, Tampa limestone and, where hydrologically connected, the Hawthorn formation in the Floridan aquifer.

The physical limits of the aquifer should be set at hydrologic boundaries. In Hillsborough County, there is no evidence of a hydrologic boundary at the base of the Lake City limestone. In addition, rotary drilling in the county has resulted in loss of mud circulation throughout the older Tertiary formations (i.e., Oldsmar and Cedar Keys limestones) and possibly the upper part of the Lawson limestone of Cretaceous age. Loss of circulation indicates the presence of cavities that, in all probability, are the result of solution by ground water. Therefore, the entire Tertiary system from the base of the Hawthorn formation to the top of the Gulf series (as used by the Florida Geological Survey) of Cretaceous age is included in the principal artesian aquifer of this report. The general occurrence of cavities in the Eocene rocks and the inferred presence of similar cavities in the Oldsmar and Cedar Keys limestones indicate ground-water movement to at least that depth.

Limestone, more or less dolomitized, is the dominant lithologic component of the aquifer. Zones of high permeability are distributed erratically through the aquifer. These zones have not been traced over great distances. It is known from examination of caves in other areas that most horizontal water courses in limestone end in vertical openings that intersect other horizontal cavities at different levels. Similar conditions are assumed to be responsible for the hydrologic continuity observed in the principal artesian aquifer in Hillsborough County.

The hydraulic systems just described are limited in vertical extent by layers of rocks of low permeability. The rocks of the upper part of the Ocala group tend to restrict this system. The Tampa and Suwannee limestones, which are a hydrologic unit, comprise the aquifer above the Ocala. The few available data indicate that the formations underlying the Ocala group to the greatest depth commonly penetrated by water wells tend to form another gross hydrologic unit. The two systems are connected hydraulically by solution openings along structural planes that probably are faults. The vertical permeability of these openings is sufficient to allow approximate equilibrium to obtain between

the two systems when the time of interchange of water is grea and the amount of water interchanged is small. Where eith system is stressed by a local discharge through a large spring well, the vertical movement of water is relatively small and th two systems behave as separate aquifers. Thus, throughout mo of the county the total limestone section is essentially a hydrolog unit, but wherever either system is stressed by large volumes discharge the Tampa and Suwannee limestones act as an aquife separate from the limestones below the Ocala group.

Several thousand gallons per minute can be pumped fro any of the several zones in the aquifer. The specific capaci of the well depends on the size and continuity of the cavities pen trated by the well.

Sulphur Springs (801-227-B) flows an average of about mgd. Based on chemical analyses of water from the spring compared with water from well 801-227-3, about 90 percent the water, or 33 mgd, is of good chemical quality derived fro the Tampa and Suwannee limestones. The remaining 4 mg consists of highly mineralized water from below the Ocala grou The proportions of minerals in the spring water are different fro those in sea water, indicating that the concentration and chemic character of the water do not reflect salt-water intrusion fro Tampa Bay. Instead, the water probably is diluted connate wate The connate water is derived from older rocks that have not bee flushed by fresh water as have the more recent rocks near th surface. Concentrations of chloride of more than 69,000 pp (Black and Brown, 1953) are known to occur in the older roc in Florida. These rocks are rich in gypsum and anhydrite fro which sulfate could be dissolved, giving rise to the type of wat occurring in well 801-227-3.

The movement of water in the Tampa and Suwannee limeston was traced by introducing 8 pounds of sodium fluorescein into sinkhole about 1,000 feet northwest of Blue Sink. During the te the dye followed a sharply angular and narrow course correspon ing to the trends of regional structures. The dye moved o half mile southwest, then 1½ miles southeast from Blue Sink (8 227-A), then southwestward to 801-226-A, and to Sulphur Sprin A number of randomly located points in the area were monitor but did not show any dye. Though the test was not made un ideal conditions, the results seem to be quite clearly indicat of structural control of ground-water movement in the area. T inferred upward movement of connate water along fault pla and the observed path of the dye are interpreted as evidence th

WELL CONSTRUCTION PERMITTING

RD80055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:29 R:13 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICH NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPH	WELL DEPH	GROUT	RBGRS	METHOD	TATEIRL	SPACE	CHLORAP	IRON	SULFUR	USER-ID	LOT	LITH	OWNER NAME
421370	I	2252	0	14	057	3	3	312918		2	2	12	Y	1	R	6					MW-1	0000	NO	TAMPA FLYING SERVICE
421371	I	2252	0	14	057	3	3	312918		2	2	12	Y	1	R	6					MW-2	0000	NO	TAMPA FLYING SERVICE
421372	I	2252	0	14	057	3	3	312918		2	2	12	Y	1	R	6					MW-3	0000	NO	TAMPA FLYING SERVICE
421373	I	2252	0	14	057	3	3	312918		2	2	12	Y	1	R	6					MW-4	0000	NO	TAMPA FLYING SERVICE
426918	I	2858	0	14	057	1	1	312918		2	2	12		0	A	0					MW-1	0000	NO	RADIANT OIL CO
426919	I	2858	0	14	057	1	1	312918		2	2	12		0	A	0					MW-2	0005	NO	RADIANT OIL CO
426920	I	2858	0	14	057	1	1	312918		2	2	12		0	A	0					MW-3	0005	NO	RADIANT OIL CO
426921	I	2858	0	14	057	1	1	312918		2	2	12		0	A	0					MW-2	0005	NO	RADIANT OIL CO
429996	I	2587	0	13	057	0	0	312918		2	1	9	Y	1	A	3						0000	NO	SUAREZ, BILL
429997	I	2587	0	13	057	0	0	312918		2	1	9	Y	1	A	3					MW-2	0000	NO	SUAREZ, BILL
429998	I	2587	0	13	057	0	0	312918		2	1	9	Y	1	A	3					MW-3	0000	NO	SUAREZ, BILL
429999	I	2587	0	13	057	0	0	312918		2	1	9	Y	1	A	3					MW-4	0000	NO	SUAREZ, BILL
313759	E	0000	A	14	057	0	0	322918		3	37	70		0	C	10					000000		NO	T D ROBER
304277	E	0000	A	14	057	0	0	322918		4	64	114		0		5					000000		NO	
346309	H	1369	A	14	057	0	0	322918		4	21	100		0	C	2					000000		NO	PALLIJA, CHUCH (WILES CONST.)
386864	N	2753	A	14	057	0	0	322916		4	*** CANCELLED ***													TESTERMAN, GLEN
430789	I	1369	A	14	057	0	0	322916		4	31	80		0	T	2						0000	NO	FREE, LISTON
457605	N	1271	A	14	057	0	0	322918		4	*** CANCELLED ***													EDGE, LINDA B.
342648	E	1094	D	14	057	0	0	322918		2														DRAKE,D
355158	C	1094	D	14	057	0	0	322918		2	34	82		0	R	11					000000		NO	KAUFMAN, HERMAN
309304	E	0000	D	14	057	0	0	322918		3	50	100		0	C	0					000000		NO	J S MORELL
314802	E	0000	D	14	057	0	0	322918		3	30	52		0	C	6					000000		NO	J C MOLCAHY
315198	E	0000	D	14	057	0	0	322918		3	40	93		0	C	7					000000		NO	A VANHYNING
318539	E	0000	D	14	057	0	0	322918		3	50	85		0	C	0					000000		NO	H SMITH
319137	E	0000	D	14	057	1	1	322918		3	41	65		0	C	5					000000		NO	H BENISON
319245	E	0000	D	14	057	0	0	322918		3	41	97		0	C	18					000000		NO	B SHEETS
319246	E	0000	D	14	057	0	0	322918		3	41	92		0	C	10					000000		NO	W WEAVER JR
320867	E	0000	D	14	057	0	0	322918		3	95	140		0	C	0					000000		NO	W WALLACE
327602	E	1251	D	14	057	0	0	322918		3	22	45		0	C	0					000000		NO	HOLT
331189	E	1056	D	14	057	0	0	322918		3	54	135		0	C	6					000000		NO	J P TIGLEY
363883	C	2671	D	14	057	0	0	322918		3	92	127	N	0	C	10					000000		NO	KARRAN, GEORGE
331646	E	1056	D	14	057	0	0	322918		4	45	91		0	C	6					000000		NO	F MANDELLA
397620	C	2372	0	14	057	0	0	322918		2	2	20	Y	1	A	2					TST #1		NO	THEO REALTY ESTATE
397621	C	2372	0	14	057	0	0	322918		2	2	20	Y	1	A	2					TST #2		NO	THEO REALTY ESTATE
397622	C	2372	0	14	057	0	0	322916		2	2	20	Y	1	A	2					TST #3		NO	THEO REALTY ESTATE
415660	I	2372	0	13	057	2	3	322918		2	2	25	Y	1	A	2					WELL-1	0001	NO	THEOCHEM LABORTORIES
417053	I	1704	0	14	057	0	0	322918		2	3	11	Y	5	A	6					MW-1	0000	NO	RADIANT OIL CO
417054	I	1704	0	14	057	0	0	322918		2	3	11	Y	5	A	6					MW-2	0000	NO	RADIANT OIL CO
417055	I	1704	0	14	057	0	0	322918		2	3	11	Y	5	A	6					MW-3	0000	NO	RADIANT OIL CO

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WELL CONSTRUCTION PERMITTING

RDR0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:29 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPH	WELL DEPH	GRCUT	BARS	METHOD	SWL ATVTEE IRLC	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
417056	I	1704	O	14	057	0	0	322918	2	3	11	Y	5	A	6						MW-4	0000	NO	RADIANT OIL CO
417057	I	1704	O	14	057	0	0	322918	2	3	11	Y	5	A	6						MW-5	0000	NO	RADIANT OIL CO
417058	I	1704	O	14	057	0	0	322918	2	3	11	Y	5	A	6						MW-6	0000	NO	RADIANT OIL CO
417059	I	1704	O	14	057	0	0	322918	2	3	11	Y	5	A	6						MW-6	0000	NO	RADIANT OIL CO
423336	I	2868	O	13	057	0	0	322918	2	5	10	Y	1	A	0						MW-1	0000	NO	RADIANT OIL CO
423337	I	2868	O	13	057	0	0	322918	2	5	10	Y	1	A	0						MW-2	0000	NO	RADIANT OIL CO
423338	I	2868	O	13	057	0	0	322918	2	5	10	Y	1	A	0						MW-3	0000	NO	RADIANT OIL CO
423339	I	2968	O	13	057	0	0	322918	2	5	10	Y	1	A	0						MW-4	0000	NO	RADIANT OIL CO
458636	I	2987	O	14	057	0	0	322918	2	15	15	Y	2	A	0							0000	NO	NEUMANN OIL CO.
458637	I	2987	O	14	057	0	0	322918	2	15	15	Y	2	A	0							0000	NO	NEUMANN OIL CO.
458638	I	2987	O	14	057	0	0	322918	2	15	15	Y	2	A	0							0000	NO	NEUMANN OIL CO.
458639	I	2987	O	14	057	0	0	322918	2	15	15	Y	2	A	0							0000	NO	NEUMANN OIL CO.
471768	I	2489	O	13	057	0	0	322918	4	13	18	Y	1	A	0							0000	NO	TEXACO REFINING
471769	I	2489	O	13	057	0	0	322918	4															TEXACO REFINING
396223	C	1232	W	14	057	0	0	322918	3	33	65	N	0	C	8						000000		NO	FUNKHOUSER, M L
375720	N	1432	W	14	057	0	0	322918	4	*** CANCELLED ***														HEINRICHS, STEVEN
398729	C	1094	W	14	057	0	0	322918	4	66	142	Y	4	R	0						000000		NO	MILLER, JERRY
352079	C	2076	A	14	057	0	0	332918	2	28	55		0	C	4						000000		NO	NEWLAND, WM.
359727	C	1126	A	14	057	0	0	332918	2	31	50		0	C	4						000000		NO	POSADA, CONNIE
361566	C	2076	A	13	057	0	0	332918	2	37	85	N	0	C	21						000000		NO	PACKWOOD, GEORGE
318937	E	0000	A	13	057	0	0	332918	3	27	100		0	C	6						000000		NO	J R DELCHER
319844	E	0000	A	14	057	0	0	332918	4	32	35		0	C	4						000000		NO	PALMA METH
322983	E	1232	A	14	057	0	0	332918	4	107	200		0	R	0						000000		NO	C RUSS
338576	E	1099	A	14	057	0	0	332918	4	105	164		0	C	0						000000		NO	CONNARS,A G
374448	C	1271	A	14	057	0	0	332918	4	29	60	N	0	C	5						000000		NO	ALDAZ, REGINA
381108	C	1817	A	14	057	0	0	332918	4	37	90	N	0	C	5						000000		NO	BALIF
391762	N	1232	A	11	057	0	0	332918	4	*** CANCELLED ***														STRICKLAND, HAZEL
415479	I	2267	A	14	057	0	0	332918	4	90	180	Y	9	R	12							0000	NO	CURTIS,FRED
425030	I	2267	A	11	057	4	3	332918	4	70	180	Y	10	R	2							0000	NO	WINAROW, BOB
328116	E	1369	A	14	057	0	0	332918	6	110	202		0	C	8						000000		NO	H BOMFORD
363533	N	1094	D	11	057	0	0	332918	2	*** CANCELLED ***														VANDERMEEP, JOHN
367789	E	0000	D	14	057	0	0	332918	2															BENJAMIN, DOUG
308996	E	0000	D	14	057	0	0	332918	3	40	95		0	C	100						000000		NO	MR LANCASTE
312180	E	0000	D	14	057	0	0	332918	3															L H PEMBERT
313947	E	0000	D	14	057	0	0	332918	3	189	260		0	R	14						000000		NO	C B HALL
315908	E	0000	D	13	057	0	0	332918	3	21	80		0	C	12						000000		NO	MARTIN
318938	E	0000	D	14	057	0	0	332918	3	40	83		0	C	0						000000		NO	R MONTGOMER
321345	E	1338	D	14	057	0	0	332918	3	21	60		0	C	8						000000		NO	CHARLES STR
323651	E	1056	D	14	057	0	0	332918	3	32	80		0	C	16						000000		NO	SEARS

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:29 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILLING	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUT	BDRS	METHOD	SWL TAETIRLC	SPCAP	CLOR	HOON	USE	USER-ID	LOT	LITH	OWNER NAME
327566	E	1024	D	14	057	0	0	332918		3	70	101		0	C	5					000000		NO	L SARDEGNA
324369	E	1056	D	14	057	0	0	332918		4	6	120		0	C	5					000000		NO	BILL MCGEE
375071	C	2251	D	14	057	0	0	332916		4	103	205	Y	26	R	2					000000		NO	MURPHY, MARTIN
377348	N	1855	D	14	057	0	0	332918		4	*** CANCELLED ***													MOODY, MARION F.
307560	E	0000	M	14	057	0	0	332918		6	136	235		0	R	20					000000		NO	
416691	I	2730	O	11	057	0	0	332918		2	2	10	N	0	A	5					MW-1	0000	NO	RADIANT OIL CO
418892	I	2730	O	11	057	0	0	332918		2	2	10	N	0	A	5					MW-2	0000	NO	RADIANT OIL CO
418893	I	2730	O	11	057	0	0	332918		2	2	10	N	0	A	5					MW-3	0000	NO	RADIANT OIL CO
418894	I	2730	O	11	057	0	0	332918		2	2	10	N	0	A	5					MW-4	0000	NO	RADIANT OIL CO
418895	I	2730	O	11	057	0	0	332918		2	2	10	N	0	A	5					MW-5	0000	NO	RADIANT OIL CO
418896	I	2730	O	11	057	0	0	332918		2	2	10	N	0	A	5					MW-6	0000	NO	RADIANT OIL CO
418897	I	2730	O	11	057	0	0	332918		2	2	10	N	0	A	5					MW-7	0000	NO	RADIANT OIL CO
421044	I	2858	O	11	057	0	0	332918		2	2	12	Y	1	A	4					MW-1	0000	NO	BELCHER OIL CO
421045	I	2858	O	11	057	0	0	332918		2	2	12	Y	1	A	0					MW-2	0000	NO	BELCHER OIL CO
421046	I	2858	O	11	057	0	0	332918		2	2	12	Y	1	A	0					MW-3	0000	NO	BELCHER OIL CO
421047	I	2858	O	11	057	0	0	332918		2	2	12	Y	1	A	0					MW-4	0000	NO	BELCHER OIL CO
422283	I	2730	O	13	057	0	0	332918		2	1	9	Y	1	A	3					MW-1	0000	NO	RADIANT OIL CO
422284	I	2730	O	13	057	0	0	332918		2	1	9	Y	1	A	3					MW-2	0000	NO	RADIANT OIL CO
422285	I	2730	O	13	057	0	0	332918		2	1	9	Y	1	A	3					MW-3	0000	NO	RADIANT OIL CO
422286	I	2730	O	13	057	0	0	332918		2	1	9	Y	1	A	3					MW-4	0000	NO	RADIANT OIL CO
424528	N	2730	O	13	057	0	0	332918		2	*** CANCELLED ***													RADIANT OIL CO
424529	N	2730	O	13	057	0	0	332918		2	*** CANCELLED ***													RADIANT OIL CO
424530	N	2730	O	13	057	0	0	332918		2	*** CANCELLED ***													RADIANT OIL CO
424531	N	2730	O	13	057	0	0	332918		2	*** CANCELLED ***													RADIANT OIL CO
425666	I	1704	O	14	057	0	0	332918		2	3	9	Y	1	A	4					MW-1	0000	NO	APEC
425667	I	1704	O	14	057	0	0	332918		2	3	9	Y	1	A	4					MW-2	0000	NO	APEC
425668	I	1704	O	14	057	0	0	332918		2	3	9	Y	1	A	4					MW-3	0000	NO	APEC
425669	I	1704	O	14	057	0	0	332918		2	2	9	Y	1	A	4					MW-4	0000	NO	APEC
427994	I	2254	O	14	057	0	0	332918		2	10	15		0	A	7					MW-1	0000	NO	CONSOLIDATED ENERGY
429532	I	1704	O	14	057	0	0	332918		2	7	15	Y	1	A	10					MW-2	0000	NO	ROADWAY EXPRESS
429533	I	1704	O	14	057	0	0	332918		2	7	15	Y	1	A	10					MW-3	0000	NO	ROADWAY EXPRESS
429534	I	1704	O	14	057	0	0	332918		2	7	15	Y	1	A	10					MW-4	0000	NO	ROADWAY EXPRESS
429535	I	1704	O	14	057	0	0	332918		2	7	15	Y	1	A	10					MW-5	0000	NO	ROADWAY EXPRESS
429536	I	1704	O	14	057	0	0	332918		2	7	15	Y	1	A	10					MW-6	0000	NO	ROADWAY EXPRESS
429537	I	1704	O	14	057	0	0	332918		2	7	15	Y	1	A	10					MW-7	0000	NO	ROADWAY EXPRESS
429538	I	1704	O	14	057	0	0	332918		2	7	15	Y	1	A	10					MW-8	0000	NO	ROADWAY EXPRESS
435614	I	2987	O	13	057	0	0	332918		2	15	16	N	0	A	0						0000	NO	MAYNARD, HERB
435615	I	2987	O	13	057	0	0	332918		2	15	16	N	0	A	0						0000	NO	MAYNARD, HERB
435616	I	2987	O	13	057	0	0	332918		2	15	16	N	0	A	0						0000	NO	MAYNARD, HERB

WELL CONSTRUCTION PERMITTING

RDB0355 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

LY: COUNTY: BASIN: S: 1 - 36 T:29 R:26 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	LOCATION S	LOCATION T	LOCATION R	DIA	CASE DEPTH	WELL DEPTH	GROUT	BGRS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
326931	E	1061	A	13	057	0	0	342918		3	21	50		0	C	7					000000		NO	E BLACKBURN
337349	E	1232	A	13	057	0	0	342918		3	31	55		0	R	11					000000		NO	GATES,J
325743	E	1061	A	13	057	0	0	342918		4	38	70		0	C	0					000000		NO	C MOORE
373132	C	1655	A	13	057	0	0	342918		4	36	41	N	0	C	10					000000		NO	CHAPMAN, MR.
414823	I	1271	A	13	057	0	0	342918		4	42	80		0	C	10						0000	NO	WILSON, HOWARD
469192	I	2267	A	13	057	0	0	342918		4	100	195	Y	25	R	12						0000	NO	GARLAND'S GARDEN
343575	C	1094	D	13	057	0	0	342918		2	106	182		0	R	14					000000		NO	O'ROACHE, JOHN
356364	C	1094	D	14	057	0	0	342918		2	89	172		0	R	14					000000		NO	HOLTON, SAM
311024	E	0000	D	13	057	0	0	342918		3	50	100		0	C	6					000000		NO	BOKLER
314977	E	0000	D	13	057	0	0	342918		3	20	50		0	C	9					000000		NO	H MCFALL
326634	E	1061	D	13	057	0	0	342918		3	30	45		0	C	6					000000		NO	K SPERRY
314935	E	0000	D	13	057	0	0	342918		4	52	140		0	C	20					000000		NO	W BISCK
317352	E	0000	D	13	057	3	4	342918		4	52	121		0	C	26					000000		NO	A GONZALEZ
324291	E	1056	D	13	057	0	0	342918		4	51	135		0	C	2					000000		NO	E G MORGAN
345864	N	1271	D	13	057	0	0	342918		4	50	87		0	C	10					000000		NO	CHERYL G. SHIRLEY OR M. V.
374386	N	2251	D	13	057	0	0	342918		4	*** CANCELLED ***													ROBERTS, DOROTHY L.
417883	I	1232	D	13	057	0	0	342918		2	2	12	Y	1	A	5					MW-1	0000	NO	ERM-SOUTH INC
417884	I	1232	D	13	057	0	0	342918		2	2	12	Y	1	A	5					MW-2	0000	NO	ERM-SOUTH INC
417885	I	1232	D	13	057	0	0	342918		2	2	12	Y	1	A	0					MW-3	0000	NO	ERM-SOUTH INC
419232	I	2730	D	11	057	0	0	342918		2	2	8	Y	1	A	2					MW-1	0000	NO	RADIANT OIL CO
419234	I	2730	D	11	057	0	0	342918		2	2	8	Y	1	A	2					MW-3	0000	NO	RADIANT OIL CO
419235	I	2730	D	11	057	0	0	342918		2	2	8	Y	1	A	2					MW-4	0000	NO	RADIANT OIL CO
419236	I	2730	D	11	057	0	0	342918		2	2	8	Y	1	A	2					MW-5	0000	NO	RADIANT OIL CO
419237	I	2730	D	11	057	0	0	342918		2	2	8	Y	1	A	2					MW-6	0000	NO	RADIANT OIL CO
434836	I	1704	D	13	057	0	0	342918		2	1	7	Y	1	A	1						0000	NO	U S PLYWOOD
434837	I	1704	D	13	057	0	0	342918		2	1	7	Y	1	A	1						0000	NO	U S PLYWOOD
434838	I	1704	D	13	057	0	0	342918		2	1	7	Y	1	A	1						0000	NO	U S PLYWOOD
434839	I	1704	D	13	057	0	0	342918		2	1	7	Y	1	A	1						0000	NO	U S PLYWOOD
436151	I	2730	D	14	057	0	0	342918		2	4	12	N	0	A	5						0000	NO	RADIANT OIL CO
436152	I	2730	D	14	057	0	0	342918		2	4	12	N	0	A	5						0000	NO	RADIANT OIL CO
436153	I	2730	D	14	057	0	0	342918		2	4	12	N	0	A	5						0000	NO	RADIANT OIL CO
436154	I	2730	D	14	057	0	0	342918		2	4	12	N	0	A	5						0000	NO	RADIANT OIL CO
441227	I	1945	D	11	057	0	0	342918		2	15	15		0	A	5						0000	NO	J.H. WILLIAMS OIL CO
441228	I	1945	D	11	057	0	0	342918		2	15	15		0	A	5						0000	NO	J.H. WILLIAMS OIL CO
441229	I	1945	D	11	057	0	0	342918		2	15	15		0	A	5						0000	NO	J.H. WILLIAMS OIL CO
441230	I	1945	D	11	057	0	0	342918		2	15	15		0	A	5						0000	NO	J.H. WILLIAMS OIL CO
454614	I	1704	D	13	057	0	0	342918		2	9	9	Y	1	A	4						0000	NO	MORRISON, PETE
454615	I	1704	D	13	057	0	0	342918		2	9	9	Y	1	A	4						0000	NO	MORRISON, PETE
454616	I	1704	D	13	057	0	0	342918		2	9	9	Y	1	A	4						0000	NO	MORRISON, PETE

T30 R18 SW of Tampa

WELL CONSTRUCTION PERMITTING

PDR0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBER	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUT	BGRS	METHOD	SWL TAE ATV TEE IRL C	SPACE	CLAR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
338757	E	1097	D	11	057	0	0	013018		3	31	65		0	C	6					000000		NO	DUKE,L B
372284	C	1855	A	14	057	0	0	023018		4	25	53		0	C	10					000000		NO	BROWN TROPHY
400079	E	2247	A	14	057	2	2	023018		4	45	130	Y	4	R	80					000000		NO	LUTHER BAR B Q REST
334531	E	1094	A	13	057	0	0	033018		2	87	142		0		8					000000		NO	LYNCH A C
363924	C	2076	A	14	057	0	0	033018		2	38	75	N	0	C	6					000000		NO	RODRIQUEZ, MARIO
316353	E	0000	A	13	057	0	0	033018		3	40	65		0	C	9					000000		NO	COLORDRO
324162	E	1432	A	14	057	0	0	033018		3	30	45		0	C	13					000000		NO	FELICIONE
325516	E	1056	A	13	057	0	0	033018		3	36	100		0	C	15					000000		NO	A WILLIAMS
326877	E	1388	A	11	057	0	0	033018		3	10	45		0	C	8					000000		NO	C KERSEY
345140	H	1598	A	11	057	0	0	033018		4	48	100		0	C	12					000000		NO	DAVIS,J
347193	C	1369	A	13	057	0	0	033018		4	42	110		0	C	9					000000		NO	VASH, GENE
347522	C	1232	A	13	057	0	0	033018		4	50	68		0	C	8					000000		NO	SCOTTYS INC.
357627	N	1056	A	13	057	2	4	033018		4	*** CANCELLED ***													REAVES, JOHN
367502	N	1598	A	13	057	0	0	033018		4	*** CANCELLED ***													GREGORY, FLORENCE
367766	C	1183	A	13	057	0	0	033018		4	42	85		0	C	10					000000		NO	CONNORS, FRANCIS L.
371887	C	1232	A	16	057	0	0	033018		4	30	42		0	C	11			D		000000		NO	RILEY, MR.
381439	N	1596	A	14	057	0	0	033018		4	*** CANCELLED ***													CHAPMAN, HAYWARD
383847	C	1056	A	13	057	2	4	033018		4	48	95	N	0	R	20					000000		NO	CAMPBELL, G. H.
386929	C	1817	A	11	057	0	0	033018		4	28	102	N	0	C	6					000000		NO	CASE, EDWARD I
391764	C	1232	A	13	057	0	0	033018		4	58	180	N	0	T	11					000000		NO	KENNEDY, DAVID
412271	C	1232	A	11	057	0	0	033018		4	98	209	Y	35	R	14					000000		NO	TRIM-RITE/BRUCE ROBBINS
422533	I	1958	A	11	057	3	4	033018		4	30	100	Y	3	C	12						0000	NO	LANE, JR, JULIAN
434318	I	2169	A	13	057	0	0	033018		4	60	60		0	C	0						0000	NO	HARRIS, BUD
439351	N	2887	A	11	057	0	0	033018		4	*** CANCELLED ***													CAVANAUGH, MICHAEL T
453183	I	2405	A	11	057	0	0	033018		4	38	120		0	C	10						0000	NO	MARY KILLOTT & SHIRLEY MOORE
342042	E	1094	D	14	057	0	0	033018		2														DOWNS,G W
352820	C	2076	D	13	057	0	0	033018		2	21	55		0	C	3					000000		NO	CANNELLA, NORMAN
365651	N	1094	D	14	057	0	0	033018		2	*** CANCELLED ***													GROVES, FLETCHER L.
410899	E	2169	D	11	057	0	0	033018		2	53	53		0	C	8					000000		NO	STARLING, RAY
430467	I	2405	D	13	057	2	3	033018		2	32	43	N	0	C	6						0000	NO	MC CLURE, SAM
323149	E	1056	D	13	057	0	0	033018		3	30	107		0	C	12					000000		NO	M W OSTERBY
324166	E	1056	D	11	057	0	0	033018		3	31	100		0	C	10					000000		NO	W STEPHENS
327948	E	1024	D	13	057	0	0	033018		3	64	185		0	C	11					000000		NO	G ERICKSEN
328193	E	1024	D	13	057	0	0	033018		3	31	75		0	C	15					000000		NO	R ROSNER
328315	E	1232	D	14	057	0	0	033018		3	32	52		0	R	7					000000		NO	LABORT,J
334340	E	1056	D	13	057	0	0	033018		4	32	50		0	C	0					000000		NO	ERDEX J
334651	E	1094	D	13	057	0	0	033018		4	93	172		0	R	14					000000		NO	MOOSE G I
353044	N	1094	D	11	057	0	0	033018		4	*** CANCELLED ***													NEUMAN, W. K.
353669	C	1056	D	14	057	2	2	033018		4	52	125		0	C	5					000000		NO	NEWMAN, MR.

