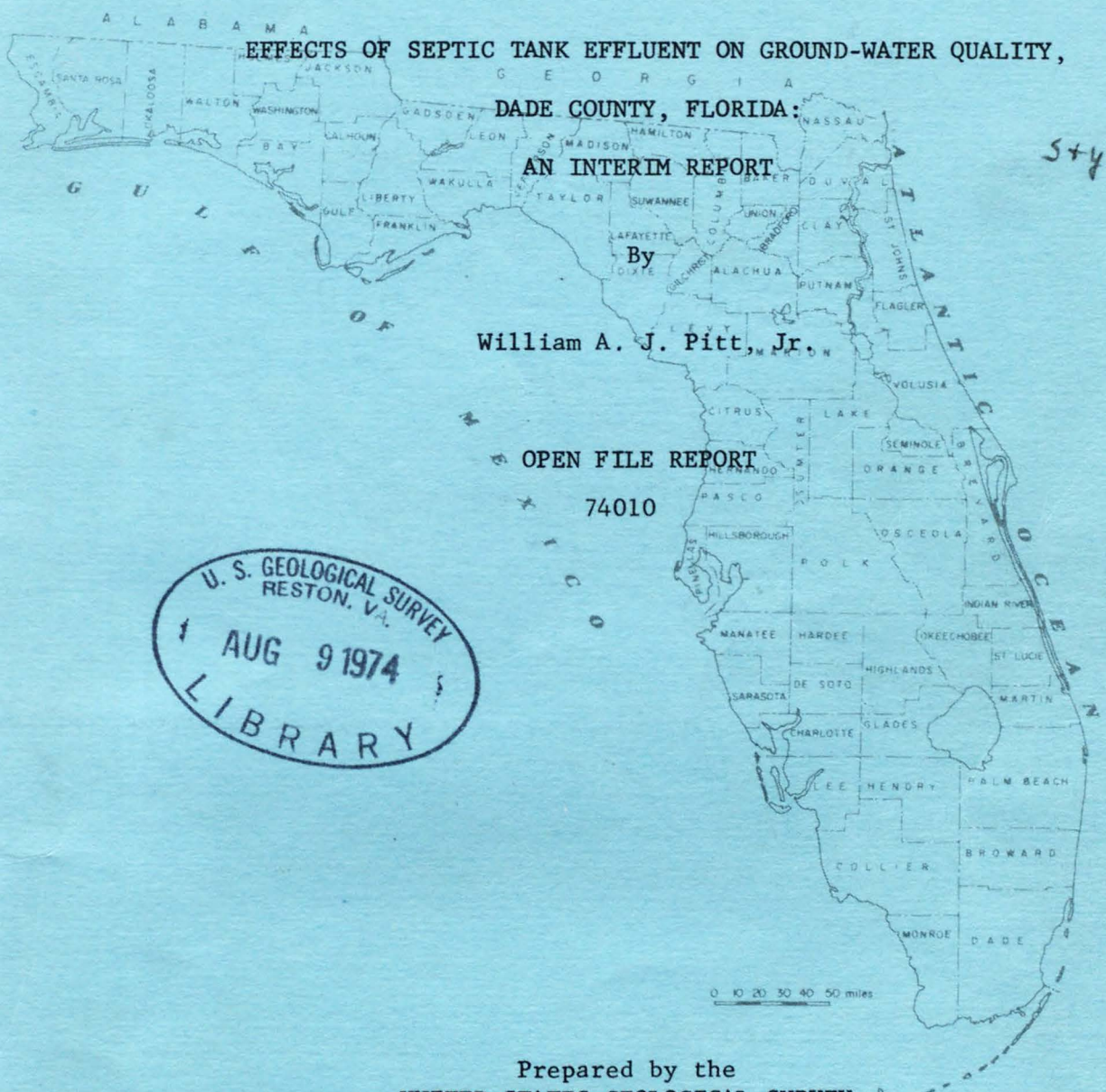
UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

EFFECTS OF SEPTIC TANK EFFLUENT ON GROUND-WATER QUALITY, DADE COUNTY, FLORIDA: AN INTERIM REPORT



By

William A. J. Pitt, Jr.

OPEN FILE REPORT

74010

Prepared by the
UNITED STATES GEOLOGICAL SURVEY
in cooperation with
DADE COUNTY, FLORIDA

Tallahassee, Florida

1974

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
TALLAHASSEE, FLORIDA
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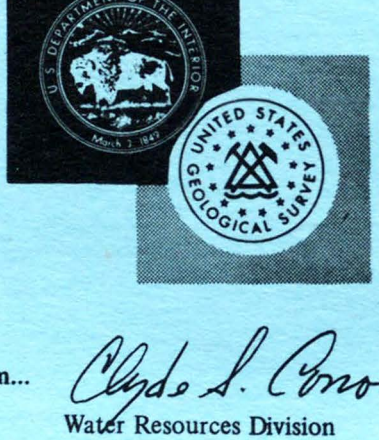

From... Clyde S. Conover
Water Resources Division
325 John Knox Road
Suite F-240

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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CONTENTS

ILLUSTRATIONS

TABLES

EFFECTS OF SEPTIC TANK EFFLUENT ON GROUND-WATER QUALITY DADE COUNTY, FLORIDA: AN INTERIM REPORT

By

William A. J. Pitt, Jr.

ABSTRACT

At each of five sites in Dade County, where individual (residence) septic tanks have been in operation for at least 15 years and where septic tank concentration is less than 5 per acre, a drainfield site was selected for investigation to determine the effects of septic tank effluent on the quality of the water in the Biscayne Aquifer.

At each site two sets of multiple depth wells were drilled. The up-gradient wells adjacent to the drainfields in most places, were constructed in such a way that the aquifer could be sampled at 10, 20, 30, 40, and 60 feet below land surface. The down-gradient wells at each site are 35 feet or more from the up-gradient wells in the direction of ground-water flow, and allow the aquifer to be sampled at various depths.

Except at one site, no fecal coliforms were found below the 10-foot depth. Total coliforms exceeded a count of one colony per ml at the 60-foot depth at two sites. At one site a fecal streptococci count of 53 colonies per ml was found at the 60-foot depth and at another a count of seven colonies was found at the 40-foot depth. The three types of bacteria occur in higher concentration in the northern areas of the county than in the south. Bacteria concentrations were also higher where the septic tanks were more concentrated.

INTRODUCTION

The U.S. Geological Survey has completed an interim report of the first year of a 3-year investigation to determine the effects of septic tank effluent on ground-water quality of the Biscayne aquifer of Dade County, Florida. The investigation is in cooperation with the Dade County Manager's office, the Dade County Pollution Control Department, and the U.S. Environmental Protection Agency. The University of Miami, under a separate contract with the county, is also involved with the investigation in an effort to determine the effects of viruses in septic tank effluent on the ground-water quality.

SCOPE

The investigation studied only possible contamination from septic tanks in areas where individual sewage disposal units (septic tanks) have been in use for more than 15 years and where the septic tank concentration is four or less per acre. All the areas investigated are west of the salt front.

This report has been prepared to fulfill the requests of many for an interim report on the investigation. It is not intended as a final report, and the data and statements contained therein are subject to change after all the data are available. This report contains all the water quality data collected at the areas selected for investigation in Dade County. The data include physical, biological, and chemical parameters.

ACKNOWLEDGMENTS

Thanks are extended to the following people who supplied data and technical assistance: Dr. Leonard Greenfield and Mrs. Frances Parsons of the University of Miami; Messrs. David Hopkins and Russell Todd of the U. S. Environmental Protection Agency; Messrs. Win Nystrom and Al Rodriguez of Dade County Pollution Control, Mr. Peter Baljet of the Florida Department of Pollution Control, and Messrs. Raul Alonso and Donald Beach who allowed the use of their septic tanks for the study.

The author gratefully acknowledges the cooperation of Mr. Richard Brusuelas of the Greater Miami Chamber of Commerce and of Mr. Dennis Carter of the Dade County Manager's office.

SITE LOCATION

Five septic tank drainfield sites were selected for study in the county on the basis of septic tank density, geology, and depth to the water table. In general, four different hydro-geologic environs were selected. The locations of the five sites are shown in figure 1.

At the North Dade drainfield site, the northernmost site, (fig. 2) two sets of multiple-depth wells were drilled. The upgradient set is next to the septic tank drainfield of one of the houses in the area, and it consists of wells tapping the aquifer at depths of approximately 10, 20, 30, 40, and 60 feet. The downgradient set is about 50 feet, in the direction of ground-water flow, from the upgradient set and consists of wells about 10 and 20 feet deep. The exact depths of these wells and of all other wells in the report are shown in the tables at the end of the report.

At the Hialeah site, the upgradient wells are in the center of the drainfield; the other study wells are 95 feet downgradient (fig. 3). The hydraulic gradient is to the southwest in contrast to the normal southeasterly gradient at all the other sites. This southwesterly gradient is caused by the cone of depression of the Hialeah-Miami Springs well fields. As at the North Dade site, the upgradient wells tap the aquifer at depths of 10, 20, 30, 40, and 60 feet and the downgradient wells tap the aquifer at depths of 10 and 20 feet.

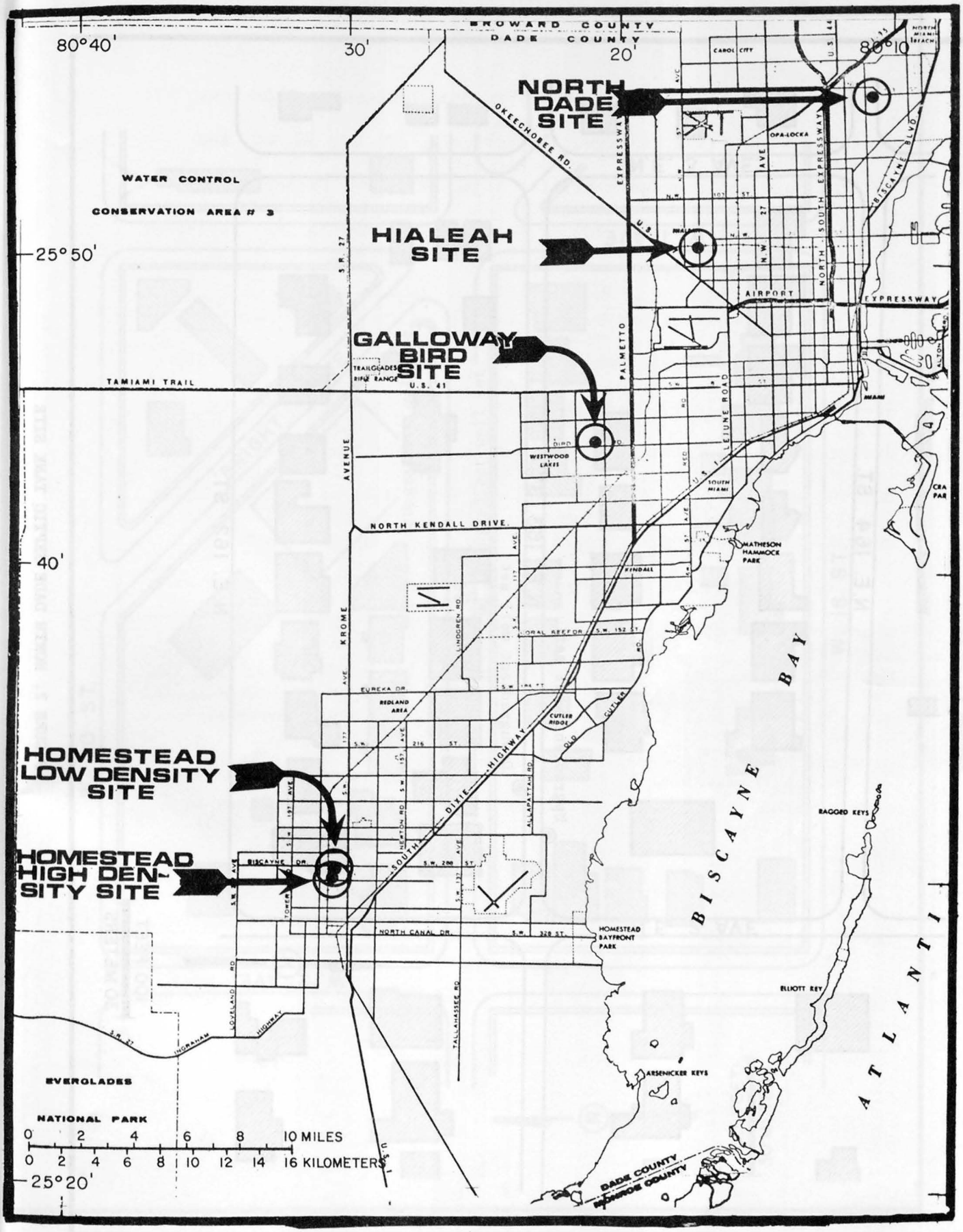


FIGURE 1. LOCATION OF STUDY SITES

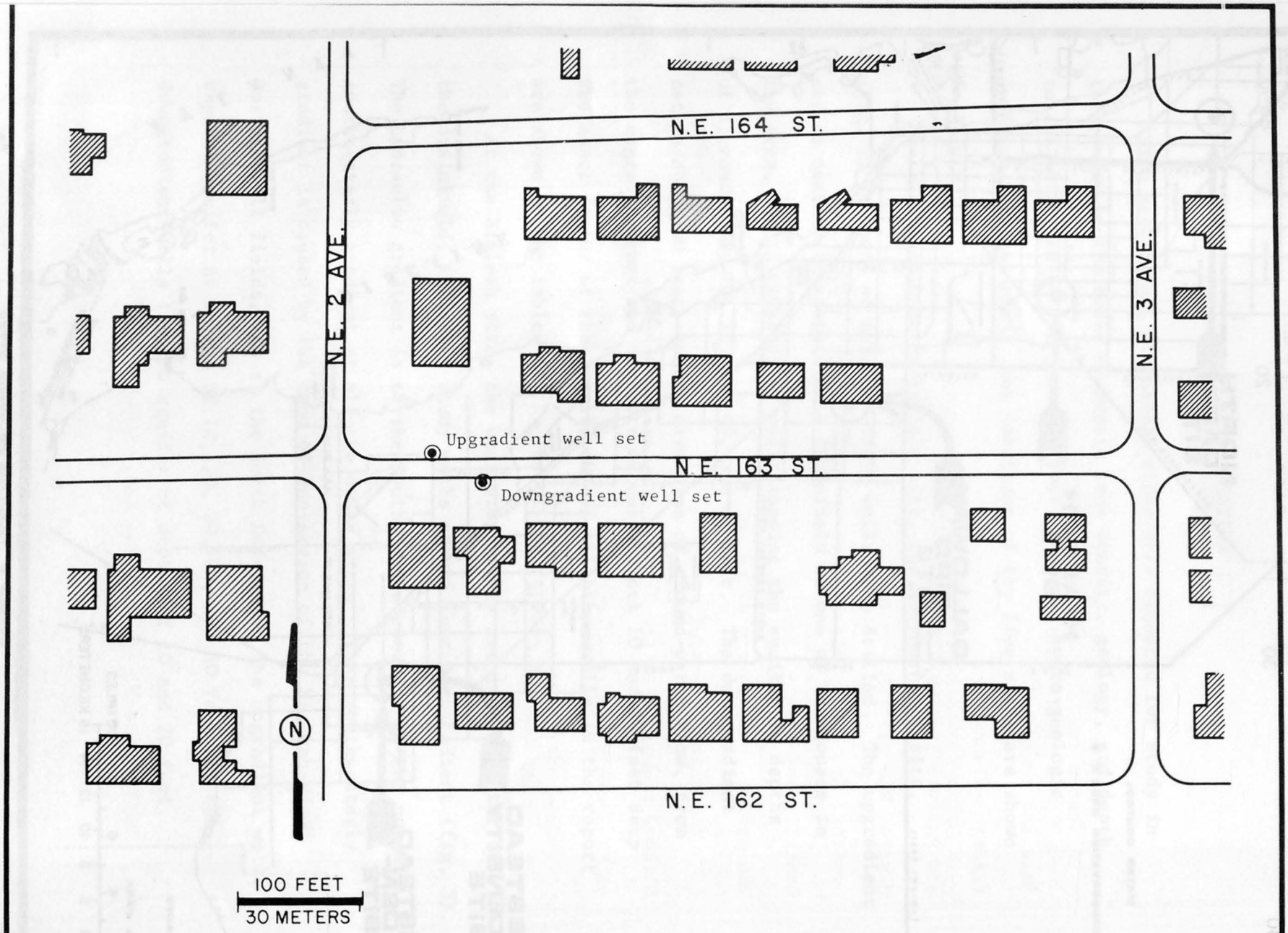


FIGURE 2. NORTH DADE SEPTIC TANK SITE

FIGURE 2. NORTH DADE SEPTIC TANK SITE

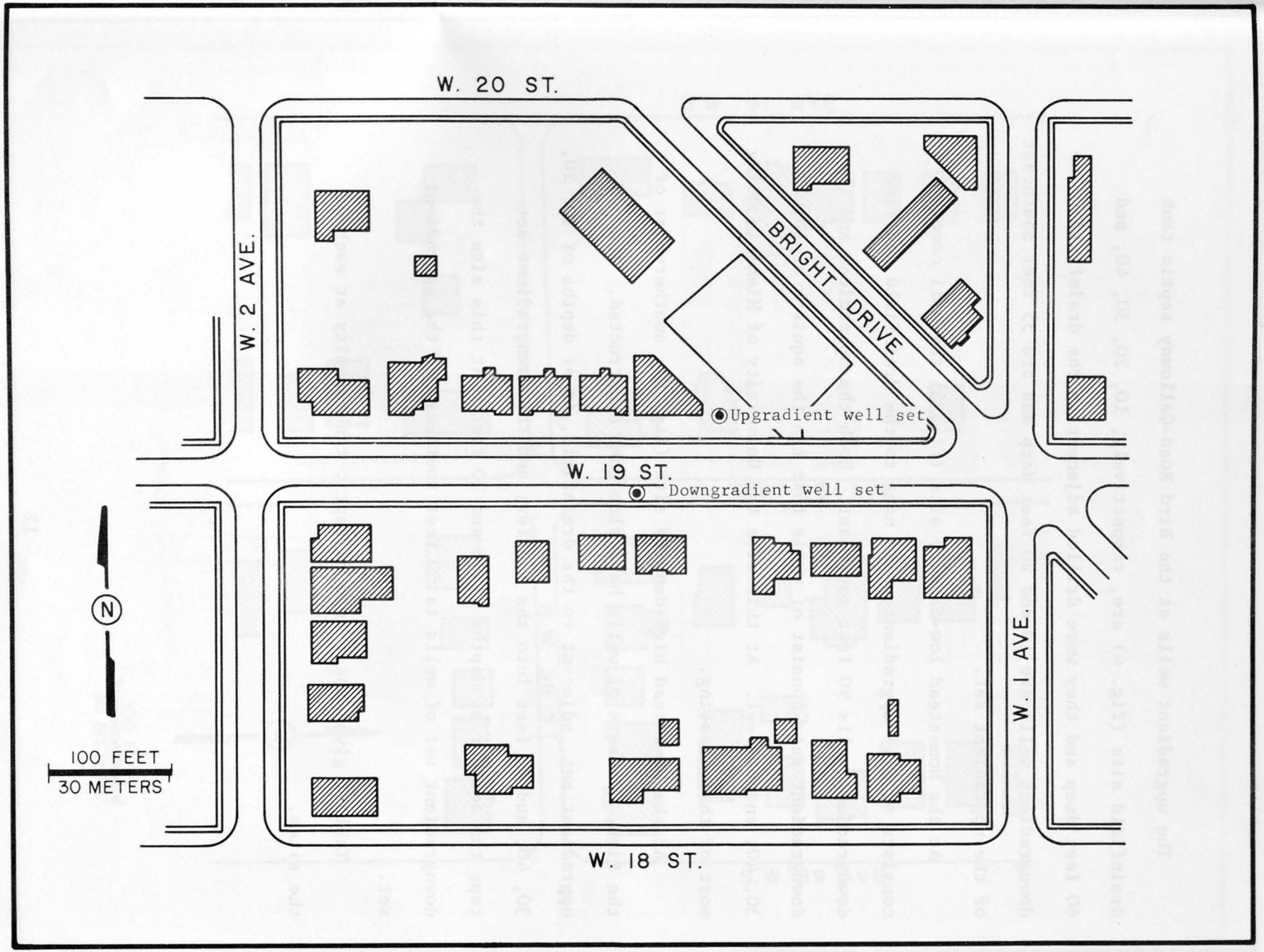


FIGURE 3. HIALEAH SEPTIC TANK SITE

The upgradient wells at the Bird Road-Galloway septic tank drainfield site (fig. 4) are, respectively, 10, 20, 30, 40, and 60 feet deep and they were drilled adjacent to the drainfield. The downgradient wells are 10 and 20 feet deep and are 35 feet southeast of the upgradient set.

At the Homestead low-density site (fig. 5) the well complex consists of five upgradient wells next to the drainfield and five downgradient wells 90 feet southeast. Both the upgradient and the downgradient sets consist of wells that tap the aquifer at 10, 20, 30, 40, and 60 feet. At this site the University of Miami is doing most of their testing.

At the Homestead high-density site (fig. 6), southernmost of the five, two sets of wells have also been constructed. The upgradient set, adjacent to the drainfield, is at depths of 10, 20, 30, 40, and 60 feet into the aquifer; and the downgradient set taps the aquifer at depths of 10 and 20 feet. At this site the downgradient set of wells is 50 feet southeast of the upgradient set.

Table 1 gives the values of septic tank density at each of the sites.