WELL CONSTRUCTION PERMITTING

RQ80055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	PASI N	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPH	WELL DEPH	GROUT	BARGS	METHOD	SWL TAE ATV TEE IPL C	SPACE	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
354829	C	2071	D	13	057	0	0	033018		4	115	146		0	C	20					000000		NO	WELLS, GEORGE
365123	C	1598	D	14	057	0	0	033018		4	62	120		0	C	10					000000		NO	GRAY, JAMES H.
373454	C	2147	D	14	057	1	3	033018		4	110	110	N	0	C	14					000000		NO	PUFFER, J.
439674	I	2169	D	11	057	0	0	033018		4	55	55		0	C	0						0000	NO	CAVANAUGH, MICHAEL T
450177	I	2169	D	14	057	0	0	033018		4	99	99		0	C	0						0000	NO	HOWET, AXEL
337458	C	1232	I	13	057	0	0	033018		4	63	63		0	R	0					000000		NO	GEN TEL COM
419238	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-1	0000	NO	RADIANT OIL CO
419239	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-2	0000	NO	RADIANT OIL CO
419240	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-3	0000	NO	RADIANT OIL CO
419241	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-4	0000	NO	RADIANT OIL CO
419242	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-5	0000	NO	RADIANT OIL CO
419243	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-6	0000	NO	RADIANT OIL CO
419244	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-7	0000	NO	RADIANT OIL CO
419245	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-8	0000	NO	RADIANT OIL CO
419246	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-9	0000	NO	RADIANT OIL CO
419247	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-10	0000	NO	RADIANT OIL CO
419248	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-11	0000	NO	RADIANT OIL CO
419249	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-12	0000	NO	RADIANT OIL CO
419250	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-13	0000	NO	RADIANT OIL CO
419251	I	2730	0	11	057	0	0	033018		2	2	8	Y	1	A	3					MW-14	0000	NO	RADIANT OIL CO
441231	I	1945	0	11	057	0	0	033018		2	25	25	Y	1	A	7						0000	NO	J.H. WILLIAMS OIL CO
441232	I	1945	0	11	057	0	0	033018		2	25	25	Y	1	A	7						0000	NO	J.H. WILLIAMS OIL CO
441233	I	1945	0	11	057	0	0	033018		2	25	25	Y	1	A	7						0000	NO	J.H. WILLIAMS OIL CO
441234	I	1945	0	11	057	0	0	033018		2	25	25	Y	1	A	7						0000	NO	J.H. WILLIAMS OIL CO
441235	I	1945	0	11	057	0	0	033018		2	25	25	Y	1	A	7						0000	NO	J.H. WILLIAMS OIL CO
441236	I	1945	0	11	057	0	0	033018		2	25	25	Y	1	A	7						0000	NO	J.H. WILLIAMS OIL CO
456781	I	2858	0	14	057	0	0	033018		2	12	12	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456782	I	2858	0	14	057	0	0	033018		2	12	12	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456783	I	2858	0	14	057	0	0	033018		2	12	12	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456784	I	2858	0	14	057	0	0	033018		2	12	12	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
475960	I	2879	0	13	057	0	0	033018		2														BODIE, DONALD C.
475981	I	2979	0	13	057	0	0	033018		2														BODIE, DONALD C.
479539	I	2525	0	14	057	0	0	033018		2														EXXON
479540	I	2525	0	14	057	0	0	033018		2														EXXON
479541	I	2525	0	14	057	0	0	033018		2														EXXON
462895	I	1704	0	11	057	0	0	033018		4	10	10	Y	3	A	4						0000	NO	EXXON
462896	I	1704	0	11	057	0	0	033018		4	10	10	Y	3	A	4						0000	NO	EXXON
462897	I	1704	0	11	057	0	0	033018		4	10	10	Y	3	A	4						0000	NO	EXXON
430793	I	2521	Y	13	057	0	0	033018		2	0	25	Y	7	B	0						0000	NO	AZZARELLI, TOM

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUT	NAT BGRS	METHOD	SWL TAE ATV TEE IRL C	SPACE	CHLORIDE	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
479560	I	2461	Y	16	057	0	0	033018		3														MOORE ENTERPRISES
343645	E	0000	A	14	057	0	0	043018		2														HORTON,A
344379	E	1094	A	11	057	0	0	043018		2														SE LOSCPGES
355579	E	2076	A	14	057	0	0	043018		2	76	109	N	0	C	9					000000		NO	YOUNG, GEORGE F.
322551	E	1432	A	13	057	0	0	043018		3	35	60		0	C	0					000000		NO	S MAYOLA
327715	E	1271	A	14	057	0	0	043018		4	80	155		0	C	13					000000		NO	J PIEPER
335682	E	1057	A	14	057	0	0	043018		4	93	160		0	C	6					000000		NO	TMP VILLAS
360130	C	1056	A	11	057	4	4	043018		4	41	90		0	C	0	7				000000		NO	MILLER, R. D.
382244	C	1232	A	14	057	0	0	043018		4	146	220	Y	37	R	10			G		000000		NO	ARDEN'S NURSERY
315530	H	0000	A	14	057	0	0	043018		6	63	150		0	C	12					000000		NO	MAAS BROTHERS
343325	E	1094	D	14	057	0	0	043018		2														CLAYTON
393162	C	1094	D	14	057	0	0	043018		2	108	212	Y	4	R	0					000000		NO	LYNCH, A C
315123	E	0000	D	14	057	0	0	043018		3	67	130		0		0					000000		NO	NOLA PARKER
320728	E	0078	D	14	057	4	3	043018		3	61	82		0	C	8					000000		NO	P HATCHER
326698	E	1056	D	14	057	0	0	043018		3	40	46		0	C	40					000000		NO	J E BARR
406200	C	1056	D	14	057	4	4	043018		4	42	270	N	0	C	6					000000		NO	MANHATTAN PLACE
449286	I	7028	F	14	057	4	4	043018		10	0	12	Y	1	A	0						0000	NO	EXXON CO USA
406123	C	2372	O	11	057	2	2	043018		2	2	4	Y	1	T	2					MW-1		NO	CITY OF TAMPA
406124	C	2372	O	11	057	2	2	043018		2	3	4	Y	1	T	2					MW-2		NO	CITY OF TAMPA
418412	I	2867	O	14	057	0	0	043018		2	3	14	Y	1	R	3					MW-1	0000	NO	AMOCO
418413	I	2867	O	14	057	0	0	043018		2	3	14	Y	1	T	4					MW-2	0000	NO	AMOCO
418414	I	2867	O	14	057	0	0	043018		2	3	14	Y	1	T	3					MW-3	0000	NO	AMOCO
418415	I	2867	O	14	057	0	0	043018		2	3	14	Y	1	T	4					MW-4	0000	NO	AMOCO
418416	I	2867	O	14	057	0	0	043018		2	3	14	Y	1	T	4					MW-5	0000	NO	AMOCO
430496	I	2858	O	13	057	3	4	043018		2	1	11	Y	1	A	0					MW-1	0000	NO	BELCHER OIL CO
430497	I	2858	O	13	057	3	4	043018		2	1	11	Y	1	A	0					MW-2	0000	NO	BELCHER OIL CO
430498	N	2858	O	13	057	3	4	043018		2	*** CANCELLED ***													BELCHER OIL CO
430499	N	2858	O	13	057	3	4	043018		2	*** CANCELLED ***													BELCHER OIL CO
436589	I	2254	O	14	057	0	0	043018		2	10	11		0	A	0						0000	NO	SOUTHLAND DISTRIBUTORS
436590	I	2254	O	14	057	0	0	043018		2	10	11		0	A	0						0000	NO	SOUTHLAND DISTRIBUTORS
436591	I	2254	O	14	057	0	0	043018		2	10	11		0	A	0						0000	NO	SOUTHLAND DISTRIBUTORS
436592	I	2254	O	14	057	0	0	043018		2	10	11		0	A	0						0000	NO	SOUTHLAND DISTRIBUTORS
458321	I	2254	O	14	057	0	0	043018		2	10	11		0	A	0						0000	NO	BARNELL BANK
458322	I	2254	O	14	057	0	0	043018		2	10	11		0	A	0						0000	NO	BARNELL BANK
458323	I	2254	O	14	057	0	0	043018		2	10	11		0	A	0						0000	NO	BARNELL BANK
458324	I	2254	O	14	057	0	0	043018		2	10	11		0	A	0						0000	NO	BARNELL BANK
458325	I	2254	O	14	057	0	0	043018		2	10	11		0	A	0						0000	NO	BARNELL BANK
463157	I	2406	O	13	057	0	0	043018		4	11	11	Y	1	A	1						0000	NO	TEXACO REFINING
463158	I	2406	O	14	057	0	0	043018		4	11	11	Y	1	A	1						0000	NO	TEXACO REFINING

WELL CONSTRUCTION PERMITTING

PDPC055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBER	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUT	BEDRS	METHOD	SWL TAE ATV IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
463159	I	2406	O	14	057	0	0	043018		4	11	11	Y	1	A	1						0000	NO	TEXACO REFINING
463160	I	2406	O	14	057	0	0	043018		4	11	11	Y	1	A	1						0000	NO	TEXACO REFINING
463161	I	2406	O	14	057	0	0	043018		4	11	11	Y	1	A	1						0000	NO	TEXACO REFINING
463162	I	2406	O	14	057	0	0	043018		4	11	11	Y	1	A	1						0000	NO	TEXACO REFINING
463163	I	2406	O	14	057	0	0	043018		4	8	8	Y	1	A	0						0000	NO	TEXACO REFINING
463164	I	2406	O	14	057	0	0	043018		4	12	12	Y	1	A	0						0000	NO	TEXACO REFINING
382243	N	1232	Y	14	057	0	0	043018		3	*** CANCELLED ***													HARDEN'S NURSERY
382397	N	1232	Y	13	057	0	0	043018		3	*** CANCELLED ***													HARDEN'S NURSERY
384900	C	1232	Y	14	057	0	0	043018		3	145	156	Y	19	C	0					000000		NO	HARDEN'S NURSERY
396605	C	1232	Y	13	057	0	0	043018		3	0	140	Y	6	R	0					000000		NO	HARDEN'S NURSERY
401572	N	2251	A	14	057	0	0	053018		2	*** CANCELLED ***													DICHIARA, JIMMIE
330256	E	1271	A	14	057	0	0	053018		3	25	80		0	C	10					000000		NO	L MOFFIT
315205	E	0000	A	11	057	0	0	053018		4	63	66		0	C	4		K			000000		NO	FERNANDEZ
319163	E	0000	A	14	057	0	0	053018		4	84	200		0	R	7					000000		NO	M FYRE
341727	E	1232	A	14	057	0	0	053018		4	72	200		0	C	5					000000		NO	LINCOLN PRO
348960	C	1024	A	11	057	0	0	053018		4	73	83		0	C	10					000000		NO	KAUL, RALPH
348961	C	1024	A	11	057	0	0	053018		4	32	40		0	C	9					000000		NO	KAUL, RALPH
348962	C	1024	A	11	057	0	0	053018		4	56	76		0	C	16					000000		NO	KAUL, RALPH
349369	C	1024	A	14	057	0	0	053018		4	42	45		0	C	12					000000		NO	KAUL, RALPH
349370	C	1024	A	14	057	0	0	053018		4	50	52		0	C	5					000000		NO	KAUL, RALPH
401230	E	2216	A	16	057	0	0	053018		4	42	52		0	C	0					LOT 3		NO	BARNETT BANK OF TAMPA N A
401796	C	1232	A	14	057	0	0	053018		4	33	84	N	0	T	8					000000		NO	DICHIARA, MR & MRS
411322	E	2267	A	14	057	0	0	053018		4	60	150	Y	12	R	5			M		000000		NO	JAGGER-BUZBEE BUILDERS
382563	E	0000	D	14	057	0	0	053018		2														THORNTON, DONALD
320801	E	0000	D	14	057	0	0	053018		4	31	130		0	C	5					000000		NO	F RODRIQUEZ
435986	I	2587	O	14	057	0	0	053018		2	1	10	Y	1	A	5						0000	NO	CARBO DISTRIBUTORS
435987	I	2587	O	14	057	0	0	053018		2	1	10	Y	1	A	5						0000	NO	CARBO DISTRIBUTORS
435988	I	2587	O	14	057	0	0	053018		2	1	10	Y	1	A	5						0000	NO	CARBO DISTRIBUTORS
435989	I	2587	O	14	057	0	0	053018		2	1	10	Y	1	A	5						0000	NO	CARBO DISTRIBUTORS
441216	I	2858	O	16	057	0	0	053018		2	1	11	Y	1	R	4						0000	NO	CIRCLE K CONVIENCE STORE
441217	I	2858	O	16	057	0	0	053018		2	1	11	Y	1	R	4						0000	NO	CIRCLE K CONVIENCE STORE
441218	I	2858	O	16	057	0	0	053018		2	1	11	Y	1	P	4						0000	NO	CIRCLE K CONVIENCE STORE
441219	I	2858	O	16	057	0	0	053018		2	1	11	Y	1	R	4						0000	NO	CIRCLE K CONVIENCE STORE
442829	I	2858	O	14	057	0	0	053018		2	2	12	Y	2	A	0						0000	NO	CIRCLE K CONVIENCE STORE
442830	I	2858	O	14	057	0	0	053018		2	2	12	Y	2	A	0						0000	NO	CIRCLE K CONVIENCE STORE
442831	I	2858	O	14	057	0	0	053018		2	2	12	Y	2	A	0						0000	NO	CIRCLE K CONVIENCE STORE
442832	I	2858	O	14	057	0	0	053018		2	2	12	Y	2	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456950	I	2858	O	14	057	0	0	053018		2	13	13	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456951	I	2858	O	14	057	0	0	053018		2	13	13	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE

WELL CONSTRUCTION PERMITTING

RDB0015 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBER	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPH	WELL DEPH	GROUT	BGS	METHOD	SWL TAE ATV TEE IRL C	SPACE	CHLORIDE	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
456952	I	2858	0	14	057	0 0	0	53	18	2	13	13	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456953	I	2858	0	14	057	0 0	0	53	18	2	13	13	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
465565	I	9033	0	14	057	0 0	0	53	18	2	29	34	Y	1	A	0						0000	NO	WILDER CORP.
465566	I	9033	0	14	057	0 0	0	53	18	2	13	13	Y	1	A	0						0000	NO	WILDER CORP.
465567	I	9033	0	14	057	0 0	0	53	18	2	13	13	Y	1	A	0						0000	NO	WILDER CORP.
465568	I	9033	0	14	057	0 0	0	53	18	2	13	13	Y	1	A	0						0000	NO	WILDER CORP.
465569	I	9033	0	14	057	0 0	0	53	18	2	43	43	Y	12	A	0						0000	NO	WILDER CORP.
465570	I	9033	0	14	057	0 0	0	53	18	2	28	30	Y	11	A	0						0000	NO	WILDER CORP.
465571	N	9033	0	14	057	0 0	0	53	18	2	*** CANCELLED ***													WILDER CORP.
465572	N	9033	0	14	057	0 0	0	53	18	2	*** CANCELLED ***													WILDER CORP.
465573	N	9033	0	14	057	0 0	0	53	18	2	*** CANCELLED ***													WILDER CORP.
473830	I	9028	0	14	057	0 0	0	53	18	2														KUTCHMIRE, JOHN E.
473831	I	9028	0	14	057	0 0	0	53	18	2														KUTCHMIRE, JOHN E.
308926	E	0012	4	13	057	0 0	0	63	18	4	62	190		0	C	10					000000		NO	
309693	H	0000	A	11	057	0 0	0	73	18	3	41	70		0	C	16					000000		NO	B LINARES
453380	I	1974	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
453381	I	1974	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
453382	I	1974	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
453383	I	1974	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
453384	I	1974	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
453385	I	1974	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
453386	I	1974	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
453387	I	1974	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
453388	I	1974	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
462241	I	2625	0	14	057	0 0	0	73	18	2	13	13	Y	1	A	0						0000	NO	SUN BANK INC
462242	I	2625	0	14	057	0 0	0	73	18	2	13	13	Y	1	A	0						0000	NO	SUN BANK INC
462243	I	2625	0	14	057	0 0	0	73	18	2	13	13	Y	1	A	0						0000	NO	SUN BANK INC
462244	I	2625	0	14	057	0 0	0	73	18	2	13	13	Y	1	A	0						0000	NO	SUN BANK INC
462245	I	2625	0	14	057	0 0	0	73	18	2	13	13	Y	1	A	0						0000	NO	SUN BANK INC
462246	I	2625	0	14	057	0 0	0	73	18	2	13	13	Y	1	A	0						0000	NO	SUN BANK INC
462247	I	2625	0	14	057	0 0	0	73	18	2	13	13	Y	1	A	0						0000	NO	SUN BANK INC
464472	I	2493	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
464473	I	2493	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
464474	I	2493	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
464475	I	2493	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
464476	I	2493	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
464477	I	2493	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
464478	I	2493	0	14	057	0 0	0	73	18	2														RATTLE SNAKE POINT, INC.
400087	E	2098	Y	14	057	0 0	0	73	18	4	90	90	Y	7	C	0					000000		NO	M D MOODY & SONS

WELL CONSTRUCTION PERMITTING

PDBC055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILLING NUMBER	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUT	NAGRS	METHOD	SWL TAE ATVIRLC	SPACE	CHLORIDE	IRON	SULF	USER-ID	LOT	LIT H	OWNER NAME
393245	C	2250	A	14	057	0	0	083018	2	228	182	Y	14	R		0					C00000		NO	PETROLEUM, WARREN
430924	I	2587	A	14	057	0	0	083018	2	13	23	Y	2	R		7						0000	NO	JOHNSTON, TIMOTHY
350722	C	2071	A	14	057	0	0	083018	4	42	67		0	C		10					000000		NO	BUTTRAM, J.
382245	C	1232	A	14	057	0	0	083018	4	79	140	Y	0	R		5		L	B		000000		NO	CHADWICK, DON
409925	C	2267	A	14	057	2	4	083016	4	67	155	N	0	C		8					000000		NO	BENCHMARK APT
415787	I	2267	A	14	057	1	4	083018	4	80	165	Y	16	R		6						0000	NO	UNICORN PROPERTIES
416450	I	1525	A	16	103	0	0	083018	4	110	160	Y	11	R		30						0000	NO	GILBERT, FRANK H MR
405137	E	2088	P	14	057	0	0	083018	4	30	90	N	0	C		0					LOT 2		NO	M D MOODY & SONS
406765	C	2169	D	14	057	0	0	083018	2	33	33	N	0	C		10					000000		NO	ADKINSON, ROGER
318777	E	0000	D	14	057	0	0	083016	3	60	90		0	C		0					000000		NO	J EVANS
318834	F	0000	D	13	057	0	0	083018	3	60	100		0	C		0					000000		NO	OTTOS CAB S
322550	E	1432	D	14	057	0	0	083018	4	35	72		0	C		4					000000		NO	R GREEN
305449	I	1056	D	14	057	3	1	083016	4	120	138	N	0	C		10					000000	0000	NO	EYDMANN, DAVID
349960	C	1094	I	13	057	0	0	083018	10	33	192		0	R		12					000000		NO	WARREN PETROLEUM
349969	C	1094	I	13	057	0	0	083018	10	43	133		0	R		0					000000		NO	WARREN PETROLEUM
363622	C	1094	I	14	057	0	0	083018	10	47	180		0	R		0					000000		NO	WARREN PETROLEUM
363624	C	1094	I	14	057	0	0	083018	10	42	165		0	R		0					000000		NO	WARREN PETROLEUM
432086	I	2858	O	13	057	2	1	083018	2	1	10	Y	1	A		0					MW.1	0000	NO	CIRCLE K CONVIENCE STORE
432087	I	2858	O	13	057	2	1	083018	2	1	10	Y	1	A		0					MW-2	0000	NO	CIRCLE K CONVIENCE STORE
432088	I	2858	O	13	057	2	1	083018	2	1	10	Y	1	A		0					MW-3	0000	NO	CIRCLE K CONVIENCE STORE
433871	I	2858	O	14	057	1	2	083018	2	2	12	N	0	A		0						0000	NO	PAYLESS OIL
433872	I	2858	O	14	057	1	2	083018	2	2	12	N	0	A		0						0000	NO	PAYLESS OIL
433873	I	2858	O	14	057	1	2	083018	2	2	12	N	0	A		0						0000	NO	PAYLESS OIL
433874	I	2858	O	14	057	1	2	083018	2	2	12	N	0	A		0						0000	NO	PAYLESS OIL
442833	I	2807	O	14	057	0	0	083018	2	2	12	Y	2	A		0						0000	NO	ROTO-ROOTER
442834	I	2807	O	14	057	0	0	083018	2	2	13	Y	1	A		0						0000	NO	ROTO-ROOTER
442835	I	2807	O	14	057	0	0	083018	2	2	13	Y	1	A		0						0000	NO	ROTO-ROOTER
442836	I	2807	O	14	057	0	0	083018	2	2	13	Y	1	A		0						0000	NO	ROTO-ROOTER
452638	I	2987	O	14	057	0	0	083018	2	15	15	Y	1	A		0						0000	NO	GULF CENTRAL DIST. CTR.
452639	I	2987	O	14	057	0	0	083018	2	15	15	Y	2	A		0						0000	NO	GULF CENTRAL DIST. CTR.
452640	I	2987	O	14	057	0	0	083018	2	15	15	Y	1	A		0						0000	NO	GULF CENTRAL DIST. CTR.
452641	I	2987	O	14	057	0	0	083019	2	15	15	Y	2	A		0						0000	NO	GULF CENTRAL DIST. CTR.
463425	I	2493	O	14	057	0	0	083018	2															SIMMS OIL CO.
463426	I	2493	O	14	057	0	0	083018	2															SIMMS OIL CO.
463427	I	2493	O	14	057	0	0	083018	2															SIMMS OIL CO.
463428	I	2493	O	14	057	0	0	083018	2															SIMMS OIL CO.
463429	I	2493	O	14	057	0	0	083018	2															SIMMS OIL CO.
463430	I	2493	O	14	057	0	0	083018	2															SIMMS OIL CO.
463431	I	2493	O	14	057	0	0	083018	2															SIMMS OIL CO.

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:16 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPH	WELL DEPH	GROUT	BGRS	METHOD	SVL TAE ATV TEE IRL C	CAPP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
463432	I	2493	0	14	057	0	0	083018		2														SIMMS OIL CO.
473744	I	2254	0	14	057	0	0	083018		2														HENDRY CORPORATION
473745	I	2254	0	14	057	0	0	083018		2														HENDRY CORPORATION
473746	I	2254	0	14	057	0	0	083018		2														HENDRY CORPORATION
473747	I	2254	0	14	057	0	0	083018		2														HENDRY CORPORATION
476220	I	2987	0	14	057	0	0	083018		2														MISENER MARINE CONST, INC.
476221	I	2987	0	11	057	0	0	083018		2														MISENER MARINE CONST, INC.
476222	I	2987	0	11	057	0	0	083018		2														MISENER MARINE CONST, INC.
476223	I	2987	0	14	057	0	0	083018		2														MISENER MARINE CONST, INC.
478103	I	9028	0	14	057	0	0	083018		2														HENDRY CORPORATION
478104	I	9028	0	14	057	0	0	083018		2														HENDRY CORPORATION
478105	I	9028	0	14	057	0	0	083018		2														HENDRY CORPORATION
478106	I	9028	0	14	057	0	0	083018		2														HENDRY CORPORATION
478107	I	9028	0	14	057	0	0	083018		2														HENDRY CORPORATION
478108	I	9028	0	14	057	0	0	083018		2														HENDRY CORPORATION
478109	I	9028	0	14	057	0	0	083018		2														HENDRY CORPORATION
478110	I	9028	0	14	057	0	0	083018		2														HENDRY CORPORATION
478111	I	9028	0	14	057	0	0	083018		2														HENDRY CORPORATION
482150	I	2250	0	11	057	0	0	083018		2														MANHATTAN OIL COMPANY
482151	I	2250	0	11	057	0	0	083018		2														MANHATTAN OIL COMPANY
482152	I	2250	0	11	057	0	0	083018		2														MANHATTAN OIL COMPANY
482153	I	2250	0	11	057	0	0	083018		2														MANHATTAN OIL COMPANY
482154	I	2250	0	11	057	0	0	083018		2														MANHATTAN OIL COMPANY
482155	I	2250	0	11	057	0	0	083018		2														MANHATTAN OIL COMPANY
482156	I	2250	0	11	057	0	0	083018		2														MANHATTAN OIL COMPANY
482157	I	2250	0	11	057	0	0	083018		2														MANHATTAN OIL COMPANY
444431	I	2858	0	14	057	0	0	083018		4	1	10	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
444432	I	2858	0	14	057	0	0	083018		4	1	10	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
444433	I	2858	0	14	057	0	0	083018		4	1	10	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
444434	I	2858	0	14	057	0	0	083018		4	1	10	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
464641	I	2489	0	11	057	0	0	083018		4	15	15	Y	1	A	7						0000	NO	TEXACO REFINING
464642	I	2489	0	11	057	0	0	083018		4	15	15	Y	1	A	7						0000	NO	TEXACO REFINING
464643	I	2489	0	11	057	0	0	083018		4	15	15	Y	1	A	7						0000	NO	TEXACO REFINING
464644	I	2489	0	11	057	0	0	083018		4	15	15	Y	1	A	7						0000	NO	TEXACO REFINING
464645	I	2489	0	11	057	0	0	083018		4	15	15	Y	1	A	7						0000	NO	TEXACO REFINING
464646	I	2489	0	11	057	0	0	083018		4	15	15	Y	1	A	7						0000	NO	TEXACO REFINING
464647	I	2489	0	11	057	0	0	083018		4	20	20	Y	2	A	7						0000	NO	TEXACO REFINING
464648	I	2489	0	11	057	0	0	083018		4	20	20	Y	2	A	7						0000	NO	TEXACO REFINING
378611	C	1286	A	14	057	0	0	093018		4	118	140	N	0	C	0					000000		NO	LACKEY, JOE

WELL CONSTRUCTION PERMITTING

PDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILLER NUMBER	USE	BASIN	COUNTY	LOCATION 000	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUT	PRODUCTIVITY	METHOD	CAPACITY	SWL TAE ATV TEE IRL	CHLORIDE	IRON	SULFATE	USER-ID	LOT	LIH	OWNER NAME
372396	N	2251	A	14	057	0	0	093018	4	*** CANCELLED ***														LACKEY, JOE
406595	E	1369	A	13	057	0	0	093018	4	67	100	N	0	C		12					000000		NO	ARROWHEAD APTS
422257	I	1369	A	14	103	0	0	093018	4	80	200	Y	10	R		6						0000	NO	CARR-RUBIN ASSOC
441517	I	2405	A	14	057	0	0	093018	4	53	125		0	C		8						0000	NO	BOIRE, STELLA
465941	I	2169	A	14	057	0	0	093018	4															GUERTIN, NATHAN
390442	C	2169	D	14	057	0	0	093018	2	25	25	N	0	C		4					000000		NO	MCCLEOD, DONALD
317146	E	0078	D	14	057	0	0	093018	3	92	117		0	C		4					000000		NO	J ARNOLD
323517	F	1024	D	14	057	0	0	093018	3	42	94		0	C		13					000000		NO	J GRAHAM
303114	E	0000	D	14	057	0	0	093018	4															
304775	E	0000	D	14	057	0	0	093018	4															
411721	C	1232	H	14	057	0	0	093018	3	0	160	N	0	R		11					000000		NO	CROW, TERWILLIGER & WOOD
382675	C	2250	H	14	057	0	0	093018	4	157	225	Y	16	R		0					378611		NO	LACKEY, JOE
420149	I	2254	O	14	057	0	0	093018	2	0	10	N	0	A		4					MW-1	0000	NO	PRONTO CARWASH
420150	I	2254	O	14	057	0	0	093018	2	0	10	N	0	A		4					MW-2	0000	NO	PRONTO CARWASH
420151	I	2254	O	14	057	0	0	093018	2	0	10	N	0	A		3					MW-3	0000	NO	PRONTO CARWASH
420152	I	2254	O	14	057	0	0	093018	2	0	10	N	0	A		4					MW-4	0000	NO	PRONTO CARWASH
421624	I	2251	O	11	057	0	0	093018	2	3	18	Y	7	R		8					MW-1	0000	NO	FINA
421625	I	2251	O	11	057	0	0	093018	2	3	18	Y	7	R		8					MW-2	0000	NO	FINA
421626	I	2251	O	11	057	0	0	093018	2	3	18	Y	7	R		8					MW-3	0000	NO	FINA
421627	I	2251	O	11	057	0	0	093018	2	3	18	Y	7	R		8					MW-4	0000	NO	FINA
421644	I	2730	O	14	057	0	0	093018	2	2	9		0	A		4					MW-1	0000	NO	RADIANT OIL CO
421645	I	2730	O	14	057	0	0	093018	2	2	9		0	A		4					MW-2	0000	NO	RADIANT OIL CO
421646	I	2730	O	14	057	0	0	093018	2	2	9		0	A		4					MW-3	0000	NO	RADIANT OIL CO
421647	I	2730	O	14	057	0	0	093018	2	2	9		0	A		4					MW-4	0000	NO	RADIANT OIL CO
422670	I	2658	O	14	057	3	2	093018	2	11	11	Y	1	A		0						0000	NO	CIRCLE K CONVIENCE STORE
422671	I	2658	O	14	057	3	2	093018	2	11	11	Y	1	A		0					MW-2	0000	NO	CIRCLE K CONVIENCE STORE
422672	I	2658	O	14	057	3	2	093018	2	11	11	Y	1	A		0					MW-3	0000	NO	CIRCLE K CONVIENCE STORE
422673	I	2658	O	14	057	3	2	093018	2	11	11	Y	1	A		0					MW-4	0000	NO	CIRCLE K CONVIENCE STORE
430170	I	1232	O	14	057	0	0	093018	2	2	12	Y	1	A		3					MW-1	0000	NO	TAMPA COLD STORAGE & WAREHOUSE
430171	I	1232	O	14	057	0	0	093018	2	2	12	Y	1	A		3					MW-2	0000	NO	TAMPA COLD STORAGE & WAREHOUSE
430172	I	1232	O	14	057	0	0	093018	2	2	12	Y	1	A		3					MW-3	0000	NO	TAMPA COLD STORAGE & WAREHOUSE
430173	I	1232	O	14	057	0	0	093018	2	2	12	Y	1	A		3					MW-4	0000	NO	TAMPA COLD STORAGE & WAREHOUSE
435211	I	2730	O	13	057	0	0	093018	2	10	10	Y	1	A		4						0000	NO	CUMBERLAND FARMS
435212	I	2730	O	13	057	0	0	093018	2	10	10	Y	1	A		4						0000	NO	CUMBERLAND FARMS
435213	I	2730	O	13	057	0	0	093018	2	10	10	Y	1	A		4						0000	NO	CUMBERLAND FARMS
435214	I	2730	O	13	057	0	0	093018	2	10	10	Y	1	A		4						0000	NO	CUMBERLAND FARMS
438474	I	2987	O	14	057	0	0	093018	2	15	15		0	A		2						0000	NO	TAMPA CROWN DISTRIBUTORS
438475	I	2987	O	14	057	0	0	093018	2	15	15		0	A		2						0000	NO	TAMPA CROWN DISTRIBUTORS
438476	I	2987	O	14	057	0	0	093018	2	15	15		0	A		2						0000	NO	TAMPA CROWN DISTRIBUTORS

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBER	UFS	BASIN	COUNTY	LOCATION OGO	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUTED	BAGS	METHOD	SWL TAE ATV TEE IRL C	SPACING	CHLORIDE	IRON	SULFATE	USER-ID	LOT	LITH	OWNER NAME
438477	I	2987	0	14	057	0	0	093018		2	15	15		0	A	2						0000	NO	TAMPA CROWN DISTRIBUTORS
448505	I	2730	0	14	057	0	0	093018		2														REMOTE SERVICES INC
448506	I	2730	0	14	057	0	0	093018		2														REMOTE SERVICES INC
448507	I	2730	0	14	057	0	0	093018		2														REMOTE SERVICES INC
448508	I	2730	0	14	057	0	0	093018		2														REMOTE SERVICES INC
469131	I	2730	0	14	057	0	0	093018		2	10	15	Y	1	A	0						0000	NO	RADIANT OIL CO
469132	I	2730	0	14	057	0	0	093018		2	10	15	Y	1	A	0						0000	NO	RADIANT OIL CO
469133	I	2730	0	14	057	0	0	093018		2	10	15	Y	1	A	0						0000	NO	RADIANT OIL CO
469134	I	2730	0	14	057	0	0	093018		2	10	15	Y	1	A	0						0000	NO	RADIANT OIL CO
426183	I	2923	0	14	057	0	0	093018		4	2	12		0	A	3					MW-1	0000	NO	EXXON CO USA
426184	I	2923	0	14	057	0	0	093018		4	2	12		0	A	3					MW-2	0000	NO	EXXON CO USA
426185	N	2923	0	14	057	0	0	093018		4	*** CANCELLED ***													EXXON CO USA
426186	N	2923	0	14	057	0	0	093018		4	*** CANCELLED ***													EXXON CO USA
475581	I	9037	Y	14	057	0	0	093018		4														NCNB NATIONAL BANK OF FLORIDA
351182	C	2276	A	13	057	0	0	103018		2	27	40		0	C	4					000000		NO	YOUNG, W. F.
353017	C	2276	A	13	057	0	0	103018		2	18	65		0	C	5					000000		NO	ADAMO, LOUISA
360009	C	1094	A	15	057	0	0	103018		2	60	115	Y	23	R	5					000000		NO	RICHMOND, GLEN
321164	E	0000	A	11	057	0	0	103018		4	67	120		0	C	6					000000		NO	B WIGMAN
333809	F	1094	A	13	057	0	0	103018		4	131	223		0	R	0					000000		NO	TAMPA ELECT
365597	N	1056	A	13	057	4	1	103018		4	*** CANCELLED ***													MCLAIN, JESS
385270	N	2250	A	14	057	0	0	103018		4	*** CANCELLED ***													JOE LACKEY REALTY
399040	I	2251	A	13	057	0	0	103018		4	140	225	Y	29	R	15					000000	0000	NO	JOE LACKEY REALTY
419672	N	1232	A	11	057	0	0	103018		4	*** CANCELLED ***													CHISWELL, A E
461797	I	2405	A	11	057	0	0	103018		4	43	120		0	C	7						0000	NO	GRAHAM, DOROTHY E.
478798	I	2405	A	11	057	0	0	103018		4														SUN POINT APARTMENTS
376948	C	2250	D	14	057	0	0	103018		2	29	90	Y	10	R	0					000000		NO	FOSTER, DENNIS
399730	C	2251	D	11	057	0	0	103018		2	54	72	Y	2	R	0					000000		NO	KRAMER & ASSOCIATES
322868	E	1056	D	13	057	0	0	103018		3	52	100		0	C	6					000000		NO	J ARNOLD
336298	E	1056	D	13	057	0	0	103018		3	43	106		0	C	11					000000		NO	J ESPY
304882	C	1057	D	13	057	0	0	103018		4	104	170		0	C	8					000000		NO	NEWBERN, C. D.
336960	E	1056	D	14	057	0	0	103018		4	43	80		0	C	5					000000		NO	S FERLITA
363262	N	1094	D	14	057	0	0	103018		4	*** CANCELLED ***													YATES, JOHN W.
376430	N	1598	D	14	057	0	0	103018		4	*** CANCELLED ***													YATES, JOHN
456777	I	2658	0	14	057	0	0	103018		2	10	10	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456778	I	2658	0	14	057	0	0	103018		2	10	10	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456779	I	2658	0	14	057	0	0	103018		2	10	10	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456767	I	2658	0	14	057	0	0	103018		2	10	10	Y	1	A	0						0000	NO	CIRCLE K CONVIENCE STORE
456755	N	2658	0	14	057	0	0	103018		2	*** CANCELLED ***													CIRCLE K CONVIENCE STORE
456786	N	2658	0	14	057	0	0	103018		2	*** CANCELLED ***													CIRCLE K CONVIENCE STORE

WELL CONSTRUCTION PERMITTING

PDF0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPH	WELL DEPH	GROUT	BNAGS	METHOD	SWL TAETV IRLC	SPCAP	CLORR	IONN	SULF	USER-ID	LOT	LITH	OWNER NAME
456787	N	2858	0	14	057	0	0	103018	2	*** CANCELLED ***													CIRCLE K CONVIENCE STORE
456788	N	2858	0	14	057	0	0	103018	2	*** CANCELLED ***													CIRCLE K CONVIENCE STORE
468599	I	2406	0	13	057	0	0	103018	2	11	11	Y	1	A	4						0000	NO	SIMMS OIL CO.
468600	I	2406	0	13	057	0	0	103018	2	11	11	Y	1	A	4						0000	NO	SIMMS OIL CO.
468601	I	2406	0	13	057	0	0	103018	2	11	11	Y	1	A	4						0000	NO	SIMMS OIL CO.
468602	I	2406	0	13	057	0	0	103018	2	24	24	Y	4	A	4						0000	NO	SIMMS OIL CO.
473242	I	2858	0	16	057	0	0	103018	2														ANDERSON, STEVE
473243	I	2858	0	16	057	0	0	103018	2														ANDERSON, STEVE
475787	I	9033	0	13	057	2	2	103018	2														AETNA REALTY INVESTORS
444231	I	2406	0	14	057	0	0	103018	4	3	15	Y	1	A	5						0000	NO	CITY OF TAMPA FIRE DEPT
444232	I	2406	0	14	057	0	0	103018	4	3	15	Y	1	A	5						0000	NO	CITY OF TAMPA FIRE DEPT
444233	I	2406	0	14	057	0	0	103018	4	3	15	Y	1	A	5						0000	NO	CITY OF TAMPA FIRE DEPT
444234	I	2406	0	14	057	0	0	103018	4	3	15	Y	1	A	5						0000	NO	CITY OF TAMPA FIRE DEPT
471773	I	2489	0	14	057	0	0	103018	4	2	10	Y	1	A	0						0000	NO	TEXACO REFINING
471774	I	2489	0	14	057	0	0	103018	4	2	10	Y	1	A	0						0000	NO	TEXACO REFINING
410677	C	1232	Y	11	057	0	0	103018	3	0	240	Y	19		0					000000		NO	CTW CORP
376536	C	1232	A	14	057	0	0	113018	4	145	160	Y	15	R	4		Q		L	000000		NO	WARFIELD LANDSCAPING
381021	C	1056	A	14	057	1	3	113018	4	48	96	N	0	C	5							NO	CARLTON PROPERTIES
408116	F	1369	A	13	057	0	0	113018	4	63	180	N	0	R	12					000000		NO	BRODERICK, ROGER M
429114	I	2215	A	13	057	0	0	113018	4	42	56		0	C	8						0000	NO	MUELLER, MRS.
425757	I	2525	0	13	057	0	0	113018	2	0	16	Y	2	R	0					MW-1	0000	NO	BAYSHORE 66
425758	I	2525	0	13	057	0	0	113018	2	0	16	Y	2	R	0					MW-2	0000	NO	BAYSHORE 66
425759	I	2525	0	13	057	0	0	113018	2	0	16	Y	2	R	0					MW-3	0000	NO	BAYSHORE 66
425760	I	2525	0	13	057	0	0	113018	2	0	16	Y	2	R	0					MW-4	0000	NO	BAYSHORE 66
394133	C	1272	P	11	057	0	0	113018	4	60	160	Y	0	T	6					000000		NO	M B DEVELOPMENT
302098	E	1609	D	21	115	0	0	133018	3	63	110		0	C	8	A				000000		NO	FISHER DR
461022	I	1030	D	21	115	0	0	133018	4	95	195		0	C	19						0000	NO	LANIER, JOAN H.
400280	I	2981	A	11	057	0	0	153018	4														CLUB BAYSHORE
435512	I	1369	A	11	057	0	0	153018	5	120	180	Y	17	R	4						0000	NO	BALLAST POINT PAVILLON
435511	I	1369	A	11	057	0	0	153018	5	100	160	Y	16	R	3						0000	NO	BALLAST POINT PAVILLON
368598	C	1394	D	14	057	0	0	153018	2	107	192		0	R	8					000000		NO	ROSAZO, WILFIEDO
406665	E	2525	D	13	057	0	0	153018	2	64	232	Y	7	C	0					000000		NO	DUBA, ROBERT O
329157	E	1056	D	11	057	0	0	153018	3	40	76		0	C	0					000000		NO	SEARS
334609	E	1699	D	13	057	0	0	153018	4	65	120		0	C	0					000000		NO	PINION,C
415692	I	2521	D	11	057	0	0	153018	4	32	90	N	0	C	0						0000	NO	HARDCASTLE, KEN
451184	I	2267	D	11	057	0	0	153018	4	60	90	Y	1	R	0						0000	NO	BAKER, AL
435531	I	1176	A	11	057	0	0	163018	2	52	100		0	T	0						0000	NO	MORALES, EVELIO
312337	E	0000	A	14	057	0	0	163018	3	42	50		0	C	5					000000		NO	E L MATTHEW
479369	I	2805	A	11	057	0	0	163018	4														RECYCLYED WOOD PRODUCTS

WELL CONSTRUCTION PERMITTING

RUB0355 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBER	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUTED	BGS	METHOD	SWL TAE ATV TEE IRL C	SPACE	CHLORIDE	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
328463	F	0000	A	14	057	0	0	163018		6	59	135		0	C	15					000000		NO	JENKINS
312148	F	0000	D	14	057	0	0	163018		3	42	102		0	C	6					000000		NO	H K SHURLEY
330457	E	1656	D	14	057	0	0	163018		3	40	62		0	C	7					000000		NO	E LOPEZ
408232	C	2461	D	14	057	0	0	163018		4	52	80		0	C	10					000000		NO	NORTHRUP, JEWELL
445516	I	2405	D	14	057	0	0	163018		4	44	52		0	C	10						0000	NO	CONDA CONSTRUCTION
378214	C	2250	L	14	057	0	0	163018		2	48	85	Y	10	R	7					000000		NO	CARLSON, DUANE
411483	N	2149	O	14	057	0	0	163018		2	*** CANCELLED ***													FLA ROCK AND TANK LINES
482158	I	2250	O	11	057	0	0	163018		2														MORETRENCH AMERICAN
482159	I	2250	O	11	057	0	0	163018		2														MORETRENCH AMERICAN
482160	I	2250	O	11	057	0	0	163018		2														MORETRENCH AMERICAN
482161	I	2250	O	11	057	0	0	163018		2														MORETRENCH AMERICAN
482162	I	2250	O	11	057	0	0	163018		2														MORETRENCH AMERICAN
482163	I	2250	O	11	057	0	0	163018		2														MORETRENCH AMERICAN
482164	I	2250	O	11	057	0	0	163018		2														MORETRENCH AMERICAN
482165	I	2250	O	11	057	0	0	163018		2														MORETRENCH AMERICAN
320078	F	0000	A	14	057	0	0	173018		3	62	80		0	R	7					000000		NO	W HENDERSON
320113	E	0000	A	14	057	0	0	173018		3	21	60		0	C	4					000000		NO	J T DWYER
414697	I	1232	A	14	057	0	0	173018		4	50	160		0	T	8						0000	NO	PARAGON GROUP
470910	I	2805	A	13	057	0	0	173018		4	52	140	Y	13	R	4						0000	NO	PARAGON GROUP
348768	C	1094	D	11	057	0	0	173018		2	109	182		0	R	11					000000		NO	FITZGERALD, GENE M.
355740	C	0000	D	11	057	0	0	173018		2	132	132		0	C	0					000000		NO	EYDMANN, DAVID
309845	E	0000	D	13	057	0	0	173018		3	52	66		0	C	15					000000		NO	R RILEY
385049	C	1945	O	14	057	0	0	173018		2	9	11	N	0	R	0					000000		NO	WENCZELL TILE COMPANY
385050	C	1945	O	14	057	0	0	173018		2	9	9	N	0	R	0					000000		NO	WENCZELL TILE COMPANY
385051	C	1945	O	14	057	0	0	173018		2	2	7	N	0	R	0					000000		NO	WENCZELL TILE COMPANY
385052	C	1945	O	14	057	0	0	173018		2	1	8	N	0	R	0					000000		NO	WENCZELL TILE COMPANY
385053	C	1945	O	14	057	0	0	173018		2	12	12	N	0	R	0					000000		NO	WENCZELL TILE COMPANY
385054	C	1945	O	14	057	0	0	173018		2	8	6	N	0	R	0					000000		NO	WENCZELL TILE COMPANY
385055	C	1945	O	14	057	0	0	173018		2	2	46	N	0	R	0					000000		NO	WENCZELL TILE COMPANY
385056	N	1945	O	14	057	0	0	173018		2	*** CANCELLED ***													WENCZELL TILE COMPANY
385057	N	1945	O	14	057	0	0	173018		2	*** CANCELLED ***													WENCZELL TILE COMPANY
385058	N	1945	O	14	057	0	0	173018		2	*** CANCELLED ***													WENCZELL TILE COMPANY
385059	N	1945	O	14	057	0	0	173018		2	*** CANCELLED ***													WENCZELL TILE COMPANY
405562	E	2607	O	11	057	0	0	173018		2	9	10	Y	1	R	4					MW-1		NO	WENZEL TILE
405563	E	2607	O	11	057	0	0	173018		2	9	10	Y	1	R	4					MW-2		NO	WENZEL TILE
405564	E	2607	O	11	057	0	0	173018		2	12	14	Y	2	R	5					MW-3		NO	WENZEL TILE
405565	E	2607	O	11	057	0	0	173018		2	8	8	Y	1	R	4					MW-4		NO	WENZEL TILE
405566	E	2607	O	11	057	0	0	173018		2	6	6	Y	1	R	3					MW-5		NO	WENZEL TILE
405567	E	2607	O	11	057	0	0	173018		2	11	12	Y	2	R	5					MW-7		NO	WENZEL TILE

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

CY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	BAS GE	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GRO UT	NAME BGRS	METHOD	SWL TAE ATV TEE IRL C	CAPA	PROH	CLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
422674	N	2858	0	14 057	2	3	173018	2	*** CANCELLED ***															CIRCLE K CONVIENCE STORE
422675	N	2858	0	14 057	2	3	173018	2	*** CANCELLED ***															CIRCLE K CONVIENCE STORE
422676	N	2858	0	14 057	2	3	173018	2	*** CANCELLED ***															CIRCLE K CONVIENCE STORE
422677	N	2858	0	14 057	2	3	173018	2	*** CANCELLED ***															CIRCLE K CONVIENCE STORE
422678	I	2858	0	14 057	2	4	173018	2	11	11	Y	1	A		G						MW-1	0000	NO	CIRCLE K CONVIENCE STORE
422679	I	2858	0	14 057	2	4	173018	2	11	11	Y	1	A		0						MW-2	0000	NO	CIRCLE K CONVIENCE STORE
422680	I	2858	0	14 057	2	4	173018	2	11	11	Y	1	A		0						MW-3	0000	NO	CIRCLE K CONVIENCE STORE
422681	I	2858	0	14 057	2	4	173018	2	11	11	Y	1	A		0						MW-4	0000	NO	CIRCLE K CONVIENCE STORE
433075	I	2489	0	14 057	1	4	173018	2	8	18	Y	3	A		7							0000	NO	WENZEL TILE
433076	I	2489	0	14 057	1	4	173018	2	8	18	Y	3	A		7						MW-2	0000	NO	WENZEL TILE
433077	I	2489	0	14 057	1	4	173018	2	8	18	Y	3	A		7						MW-3	0000	NO	WENZEL TILE
433078	I	2489	0	14 057	1	4	173018	2	8	18	Y	3	A		7						MW-4	0000	NO	WENZEL TILE
433079	I	2489	0	14 057	1	4	173018	2	5	15	Y	2	A		5						MW-1	0000	NO	WENZEL TILE
433080	I	2489	0	14 057	1	4	173018	2	5	15	Y	2	A		5						MW-2	0000	NO	WENZEL TILE
433081	I	2489	0	14 057	1	4	173018	2	5	15	Y	2	A		5						MW-3	0000	NO	WENZEL TILE
433082	I	2489	0	14 057	1	4	173018	2	5	15	Y	2	A		5						MW-4	0000	NO	WENZEL TILE
433083	I	2489	0	14 057	1	4	173018	2	5	15	Y	2	A		5						MW-6	0000	NO	WENZEL TILE
433084	I	2489	0	14 057	1	4	173018	2	3	8	Y	1	A		4						MW-6	0000	NO	WENZEL TILE
433085	I	2489	0	14 057	1	4	173018	2	3	8	Y	1	A		4						MW-7	0000	NO	WENZEL TILE
433086	I	2489	0	14 057	1	4	173018	2	3	8	Y	1	A		4						MW-8	0000	NO	WENZEL TILE
433087	I	2489	0	14 057	1	4	173018	2	3	8	Y	1	A		4						MW-9	0000	NO	WENZEL TILE
433088	I	2489	0	14 057	1	4	173018	2	3	9	Y	1	A		4						MW-10	0000	NO	WENZEL TILE
477217	I	2406	0	14 057	0	0	173018	2																TAMPA SHIPYARD
477218	I	2406	0	14 057	0	0	173018	2																TAMPA SHIPYARD
477219	I	2406	0	14 057	0	0	173018	2																TAMPA SHIPYARD
477220	I	2406	0	14 057	0	0	173018	2																TAMPA SHIPYARD
477221	I	2406	0	14 057	0	0	173018	2																TAMPA SHIPYARD
365048	C	1945	0	14 057	0	0	173018	4	46	46	N	0	R		0						000000		NO	WENCZELL TILE COMPANY
308271	E	0000	A	14 057	0	0	183018	3	3	47		0	C		8						000000		NO	H JONES
332895	C	1283	A	16 103	0	0	183018	4	31	70		0	C		10						000000		NO	T BERGER
418898	I	2730	0	11 057	0	0	193018	2	2	10	N	0	A		5						MW-1	0000	NO	RADIANT OIL CO
418899	I	2730	0	11 057	0	0	193018	2	2	10	N	0	A		5						MW-2	0000	NO	RADIANT OIL CO
418900	I	2730	0	11 057	0	0	193018	2	2	10	N	0	A		5						MW-3	0000	NO	RADIANT OIL CO
418901	I	2730	0	11 057	0	0	193018	2	2	10	N	0	A		5						MW-4	0000	NO	RADIANT OIL CO
390768	C	2372	0	14 057	0	1	193018	4	8	11	Y	1	A		2						000000		NO	CHEVRON OIL COMPANY
393792	C	2372	0	13 057	0	1	193018	4	2	11	Y	1	A		2						000000		NO	CHEVRON OIL COMPANY
393793	C	2372	0	13 057	0	1	193018	4	2	11	Y	1	A		2						000000		NO	CHEVRON OIL COMPANY
393794	C	2372	0	13 057	0	1	193018	4	2	11	Y	1	A		1						000000		NO	CHEVRON OIL COMPANY
393795	C	2372	0	13 057	0	1	193018	4	2	11	Y	1	A		2						000000		NO	CHEVRON OIL COMPANY

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 P:13 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICK NUMBER	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUT	NAGBS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLORE	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
393796	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	19				000000		NO	CHEVRON OIL COMPANY
393797	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	20				000000		NO	CHEVRON OIL COMPANY
393798	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	20				000000		NO	CHEVRON OIL COMPANY
393799	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	21				000000		NO	CHEVRON OIL COMPANY
393800	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	2				000000		NO	CHEVRON OIL COMPANY
393801	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	20				000000		NO	CHEVRON OIL COMPANY
393802	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	20				000000		NO	CHEVRON OIL COMPANY
393803	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	20				000000		NO	CHEVRON OIL COMPANY
393804	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	19				000000		NO	CHEVRON OIL COMPANY
393805	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	19				000000		NO	CHEVRON OIL COMPANY
393806	C	2372	0	13	057	0	1	19	30	18	4	10	11	Y	1	A	20				000000		NO	CHEVRON OIL COMPANY
409697	C	0000	0	14	057	0	0	19	30	18	4	1	11	Y	1	A	0				MW-1		NO	UNION OIL CO
409698	C	0000	0	14	057	0	0	19	30	18	4	1	11	Y	1	A	0				MW-2		NO	UNION OIL CO
409699	C	0000	0	14	057	0	0	19	30	18	4	1	11	Y	1	A	0				MW-3		NO	UNION OIL CO
409700	C	0000	0	14	057	0	0	19	30	18	4	1	11	Y	1	A	0				MW-4		NO	UNION OIL CO
420354	I	1232	0	14	057	0	0	19	30	18	4	3	15	Y	7	A	3				MW-1	0000	NO	SHELL OIL CO
420355	I	1232	0	14	057	0	0	19	30	18	4	3	17	Y	6	A	1				MW-2	0000	NO	SHELL OIL CO
420356	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-3	0000	NO	SHELL OIL CO
420357	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-4	0000	NO	SHELL OIL CO
420358	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-5	0000	NO	SHELL OIL CO
420359	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-6	0000	NO	SHELL OIL CO
420360	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-7	0000	NO	SHELL OIL CO
420361	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-8	0000	NO	SHELL OIL CO
420362	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-9	0000	NO	SHELL OIL CO
420363	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-10	0000	NO	SHELL OIL CO
420364	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-11	0000	NO	SHELL OIL CO
420365	I	1232	0	14	057	0	0	19	30	18	4	3	11		0	A	0				MW-12	0000	NO	SHELL OIL CO
420366	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-13	0000	NO	SHELL OIL CO
420367	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-14	0000	NO	SHELL OIL CO
420368	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-15	0000	NO	SHELL OIL CO
420369	I	1232	0	14	057	0	0	19	30	18	4	3	11	Y	1	A	0				MW-16	0000	NO	SHELL OIL CO
472732	I	2406	0	14	057	0	0	19	30	18	4	2	12	Y	1	A	3					0000	NO	CHEVRON USA INC.
472733	I	2406	0	14	057	0	0	19	30	18	4	2	12	Y	1	A	3					0000	NO	CHEVRON USA INC.
472734	I	2406	0	14	057	0	0	19	30	18	4	2	12	Y	1	A	3					0000	NO	CHEVRON USA INC.
472735	I	2406	0	14	057	0	0	19	30	18	4	2	12	Y	1	A	3					0000	NO	CHEVRON USA INC.
472736	I	2406	0	14	057	0	0	19	30	18	4	2	12	Y	1	A	3					0000	NO	CHEVRON USA INC.
472737	I	2406	0	14	057	0	0	19	30	18	4	2	12	Y	1	A	3					0000	NO	CHEVRON USA INC.
472738	N	2406	0	14	057	0	0	19	30	18	4	*** CANCELLED ***												CHEVRON USA INC.
472739	N	2406	0	14	057	0	0	19	30	18	4	*** CANCELLED ***												CHEVRON USA INC.

WELL CONSTRUCTION PERMITTING

RDP0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBER	USE	BASIN	COUNTY	LOCATION QQO	S	T	R	DIA	CASE DEPH	WELL DEPH	GRO UT	BGS	METHOD	SWL TAE ATV TEE IPL C	CHLORIDE	IRON	SULF	USER-ID	LOT	LIH	OWNER NAME
472740	N	2406	0	14	057	0	0	193018		4	*** CANCELLED ***												CHEVRON USA INC.
472741	N	2406	0	14	057	0	0	193018		4	*** CANCELLED ***												CHEVRON USA INC.
473774	N	2406	0	11	057	0	0	193018		4	*** CANCELLED ***												CHEVRON USA, INC.
473775	N	2406	0	11	057	0	0	193018		4	*** CANCELLED ***												CHEVRON USA, INC.
473776	N	2406	0	11	057	0	0	193018		4	*** CANCELLED ***												CHEVRON USA, INC.
402816	C	1232	A	16	057	0	0	203018		4	40	84	N	0	T	9				000000		NO	SMITH, BILL MR
480715	I	2825	A	14	057	0	0	203018		4													STARKS MATTHEW
331629	F	1232	D	14	057	0	0	203018		3	35	110		0	R	7				000000		NO	M RAY
431160	I	1232	0	13	057	0	0	203018		2	10	20	Y	4	A	4					0000	NO	CHEROKEE OIL COMPANY
470586	I	9039	0	14	057	0	0	203018		2	10	10	Y	2	R	4					0000	NO	BELCHER OIL COMPANY
470587	I	9039	0	14	057	0	0	203018		2	10	10	Y	2	R	3					0000	NO	BELCHER OIL COMPANY
470588	I	9039	0	14	057	0	0	203018		2	10	10	Y	2	R	2					0000	NO	BELCHER OIL COMPANY
470589	I	9039	0	14	057	0	0	203018		2	10	10	Y	2	R	2					0000	NO	BELCHER OIL COMPANY
470590	I	9039	0	14	057	0	0	203018		2	10	10	Y	2	R	2					0000	NO	BELCHER OIL COMPANY
470591	I	9039	0	14	057	0	0	203018		2	10	10	Y	2	R	2					0000	NO	BELCHER OIL COMPANY
470592	I	9039	0	14	057	0	0	203018		2	10	10	Y	2	R	2					0000	NO	BELCHER OIL COMPANY
470593	N	9039	0	14	057	0	0	203018		2	*** CANCELLED ***												BELCHER OIL COMPANY
475584	I	2825	0	14	057	0	0	203018		2													CITY OF TAMPA
475585	I	2825	0	14	057	0	0	203018		2													CITY OF TAMPA
475586	I	2825	0	14	057	0	0	203018		2													CITY OF TAMPA
482350	I	9023	0	14	057	0	0	203018		2													MACDILL AIR FORCE BASE
482351	I	9023	0	14	057	0	0	203018		2													MACDILL AIR FORCE BASE
482354	I	9023	0	14	057	0	0	203018		2													MACDILL AIR FORCE BASE
482355	I	9023	0	14	057	0	0	203018		2													MACDILL AIR FORCE BASE
482356	I	9023	0	14	057	0	0	203018		2													MACDILL AIR FORCE BASE
482357	I	9023	0	14	057	0	0	203018		2													MACDILL AIR FORCE BASE
482358	I	9023	0	14	057	0	0	203018		2													MACDILL AIR FORCE BASE
483604	I	9023	0	14	057	0	0	203018		2													MACDILL AIR FORCE BASE
397924	C	2251	Y	11	057	0	0	203018		6	0	0	Y	83	R	0				000000		NO	TAMPA, CITY OF
385375	C	2372	0	11	057	0	0	213018		2	5	20	Y	1	T	2				000000		NO	UNITED STATES AIR FORCE BASE
385377	C	2372	0	11	057	0	0	213018		2	10	21	Y	1	T	3				000000		NO	UNITED STATES AIR FORCE BASE
420601	I	1232	0	14	057	0	0	213018		2	7	22	Y	3	A	0				MW-1	0000	NO	ENGINEERING SCIENCE
420605	I	1232	0	11	057	0	0	213018		2	7	22	Y	1	A	0				MW-1	0000	NO	ENGINEERING SCIENCE
420606	I	1232	0	11	057	0	0	213018		2	5	15		0	A	0				MW-2	0000	NO	ENGINEERING SCIENCE
420607	I	1232	0	11	057	0	0	213018		2	4	21		0	A	0				MW-3	0000	NO	ENGINEERING SCIENCE
420608	I	1232	0	11	057	0	0	213018		2	4	14		0	A	0				MW-4	0000	NO	ENGINEERING SCIENCE
420609	I	1232	0	11	057	0	0	213018		2	4	20		0	A	0				MW-5	0000	NO	ENGINEERING SCIENCE
420610	I	1232	0	11	057	0	0	213018		2	7	15	Y	1	A	0				MW-6	0000	NO	ENGINEERING SCIENCE
420611	I	1232	0	11	057	0	0	213018		2	4	14		0	A	0				MW-7	0000	NO	ENGINEERING SCIENCE