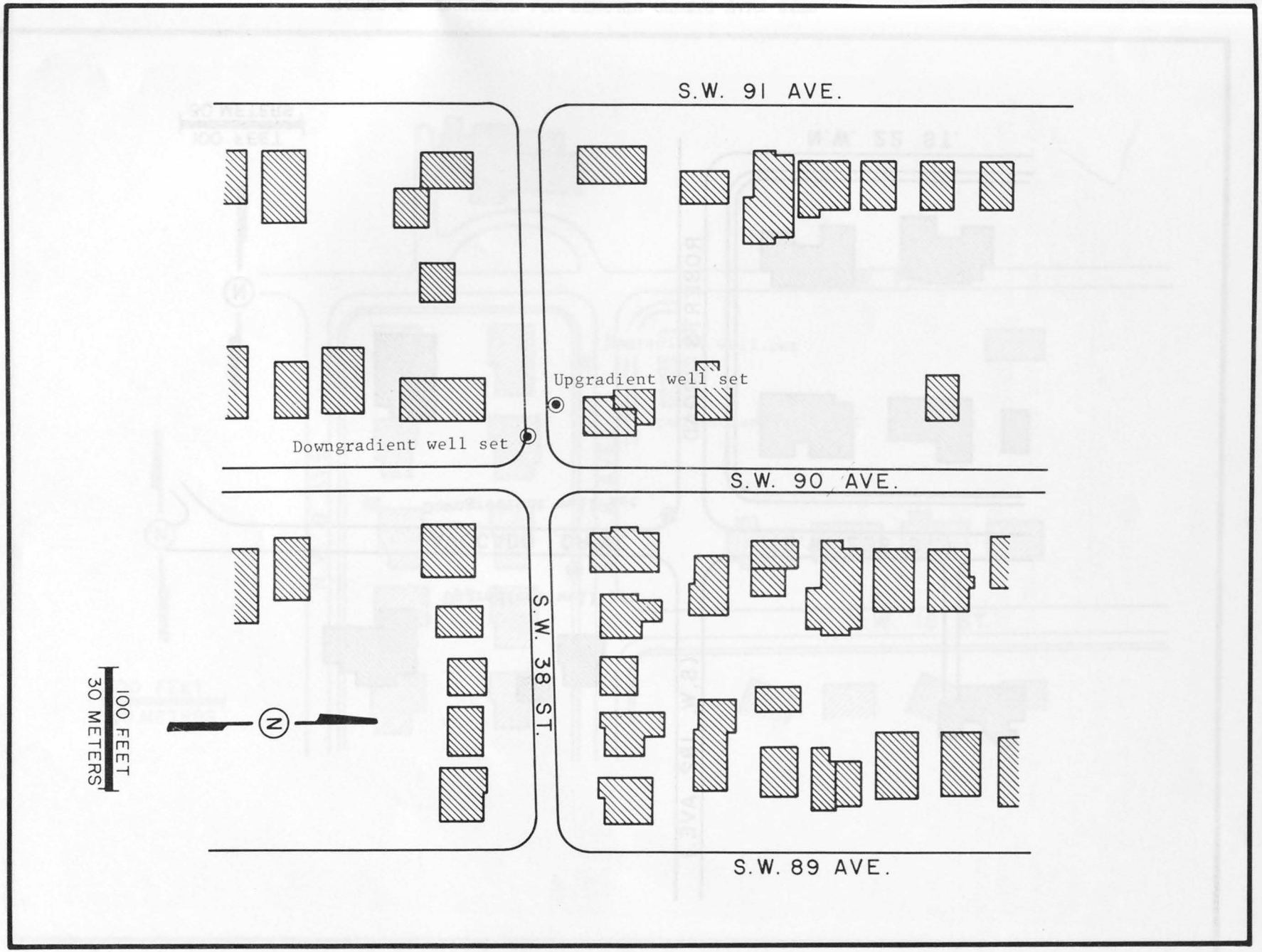


FIGURE 4. BIRD ROAD-GALLOWAY SEPTIC TANK SITE

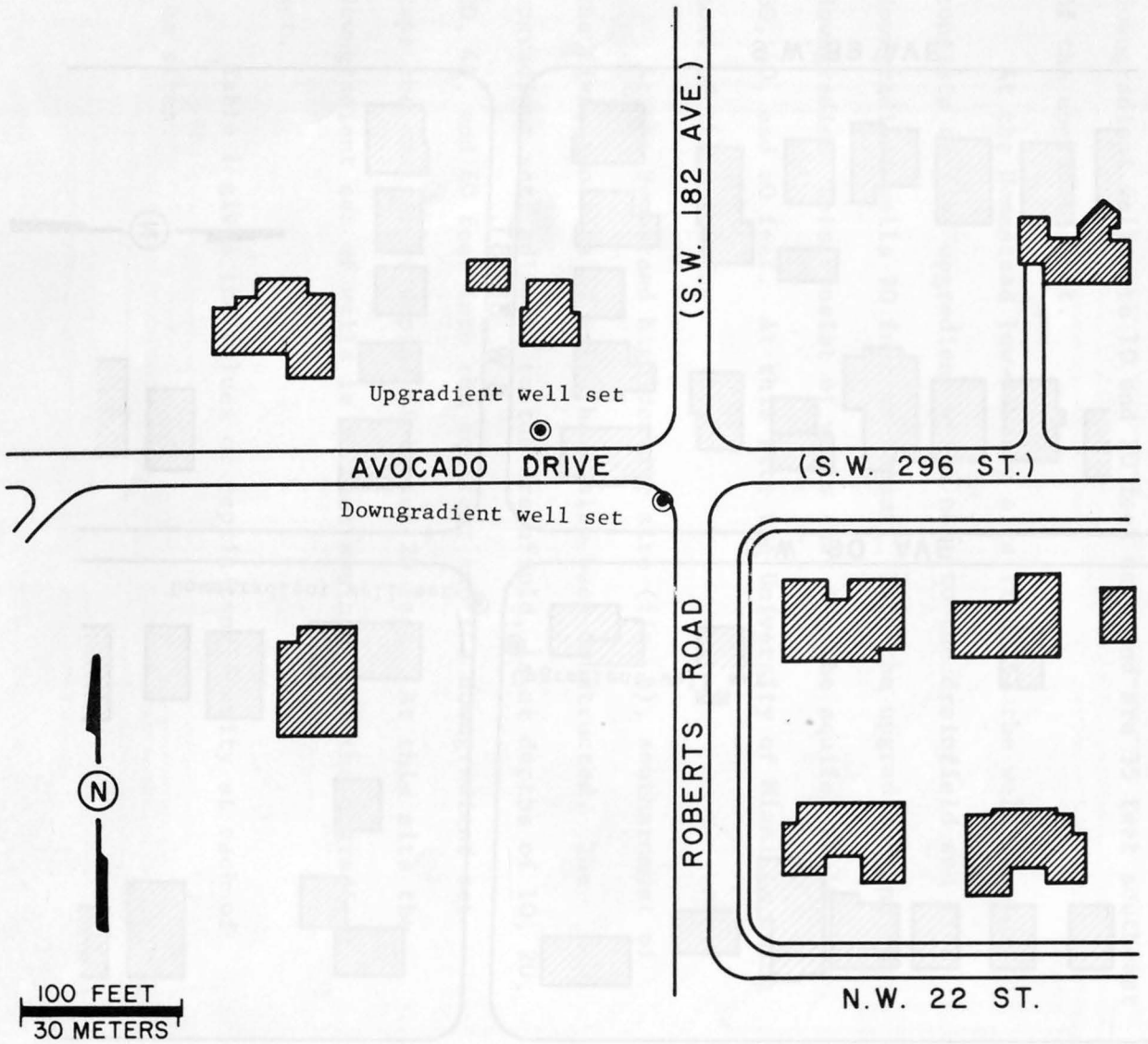


FIGURE 5. HOMESTEAD LOW DENSITY SEPTIC TANK SITE

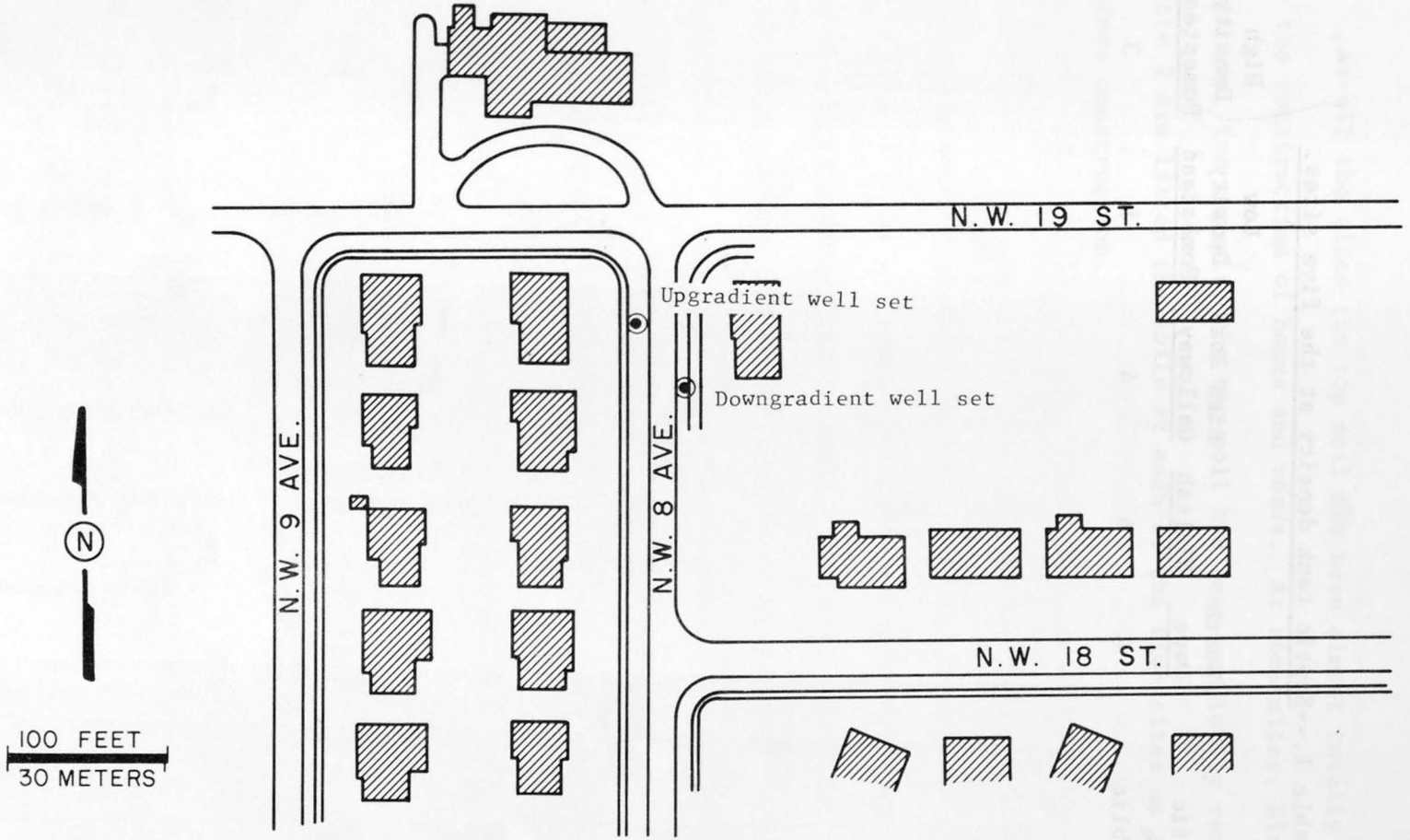


FIGURE 6. HOMESTEAD HIGH DENSITY SEPTIC TANK SITE

Table 1.--Septic tank density at the five sites.

	North Dade	Hialeah	Bird Road Galloway	Low Density Homestead	High Density Homestead
Number of septic tanks per acre (including public right of way)	4	4	4	1	3

TOP SOIL

At all the sites the top soil has been almost totally removed by the construction of homes and roads. At some sites, Bird Road-Galloway, for example, the top soil has been completely removed. In table 2 are listed the soils at each of the five sites as they were before construction.

Table 2.--Natural soil characteristics
(U.S. Department of Agriculture, 1947)

Site	Soil Series	Organics	Drainage		pH	Inches [1/] Soil Depth
			Internal	External		
North Dade	Dade Fine Sand	Small quantities of decaying organic matter	Rapid to very rapid	Rapid to very rapid	≤7	12-48
Hialeah	Dade Fine Sand	Moderate	Rapid when low water table	slow	≤7	6-10
Bird Road-Galloway	Rockdale Fine Sand	Low in organics	Very rapid	Little or none	≥7	2- 6
Homestead Low Density	Rockdale Fine Sandy Loam	Low in organics	Very rapid	Little or none	≥7	2- 6
Homestead High Density	Rockdale Fine Sandy Loam	Low in organics	Very rapid	Little or none	≥7	2- 6

[1/] Inches times 2.54 = centimeters

The organic content of the soil is relatively high in the north part of the county being highest at the Hialeah site. To the south, beginning with the Bird Road-Galloway site, the organic content is very low. The depth of the soil is considerably different in the north and south parts of the county. At the North Dade and Hialeah areas soil cover ranges from 12 to 48 inches and from 6 to 10 inches respectively; at the other three areas soil depth ranges from 2 to 6 inches. Another important difference is the soil pH which is usually higher in the south than in the north.

Table 2 shows a distinct change in external drainage characteristics from north to south. The Homestead sites and the Bird Road-Galloway site support little or no external drainage or runoff and have very rapid internal drainage. The Hialeah and North Dade sites support some runoff and the internal drainage is slower than in the other three sites.

AQUIFER CHARACTERISTICS

The Biscayne aquifer is the major source of potable water for Dade County. The aquifer is composed of permeable limestone, sandstone, and sand. Most of the sand and sandstone is calcareous but layers of siliceous sand are also present.

The aquifer is wedge shaped, being thickest near the coast, and thinnest near the western edge of Dade County. Near the coast its thickness ranges from about 160 feet in the north to 60 feet in the south.

Sand is predominant in the upper section of the aquifer in the northern part of the county and limestone is predominant in the lower section of the aquifer and in the southern part of the county.

The aquifer is replenished by local rainfall and by seepage from canals and the water conservation areas to the west and northwest. The annual rainfall in the area is about 60 inches, of which one third (Meyer, 1971) is evapotranspired before the water reaches the water table and another one third is evapotranspired from the water table and the canals and lakes that cut into the aquifer. The remaining one third is discharged to the sea by canals and by seepage.

The drilling records for the deepest well at each of the sites, (figs. 7-11) describe the different strata penetrated to a depth of 60 feet at each of the five sites investigated. Vertical hydraulic

DRILLING REPORT

DEPTH	DESCRIPTION	BLOWS ON SAMPLER*	PENETRATION (FOOT)	BLOWS ON CASING
	Organic soil.	4	1	4
2'		3	2	3
	Hard limestone	18	3	18
4'	imported fill.	22	4	22
	Unconsolidated	27	5	27
	sand at top giv-	19	6	19
	ing way to a very	17	7	17
▼ 8'	sandy limestone.	8	8	8
		8	9	8
10'	Peat & Marl layer	6	10	6
	between a fairly	3	11	3
	hard limestone.	34	12	34
	Some sand present	37	13	37
15'		43	14	43
	Oolitic fossilife-	45	15	45
	rous limestone in	WASHED	16	31
	thin layers between		17	17
	medium sand. Shells		18	23
20'			19	20
	Brownish colored		20	14
	quartz sand of		21	11
	fine to medium		22	10
	grain sizes.		23	7
25'			24	7
	A very fine brown		25	5
	sand.		26	7
	Slightly consoli-		27	9
	dated.		28	11
32'			29	10
	Fine sand above.		30	8
	Thin white lime-		31	9
35'	stone at bottom.		32	6
	A very fine white		33	7
	silica sand.		34	6
39'			35	15
40'	White porous lime.		36	13
	Grayish brown co-		37	9
	lored coarse sand		38	6
43'			39	8
	Coarse sand above		40	22
	sandy limestone.		41	28
46'			42	17
	Hard limestone.		43	19
48'	Sandy limestone.		44	14
50'			45	18
	Soft white sand		46	23
	changing to brown		47	42
	sand and then to		48	27
	hard sandy limestone		49	25
55'			50	61
56'	Dark tan limestone		51	43
	Sandy limestone		52	22
58'	Tan limestone with		53	27
	marine fossils and		54	24
60'	sand in the holes.		55	26
			56	33
			57	39
			58	30
			59	41
			60	37

U. S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
MIAMI, FLORIDA

Well: North Dade High density
255527N0801147.5W

Location: N.E. Corner Intersection
N.E. 2 Ave. & N.E. 162 St.

County: Dade State: Florida

Ground Elevation: 10 Ft. M.S.L.

Diameter: 2"

Depth: 62' (60' cased)

Casing: 2 " Type: Steel Pipe

Finish: 2' Open Hole

Construction: Drive Wash

Driller: U. S. Geological Survey

Date Finished: December 17, 1971

HAMMER WEIGHT (lbs.)
Casing: 280 Spoon: 140

HAMMER DROP (inches)
Casing: 5 to 20 Spoon: 30

Sampler Size: 1½"I.D. 1½"O.D. 2 "

Water Level: 8 Ft. Below Surface
At: A.M. Date: December 17, 1971

REMARKS

Samples are stored.
Particle sizes, porosity, permeability, and effective size have been determined.

*Blow Count per each 6 inches

Compiled by: W. Pitt Date: Jan.8,1971

Note: Inches times 2.54=centimeters
Feet times 0.305 =meters
Pounds times 0.453=kilograms

FIGURE 7. LITHOLOGIC SECTION OF NORTH DADE SITE

DRILLING REPORT

DEPTH	LITH	DESCRIPTION	BLOWS ON SAMPLER*	PENETRATION (FOOT)	BLOWS ON CASING
1'		Organic Soil and imported fill.	5	1	5
			30	2	30
		Hard limestone.	35	3	35
3'			20	4	20
4'		Soft sandy lime-	24	5	24
5'		stone.	14	6	14
		Mostly sand that	12	7	12
		is somewhat con-	22	8	22
		solidated.	18	9	18
		Intermingled la-	24	10	24
		yers of limestone	30	11	30
		only inches thick	15	12	15
			19	13	19
13'			32	14	32
		Sandy limestone.	22	15	22
15'					
16'		Unc. quartz sand	WASH	16	10
		Extremely sandy		17	18
		limestone.		18	20
18'				19	7
		Mostly calcareous		20	8
		sand but silica		21	5
		sand in pockets.		22	12
		The calcareous		23	6
		sand is somewhat		24	4
		consolidated but		25	3
		the silica sand		26	11
		is not.		27	13
		No hard limestone		28	13
		anywhere in layer		29	5
32'				30	4
		Fine white sand		31	11
		with ½" layers of		32	11
		a yellowish clay		33	58
35'				34	62
		Sand with 3" lay-		35	54
		ers of yellow clay		36	36
37'				37	12
		White sand with		38	10
		thin clay layers.		39	8
40'				40	10
		Soft tan colored		41	9
		coarse sand.		42	17
42'				43	400
		Extremely hard li-		44	370
		mestone of medium		45	CHOPPED
		permiability and		46	
		small solution		47	
		holes. No cavities		48	210
49'				49	22
		White consolida-		50	17
		ted silica sand		51	18
		Almost a sandstone		52	18
53'				53	27
				54	37
		Highly permeable		55	44
55'		riddled limestone		56	22
				57	8
		Sandy limestone		58	18
		of high porosity		59	20
		and permiability.		60	26
60'					

U. S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
MIAMI, FLORIDA

Well: Hialeah High density
255019N0801707.5W

Location: 300'W. of N.W. Corner of Intersection W.19St-W.1Ave.

County: Dade State: Florida

Ground Elevation: 6 Ft. M.S.L.

Diameter: 2"

Depth: 62' (60' cased)

Casing: 2 " Type: Steel Pipe

Finish: 2' Open Hole

Construction: Drive Wash

Driller: U. S. Geological Survey

Date Finished: October 8, 1971

HAMMER WEIGHT (lbs.)
Casing: 280 Spoon: 140

HAMMER DROP (inches)
Casing: 12 to 20 Spoon: 30

Sampler Size: 1½ "I.D. 1½ "O.D. 2 '

Water Level: 4 Ft. Below Surface
At: A.M Date: October 28, 1971

REMARKS

Samples are stored.
Particle sizes, porosity, permeability, and effective size have been determined

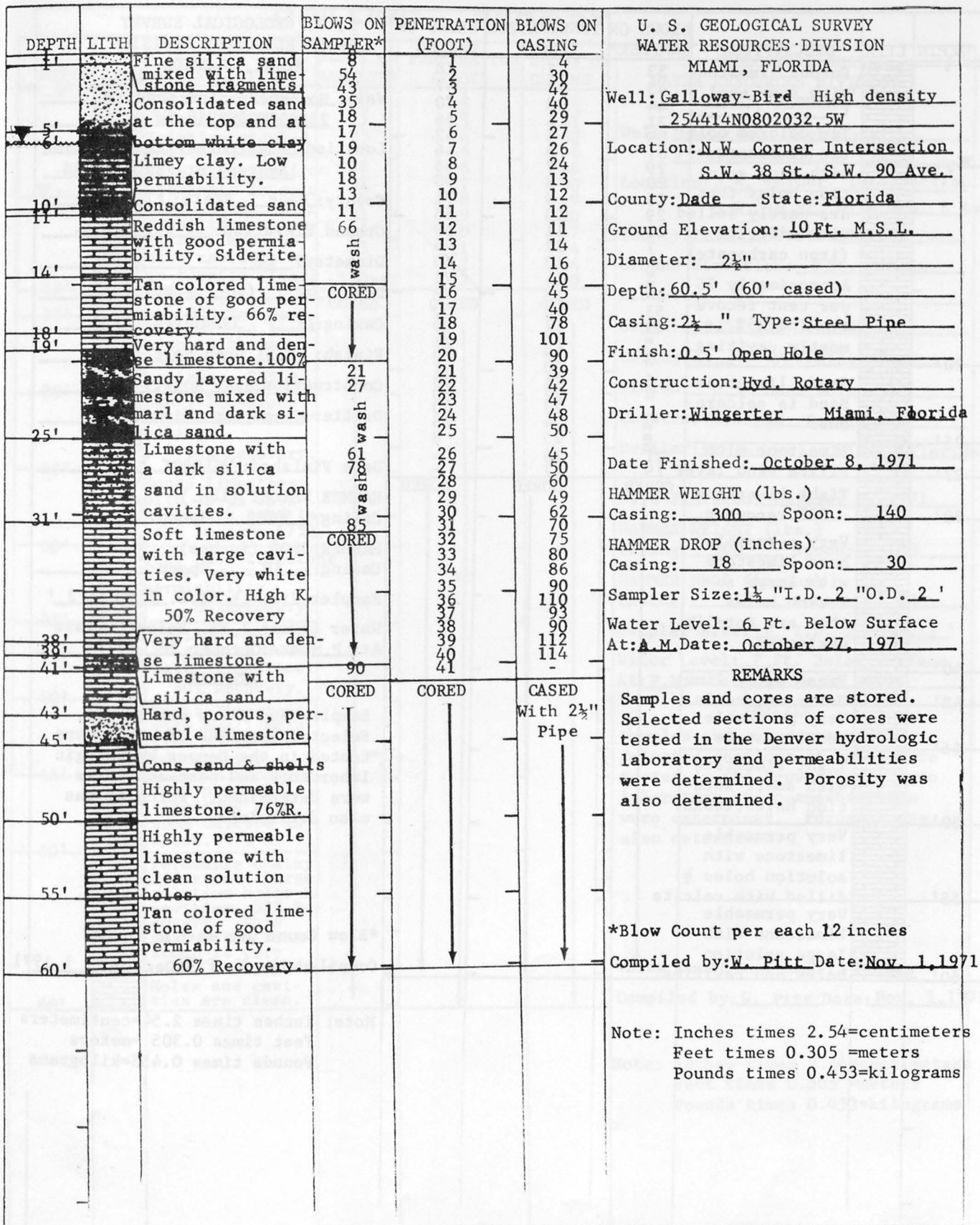
*Blow Count per each 6 inches

Compiled by: W. Pitt Date: Nov.1,1971

Note: Inches times 2.54=centimeters
Feet times 0.305 =meters
Pounds times 0.453=kilograms

FIGURE 8. LITHOLOGIC SECTION OF HIALEAH SITE

DRILLING REPORT



U. S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
MIAMI, FLORIDA

Well: Galloway-Bird High density 254414N0802032.5W

Location: N.W. Corner Intersection S.W. 38 St. S.W. 90 Ave.