WELL CONSTRUCTION PERMITTING

RDB0355 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	INACTIVE	CASE DEPH	WELL DEPH	GROUT	BGRS	METHOD	SWL TAE ATV TEE IPL C	CHLORAPR	CHLORDN	SULF	USER-ID	LOT	LITH	OWNER NAME
420612	I	1232	0	11	057	0	0	213018		2	4	14		0	A	0				MW-8	0000	NO	ENGINEERING SCIENCE
420622	I	1232	0	14	057	0	0	213018		2	53	63	Y	10	R	0				MW-1	0000	NO	ENGINEERING SCIENCE
420623	I	1232	0	14	057	0	0	213018		2	42	57	Y	7	R	0				MW-2	0000	NO	ENGINEERING SCIENCE
420624	I	1232	0	14	057	0	0	213018		2	70	90	Y	18	R	0				MW-3	0000	NO	ENGINEERING SCIENCE
436390	I	1232	0	13	057	0	0	213018		2	2	10	Y	1	A	4					0000	NO	U.S GOVERNMENT
436391	I	1232	0	13	057	0	0	213018		2	3	18	Y	1	A	3					0000	NO	U.S GOVERNMENT
429834	N	2923	0	14	057	0	0	213018		4	*** CANCELLED ***												SOUTHLAND CORP
429835	N	2923	0	14	057	0	0	213018		4	*** CANCELLED ***												SOUTHLAND CORP
429836	N	2923	0	14	057	0	0	213018		4	*** CANCELLED ***												SOUTHLAND CORP
429837	N	2923	0	14	057	0	0	213018		4	*** CANCELLED ***												SOUTHLAND CORP
439458	I	2525	A	11	057	0	0	223018		4	58	120	Y	27	R	0					0000	NO	SHAVER CONSTRUCTION CO.
396224	C	1056	D	13	057	0	0	223018		3	30	160	N	0	R	10				000000		NO	WARE JR, EARL H
385378	C	2372	0	11	057	0	0	223018		2	0	11	Y	1	T	4				000000		NO	UNITED STATES AIR FORCE BASE
385379	C	2372	0	11	057	0	0	223018		2	0	11	Y	1	T	4				000000		NO	UNITED STATES AIR FORCE BASE
385380	C	2372	0	11	057	0	0	223018		2	0	11	Y	1	T	4				000000		NO	UNITED STATES AIR FORCE BASE
385381	C	2372	0	11	057	0	0	223018		2	0	11	Y	1	T	4				000000		NO	UNITED STATES AIR FORCE BASE
420602	I	1232	0	11	057	0	0	223018		2	7	20	Y	2	A	0				MW-1	0000	NO	ENGINEERING SCIENCE
420603	I	1232	0	11	057	0	0	223018		2	5	20		0	A	0				MW-2	0000	NO	ENGINEERING SCIENCE
420604	I	1232	0	11	057	0	0	223018		2	7	27	Y	1	A	0				MW-3	0000	NO	ENGINEERING SCIENCE
467319	I	2489	0	14	057	0	0	223018		2	18	21	Y	2	A	0					0000	NO	MACDILL AIR FORCE BASE
467320	I	2489	0	14	057	0	0	223018		2	16	16	Y	2	A	0					0000	NO	MACDILL AIR FORCE BASE
467321	I	2489	0	14	057	0	0	223018		2	17	17	Y	1	A	0					0000	NO	MACDILL AIR FORCE BASE
467322	I	2489	0	14	057	0	0	223018		2	15	15	Y	1	A	0					0000	NO	MACDILL AIR FORCE BASE
467323	I	2489	0	14	057	0	0	223018		2													MACDILL AIR FORCE BASE
467324	I	2489	0	14	057	0	0	223018		2													MACDILL AIR FORCE BASE
467325	I	2489	0	14	057	0	0	223018		2													MACDILL AIR FORCE BASE
467326	I	2489	0	14	057	0	0	223018		2													MACDILL AIR FORCE BASE
467327	I	2489	0	14	057	0	0	223018		2													MACDILL AIR FORCE BASE
467328	I	2489	0	14	057	0	0	223018		2													MACDILL AIR FORCE BASE
470630	I	2489	0	13	057	0	0	223018		2	5	15	Y	1	A	4					0000	NO	MACDILL AIR FORCE BASE
470631	I	2489	0	13	057	0	0	223018		2	3	13	Y	1	A	4					0000	NO	MACDILL AIR FORCE BASE
470632	I	2489	0	13	057	0	0	223018		2	5	15	Y	1	A	4					0000	NO	MACDILL AIR FORCE BASE
470633	I	2489	0	13	057	0	0	223018		2													MACDILL AIR FORCE BASE
470634	I	2489	0	13	057	0	0	223018		2													MACDILL AIR FORCE BASE
470635	I	2489	0	13	057	0	0	223018		2													MACDILL AIR FORCE BASE
470636	I	2489	0	13	057	0	0	223018		2													MACDILL AIR FORCE BASE
470637	I	2489	0	13	057	0	0	223018		2													MACDILL AIR FORCE BASE
470638	I	2489	0	13	057	0	0	223018		2													MACDILL AIR FORCE BASE
470639	I	2489	0	13	057	0	0	223018		2													MACDILL AIR FORCE BASE

WELL CONSTRUCTION PERMITTING

RDR0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBER	USE	PAS IN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPTH	WELL DEPTH	GROUT	BRANGS	METHOD	SWL TAETATVEIBLC	SPACAP	CHLORPR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
470648	I	2489	0	13	057	0	0	223018		2	10	20	Y	1	A	4						0000	NO	MACDILL AIR FORCE BASE
470649	I	2489	0	13	057	0	0	223018		2	14	24	Y	1	A	9						0000	NO	MACDILL AIR FORCE BASE
470650	I	2489	0	13	057	0	0	223018		2	14	24	Y	1	A	10						0000	NO	MACDILL AIR FORCE BASE
470651	I	2489	0	13	057	0	0	223018		2	14	24	Y	1	A	5						0000	NO	MACDILL AIR FORCE BASE
470652	I	2489	0	13	057	0	0	223018		2														MACDILL AIR FORCE BASE
470653	I	2489	0	13	057	0	0	223018		2	10	20	Y	1	A	6						0000	NO	MACDILL AIR FORCE BASE
470654	I	2489	0	13	057	0	0	223018		2	8	18	Y	1	A	10						0000	NO	MACDILL AIR FORCE BASE
470655	I	2489	0	13	057	0	0	223018		2	6	16	Y	1	A	4						0000	NO	MACDILL AIR FORCE BASE
470656	I	2489	0	13	057	0	0	223018		2	9	19	Y	1	A	8						0000	NO	MACDILL AIR FORCE BASE
470657	I	2489	0	13	057	0	0	223018		2	9	19	Y	1	A	6						0000	NO	MACDILL AIR FORCE BASE
470658	I	2489	0	13	057	0	0	223018		2	13	23	Y	2	A	0						0000	NO	MACDILL AIR FORCE BASE
470659	I	2489	0	13	057	0	0	223018		2	10	20	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470660	I	2489	0	13	057	0	0	223018		2	10	20	Y	2	A	4						0000	NO	MACDILL AIR FORCE BASE
470661	I	2489	0	13	057	0	0	223018		2	10	20	Y	1	A	5						0000	NO	MACDILL AIR FORCE BASE
470662	I	2489	0	13	057	0	0	223018		2	10	20	Y	1	A	5						0000	NO	MACDILL AIR FORCE BASE
470663	I	2489	0	13	057	0	0	223018		2	10	20	Y	1	A	5						0000	NO	MACDILL AIR FORCE BASE
470664	I	2489	0	13	057	0	0	223018		2	6	16	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470665	I	2489	0	13	057	0	0	223018		2	9	19	Y	1	A	3						0000	NO	MACDILL AIR FORCE BASE
470666	I	2489	0	13	057	0	0	223018		2	10	20	Y	2	A	4						0000	NO	MACDILL AIR FORCE BASE
470667	I	2489	0	13	057	0	0	223018		2														MACDILL AIR FORCE BASE
470668	I	2489	0	13	057	0	0	223018		2														MACDILL AIR FORCE BASE
470669	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470670	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470671	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470672	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470673	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470674	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470675	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	4						0000	NO	MACDILL AIR FORCE BASE
470676	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	4						0000	NO	MACDILL AIR FORCE BASE
470677	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470678	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470679	I	2489	0	13	057	0	0	223018		2	8	28	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470680	I	2489	0	13	057	0	0	223018		2	18	28	Y	2	A	0						0000	NO	MACDILL AIR FORCE BASE
470681	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470682	I	2489	0	13	057	0	0	223018		2	4	14	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470707	I	2489	0	13	057	0	0	223018		2	5	10	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470708	I	2489	0	13	057	0	0	223018		2	5	15	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470709	I	2489	0	13	057	0	0	223018		2	5	15	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE
470710	I	2489	0	13	057	0	0	223018		2	5	10	Y	1	A	0						0000	NO	MACDILL AIR FORCE BASE

WELL CONSTRUCTION PERMITTING

RDR0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:30 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S	T	R	DIA	CASE DEPH	WELL DEPH	GROUT	BGRS	METHOD	SWL TAETATV IRLC	SPACP	CHLORPR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
470711	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470712	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470713	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470714	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470715	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470716	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470717	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470718	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470719	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470720	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470721	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470722	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470723	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470726	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470727	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470733	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470734	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470735	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470736	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470737	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470738	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470746	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470747	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470748	I	2489	0	13	057	0	0	22	30	18	2													MACDILL AIR FORCE BASE
470904	I	7039	0	14	057	0	0	22	30	18	2	0	8		0	A	5					0000	NO	MACDILL AIR FORCE BASE
470905	I	7039	0	14	057	0	0	22	30	18	2	0	8		0	A	5					0000	NO	MACDILL AIR FORCE BASE
470906	I	7039	0	14	057	0	0	22	30	18	2	8	8		0	A	5					0000	NO	MACDILL AIR FORCE BASE
470907	I	7039	0	14	057	0	0	22	30	18	2	8	8		0	A	5					0000	NO	MACDILL AIR FORCE BASE
470908	I	7039	0	14	057	0	0	22	30	18	2	8	8		0	A	5					0000	NO	MACDILL AIR FORCE BASE
470909	I	7039	0	14	057	0	0	22	30	18	2	0	8		0	A	3					0000	NO	MACDILL AIR FORCE BASE
467316	I	2489	0	14	057	0	0	22	30	18	4	50	50	Y	5	A	0					0000	NO	MACDILL AIR FORCE BASE
467317	I	2489	0	14	057	0	0	22	30	18	4	60	60	Y	9	A	0					0000	NO	MACDILL AIR FORCE BASE
467318	I	2489	0	14	057	0	0	22	30	18	4													MACDILL AIR FORCE BASE
470640	I	2489	0	13	057	0	0	22	30	18	4	27	37	Y	5	R	0					0000	NO	MACDILL AIR FORCE BASE
470641	I	2489	0	13	057	0	0	22	30	18	4	36	46	Y	5	R	0					0000	NO	MACDILL AIR FORCE BASE
470644	I	2489	0	13	057	0	0	22	30	18	4													MACDILL AIR FORCE BASE
470646	I	2489	0	13	057	0	0	22	30	18	4													MACDILL AIR FORCE BASE
470647	I	2489	0	13	057	0	0	22	30	18	4													MACDILL AIR FORCE BASE
470724	I	2489	0	13	057	0	0	22	30	18	4													MACDILL AIR FORCE BASE

Roto-Rooter (Tampa)

```
PWS014 275310 822125 03 _      DRINKING WATER PROGRAM                          01/11/90
                          LATITUDE/LONGITUDE RANGE LOOK UP                     17:12:50

 TYPE DISPLAYED: PLANT, SOURCE AND WELL
 LATITUDE LONGITUDE  PWS-ID PLT SRC WELL MAILING NAME                          ST/TP/PR

 27:55:00 82:32:40  6294857  01 001       JOHN'S ROAD PROPERTIES                A  O  D
 27:55:00 82:32:40  6294857  01           JOHN'S ROAD PROPERTIES                A  O  D
 27:55:10 82:30:10  6295297  01 001 0001 MONTGOMERY ELEVATOR                    A  O  H
 27:55:10 82:30:10  6295297  01 001       MONTGOMERY ELEVATOR                   A  O  H
 27:55:10 82:30:10  6295297  01           MONTGOMERY ELEVATOR                   A  O  H
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 MORE DATA ON FILE? NO                    SCREEN ACTION _
PWS002 6294857              DRINKING WATER PROGRAM                             01/11/90
                       SYSTEM INVENTORY INFORMATION PART 2                      17:13:51
                                                                  LAST UPDATED: 03/06/89
MAILING NAME: JOHN'S ROAD PROPERTIES                    ACTIVE       OTHER PUBLIC

 RET POP SERVED: _______25                  BACT SAMPLES REQ'D: __1
     DESIGN CAP: _____________ (GPD)        RADS SAMPLES REQ'D: ___
    MAXIMUM DAY: _____________ (GPD)        RADS SAMPLES FREQY: ____  (MONTHS)
   % DESIGN CAP:                            TTHM SAMPLES REQ'D: ___
 AVG PRODUCTION:          1,000 (GPD)       TTHM SAMPLES FREQY: _____ (MONTHS)
   MAXIMUM/HOUR: _____________ (G)         SERVICE CONNECTIONS: ________1
TOT STORAGE CAP: __________100 (G)              NUMBER METERED: _________
      METER CAP: ____________________           TYPE OF METER: ____________________
                                              CONSEC INDIC: 0 = NOT CONSECUTIVE
SERVICE AREA CHARACTERISTICS:

  PRIMARY: RO = RETAIL/GENERAL MERCH          TOTAL # OF PLANTS:      1
SECONDARY: __ = ........................     TOTAL # OF SOURCES:      1

    PRIMARY PLANT:   1  LATITUDE: 27:55:00   LONGITUDE: 82:32:40
   PRIMARY SOURCE:   1  LATITUDE: 27:55:00   LONGITUDE: 82:32:40

                                  SCREEN ACTION _
PWS002 6295297              DRINKING WATER PROGRAM                             01/11/90
                       SYSTEM INVENTORY INFORMATION PART 2                      17:14:25
                                                                  LAST UPDATED: 09/23/88
MAILING NAME: MONTGOMERY ELEVATOR                       ACTIVE       OTHER PUBLIC

   1 [illegible]                                BACT SAMPLES REQ'D: __1
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```
[illegible]                    (G/D)    [illegible]: _____ [illegible]
  MAXIMUM/HOUR: _____________ (G)     SERVICE CONNECTIONS: ________1
TOT STORAGE CAP: __________1[illegible] (G)          NUMBER METERED: _________
      METER CAP: ____________________          TYPE OF METER: ____________________
                                             CONSEC INDIC: 0 = NOT CONSECUTIVE
SERVICE AREA CHARACTERISTICS:

  PRIMARY: IN = INDUSTRIAL                      TOTAL # OF PLANTS:      1
SECONDARY: OF = OFFICE FOR BUSINESS             TOTAL # OF SOURCES:     1

    PRIMARY PLANT:    1  LATITUDE: 27:55:10   LONGITUDE: 82:30:10
   PRIMARY SOURCE:    1  LATITUDE: 27:55:10   LONGITUDE: 82:30:10

                                  SCREEN ACTION  _
```

NEW
SEPTEMBER '89
ISSUE

Tampa

Including incorporated areas of

Oldsmar/Temple Terrace and Nearby Communities

(consult the Local Calling and Service Pages of this Directory)

White Pages

GTE

The Everything Pages®

IMPORTANT
Please DO NOT use this directory until Saturday, September 9, 1989. Many numbers will be changed at this time.

GTE Florida

SEPTEMBER 9, 1989 AREA CODE 813

Monts De Oca Wm G 208 W Thomas ... 238-5135
Monts Doris 2114 29th Av E ... 248-9645
Monts F D 9810 Joe Ebert Rd ... 986-1240
Monts Gary L 5611 Golden Dr ... 886-9580
Monts M A 2903 28th Av E ... 248-5742
Monts Sylvia M 4907 Tempie Heights Rd ... 985-3805
Monts de Oca Clint H 204 N Woodbine Av ... 985-1790
Monts De Oca Dewey R 706 137th Av ... 971-4209
Monts de Oca Dolly R Mrs
215 Grand Central Av ... 251-8465
Monts De Oca J B 4518 Azeele ... 286-1544
MontsDeOca M 1602 River Dr ... 237-8292
MontsDeOca Michael
526 Golden Raintree Pl ... 684-2670
MontsDeOca Monti L 8717 48th St N ... 989-3218
Monty T S 1 Quail Ridge Ln ... 973-0736
Monty Vince 10910 Sarah Park Dr ... 980-2811
Montz George J 416 Belle View Av ... 988-6688
Monville John D & Dorothy 752 Secord Dr ... 840-2353
Monville Mike & Ann 420 Pinebark Ln ... 973-2163

MONY FINANCIAL SERVICES
3030 North Rocky Point Rd W ... 886-9836

Monzillo John 13326 Thomasville Cir ... 985-7506
Mood John B 1844 Wolf Laurel Dr ... 634-7893
Moodie Duncan M 3912 Butternut Ct ... 654-3604
Moodie Sam 3907 Bird E ... 989-1439
Moodie Scott A 2610 111th Av E ... 971-0160
Moody A E 10124 Hyacinth Av ... 977-8239
Moody Albert E Gbstn ... 677-1477
Moody Albert H 7514 Carolton Cir ... 621-3762
Moody Alford H 9330 Dartmouth Av ... 935-5469
Moody Allan F 3913 Wyoming Av ... 831-0236
Moody Ashby M 5700 Marner ... 287-8887

MOODY AND ASSOCIATES INSURANCE AGENCY
27435 County Rd 54 ... 973-0441

Moody B H Sr 127 Morrow Cir ... 685-1754
Moody Belton F 604 Bridges Lp ... 840-2436
Moody Beryl 4219 Miller Av ... 985-6906
Moody Bill & Joyce 6921 16th St N ... 237-0781
Moody C A 11619 50th St N ... 980-3769
Moody C Michael 212 Coolidge Av S ... 286-0408
Moody C O 806 S Parsons Av ... 685-7906
Moody Carolyn C 11684 Monette Rd ... 677-5497
Moody Chris & Janice 1437 Dumont Dr ... 689-0251
Moody Chris C Rev 215 Palm Av E ... 229-0789
Moody Curtis L 5312 Plum Av ... 689-4550
Moody D E 2009 Delce Av ... 251-5635
Moody D H ... 685-8771
Moody D L 5312 Plum Av Seffner ... 689-7920
Moody D T & M 11311 Grandville ... 989-3836
Moody Dean 3520 MacDill Av S ... 837-6043
Moody Dennis 12524 Bronco Dr ... 854-2533
Moody Derril P 6604 113th Av E ... 985-4824
Moody Donald E Sr 5233 Lime Av ... 689-8249
Moody E M 3401 Marin Av ... 839-7053
Moody F N ... 839-7447
Moody Faye 711 Russell Ln ... 684-6026
Moody Geoffrey 2026 Sheffield Ct ... 855-9398
Moody George P 18109 1st Av ... 949-7935
Moody Gordon D Sr 1404 W Arctic ... 933-6769
Moody Group Inc The 4601 Kennedy Blvd W ... 875-8750
Moody Henry 3013 24th St SE ... 645-2674
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Exotique Boutique 9318 Floriland Mall 935-9179
EXPEDITE TRANSPORT SERVICES 654-7777
Expedite Transport Services 684-7131
Expedite Transport Services
5407 Florida Av N 684-7132
Expert Auto 8500 Nebraska Av N 932-1596
EXPERT CLEANING SERVICES INC 664 Riviera Dr 251-4901
Expert Freight Brokerage Inc
14310 Dale Mabry Hwy N 968-3266
EXPERT SERVICES GROUP
5111 26th St N 238-6433
Export Management International Inc
220 Madison E 229-7744
Exportex Trading Group
9743 Hillsborough Av W 884-2863
Exposito David 11720 14th St N 977-2315
Exposito K 949-3842
Exposito Valentin 205 24th St N 248-6358
ExpoSystems 3203 Queen Palm Dr 623-2402
Express 3302 Buffalo Av W 879-0962
Express Air Conditioning 963-6857
Express America 402 Reo 287-5520
EXPRESS AMERICA INC
15115 N Nebraska Av 971-3326

EXPRESS CARE OF UNIVERSITY COMMUNITY HOSPITAL
3100 Fletcher Av E 971-6000

Express Check USA Tampa 224-9758
Express Food Mart & Larry's Deli
4526 Land O'Lakes Blvd LL 996-3976
Express Forms 107 Bayview Blvd 855-9093
EXPRESS FREIGHT INC
3101 3rd Av 247-1080

EXPRESS-IT MESSENGER SERVICE INC
11714 Dale Mabry Hwy N 968-5757

Express Lane Food Store Inc
13002 15th St N 977-5558
Express Limited Old Hyde Park Village 251-6945
Express Lube 877-0999
EXPRESS OFFICE SERVICES
100 Ashley Dr S 223-9616
Express Personnel Service
5835 Memorial Hwy 886-1961
Express Press Inc 100 Ashley Dr S 229-8099
Express Press Inc 5137 W Rio Vista Av 884-3310
Express Services Temporary & Permanent
Personnel 5835 Memorial Hwy 886-1961
Express Shoe Repair 227 Westshore Plaza 286-2999
Express Trading Co 107 Bayview Blvd 855-9093

Express Transport trucking
4731 Transport Dr ..... [illegible]
Expression Of Style ..... [illegible]
Expressions Advertising & Design Group Inc
765 Lumsden Rd W ..... [illegible]
EXPRESSIONS CUSTOM FURNITURE
2120 Dale Mabry Hwy S ..... 251-[illegible]
Expressway Inn 3693 Gandy Blvd ..... [illegible]
Expressway Inn South 3688 Gandy Blvd ..... [illegible]
Exquisite Upholstery 3010 Barcelona ..... [illegible]
Exstein Gerald M 1 Paradise Lakes Dr ..... [illegible]
Exter Morton & Beverly 5100 Berchette Rd ..... [illegible]
Exterior Manufacturing Co
1202 Tech Blvd ..... [illegible]
Exterm-Atrol Pest Control 302 E Chelsea ..... [illegible]
Extermination Systems Inc
13211 Nebraska Av N ..... [illegible]
Extermination Systems Inc
13211 Nebraska Av N ..... [illegible]
Extra Extra Newsstand
8436 W Hillsborough Av ..... [illegible]
Extra Space Center
6717 Benjamin Rd ..... [illegible]
8119 Anderson Rd ..... [illegible]
9688 Lake Patience Rd ..... [illegible]
1755 Brandon Blvd W ..... [illegible]
Extra Space Center 105 Faulkenburg Rd ..... [illegible]
Extras Inc 5701 Hillsborough Av E ..... [illegible]
Exum Bruce W 3619 Oak Dr N ..... [illegible]
Exum Elwyn 1418 14th Av SE ..... [illegible]
Exum Grady L 6330 Morningstar Dr ..... [illegible]
Exum James H 1304 La Sale ..... [illegible]
Exum John J 115A Rhodine Rd ..... [illegible]
Exum Kenneth Ray 10804 Magnolia Dr ..... [illegible]
Exum L J 5115 Halifax Dr ..... [illegible]
Exum Larry W 2116 Country Club Dr W ..... [illegible]
Exum R H Jr 11625 Winn Rd ..... [illegible]
EXUM REALTY INC
9411 US Hwy 301 S ..... 677-[illegible]
Exuma Ariel M 1318 Nick Nuccio Pkwy ..... [illegible]
Exuma Cenerien 1325 Scott E ..... [illegible]
EXUM'S WELL DRILLING & PUMPS
1418 14th Av SE Rstn ..... 645-[illegible]
Exxon Company USA
Tampa Office
5010 Kennedy Blvd W ..... [illegible]
Service Stations
615 Bloomingdale Av W ..... [illegible]
2105 Adamo Dr ..... [illegible]
2605 50th St N ..... [illegible]
519 19th St N ..... [illegible]
4242 Busch Blvd E ..... [illegible]
10002 Florida Av N ..... [illegible]
2502 Sligh Av W ..... [illegible]
911 Dale Mabry Hwy N ..... [illegible]
1501 Fowler Av E ..... [illegible]
4803 Memorial Hwy ..... [illegible]
Exxon Company USA
911 Dale Mabry Hwy N ..... [illegible]
Exxon Company USA 4803 Memorial Hwy ..... [illegible]
Exxon Office Systems 3401 Cypress ..... [illegible]
Exxon Shop 2810 State Rd 674 ..... [illegible]
Eyas Jerry C 202 Gornto Lake Rd ..... [illegible]
Eydmann David 4710 Wisconsin Av ..... [illegible]
Eydmann Ray 3510 San Juan ..... [illegible]
Eye Bank-Central Fla Lions
13131 Magnolia Dr ..... [illegible]
EYE DESIGN OPTICAL
1410 Fletcher Av E ..... 977-[illegible]
4557 Gunn Hwy ..... [illegible]

EYE EAR NOSE & THROAT CLINIC OF CARROLLWOO
8901 Armenia Av N ..... 933-[illegible]

EYE & EAR WORKS
21611 Village Lakes Shopping Center ..... 949-[illegible]
EYE-IN-THE SKY INC
500 S Howard Av ..... 251-[illegible]
Eye Laser Institute Inc The
3900 Central Av St Petersburg ..... [illegible]
Eye Priority 11210 N Dale Mabry Hwy ..... [illegible]
Eye Priority Of Carrollwood
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Eye Priority Of Temple Terrace
5208 Fowler Av E ..... [illegible]
Eye Priority Of Town 'N Country
7541 W Hillsborough Av ..... [illegible]
Eye Raymond 1417 Leland Dr ..... [illegible]
Eye Surgical Specialists
320 Oakfield Dr Bran ..... [illegible]
Eye Surgical Specialists
4002 State Rd 674 ..... [illegible]
Eye Talk Optical 311A Nolands Dr ..... [illegible]
Eyer Robt 13104 Livingston Av ..... [illegible]
Eyewise Optical 18459 US Hwy 41 N ..... [illegible]

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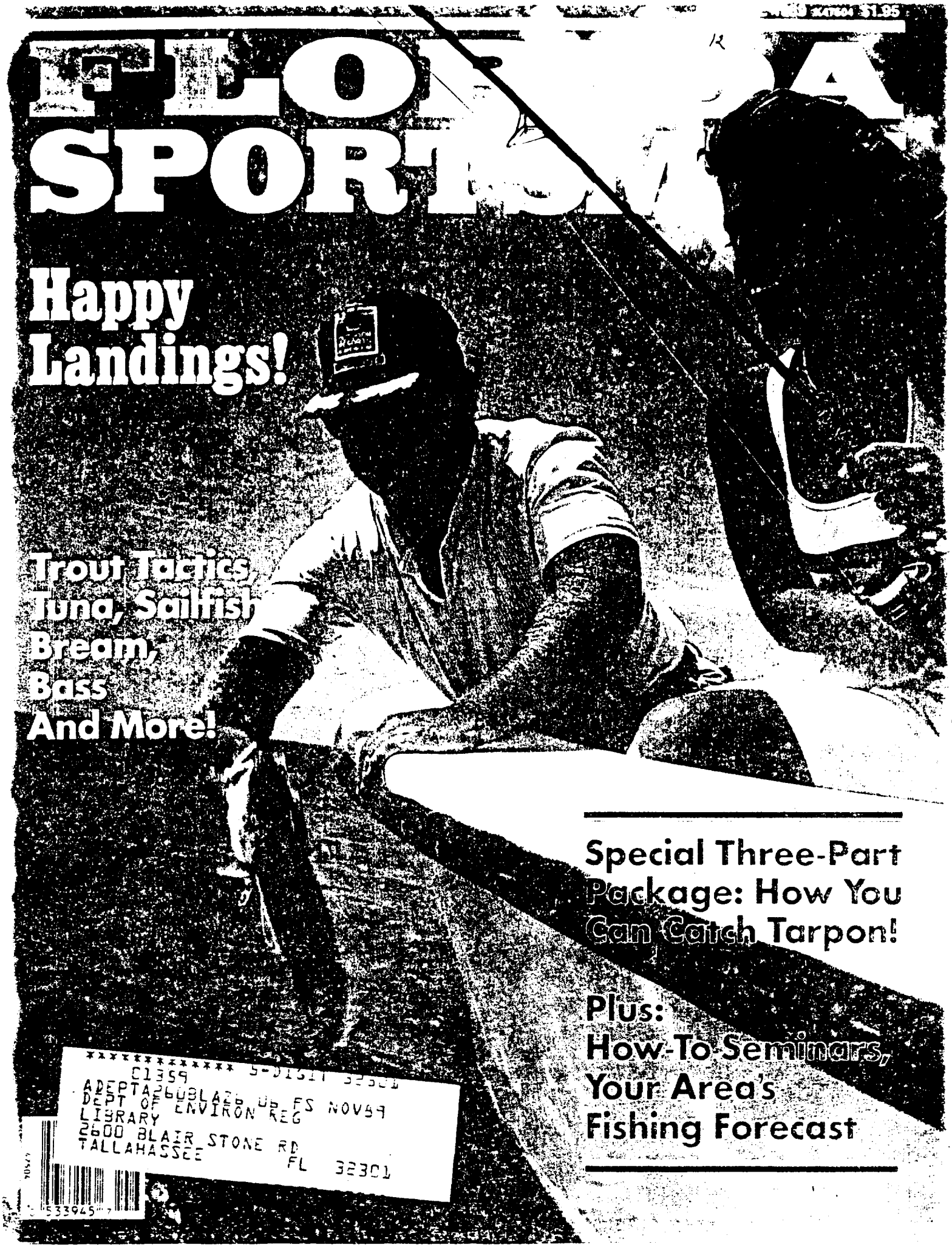
FLORIDA SPORTS



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SPORTSMAN'S REGIONAL EXPERTS ON THE SCENE GUIDE YOU TO THE HOT SPOTS IN THIS EXCLUSIVE REPORT

West Central

Beaches Are Crowded With Tarpon Anglers

Redfish bring big smiles to Gulf anglers.

June on the **West Central** coast brings silver kings to the beaches and bays in the highest numbers of the year. Yep, it's Tarpon Time from Venice to Crystal River.

Most tarpon nuts have their own favored methods to draw strikes and engage a tangle with these super sardines, but there are four time-proven standbys that take far more tarpon than their share.

Live-baiting along the beaches is about as sure a way to hook-up as can be found. The tricks are few but important. Choose a rod with a silky smooth power arc and mate it with a reel sporting a new drag system (available at any reel repair shop for a few bucks installed).

Lines testing 40 or 50 pounds are favored, but plenty of tarpon are taken on 20-pound, too. Recent improvements allow the use of monofilament leaders and experts prefer about six feet of 100-pound-test, clear mono for this purpose. They mount a sizable slip-float and pin it so that the bait holds a foot or two off the bottom. Then, a forged, sharpened 6/0 hook is slipped through the tail of a hand-sized pinfish.

Once the rigging is completed, the angler quietly cruises Suncoast beaches and searches for the flash of rolling tarpon at dawn. The boat is then eased several hundred yards in front of the school and baits are tossed into the approaching tarpon's path. Usually, the strikes come quickly.

Another favorite, but much more boring method, involves soaking dead shad on the bottom of several daylight schooling areas and wading through gafftopsail catfish in search of a tarpon. The biggest fish of each year often fall for the old soaked-shad routine. Sarasota Bay, MacDill Pocket, McKay Bay, Apollo Beach, Terra Ceia Bay and a host of other spots will usually hold up to a dozen patient anglers waiting on the bite. Great for meditation.

Then there are the bridge fishermen. They pay a visit to Tod Staley at Twelve Fathom Jigs in St. Petersburg and stock up on the Mean Green Tarpon Machine. Actually, it's just a red, lead-head jig with a chartreuse shad tail and trailing red mylar hackle. But when tossed at the lighted edge between the dark underbelly of several local bridges and open water, the surface has been known to regularly explode.

Leading bridges for night-time jigging include the Sunshine Skyway, Howard Franklin, Gandy and Rt. 60 Causeway. Boaters use bridge hooks to position their boats back in the shadows, then move to the bow and flip jigs at the passing procession of fish that prowl the lighted edge. It may just be the coolest fishing of June.

Then there are the wand-wavers. Once the province of an elite cadre of Florida Keys and Homosassa anglers, flyfishing for

133

138

142

The same artificials will nab a legal redfish in a heartbeat if they are worked closer to a shoreline. If this year is anything like the last, reds will be around in great number and lunker sizes.

Right up under the mangroves on high tides, the reds will drop off to channel edges and potholes as the water fades. Top spots include the marvelous Suncoast Keys of Citrus County, the almost unfished and unexplored expanse from Pine Island to Chassahowitzka in Hernando County, inside Anclote Key off Tarpon Springs, Caladesi State Park, Cockroach Bay, Mullet Key, Rattlesnake Key and Terra Ceia Bay in Manatee County and a host of others.

Freshwater anglers need not feel left out during June, either, but successful catches often call for a change of tactics. Panfish will be on the beds and hungry as the moon fills and heavy stringers of hand-size bream can often be taken.

Jim Veal, who has for years run the Panavista Lodge on Lake Panasoffkee in Sumter County, favors June as the best time to take the outlandish shellcrackers that call his lake home. His biggest fish come with a drifted cricket or Missouri minnow fished in the open pockets of mid-lake hydrilla banks.

Bass seem to favor night feeding as the summer sun scorches shallow lakes. Several locations give up fine catches of big bass during the cool of night. Among the more productive waters are most of the Kissimmee Chain, especially Toho and Hatchineha; as well as less-famous waters like the East Tampa Bypass Canal.

Still other anglers pick June nights as the very best to score in the clear, sand-bottom lakes of the Ocala National Forest. There, the favored baits seem to be a black Johnson's Spoon with matching skirt or an unweighted, jumbo plastic worm or snake imitation.

June 17—the Saturday before Fathers Day—again finds the nearly famous Fathers Day Weekend Catfish Tournament under way in Tampa Bay, based out of the county launching ramp at Gandy Bridge. Hatched as a funding vehicle of the Hillsborough Wildlife Federation, the event is different from the average fishing contest.

The top prize of several thousand dollars goes to the lucky angler boating the largest catfish of the day. The catfish money prize ladder pays down ten spots and scatters $10,000 among the winners. A complete aluminum boat, motor and trailer goes to some lucky pro-registrant (thanks to Sports Unlimited Stores in Hillsborough and Pinellas) at the weigh-in, too.

In addition to cats, black drum, speckled trout and sheepshead catches are also awarded. Noted for its modest entry fees of $5 for kids and $10 for adults, the event draws fishing families from throughout central Florida. Proceeds are returned to the conservation group. Additional information is available from Tony Lyle, Event Chairman, in Tampa at (813) 971-3287.

—Dave Markett

Southwest

Catch The Romance Of Silver Kings

If **Southwest Florida** fishermen can count on only one thing in June, it is that tarpon will be caught every day, by the dozens and even by the hundreds, in the world's most famous Tarpon Hole: at Boca Grande Pass.

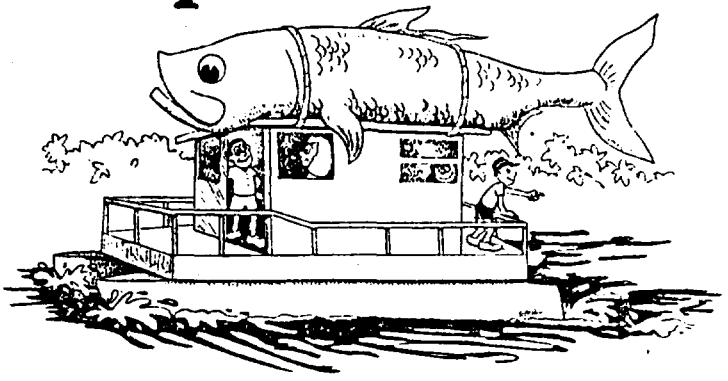
Catch-and-release fishing for snook in the passes is a good bet, and bedding bluegills are reliable, but you can take the Boca Grande tarpon to the bank, as the entire Gasparilla Island tourist industry has known since the turn of the century.

In the old days gentlemen, and ladies too, took to the pass in rowboats manned by guides who slipstreamed in the rushing current until hooking a silver king. After that the fight was waged wherever the tarpon decided to go, sometimes so far distant it was necessary for a small steamer to pick up the exhausted fishermen and the tarpon at the end of the battle.

Tarpon in those days were so abundant no one ever thought twice about killing the fish, which was done routinely and almost without fail in that era. There still is no shortage of tarpon at Boca Grande, but with over 500 fish per year killed "for mounting" every year since anyone on the island can remember, the system was due for a change.

That change doubtlessly will come this year, as the state tarpon tag program takes

Fish here once and you'll be hooked.



Bragging size tarpon, grouper, snapper, shark, redfish and seatrout aren't the only ones getting caught in the Park's bays, inlets and canals.

So are the fishermen.

And now, our **40 ft. fully-equipped houseboats** can turn your fishing trip into an angling extravaganza!

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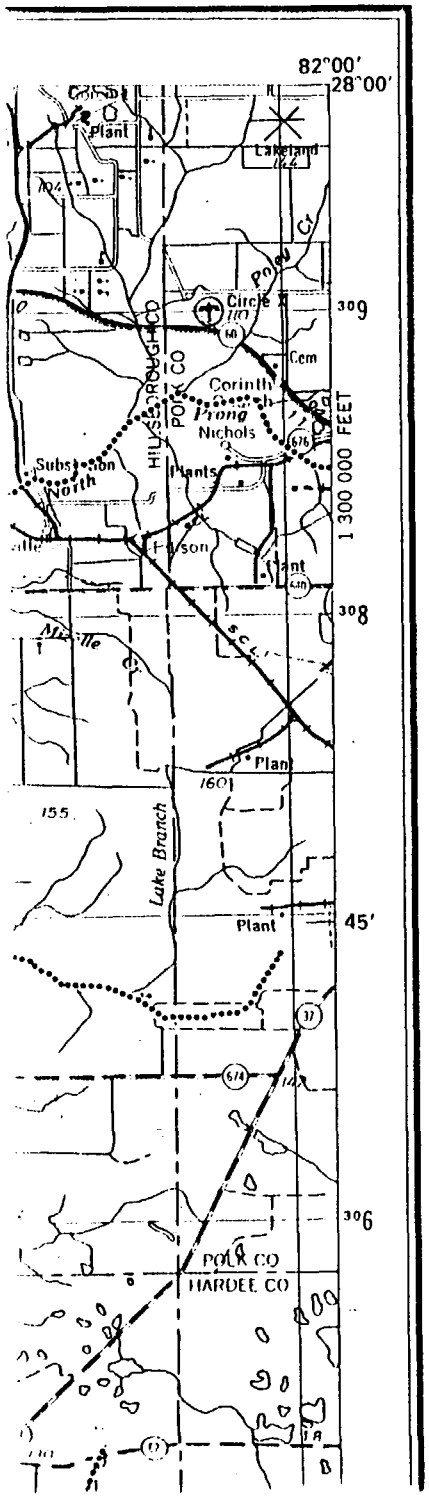

AQUATIC ORGANISMS

Shown in BLUE: species with special status shown in RED-(F) or (S) indicates species protected by Federal or state legislation; all Latin names given in text.

SYMBOL	SPECIES
	PLANTS (1-49)
	1 Turtle grass
	2 Widgeon grass
	3 Shoal grass
	INVERTEBRATES (50-99)
	50 Shrimp
	51 White shrimp
	52 Brown shrimp
	53 Pink shrimp
	54 Blue crab
	55 Stone crab
	56 Spiny lobster
	57 Eastern oyster
	58 Crayfish
	59 Brackish-water clam
	60 Sponges
	61 Southern quahog
	62 Northern quahog
	63 Sunray venus clam
	64 Bay scallop
	65 Rock shrimp
	66 Calico scallop
	67 Unicolor mussel (S)
	68 Fire coral
	69 Horny coral
	70 Stony coral
	71 Gorgonian coral
	72 Corals
	73 Queen conch
	74 Pygmy octopus
	75 Atlantic geoduck
	76 Loose coiled snail
	77 Athearns villosa
	FISH (100-299)
	100 Jack
	101 Sharks, skates, rays
	102 Grouper
	103 Mullet
	104 Catfish and bullheads
	105 Snapper
	106 Sunfish and bass
	107 Drum
	108 Spotted seatrout
	109 Weakfish
	110 Sand seatrout
	111 Atlantic croaker
	112 Red drum
	113 Black drum
	114 Star drum
	115 Spot
	116 Southern kingfish
	117 Northern kingfish
	118 Gulf kingfish
	119 Sheepshead
	120 Southern flounder
	121 Blue catfish
	122 White catfish
	123 Channel catfish
	124 Yellow bullhead
	125 Brown bullhead
	126 White crappie
	127 Black crappie
	128 Largemouth bass
	129 Spotted bass
	130 Green sunfish
	131 Longear sunfish
	132 Warmouth
	133 Bluegill
	134 Redear sunfish
	135 Striped mullet
	136 Red snapper
	137 Florida pompano
	138 Bluefish
	139 Cobia
	140 Atlantic spadefish
	141 Little tunny
	142 Spanish mackerel
	143 King mackerel
	144 Sea catfish
	145 Gulf menhaden
	146 Bay anchovy
	147 Gars
	148 Buffalos
	149 Freshwater drum
	150 Bowfin
	151 Carp
	152 Key silverside (S)
	153 Tarpon

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St Petersburg

FLORIDA

1:250 000-scale map of

Gulf Coast Ecological Inventory

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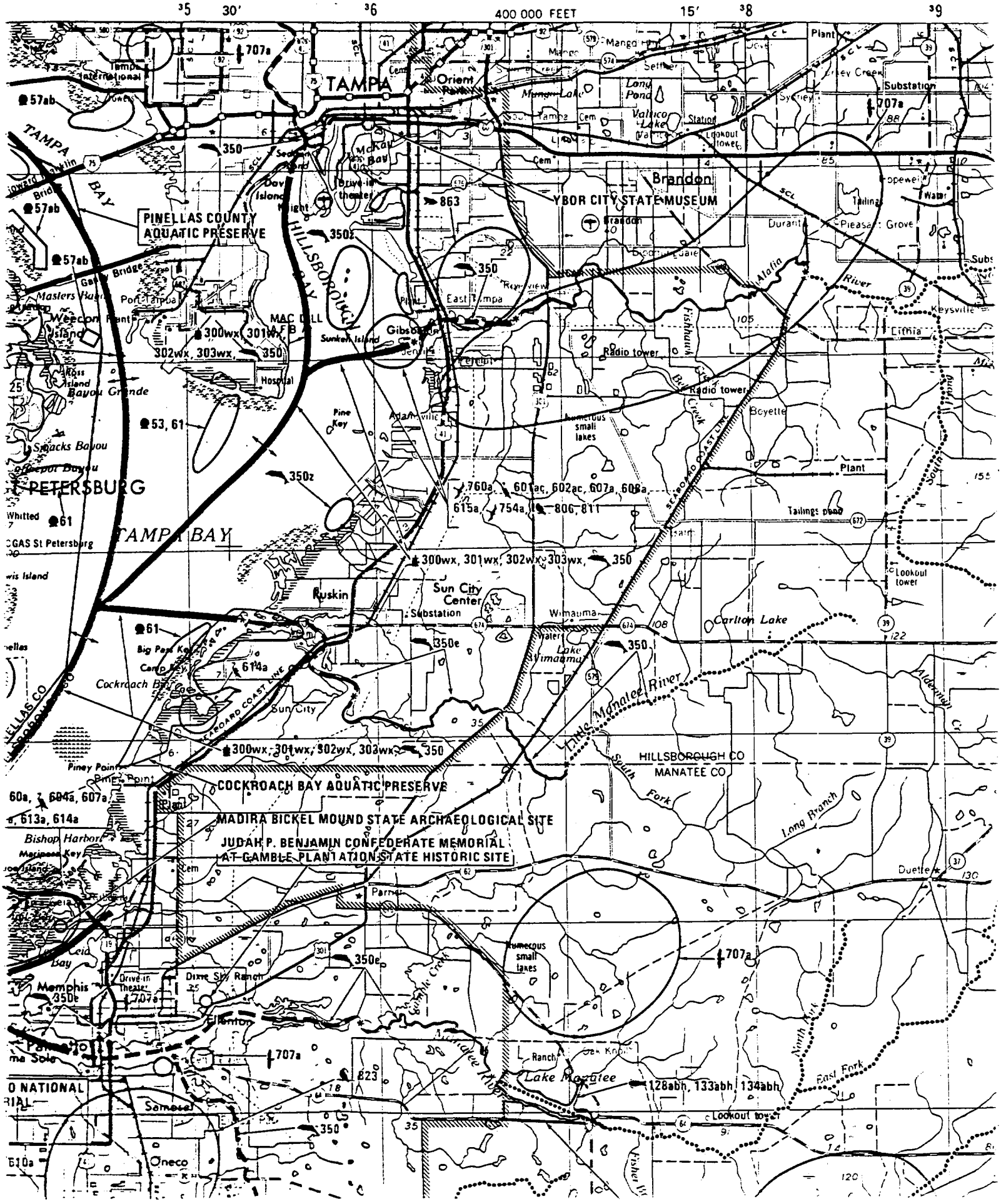
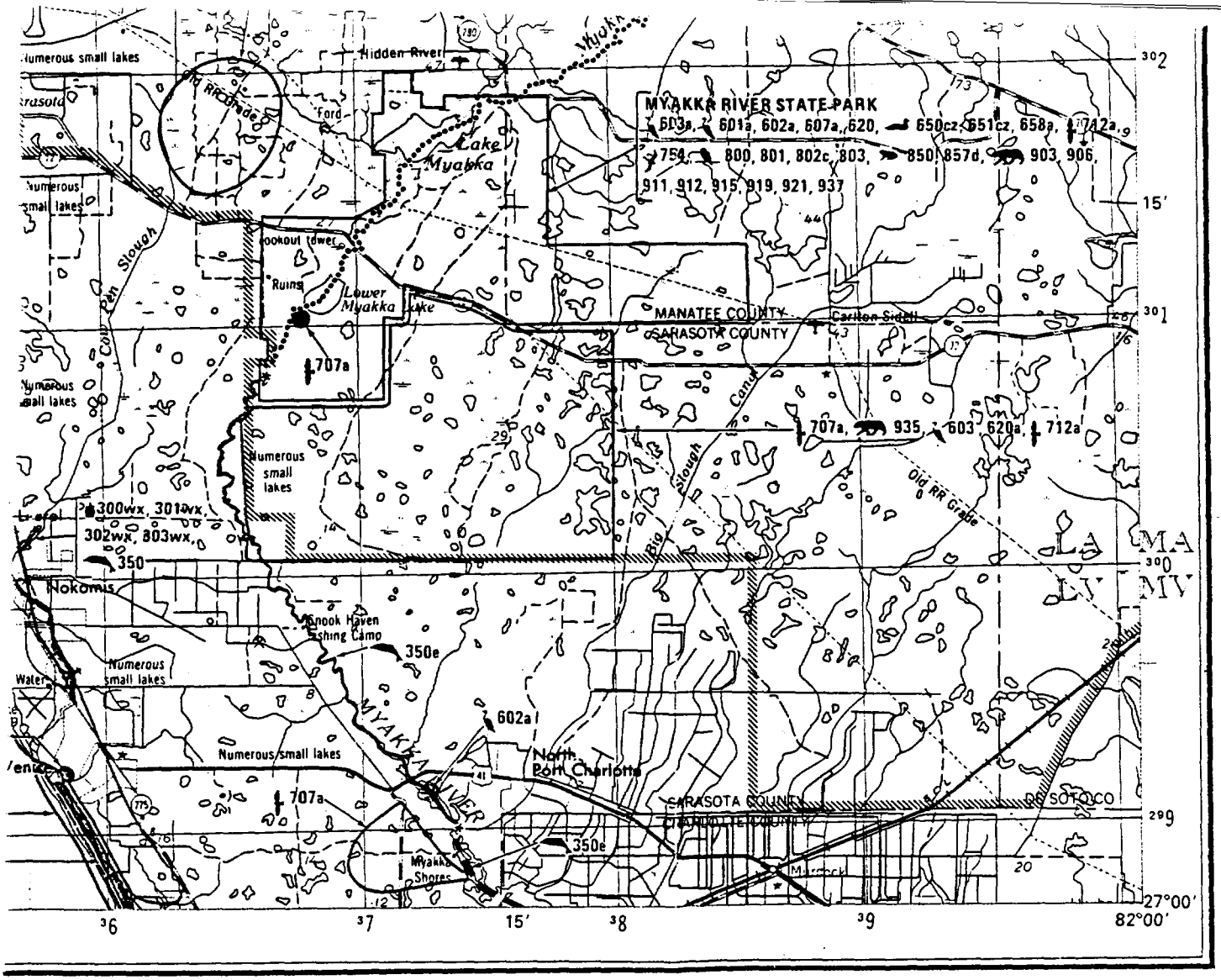


400 000 FEET
TAMPA
Orient Park
Brandon
YBOR CITY STATE MUSEUM
PINELLAS COUNTY AQUATIC PRESERVE
TAMPA BAY
HILLSBOROUGH BAY
PETERSBURG
Ruskin
Sun City Center
Wimauma
Carlton Lake
Lake Wimauma
Little Manatee River
Lake Manatee
COCKROACH BAY AQUATIC PRESERVE
MADIRA BICKEL MOUND STATE ARCHAEOLOGICAL SITE
JUDAH P. BENJAMIN CONFEDERATE MEMORIAL AT GAMBLE PLANTATION STATE HISTORIC SITE
HILLSBOROUGH CO
MANATEE CO
Memphis
Ellenton
Palmetto
Oneco
Durant
Pleasant Grove
Keysville
Lithia
Boyette
Duette
Parrish
Sun City
Gibsonton
East Tampa
Port Tampa
Weedon Island
Bayou Grande
Snacks Bayou
Cockroach Bay
Piney Point
Bishop Harbor
Numerous small lakes
Radio tower
Lookout tower
Tailings pond
Plant
Substation
Station
Hospital
Drive-in theater
Dixie Sky Ranch
Gamble Creek
Long Branch
South Fork
North Fork
East Fork
Alafia River
Fishhawk Creek
Bell Creek
Sunken Island
Pine Key
Big Pass Key
Camp Key
Mangrove Point
Masters Bayou
Whitted
Tampa International
Mango
Seffner
Sydney
Valrico Lake
Long Pond
Mango Lake
McKay Bay
Davis Island
Ross Island
Gandy Bridge
MAC DILL A.F.B.
SEABOARD COAST LINE
SCL
HILLSBOROUGH CO
MANATEE CO



LAND USE–LAND COVER SYMBOLS

Study area (within territorial limits of United States)

Coastal zone boundary or Federal-state demarcation

Special land use areas, including refuges and wildlife management areas, parks and seashores; may be used in lieu of habitat boundary

Subdivision of a special land use area into more than one designation

Marsh or swamp

Beach/Dunes

Seagrass

Reef

POINT AND AREA FEATURE SYMBOLS

Shown in RED for species with special status, BLUE for aquatic organisms, and BROWN for terrestrial organisms.

Localized concentration of species — 650h

General habitat boundary for indicated species; may be superceded by special land use boundary — 50d

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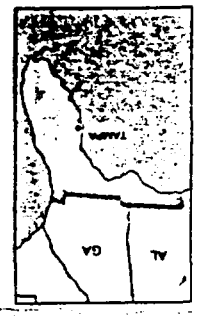

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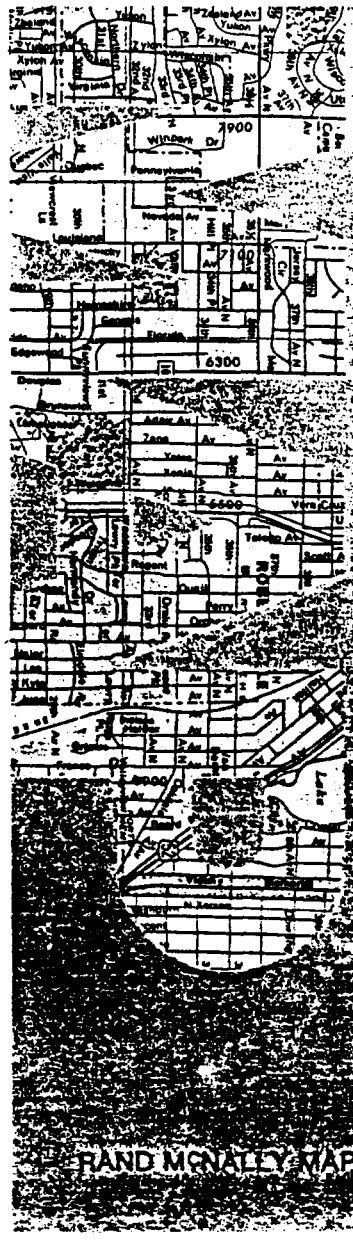

Including
Apollo Beach
Brandon
Citrus Park
Gibsonton
Lutz
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Ruskin
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Thonotosassa
Sun City Center
and Neighboring Communities

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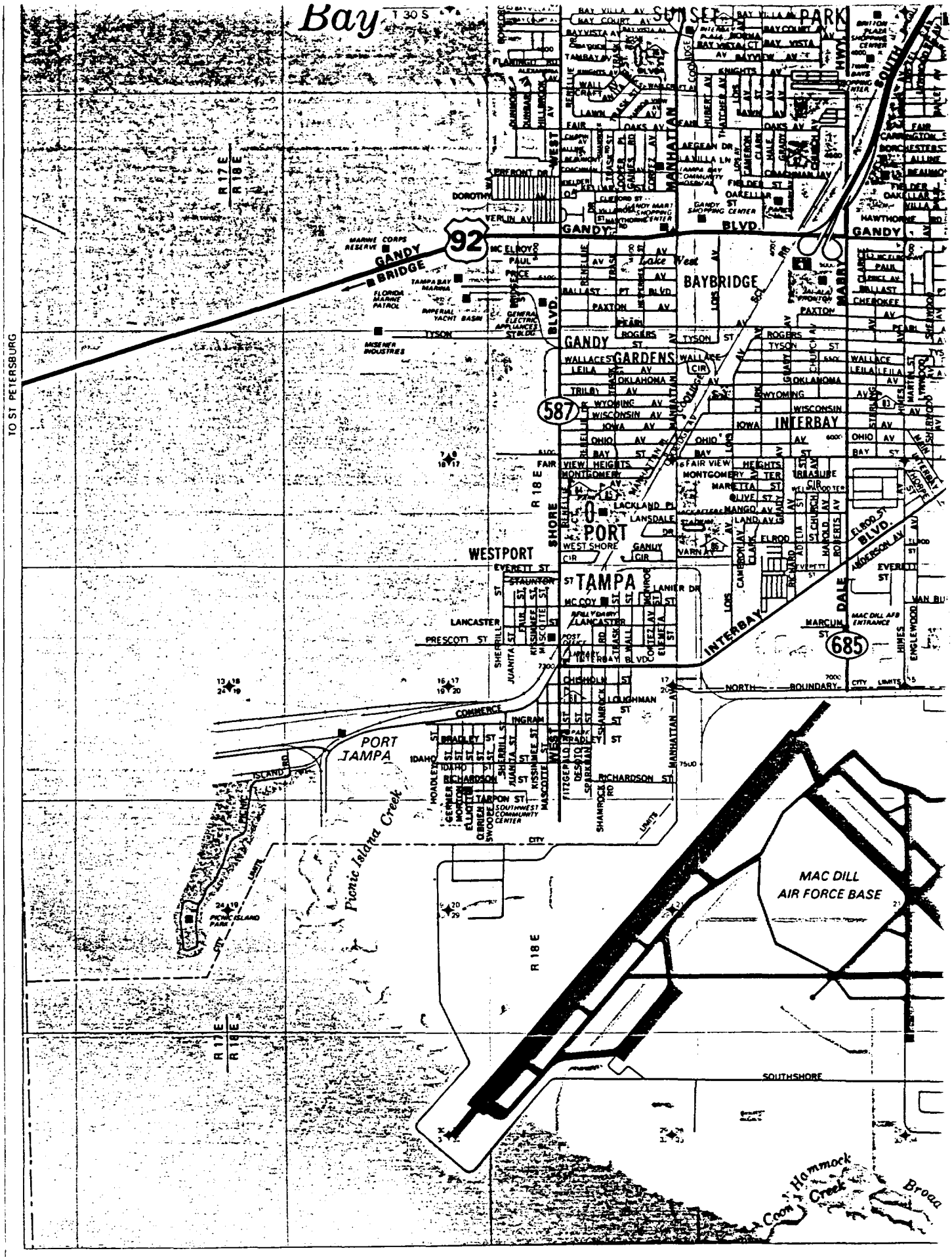

TYLE RD H-4, G-10-19
TYLE COVE L-7
TYLE LAKE PL L-7
TYLE OAK ST A-19
TYLE RIVER R D-12
TYLE WOOD CT M-6
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CHERO DR S-14
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NEWOOD PL G-7
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MARYETTE ST N-11
MC LEOD DR V-12
MC MILLAN LN D-E-10
MC MULLEN RD X-21-23
MC MULLEN LOOP W-21
MC MULLEN LOOP RD W-Y-21
MC RAE RD T-9
MEADE RD X-15-16
MEADOW DR G-11
MIDWAY ST T-22
MIENER AV S-14
MIKE DR R-8
MILES RD E-4
MILEY RD EF-8
MILL BEND CT D-11
MILL LAKE CT P-6
MILL POND LN I-9
MILL RUN CIR L-7
MONTROSE AV S-9
MOODY I-17
MOODY AV L-16-17
MOODY RD V-21
MOON RD X-16
MOON AV X-20
N/S MOON AV Y-16
MOONDALE CT Z-20
MOONLIGHT CT H-8
NAKORA DR K-9
NANCE AV L-37
NANCY AV L-4
NANCY ST Q-R-11
NANTUCKET DR S-9
NAPLES PL H-6
NAPOLEON AV K-21
NASHVILLE DR H-6
NASSAU ST I-M-15
NORTH BAY ST M-P-13; S-13
NORTH BOULEVARD M-12
NORTH BOUNDARY RD I-H-21
E/W NORTH BRANCH RD N-31
NORTH LAKEVIEW DR K-5
NORTH VILLAGE DR J-J-7