County: Dade State: Florida

Ground Elevation: 10 Ft. M.S.L.

Diameter: 2½"

Depth: 60.5' (60' cased)

Casing: 2½" Type: Steel Pipe

Finish: 0.5' Open Hole

Construction: Hyd. Rotary

Driller: Wingerter Miami, Florida

Date Finished: October 8, 1971

HAMMER WEIGHT (lbs.)
Casing: 300 Spoon: 140

HAMMER DROP (inches)
Casing: 18 Spoon: 30

Sampler Size: 1⅛ "I.D. 2 "O.D. 2 '

Water Level: 6 Ft. Below Surface
At: A.M. Date: October 27, 1971

REMARKS

Samples and cores are stored. Selected sections of cores were tested in the Denver hydrologic laboratory and permeabilities were determined. Porosity was also determined.

*Blow Count per each 12 inches

Compiled by: W. Pitt Date: Nov. 1, 1971

Note: Inches times 2.54=centimeters
Feet times 0.305 =meters
Pounds times 0.453=kilograms

FIGURE 9. LITHOLOGIC SECTION OF BIRD ROAD-GALLOWAY SITE

DRILLING REPORT

DEPTH	LITH	DESCRIPTION	BLOWS ON SAMPLER*	PENETRATION (FOOT)	BLOWS ON CASING
½'		Porous limestone with some marl	33	1	18
			45	2	47
			44	3	70
			31	4	66
		Tan colored oolitic limestone with many solution holes that are partly filled with siderite (iron carbonate)	39	5	42
			31	6	46
7'			29	7	56
			20	8	90
			26	9	71
			29	10	65
			22	11	59
			7	12	46
			wash	13	60
		Approximatly 75 per cent recovery. The 25% is mostly cavities.		14	71
				15	78
			53	16	50
			53	17	56
			wash	18	91
				19	76
20'				20	41
		Sandy limestone. Sand is calcareous.	5	21	33
			4	22	30
				23	40
			wash	24	18
25'				25	8
		Limestone with silica sand layer	21	26	-
27'			19	27	-
		Tight limestone 98% recovery	CORED	CORED	CORED
30'					
		Very permeable hard limestone with large solution holes that are totally unclogged.			
40'					
		Fresh water lime.			
42'		Helisoma snails			
		Very permeable tan limestone.			
45'					
		Tight limestone with small solution holes. 100%R.			
50'					
		Very permeable limestone with solution holes ½ filled with calcite			
55'					
		Very permeable Limestone with large solution holes and cavities.			
60'					

U. S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
MIAMI, FLORIDA

Well: Homestead Low density
252930N0802910.5W

Location: N W Corner Intersection
Avocado Dr.-Roberts Rd.

County: Dade State: Florida

Ground Elevation: 10 Ft. M.S.L.

Diameter: 2½"

Depth: 60.5' (60' cased)

Casing: 2½ " Type: Steel Pipe

Finish: 0.5' Open Hole

Construction: Hyd. Rotary

Driller: Wingerter Miami, Fla.

Date Finished: October 5, 1971

HAMMER WEIGHT (lbs.)
Casing: 300 Spoon: 140

HAMMER DROP (inches)
Casing: 18 Spoon: 30

Sampler Size: 1½ "I.D. 2 "O.D. 2 '

Water Level: 7 Ft. Below Surface
At: P.M Date: October 28, 1971

REMARKS

Samples and cores are stored. Selected sections of cores were tested in the Denver hydrologic laboratory and permeabilities were determined. Porosity was also determined.

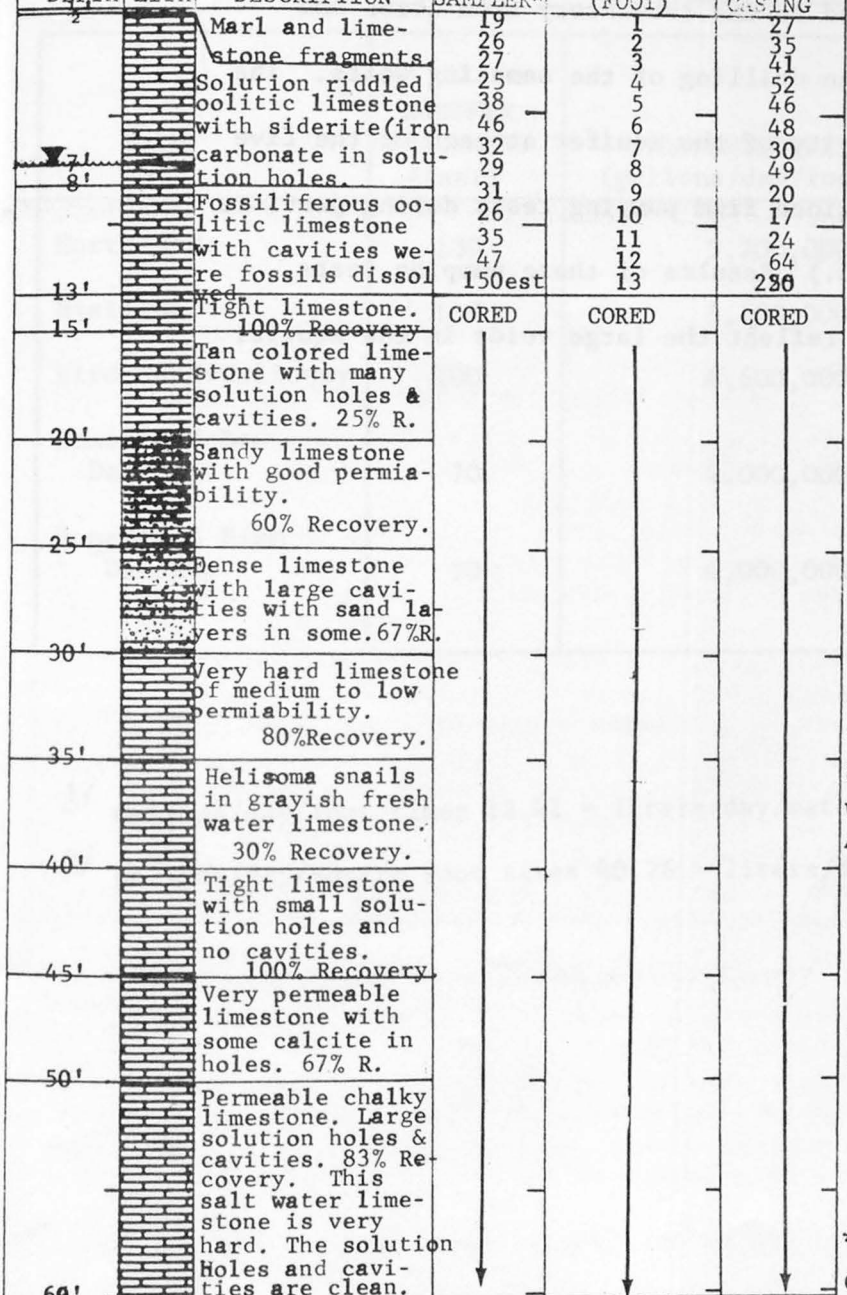
*Blow Count per each 12 inches

Compiled by: W. Pitt Date: Nov. 1, 1971

Note: Inches times 2.54=centimeters
Feet times 0.305 =meters
Pounds times 0.453=kilograms

FIGURE 10. LITHOLOGIC SECTION OF HOMESTEAD LOW DENSITY SITE

DRILLING REPORT



DEPTH	DESCRIPTION	BLOWS ON SAMPLER*	PENETRATION (FOOT)	BLOWS ON CASING
2'	Marl and limestone fragments.	19	1	27
		26	2	35
		27	3	41
	Solution riddled oolitic limestone with siderite(iron carbonate in solution holes.	25	4	52
		38	5	46
		46	6	48
7'		32	7	30
8'		29	8	49
		31	9	20
	Fossiliferous oolitic limestone with cavities were fossils dissolved.	26	10	17
		35	11	24
		47	12	64
13'		150est	13	280
15'	Tight limestone. 100% Recovery	CORED	CORED	CORED
	Tan colored limestone with many solution holes & cavities. 25% R.			
20'	Sandy limestone with good permiability. 60% Recovery.			
25'	Dense limestone with large cavities with sand layers in some. 67%R.			
30'	Very hard limestone of medium to low permiability. 80%Recovery.			
35'	Helisoma snails in grayish fresh water limestone. 30% Recovery.			
40'	Tight limestone with small solution holes and no cavities. 100% Recovery.			
45'	Very permeable limestone with some calcite in holes. 67% R.			
50'	Permeable chalky limestone. Large solution holes & cavities. 83% Recovery. This salt water limestone is very hard. The solution Holes and cavities are clean.			
60'				

U. S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
MIAMI, FLORIDA

Well: Homestead High density 252910N0802921.5W

Location: S.W. Corner Intersection N.W. 19 St. with N.W. 8 Ave.

County: Dade State: Florida

Ground Elevation: 8 Ft. M.S.L.

Diameter: 2⅓"

Depth: 60.5' (60' cased)

Casing: 2⅓" Type: Steel Pipe

Finish: 0.5' Open Hole

Construction: Hyd. Rotary

Driller: Wingerter Miami, Florida

Date Finished: October 6, 1971

HAMMER WEIGHT (lbs.)
Casing: 300 Spoon: 140

HAMMER DROP (inches)
Casing: 18 Spoon: 30

Sampler Size: 1⅛"I.D. 2 "O.D. 2 '

Water Level: 7 Ft. Below Surface
At: P.M. Date: October 28, 1971

REMARKS

Samples and cores are stored. Selected sections of cores were tested in the Denver hydrologic laboratory and permeabilities were determined. Porosity was also determined.

*Blow Count per each 12 inches

Compiled by: W. Pitt Date: Nov. 1,1971

Note: Inches times 2.54=centimeters
Feet times 0.305 =meters
Pounds times 0.453=kilograms

FIGURE 11. LITHOLOGIC SECTION OF HOMESTEAD HIGH DENSITY SITE

conductivity of the aquifer at different depths where the wells are finished were determined in the laboratory from cores and cuttings obtained during the drilling of the sampling wells. The average hydraulic conductivity of the aquifer at each of the five sites is based on data obtained from pumping tests during previous investigations.(See table 3.) Results of these pumping tests, reported by Parker (1955), reflect the large voids in the aquifer.

Table 3.--Aquifer characteristics

SITE	AQUIFER THICKNESS (feet)	TRANSMISSIVITY (gallons/day/foot) [1/]	HYDRAULIC CONDUCTIVITY (gallons/ day/square foot) [2/]
North Dade	130	3,200,000	24,600
Hialeah	110	3,200,000	29,100
Bird Road-Galloway	100	4,500,000	45,000
Homestead Low Density	70	4,000,000	57,100
Homestead High Density	70	4,000,000	57,100

1/ Gallons/day/foot times 12.41 = liters/day/meter.

2/ Gallons/day/square foot times 40.76 = liters/day/square meter.

The average hydraulic conductivity in the aquifer is more than twice as high in the south as in the north, and the hydraulic conductivity of the strata in the top 60 feet of the aquifer, as shown by the data in the appendix, is much higher in the south than in the north.

At the North Dade site the hydraulic conductivity of the top 60 feet, mostly sand, is 1,000 gpd/ft^2. The hydraulic conductivity of the strata in the bottom of the aquifer (within the depth range 60-130 feet) is 45,000 gpd/ft^2. Similarly in Hialeah the top 60 feet of aquifer contains sand and is of low hydraulic conductivity and the bottom of the aquifer is highly permeable.

At the Bird Road-Galloway site, the upper strata are not as permeable as the lower strata as indicated by the drilling logs. They are however still more permeable than the upper strata in the North Dade and Hialeah sites.

In Homestead the aquifer is chiefly porous limestone and therefore highly permeable. Throughout its entire thickness the hydraulic conductivity is fairly uniform.

The cores obtained at selected depths at the Bird Road-Galloway and the Homestead sites show thin layers of relatively impermeable limestone that are very hard and dense. These layers must be discontinuous over the southern half of the county because at some sites some of the parameters found in the water above and below them show no changes in concentration. It is possible that

similarly impermeable layers are also present at the North Dade and the Hialeah sites but the samples collected there did not contain significant amounts of dense limestone. Thin layers of low permeability occur at 19-19.5, 41-42, and 51-51.5 feet at Bird Road-Galloway and 27.5-28, 37-37.5, and 56.5-57 feet at Homestead.

A soil classification triangle of the material from the wells is shown in figure 12. The figure shows that all the material from the North Dade, Hialeah, and Bird Road-Galloway sites below the 10-foot level is composed of well graded or uniform sand and gravelly sand, and the shallowest materials (above the 10-foot level) are composed of gravel and sandy gravel. The material from the two deepest wells in the Bird Road-Galloway site is over 90% gravel. The Homestead wells are finished in zones of indurated material and a soil classification cannot be applied to them.

Table 4, a list of particle size analyses, shows that the upper 30 feet of aquifer material at the North Dade site, the Hialeah site, and the Bird Road-Galloway site are composed of coarse to medium grained sand that provides good filtration.

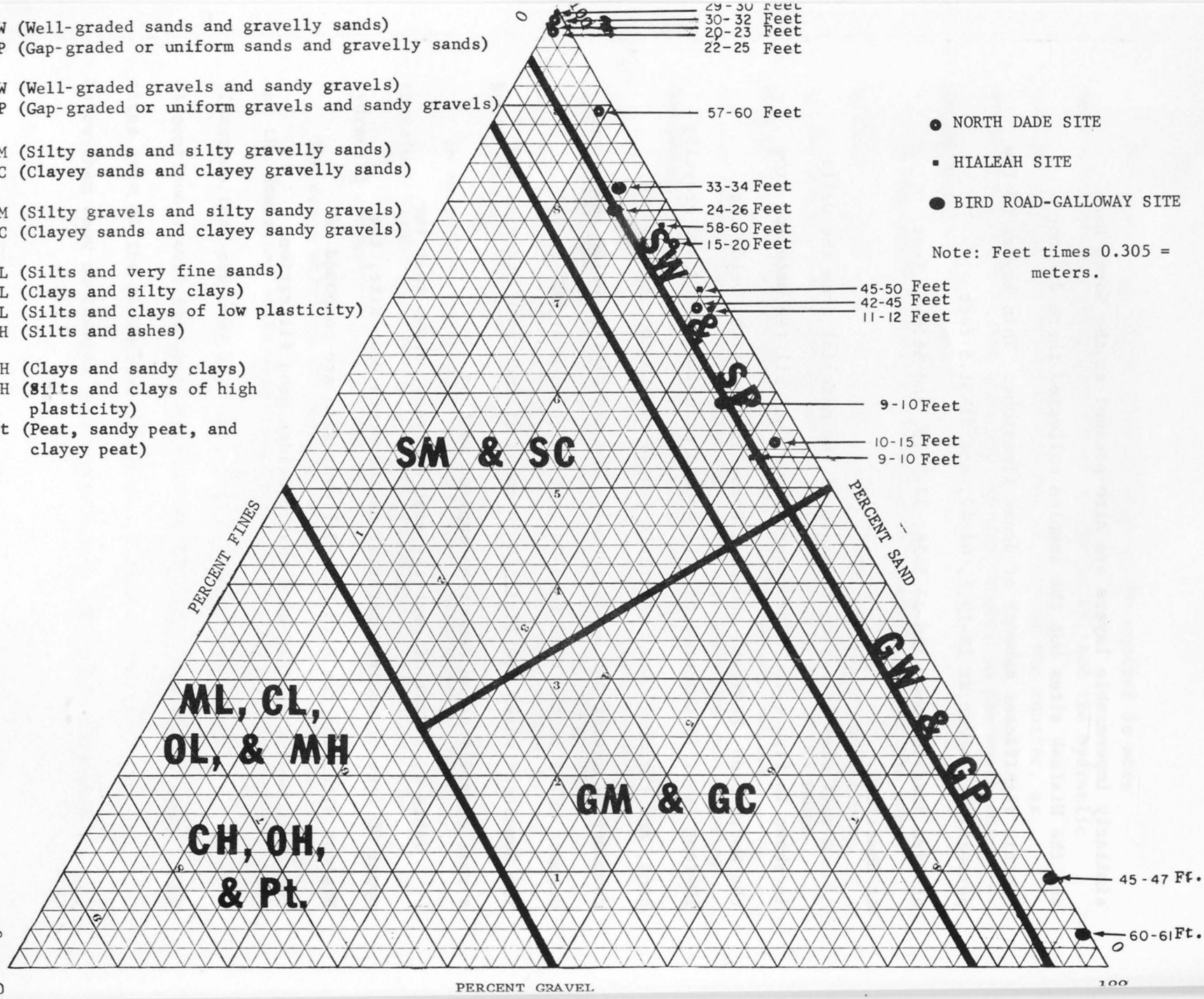


FIGURE 12. SOIL CLASSIFICATION TRIANGLE

Table 4.--Particle size analysis

SITE	DEPTH (feet) [1/]	MEDIAN DIAMETER (millimeters)	EFFECTIVE SIZE (millimeters)	POROSITY (percent)	GRADATION
North Dade	10-11	0.64	0.16	45	Gap graded
	20-21	0.36	0.14	47	Gap graded
	30-32	0.28	0.18	45	Uniformly graded
	44-45	0.32	0.10	50	Gap graded
	59-60	0.46	0.20	45	Well graded
Hialeah	10-12	0.78	0.12	45	Gap graded
	21-23	0.22	0.10	40	Uniformly graded
	28-30	0.18	0.16	40	Uniformly graded
	44-46	0.74	0.16	50	Gap graded
	60-62	0.32	0.16	55	Gap graded
Bird Road-Galloway	8-10	0.77	0.12	40	Gap graded
	25-26	0.44	0.10	50	Well graded
	33-34	0.45	0.13	50	Gap graded
	49-50	13.00	2.10	55	Gap graded
	60-61	- --	- --	--	Uniformly graded

[1/] Feet times 0.305 = meters

Figures 13 through 17 show the average ground-water levels, average yearly high and the average yearly low, and the average monthly high and monthly low, for 1960-71. Water-level measurements at the septic tank sites were used to estimate the hydraulic gradients in the five sites. Hydraulic gradients estimated for two different times of the year are presented in table 5.