PUBLIC WATER SUPPLIES OF SELECTED MUNICIPALITIES IN FLORIDA, 1975

15

LIBRARY
STATE OF FLORIDA
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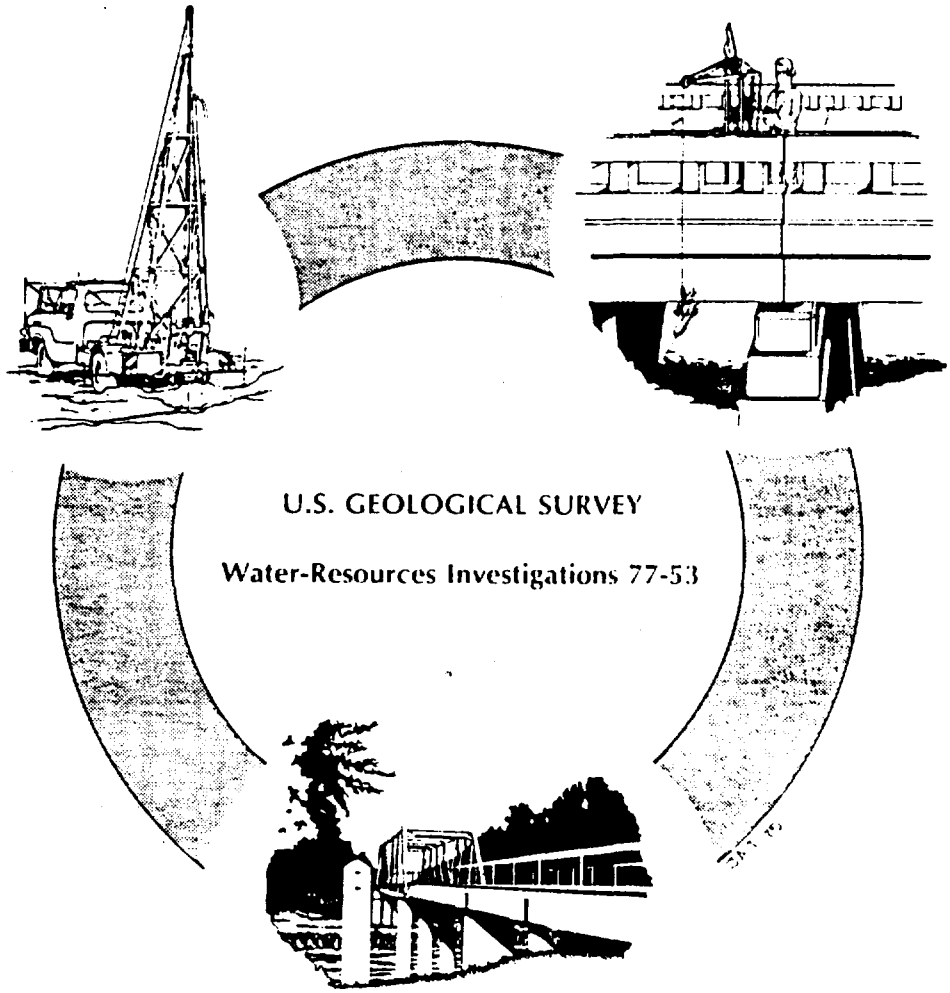
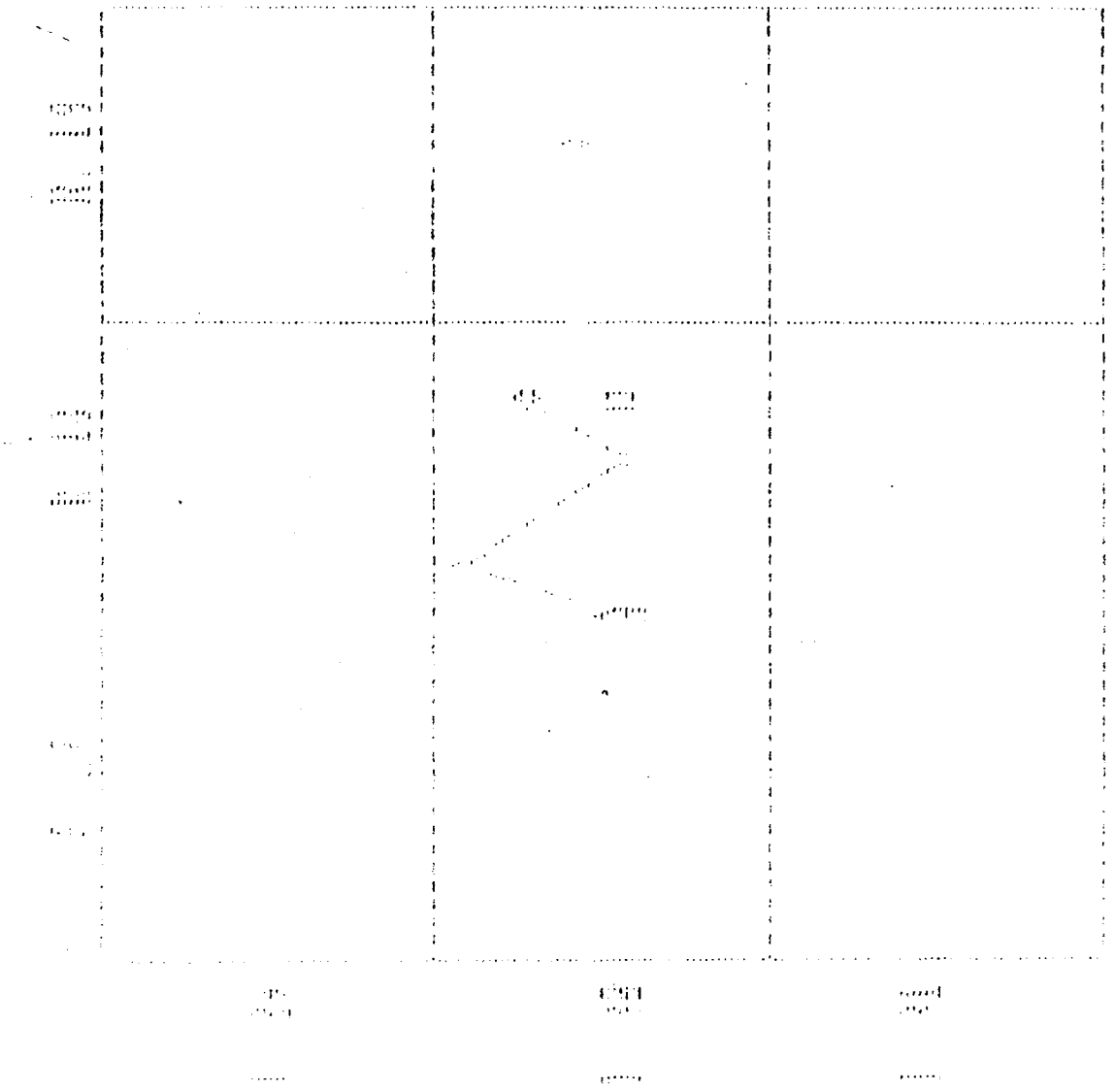
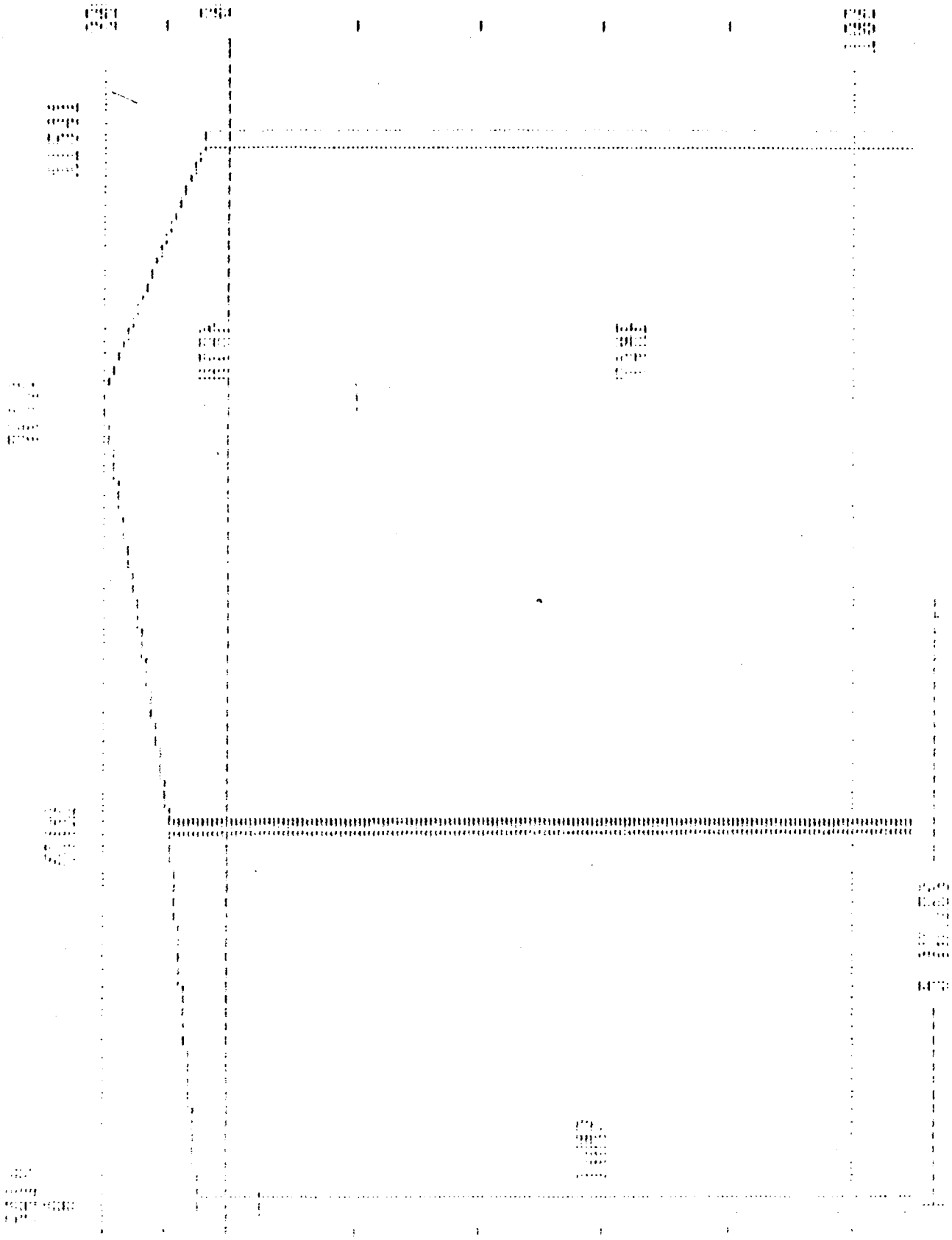


Prepared in cooperation with
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
SUWANNEE RIVER WATER MANAGEMENT DISTRICT
NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT
AND OTHER STATE, LOCAL, AND FEDERAL AGENCIES





LITHOLOGIC WELL LOG PRINTOUT SOURCE - FGS

WELL NUMBER: W- 5414 COUNTY - MILLSBOROUGH
TOTAL DEPTH: 581 FT. LOCATION: T.30S R.18E S.19
25 SAMPLES FROM 10 TO 581 FT. LAT = N 27D 51M 45
                LON = W 82D 32M 29
COMPLETION DATE - 07/05/50 ELEVATION - 3 FT
OTHER TYPES OF LOGS AVAILABLE - CALIPER

OWNER/DRILLER: GULF OIL CORP., FRANK H. MAY AND SON

WORKED BY: SAMPLES DESCRIBED BY CHRISTOPHER WAYNE
GOOD SAMPLES

0. -	10.	122HTRN	HAWTHORN GROUP
10. -	220.	122TMAP	TAMPA MEMBER OF ARCADIA FM.
220. -	400.	123SWNN	SUWANNEE LIMESTONE
400. -	590.	124CLRV	CRYSTAL RIVER FM.

0 - 10 CLAY; LIGHT OLIVE GRAY; 15% POROSITY, INTERGRANULAR, POSSIBLY HIGH PERMEABILITY;
MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-VCA;
FOSSILS: NO FOSSILS;

10 - 20 LIMESTONE; WHITE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% RECOGNIZABLE CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-VCA, CHERT-VCA, PHOSPHATIC SAND-VCA;
FOSSILS: NO FOSSILS;

20 - 30 LIMESTONE; WHITE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;

GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-03%, PYRITE-02%, CLAY-01%, SPAR-01%;
FOSSILS: BENTHIC FORAMINIFERA;
WITH SORITES

30 - 40 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-04%, PYRITE-01%;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS;

40 - 50 AS ABOVE

50 - 60 AS ABOVE

W- 3414 CONTINUED PAGE - 2

60 - 70 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-01%;
FOSSILS: BENTHIC FORAMINIFERA;

70 - 80 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%;
FOSSILS: BENTHIC FORAMINIFERA;

80 - 90 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%, IRON STAIN-01%;
FOSSILS: BENTHIC FORAMINIFERA;

90 - 100 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-01%;
FOSSILS: MOLLUSKS;

100 - 110 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;

GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-01%;
FOSSILS: WORM TRACES;

110 - 120 NO SAMPLES

120 - 130 LIMESTONE; VERY LIGHT ORANGE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-01%, CHERT-01%, SPAR-02%;
FOSSILS: BENTHIC FORAMINIFERA;

130 - 140 AS ABOVE

140 - 150 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%;
FOSSILS: BENTHIC FORAMINIFERA;

150 - 160 AS ABOVE

160 - 170 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-02%, QUARTZ SAND-01%;
FOSSILS: BENTHIC FORAMINIFERA;

170 - 180 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-02%, QUARTZ SAND-01%, DOLOMITE-01%;
FOSSILS: MOLLUSKS;

180 - 190 AS ABOVE

190 - 200 NO SAMPLES

200 - 210 NO SAMPLES

210 - 220 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;

GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-0%;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID;

220 - 230 AS ABOVE
WITH DICTYCONUS COOKEI

230 - 240 AS ABOVE

240 - 250 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-0%, CHERT-0%;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, ECHINOID;

W- 3414 CONTINUED PAGE - 4

250 - 260 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-0%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS;

260 - 270 AS ABOVE

270 - 280 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-0%, CHERT-0%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID;

280 - 290 NO SAMPLES

290 - 300 NO SAMPLES

300 - 310 AS ABOVE
WITH DISCORINOPSIS GUNTERI

310 - 320 AS ABOVE

320 - 330 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CALCILUTITE-0%;

330 - 340 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CHERT-VIA;
FOSSILS: BENTHIC FORAMINIFERA;

340 - 350 AS ABOVE

350 - 360 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CHERT-VIA;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID;

360 - 370 AS ABOVE

W- 3414 CONTINUED PAGE - 5

370 - 380 AS ABOVE

380 - 390 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: DOLOMITE-VOA, CHERT-VIA;
FOSSILS: WORM TRACES, BRYOZOA, BENTHIC FORAMINIFERA, ECHINOID;

390 - 400 AS ABOVE

400 - 410 AS ABOVE
WITH GYPSUM GLOBULA

410 - 420 AS ABOVE
WITH LEPS.

420 - 430 AS ABOVE

430 - 440 LIMESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: DOLOMITE-VOA;
FOSSILS: MOLLUSKS, ECHINOID, BENTHIC FORAMINIFERA;

440 - 450 LIMESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;

450 - 460 AS ABOVE

460 - 470 AS ABOVE

470 - 480 LIMESTONE; VERY LIGHT ORANGE; 21% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: DOLOMITE-03%, SPAR-02%;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID, BRYOZOA;

480 - 490 LIMESTONE; VERY LIGHT ORANGE; 21% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: DOLOMITE-03%, SPAR-02%, IRON STAIN-01%, PHOSPHATIC SAND-01%;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, VERTEBRATE, BRYOZOA, ECHINOID;

W- 5414 CONTINUED PAGE - 5

490 - 500 AS ABOVE

500 - 510 CALCARENITE; VERY LIGHT ORANGE; 23% POROSITY, INTERGRANULAR, VUGULAR;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%;
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA;
WITH OPERCULINOIDES SP.

510 - 520 AS ABOVE

520 - 530 AS ABOVE

530 - 540 AS ABOVE

540 - 550 AS ABOVE

550 - 560 AS ABOVE

560 - 570 AS ABOVE
WITH NUMMULITES VANDERSTOKI

570 - 580 CALCARENITE; VERY LIGHT ORANGE; 23% POROSITY, INTERGRANULAR, VUGULAR;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-01%, SPAR-01%;
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, MOLLUSKS;

580 - 590 AS ABOVE

590 TOTAL DEPTH

LITHOLOGIC WELL LOG PRINTOUT SOURCE - FGS

WELL NUMBER: W- 7672 COUNTY - HILLSBOROUGH
TOTAL DEPTH: 1000 FT. LOCATION: T.30S R.18E S.22
90 SAMPLES FROM 10 TO 1000 FT. LAT = N 27D 51M 27
LON = W 82D 25M 40

COMPLETION DATE - 02/04/55 ELEVATION - 20 FT
OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER: U.S. PHOSPHATE PRODUCTS LAYNE ATLANTIC CO.

WORKED BY: SAMPLES DESCRIBED BY CHRISTOPHER WAYNE
GOOD SAMPLES

0. -	40.	122HTRN	HAWTHORN GROUP
40. -	160.	122THMP	THMPH MEMBER OF HAWTHORN FM.
160. -	270.	123SWNN	SUWANNEE LIMESTONE
270. -	550.	124OCRV	OCALA LIMESTONE LOWER MEMBER
550. -	600.	124OCRLL	OCALA LIMESTONE LOWER MEMBER
600. -	1000.	124AVPK	AVON PARK LIMESTONE

0 - 10 NO SAMPLES

10 - 20 SAND; VERY LIGHT ORANGE; 35% POROSITY, INTERGRANULAR;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MEDIUM;
ROUNDNESS:ANGULAR; LOW SPHERICITY; UNCONSOLIDATED;
ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC GRAVEL-02%, PHOSPHATIC SAND-02%, QUARTZ-10%;
FOSSILS: NO FOSSILS;

20 - 30 SAND; VERY LIGHT ORANGE TO BLACK; 35% POROSITY, INTERGRANULAR;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MEDIUM;
ROUNDNESS:ANGULAR; LOW SPHERICITY; UNCONSOLIDATED;
ACCESSORY MINERALS: CLAY-05%, PHOSPHATIC GRAVEL-05%, PHOSPHATIC SAND-05%, LIMESTONE-05%;
FOSSILS: NO FOSSILS;

30 - 40 AS ABOVE

40 - 50 LIMESTONE; VERY LIGHT ORANGE TO WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 50% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-20%, PHOSPHATIC GRAVEL-02%, PHOSPHATIC SAND-02%, CLAY-02%;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA;
WITH SORITES

50 - 60 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 50% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: PHOSPHATIC GRAVEL-05%, SAND-05%;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID;

50 - 70 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 50% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: PHOSPHATIC GRAVEL-SIZ, SPAR-SIZ, QUARTZ SAND-SIZ;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID;

70 - 80 AS ABOVE

80 - 90 LIMESTONE; WHITE; 15% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 55% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
FOSSILS: NO FOSSILS;

90 - 100 AS ABOVE

100 - 110 LIMESTONE; WHITE; 15% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 55% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-SIZ;
FOSSILS: WORM TRACES;

110 - 120 AS ABOVE

120 - 130 LIMESTONE; GRAYISH BROWN TO WHITE; 15% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 55% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;

FOSSILS: BENTHIC FORAMINIFERA;

130 - 140 LIMESTONE; WHITE; 15% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%;
FOSSILS: NO FOSSILS;

140 - 150 LIMESTONE; WHITE; 15% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%, QUARTZ-01%;
FOSSILS: BRYOZOA, MOLLUSKS, BENTHIC FORAMINIFERA;

150 - 160 LIMESTONE; WHITE; 15% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-02%;
FOSSILS: BRYOZOA;

160 - 170 LIMESTONE; WHITE; 15% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-02%, QUARTZ-01%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS, BRYOZOA;
WITH ROTALIA MEXICANA

170 - 180 AS ABOVE

180 - 190 LIMESTONE; WHITE; 15% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-02%, QUARTZ-01%, CHERT-02%;
FOSSILS: ECHINOID, MOLLUSKS;

190 - 200 AS ABOVE

200 - 210 NO SAMPLES

210 - 220 AS ABOVE

GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-02%, CHERT-01%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS;
WITH DICTYCONUS COOKEI

230 - 240 AS ABOVE
WITH DISCORDOPSIS GUNTERI

240 - 250 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CHERT-03%, SPAR-02%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS, BRYOZOA;

250 - 260 AS ABOVE

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260 - 270 LIMESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CHERT-03%, QUARTZ SAND-01%, QUARTZ-01%, SPAR-01%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS, BRYOZOA;

270 - 280 LIMESTONE; VERY LIGHT ORANGE; 22% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CHERT-01%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS;
WITH CYPEINA BLUEGLA AND OPERCULINOIDES OCHLANUS AND LEPS.

280 - 290 AS ABOVE

290 - 300 AS ABOVE

300 - 310 AS ABOVE

310 - 320 AS ABOVE

320 - 330 AS ABOVE

330 - 340 LIMESTONE; VERY LIGHT ORANGE; 22% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%;

340 - 350 LIMESTONE; VERY LIGHT ORANGE; 25% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 80% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%, QUARTZ SAND-01%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS, BRYOZOA;

350 - 360 AS ABOVE

360 - 370 AS ABOVE

370 - 380 AS ABOVE

380 - 390 AS ABOVE

390 - 400 NO SAMPLES

400 - 410 AS ABOVE

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410 - 420 LIMESTONE; VERY LIGHT ORANGE; 25% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 80% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CHERT-01%, SPAR-01%, QUARTZ SAND-01%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS;

420 - 430 AS ABOVE
WITH SPIROLINA CORYENSIS (QUESTION)

430 - 440 AS ABOVE

440 - 450 AS ABOVE
WITH DICTYCONUS COOKEI

450 - 460 AS ABOVE

460 - 470 CALCARENITE; VERY LIGHT ORANGE; 25% POROSITY, INTERGRANULAR, VUGULAR;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID;

470 - 480 CALCARENITE; VERY LIGHT ORANGE; 25% POROSITY, INTERGRANULAR, VUGULAR;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-01%, IRON STAIN-01%;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, ECHINOID;

480 - 490 AS ABOVE

490 - 500 CALCARENITE; VERY LIGHT ORANGE; 25% POROSITY, INTERGRANULAR, VUGULAR;

ACCESSORY MINERALS: SPAR-VIX, QUARTZ SAND-VIX;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID;

500 - 510 AS ABOVE

510 - 520 CALCARENITE; VERY LIGHT ORANGE; 25% POROSITY, INTERGRANULAR, VUGULAR;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR-VIX, QUARTZ SAND-VIX, QUARTZ-VIX;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID;

520 - 530 AS ABOVE

530 - 540 AS ABOVE

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540 - 550 LIMESTONE; VERY LIGHT ORANGE; 22% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CAYSTALS, BIOGENIC; 72% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: SPAR-VIX;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID;

550 - 560 AS ABOVE

560 - 570 AS ABOVE

570 - 580 LIMESTONE; VERY LIGHT ORANGE; 22% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CAYSTALS, BIOGENIC; 72% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: SPAR-VIX, CALCILUTITE-VIX;
OTHER FEATURES: CHALKY;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID;

580 - 590 AS ABOVE

590 - 600 LIMESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 21% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CAYSTALS; 50% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: SPAR-VIX;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS;
WITH ABUNDANT DICTYOCONUS COONEI.

600 - 610 AS ABOVE

620 - 630 AS ABOVE

630 - 640 LIMESTONE; VERY LIGHT ORANGE; 22% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 50% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: SPAR-05%, CHERT-04%, DOLOMITE-05%;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID;

640 - 650 AS ABOVE

650 - 660 NO SAMPLES

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660 - 670 DOLOMITE; VERY LIGHT ORANGE TO GRAYISH BROWN; 21% POROSITY, INTERGRANULAR,
VUGULAR; 30-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: LIMESTONE-10%, QUARTZ SAND-01%, SPAR-02%;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, ECHINOID;

670 - 680 AS ABOVE

680 - 690 AS ABOVE

690 - 700 DOLOMITE; VERY LIGHT ORANGE TO GRAYISH BROWN; 21% POROSITY, INTERGRANULAR,
VUGULAR; 30-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: LIMESTONE-10%, QUARTZ SAND-01%, SPAR-01%;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS;

700 - 710 NO SAMPLES

710 - 720 NO SAMPLES

720 - 730 NO SAMPLES

730 - 740 AS ABOVE

740 - 750 DOLOMITE; VERY LIGHT ORANGE TO GRAYISH BROWN; 21% POROSITY, INTERGRANULAR,
VUGULAR; 30-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;

FOSSILS: BENTHIC FORAMINIFERA;

750 - 760 DOLOMITE; VERY LIGHT ORANGE TO GRAYISH BROWN; 21% POROSITY, INTERGRANULAR, VUGULAR; 50-90% ALTERED; EUHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: LIMESTONE-VCA, CALCILUTITE-VCA;
OTHER FEATURES: CHALKY;
FOSSILS: BENTHIC FORAMINIFERA;

760 - 770 DOLOMITE; GRAYISH BROWN TO LIGHT GRAY; 50-90% ALTERED; EUHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: LIMESTONE-VCA;
FOSSILS: BENTHIC FORAMINIFERA;

770 - 780 NO SAMPLES

780 - 790 NO SAMPLES

790 - 800 NO SAMPLES

800 - 810 NO SAMPLES

810 - 820 DOLOMITE; GRAYISH BROWN; 21% POROSITY, INTERGRANULAR, VUGULAR;
50-90% ALTERED; EUHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: LIMESTONE-VCA, QUARTZ SAND-VCA, DOLOMITE-VCA;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, ECHINOID;

820 - 830 DOLOMITE; GRAYISH BROWN; 21% POROSITY, INTERGRANULAR, VUGULAR;
50-90% ALTERED; EUHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: LIMESTONE-VCA;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA;

830 - 840 DOLOMITE; DARK YELLOWISH BROWN; 21% POROSITY, INTERGRANULAR, VUGULAR;
50-90% ALTERED; EUHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: LIMESTONE-VCA;
FOSSILS: MOLLUSKS;

840 - 850 AS ABOVE

850 - 860 DOLOMITE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN; 21% POROSITY, INTERGRANULAR, VUGULAR;

GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, IRON STAIN-01%, QUARTZ SAND-05%, LIMESTONE-15%;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA;

860 - 870 AS ABOVE

870 - 880 LIMESTONE; VERY LIGHT ORANGE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 90% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CHERT-01%, IRON STAIN-01%, QUARTZ SAND-01%, PEBT-01%;
FOSSILS: MOLLUSKS;

880 - 890 AS ABOVE

890 - 900 AS ABOVE

900 - 910 AS ABOVE

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910 - 920 LIMESTONE; VERY LIGHT ORANGE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 90% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-02%, PHOSPHATIC SAND-01%;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS;

920 - 930 LIMESTONE; VERY LIGHT ORANGE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 90% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-05%, PHOSPHATIC SAND-02%, QUARTZ-01%;
FOSSILS: BENTHIC FORAMINIFERA;

930 - 940 AS ABOVE

940 - 950 LIMESTONE; VERY LIGHT ORANGE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 90% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-05%, PHOSPHATIC SAND-03%, QUARTZ-04%, IRON STAIN-01%;
FOSSILS: BENTHIC FORAMINIFERA;

950 - 960 AS ABOVE

960 - 970 AS ABOVE

970 - 980 LIMESTONE; VERY LIGHT ORANGE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 90% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;

ACCESSORY MINERALS: QUARTZ SAND-[illegible]%, PHOSPHATIC SAND-[illegible]%, QUARTZ-[illegible]%;
FOSSILS: BENTHIC FORAMINIFERA;

980 - 990 AS ABOVE

990 - 1000 LIMESTONE; VERY LIGHT ORANGE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 90% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: IRON STAIN-02%;
FOSSILS: NO FOSSILS;

1000 TOTAL DEPTH

LITHOLOGIC WELL LOG PRINTOUT SOURCE - FGS

WELL NUMBER: W- 4702 COUNTY - HILLSBOROUGH
TOTAL DEPTH: 265 FT. LOCATION: T.30S R.18E S. 5
21 SAMPLES FROM 0 TO 265 FT. LAT = N 27D 54M 02
LON = W 82D 31M 37
COMPLETION DATE - 22/06/56 ELEVATION - 9 FT
OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER: TARNOW FOOD DELICACIES, INC./BEN LOVELACE AND CO.

WORKED BY: SAMPLES DESCRIBED BY CHRISTOPHER WAYNE
MANY SAMPLES MISSING

150. - 200. 122HTRN HAWTHORN GROUP
200. - 265. 123SWNN SUWANNEE LIMESTONE

0 - 150 0-180 MISSING

150 - 190 DOLOMITE; WHITE TO MODERATE LIGHT GRAY; 21% POROSITY, INTERGRANULAR, VUGULAR; 10-50% ALTERED; ANHEDRAL:
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: IRON STAIN-01%;
FOSSILS: NO FOSSILS;

190 - 200 NO SAMPLES

200 - 210 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: IRON STAIN-01%, SPAR-01%;
FOSSILS: NO FOSSILS;
CHARACTERISTIC SUWANNEE LMST.

210 - 220 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-01%, SPAR-01%, CHERT-01%;
FOSSILS: BENTHIC FORAMINIFERA;
WITH SORITES

220 - 240 AS ABOVE

240 - 250 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT (TYPE(S)): CALCILUTITE MATRIX;
ACCESSORY MINERALS: QUARTZ SAND-01%, CHERT-01%, SPAR-02%;
FOSSILS: ECHINOID, BENTHIC FORAMINIFERA, MOLLUSKS;

250 - 265 LIMESTONE; WHITE; 20% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN TYPE: INTRACLASTS, CRYSTALS; 70% ALLOCHEMICAL CONSTITUENTS;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT (TYPE(S)): CALCILUTITE MATRIX;
ACCESSORY MINERALS: DOLOMITE-01%, QUARTZ SAND-01%, CHERT-01%, SPAR-01%;
FOSSILS: ECHINOID, BENTHIC FORAMINIFERA, MOLLUSKS;
WITH ROTALIA MEXICANA

265 TOTAL DEPTH

AREAS OF NATURAL RECHARGE TO THE FLORIDAN AQUIFER IN FLORIDA

By
J. W. Stewart

Prepared by the
U.S. GEOLOGICAL SURVEY
in cooperation with the
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
BUREAU OF WATER RESOURCES MANAGEMENT

Tallahassee, Florida
1980

DEPARTMENT OF NATURAL RESOURCES
BUREAU OF GEOLOGY

This public document was promulgated at a total cost of $617.00 or a per copy cost of $.33 for the purpose of disseminating hydrologic data.

INTRODUCTION

The Floridan aquifer is the most extensive and widely used aquifer in Florida. In 1970 about 3,070 million gallons per day were withdrawn from the aquifer. 622 million gallons per day for public supplies are total equal of for agriculture use. 1[illegible] million gallons per day for industrial use, and the largest for thermoelectric power generation.

Water use has increased greatly during the past decade and is expected to increase in increasing. Information is needed to plan for the future development and management of the Floridan aquifer. This report identifies areas of natural recharge to the Floridan aquifer and evaluates their effectiveness. The report also includes a discussion of artificial recharge methods that have been used or that could be used to supplement natural recharge to the Floridan. The report was prepared in cooperation with the Bureau of Water Resources Management, Florida Department of Environmental Regulation.

DISTRIBUTION OF RAINFALL

The principal source of recharge to the Floridan aquifer is rainfall. Average annual rainfall in Florida is about 54 in. but varies in the north and range from about 41 inches along the east coast to more than 60 inches in parts of the Tallahassee and others 1971). Extreme rainfall totals range from about 35 inches to about 65 inches annually or about 80 to 90 percent of the average annual rainfall.

GEOHYDROLOGY

The Floridan aquifer is composed mostly of limestone and dolomite and includes the following geologic formations: Tampa City Limestone, Suwannee Limestone, and Ocala Group. All of Eocene age. Suwannee Limestone of Oligocene age and Tampa Limestone and lower part of the Hawthorn Formation of Miocene age where in contains limestone beds that are hydrologically interrelated to the older limestones (Parker and others 1955). The aquifer ranges in thickness from about 500 feet in south central Florida to about 2,000 feet in central and northeast Florida (Lichter 1973 and Healy 1975).

In some areas the Floridan aquifer is at or near land surface. In other areas it is as much as 1,000 feet below land surface. The altitude of the top of the aquifer is shown in figure 1. Where the aquifer is buried it is overlain by a varying sequence of sand, clay marl and limestone that ranges in thickness from a few feet to parts of south central and east Florida to several hundred feet in south central Florida. The overlying limestone and permeability of these materials affect the quantity and the quality of water that recharges the aquifer.

Deposits of sand blanket much of Florida. The sand forms a water table aquifer that absorbs that part of the rainfall that is not lost by evapotranspiration or surface runoff. Not all the water reaching the water table or those areas are available to recharge the Floridan. Some great areas on the east flatwoods intermittent streams where the surface water table is not below ground elevation in large areas. Part of the water that reaches the water table aquifer is used in the shallow aquifer to recharge the Floridan aquifer where the potentiometric surface of the Floridan is below the water table.

Where there is a sequence of low permeability between the water table aquifer and the Floridan the clay and marl impede movement of water between the aquifers and cause the water in the Floridan to be confined. Water in the Floridan aquifer is considered to come from areas of much of the basin.

Where the Floridan is at or near land surface, the water table is at the Floridan and there the aquifer is unconfined and is recharged directly by rainfall. Recharge also occurs from streams that intersect the aquifer and through sinkholes that are open to the aquifer.

Most of the potentiometric surface of the Floridan aquifer when used for its recharge with other hydrologic data are useful in delineating areas of natural recharge. Recharge and areas of large ground-water withdrawals in wells in May 1974 (Healy 1975) the altitude of the potentiometric surface of the Floridan aquifer ranged from sea level to more than sea level at the recently measured area of coastal Dade County to as much as 100 feet below sea level in northwestern Walton County (fig. 2). The head was shallow and to be least where in the inland northern and water throughout the southern part of the State along most of the coastal areas and in most low areas, valleys, in where the potentiometric surface of the Floridan aquifer is above the water table, water leaks upward from the Floridan to the water table aquifer. These areas generally constitute areas of natural discharge rather than areas of recharge to the aquifer.

EVALUATING AND DELINEATING RECHARGE AREAS

Various geologic and hydrologic factors affect recharge of the Floridan aquifer and aid in defining areas of varying recharge potential. Of these, land surface, landforms are a major indicator of the amount of recharge to the Floridan aquifer. The no large rate generally is not as low as areas dominated by poorly drained soils. Indicates in areas dominated by moderately drained soils and high in areas of well-drained soils. Some of the poorest infiltration areas are in the areas of well-drained permeable sand ridges of varying and west central Florida which underlie parts of Orange, Lake, Polk, Pasco and Hernando counties. Because the moderately to poorly well-drained areas occupy much a large part of the basin water areas, nonetheless large total rate of recharge to the Floridan aquifer.

The thickness and permeability of the land surface material to reach the soil zone affect the quantity of water that can be stored in the water table aquifer. In areas of deeper and permeable water moves in the water table aquifer is a potential source of recharge to the Floridan aquifer. However where the water table is at the water table aquifer and the potentiometric surface of the Floridan are at or near land surface permeability recharge is limited by the "fill" condition of the aquifers. In most areas most of the precipitation is used as a supplemental or spring and is surface runoff.

Where the Floridan aquifer is overlain by confining beds, the thickness and permeability of the confining beds are principal factors in controlling the amount of recharge to the Floridan from the water table aquifer. The thicker and less permeable confining beds impede movement of water between the two aquifers more than the thinner and more permeable beds (fig. 3).

Topographic and landforms have a distinct influence on recharge of the Floridan aquifer by controlling the hydraulic which have the more permeable soils and deep water table, delineate areas in which most of it both do not have surface drainage are the prime areas of natural recharge. The best areas along the coast and through and the southern part of the peninsula are areas of artesian flow and where there are discharge areas where they are influenced by pumping.

The areas could depend of recharging the Floridan aquifer in the direct rainfall at surface runoff area sinkholes that are directly connected with the aquifer. Many sinkhole areas have channel-shaped topography characterized by most and drainage and areas that are sometimes sinkholes that are open from land surface to the Floridan aquifer. Recharge through directly connected sinkholes is not as common as other types of natural recharge, but in some areas sinkholes are the prime and parts of recharge to the Floridan aquifer. Major areas of recharge through directly connected sinkholes are in central Polk, north central Pasco, south central Hernando and parts of Citrus and northwestern Levy counties.

DESCRIPTION OF RECHARGE AREAS

The potentially for natural recharge to the Floridan aquifer are classified into four types. They are (1) areas of generally no recharge, (2) areas of very low recharge, (3) areas of very low to moderate recharge and (4) areas of high recharge. The areas are generalized and local discharge areas such as water stream depression and water control areas are not included.

The areas of generally no recharge under natural conditions are mostly where the potentiometric surface of the Floridan aquifer is above land surface north of the line and outside with areas of artesian flow shown by Healy (1975). About 45 percent of the State falls within this classification. The areas of known very low recharge are where the surface is known to be overlain by relatively impervious clay beds generally more than 25 feet thick. In some areas recharge rates are estimated to be less than 5 inches per year. The areas of very low to moderate recharge are where the confining beds are generally less than 40 feet thick or broached but are beds underlying where the sinkhole bed may be more than 25 feet thick and underwater. Areas of very low to moderate recharge also include areas where the confining bed is absent but where the water table and the potentiometric surface of the Floridan aquifer are both close to the land surface or at least recharge occurs. Recharge rates of very low to moderate recharge are estimated to range from less than 5 inches to as much as 10 inches per year. The areas of high recharge represent about 15 percent of the State and in these areas recharge rates are estimated to range from 10 to 20 inches per year.

ARTIFICIAL RECHARGE

Throughout much of the State recharge to the Floridan aquifer is increased by pumping from the Floridan aquifer. Pumping lowers the potentiometric surface and increases the head difference between the water table aquifer and the potentiometric surface of the Floridan aquifer where the potentiometric surface is naturally below the water table. This increases the leakage through the confining beds from the overlying water table aquifer in areas where the potentiometric surface is shown to be below the water table aquifer and the water table is at or near land surface. In areas of the potentiometric surface of the Floridan aquifer by pumping may result in recharging part of the water that would otherwise be lost to runoff or evapotranspiration.

In areas where the potentiometric surface of the Floridan aquifer is above the water table aquifer, lowering of the potentiometric surface below the water table by pumping from the Floridan aquifer generally increases the head difference between the two aquifers. The increase recharge to the Floridan aquifer in areas where the potentiometric surface is above land surface, such as in swamp and springs, lowering the potentiometric surface by pumping from wells in the Floridan aquifer may reverse the gradient towards the ground water, resulting in capture of water that would otherwise be lost to spring and swamp discharge. The areas of large ground water withdrawal from the Floridan aquifer shown in figure 4 are areas of increased or induced recharge or increased recharge from the Floridan aquifer.

Several other methods of artificially recharging the Floridan aquifer are as follows:

1. Artificial recharge to the Floridan aquifer by gravity flow from the surface aquifer through a network of connecting wells is a locally proven method in Florida. This method consists of constructing one or more wells that are open to both the water-table aquifer and the Floridan aquifer allowing water to flow downward by gravity into the Floridan aquifer. This method is feasible in areas where the water table is higher than potentiometric surface and the water table is at least 10 to 20 feet above the potentiometric surface of the Floridan aquifer. The use of artificial recharge wells is dependent upon adequate water has been tested or estimated recharge to the Floridan aquifer is not yet fully developed where. Early experimentation conducted in 1974 in Hillsborough County indicated that the method is technically successful (Stanley 1977). Areas where it has potential for artificial recharge are the Floridan aquifer using artificial wells include parts of northern Lake Pasco, Hernando, and Walton counties, parts of central Orange County, southwest Polk County, northwest Manatee County, small parts of southeast Hillsborough County, southwest Hardee County, eastern Dubois County, and west central Highlands County.

2. Drainage wells are used extensively to drain permanently wet areas and flood prone areas and to control lake levels. The wells were constructed throughout the south central part of the State or late in the 1960s. However, in recent years, some of the areas have been determined during the past decade because of concern regarding the poor quality of water injected. The wells were constructed to small size using through the surficial materials and leakage the borehole open to the Floridan aquifer. Large surface water was diverted to the wells and water forced by gravity down the casing to recharge the Floridan aquifer. The Orlando Water Park, some in one of artesian use of drainage wells and large quantities of water are recharged to the Floridan through them.

3. Treatment plant of surplus freshwater and treated wastewater use the Floridan aquifer through wells in a relatively new process. This method is feasible in areas where the potentiometric surface of the Floridan aquifer is below or close to the water table. The method of artificially recharged is operating the fresh or treated water into the water table of the aquifer to obtain additional storage and to prevent or damage of the potentiometric surface. Potentiometric of fresh water also possible water source include a little permanent storage since the Floridan aquifer is already full. The last proposed is gain from the water reservoir water in Dade County and at Margate and Coral Springs wastewater disposal systems are under construction in West Palm Beach, Boca Raton, Fort Lauderdale, Clearwater and south of Miami. Cycle storage of fresh water in other parts of the Floridan aquifer is being evaluated in Manatee by the U.S. Geological Survey.

Lack of knowledge of determining the water available for recharge or the high recharge areas such as by underlying importance of water diversion of rainfall to sinkholes or spreading of fresh water water would artificially increase the amount of recharge to the Floridan. However the amount that recharge can be increased cannot be determined without detailed study of an area.

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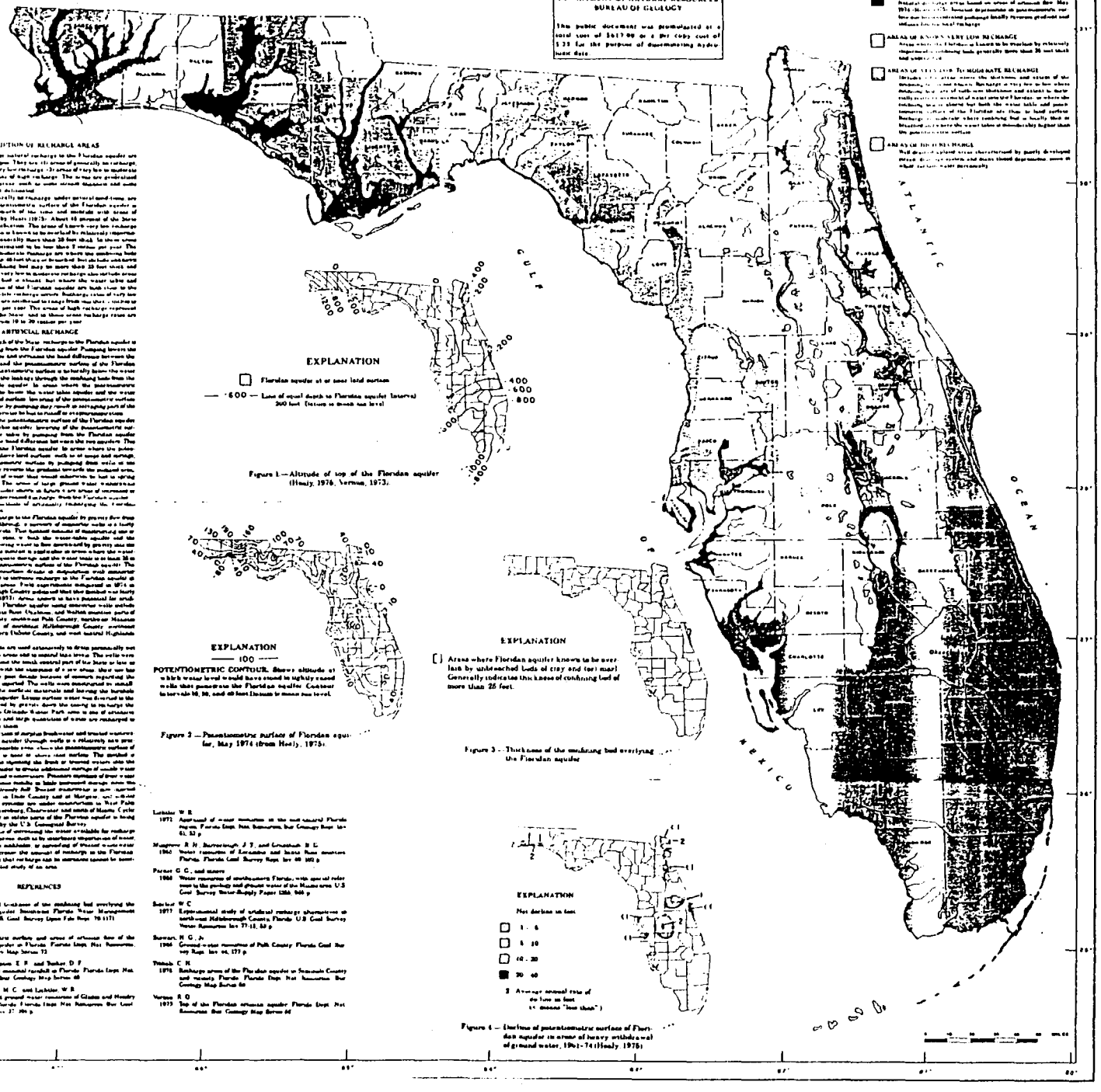

ND 18

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION, Complainant,	:	IN THE OFFICE OF THE South WEST DISTRICT,
vs.	:	
Frank Smith, dba: Roto Rooter Sewer Service, Respondent.	:	OGC Case No.:

NOTICE OF VIOLATION AND
ORDERS FOR CORRECTIVE ACTION

TO: Frank Smith
dba: Roto-Rooter Sewer Company
5390 So. West Shore Blvd.
Certified Mail Number P.O. Box 13627 TPA. 33611

Pursuant to the authority of Section 403.121(2), Florida Statutes, [Section 403.860(3), Florida Statutes, if NOV concerns violation of the Florida Safe Drinking Water Act] and Florida Administrative Code Rule 17-1.58(1), the State of Florida Department of Environmental Regulation ("Department"), gives notice to [Frank Smith , et] ("Respondent"), of the following findings of fact and conclusions of law with respect to violations of Chapter 403, Florida Statutes:

FINDINGS OF FACT

PARAGRAPHS APPLICABLE TO ALL COUNTS

1. The Department is the administrative agency of the State of Florida which has the authority to administer and enforce the provision of Chapter 403, Florida Statutes, and the rules promulgated thereunder, Chapter 17, Florida Administrative Code.

2.) Respondent is Proprietor of Roto-Rooter Sewer Service, a business specializing in the Cleaning of building drains; the Pumping of Individual Domestic waste septics, Oil-water Separators, Restaurant grease traps and Auto Service station Sumps; and the supply and Maintenance of temporary toilet facilities for Construction Projects and Similar functions.

3) Respondent operates his Sewer Service business from a parcel of land located at 5390 Southwestshore Boulevard, Tampa, Hillsborough County. (Section 8, Township 30So., Range 18E.; deed copy attached as exhibit "A.")

4.) In the Course of conducting his business, Respondent Stores Domestic waste derived from Pumping Individual Septic tanks, and from Pumping Portable toilets in a series of below ground tanks. These tanks are made of Steel and are generally in a very Poor State of Repair.

5.) Respondent has also used a portion of his Property for the improper disposal of Oils derived from a Variety of industrial Sources. These Oils are Present in a Shallow Pit in the East-Central Portion of the Respondents Property.

(6.) The Department previously informed Respondent of its belief that Respondent was in violation of Chapter 403, Florida Statutes, and the rules promulgated thereunder by letters dated January 17, 1983, (Warning Notice No. 84-82-12-364; Exhibit "B")

Warning Notice #9982-12-364 Contained Specific instructions regarding Sampling which was deemed to be necessary in order to assess the true extent of the Respondents Violations.

(7.) Respondent agreed in writing on January 21, 1983 to accomplish the Sampling Program requested in warning Notice #29-82-13-264. No time certain within which the sampling and analysis would occur was specified. (Exhibit "C")

(8.) When the Respondent failed to submit the analytical information ~~agreed to~~ required in exhibit "B" and agreed to in exhibit "C" within approximately forty (40) days, the Department sent a follow-up request to the Respondent asking him to provide the name of the laboratory retained, the date the samples were taken, the technician's name and address, and the projected reporting date. (March 1, 1983; attached as exhibit "D") Respondent replied by phone on March 4, 1983, (exhibit "E") indicating that a consulting laboratory was to give him an estimate on the required sampling and analysis.

(9.) On April 29, 1983, the Respondent was informed by letter that four (4) months had elapsed since he was notified that sampling would be required at his site. (Exhibit "F") Respondent was informed of the Department's intent to proceed with enforcement pursuant to sections 403.141 and 403.161 Fla. Statutes. Said letter was delivered to Respondent by Certified Mail (P481-530-225) on May 4, 1983.

(10.) The Respondent replied by telephone, and requested a modification of the sampling conditions. The Respondent then followed his telephone call with a copy of the cost estimate given to him by NFS, Services, Inc. in response to the Department's

letter of March 1, 1983, (Exhibit "E"). On June 15, 1983 the Respondent was advised in writing what modifications of the sampling plan were acceptable to the Department. (Exhibit "F") On ~~June the~~ June 22, 1983 Certified letter Number P481-834-468 was sent to the Respondent informing him that the required sampling information pursuant to the Departments' letter of June 15, 1983 (exhibit "E") would be due in the South West District Office on August 15, 1983.

(11.) As of the date of this Notice of Violation, the Respondent has not made any further effort to execute the required sampling and analysis, nor has any such report been received by the Department.

Count I

12.

Reference #19

A DIGITAL MODEL OF THE FLORIDAN AQUIFER, NORTH OF TAMPA, FLORIDA

By Alton F. Robertson and Michael J. Mallory

U. S. GEOLOGICAL SURVEY

Water-Resources Investigations 77-64

Prepared in cooperation with the

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

October 1977

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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

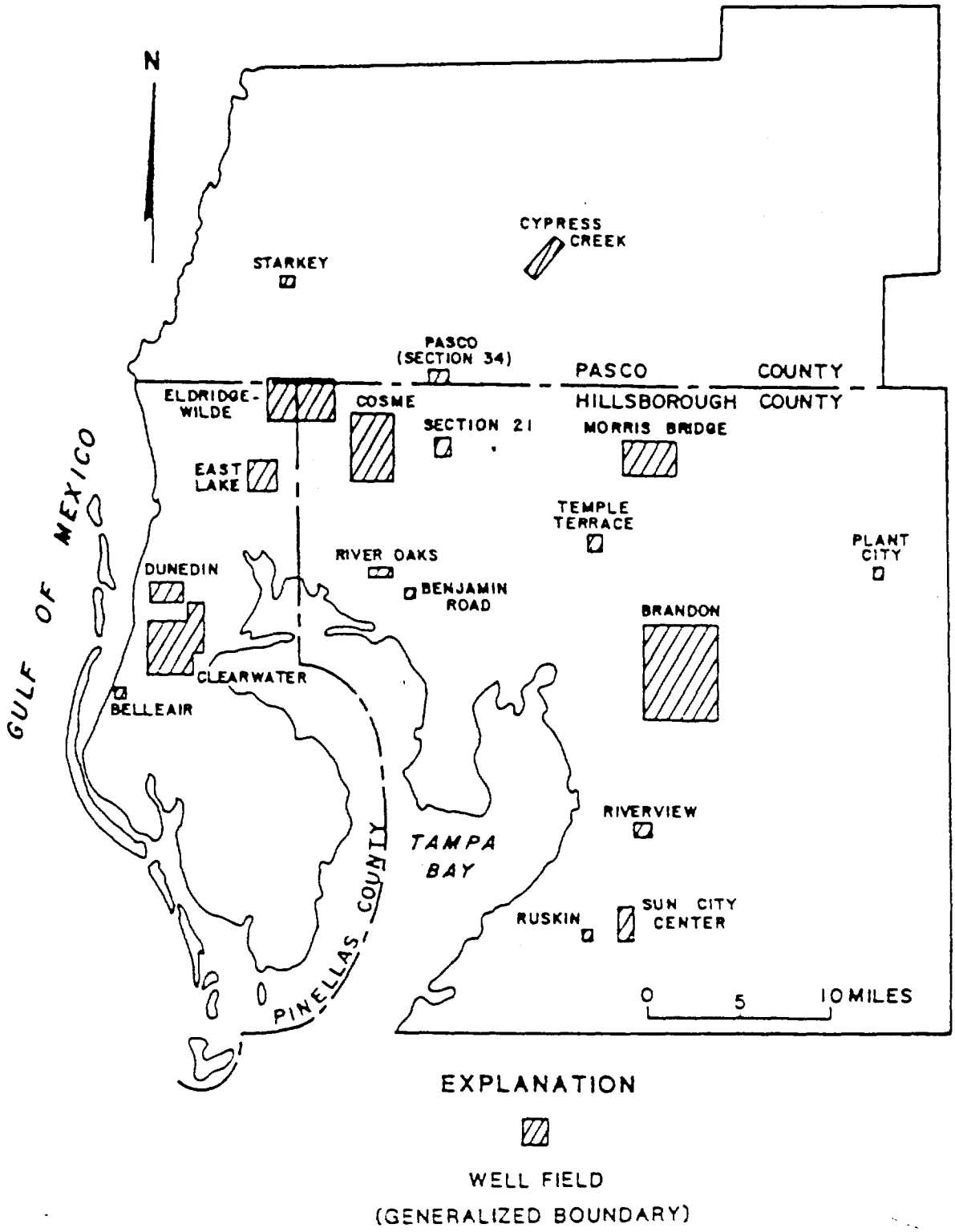


Figure 22.--Location of selected well fields in Hillsborough, Pasco, and Pinellas Counties.

U.S. Air Force Installation Restoration Program

REMEDIAL INVESTIGATION WORK PLAN (RIWP) FOR MACDILL AIR FORCE BASE, FLORIDA

General Order 13B-97385C
Task Order Authorization Y-01

Prepared for

OAK RIDGE NATIONAL LABORATORY
OAK RIDGE, TENNESSEE 37831

Operated by

MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
DEPARTMENT OF ENERGY

Prepared by

CH2M HILL
3030 North Rocky Point Drive, West Suite 350
Tampa, Florida 33607

FCR24685.31.00
December 1988

rainfall in August. Heavy thunderstorms are common during summer months, accounting for high rainfall averages during the summer season. Average annual evapotranspiration is approximately 39 inches; average annual lake evaporation is approximately 51 inches (Fernald and Patton, 1984).

MAFB is located within the Gulf Coastal Lowlands of the Gulf Coastal Plain Province, which is characterized by flat topography with numerous wetlands. The base is also characterized by flat topography, with elevations of 15 feet msl or less. A portion of the base is below 5 feet msl and is covered by mangrove swamp.

Surface-water hydrology on MAFB is characterized by low, flat areas with low runoff rates and standing water areas. Drainage canals, storm drains, and tidal creeks drain the base into Tampa Bay and Hillsborough Bay. Surface-water runoff from precipitation is controlled by a stormwater canal system that carries water to tidal creeks or directly to Tampa Bay or Hillsborough Bay. Tidal streams and mangrove swamps cover a large portion of the south base area. Broad Creek and Coon Hammock Creek are the two main outlets in the mangrove area.

Central Florida and MAFB lie within the Atlantic Coastal Plain Geologic Province. The Coastal Plain is characterized by thick unconsolidated to consolidated sediments forming a wedge that thins inland and generally overlies crystalline bedrock. In central Florida, the Coastal Plain sediments found at the surface are Miocene or younger rocks, and consist of clastic sediments and some sandy limestones and dolomites. The surficial deposits at MAFB consist of thin layers of fine, quartzitic sands and clay which overlie the Tampa Limestone. The Tampa Limestone has an irregular surface of solution cavities and voids and is the upper-most unit of the limestone aquifer system in this area.

The regional hydrogeology of the west-central Florida area is characterized as a multi-layered aquifer system which includes a surficial aquifer and the confined limestone aquifer. Groundwater at MAFB occurs in the shallow, surficial aquifer under unconfined conditions. The surficial aquifer at MAFB consists of fine to very fine sands and clayey sands that are from 5 to 25 feet thick. The water table in these materials is high, often within 3 feet below ground surface. The upper limestone aquifer underlies the surficial aquifer at MAFB. The surficial aquifer and the limestone aquifer may be hydraulically connected in some areas beneath MAFB.

The surficial aquifer is not used for drinking water supplies on MAFB. The limestone aquifer, although not used

for water supplies at MAFB, is a major source of water in west-central Florida and the Tampa area. Large well fields exist north of Tampa that supply water to municipalities and industries. Water supply for MAFB is provided primarily from the Hillsborough River by the City of Tampa.

1.4 REMEDIAL INVESTIGATION OBJECTIVES

The RI is a field effort designed to investigate site conditions at 10 IRP sites at MAFB. Site locations are shown in Figure 1.2. The investigation is designed in a step-wise approach. This approach will allow expansion or reduction of the investigations at each site based on field results, thus allowing project activities to be adjusted to reflect field conditions.

The primary objectives of the RI activities are to 1) identify whether contaminants are present and whether contaminant release has occurred; 2) to further evaluate the extent of contaminant migration and characterize the source of contaminants; 3) to obtain sufficient data to support future remedial actions (e.g., feasibility study, immediate removal, or no further action); and 4) to provide recommendations for the next step in the IRP process.

The RI process will involve the following two-staged approach:

- Stage 1. Obtain sufficient information to determine whether a site can be removed from further study or should be carried forward into Stage 2 investigations. The decision to remove a site from further study will be based on a risk assessment (RA) and would be documented with a technical memorandum stating that no further action is required (NFAR).

- Stage 2. Conduct further field studies to fill in data gaps identified in the Stage 1 investigations. Some Stage 2 investigations may culminate with an RA/NFAR. Others will go on through FS, remedial design (RD), and site remediation. For some of the latter, it may be necessary to go through a second round of work plan development and then to a third stage of field investigation. Second-round work plan development is covered under Task Order Y-01, but third stage field investigations are not included.

Stage 1 and Stage 2 activities will be supplemented by record searches, where appropriate. The extent of Stage 2 activities will depend on the findings in Stage 1.

M.2 - SITE MAINTENANCE FORM

* ACTION: _ *

EPA ID: FLD981015621

SITE NAME: ROTO - ROOTER SOURCE: R

STREET: 5320 S WESTSHORE BLVD CONG DIST: 07

CITY: TAMPA ZIP: 33681

CNTY NAME: HILLSBOROUGH CNTY CODE: 057

LATITUDE: 27/57/06.0 LONGITUDE: 082/27/00.0

SMSA: 8280 HYDRO UNIT: 03100206

INVENTORY IND: Y REMEDIAL IND: Y REMOVAL IND: N FED FAC IND: N

NPL IND: N NPL LISTING DATE: NPL DELISTING DATE:

APPROACH: SITE CLASS:

SITE/SPILL IDS:

RPM NAME: RPM PHONE: - -

DIOXIN TIER: REG FLD1: REG FLD2:

RESP TERM: PENDING ( ) NO FURTHER ACTION ( ) * PENDING (_) NO FURTHER ACTION (_)

ENF DISP: NO VIABLE RESP PARTY ( ) VOLUNTARY RESPONSE ( )

ENFORCED RESPONSE ( ) COST RECOVERY ( )

SITE DESCRIPTION:

M.2 - PROGRAM MAINTENANCE FORM

* ACTION: _ *

SITE: ROTO - ROOTER

EPA ID: FLD981015621 PROGRAM CODE: H01 PROGRAM TYPE: * _ *

PROGRAM QUALIFIER: ALIAS LINK : * * *

PROGRAM NAME: SITE EVALUATION *

DESCRIPTION:

* *
* *
* *
* *

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: ROTO - ROOTER
PROGRAM: SITE EVALUATION

EPA ID: FLD981015621 PROGRAM CODE: H01 EVENT TYPE: DS1

FMS CODE: EVENT QUALIFIER: EVENT LEAD: E * _ ___ _ *

EVENT NAME: DISCOVERY STATUS: * _____ _

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START:	__/__/__	__/__/__	__/__/__
COMP :	COMP :	COMP : 85/06/30	__/__/__	__/__/__	__/__/__

HQ COMMENT:

* _____ *

RG COMMENT:

* _____ *

COOP AGR #	AMENDMENT #	STATUS	STATE %
_____	_____	__	___

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: ROTO - ROOTER
PROGRAM: SITE EVALUATION

EPA ID: FLD981015621 PROGRAM CODE: H01 EVENT TYPE: PA1

FMS CODE: EVENT QUALIFIER: EVENT LEAD: S * _ ___ _ *

EVENT NAME: PRELIMINARY ASSESSMENT STATUS: * _____ _

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START:	__/__/__	__/__/__	__/__/__
COMP :	COMP :	COMP : 85/09/12	__/__/__	__/__/__	__/__/__

HQ COMMENT:

* _____ *

RG COMMENT:

* _____ *

COOP AGR #	AMENDMENT #	STATUS	STATE %
_____	_____	__	___

File Copy

ROTO-ROOTER SEWER SERVICE
FLD981015621
PRELIMINARY ASSESSMENT

A. SITE DESCRIPTION. The Roto-Rooter Sewer Service site is located at 5320 South Westshore Boulevard, Tampa, Hillsborough County, Florida. The facility specializes in the collection, storage and disposal of domestic and commercial septage waste and industrial oils. The area of the site and the period of operation are unknown.

B. DESCRIPTION OF HAZARDOUS CONDITIONS, INCIDENTS AND PERMIT VIOLATIONS. FDER site inspectors on January 12, 1983, found that the site owner had allowed the indiscriminant dumping of waste oils and oily sludges onto the ground surface. Domestic waste materials and sludges were found to be stored in leaking, below ground tanks. An unlined pit used for the disposal of waste oil was also discovered. As a result of the inspection a warning notice was issued by the FDER to the owner requiring that a sampling program be conducted. The owners' contractor, Professional Service Industries, Inc. (P.S.I.), on February 7, 1985, detected volatile organic compounds, elevated nutrient and bacteria levels in on-site groundwater samples. In addition, surface water sample analysis by P.S.I. of water in an adjacent off-site drainage ditch detected fecal coliform bacteria (1,700 counts/100ml). Surface soil sample analyses from the on-site disposal pit detected high concentrations of some metals and 1,2-dichloropropane (11,000 ug/mg).

C. NATURE OF HAZARDOUS MATERIALS. The waste present include compounds that are toxic, persistent, volatile, flammable and known or suspected carcinogens.

D. ROUTES OF CONTAMINATION. Potential routes of contamination are groundwater, surface water, air and direct contact.

E. POSSIBLE AFFECTED POPULATION AND RESOURCES. The area residents are provided with drinking water from the city of Tampa's municipal system. The city's source for potable water is the Hillsborough River located upgradient from the site. Therefore, contaminant introduction into the public system is unlikely. However, some area residents may utilize individual water wells for other purposes.

Contaminated groundwater and surface water from the contaminated ditch which empties into an off-site pond may enter Tampa Bay, thereby, potentially exposing recreational users and wildlife to contaminants.

Humans may also come in contact with hazardous substances via contaminated soil, open septage and contaminated ditch water. Potential fires in the pit could injure workers, contaminate air and damage off-site property. Volatile compounds and septage gases may also contaminate the air.

F. RECOMMENDATIONS AND JUSTIFICATIONS. The facility owners were required to implement a sampling program at the site. Sampling was conducted in February 1985 by an independent contractor for the owners. Therefore, it is recommended that the site be given a low priority for further investigation.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION
01 STATE: FL | 02 SITE NUMBER: D981015621

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site): Roto-Rooter Sewer Service

02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: 5320 South Westshore Boulevard

03 CITY: Tampa

04 STATE: FL | 05 ZIP CODE: 33681 | 06 COUNTY: Hillsbourgh | 07 COUNTY CODE: 057 | 08 CONG DIST: 09

09 COORDINATES LATITUDE: 27 53 00.0 | LONGITUDE: 082 31 30.0

10 DIRECTIONS TO SITE (Starting from nearest public road):
Proceed south from Tampa on the Crosstown Expressway (State Route 618). Exit onto Gandy Blvd. and then left onto South Westshore Blvd. The site is located to the left on South Westshore Blvd. immediately prior to reaching the railroad tracks.