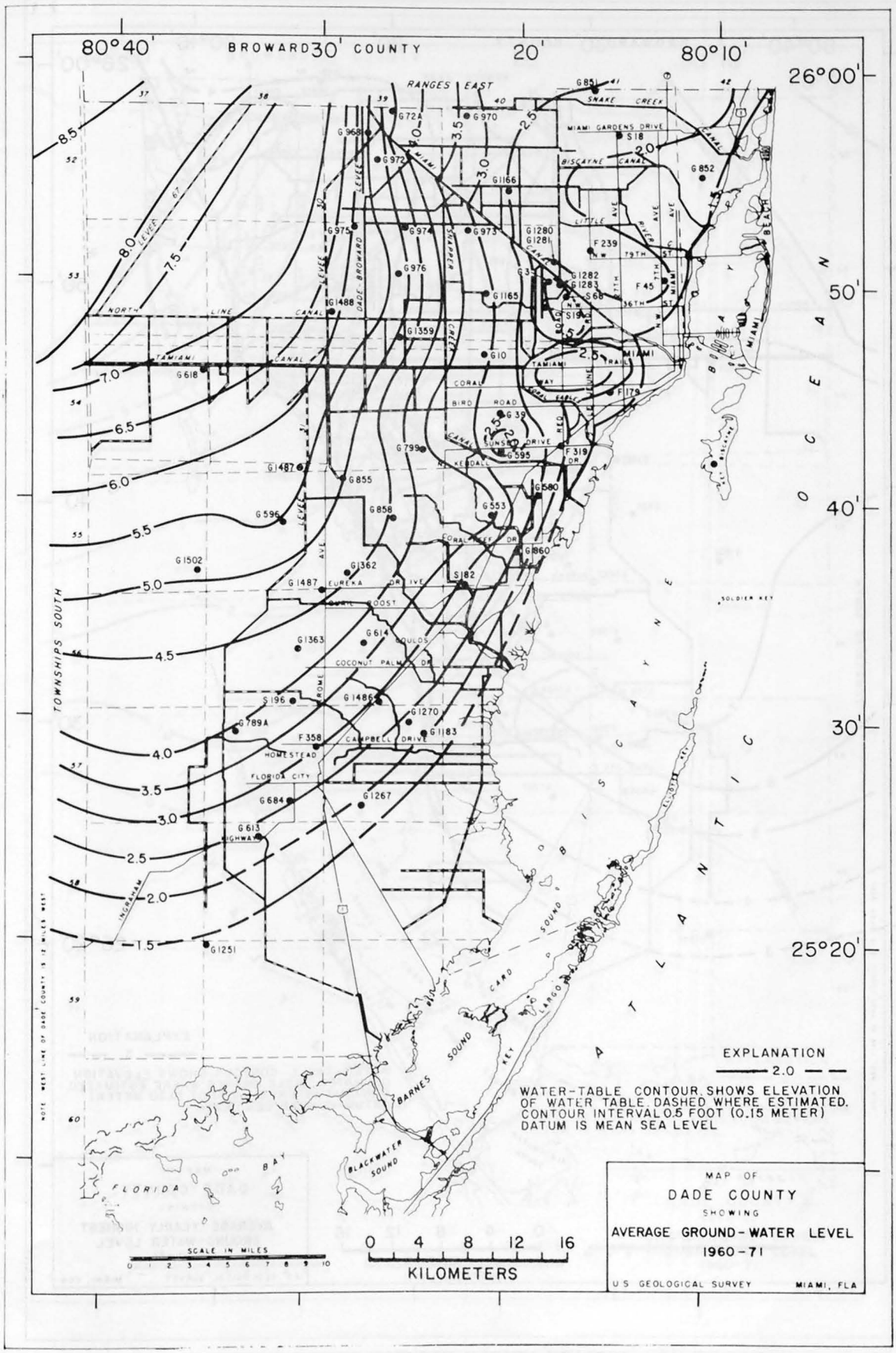


FIGURE 13. AVERAGE GROUND-WATER LEVEL

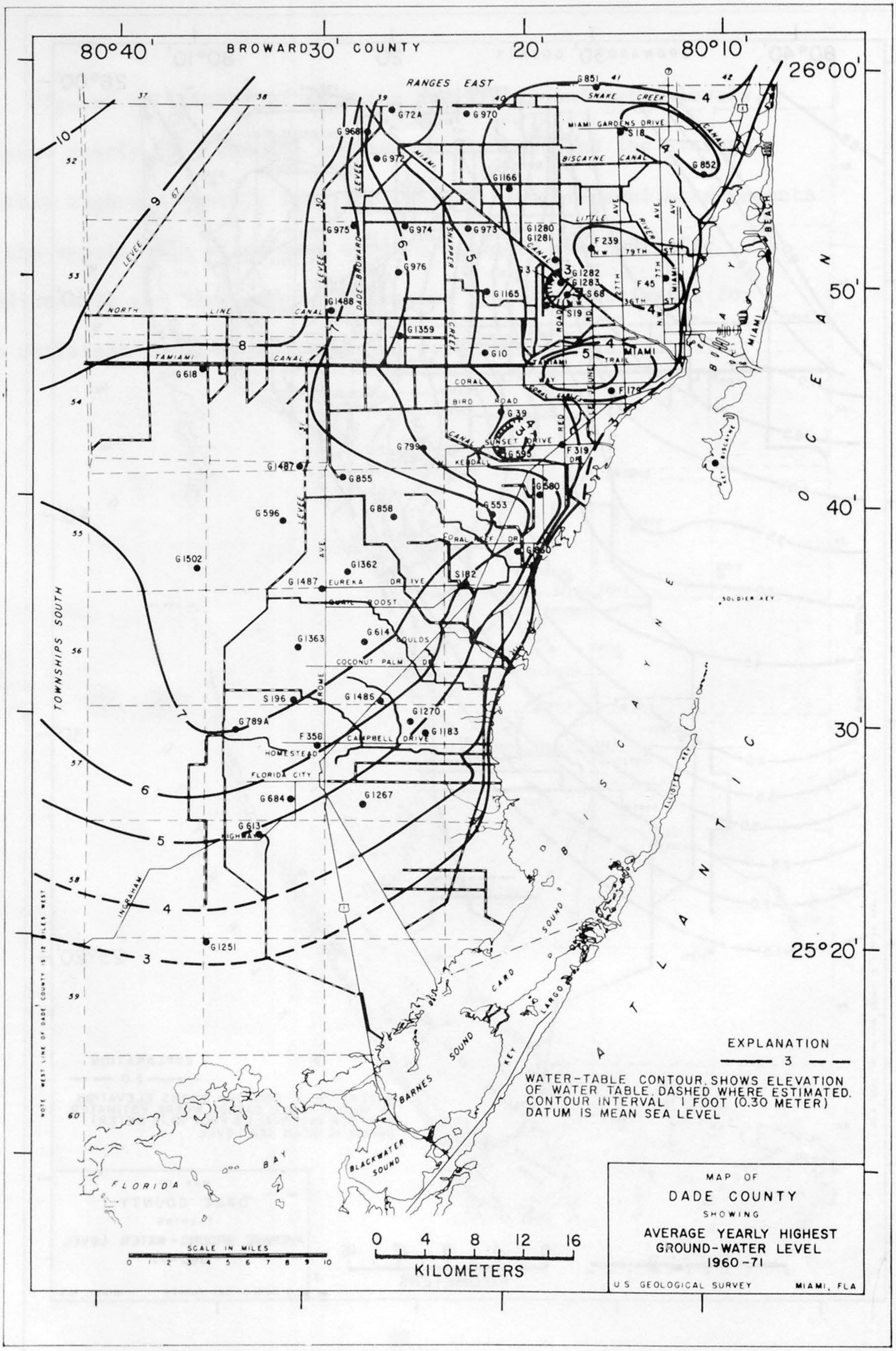


FIGURE 14. AVERAGE YEARLY HIGHEST GROUND-WATER LEVEL

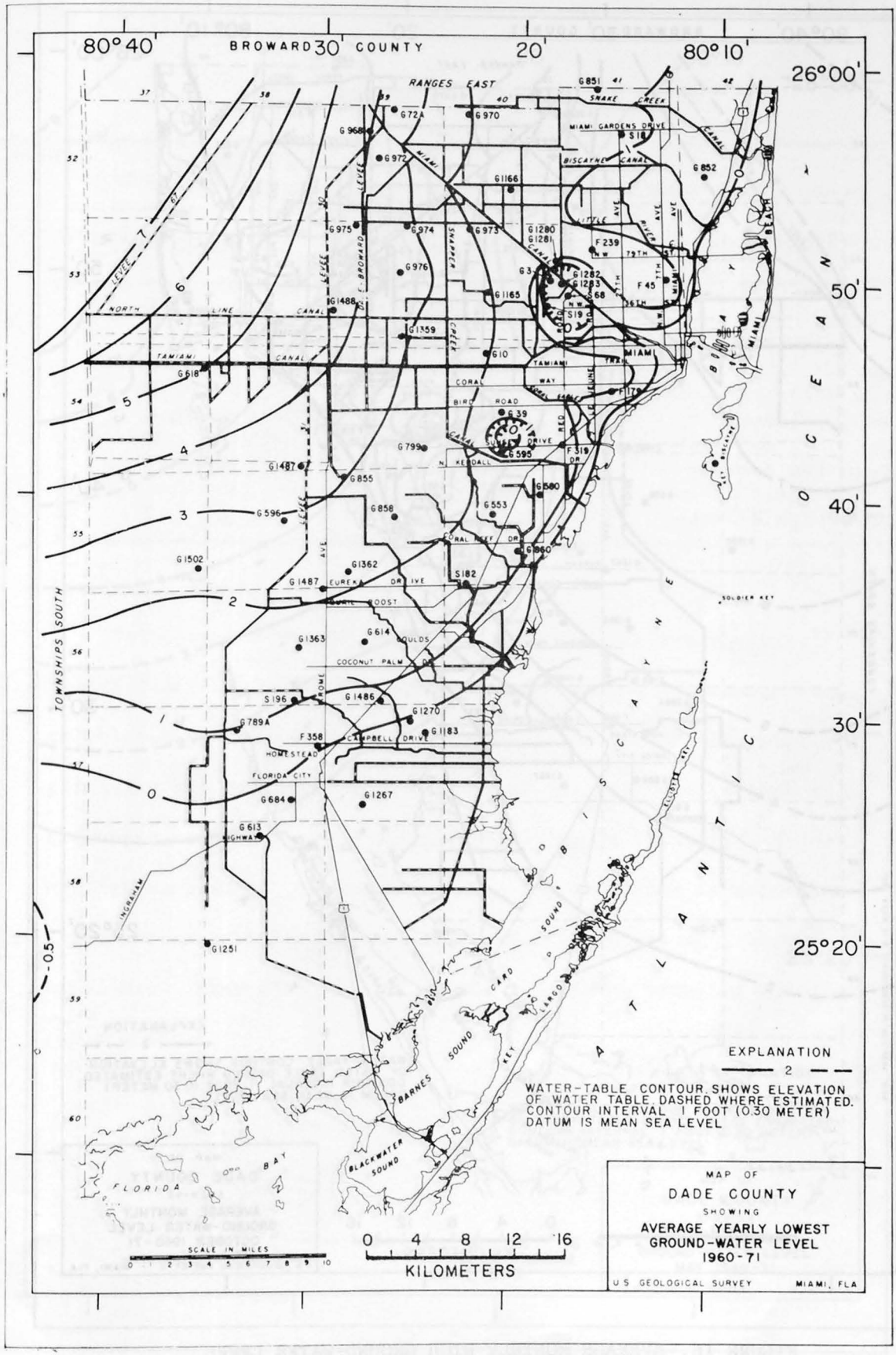


FIGURE 15. AVERAGE YEARLY LOWEST GROUND-WATER LEVEL

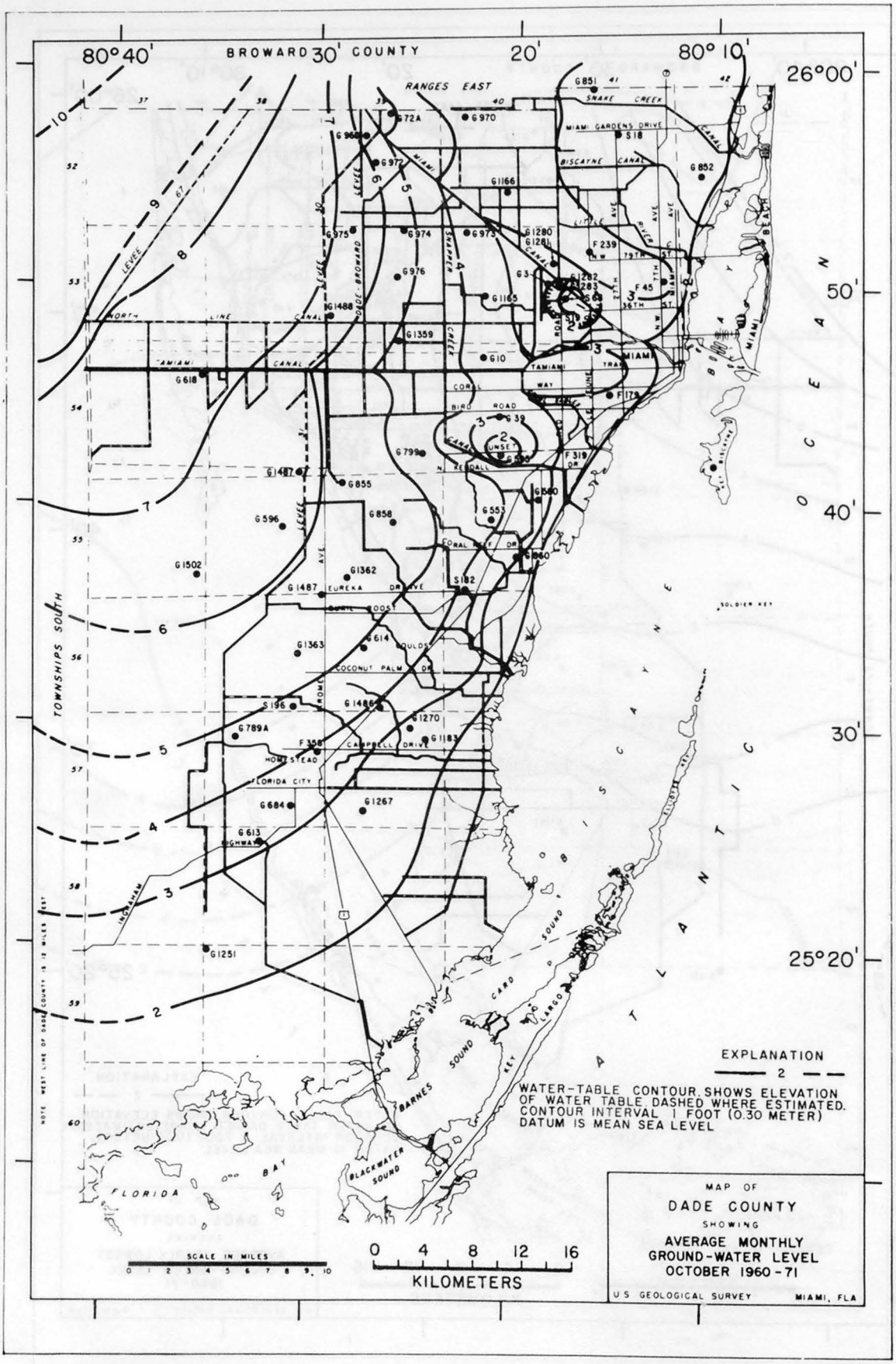


FIGURE 16. AVERAGE MONTHLY HIGH GROUND-WATER LEVEL

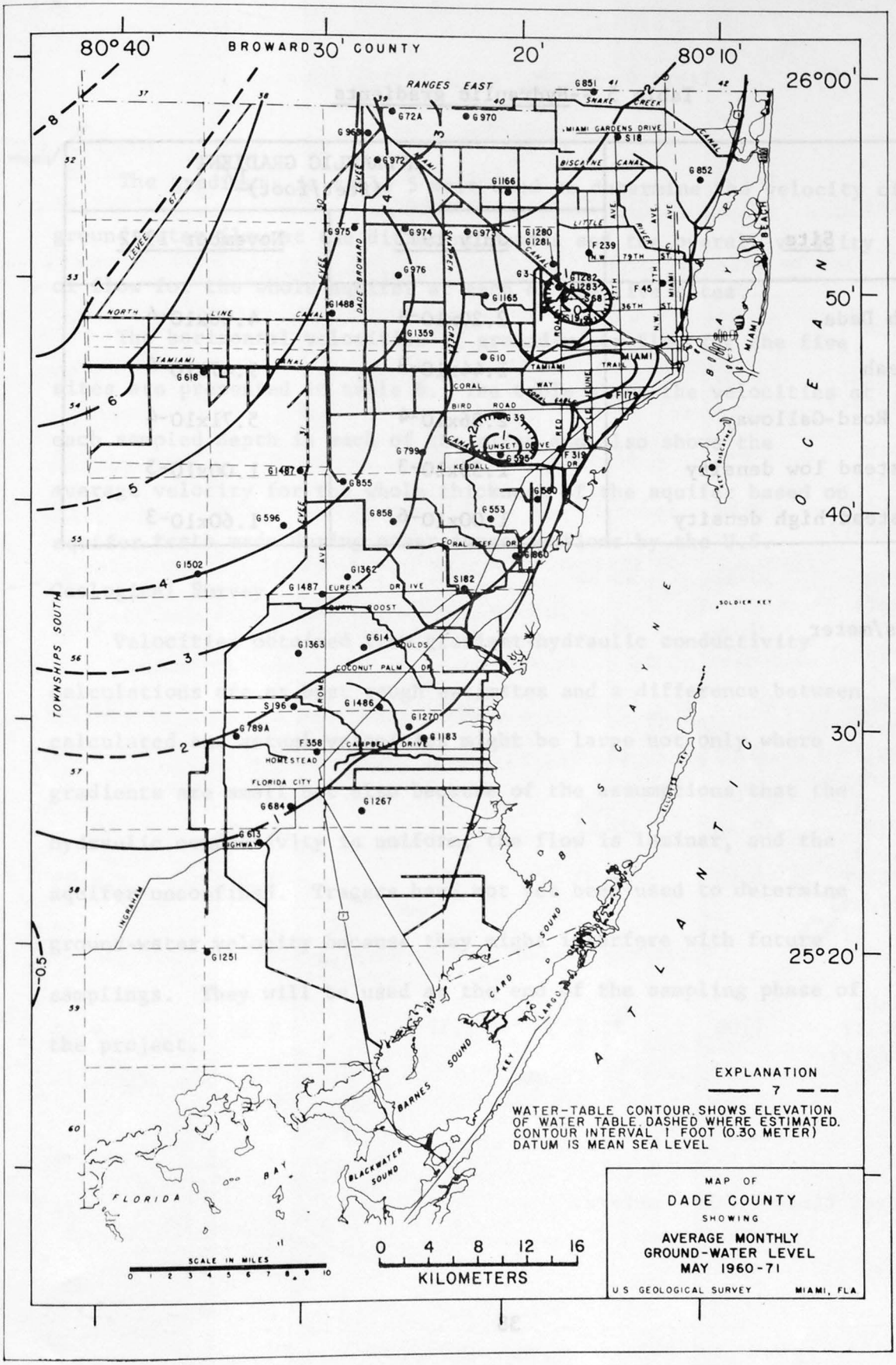


FIGURE 17. AVERAGE MONTHLY LOW GROUND-WATER LEVEL

Table 5.--Hydraulic gradients

Site	HYDRAULIC GRADIENT (feet/foot)[1/]	
	July 1972	November 1972
North Dade	2.20×10^{-4}	4.00×10^{-4}
Hialeah	1.44×10^{-3}	9.47×10^{-4}
Bird Road-Galloway	2.86×10^{-4}	5.71×10^{-4}
Homestead low density	1.33×10^{-3}	1.00×10^{-3}
Homestead high density	1.00×10^{-6}	1.60×10^{-3}

[1/] Meters/meter

The gradients in table 5 were used to determine the velocity of ground-water flow at the different depths and the overall velocity of flow for the whole aquifer at each of the five sites.

The horizontal velocities of ground-water flow for the five sites are presented in table 6. The table shows the velocities at each sampled depth in each of the sites and also shows the average velocity for the whole thickness of the aquifer based on aquifer tests made during other investigations by the U.S. Geological Survey.

Velocities obtained from gradient-hydraulic conductivity calculations are at best rough estimates and a difference between calculated and actual velocities might be large not only where gradients are small but also because of the assumptions that the hydraulic conductivity is uniform, the flow is laminar, and the aquifer unconfined. Tracers have not yet been used to determine ground-water velocity because they might interfere with future samplings. They will be used at the end of the sampling phase of the project.

Table 6.--Ground-water velocities

Sites	North Dade	Hialeah	Bird Road-Galloway	Homestead Low Density	Homestead High Density
Vertical velocities by laboratory analysis					
DEPTH (feet)[1/]	10-11	10-12	8-10	12	12
VELOCITY (feet/day)	0.02	0.03	0.02	6.20	6.95
DEPTH (feet)	20-21	21-23	25-26	22-23	25-26
VELOCITY (feet/day)	0.03	0.03	0.03	6.20	6.95
DEPTH (feet)	30-32	28-30	33-34	25-26	34
VELOCITY (feet/day)	0.04	0.05	0.04	6.20	6.95
DEPTH (feet)	44-45	44-46	49-50	45-46	45-46
VELOCITY (feet/day)	0.02	0.06	2.29	6.20	6.95
DEPTH (feet)	59-60	60-62	60-61	60-61	60
VELOCITY (feet/day)	0.08	0.10	2.29	6.20	6.95
Horizontal velocities by pumping test					
OVERALL VELOCITY (feet/day)	1.02	2.13	2.57	8.85	9.92

[1/] Feet times 0.305 = meters.

GROUND-WATER QUALITY

The chemical, physical, and biological nature of water, both fresh and contaminated, can be made known through analyses of the water, both in the laboratory and in the field. The laboratory and field analyses quantify three different kinds of parameters: physical, chemical, and biological. During this investigation, samples were collected and analyzed for parameters in all three categories. The following table lists the parameters determined, by category. It includes many of the parameters that generally indicate possible ground-water deterioration.

Parameters determined in water from wells at or near five drainfield sites in Dade County (sample collection and analysis by U.S. Geological Survey except as indicated) are shown on page 42.

Physical parameters

Turbidity	Color	Temperature

Chemical parameters

Nitrogen species	Sodium	Parathion
Phosphorus species	Potassium	Methyl parathion
Biochemical oxygen demand[2/]	Strontium	Trithion
Chemical oxygen demand[1/]	Cadmium	Methyl trithion
Sulphate	Chromium	Toxaphene
pH	Copper	Aldrin
Bicarbonate alkalinity	Iron	DDD
Carbonate alkalinity	Lead	DDE
Total alkalinity	Manganese	DDT
Carbon dioxide	Zinc	Dieldrin
Total carbon	Polychlorinated biphenyls	
Total inorganic carbon	Oils and greases	
total organic carbon	Detergents	
Specific conductance	Heptachlor	
Dissolved solids	Heptachlor epoxide	
Carbonate hardness	Lindane	
Non-carbonate hardness	Chlordane	
Chloride	2,4-D	
Fluoride	2,4,5-T	
Silica	Silvex	
Boron	Diazinon	
Arsenic	Ethion	
Calcium	Malathion	
Magnesium	Endrin	

Biological Parameters

Total coliform bacteria[1/]	Fecal coliform bacteria[1/]	Enteroviruses[3/]
	Fecal streptococcoe bacteria[1/]	

1/ Samples analyzed by the U.S. Environmental Protection Agency
2/ Samples analyzed by the Dade County Pollution Control Department
3/ Samples analyzed by the University of Miami

The samples were collected from the test wells quarterly to evaluate the effects of most major climatological and hydrologic conditions on water quality. During the year of data collection, however, ground-water levels generally were below average and the possible effects of high water levels on drainfield-aquifer relations could not be analyzed. The wells were pumped by means of a centrifugal pump and the samples removed from the wells through flexible transparent tubing. Both pump and tubing were sterilized by UV radiation.

Before each sample was collected, at least one and a half times the volume of water standing in the well casing was removed. This removal insured that the water sampled came from the aquifer rather than the well. Pre-pumping was restricted to this small quantity to avoid inducing migration of water to the well from parts of the aquifer distant from the well.

During the investigation, some of the parameters were found to be more useful than others in determining the effects of septic tank effluent on ground-water quality. A general discussion of the nature of the water from the wells is given in the following few pages. Areal variations from site to site are described to indicate the effects of septic tank density, lithology, and soil cover.

It is beyond the scope of this report to attempt to interpret each single parameter and to reach final conclusions on the effects of septic tanks after only 1 year of a 3 year investigation. More data need to be collected before their effects can be fully interpreted.

Physical Characteristics

Turbidity of the ground water is used in this study as an index of sand particles in the aquifer. It is higher in the North Dade and Hialeah sites, and it is higher near the top of the aquifer than deep into the aquifer. The appendix shows that the average trubidity ranges from about 30 JTU (Jackson Turbidity Units) in the sandy areas in the north to about 5 JTU in the limestone areas of Homestead. The average turbidity is about 20 JTU in the Bird Road-Galloway site.

In south Florida highly colored natural water is frequently encountered. Besides natural iron in water in the Biscayne aquifer which gives a yellowish-brownish color to the ground-water in many areas of Dade County, organic soils contribute to the color of the water.

The areal distribution of highly colored ground-water is similar to the areal distribution of organic soils at the sites studied. A comparison of samples from Hialeah and North Dade, where there are relatively deep organic soil covers, with samples from Bird Road-Galloway, where there is very little soil cover, indicates that the iron content is of the same order of magnitude. The color is at least one order of magnitude higher where the organic soil is present.

Chemical Characteristics

Nitrate concentrations range on the average, from 0.00 mg/l (milligrams per liter) in the north to 2.20 mg/l in south Dade County. This is below the U.S. Public Health Service (1962) drinking water standard of 10 mg/l of nitrate as nitrogen (45 mg/l of nitrate as NO_3). Nitrate was found in very low concentrations at all the sites. Some organic nitrogen was also found but no nitrite was present in the ground water. Ammonia nitrogen concentration is high in the north and low in the highly permeable areas in the south. Concentrations range from 6.40 mg/l NH_3 as N in Hialeah in the middle of the drainfield to 0.00 mg/l in Homestead.

Orthophosphate and the total phosphate concentrations at different depths in all the sites are shown in the tables in the appendix. They show almost equal values of ortho and total phosphates. Only some minute quantities are in polyphosphate or insoluble forms and some in organic form. The only orthophosphate concentrations above 0.1 mg/l were found in Hialeah at shallow depths (30 feet or less).

The biochemical oxygen demand and chemical oxygen demand tests are excellent indicators of the presence of sewage because they determine the oxygen demand exerted by it. The chemical oxygen demand test determines total organic material whether it is biologically resistant or not, as well as many inorganic oxidizable chemical compounds. The total oxygen demand of sewage is exerted by three types of materials, carbonaceous organic material, oxidizable nitrogenous material, and inorganic chemical compounds. The biochemical oxygen demand test determines the demand exerted by the carbonaceous organic mayerial and the oxidizable nitrogenous material degradable by biological action.

Biochemical oxygen demand was low at all the sites but was slightly higher in the north. Chemical oxygen demand was also higher in the north than in the south.

Sulfate concentrations were less than 50 mg/l in all samples collected. The maximum sulfate concentration recommended for drinking water by the U.S. Public Health Service (1962) is 250 mg/l.

Herbicides and insecticides were present in very low concentrations. The only herbicide found was 2,4-D, at the 30- and 40-foot levels in Hialeah. Malathion, an organophosphate insecticide, was found at the 10-foot level in the low density Homestead site, and chlorinated hydrocarbon insecticides were found at the 10- and 20-foot levels in the Bird Road-Galloway and the Hialeah sites. The highest concentration of any of these parameters was 0.08 micrograms per liter which is below U.S. Public Health Service (1962) permissible limits for drinking water. Herbicides and insecticides were analyzed to be certain that no common parameters were overlooked in the study. The source of the small amount of herbicides and insecticides was probably from lawn spraying and not from the septic tank.

Most of the trace metals, such as arsenic, cadmium, chromium, copper, lead, and manganese were present in quantities below permissible limits.

Biological Characteristics

Total coliform, fecal coliform, and fecal streptococcal bacteria in the ground-water were investigated. Microorganisms of fecal origin are usually found in large numbers in domestic sewage and when found in natural waters they are good indicators of fecal contamination.

Data in tables 7 through 11 show the average number of colonies per 100 ml (milliliters) for the three types of bacteria analyzed. In calculating averages the values expressed as <1 or <2 in the tables in the Appendix have been considered as zero for tables 7 through 11. Two trends are immediately apparent. The higher bacteria values occur in the northern areas (tables 9, 10, and 11); low values occurred in the southern areas (tables 7 and 8).

Tables 7 through 11 show that there were fewer total coliform concentrations below the 30-foot level than above. Except for one colony at the 60-foot well in the high density Homestead area, no fecal coliform bacteria were found below 10 feet at any of the sites. Except for the fecal streptococci count of 53 at the 60-foot well in North Dade, the maximum value for fecal streptococci below 30 feet at any site was at the 40-foot level in North Dade with a count of 7 fecal streptococcal colonies per 100 ml. The only sites where total coliforms exceeded a count of 1 colony per 100 ml below the 30-foot level were at the 60-foot depth in North Dade and at the 60-foot depth in the downgradient site in Homestead where the total coliform count is shown by the table to be 8 and 10 respectively.

Table 7.--North Dade - Bacteria colonies per 100 ml.

Location	NORTH DADE									
Grade	UPGRADIENT					DOWNGRADIENT				
Well depth (feet)[1/]	10	20	30	40	60	10	20	n.a.	n.a.	n.a.
Total Coliform	15	1	1	1	8	1	8	-	-	-
Fecal Coliform	0	0	0	0	0	0	0	-	-	-
Fecal Streptococci	1	3	0	7	53	7	5	-	-	-

Table 8.--Hialeah - Bacteria colonies per 100 ml.

Location	HIALEAH									
Grade	UPGRADIENT					DOWNGRADIENT				
Well depth (feet)	10	20	30	40	60	10	20	n.a.	n.a.	n.a.
Total Coliform	5	1	1	1	1	0	0	-	-	-
Fecal Coliform	2	0	0	0	0	0	0	-	-	-
Fecal Streptococci	8	2	1	1	0	1	0	-	-	-

Table 9.--Bird Road-Galloway - Bacteria colonies per 100 ml.

Location	BIRD ROAD - GALLOWAY									
Grade	UPGRADIENT					DOWNGRADIENT				
Well depth (feet)	10	20	30	40	60	10	20	n.a.	n.a.	n.a.
Total Coliform	99	2	1	1	1	96	2	-	-	-
Fecal Coliform	21	0	0	0	0	2	0	-	-	-
Fecal Streptococci	4	0	1	1	0	2	1	-	-	-

[1/] Feet times 0.305 = meters.

Table 10.--Homestead (low density) - Bacteria colonies per 100 ml.

Location	HOMESTEAD (Low Density)									
Grade	UPGRADIENT					DOWNGRADIENT				
Well depth (feet)[1/]	10	20	30	40	60	10	20	30	40	60
Total Coliform	18	1	8	1	1	19	4	3	1	10
Fecal Coliform	0	0	0	0	0	0	0	0	0	0
Fecal Streptococci	0	0	0	0	1	0	0	0	2	0

Table 11.--Homestead (high density) - Bacteria colonies per 100 ml.

Location	HOMESTEAD (High Density)									
Grade	UPGRADIENT					DOWNGRADIENT				
Well depth (feet)	10	20	30	40	60	10	20	n.a.	n.a.	n.a.
Total Coliform	28	4	23	1	1	28	14	-	-	-
Fecal Coliform	0	0	0	0	1	2	0	-	-	-
Fecal Streptococci	2	0	1	0	0	8	1	-	-	-

[1/] Feet times 0.305 = meters.

The data for the two Homestead sites shows that the bacteriological parameters at the high density site are slightly higher in concentration than in the low density site.

FUTURE PLANS

The immediate plans call for continued quarterly sampling of water from the wells for analysis of selected parameters but with an additional effort directed toward investigating the high ammonia content of ground-water at the Hialeah site. The plans are to sample deep fire wells and shallow sprinkling wells near the site in an attempt to determine whether the high ammonia concentration is widespread or localized to the study site. If the ammonia appears to be widespread, the next step will be to sample fire wells and sprinkling wells near the Hialeah race track, and near the aluminum plants and the food processing plants to determine whether they constitute the major source of ammonia in the ground water.

Next year (1973), the scope of the project will be expanded considerably. Samples of water will be taken from sprinkling wells in a sewered and an unsewered (septic tank) area of as similar hydrogeologic conditions as possible, and of similar building density. The analyses are expected to provide a good comparison of the nitrate and phosphate concentrations at both sites. Two sites will be selected in the south Dade area, where the least influence from soil cover, normally high color and turbidity, and other interfering parameters can be predicted, and where the data would be of use in planning the development of this rapidly growing area of the county.

An effort to locate and sample wells in largely undeveloped areas near the septic tank sites under investigation will be made in order to determine, as closely as possible, the chemical, physical, and bacteriological conditions of water from uninhabited areas where no septic tanks are in existence.

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GLOSSARY

Downgradient: The direction of ground-water movement from a higher to a lower water level. The lower water level elevation is said to be downgradient of the upper water level elevation.

Effective size: The size of a particle in a soil of which 10 percent of other particles are smaller. D_{10}, the diameter of that particle.

External drainage: A measure of the portion of rainfall that is removed from a particular soil by surface runoff.

Gap graded: A soil composed of a mixture of uniformly graded soils is said to be gap graded if there are not particles of every size. A soil whose uniformity coefficient is between 5 and 10.

Hydraulic conductivity: A measure of the volume of water that a material transmits through a cross sectional area perpendicular to the direction of flow in a unit of time.

Internal drainage: A measure of the part of rainfall that is removed from a particular soil by infiltration.

Median diameter: The size of a particle in a soil of which 50 percent of the other particles are smaller. D_{50}, the diameter of that particle.

Permeability: A measure of the capacity of a material to transmit water under pressure.

Porosity: A ratio, expressed in percentage, of the volume of the interstices in a soil to the volume of the soil.

Porosity, Effective: A ratio, expressed in percentage, of the volume of interconnected interstices available for fluid transmission in a soil to the volume of the soil.

Transmissivity: The rate at which water is transmitted through a strip of the aquifer of unit width extending the full saturated thickness.

Trask sorting coefficient: Measures the spread of sizes on either size of the median diameter. It is defined as the square root of the ratio of the size of the particles 75 percent smaller than the other particles to the size of the particles 25 percent smaller than the other particles.

$$So = \sqrt{\frac{D_{75}}{D_{25}}}$$

Uniformity coefficient: A ratio of the diameter of a particle 60 percent smaller than the other particles in the soil to the diameter of a particle 10 percent smaller than the other particles in the soil.

$$C_u = \frac{D_{60}}{D_{10}}$$

Uniformly graded: Said of a soil in which all grains are nearly the same size. A soil whose uniformity coefficient is less than 5.

Upgradient: The direction opposite to the direction of groundwater movement from a higher to a lower water level elevation. The higher water level elevation is said to be upgradient of the lower water level elevation.

Well graded: Said of a soil made up of a wide range of grain sizes. A soil whose uniformity coefficient is greater than 10.

APPENDIX

Table: Data collected since the beginning of the study in October in 1971 to August 1972.

Conversion Factors: English to metric.

Memo: From William Pitt to the Miami office record file on October 29, 1971.

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
Subject to Revision

Date	SITE Well	Sampled Depth	Top of Casing Elev. Ft.msl.	Depth to Water. Ft.	Water Level in Ft.msl.	Volume in Well Gallons	Volume Pumped in Gallons	Hydraulic Conductivity K	Effective Size D_0 *	Uniformity Coeff. C_u	Trask Sorting Coeff. S_o	Residue from one Liter	Field Temperature °C	Field Conductance mmhos.	Field pH	Field Alkalinity as HCO_3	Field FREE CO_2	Total Coliforms Colonies per 100 ml.	Fecal Coliforms Colonies per 100 ml.	Fecal Streptococci Colonies per 100 ml.	BOD =	COD Θ	Total Carbon
1972	NORTH DADE	UPG																					
2/18	10Ft. Well	(10'-11')	9.59	-	-	2	6	460	0.160	15.2	5.0	V.Dk Brn	27.0	595	7.25	354	32	3	< 2	< 2	3.9	94.5	144
"	20Ft. Well	(20'-21')	9.69	-	-	4	8	750	0.140	1.9	1.5	Lt Brn	27.0	370	7.50	188	9	2	< 2	1	2.6	76.2	51
"	30Ft. Well	(30'-32')	9.64	-	-	5	10	960	0.180	1.8	1.4	Dk Brn	27.0	405	7.55	228	10	< 2	< 2	< 2	1.1	51.1	61
"	40Ft. Well	(44'-45')	9.87	7.86	2.01	8	16	540	0.100	7.5	4.5	Brown	26.5	480	7.45	262	15	< 2	< 2	18	1.3	40.7	79
"	60Ft. Well	(59'-60')	9.78	-	-	17	34	2,000	0.200	2.6	1.5	V.Lt Brn	26.5	545	7.35	288	20	< 2	< 2	< 2	1.2	28.6	80
2/16	HIALEAH	UPG																					
"	10Ft. Well	(10'-12')	6.12	-	-	3	6	400	0.120	18.6	4.3	Dk Brn	26.0	605	7.35	296	21	2	2	2	1.4	30.1	72
"	20Ft. Well	(21'-23')	6.02	-	-	5	10	370	0.105	2.5	1.3	Black	26.0	600	7.35	298	21	< 2	< 2	< 2	1.1	33.3	74
"	30Ft. Well	(28'-30')	6.16	4.35	1.81	7	14	670	0.160	1.1	1.1	Brown	26.0	580	7.35	306	22	< 2	< 2	< 2	0.8	30.3	76
"	40Ft. Well	(44'-46')	6.12		-	9	18	870	0.160	7.5	3.1	Brown	26.0	610	7.35	320	23	< 2	< 2	< 2	2.2	29.9	Lost
"	60Ft. Well	(60'-62')	6.21	-	-	12	24	1,400	0.160	3.0	2.8	Brown	26.0	610	7.25	316	28	< 2	< 2	< 2	1.1	34.4	74
2/15	BIRD RD - GALLOWAY	UPG																					
2/15	10Ft. Well	(8'-10')	9.88	-	-	2	4	330	0.115	12.2	4.0	Lt Brn	26.0	610	7.35	292	21	340	58	8	2.0	42.4	-
"	20Ft. Well	(25'-26')	10.06	-	-	4	8	470	0.100	5.9	2.3	Black	25.8	580	7.40	310	20	< 2	< 2	< 2	0.7	15.2	-
"	30Ft. Well	(33'-34')	10.02	-	-	6	12	780	0.130	5.4	2.7	V.Lt Blck	25.5	560	7.30	292	23	< 2	< 2	< 2	0.8	36.4	-
"	40Ft. Well	(49'-50')	10.15	5.89	4.26	8	16	40000	2.100	6.0	2.0	Black	25.5	520	7.40	339	21	< 2	< 2	< 2	0.8	53.3	-
"	60Ft. Well	(60'-61')	10.76	-	-	19	36					Lt Blck	25.5	520	7.40	364	23	1	< 2	< 2	0.8	46.3	-

+ Wells evacuated 200% before samples are collected.

* In mm.. All parameters expressed in mg./l. except as noted. Θ Collected by the Environmental Protection Agency
= Collected by Dade County Pollution Control (Oct & Feb)

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
Subject to Revision

Date	SITE Well	Sampled Depth	Top of Casing Elev. Ft.msl.	Depth to Water. Ft.	Water Level in Ft.msl.	Volume in Well Gallons	Volume+ Pumped in Gallons	Hydraulic Conductivity K	Effective Size * D_{10}	Uniformity Coeff. C_u	Trask Sorting Coeff. S_o	Residue from one Liter	Field Temperature °C	Field Conductance mmhos.	Field pH	Field Alkalinity as HCO_3	Field FREE CO_2	Total Coliforms Colonies per 100 ml.	Fecal Coliforms	Fecal Streptococci	BOD	COD	Total Carbon
1972	HOMESTEAD-LOW DENS. UPG.																						
2/17	10Ft. Well	(12'-13')	10.16	7.74	2.42	2	4	40,000	-	-	-	Lt Brn	25.5	500	7.55	252	11	43	<2	<2	1.1	13.4	55
"	20Ft. Well	(22'-23')	9.96	-	-	4	8	40,000	-	-	-	Brown	25.5	545	7.45	232	13	3	<2	<2	1.1	11.3	47
"	30Ft. Well	(35'-36')	10.03	-	-	7	14	40,000	-	-	-	Brown	24.5	560	7.60	236	9	<2	<2	<2	1.0	7.4	50
"	40Ft. Well	(45'-46')	9.93	-	-	8	16	40,000	-	-	-	Dk Brn	24.5	520	7.60	222	9	3	<2	<2	0.9	21.2	54
"	60Ft. Well	(60'-61')	10.50	8.28	2.22	17	34	40,000	-	-	-	Brown	24.5	545	7.40	240	15	4	<2	2	0.8	9.7	49
2/17	HOMESTEAD-LOW DENS. DNG.																						
"	10Ft. Well	(12 ft.)	9.50	-	-	2	4	40,000	-	-	-	LtBrn	25.5	510	7.55	232	10	48	<2	<2	0.8	12.1	66
"	20Ft. Well	(22 ft.)	9.54	-	-	4	8	40,000	-	-	-	V.LtBrn	24.5	550	7.50	242	12	6	<2	<2	0.8	17.3	54
"	30Ft. Well	(35'-36')	9.49	7.31	2.18	7	14	40,000	-	-	-	Brown	24.5	540	7.50	244	12	8	<2	<2	1.0	2.6	50
"	40Ft. Well	(45'-46')	9.46	-	-	8	16	40,000	-	-	-	Lt Brn	24.5	530	7.40	232	15	2	<2	<2	0.8	5.0	47
"	60Ft. Well	(60 ft.)	9.38	7.18	2.20	11	22	40,000	-	-	-	Lt Brn	24.5	530	7.65	230	8	<2	<2	<2	0.8	16.5	50
2/16	HOMESTEAD-HIGH DENSITY UP																						
"	10Ft. Well	(12 ft.)	7.94	5.67	2.27	2	4	40,000	-	-	-	Brown	25.0	505	7.45	264	15	6	<2	4	1.7	6.9	74
"	20Ft. Well	(25'-26')	7.87	-	-	5	10	40,000	-	-	-	Lt Brn	25.0	520	7.40	236	15	3	<2	<2	0.9	13.4	48
"	30Ft. Well	(34 ft.)	7.99	-	-	7	14	40,000	-	-	-	Brown	25.0	525	7.45	234	6	6	<2	<2	1.4	13.0	54
"	40Ft. Well	(45'-46')	8.08	-	-	8	16	40,000	-	-	-	Brown	25.0	530	7.40	238	15	1	<2	<2	0.8	20.1	47
"	60Ft. Well	(60 ft.)	8.03	-	-	18	36	40,000	-	-	-	Brown	24.5	540	7.70	240	8	<2	<2	<2	0.8	28.1	55
5/26	North Dade UPG.																						
5/14	10 Ft. Well	(10'-11')	9.92	-	-	2	4	460	0.160	15.2	5.0	Dk, Brn	27.0	440	7.10	228	29	15 °	0 °	--	0.3	6.3	85
5/26	20 Ft. Well	(20'-21')	9.69	8.70	0.99	4	8	750	0.140	1.9	1.5	V DkBrn	27.0	415	7.50	226	11	<2	<2	5	0.5	52.3	-
5/26	30 Ft. Well	(30'-32')	9.64	-	-	6	12	960	0.180	1.8	1.4	Lt Brn	26,5	405	7.40	218	14	<2	<2	<2	0.3	41.2	-
5/26	40 Ft. Well	(44'-45')	9.87	-	-	8	16	540	0.100	7.5	4.5	Brown	26.0	490	7.40	212	13	<2	<2	2	0.2	35.4	-
5/26	60 Ft. Well	(59'-60')	9.78	8.79	0.99	17	34	2,000	0.200	2.6	1.5	V Lt.	26.0	530	7.30	236	19	<2	<2	2	0.1	36.2	-
5/23	NORTH DADE DNG.																						
5/23	10 Ft. Well	(12'-12')	10.10	-	-	2	4	460	0.160	15.2	5.0	Dk Brn	27.5	445	7.10	208	26	<2	<2	<2	0.5	46.7	-
5/23	20 Ft. Well	(22'-23')	10.14	9.16	0.98	4	8	750	0.140	1.9	1.5	V Lt.	26.5	385	7.30	204	16	<2	<2	<2	0.6	35.1	-
5/24	HIALEAH UPG.																						
5/24	10 Ft. Well	(10'-12')	6.12	-	-	3	6	400	0.120	18.6	4.3	Dk Brn	27.0	555	7.40	244	15	<2	<2	<2	0.7	44.5	-
5/24	20 Ft. Well	(21'-23')	6.02	3.66	2.36	5	10	370	0.105	2.5	1.3	V Dk B	27.0	575	7.20	266	27	<2	<2	3	0.2	22.9	-
5/24	30 Ft. Well	(28'-30')	6.16	-	-	7	14	670	0.160	1.1	1.1	Brown	26.5	575	7.30	266	21	<2	<2	<2	0.4	28.9	-
5/24	40 Ft. Well	(44'-46')	6.12	-	-	9	18	870	0.160	7.5	3.1	Brown	26.0	600	7.10	270	34	<2	<2	<2	0.4	27.9	-
5/24	60 Ft. Well	(60'-62')	6.21	4.05	2.16	12	24	1,400	0.160	3.0	2.8	Dk Brn	26.0	605	7.20	270	27	<2	<2	<2		25.9	-
5/24	HIALEAH DNG.																						
5/24	10 Ft. Well	(9'-10')	5.17	-	-	3	6	400	0.120	18.6	4.3	Lt Brn	26.0	610	7.10	260	33	<2	<2	2	0.3	24.6	-
5/24	20 Ft. Well	(22'-23')	5.18	2.95	2.23	5	10	370	0.105	2.5	1.3	V LtBr	25.5	545	7.10	236	30	<2	<2	<2	0.5	21.4	-

+ Wells evacuated 200% before samples are collected.

* In mm. All parameters expressed as mg./l. except as noted.

°Data collected by U.S.G.S.