III. RESPONSIBLE PARTIES

01 OWNER (If known): Roto-Rooter, Drain and Sewer Service

02 STREET (Business, mailing, residential): P.O. Box 13627

03 CITY: Tampa

04 STATE: FL | 05 ZIP CODE: 33681 | 06 TELEPHONE NUMBER: (813) 839-0038

07 OPERATOR (If known and different from owner): Frank Smith, Owner

08 STREET (Business, mailing, residential): Same

09 CITY: Same

10 STATE | 11 ZIP CODE | 12 TELEPHONE NUMBER: ( ) Same

13 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☒ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES DATE 01/12/83 (MONTH DAY YEAR)
☐ NO

BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☒ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)

CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
Pre-1983 (BEGINNING YEAR) | Present (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
Hazardous substances present at the site include domestic septage waste, industrial oils and commercial oily waste. These wastes contain metals and volatile organics that are toxic, persistent, volatile, flammable and known or suspected carcinogens.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
The owners have allowed the indiscriminant dumping and the unstable containment of waste oils and septage to occur at the site. As a result, volatile organics and metals have contaminated on-site groundwater and metals have contaminated on-site soils. In addition, high counts of fecal coliform have been detected in an off-site drainage ditch that eventually discharges into Tampa Bay.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☒ B. MEDIUM (Inspection required) ☐ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT: Eric Nuzie Eric L. Nuzie

02 OF (Agency/Organization): Florida DER

03 TELEPHONE NUMBER: (904) 488-0190

04 PERSON RESPONSIBLE FOR ASSESSMENT: David Troutman

05 AGENCY: N/A | 06 ORGANIZATION: E.C. Jordan Co. | 07 TELEPHONE NUMBER: (904) 656-1293 | 08 DATE: 06/05/85 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

JB

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D981015621

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [ ] A. SOLID
- [ ] B. POWDER, FINES
- [x] C. SLUDGE
- [ ] D. OTHER _____ (Specify)
- [ ] E. SLURRY
- [x] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS unknown
CUBIC YARDS unknown
NO. OF DRUMS unknown

03 WASTE CHARACTERISTICS (Check all that apply)

- [x] A. TOXIC
- [ ] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [x] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [x] G. FLAMMABLE
- [ ] H. IGNITABLE
- [x] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [ ] K. REACTIVE
- [ ] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	unknown		The owner has dumped and stored
OLW	OILY WASTE	unknown		septage and industrial waste
SOL	SOLVENTS			oils in an indiscrimanant
PSD	PESTICIDES			manner.
OCC	OTHER ORGANIC CHEMICALS	unknown		
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	unknown		

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION	
OCC	1,2, - Dichloropropane	78875	SI	1810	ug/l	1/
OCC	Chlorobenzene	108-90-7	SI	250	ug/l	1/
OCC	Dichloromethane	999	SI	41	ug/l	1/
OCC	Benzene	71432	SI	2,540	ug/l	1/
OCC	Ethylbenzene	100414	SI	128	ug/l	1/
MES	Silver	7440-22-4	SI	50	ug/l	2/
MES	Barium	7440-39-3	SI	6,700	ug/l	2/
MES	Cadmium	7440-43-9	SI	630	ug/l	2/
MES	Lead	7439-92-1	SI	28,000	ug/l	2/
MES	Mercury	7439-92-6	SI	13	ug/l	2/
MES	Iron	999	SI	740,000	ug/l	2/
MES	Manganese	7439-96-5	SI	4,100	ug/l	2/
MES	Zinc	7440-66-6	SI	23,000	ug/l	2/
MES	Copper	7440-50-8	SI	15,000	ug/l	2/
MES	Sodium	7440-28-5	SI	11,000	ug/l	2/
MES	Chromium	7439-92-1	SI	3,700	ug/l	2/

V. FEEDSTOCKS (See Appendix for CAS Numbers) N/A

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See attached reference list.

EPA FORM 2070-12 (7-81)

1/ Concentrations taken from on-site groundwater monitoring wells.

2/ Concentrations taken from surface soil of the on-site disposal pit.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: FL
02 SITE NUMBER: D981015621

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION — 02 ☒ OBSERVED (DATE: 2/7/85) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 101-1,000 — 04 NARRATIVE DESCRIPTION

The following compounds were in on-site groundwater samples: 1,2,-dichloropropane (1,810 ug/l), chlorobenzene (250 ug/l), dichloromethane (41 ug/l), benzene (2,540 ug/l), and ethylbenzene (128 ug/l). High nutrient levels and coliforms were also detected in these samples.

01 ☒ B. SURFACE WATER CONTAMINATION — 02 ☒ OBSERVED (DATE: 2/7/85) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 1,001-3,000 — 04 NARRATIVE DESCRIPTION

Surface water sample analysis by PSI of a nearby drainage ditch detected fecal coliform bacteria (1,700 counts/100ml) that may be attributed to the on-site unstable storage of septage. The drainage ditch leads into a small unnamed pond which discharges into Tampa Bay.

01 ☒ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: ____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 101-1,000 — 04 NARRATIVE DESCRIPTION

Oily waste within the pit area may ignite, contaminating the air. The exposed volatile organic compounds and septage gases may also contaminate the air.

01 ☒ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: ____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 101-1,000 — 04 NARRATIVE DESCRIPTION

See section C, "Contamination of Air."

01 ☒ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: ____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 101-1,000 — 04 NARRATIVE DESCRIPTION

Persons may come into contact with hazardous substances via contaminated soil, open septage, and contaminated surface water in the adjacent drainage ditch.

01 ☒ F. CONTAMINATION OF SOIL — 02 ☒ OBSERVED (DATE: 2/7/85) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: unknown (Acres) — 04 NARRATIVE DESCRIPTION

Analysis of surface soil in the oil disposal pit by PSI detected concentrations of metals and 1,2,-dichloropropane (11,000 ug/mg). Soil composite analysis of the roadway leading to the oil pit area also detected some metals. In addition, three ruptured underground and two above ground storage tanks containing sewage could potentially contaminate adjacent soils. These have not been sampled. See IV Hazardous Substance

01 ☒ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 101-1,000 — 04 NARRATIVE DESCRIPTION

Area residents are provided with municipal drinking water supplies derived from the Hillsborough River upgradient from the site. Therefore, contaminant introduction into the municipal drinking water supply is unlikely. However, some area residents may utilize individual water wells for other purposes.

01 ☒ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ____) ☒ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: 1-100 — 04 NARRATIVE DESCRIPTION

Workers at the site may come into contact with contaminants at the site or become injured in the event of on-site fires.

01 ☒ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 1,001-3,000 — 04 NARRATIVE DESCRIPTION

Persons may be exposed to contaminants via direct contact at the site and via direct contact with contaminated surface water. Persons may also be injured in the event of fires.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: FL
02 SITE NUMBER: D981015621

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None reported - contact with contaminants may result in damage to terristrial and aquatic flora.

01 ☒ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

None reported - the ingestion of metals may result in damage to area wildlife. In addition, fecal coliform bacteria potentially entering Tampa Bay may adversely affect wildlife.

01 ☒ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The ingestion of metals by area wildlife may result in the contamination of the food chain.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☒ OBSERVED (DATE: 2/7/85) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

Personnel from PSI observed that three underground septage storage tanks were in poor physical condition, with numerous ruptures, potentially leaking waste into on-site groundwater and soil.

01 ☒ N. DAMAGE TO OFFSITE PROPERTY — 02 ☒ OBSERVED (DATE: 2/7/85) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Surface water sample analysis of an off-site ditch detected fecal coliform bacteria (1,700 counts/100ml). The ditch leads into an off-site pond that discharges into Tampa Bay approximately ¼ mile from the site.

01 ☒ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☒ OBSERVED (DATE: 2/7/85) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

See section N, "Damage to Off-site Property."

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☒ OBSERVED (DATE: 1/12/83) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

A warning notice was issued to the site owner by FDER for unauthorized disposal of waste oil materials.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

None.

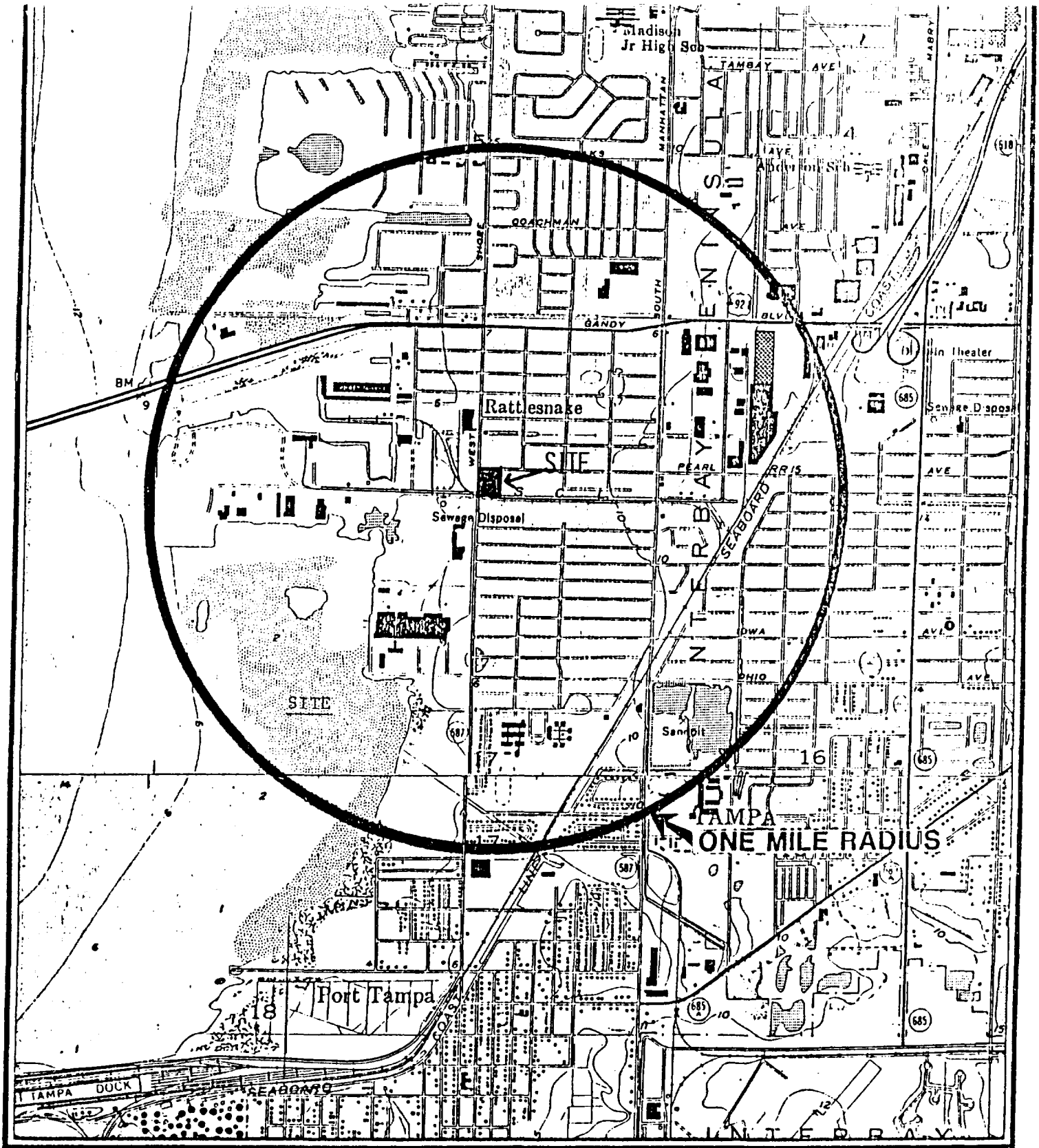
III. TOTAL POPULATION POTENTIALLY AFFECTED: 1,001-3,000

IV. COMMENTS

A contractor for the owner has installed monitoring wells and has recently sampled groundwater, surface water and soil. Further inspections and sampling may be required to ascertain the extent and level of contamination. A consent order is being prepared for this site. The owner has not complied with all the items in the warning notice.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See attached reference list.



SCALE 1 : 24000

0 1/2 1 MILE

1000 0 1000 2000 FEET

N

SITE LOCATION MAP

ROTO - ROOTER

HILLSBOROUGH COUNTY, FLORIDA

USGS QUAD. Gandy Bridge, Florida
Port Tampa, Florida

DATE 1981

ECJORDANCO

REFERENCES

1. Environmental Protection Agency, Federal Register, National Oil and Hazardous Substances Contingency Plan, Part V, July 16, 1982.

2. Farm Chemicals Handbook, Willoughby, OH: Meister Publishing Company, 1982.

3. Florida Department of Environmental Regulation, The Sites List, Summary Status Report, July 1, 1983 - June 30, 1984.

4. Florida Department of Environmental Regulation, 3012 Folder, 2600 Blairstone Road, Tallahassee, Florida. To be used for completion of Preliminary Assessment, Form 2070-12.

5. Health and Safety Plan, Florida 3012 Program, E.C. Jordan Co., June 1984.

6. Healy, Henry G., 1977, Public Water Supplies of Selected Municipalities in Florida, 1975: U.S. Geological Survey, Water-Resources Investigations 77-53, p. 309.

7. NUS Project for Performance of Remedial Response Activities at Uncontrolled Hazardous Substance Facilities--Zone 1, NUS Corporation, Superfund Division.

8. NUS Training Manual, Project for Performance of Remedial Response Activities at Uncontrolled Hazardous Substance Facilities--Zone 1, NUS Corporation, Superfund Division.

9. Sax, N. Irving, Dangerous Properties of Industrial Materials, Sixth Edition, Van Nostrand Reinhold Co., 1984.

10. TLVs Threshold Limit Values for Chemical Substances in the Work Environment Adopted by ACGIH for 1983-84, American Conference of Governmental Industrial Hygienists, ISBN: 0-936712-45-7, 1983.

11. U.S. Geological Survey, Topographic Map, 1:24,000 Series.

12. Windholz, M., ed. The Merck Index, an Encyclopedia of Chemicals and Drugs, Rahway, NJ: Merck and Company, Inc., 1976.

Roto-Rooter dumping incident. off-site dumping incident 1/11/84 rec'd

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices
And/Or To Other Than The Addressee

To: _____ Loctn.: _____
To: _____ Loctn.: _____
To: _____ Loctn.: _____
From: _____ Date: _____

Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: _____ Date Due: _____

TO: Dr. R. H. Patton

FROM: Tom Stephens TS

DATE: January 11, 1984

SUBJECT: Project #83-246 Roto-Rooter Dumping Incident

On December 9, 1983 two soils and two other samples of an oily material were logged into our laboratory. The two soils (SPAN Lab #'s 20386 and 20387) were saturated with and covered by about 1/2 inch of some type of oil. These two samples were collected after a Roto-Rooter truck was seen discharging the material onto a small wooded road off Rhodine Road, Hillsborough County. Sample #20388 was an oily material collected from the hydraulic lift sump next to the sump which was pumped two days previous by Roto-Rooter at Swanson's Chrysler-Plymouth. The last sample (#20389) was a raw hydraulic oil collected at Swanson's Chrysler-Plymouth.

The oil on top of the soil samples was weighed into volumeric flasks, diluted with methylene chloride and injected into a GC/FID. The other two samples were handled the same way.

Chromatograms from the two soils and the one from the sump at the Chrysler-Plymouth dealer indicated the samples contain early eluting components similar to a weathered mineral spirits making up approximately 9% of the sample weight, and a petroleum hydrocarbon mixture of hydraulic oil and lighter weight petroleum hydrocarbons similar to a highly weathered diesel #2 fuel oil. The hydraulic oil made up approximately 88% of the sample weight and the diesel oil the remaining 3%. The chromatograms from these three samples were virtually identical to one another. The other sample (SPAN Lab #20389) which was the raw hydraulic oil was missing the early mineral spirits components and the diesel fuel components.

Due to the similarities, it is my opinion the oil from the soils came from the sump area at Swanson's Chrysler-Plymouth.

TLS:ac

McAlister

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

LAB ID 20386

CHEMICAL ANALYSIS REPORT FORM

SAMPLE TYPE: ~~WATER~~ SEDIMENT — FRESH ____ SALINE ____

AGENCY CODE	STORET STATION NUMBER	DATE (M/D/Y)	TIME A — GRAB SAMPLE	DEPTH, F
40		12/6/83	4:25 pm	
			TIME B COMPOSITE SAMPLE	
			COMP BEGIN	
			COMP END	

REMARKS Sample #1 — illegal oil dumping by Roto-Rooter Septic tank truck

LOCATION East end of Rhodine rd. Hillsborough County

SAMPLE SOURCE: Soil
GROUNDWATER: MONITORING WELL: ☐ DRINKING WATER WELL: ☐
SURFACE WATER: RIVER/STREAM: ☐ LAKE/POND: ☐ ESTUARY/BAY: ☐
EFFLUENT: ☐ FIELD BLANK: ☐ FIELD DUPLICATE: ☐ OTHER: Soil

TAS #	FIELD/LAB ID #	PRESERVATION	WELL #
1314	TN #1 5953	ice	

SAMPLED BY: Clarke R. Pollie

FIELD REPORT PREPARED BY: Clarke R. Pollie

	UNIT	CODE*	VA
SPECIFIC CONDUCTANCE	µMHOS/CM	94	
pH	STD UNIT	400	
TEMPERATURE	°C	10	
MEASURED BY:			

PARAMETER	UNIT	CODE*	VALUE	PARAMETER	UNIT	CODE*	VAL
Oil type confirmation							
per phone conversation w/ Dr. Robt. Patton on 12/6/83							

RECEIVED
DEC 16 1983
SOUTH DISTRICT

CHAIN OF CUSTODY SAMPLE

GC/FID analysis indicated a mixture of petroleum hydrocarbons similar to mineral spirits, diesel #2 fuel oil, and hydraulic oil

STORET FIELD SAMPLE #		28	1595
AGENCY COLLECTING		27	804
AGENCY ANALYZING		28	

J — Estimated Value
K — Actual value is known to be less than value given.
L — Actual value is known to be greater than value given.
U — Material was analyzed for but not detected. The number is the Minimum Detection Limit.

ANALYST	QA VERIFIED BY	LAB REPORT VERIFIED BY	DATE
1-11-84	1-11-84	RBP	12-Jan-84

i mi dist 6/2

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

LAB ID 20387

CHEMICAL ANALYSIS REPORT FORM

SAMPLE TYPE: ~~WATER~~ SEDIMENT – FRESH ____ SALINE ____

AGENCY CODE	STORET STATION NUMBER	DATE (M/D/Y)	TIME A – GRAB SAMPLE	DEPTH, FE
40		12/6/83	4:30 pm	
			TIME B COMPOSITE SAMPLE	
			COMP BEGIN	
			END	

REMARKS #2 soil – illegal oil dumping by Septic tank Dump Truck

LOCATION East end of Rhodine Rd. Hills. County

SAMPLE SOURCE:
GROUNDWATER
MONITORING WELL: ☐
DRINKING WATER WELL: ☐

SURFACE WATER
RIVER/STREAM: ☐
LAKE/POND: ☐
ESTUARY/BAY: ☐

EFFLUENT: ☐
FIELD BLANK: ☐
FIELD DUPLICATE: ☐
OTHER: soil

TAS #	FIELD/LAB ID #	PRESERVATION	WELL #
1314	IN ~~#2~~ 5954	ice	

SAMPLED BY: Clake R. Pale

FIELD REPORT PREPARED BY: Clake R. Pale

	UNIT	CODE△	VAL
SPECIFIC CONDUCTANCE	µMHOS/CM	94	
pH	STD UNIT	400	
TEMPERATURE	°C	10	
MEASURED BY:			

PARAMETER	UNIT	CODE*	VALUE	PARAMETER	UNIT	CODE*	VAL
Oil type Confirmation							
Per conversation w/ Dr. Robt. Patton on 12/6/83							
CHAIN OF CUSTODY SAMPLE							
GC/FID analysis indicated a mixture of petroleum hydrocarbons similar to mineral spirits, diesel #2 fuel oil, and hydraulic oil.							
				STORET FIELD SAMPLE #		29	5950
				AGENCY COLLECTING		27	8040
				AGENCY ANALYZING		28	

J – Estimated Value
K – Actual value is known to be less than value given.
L – Actual value is known to be greater than value given.
U – Material was analyzed for but not detected. The number is the Minimum Detection Limit.

ANALYST	QA VERIFIED BY	LAB REPORT VERIFIED BY	DATE
H 1-11-84	H 1-11-84	RHP	12-Jan-84

APPLY TO FIELD MEASUREMENT

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

LAB ID 20388

CHEMICAL ANALYSIS REPORT FORM

SAMPLE TYPE: ~~WATER~~ – FRESH ____ SALINE ____

AGENCY CODE	STORET STATION NUMBER	DATE (M/D/Y)	TIME A – GRAB SAMPLE	DEPTH, F
40		12-7-83	TIME B COMPOSITE SAMPLE	
			COMP BEGIN	
			END	

REMARKS #3 – Hydraulic Sump Sludges from auto dealership

LOCATION Swanson Chrysler-Plymouth Hydraulic Lift Sump – 2500 34th St. St. Petersburg

SAMPLE SOURCE:
GROUNDWATER
MONITORING WELL: ☐
DRINKING WATER WELL: ☐
SURFACE WATER
RIVER/STREAM: ☐
LAKE/POND: ☐
ESTUARY/BAY: ☐
EFFLUENT: ☐
FIELD BLANK: ☐
FIELD DUPLICATE: ☐
OTHER: sludge

TAS #	FIELD/LAB ID #	PRESERVATION	WELL #
134	TN #3 5955	ice	

SAMPLED BY: Clare R. Palk

FIELD REPORT PREPARED BY: Clare R. Palk

	UNIT	CODE*	VA
SPECIFIC CONDUCTANCE	µMHOS/CM	94	
pH	STD UNIT	400	
TEMPERATURE	°C	10	
MEASURED BY:			

PARAMETER	UNIT	CODE*	VALUE	PARAMETER	UNIT	CODE*	VA
Oil Type confirmation per Telephone Conversation with Dr. Patton of 12/7/83							
CHAIN OF CUSTODY SAMPLE							
OC/FID analysis indicated a mixture of petroleum hydrocarbon similar to mineral spirits, diesel #2 fuel oil and hydraulic oil.							
				STORET FIELD SAMPLE #		29	5955
				AGENCY COLLECTING		27	SCM
				AGENCY ANALYZING		28	

J – Estimated Value
K – Actual value is known to be less than value given.
L – Actual value is known to be greater than value given.
U – Material was analyzed for but not detected. The number is Minimum Detection Limit.

ANALYST	DA VERIFIED BY	LAB REPORT VERIFIED BY	DATE
1-11-84	1-11-84		12-Jan-84

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

CHEMICAL ANALYSIS REPORT FORM

LAB ID 20389

SAMPLE TYPE: WATER – FRESH ____ SALINE ____

AGENCY CODE	STORET STATION NUMBER	DATE (M/D/Y)	TIME A – GRAB SAMPLE	DEPTH, F
40		12-7-83	TIME B COMPOSITE SAMPLE	
			COMP BEGIN	
			COMP END	

REMARKS #4 – New oil sample
Hydraulic lift oil

LOCATION Swanson Crysler – Plymouth
2500 34th St. So.
St. Petersburg

SAMPLE SOURCE:
GROUNDWATER
MONITORING WELL: ☐
DRINKING WATER WELL: ☐

SURFACE WATER
RIVER/STREAM: ☐
LAKE/POND: ☐
ESTUARY/BAY: ☐

EFFLUENT: ☐
FIELD BLANK: ☐
FIELD DUPLICATE: ☐
OTHER: ~~Soil~~ Oil

TAS #	FIELD/LAB ID #	PRESERVATION	WELL #
1314	TN ~~#4~~ 5956	ice	

SAMPLED BY: Clake R. Palk

FIELD REPORT PREPARED BY: Clake R. Palk

	UNIT	CODE	VA
SPECIFIC CONDUCTANCE	µMHOS/CM	94	
pH	STD UNIT	400	
TEMPERATURE	°C	10	
MEASURED BY:			

PARAMETER	UNIT	CODE*	VALUE	PARAMETER	UNIT	CODE*	VAL
Oil type confirmation							
Per Telephone Conversation							
with Dr. Patton on 12/6/83							
CHAIN OF CUSTODY SAMPLE							
				STORET FIELD SAMPLE #		29	5956
				AGENCY COLLECTING		27	8040
				AGENCY ANALYZING		28	

J – Estimated Value
K – Actual value is known to be less than value given.
L – Actual value is known to be greater than value given.
U – Material was analyzed for but not detected. The number is Minimum Detection Limit.

ANALYST [signature] 1-11-84 | QA VERIFIED BY [signature] 1-11-84 | LAB REPORT VERIFIED BY RHP | DATE 12-Jan-84

[illegible] APPLY TO FIELD MEASUREMENT

rec'd 12/8/83

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices
Or To Other Than The Addressee

To: _____ Loctn.: _____
To: _____ Loctn.: _____
To: _____ Loctn.: _____
From: _____ Date: _____

Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: _____ Date Due: _____

TO: Dr. Patton

FROM: Clabe Polk CRP

DATE: December 8, 1983

SUBJECT: Roto-Rooter oil dumping incident

On December 6, 1983, two soil samples were collected from the Rhodine Road dumping site. See attached memo for locations.

On December 7, 1983, two oil samples were collected from Swanson Chrysler-Plymouth's service shop. One was from the hydraulic lift sump next to the sump pumped on the 5th by Roto-Rooter, and one was of their raw hydraulic oil. The consistency seems about the same as the oil at the Rhodine Road site. Conversation at the auto dealer shop indicated that the sumps contained water, mineral spirits, floor sweepings, etc., as well as hydraulic oil.

We would like to tie the auto dealership through Roto-Rooter to the site if possible. Also, if there is a chance that any RCRA listed hazardous components are present, we may be interested in trying to make a Water Quality Assurance Act case.

CRP/err

ROTO ROOTER - DUMPING INCIDENT
12/7/83
rec'd

Mr. Trumbull - Service Manager 2:25 pm 12-7-83
Swanson ~~[illegible]~~ - Plymouth
Chysler

Roto-Rooter - Cleans Hydraulic Sumps around Service
Hydraulic lifts for sludges.

Mr. Trumbull remembers that Roto-Rooter picked up oil
within last two days. -
mixture of Hydraulic oil
Water
Sludges
Sand
Slop Oil.

Mr. Trumbull - says Sumps are not frequently cleaned.
but when the Pressure tanks and valves need
repair or service, Roto-Rooter is called to Pumpout
the Sumps. - two pits were apparently
Pumped out on 12/5.

Miscellaneous Comments from Mechanics -
These pits have: Hydraulic oil
Mineral Spirits
gasoline
Motor oil
Water
a whole pile of different things.

Trumbull was Cooperative - and kept stating that he was
Surely glad this visit his problem.

12/7/83

* * LABORATORY SCHEDULE AND SAMPLE INFORMATION TRACKING SYSTEM * *

CHEMICAL ANALYSIS SCHEDULE REQUEST

TO DER CENTRAL LABORATORY, TALLAHASSEE

PROJECT INFORMATION

FIELD PROJECT CODE

PROJECT REQUESTED BY: C. Polk

AGENCY/LOCATION DER Southwest

PROJECT COST MODULE: 1314

DATE OF REQUEST 12-7-83

PROJECT NAME: Roto-Rooter Dumping incident

PROJECT LOCATION: Roddine Road, Hills. County

PURPOSE/OBJECTIVE: Criminal enforcement

SAMPLE COLLECTION DATE: immediately

LAB DELIVERY DATE: immediately

SAMPLE INFORMATION

SAMPLE TYPE*	NUMBER OF SAMPLES**	ANALYSIS REQUESTED	SAMPLE TYPE*	NUMBER OF SAMPLES**	ANALYSIS REQUESTED
Soil	1	Confirmation of hydraulic oil			
oil	1	Hydraulic samp.-Chrysler dealer			
oil	1	Raw hydraulic 0.1			

NOTE: These samples approved for emergency analysis by Dr. R. Patton by phone at 2:47 p.m. on 12/6/83

PROJECT SCHEDULE INFORMATION/CONFIRMATION

1. xxxxxxx SAMPLES SCHEDULED FOR LAB DELIVERY DURING WEEK OF December 12, 1983 .

* FOR SAMPLE TYPE USE ONLY: WATER, SOIL/SEDIMENT, TISSUE OR CHEMICAL WASTE.

** ENTER NUMBER OF SAMPLES IN EACH PARAMETER CATEGORY.

12/6/83

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee

To: _____ Loctn.: _____
To: _____ Loctn.: _____
To: _____ Loctn.: _____
From: _____ Date: _____
Reply Optional ( ) Reply Required ( ) Info. Only ( )
Date Due: _____ Date Due: _____

TO: File

FROM: Clabe Polk

DATE: December 6, 1983

SUBJECT: Waste oil dumping incident
septic tank pump truck; Section 36, Township 30 South, Range 20 East, Hillsborough County

In response to a call from Joe Wilhelm, Hillsborough County Health Department on 12/6/83 at 2:00 p.m., I investigated a wooded site located north of Rhodine Road, 1 mile east of the end of the pavement where a septic tank pump truck belonging to "Roto-Rooter Company" was seen dumping oil on 12/5/83. Present at the inspection was Joe Wilhelm, who met me near the site at 4:00 p.m.

It appeared that the truck had turned onto a small wooded road off Rhodine Road, traveled about 30 yards and opened his valves. He then proceeded to drive an estimated 300-350 yards draining oil all along the road as he drove. Although there had been no appreciable rain in the previous 24 hours, liquid puddles persisted even though the soil was a well drained sand. The liquid remaining appeared to be an oil-water emulsion and was "coffee" colored. The consistency was that of a medium weight lubricating oil.

Two samples were taken per my previous telephone call to Dr. Patton. They were composite soil samples, #1 at the north-eastern extremity of the oil; #2 at the south-western extremity of the oil.

CRP/err

~~Dumping incident~~ 12,6,83

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
SOUTHWEST DISTRICT

CONVERSATION RECORD

Date 12/6/83 Subject Dumping

Time 2:00 P.M. Permit No. —

County Hillsborough

Mr Wilhelm Telephone No. 272-6320

Representing Hillsborough County Health Dept.

[X] Telephoned Me [ ] Was Called [ ] Scheduled Meeting [ ] Unscheduled Meeting

Other Individuals Involved in Conversation/Meeting

Summary of Conversation/Meeting Roto Router dumped 12:30 P.M. 12/5/83 oily waste (contents from hydraulic lift sump) on dirt road. off of Robidine Rd. Dead end of Robidine Rd. Turns to dirt and then turn left into 1st opening in to woods. 50-75 feet light Tan Color. Smelled like oil liquid traveled about a city block. He wants to file criminal charges he talking to State's Attorney

581 Sewage from portable to

Drivers Name - William Turner

(continue on another sheet, if necessary)

Signature [signature]

Title Eng. Tr.

Swanson Chrystler Plymouth Clearwater.
[illegible] 34th St. No. 1st Petersburg

OVERSIZED

DOCUMENT

MAP