@ Collected by the Environmental Protection Agency
= Collected by Dade County Pollution Control, Oct & Feb

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
Subject to Revision

Date	SITE Well	Sampled Depth	Top of Casing Elev. Ft.msl.	Depth to Water. Ft.	Water Level in Ft.msl.	Volume in Well in Gallons	Volume+ Pumped in Gallons	Hydraulic Conductivity K	Effective Size * D_{10}	Uniformity Coeff. C_u	Trask Sorting Coeff. S_o	Residue from one Liter	Field Temperature °C	Field Conductance mmhos.	Field pH	Field Alkalinity as HCO_3	Field FREE CO_2	Total Coliforms Colonies per 100 ml.	Fecal Coliforms	Fecal Streptococci	BOD	COD	Total Carbon
1972	BIRD RD.--GALLOWAY UPG.																						
5/23	10 Ft. Well	(8'-10')	9.88	-	-	2	4	330	0.115	12.2	4.0	Lt. Brn	25.0	565	7.20	270	27	20	<2	< 2	0.2	26.8	-
5/23	20 Ft. Well	(25'-26')	10.06	-	-	4	8	470	0.100	5.9	2.3	Brown	25.0	560	7.20	260	26	<2	<2	< 2	0.4	14.6	-
5/23	30 Ft. Well	(33'-34')	10.02	-	-	6	12	780	0.130	5.4	2.7	VLt. Br	25.0	545	7.20	258	26	<2	<2	< 2	0.1	11.4	-
5/23	40 Ft. Well	(49'-50')	10.15	-	-	8	16	40,000	2.100	6.0	2.0	Brown	25.0	530	7.20	250	25	2	<2	< 2	0.2	11.	-
5/23	60 Ft. Well	(60'-61')	10.78	5.74	5.02	19	38					Dk Brn	25.0	515	7.20	252	25	3	<2	< 2	0.0	11.7	-
5/23	BIRD RD.--GALLOWAY DNG.																						
5/23	10 Ft. Well	(8'-10')	10.11	-	-	2	4	330	0.115	12.2	4.0	Lt. Brn	26.0	565	7.30	268	21	190	2	3	0.6	9.3	-
5/23	20 Ft. Well	(25'-26')	10.19	5.18	5.01	4	8	470	0.100	5.9	2.3	Brown	25.0	550	7.20	264	26	<2	<2	< 2	0.0	9.9	-
5/25	HOMESTEAD--LOW DENS.,UPG																						
5/25	10 Ft. Well	(12'-12')	10.16	-	-	2	4	40,000	-	-	-	Lt. Brn	25.0	520	7.50	208	10	<2	<2	< 2	0.3	14.1	-
5/25	20 Ft. Well	(22'-23')	9.96	-	-	5	10	40,000	-	-	-	Lt. Brn	24.5	535	7.40	204	13	<2	<2	< 2	0.2	1.7	-
5/25	30 Ft. Well	(25'-26')	10.03	-	-	7	14	40,000	-	-	-	Lt. Brn	24.0	530	7.40	200	13	<2	<2	< 2	0.1	2.5	-
5/25	40 Ft. Well	(45'-46')	9.93	-	-	9	18	40,000	-	-	-	Lt. Brn	24.0	525	7.30	202	16	<2	<2	< 2	0.1	1.9	-
5/25	60 Ft. Well	(60'-61')	10.50	6.72	3.78	19	39	40,000	-	-	-	Brown	24.0	525	7.40	200	13	<2	<2	< 2	0.1	7.5	-
5/25	HOMESTEAD-LOW DENS.,DNG																						
5/25	10 Ft. Well	(12 ft.)	9.50	5.61	3.89	2	4	40,000	-	-	-	Brown	24.5	450	7.40	190	12	6	<2	< 2	0.2	4.5	-
5/25	20 Ft. Well	(22 ft.)	9.54	-	-	4	8	40,000	-	-	-	Brown	24.0	520	7.50	210	10	<2	<2	< 2	0.1	0.8	-
5/25	30 Ft. Well	(35'-36')	9.49	-	-	7	14	40,000	-	-	-	Lt Brn	24.0	530	7.50	204	10	<2	<2	< 2	0.1	2.4	-
5/25	40 Ft. Well	(45'-46')	9.46	-	-	8	16	40,000	-	-	-	Brown	24.0	520	7.50	204	10	<2	<2	5	0.2	1.2	-
5/25	60 Ft. Well	(60 ft.)	9.38	5.62	3.76	12	24	40,000	-	-	-	Brown	24.5	530	7.50	200	10	<2	<2	< 2	0.1	1.5	-
5/24	HOMESTEAD-HIGH DENS.,UPG																						
5/24	10 Ft. Well	(12 ft.)	7.94	-	-	2	4	40,000	-	-	-	Dk. Brn	24.5	492	7.50	200	10	27	<2	3	0.2	1.7	-
5/24	20 Ft. Well	(25'-26')	7.87	-	-	5	10	40,000	-	-	-	Dk. Brn	25.0	520	7.40	206	13	<2	<2	<2	0.3	00.4	-
5/24	30 Ft. Well	(34 ft.)	7.99	-	-	7	14	40,000	-	-	-	Dr. Brn	25.0	528	7.40	204	13	<2	<2	< 2	0.2	0.4	-
5/24	40 Ft. Well	(45'-46')	8.08	-	-	8	16	40,000	-	-	-	Dk. Brn	24.5	520	7.70	204	7	<2	<2	< 2	0.2	1.3	-
5/24	60 Ft. Well	(60 ft.)	8.02	4.11	3.91	20	40	40,000	-	-	-	Dk. Brn	24.5	525	7.80	204	5	<2	<2	< 2	0.3	0.4	-
5/24	HOMESTEAD-HIGH DENS.DNG																						
5/24	10 Ft. Well	(12 ft.)	8.36	-	-	2	4	40,000	-	-	-	Brown	24.5	530	7.50	252	13	52	5	15	0.2	0.4	-
5/24	20 Ft. Well	(25'-26')	8.28	4.37	3.91	5	11	40,000	-	-	-	Lt. Brn	24.5	520	7.50	206	10	12	<2	<2	0.3	0.4	-

+ Wells evacuated 200% before samples are collected. * In mm. All parameters expressed in mg/l except as noted. 0 Collected by the Environmental Protection Agency = Collected by Dade County Pollution Control (Oct. & Feb.)

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DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

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Date	SITE Well	Sampled Depth	Top of Casing Elev. Ft.msl.	Depth to Water. Ft.	Water Level in Ft.msl.	Volume in Well Gallons	Volume Pumped in Gallons	Hydraulic Conductivity K	Effective Size D_{10}	Uniformity Coeff. C_u	Trask Sorting Coeff. S_o	Residue from one Liter	Field Temperature °C	Field Conductance mmhos.	Field pH	Field Alkalinity as HCO_3	Field FREE CO_2	Total Coliforms θ	Fecal Coliforms θ	Fecal Streptococci θ	BOD =	COD θ	Total Carbon
																		Colonies per 100 ml.					
1972	NORTH DADE UPG.																						
8/7	10 Ft. Well	(10'-11')	9.92	7.98	1.94	0.5	1	460	0.160	15.2	5.0	Dk Brn	28.5	440	7.25	240	22	26	Lost	2	3.0	81.7	85
"	20 Ft. Well	(20'-21')	9.69	7.78	1.91	1.0	2	750	0.140	1.9	1.5	VDkBrn	27.0	445	7.40	242	15	2	Lost	2	11.0	53.2	74
"	30 Ft. Well	(30'-32')	9.64	7.73	1.91	1.9	4	960	0.180	1.8	1.4	Brown	26.5	405	7.45	222	12	2	Lost	<2	24.0	46.8	66
"	40 Ft. Well	(44'-45')	9.87	7.96	1.91	6.0	12	540	0.100	7.5	4.5	Lt Brn	26.5	525	7.50	220	11	2	Lost	2	13.0	37.6	60
"	60 Ft. Well	(59'-60')	9.78	7.87	1.91	8.5	17	2,000	0.200	2.6	1.5	Lt Brn	26.5	510	7.35	238	17	20	Lost	156	7.0	37.4	71
	NORTH DADE DNG.																						
8/7	10 Ft. Well	(12'-12')	10.10	8.16	1.94	0.6	1	460	0.160	15.2	5.0	VDkBrn	-	500	6.95	256	46	2	Lost	14	>48.0	56.4	79
"	20 Ft. Well	(22'-23')	10.14	8.23	1.91	2.4	5	750	0.140	1.9	1.5	Dk Brn	28.0	360	7.35	214	15	16	Lost	10	>34.0	38.0	58
	HIALEAH UPG.																						
8/8	10 Ft. Well	(10'-12')	6.12	5.28	0.84	1.1	2	400	0.120	18.6	4.3	Lt Brn	28.0	600	7.15	260	29	10	2	<2	4.0	30.0	77
"	20 Ft. Well	(21'-23')	6.02	5.17	0.85	2.9	6	370	0.105	2.5	1.3	VDkBrn	27.5	580	7.30	260	21	2	<2	3	1.0	26.0	70
"	30 Ft. Well	(28'-30')	6.16	5.30	0.86	4.0	8	670	0.160	1.1	1.1	VDkBrn	27.0	580	7.30	270	22	2	<2	2	1.0	29.5	72
"	40 Ft. Well	(44'-46')	6.12	5.32	0.80	6.6	13	870	0.160	7.5	3.1	Dk Brn	27.0	630	7.30	280	22	2	<2	2	3.0	28.4	78
"	60 Ft. Well	(60'-62')	6.21	5.54	0.67	9.2	18	1,400	0.160	3.0	2.8	Lt Brn	265	630	7.30	278	22	2	<2	<2	2.0	26.0	77
	HIALEAH DNG.																						
8/8	10 Ft. Well	(9'-10')	5.17	4.40	0.77	0.9	2	400	0.120	18.6	4.3	Brown	-	630	7.35	280	20	<2	<2	<2	2.0	29.2	85
"	20 Ft. Well	(22'-23')	5.18	4.40	0.78	3.0	6	370	0.150	2.5	1.3	Lt Brn	-	565	7.50	222	11	<2	<2	<2	3.0	21.6	48
	BIRD RD.--GALLOWAY UPG.																						
8/7	10 Ft. Well	(8'-10')	9.88	5.42	4.46	0.8	2	330	0.115	12.2	4.0	Brown	27.0	550	7.25	260	23	24	Lost	4	4.0	25.2	72
"	20 Ft. Well	(25'-26')	10.06	5.60	4.46	3.3	7	470	0.100	5.9	2.3	Lt Brn	25.0	550	7.40	158	10	4	Lost	<2	0.5	17.2	67
"	30 Ft. Well	(33'-34')	10.02	5.62	4.40	4.6	9	780	0.130	5.4	2.7	Lt Brn	25.0	550	7.20	260	26	4	Lost	2	0.6	16.3	61
"	40 Ft. Well	(49'-50')	10.15	5.68	4.47	7.2	14	<40,000	2.100	6.0	2.0	Lt Brn	24.5	545	7.30	256	20	2	Lost	1	0.4	16.4	70
"	60 Fr. Well	(60'-61')	10.76	6.34	4.42	13.9	28	<40,000	-	-	-	Lt Brn	25.0	520	7.30	254	20	<2	Lost	<2	0.4	16.2	69
	BIRD RD.--GALLOWAY DNG.																						
8/7	10 Ft. Well	(8'-10')	10.11	5.77	4.34	0.7	1	330	0.115	12.2	4.0	Dk Brn	26.5	600	7.20	280	28	2	Lost	2	1.0	7.2	77
"	20 Ft. Well	(25'-26')	10.19	5.78	4.41	3.3	7	470	0.100	5.9	2.3	Brown	-	590	7.20	274	27	4	Lost	1	0.7	8.4	75
	HOMESTEAD--LOW DENS.UPG.																						
8/9	10 Ft. Well	(12'-12')	10.16	6.72	3.44	0.9	2	<40,000	-	-	-	Dk Brn	25.0	500	7.40	212	13	10	<2	<2	2.0	8.8	54
"	20 Ft. Well	(22'-23')	9.96	6.73	3.23	2.7	5	<40,000	-	-	-	Lt Brn	24.0	535	7.30	204	16	<2	<2	<2	1.0	5.6	51
"	30 Ft. Well	(25'-26')	10.03	6.81	3.22	3.1	6	<40,000	-	-	-	Lt Brn	24.5	535	7.40	198	12	24	<2	<2	1.0	5.2	49
"	40 Ft. Well	(45'-46')	9.93	6.98	2.95	6.4	13	<40,000	-	-	-	Lt Brn	24.5	530	7.35	200	14	<2	<2	<2	2.0	5.2	51
"	60 Ft. Well	(60'-61')	10.30	7.30	3.20	13.7	27	<40,000	-	-	-	Lt Brn	24.5	520	7.40	198	12	<2	<2	<2	1.0	4.0	51

All parameters expressed in mg./l. except as noted. * In mm.. + Wells evacuated 200% before samples are collected.

θ Collected by the Environmental Protection Agency
= Collected by Dade County Pollution Control

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
Subject to Revision

Date	SITE Well	Sampled Depth	Top of Casing Elev. Ft.msl.	Depth to Water. Ft.	Water Level in Ft.msl.	Volume in Well Gallons	Volume Pumped+ in Gallons	Hydraulic Conductivity K	Effective Size D_0 *	Uniformity Coeff. C_u	Trask Sorting Coeff. S_0	Residue from one Liter	Field Temperature °C	Field Conductance mmhos.	Field pH	Field Alkalinity as HCO_3	Field FREE CO_2	Total Coliforms θ Colonies per 100 ml.	Fecal Coliforms θ Colonies per 100 ml.	Fecal Streptococci θ Colonies per 100 ml.	BOD -	COD θ	Total Carbon
1972	HOMESTEAD-LOW DENS.DNG																						
8/9	10 Ft. Well	(12 ft.)	9.50	6.29	3.21	0.9	2	<40000	-	-	-	Lt Brn	25.5	610	7.40	206	13	4	<2	<2	2.0	5.6	51
"	20 Ft. Well	(22 ft.)	9.54	6.31	3.23	2.6	5	<40000	-	-	-	Lt Brn	24.0	535	7.30	208	17	6	<2	<2	1.0	4.0	52
"	30 Ft. Well	(35'-36')	9.49	6.32	3.17	4.8	10	<40000	-	-	-	Lt Brn	24.5	530	7.40	200	13	2	<2	<2	1.0	4.4	54
"	40 Ft. Well	(45'-46')	9.46	6.28	3.18	6.5	13	<40000	-	-	-	Lt Brn	24.5	520	7.40	200	13	2	<2	<2	2.0	4.8	49
"	60 Ft. Well	(60 ft.)	9.38	6.20	3.18	8.8	18	<40000	-	-	-		24.5	520	7.30	200	16	30	<2	<2	2.0	4.4	52
	HOMESTEAD-HIGH DENS.UPC																						
8/8	10 Ft. Well	(12 ft.)	7.94	4.65	3.29	1.2	2	<40000	-	-	-		25.0	510	7.40	212	13	50	<2	<2	14.0	0.2	55
"	20 Ft. Well	(25'-26')	7.87	4.66	3.21	3.5	7	<40000	-	-	-		24.0	530	7.40	202	13	8	<2	<2	14.0	0.4	51
"	30 Ft. Well	(34 ft.)	7.99	4.76	3.23	4.8	10	<40000	-	-	-	Dk Brn	24.0	530	7.40	202	13	64	<2	4	22.0	1.0	49
"	40 Ft. Well	(45'-46')	8.08	4.85	3.23	6.7	13	<40000	-	-	-	Lt Brn	24.0	530	7.30	200	16	2	<2	<2	30.0	1.0	50
"	60 Ft. Well	(60 ft.)	8.03	4.79	3.24	14.1	28	<40000	-	-	-	Lt Brn	24.0	520	7.40	202	13	2	2	<2	13.0	0.4	50
	HOMESTEAD-HIGH DENS.DNG																						
8/8	10 Ft. Well	(12 ft.)	8.36	5.08	3.28	1.1	2	<40000	-	-	-	Dk Brn	25.0	520	7.40	210	13	2	<2	<2	24.0	0.2	52
"	20 Ft. Well	(25'-26')	8.28	5.16	3.12	3.4	7	<40000	-	-	-	Lt Brn	24.5	525	7.45	204	11	16	<2	1	32.0	0.2	47

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DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

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Date	SITE Well	Sampled Depth	Organic Carbon C	Inorganic Carbon	Organic Nitrogen. N	Nitrite NO_2	Nitrate NO_3	Ammonia Nitro- NH_4	Ortho-Phosphate. PO_4	Total Phosphate PO_4	Detergents ABS & MBAS	Oil and Grease	Lab. Alkalinity as CO_3	Dissolved solids. Det.	Hardness. Ca & Mg	Hardness. Non-CO_2	Turbidity (Units)	Color (Units)	Magnesium Mg	Sodium Na
1972	NORTH DADE UPG																			
2/18	10Ft. Well	(10'-11')	68	76	0.26	0.02	0.0	0.91	0.02	-	0.30	2.80	173	446			50	140	3.0	10
"	20Ft. Well	(20'-21')	13	38	0.31	0.06	0.01	0.26	0.01	0.01	0.10	4.90	87	250	160	18	20	40	2.0	8.5
"	30Ft. Well	(30'-32')	13	48	0.00	0.02	0.0	0.32	0.18	0.39	0.10	6.90	108	266	190	13	50	65	3.1	8.6
"	40Ft. Well	(44'-45')	15	64	0.60	0.02	0.0	0.35	0.02	0.12	0.10	-	118	320	220	26	125	50	2.8	13
"	60Ft. Well	(59'-60')	18	62	0.32	0.05	0.0	0.42	0.02	0.02	0.20	-	132	350	250	300	35	90	2.1	15
2/16	HIALEAH UPG																			
"	10Ft. Well	(10'-12')	7	65	0.83	0.00	0.0	6.40	0.42	0.49	0.10	4.20	128	345	230	26	40	25	3.1	27
"	20Ft. Well	(21'-23')	9	65	0.87	0.01	0.0	3.60	0.02	0.02	0.20	7.60	138	342	250	19	60	25	4.2	26
"	30Ft. Well	(28'-30')	9	67	1.20	0.01	0.0	2.00	0.01	0.02	0.20	2.40	140	356	250	22	40	30	3.4	23
"	40Ft. Well	(44'-46')	Lost	Lost	0.94	0.01	0.0	4.80	0.02	0.07	0.20	3.20	142	352	260	19	30	25	4.8	26
"	60Ft. Well	(60'-62')	8	66	0.81	0.00	0.0	4.00	0.00	0.02	0.30	12.00	144	350	250	15	15	25	4.6	27
2/15	BIRD RD - GALLOWAY UPG																			
2/15	10Ft. Well	(8'-10')	-	-	0.59	0.01	0.0	2.40	0.10	0.39	0.10	11.00	128	314	230	14	20	10	2.9	20
"	20Ft. Well	(25'-26')	-	-	0.42	0.01	0.0	0.87	0.01	0.03	0.10	2.40	146	332	250	7	20	5	3.4	18
"	30Ft. Well	(33'-34')	-	-	0.44	0.01	0.0	0.63	0.00	0.02	0.10	9.00	136	330	240	19	10	10	3.5	18
"	40Ft. Well	(49'-50')	-	-	0.16	0.01	0.0	0.59	0.00	0.01	0.10	4.00	138	314	250	16	30	10	3.6	16
"	60Ft. Well	(60'-61')	-	-	0.52	0.01	0.0	0.61	0.01	0.02	0.10	3.10	138	306	300	16	30	20	3.7	14

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GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
Subject to Revision

Date	SITE Well	Sampled Depth	Organic Carbon C	Inorganic Carbon C	Organic Nitrogen. N	Nitrite NO_2	Nitrate NO_3	Ammonia Nitrogen NH_4	Ortho-Phosphate. PO_4	Total Phosphate PO_4	Detergents ABS & MBAS	Oil and Grease	Lab. Alkalinity as CO_3	Dissolved solids. Det.	Hardness. Ca & Mg	Hardness. Non-CO_3	Turbidity (Units)	Color (Units)	Magnesium Mg	Sodium Na
1972	HOMESTEAD-LOW DENS. UPG.																			
2/17	10Ft. Well	(12'-13')	2	53	0.15	0.01	0.84	0.16	0.00	0.04	0.00	5.3	116	273	220	25	9	5	2.0	11
"	20Ft. Well	(22'-23')	0	47	0.44	0.01	2.10	0.63	0.00	0.02	0.00	5.1	114	323	230	38	3	0	2.9	21
"	30Ft. Well	(35'-36')	1	49	0.27	0.01	2.10	0.00	0.00	0.01	0.00	7.2	104	300	210	39	4	0	2.8	21
"	40Ft. Well	(45'-46')	4	50	0.07	0.01	1.90	0.10	0.00	0.01	0.00	6.1	109	309	220	37	5	0	3.1	21
"	60Ft. Well	(60'-61')	4	45	0.16	0.01	2.00	0.08	0.00	0.01	0.10	-	106	312	220	46	9	5	2.9	20
2/17	HOMESTEAD-LOW DENS. DNG																			
"	10Ft. Well	(12 ft.)	15	51	0.12	0.09	1.90	0.06	0.01	0.01	0.10	12.0	114	290	220	30	2	0	2.2	15
"	20Ft. Well	(22 ft.)	0	54	0.22	0.01	2.10	0.12	0.00	0.01	0.10	11.0	112	334	230	40	10	10	2.8	21
"	30Ft. Well	(35'-36')	0	50		0.02	2.10	0.17	0.00	0.00	0.10	4.1	110	311	230	44	9	5	2.8	20
"	40Ft. Well	(45'-46')	0	47	0.19	0.01	2.10	0.05	0.00	0.01	0.10	6.9	110	313	230	44	5	0	2.9	21
"	60Ft. Well	(60 ft.)	1	49		0.01	2.00	0.16	0.00	0.01	0.00	12.0	106	303	220	45	5	0	2.8	20
2/16	HOMESTEAD-HIGH DENSITY UP																			
"	10Ft. Well	(12 ft.)	22	52	0.08	0.01	1.30	0.01	0.00	0.01	0.00	1.3	118	295	220	28	10	0	2.1	15
"	20Ft. Well	(25'-26')	0	48	0.06	0.01	1.10	0.02	0.00	0.03	0.00	3.6	108	295	210	31	10	0	2.6	22
"	30Ft. Well	(34 ft.)	5	49	0.06	0.01	1.10	0.06	0.00	0.00	0.10	8.9	114	306	220	31	8	10	2.6	22
"	40Ft. Well	(45'-46'	0	47		0.06	1.10	0.10	0.00	0.00	0.10	11.0	106	292	210	29	5	5	2.6	22
"	60Ft. Well	(60 ft.)	3	52	0.05	0.03	1.00	lost	0.00	0.01	0.10	6.6	110	310	220	38	10	15	2.6	21
	NORTH DADE UPG.																			
6/14	10 Ft. Well	(10'-11')	25	60	1.20	0.07	0.20	0.19	0.02	0.02	0.08	6.3	127	319	230	15	20	180	1.8	5.4
5/26	20 Ft. Well	(20'-21')	16	-	0.38	0.01	0.00	0.13	0.01	0.01	0.00	7.4	126	259	220	8	10	110	1.8	4.5
"	30 Ft. Well	(30'-32')	15	-	0.34	0.01	0.00	0.15	0.01	0.02	0.00	8.1	122	258	210	7	4	100	3.5	6.4
"	40 Ft. Well	(44'-45')	13	-	0.63	0.01	0.00	0.08	0.01	0.01	0.01	6.0	120	325	230	30	6	90	3.5	15
"	60 Ft. Well	(59'-60')	15	-	0.52	0.01	0.00	0.26	0.01	0.01	0.00	5.5	132	326	230	7	3	90	3.8	15
5/23	NORTH DADE DNG.			-																
"	10 Ft. Well	(12'-13')	14	-	0.58	0.01	0.25	0.15	0.00	0.00	0.05	9.4	112	304	210	28	20	200	3.4	6.7
"	20 Ft. Well	(22'-23"0	9	-	0.54	0.01	0.00	0.15	0.01	0.01	0.02	8.5	107	250	190	-	3	70	1.4	4.8
5/24	HIALEAH UPG.			-																
"	10 Ft. Well	(10'-12')	14	-	0.85	0.04	0.00	2.40	0.18	0.19	0.00	Lost	136	340	240	15	80	40	4.9	28
"	20 Ft. Well	(21'-23')	5	-	0.15	0.00	0.00	2.50	0.00	0.00	0.01	Lost	147	344	260	15	40	35	3.8	24
"	30 Ft. Well	(28'-30')	10	-	2.00	0.00	0.00	0.99	0.00	0.00	0.02	12.0	146	355	260	15	25	50	3.8	23
"	40 Ft. Well	(44'-46')	8	-	0.65	0.00	0.00	3.30	0.00	0.01	0.04	13.0	151	373	260	13	55	45	4.6	26
"	60 Ft. Well	(60'-62')	6	-	1.40	0.00	0.00	2.30	0.00	0.00		12.0	152				10			25
5/24	HIALEAH DNG.			-																
"	10 Ft. Well	(9'-10')	10	-	0.65	0.04	0.34	2.80	0.16	0.17	0.01	11.0	146	366	260	20	5	45	4.0	25
"	20 Ft. Well	(22'-23')	7	-	0.35	0.00	0.00	1.20	0.01	0.01	0.02	9.7	132	336	250	27	5	45	3.9	23

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WATER RESOURCES DIVISION

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Date	SITE Well	Sampled Depth	Organic Carbon C	Inorganic Carbon C	Organic Nitrogen N	Nitrite NO_2	Nitrate NO_3	Ammonia Nitrogen NH_4	Ortho-Phosphate PO_4	Total Phosphate PO_4	Detergents ABS & MBAS	Oil and Grease	Lab Alkalinity as CO_3	Dissolved solids. Det.	Hardness Ca & Mg	Hardness. Non-CO_3	Turbidity (Units)	Color (Units)	Magnesium Mg	Sodium Na
1972	BIRD RD.-GALLOWAY UPG.																			
5/23	10 Ft. Well	(8'-10')	4	-	0.56	0.03	1.10	0.49	0.03	0.03	0.02	6.2	124	330	240	29	25	15	3.6	19
"	20 Ft. Well	(25'-26')	5	-	0.08	0.01	0.00	0.61	0.01	0.01	0.02	8.7	121	298	230	24	9	15	3.5	19
"	30 Ft. Well	(33'-34')	4	-	0.39	0.00	0.00	0.48	0.00	0.01	0.06	0.6	144	332	260	16	6	15	3.7	18
"	40 Ft. Well	(49'-50')	4	-	0.46	0.00	0.00	0.36	0.00	0.00	0.02	163	120	293	220	20	10	15	3.5	16
"	60 Ft. Well	(60'-61')	4	-	0.58	0.00	0.00	0.34	0.00	0.00	0.04	3.5	142	312	260	18	9	15	3.5	14
5/26	BIRD RD.-GALLOWAY DNG.																			
"	10 Ft. Well	(8'-10')	5	-	0.31	0.04	0.06	0.74	0.01	0.02	0.04	2.4	143	342	260	17	35	15	3.7	20
"	20 Ft. Well	(25'-26')	4	-	0.68	0.00	0.00	0.47	0.00	0.00	0.02	6.6	145	322	260	15	22	15	3.7	18
5/25	HOMESTEAD-LOW DENS.UPG.																			
"	10 Ft. Well	(12'-13')	0	-	0.23	0.01	1.60	0.03	0.00	0.00	0.00	4.9	117	310	230	38	2	15	3.2	19
"	20 Ft. Well	(21'-23')	0	-	0.15	0.01	2.10	0.03	0.00	0.00	0.00	9.6	114	310	220	32	1	10	2.8	21
"	30 Ft. Well	(35'-36')	0	-	0.47	0.00	1.80	0.01	0.00	0.00	0.00	6.3	114	310	220	32	1	10	2.8	21
"	40 Ft. Well	(45'-46')	0	-	0.36	0.00	1.80	0.02	0.00	0.06	0.00	9.2	114	310	220	33	2	15	2.8	21
"	60 Ft. Well	(60'-61')	0	-	0.12	0.01	2.00	0.01	0.00	0.00	0.00	6.1	113	342	230	40	4	15	2.8	21
5/25	HOMESTEAD-LOW DENS.DNG																			
"	10 Ft. Well	(12 ft.)	0	-	0.19	0.01	1.40	0.02	0.01	0.01	0.00	8.0	106	255	200	22	2	15	1.8	13
"	20 Ft. Well	(22 ft.)	0	-	0.22	0.01	1.90	0.02	0.00	0.00	0.00	7.2	114	325	220	32	8	15	2.8	21
"	30 Ft. Well	(35'-36')	0	-	0.83	0.01	2.00	0.02	0.00	0.00	0.00	7.0	115	320	220	31	2	10	2.8	21
"	40 Ft. Well	(45'-46')	0	-	0.30	0.01	1.80	0.02	0.00	0.00	0.00	6.6	114	316	220	32	2	15	2.8	21
"	60 Ft. Well	(60 ft.)	1	-	0.32	0.01	2.00	0.02	0.00	0.00	0.00	7.0	112	319	220	36	4	15	2.8	21
5/24	HOMESTEAD-HIGH DENS.UPG																			
"	10 Ft. Well	(12 ft.)	0	-	0.46	0.01	1.30	0.00	0.00	0.00	0.02	6.6	112	294	210	23	4	10	2.2	10
"	20 Ft. Well	(25'-26')	0	-	0.22	0.00	1.50	0.00	0.00	0.00	0.00	15.0	115	314	220	31	5	10	2.7	22
"	30 Ft. Well	(34 ft.)	0	-	0.16	0.01	1.50	0.01	0.00	0.00	0.01	9.5	115	316	220	30	1	10	2.7	23
"	40 Ft. Well	(45'-46')	0	-	0.19	0.02	1.40	0.00	0.00	0.00	0.00	8.5	115	310	220	31	3	10	2.7	23
"	60 Ft. Well	(60 ft.)	0	-	0.23	0.01	1.20	0.00	0.00	0.00	0.00	15.0	114	315	220	32	7	10	2.7	22
5/24	HOMESTEAD-HIGH DENS.DNG																			
"	10 Ft. Well	(12 ft.)	0	-	0.21	0.02	1.50	0.04	0.00	0.00	0.00	15.0	120	318	230	32	6	10	2.7	21
"	20 Ft. Well	(25'-26')	0	-	0.10	0.01	1.40	0.03	0.00	0.00	0.00	16.0	115	315	220	30	30	10	2.7	23

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84

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

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Date	SITE Well	Sampled Depth	Organic Carbon C	Inorganic Carbon C	Organic Nitrogen N	Nitrite NO_2	Nitrate NO_3	Ammonia Nitrogen NH_4	Ortho-Phosphate PO_4	Total Phosphate PO_4	Detergents ABS & MBAS	Oil and Grease	Lab. Alkalinity as CO_3	Dissolved solids. Det.	Hardness. Ca & Mg	Hardness. Non-CO_3	Turbidity (Units)	Color (Units)	Magnesium Mg	Sodium Na
1972	NORTH DADE UPG.																			
8/7	10 Ft. Well	(10'-11')	24	61	0.91	0.02	0.00	0.14	0.01	0.01	0.07	26.0	124	296	230	20	25	200	0.9	4.4
"	20 Ft. Well	(20'-21')	16	58	0.52	0.00	0.00	0.15	0.01	0.01	0.05	19.0	124	300	230	20	5	200	0.9	4.4
"	30 Ft. Well	(30'-32')	16	50	0.41	0.00	0.00	0.16	0.02	0.03	0.05	6.7	128	273	210	11	4	120	3.2	4.7
"	40 Ft. Well	(44'-45')	10	50	0.71	0.00	0.00	0.05	0.01	0.01	0.06	21.0	126	348	250	39	4	120	3.2	16
"	60 Ft. Well	(59'-60')	15	56	0.81	0.00	0.00	0.24	0.01	0.01	0.08	13.0	128	341	240	32	10	160	2.2	14
	NORTH DADE DNG.																			
8/7	10 Ft. Well	(12'-12')	15	64	0.87	0.01	0.00	0.18	0.01	0.01	0.06	7.4	116	314	210	17	65	120	2.4	7.0
"	20 Ft. Well	(22'-23')	15	43	0.79	0.00	0.00	0.16	0.01	0.01	0.09	5.2	108	241	190	12	3	120	1.6	4.3
	HIALEAH UPG.																			
8/8	10 Ft. Well	(10'-12')	12	65	0.55	0.00	0.00	4.80	0.21	0.21	0.08	9.4	142	351	240	4	9	30	4.6	31
"	20 Ft. Well	(21'-23')	10	60	0.75	0.00	0.00	1.60	0.00	0.00	0.12	6.9	138	350	250	17	25	50	3.8	23
"	30 Ft. Well	(28'-30')	12	60	0.58	0.00	0.00	0.97	0.00	0.00	0.20	9.1	138	363	250	24	20	120	3.2	22
"	40 Ft. Well	(44'-46')	12	66	0.35	0.02	0.00	3.20	0.02	0.05	0.20	12.3	150	387	260	16	40	60	4.6	29
"	60 Ft. Well	(60'-62')	7	70	0.35	0.00	0.00	2.40	0.00	0.00	0.20	14.0	150	383	260	24	7	60	4.6	30
	HIALEAH DNG.																			
8/8	10 Ft. Well	(9'-10')	6	79	0.12	0.04	1.40	1.50	0.17	0.18	0.00	12.8	158	407	290	33	5	60	4.6	20
"	20 Ft. Well	(22'-23')	11	37	0.45	0.01	0.00	2.20	0.01	0.07	0.16	11.1	122	346	230	24	6	50	4.0	29
	BIRD RD.--GALLOWAY UPG.																			
8/7	10 Ft. Well	(8'-10')	2	70	0.41	0.02	0.54	0.02	0.05	0.05	0.05	8.3	142	335	260	23	8	10	3.2	16
"	20 Ft. Well	(25'-26')	0	67	1.10	0.00	0.00	0.46	0.00	0.00	0.04	16.0	140	335	260	23	8	10	3.7	18
"	30 Ft. Well	(33'-34')	3	58	1.10	0.00	0.00	0.48	0.00	0.00	0.03	24.0	140	332	250	18	5	20	3.6	18
"	40 Ft. Well	(49'-50')	2	68	0.56	0.00	0.00	0.39	0.00	0.00	0.04	10.0	138	321	250	19	9	10	3.6	16
"	60 Ft. Well	(60'-61')	2	67	0.35	0.00	0.00	0.35	0.00	0.00	0.03	8.4	138	313	240	14	10	10	3.8	15
	BIRD RD.--GALLOWAY DNG.																			
8/7	10 Ft. Well	(8'-10')	1	76	0.34	0.08	0.22	0.02	0.05	0.05	0.02	9.8	156	367	290	32	3	10	3.6	18
"	20 Ft. Well	(25'-26')	1	74	0.42	0.02	0.06	0.06	0.01	0.01	0.04	9.4	158	360	290	29	6	5	3.6	18
	HOMESTEAD--LOW DENS.UPG																			
8/9	10 Ft. Well	(12'-12')	4	50	0.34	0.00	1.40	0.01	0.00	0.01	0.00	15.2	118	298	230	29	5	0	2.4	16
"	20 Ft. Well	(22'-23')	3	48	0.94	0.00	1.90	0.00	0.00	0.00	0.00	12.8	114	314	230	36	1	0	2.4	21
"	30 Ft. Well	(25'-26')	4	45	0.25	0.00	1.90	0.03	0.00	0.00	0.00	11.6	116	314	230	34	4	0	2.8	21
"	40 Ft. Well	(45'-46')	3	48	0.77	0.00	1.90	0.00	0.00	0.00	0.00	13.5	112	314	230	39	2	0	2.6	21
"	60 Ft. Well	(60'-61')	3	48	0.31	0.00	1.80	0.01	0.00	0.00	0.00	12.1	112	317	230	40	4	0	2.8	20

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DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
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Date	SITE Well	Sampled Depth	Organic Carbon C	Inorganic Carbon C	Organic Nitrogen N	Nitrite NO_2	Nitrate NO_3	Ammonia Nitrogen NH_4	Ortho-Phosphate PO_4	Total Phosphate PO_4	Detergents ABS & MBAS	Oil and Grease	Lab. Alkalinity CO_3	Dissolved solids. Det.	Hardness. Ca & Mg	Hardness. Non-CO_3	Turbidity (Units)	Color (Units)	Magnesium Mg	Sodium Na
	HOMESTEAD-LOW DENS.DNG																			
8/9	10 Ft. Well	(12 ft.)	2	49	0.35	0.00	1.80	0.01	0.01	0.01	0.00	11.4	114	310	230	36	1	0	2.6	19
"	20 Ft. Well	(22 ft.)	1	51	0.46	0.00	1.80	0.01	0.00	0.00	0.00	10.4	114	317	130	40	2	0	2.6	20
"	30 Ft. Well	(35'-36')	4	50	1.00	0.00	1.80	0.02	0.00	0.00	0.00	11.5	114	318	130	40	4	0	2.6	20
"	40 Ft. Well	(45'-46')	5	44	0.27	0.00	1.90	0.01	0.00	0.00	0.00	10.4	114	317	130	40	4	0	2.6	20
"	60 Ft. Well	(60 ft.)	3	49	1.10	0.00	1.80	0.02	0.00	0.00	0.00	14.4	114	318	130	40	3	0	2.8	20
	HOMESTEAD-HIGH DENS.UPG																			
8/8	10 Ft. Well	(12 ft.)	0	55	0.48	0.00	1.40	0.02	0.00	0.00	0.03	0.2	128	332	240	30	7	5	3.0	18
"	20 Ft. Well	(25'-26')	3	48	0.37	0.00	2.20	0.03	0.00	0.00	0.04	5.8	118	324	230	31	3	0	2.8	22
"	30 Ft. Well	(34 ft.)	2	47	0.44	0.00	2.20	0.03	0.00	0.00	0.03	9.6	118	320	230	31	2	0	2.8	22
"	40 Ft. Well	(45'-46')	3	47	0.34	0.00	2.10	0.03	0.00	0.00	0.02	9.1	118	324	230	31	2	0	2.8	22
"	60 Ft. Well	(60 ft.)	4	46	0.14	0.01	1.40	0.02	0.00	0.00	0.01	7.8	118	322	230	23	4	0	2.8	22
	HOMESTEAD-HIGH DENS.DNG																			
8/8	10 Ft. Well	(12 ft.)	4	48	0.17	0.01	1.50	0.02	0.00	0.00	0.01	6.5	118	325	230	31	9	0	2.8	22
"	20 Ft. Well	(25'-26')	0	47	0.11	0.00	1.70	0.03	0.00	0.00	0.00	8.2	116	320	230	34	5	0	2.8	22

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WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
Subject to Revision

Date	SITE Well	Sampled Depth	Calcium Ca	Potassium K	Strontium Sr	Iron Fe	Manganese Mn	Copper Cu	Lead Pb	Zinc Zn	Chromium (Hexa.) Cr	Arsenic As	Silica SiO_2	Sulfate SO_4	Chloride Cl	Fluoride F	Boron B	Cadmium Cd	$CaCO_3$ Alkalinity	Carbonate CO_3	Field Alkalinity as $CaCO_3$
1972	NORTH DADE UPG																				
2/18	10Ft. Well	(10'-11')	120	2.4	1.10	4.2	0.07	0.00	0.00	6.20	0.00	0.00	5.7	15	22	0.2	1.10	0.00	142	0.00	290
"	20Ft. Well	(20'-21')	62	1.5	0.73	1.1	0.01	0.00	0.00	8.20	0.00	0.00	5.7	11	17	0.6	0.70	0.00	144	0.00	154
"	30Ft. Well	(30'-32')	72	3.2	0.71	0.3	0.01	0.00	0.00	0.48	0.00	0.00	5.8	11	15	0.4	0.75	0.00	180	0.00	187
"	40Ft. Well	(44'-45')	84	2.2	0.69	2.2	0.02	0.00	0.00	0.40	0.00	0.00	6.7	22	23	0.2	0.60	0.00	197	0.00	215
"	60Ft. Well	(59'-60')	96	0.5	0.71	2.5	0.00	0.00	0.00	0.03	0.00	0.00	8.0	25	26	0.2	0.70	0.00	220	0.00	236
2/16	HIALEAH UPG																				
"	10Ft. Well	(10'-12')	88	3.8	0.72	3.3	0.03	0.00	0.00	0.02	0.00	-	7.6	29	37	0.4	1.20	0.00	214	0.00	242
"	20Ft. Well	(21'-23')	92	3.3	0.74	3.6	0.03	0.00		0.92	0.00	0.01	7.6	30	36	0.2	0.70	0.00	230		244
"	30Ft. Well	(28'-30')	96	1.4	0.80	3.5	0.04	0.00	0.00	0.27	0.00	0.00	6.8	36	32	0.2	0.35	0.00	233	0.00	251
"	40Ft. Well	(44'-46')	94	2.2	0.90	3.4	0.03	0.00	0.00	0.02	0.00	-	8.4	34	37	0.2	0.70	0.00	236	0.00	262
"	60Ft. Well	(60'-62')	94	1.8	0.86	3.2	0.02	0.00	0.00	0.01	0.00	0.00	8.4	34	35	0.2	0.50	0.00	239	0.00	259
2/15	BIRD RD - GALLOWAY UPG																				
2/15	10Ft. Well	(8'-10')	86	3.2	0.51	2.1	0.01	0.00	0.00	0.09	0.00	0.00	6.7	34	25	0.4	0.75	0.00	213	0.00	239
"	20Ft. Well	(25'-26')	94	2.8	0.64	1.5	0.01	0.00	0.00	0.03	0.00	0.00	6.2	30	11	0.2	0.75	0.00	242	0.00	254
"	30Ft. Well	(33'-34')	92	2.6	0.65	0.78	0.01	0.01	0.00	0.06	0.00	0.00	6.0	27	23	0.2	0.60	0.00	226	0.00	239
"	40Ft. Well	(49'-50')	92	2.2	0.66	1.7	0.01	0.01	0.00	0.02	0.00	0.00	6.0	24	19	0.2	0.55	0.00	230	0.00	278
"	60Ft. Well	(60'-61')	92	1.5	0.65	1.7	0.01	0.00	0.00	0.03	0.00	0.00	6.2	20	18	0.2	0.35	0.00	230	0.00	298

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DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
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Date	SITE Well	Sampled Depth	Calcium Ca	Potassium K	Strontium Sr.	Iron Fe	Manganese Mn	Copper Cu	Lead Pb	Zinc Zn	Chromium (Hexa.) Cr	Arsenic As	Silica SiO_2	Sulfate SO_4	Chloride Cl	Fluoride F	Boron B	Cadmium Cd	$CaCO_3$ Alkalinity	Carbonate CO_3	Field Alkalinity as $CaCO_3$
1972	HOMESTEAD-LOW DENS. UPG.																				
2/17	10Ft. Well	(12'-13')	84	3.7	0.92	0.18	0.02	0.00	0.00	0.01	0.00	0.00	2.4	25	19	0.2	0.15	0.00	194	0.00	207
"	20Ft. Well	(22'-23')	86	5.4	0.79	0.01	0.01	0.00	0.00	0.04	0.00	-	3.4	40	33	0.2	0.35	0.00	190	0.00	190
"	30Ft. Well	(35'-36')	80	5.2	0.76	0.00	0.00	0.00	0.00	0.01	0.00	0.00	3.4	40	32	0.2	0.25	0.00	174	0.00	193
"	40Ft. Well	(45'-46')	82	5.2	0.81	0.22	0.01	0.00	0.00	0.01	0.01	0.00	3.2	39	32	0.2	0.20	0.00	182	0.00	182
"	60Ft. Well	(60'-61')	84	4.9	0.78	0.29	0.00	0.00	0.00	0.01	0.00	0.00	3.4	41	32	0.2	0.40	0.00	177	0.00	197
2/17	HOMESTEAD-LOW DENS. DNG.																				
"	10Ft. Well	(12 ft.)	84	4.2	0.77	0.04	0.01	0.00	0.00	0.02	0.00	0.00	3.0	29	22	0.2	0.25	0.00	190	0.00	190
"	20Ft. Well	(22 ft.)	86	5.4	0.92	0.16	0.00	0.00	0.00	0.00	0.00	0.00	3.6	40	31	0.2	0.20	0.00	187	0.00	198
"	30Ft. Well	(35'-36')	86	5.3	0.81	0.03	0.00	0.00	0.00	0.00	0.00	0.00	3.6	40	33	0.2	0.15	0.00	184	0.00	200
"	40Ft. Well	(45'-46')	86	5.2	0.81	0.44	0.00	0.00	0.00	0.00	0.00	0.00	3.6	40	33	0.2	0.25	0.00	184	0.00	190
"	60Ft. Well	(60 ft.)	84	4.8	0.79	0.24	0.01	0.00	0.00	0.02	0.00	0.00	3.8	41	31	0.1	0.40	0.00	177	0.00	189
2/16	HOMESTEAD-HIGH DENSITY UPG																				
"	10Ft. Well	(12 ft.)	86	3.0	0.86	0.02	0.00	0.00	0.00	0.05	0.00	0.00	3.2	25	25	0.2	0.30	0.00	197	0.00	216
"	20Ft. Well	(25'-26')	80	4.2	0.81	0.33	0.00	0.00	0.00	0.02	0.01	0.00	3.8	32	34	0.2	0.50	0.00	180	0.00	193
"	30Ft. Well	(34 ft.)	84	4.2	0.76	0.23	0.00	0.00	0.00	0.02	0.00	0.00	3.8	32	34	0.2	0.20	0.00	190	0.00	192
"	40Ft. Well	(45'-46')	78	4.3	0.74	0.22	0.00	0.00	0.00	0.02	0.00	0.00	3.8	32	33	0.2	0.35	0.00	177	0.00	195
"	60Ft. Well	(60 ft.)	84	4.0	0.79	0.41	0.01	0.00	0.00	0.00	0.00	0.00	4.2	32	35	0.1	0.25	0.00	184		197
	NORTH DADE UPG.																				
6/14	10 Ft. Well	(10'-11')	87	1.7	0.58	1.10	0.02	0.00	0.00	0.35	0.00	0.01	3.4	22	10	0.2	0.63	0.00	211	0.00	187
5/26	20 Ft. Well	(20'-21')	84	1.3	0.74	2.40	0.02	0.01	0.00	3.30	0.00	0.01	5.0	6.4	10	0.4	0.49	0.00	210	0.00	185
"	30 Ft. Well	(30'-32')	76	3.2	0.08	0.67	0.00	0.00	0.00	0.28	0.00	0.00	4.6	7.2	10	0.4	0.27	0.00	203	0.00	179
"	40 Ft. Well	(44'-45')	86	2.9	0.84	1.00	0.01	0.01	0.00	0.06	0.00	0.01	4.7	32	26	0.4	0.52	0.00	200	0.00	174
"	60 Ft. Well	(59'-60')	84	0.4	1.10	0.67	0.01	0.00	0.00	0.02	0.00	0.01	6.4	30	26	0.4	0.42	0.00	220	0.00	194
5/23	NORTH DADE DNG.																				
"	10 Ft. Well	(12'-13')	80	4.0	0.66	0.84	0.06	0.01	0.00	9.00	0.00	0.02	2.1	26	18	0.2	0.55	0.00	187	0.00	171
"	20 Ft. Well	(22'-23"0	78	0.2	0.82	2.50	0.01	0.01	0.00	0.80	0.00	0.01	4.9	8.8	8.0	0.3	0.50	0.00	179	0.00	167
5/24	HIALEAH UPG.																				
"	10 Ft. Well	(10'-12')	88	3.3	0.82	1.20	0.02	0.00	0.00	0.01	0.00	0.01	6.1	20	42	0.4	1.00	0.00	226	0.00	200
"	20 Ft. Well	(21'-23')	97	3.2	0.80	4.30	0.05	0.00	0.01	0.39	0.00	0.01	5.3	23	34	0.3	1.10	0.00	244	0.00	218
"	30 Ft. Well	(28'-30')	97	1.2	0.90	4.80	0.05	0.00	0.01	0.09	0.00	0.00	6.2	27	32	0.3	0.54	0.00	244	0.00	218
"	40 Ft. Well	(44'-46')	98	1.8	0.90	1.60	0.03	0.00	0.00	0.02	0.00	0.01	7.7	23	40	0.4	0.98	0.00	252	0.00	221
"	60 Ft. Well	(60'-62')		1.7	0.92								7.7	22	36		0.68	0.00	253	0.00	221
5/24	HIALEAH DNG.																				
"	10 Ft. Well	(9'-10')	94	3.9	0.84	0.34	0.01	0.00	0.00	0.01	0.00	0.00	7.4	30	36	0.4	0.99	0.00	242	0.00	213
"	20 Ft. Well	(22'-23')	92	2.3	0.76	0.87	0.02	0.00	0.00	2.80	0.00	0.02	7.4	26	36	0.3	0.95	0.00	220	0.00	194

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1972	BIRD RD.-GALLOWAY UPG.																				
5/23	10 Ft. Well	(8'-10')	94	3.4	0.80	0.29	0.01	0.02	0.00	0.02	0.00	0.01	5.2	38	24	0.4	0.60	0.00	207	0.00	221
"	20 Ft. Well	(25'-26')	94	2.9	0.74	1.20	0.01	0.01	0.00	0.02	0.00	0.01	5.0	32	24	1.10	0.74	0.00	201	0.00	213
"	30 Ft. Well	(33'-34')	96	2.6	0.74	0.96	0.01	0.00	0.00	0.06	0.00	0.01	4.7	28	23	0.4	0.59	0.00	239	0.00	212
"	40 Ft. Well	(49'-50')	90	2.1	0.70	1.30	0.01	0.00	0.00	0.02	0.00	0.01	4.7	21	19	0.3	0.47	0.00	200	0.00	205
"	60 Ft. Well	(60'-61')	94	1.4	0.74	1.30	0.01	0.00	0.00	0.02	0.00	0.01	4.9	22	20	0.3	0.39	0.00	237	0.00	207
5/26	BIRD RD.-GALLOWAY DNG.																				
"	10 Ft. Well	(8'-10')	96	3.3	0.74	1.50	0.01	0.00	0.00	0.04	0.00	0.01	5.4	32	24	0.4	0.79	0.00	239	0.00	220
"	20 Ft. Well	(25'-26')	96	2.6	0.74	1.90	0.01	0.00	0.00	0.02	0.00	0.01	4.9	29	22	0.3	0.58	0.00	241	0.00	216
5/25	HOMESTEAD-LOW DENS.UPG																				
"	10 Ft. Well	(12'-13')	88	3.2	1.00	1.10	0.01	0.01	0.00	0.07	0.00	0.00	2.8	36	30	0.2	0.35	0.00	195	0.00	171
"	20 Ft. Well	(21'-23')	84	4.8	0.86	0.07	0.00	0.01	0.00	0.02	0.00	0.00	3.2	39	32	0.4	0.34	0.00	190	0.00	167
"	30 Ft. Well	(35'-36')	84	5.1	0.84	0.07	0.00	0.01	0.00	0.02	0.00	0.00	3.2	38	32	0.2	0.32	0.00	189	0.00	164
"	40 Ft. Well	(45'-46')	84	5.1	0.84	0.15	0.00	0.00	0.00	0.02	0.00	0.00	3.3	38	32	0.4	0.30	0.00	189	0.00	166
"	60 Ft. Well	(60'-61')	86	4.9	0.90	0.18	0.01	0.00	0.00	0.02	0.00	0.00	3.3	41	32	0.2	0.33	0.00	188	0.00	164
5/25	HOMESTEAD-LOW DENS.DNG																				
"	10 Ft. Well	(12 ft.)	78	3.3	0.82	0.06	0.01	0.00	0.00	0.02	0.00	0.00	2.1	26	20	0.2	0.35	0.00	176	0.00	156
"	20 Ft. Well	(22 ft.)	84	5.2	0.88	0.12	0.01	0.00	0.00	0.02	0.00	0.00	3.0	39	32	0.2	0.29	0.00	189	0.00	172
"	30 Ft. Well	(35'-36')	84	5.2		0.10	0.00	0.01	0.00	0.01	0.00	0.00	3.2	39	32	0.2	0.28	0.00	191	0.00	167
"	40 Ft. Well	(45'-46')	84	5.1	0.80	0.21	0.00	0.01	0.00	0.01	0.00	0.00	3.2	38	32	0.2	0.30	0.00	190	0.00	167
"	60 Ft. Well	(60 ft.)	84	5.1	0.83	0.26	0.01	0.01	0.00	0.01	0.00	0.00	3.2	42	32	0.2	0.27	0.00	186	0.00	164
5/24	HOMESTEAD-HIGH DENS.UP																				
"	10 Ft. Well	(12 ft.)	80	3.3	0.74	0.02	0.00	0.00	0.00	0.07	0.00	0.00	2.6	27	28	0.2	0.23	0.00	187	0.00	164
"	20 Ft. Well	(25'-26')	84	4.0		0.08	0.00	0.00	0.00	0.03	0.00	0.00	2.0	34	32	0.2	0.32	0.00	191	0.00	169
"	30 Ft. Well	(34 ft.)	84	4.1	0.80	0.10	0.00	0.00	0.00	0.03	0.00	0.00	2.1	33	32	0.4	0.26	0.00	192	0.00	167
"	40 Ft. Well	(45'-46')	84	4.1	0.82	0.10	0.00	0.00	0.00	0.01	0.00	0.00	3.1	33	34	0.2	0.24	0.00	191	0.00	167
"	60 Ft. Well	(60 ft.)	84	4.0	0.80	0.20	0.01	0.00	0.00	0.02	0.00	0.00	3.3	36	32	0.2	0.18	0.00	190	0.00	167
5/24	HOMESTEAD-HIGH DENS.DN																				
"	10 Ft. Well	(12 ft.)	88	3.9	0.80	0.07	0.00	0.00	0.00	0.01	0.00	0.00	2.9	32	32	0.2	0.24	0.00	200	0.00	207
"	20 Ft. Well	(25'-26')	84	4.0	0.88	2.40	0.02	0.01	0.00	3.30	0.00	0.00	3.0	34	34	0.2	0.23	0.00	192	0.00	169

All parameters expressed in mg./l. except as noted

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
Subject to Revision

Date	SITE Well	Sampled Depth	Calcium Ca	Potassium K	Strontium, Sr	Iron Fe	Manganese Mn	Copper Cu	Lead Pb	Zinc Zn	Chromium (Hexa.) Cr	Arsenic As	Silica SiO_2	Sulfate SO_4	Chloride Cl	Fluoride F	Boron B	Cadmium Cd	$CaCO_3$ Alkalinity	Carbonate CO_3	Field Alkalinity as CaCO
1972	NORTH DADE UPG.																				
8/7	10 Ft. Well	(10'-11')	89	1.7	0.84	-	0.01	-	-	1.50	-	-	3.0	16	10	0.3	0.06	-	207	0.00	-
"	20 Ft. Well	(20'-21')	89	1.6	0.84	-	0.01	-	-	1.30	-	-	5.0	16	8.0	0.4	0.04	-	207	0.00	-
"	30 Ft. Well	(30'-32')	80	3.3	0.84	-	0.01	-	-	0.24	-	-	4.7	8.0	10	0.3	0.05	-	203	0.00	-
"	40 Ft. Well	(44'-45')	94	3.0	0.90	-	0.02	-	-	0.03	-	-	4.9	37	28	0.3	0.06	-	210	0.00	-
"	60 Ft. Well	(59'-60')	94	0.5	0.84	-	0.01	-	-	0.03	-	-	6.3	23	26	0.3	0.05	-	213	0.00	-
	NORTH DADE DNG.																				
8/7	10 Ft. Well	(12'-12')	80	4.2	0.84	-	0.11	-	-	2.50	-	-	2.5	20	10	0.2	0.07	-	194	0.00	-
"	20 Ft. Well	(22'-23')	74	0.3	0.72	-	0.02	-	-	0.84	-	-	4.9	4.0	10	0.2	0.04	-	180	0.00	-
	HIALEAH UPG.																				
8/8	10 Ft. Well	(10'-12')	88	4.4	0.76	-	0.02	-	-	0.01	-	-	7.4	17	42	0.4	0.12	-	236	0.00	-
"	20 Ft. Well	(21'-23')	92	3.2	0.76	-	0.04	-	-	0.24	-	-	6.8	22	34	0.3	0.07	-	230	0.00	-
"	30 Ft. Well	(28'-30')	96	1.4	0.92	-	0.02	-	-	0.05	-	-	6.3	26	32	0.3	0.05	-	230	0.00	-
"	40 Ft. Well	(44'-46')	98	2.6	0.92	-	0.03	-	-	0.01	-	-	7.8	22	40	0.3	0.10	-	249	0.00	-
"	60 Ft. Well	(60'-62')	98	2.0	0.90	-	0.02	-	-	0.02	-	-	8.1	22	40	0.3	0.07	-	249	0.00	-
	HIALEAH DNG.																				
8/8	10 Ft. Well	(9'-10')	110	4.3	0.92	-	0.01	-	-	0.01	-	-	7.8	32	32	0.4	0.10	-	262	0.00	-
"	20 Ft. Well	(22'-23')	84	3.8	0.76	-	0.02	-	-	0.84	-	-	7.0	25	46	0.3	0.09	-	203	0.00	-
	BIRD RD.--GALLOWAY UPG.																				
8/7	10 Ft. Well	(8'-10')	98	2.8	0.84	-	0.01	-	-	0.01	-	-	5.2	27	20	0.3	0.06	-	236	0.00	-
"	20 Ft. Well	(25'-26')	96	2.8	0.84	-	0.01	-	-	0.01	-	-	4.9	28	24	0.7	0.06	-	233	0.00	-
"	30 Ft. Well	(33'-34')	94	2.8	0.84	-	0.01	-	-	0.01	-	-	4.9	26	22	0.3	0.06	-	233	0.00	-
"	40 Ft. Well	(49'-50')	93	2.2	0.74	-	0.01	-	-	0.01	-	-	4.8	26	20	0.2	0.05	-	230	0.00	-
"	60 Fr. Well	(60'-61')	91	1.7	0.80	-	0.01	-	-	0.01	-	-	4.8	21	18	0.3	0.03	-	230	0.00	-
	BIRD RD.--GALLOWAY DNG.																				
8/7	10 Ft. Well	(8'-10')	110	2.8	0.84	-	0.01	-	-	0.01	-	-	5.5	33	26	0.3	0.05	-	259	0.00	-
"	20 Ft. Well	(25'-26')	110	3.0	0.84	-	0.01	-	-	0.00	-	-	5.5	33	24	0.3	0.05	-	262	0.00	-
	HOMESTEAD--LOW DENS.UPG.																				
8/9	10 Ft. Well	(12'-12')	86	4.6	0.92	-	0.00	-	-	0.01	-	-	2.4	30	26	0.3	0.02	-	197	0.00	-
"	20 Ft. Well	(22'-23')	86	5.0	0.84	-	0.00	-	-	0.01	-	-	2.8	35	34	0.2	0.02	-	190	0.00	-
"	30 Ft. Well	(25'-26')	86	5.0	0.84	-	0.01	-	-	0.05	-	-	2.8	35	34	0.2	0.02	-	194	0.00	-
"	40 Ft. Well	(45'-46')	86	5.0	0.84	-	0.01	-	-	0.00	-	-	2.8	39	34	0.2	0.02	-	187	0.00	-
"	60 Ft. Well	(60'-61')	86	5.0	0.84	-	0.01	-	-	0.00	-	-	2.8	39	34	0.3	0.06	-	187	0.00	-

All parameters expressed in mg./l. except as noted.

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
Subject to Revision

Date	SITE Well	Sampled Depth	Calcium Ca	Potassium K	Strontium Sr	Iron Fe	Manganese Mn	Copper Cu	Lead Pb	Zinc Zn	Chromium (Hexa.) Cr	Arsenic As	Silica SiO_2	Sulfate SO_4	Chloride Cl	Fluoride F	Boron B	Cadmium Cd	$CaCO_3$ Alkalinity	Carbonate CO_3	Field Alkalinity as $CaCO_3$
1972	HOMESTEAD-LOW DENS.DNG																				
8/9	10 Ft. Well	(12 ft.)	86	4.8	0.84	-	0.00	-	-	0.00	-	-	2.7	32	34	0.2	0.02	-	190	0.00	-
"	20 Ft. Well	(22 ft.)	86	5.0	0.84	-	0.00	-	-	0.00	-	-	2.8	36	34	0.2	0.03	-	190	0.00	-
"	30 Ft. Well	(35'-36')	86	5.0	0.84	-	0.00	-	-	0.00	-	-	2.8	36	34	0.2	0.03	-	190	0.00	-
"	40 Ft. Well	(45'-46')	86	5.0	0.84	-	0.00	-	-	0.00	-	-	2.8	36	34	0.2	0.03	-	190	0.00	-
"	60 Ft. Well	(60 ft.)	86	5.0	0.84	-	0.00	-	-	0.00	-	-	3.0	36	34	0.2	0.03	-	190	0.00	-
	HOMESTEAD-HIGH DENS.UPG																				
8/8	10 Ft. Well	(12 ft.)	92	3.4	0.84	-	0.00	-	-	0.01	-	-	3.0	31	28	0.2	0.02	-	213	0.00	-
"	20 Ft. Well	(25'-26')	86	4.2	0.84	-	0.00	-	-	0.01	-	-	3.0	33	34	0.2	0.03	-	197	0.00	-
"	30 Ft. Well	(34 ft.)	86	4.2	0.84	-	0.01	-	-	0.01	-	-	3.2	33	34	0.2	0.02	-	197	0.00	-
"	40 Ft. Well	(45'-46')	86	4.2	0.84	-	0.01	-	-	0.01	-	-	3.2	33	34	0.2	0.01	-	197	0.00	-
"	60 Ft. Well	(60 ft.)	86	4.2	0.84	-	0.00	-	-	0.01	-	-	3.4	33	34	0.2	0.01	-	197	0.00	-
	HOMESTEAD-HIGH DENS.DNG																				
8/8	10 Ft. Well	(12 ft.)	86	4.2	0.84	-	0.00	-	-	0.01	-	-	3.0	33	34	0.3	0.01	-	197	0.00	-
"	20 Ft. Well	(25'-26')	86	4.4	0.84	-	0.00	-	-	0.04	-	-	2.0	36	34	0.2	0.03	-	194	0.00	-

All parameters expressed in mg./l. except as noted.

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

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Subject to Revision

Date	SITE Well	Sampled Depth	Hepta-chlor	Lin-dane	Chlor-dane	PCB	2, 4-D	2,4,5-T	Silvex	Dia-zinon	Ethion	Mala-thion	Methyl Pana-thion	Methyl Tri-thion	Para-thion	Tri-thion	Aldrin	DDD	DDE	DDT	Dieldrin	Endrin
1971	HIALEAH UPG																					
10/28	10Ft.Well	(10'-12')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0
"	20Ft.Well	(21'-23')	0	0	0	Trace	Lost	Lost	Lost	0	0	0	0	0	0	0	0	0	0	0	0	0
"	30Ft.Well	(28'-30')	0	0	0	0	0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	40Ft.Well	(44'-46')	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	60Ft.Well	(60'-62')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/27	BIRD RD.-GALLOWAY UPG																					
"	10Ft. Well	(8'-10')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0.03	0	0
"	20Ft. Well	(25'-26')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Trace	Trace	0	0
"	30Ft. Well	(33'-34')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	40Ft. Well	(49'-50')	0	0	00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	60Ft. Well	(60'-61')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/28	HOMESTEAD-LOW DENS. UPG																					
"	10Ft. Well	(12'-13')	0	0	0	0	0	0	0	0	0	0.03	0	0	0	0	0	0	0	0	0	0
"	20Ft. Well	(22'-23')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	30Ft. Well	(35'-36')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	40Ft. Well	(45'-46')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	60Ft. Well	(60'-61')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Trace	0	0
1972	NORTH DADE UPG																					
2/18	10Ft. Well	(10'-11')	-	-	-	-	-	-	-	-	--	-	-	-	-	-	-	-	-	-	-	-
"	20Ft. Well	(20'-21')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	30Ft. Well	(30'-32')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	40Ft. Well	(44'-45')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	60Ft. Well	(59'-60')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2/16	HIALEAH UPG																					
"	10Ft. Well	(10'-12')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	20Ft. Well	(21'-23')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	30Ft. Well	(28'-30')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	40Ft. Well	(44'-46')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	60Ft. Well	(60'-62')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2/15	BIRD RD - GALLOWAY UPG																					
2/15	10Ft. Well	(8'-10')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	20Ft. Well	(25'-26')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	30Ft. Well	(33'-34')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	40Ft. Well	(49'-50')	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
"	60Ft. Well	(60'-61')	-	-	-	-	-	-	-	-	-	-	-	--	-	-	-	-	-	-	-	-

° Values for insecticides and pesticides in ug./l.

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

DADE COUNTY SEPTIC TANK STUDY (Effects on ground water)

Provisional Data
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Date	SITE Well	Sampled Depth	Heptachlor 1	Heptachlor 2	Lindane	Chlordane	PCB	2,4-D	2,4,5-T	Silvex	Diazinon	Ethion	Malathion	Methyl Parathion	Methyl Trithion	Parathion	Trithion	Aldrin	DDD	DDE	DDT	Dieldrin	Endrin	Toxaphene
1972	NORTH DADE UPG.																							
8/7	10 Ft. Well	(10'-11')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	20 Ft. Well	(20'-21')	0	0		0												0	0	0	0	0	0	
"	30 Ft. Well	(30'-32')	0	0		0												0	0	0	0	0	0	
"	40 Ft. Well	(44'-45')	0	0		0												0	0	0	0	0	0	
"	60 Ft. Well	(59'-60')	-	-	-	-	-	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	NORTH DADE DNG.																							
8/7	10 Ft. Well	(12'-12')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	20 Ft. Well	(22'-23')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HIALEAH UPG.																							
-	10 Ft. Well	(10'-12')																						
-	20 Ft. Well	(21'-23')																						
-	30 Ft. Well	(28'-30')																						
-	40 Ft. Well	(44'-46')																						
-	60 Ft. Well	(60'-62')																						
	HIALEAH DNG.																							
8/8	10 Ft. Well	(9'-10')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	20 Ft. Well	(22'-23')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
	BIRD RD.--GALLOWAY UPG.																							
-	10 Ft. Well	(8'-10')																						
-	20 Ft. Well	(25'-26')																						
-	30 Ft. Well	(33'-34')																						
-	40 Ft. Well	(49'-50')																						
-	60 Fr. Well	(60'-61')																						
	BIRD RD.--GALLOWAY DNG.																							
8/7	10 Ft. Well	(8'-10')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0
"	20 Ft. Well	(25'-26')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HOMESTEAD--LOW DENS. UPG																							
-	10 Ft. Well	(12'-12')																						
-	20 Ft. Well	(22'-23')																						
-	30 Ft. Well	(25'-26')																						
-	40 Ft. Well	(45'-46')																						
-	60 Ft. Well	(60'-61')																						

Values for insecticides and pesticides in ug./l.

1. Heptachlor 2. Heptachlor Epoxide

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

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Date	SITE Well	Sampled Depth	Heptachlor 1	Heptachlor 2	Lindane	Chlordane	PCB	2,4-D	2,4,5-T	Silvex	Diazinon	Ethion	Malathion	Methyl Parathion	Methyl Trithion	Parathion	Trithion	Aldrin	DDD	DDE	DDT	Dieldrin	Endrin	Toxaphene
1972	HOMESTEAD-LOW DENS.DNG																							
8/9	10 Ft. Well	(12 ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	20 Ft. Well	(22 ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	30 Ft. Well	(35'-36')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	40 Ft. Well	(45'-46')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	60 Ft. Well	(60 ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HOMESTEAD-HIGH DENS.UPG																							
8/8	10 Ft. Well	(12 ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	20 Ft. Well	(25'-26')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	30 Ft. Well	(34 ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	40 Ft. Well	(45'-46')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	60 Ft. Well	(60 ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HOMESTEAD-HIGH DENS.DNG																							
8/8	10 Ft. Well	(12 ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"	20 Ft. Well	(25'-26')	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Values for insecticides and pesticides in ug./l. 1. Heptachlor 2. Heptachlor Epoxide

18A

CONVERSION FACTORS

Feet times 0.305 = meters	Gallons times 3.785 = liters
Inches times 2.54 = centimeters	Pounds times 0.453 = kilograms

Gallons/day/foot times 12.41 = liter/day/meter

Gallons/day/square foot times 40.76 = liters/day/square meter

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Exhibit A

Memorandum

TO : The Record, WRD
Miami, Florida

DATE: October 29, 1971

FROM : William A. J. Pitt, Jr.
Miami, Florida

SUBJECT: Well Sampling

A two-gallon volume of water from Snapper Creek Canal at S.W. 99th Avenue was collected at 7:30 p.m. October 22, 1971. This water was used as a coliform bacteria contaminated source in an effort to determine a satisfactory method of sterilizing a pump and tubing after pumping from a contaminated source.

The procedure followed to determine this was as follows:

1. The pump was dismanteled and the impeller, housing, connectors, and tubing were exposed to ultraviolet radiation for 30 minutes from two General Electric germicidal lamps of 15 watts and 120 volts encased in a 1 x 1 x 2 ft. wooden box lined with heavy-weight aluminum foil.

2. A half-gallon sample of the bacteria contaminated water was then pumped through the pump and tubing and collected for analysis.

3. A total coliform count showed the sample to contain over 4,000 total coliform colonies per 100 ml. Three dilutions were taken; one of 1 ml, one of 10 ml, and one of 30 ml.

4. The pump was again taken apart and together with the tubing it was exposed to ultraviolet radiation the same as before.

5. A half-gallon sample of sterile water was then pumped through the system. A total coliform count on the pumped water had a zero coliform count in 100 ml.

6. A half-gallon sample of the contaminated water was then pumped through. The total coliform count on the pumped sample was over 4,000 total coliform colonies per 100 ml.

7. The pump and tubing were then disinfected by pumping methanol (methyl alcohol) through the system and then rinsing it with sterile water. One half-gallon of sterile water was then pumped. through and collected. The coliform count was zero per 100 ml.

The Record, WRD
Miami, Florida

8. A half-gallon sample of contaminated water was then pumped through and collected. The total coliform count was over 4,000 colonies per 100 ml.

9. The system was then disinfected by pumping isopropyl alcohol and then rinsing it with sterile water. One half-gallon of sterile water then pumped through and collected. The total coliform count was 113 colonies per 100 ml.

10. Half a gallon of contaminated sample was then pumped through and collected. The total coliform count was over 4,000 colonies per 100 ml.

It is obvious from the test, since all the analysis on the contaminated water showed the same number of coliforms, that there could not have been any residual alcohol left after rinsing with sterile water.

The test shows that ultraviolet radiation from the sterilizer was enough to destroy all the coliform bacteria left inside the tubing and the pump. It also showed that methanol was a good disinfectant of coliforms but that isopropyl was not.

In the testing of the wells we will, therefore, disinfect the pump and the tubing (FDA approved tygon) with the ultraviolet sterilizer and as a back-up with the methanol technique.

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cc: