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TEST WELL EXPLORATION IN THE MYAKKA RIVER BASIN AREA, FLORIDA

By
H. Sutcliffe, Jr. and B. F. Joyner
U. S. Geological Survey

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ABSTRACT

In recent years, difficulties encountered in obtaining ground-water supplies with acceptable chemical characteristics in the Myakka River basin area led to the implementation of a test drilling program. Under this program, well drilling and data collection were executed in such a manner that all water-producing zones of the local aquifers, together with the quality and quantity of the water available, were effectively identified.

A step-drilling method was utilized which allowed the collection of formation cuttings, water samples, and water-level data, from isolated zones in the well as drilling proceeded. The step drilling procedure is described. The driller's logs, geophysical logs, and chemical quality of water tables are presented.

INTRODUCTION

In the Myakka River basin area, figure 1, of southwest Florida, artesian aquifers are the most reliable and prolific sources of water. In the past, thousands of wells of various diameters and depths, constructed by various methods and finished in various ways, have been drilled in these aquifers. Prior to the enactment of local well drilling laws in Sarasota and Manatee counties, few records were kept of the methods of construction, materials penetrated, water levels, water yields, or quality of the water from wells. Local public officals, aware of the rapid increase in population and ground-water usage and the increasing difficulties experienced by both public and private interests in obtaining water of the desired quantity and quality, requested that the Geological Survey investigate the water resources of the area.

An investigation of the water resources of the Myakka River basin by the U.S. Geological Survey in cooperation with Sarasota County and the Division of Geology, Florida Board of Conservation, was begun in February 1962. Drilling test wells was an integral part of this investigation.

The test-drilling program was necessary to identify the various aquifers within the water-bearing formations and to obtain samples of water from these aquifers for chemical quality determinations. Geological and geophysical methods were employed to gather data which would permit correlation of the test well data with geophysical logs obtained from a number of older wells, thus aiding the interpretation of the geohydrologic characteristics of areas between the test well sites.

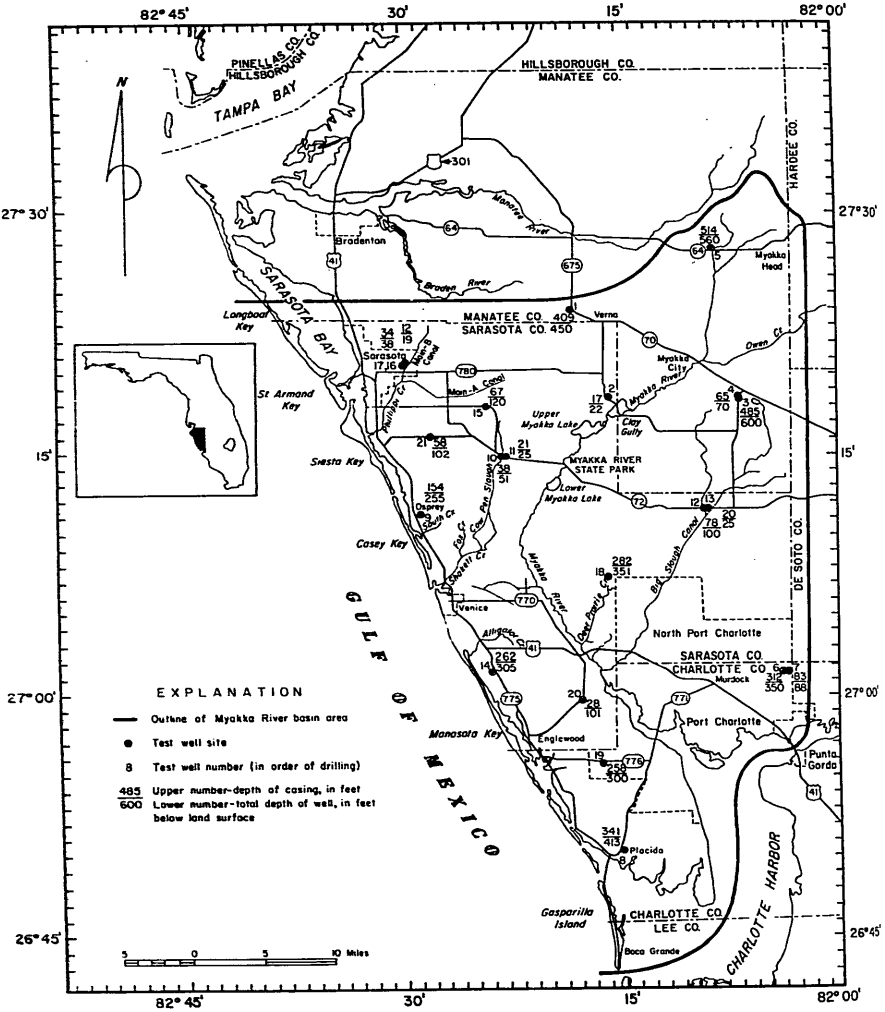


Figure 1. Myakka River basin area showing location of test wells.

SCOPE OF THE TEST WELL PROGRAM

The drilling program consisted of drilling 21 test wells by the cable-tool method. Well sites were selected to give a broad areal coverage in order to provide the fullest picture of ground-water conditions in the area. Consideration was given to localities where ground-water information was meager, where good-quality water supplies were most needed, and where geologic evidence suggested that water of acceptable quality might be located, in the selection of these sites (fig. 1).

The significant hydrologic data collected include:

(1) hydraulic head of each aquifer penetrated,

(2) chemical quality of water from each aquifer,
(3) materials penetrated during drilling,
(4) yield of each aquifer penetrated, and
(5) geophysical logs for well at completed depth.

The completed test wells were used as observation wells for recording water-level fluctuations and collecting water-quality data. Monitoring of selected wells was continued upon completion of the project; this information will supplement similar data collected at several observation wells in the area since the early 1930's. Water samples are collected periodically at selected observation wells so that seasonal variations in chemical quality can be determined.

PURPOSE OF THIS REPORT

The purpose of this report is to describe the methods used and to present the data collected during the exploratory water well drilling program. Two reports tentatively entitled "Water Resources of the Myakka River Basin Area" and "Water Resource Records of the Myakka River Basin Area", to be published by the Division of Geology, Florida Board of Conservation, will present the results and conclusions of this investigation and the hydrologic records (other than test well data) collected.

ACKNOWLEDGEMENTS

Grateful acknowledgment is extended to: the Sarasota County Board of Public Instruction, General Development Corporation, Florida Sate Highway Department, Manatee County Highway Department, and Mr. Albert Blackburn, all who granted permission to drill and maintain observation wells on their property. Appreciation is expressed to the Florida Board of Conservation, Division of Geology for its cooperation in providing well logging services and aiding in the interpretation of geologic contacts. Appreciation is also expressed to the Sarasota County Agent, Sarasota County Health Department, Manatee County Health Department, Smally, Wellford and Nalvin, consulting engineers to Sarasota County, and other helpful citizens whose interest, cooperation, and enthusiasm aided the project's completion.

STEP-DRILLING METHODS

Step drilling is a method of test drilling which assures the isolation of a water-bearing stratum so that the chemical quality and hydraulic head of the water can be determined as drilling progresses. Because wells drilled by more usual methods obtain water from several permeable zones, the quality of the water and level of water in an individual zone cannot be determined. Step drilling is particularly well suited to the lower west coast of Florida because of the type and character of the subsurface materials. The bulk of the subsurface materials is clay, shale, limestone, and sandstone. These rocks do not readily cave into the drill hole. The usual occurrence of clay above a limestone bed permits the seating of temporary casing in a test hole because a casing shoe seals

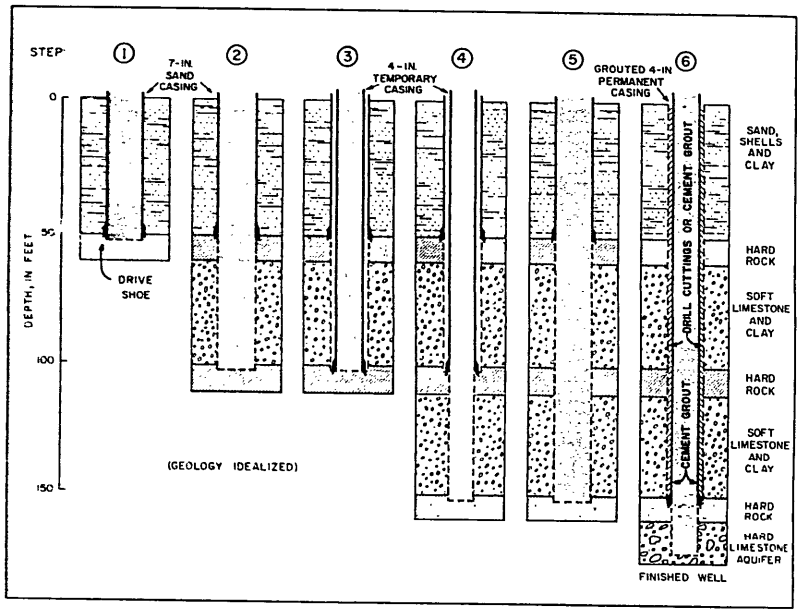


Figure 2. Basic steps of the step-drilling method.

the casing very tightly in the clay, while the underlying limestone supports the weight of the casing. In the step-drilling process where inner and outer casings are employed, hydraulically tight seals are a prerequisite for accurate measurement of water levels in the isolated strata.

Step drilling utilizing cable-tool equipment involves six basic steps, as illustrated in figure 2. Step 1 involves driving and drilling a "surface" casing equipped with a drive shoe into the ground until a stratum of consolidated rock is found. The material inside the casing is drilled out as the driving progresses. Samples of the materials penetrated are collected at 5- to 10-foot intervals using a bailer. When a saturated zone is found, a mixture of water and drill cutting is bailed from the well and dumped into a bucket. A water sample is collected by decanting the clear water from the bucket after the cuttings have settled. As successive water-bearing zones are found (as in a limestone stratum below the surficial sand), the drive shoe on the "surface" casing holds the water and sand above the zone to be sampled out of the well.

Step 2 involves drilling ahead with the cable-tool bit, below the seated surface casing, until a water-bearing stratum is encountered. Cuttings are collected from each 5 or 10-foot interval as drilling proceeds and a water sample from the water-bearing stratum is bailed from the well. The depth to water is

measured by a steel tape, lowered into the well, and this information, together with a log of the material penetrated as drilling progresses, is entered in the driller's log. When the drill bit encounters a suitable rock on which to seat the inner casing,the drilling is stopped.

Step 3 consists of installing the inner 4-inch casing equipped with a drive shoe on the bottom and firmly seating this casing on the rock at the bottom of the hole. In actual practice, the casing may move down the hole a few feet before a new seat is established.

Step 4 consists of drilling through the 4-inch casing with a 4-inch bit until another water-bearing zone is found. again water samples and cutting are collected as drilling proceeds, and the level of water in this zone measured. When the next consolidated rock is reached, drilling is halted, and the 4-inch inner casing is removed.

In step 5, the hole is reamed to the larger size, from the point where the 4-inch casing was seated to the point where drilling stopped in step 4. When all the cuttings are removed and the hole is clean, the 4-inch casing is replaced in the hole and seated at the bottom, as shown in step 3, figure 2. By repeating steps 3, 4, and 5, a well can be drilled to any reasonable depth.

During the drilling process, a constant check is maintained on the water level inside the 4-inch casing and the water level in the annular space between the 4-inch casing and the sand casing. A differential between these water levels indicates a good seal is formed by the casing shoe. Conversely, identical water levels indicate a leak around the shoe, in which case the inner casing should be driven again until a firm seat is made.

When the final setting of 4-inch pipe is decided upon, the hole is in the condition illustrated by step 5 (fig. 2). Step 6 consists of positioning the permanent casing in the well within 1 or 2 feet of the bottom of the hole. Twenty feet of cement grout is placed in the bottom of the well with a bailer so that the cement moves up the hole outside the 4-inch casing. The 4-inch casing is then seated firmly on the bottom of the hole and driven slightly, to insure a firm seat. Most of the grout on the inside of the casing is removed by bailing: the well is left standing until the cement sets. Next, drilling proceeds inside the 4-inch casing and the well is completed with a know length of open hole in a single aquifer. The annular space between the 4-inch casing and the 6-inch hole above the cement grout is filled with drill cuttings or cement grout, and the surface casing is removed for use at the next test site.

Seven inch inside diameter casing was originally specified for "sand" casing to provide adequate space for placing and removing the 4-inch inside diameter inner casing. It was determined during the program that 6-inch inside diameter casing could be subsituted for the 7-inch casing without affecting the results of the step-drilling method. Use of 6-inch casing had the decided advantage of being readily available from local suppliers while the 7-inch had to be special ordered.

DATA COLLECTIONS

ROCK AND WATER SAMPLING

Samples of cuttings were usually taken at 5-foot intervals to the first competent rock, and about 10-foot intervals thereafter. These samples were all taken from the bottom of the well by bailer. They were forwarded to the Division of Geology at Tallahassee for processing and storage in the cuttings file. With the aid of a microscope, the lithology and paleontology of rock materials are studied in order to make geologic age determinations which are necessary for the preparation of a geologic log. Water samples, of 1-liter volume, were taken from the more productive zones. These samples were analyzed for their major chemical constituents.

GEOPHYSICAL METHODS

Each deep well drilled under the program was surveyed by geophysical logging equipment. The graphical geophysical data presented is a strip chart recording of the electrical or radiation characteristics of the material in the earth penetrated by the test hole. Throughout the length of some holes, a record of temperature, resistivity, self-potential and gamma ray radioactivity was made. Caliper logs which show the diameter of the bore hole were obtained where possible.

These logs, especially the gamma ray, may be correlated from well to well on a geologic basis, as well as on the basis of the graphical representations of the particular beds, or sequence of beds. Reliable predictions of the thickness and depth of the more productive strata in areas between test well sites can be made based on the correlations of geophysical and driller's logs. Geophysical logs of 13 wells are given in the appendix, figures 3 - 15.

APPENDIX

A. Well Driller's logs
B. Chronological and water level logs
C. Chemical analyses of water
D. Geophysical logs

APPENDIX A

The following table gives driller's name, depth at which various materials were encountered, and thickness of material for each well drilled inder the program.

TABLE 1. WELL DRILLERS' LOG

USGS Well No. 1 Driller: M. Ballard, J.R. Guest
Verna

Material	Thickness *(feet)*	Depth *(feet)*
Sand, surface	10	10
Sand, dark red, contains iron water	5	15
Sand, coarse with pea gravel	5	20
Sand, very fine, dark color, phosphatic	10	30
Sand, very fine, dark color, phosphatic, some water	5	35
Sand, very fine, dark color, phosphatic, some pea gravel	12	47
Sand, and clay, mixed	3	50
Same, heaving up casing	5	55
Sand, with very little clay	40	95
Clay, hard, blue, dry	15	110
Limestone, soft, no water	2	112
Clay, light gray, with black specks	6	118
Limestone with streaks of clay, water bearing	3	121
Limestone	4	125
Clay, blue	1	126
Limestone	1	127
Clay, blue	14	141
Limestone	3	144
Clay, white	7	151
Limestone	1	152
Clay, white	3	156
Limestone, soft	3	159
Rock	3	162
Clay, white, water bearing	18	180
Limestone	2	182
Clay	3	185
Clay, gray	7	192
Limestone	3	195
Clay, white	9	204
Limestone	1	205
Clay, white	5	210
Clay, white, sandy, with streaks of limestone	2	212
Clay, white, sandy	4	216
Limestone	7	223
Limestone gravel, with white sandy clay	10	233
Clay, sandy	8	241
Clay, hard, blue, dry	4	245
Clay, white, sandy	8	253
Limestone, and clay, white, little water	6	259
Clay, gray, sandy	40	295
Limestone, water bearing	15	310
Limestone, crumbly, and clay, water bearing	5	315
Clay, white	9	324

TABLE 1. Continued

USGS Well No. 1 (continued) Material	Thickness (feet)	Depth (feet)
Clay, blue, dry	3	327
Limestone	1	328
Clay, blue	2	330
Clay, blue and gray, with gravel, bailing necessary after drilling two feet	12	342
Clay, blue and gray	4	346
Limestone	1	347
Limestone and clay, blue	4	351
Limestone	2	353
Clay, white and limestone streaks	5	358
Limestone, hard	4	362
Clay, white and blue	3	365
Clay, white	6	371
Limestone, hard, water bearing	4	375
Limestone	25	400
Clay, white	2	402
Limestone, soft, sandy	20	422
Limestone, hard	4	426
Limestone	24	450
USGS Well No. 2		Driller: M. Ballard
Old Myakka		
Sand	12	12
Sand and clay, white	7	19
Sand, black and gravel, with clay, white	3	22
Limestone		
Set Cook 0.010 screen from 17 to 21		
USGS Well No. 3		Driller: M. Ballard
Edgeville, deep		
Sand, tan to gray, with some phosphate	45	45
Sand and little clay	35	80
Sand and little clay, green, heaves	5	85
Sand and little clay, with some phosphate	10	95
Sand, phosphatic	10	105
Sand and some clay, phosphatic	20	125
Sand, coarse, phosphatic	5	130
Sand and some clay, phosphatic	15	145
Sand, phosphatic	27	172
Clay, sandy	13	185
Clay, dark, sandy, phosphatic	5	190
Clay	6	196
Sandstone	2	198
Clay, sandy, very fine	17	215
Limestone, water bearing	1	216
Clay, blue	1	217
Limestone	4	221
Clay, blue	1	222

TABLE 1. Continued

USGS Well No. 3 (continued)

Material	Thickness (feet)	Depth (feet)
Limestone, water bearing	19	241
Clay, white, sandy	1	242
Limestone	9	251
Limestone, crumbly, water bearing	13	264
Limestone	1	265
Clay, white	11	276
Limestone	5	281
Clay, white	13	294
Limestone	1	295
Clay, white with streaks of limestone	5	300
Clay, light gray	5	305
Clay, gray	5	310
Limestone	1	311
Clay, gray with streaks of limestone	14	325
Limestone, water bearing	2	327
Limestone	1	328
Clay, white	3	331
Limestone	2	333
Clay, white	7	340
Clay, white with streaks of limestone	10	350
Limestone	3	353
Clay, gray	2	355
Clay, white, with streaks of limestone	5	360
Limestone, water bearing, very good	9	369
Clay, white	10	379
Limestone, water bearing	4	383
Clay, light blue	7	390
Limestone, soft	1	391
Clay, white	4	395
Clay, blue, dry	10	405
Limestone	3	408
Clay, light gray	7	415
Limestone	1	416
Clay, white	4	420
Clay, white, with streaks of limestone	6	426
Limestone	4	430
Limestone, hard	2	432
Limestone, soft, water bearing	14	446
Limestone, hard	4	450
Limestone, water bearing	12	462
Limestone, soft, water bearing	5	467
Limestone, harder	3	470
Limestone, hard	2	472
Limestone, soft	2	474
Limestone, hard	2	476
Limestone, water bearing	4	480
Limestone, soft	5	485
Limestone, water bearing	13	498

TABLE 1. Continued

USGS Well No. 3 (continued)

Material	Thickness *(feet)*	Depth *(feet)*
Clay, white and blue	4	502
Limestone, hard	12	514
Limestone	18	532
Limestone, soft, water bearing	8	540
Limestone, hard	6	546
Clay, white	17	563
Limestone	3	566
Limestone, soft	11	577
Limestone	9	586
Limestone, soft	14	600
USGS Well No. 4		Driller: M. Ballard
Edgeville, shallow		
Sand, fine, brown and humus	20	20
Sand, fine, brown and clay, brown	5	25
Sand, fine, brown and less clay	5	30
Sand, fine, brown	10	40
Sand, fine with little clay, gray	5	45
Sand, fine	5	50
Sand, fine to medium, brown with little clay	5	55
Sand, fine to coarse with some clay	5	60
Sand, fine to coarse with less clay	5	65
Sand, fine to coarse with very little clay	5	70
Set 5 feet of Cook 0.010 screen, 65 to 70		
USGS well No. 5		Driller: M. Ballard
Myakka Head		
Sand	38	38
Sand, gravel, and little clay	27	65
Sand, gravel, and clay	20	85
Sand, and clay	5	90
Clay, gray, sandy	30	120
Sand, and clay, blue	15	135
Sand	11	146
Clay, blue	4	150
Clay, gray, sandy, with gravel and limestone streaks	12	162
Sand, water bearing	3	165
Sand, clay, gray, and limestone streaks	12	177
Clay, blue, sandy	8	185
Clay, blue, and little gravel	10	195
Clay, blue	25	220
Clay, gray with gravel	5	225
Limestone, water bearing	4	229
Clay, gray	5	234
Limestone	6	240
Clay, gray	12	252
Limestone	3	255

TABLE 1. Continued

USGS Well No. 5 (continued)

Material	Thickness *(feet)*	Depth *(feet)*
Clay, gray	2	257
Limestone	2	259
Clay, gray	2	261
Limestone, water bearing	7	268
Clay, white	6	274
Limestone and clay	9	283
Clay, white	5	288
Limestone	3	291
Clay, white	4	295
Limestone	4	299
Clay, white	11	310
Limestone	3	313
Clay, gray, sandy and gravel	13	326
Limestone	5	331
Clay, gray	13	344
Limestone, hard, waterbearing	6	350
Limestone, hard	3	353
Limestone, crumbly	1	354
Limestone, hard	2	356
Limestone, crumbly	2	358
Limestone	2	360
Limestone, hard	12	372
Limestone, crumbly, and sand	13	383
Limestone, little sand	22	405
Limestone, some sand	5	410
Limestone	5	415
Clay, white, sandy	11	426
Limestone and sand	4	430
Clay, white, sticky	5	435
Clay, white	9	444
Limestone, with hard chert cap	3	447
Limestone and chert	1	448
Limestone and chert, water bearing	2	450
Limestone, hard, water bearing	5	455
Limestone, hard	3	458
Clay, black with streak of coal	4	462
Clay, blue, sandy	14	476
Limestone	14	490
Limestone, water bearing	5	495
Limestone	5	500
Limestone, little clay, white	5	505
Limestone	25	530
Limestone, water bearing	30	560

USGS Well No. 6 Driller: Calloway
Port Charlotte, deep

Sand, dark	25	25
Sand, dark gray	5	30

TABLE 1. Continued

USGS Well No. 6 (continued)

Material	Tickness *(feet)*	Depth *(feet)*
Sand, gray with shells	10	40
Sand, coarse and clay, mixed	5	45
Sand, coarse, gravel, and clay, mixed	10	55
Sand, coarse, and clay	10	65
Clay, dark, sandy	10	75
Clay, light gray, and shell, mixed	5	80
Clay, hard, dry, and shell	5	85
Clay, light gray, and sand, coarse, black, mixed	5	90
Clay, very sandy, very fine	15	105
Clay, dark, sandy	5	110
Clay, white, and limestone gravel	10	120
Clay, sandy	5	125
Clay, blue	2	127
Limestone	3	130
Sandstone, and clay	10	140
Sandstone, hard	3	143
Clay, white, sandy	1	144
Limestone	2	146
Limestone, and clay	4	150
Limestone, and clay, sandy	5	155
Limestone, and clay, white, sandy	5	160
Limestone, and clay, mixed	16	176
Clay, white	6	182
Limestone	3	185
Limestone, white and brown, water bearing	5	190
Limestone, brown, and clay, white, water bearing	5	195
Limestone, brown, clay, white, water bearing, flow	5	200
Clay, white, and limestone, brown	5	205
Clay, white, and limestone, white	10	215
Limestone, brown	5	220
Clay, white, and limestone, mixed	25	245
Limestone	2	247
Clay, gray, and sand, black pepper, mixed	16	263
Limestone	7	270
Limestone, soft	5	275
Limestone	10	285
Limestone, water bearing, cavity from 286 to 287	5	290
Limestone, crumbly	5	295
Limestone, white	10	305
Limestone, crumbly, water bearing, more flow	5	310
Limestone, white	10	320
Limestone, water bearing	5	325
Limestone,water bearing, little flow	5	330
Limestone, hard, white	10	340
Limestone, hard, white, water bearing, more flow	5	345

TABLE 1. Continued

USGS Well No. 6 (continued) Material	Thickness *(feet)*	Depth *(feet)*
Sandstone, water bearing, heavy flow	5	350
USGS Well No. 7		Driller: Calloway
Port Charlotte, shallow		
Sand, dark brown	25	25
Sand, dark gray	5	30
Sand, gray, and shells	10	40
Sand, coarse, and clay, mixed	5	45
Sand, coarse, gravel, and clay	10	55
Sand, coarse, and clay	10	65
Clay, dark, sandy	10	75
Clay, light gray, and shell, mixed	5	80
Sand, coarse, black, with streaks of clay, light gray	10	90
Set Cook 0.010 screen from 83 to 88		
USGS Well No. 8		Driller: M. Ballard
Placida		
Sand, gray	30	30
Limestone, white, and little shale	5	35
Sand, white, and little shale	5	40
Shell	2	42
Shell, with shale and fine sand	8	50
Clay, gray	5	55
Clay, blue, with rock streaks and some sand	15	70
Chert, hard, water bearing at 72	5	75
Rock, hard, and sand	5	80
Rock, and sand, white	5	85
Sand, sugar, very fine	1	86
Limestone, cavity from 88 to 90	4	90
Limestone and shell, very little clay	5	95
Limestone and shells, very little clay, cavity at 96 to 97	5	100
Limestone, shell, and very little clay	5	105
Limestone, sand, and clay	5	110
Cavity	2	112
Limestone, clay, gray, and sand, pepper	3	115
Limestone, clay, gray, and sand, pepper	7	122
Limestone, hard	3	125
Limestone	5	130
Clay, blue	10	140
Limestone, brown, harder at bottom, cavity from 146 to 148, started flowing at 155	20	160
Limestone, white and brown	5	165
Clay, gray, and limestone, brown	5	170
Limestone, white, and some clay, gray	10	180
Limestone, brown	10	190
Limestone, white, and clay, hard from 192 to 194	15	205

TABLE 1. Continued

USGS Well No. 8 (continued) Material	Thickness *(feet)*	Depth *(feet)*
Clay, white, limestone, white, and sand, Phosphatic	20	225
Clay, blue, with limestone and sand, phosphatic	10	235
Limestone, white, clay, blue, and sand, phosphatic	5	240
Rock, black, white and clear, hard from 243 to 245	5	245
Sand, black, and clay, white	5	250
Shell, rock, and sand, black	5	255
Rock, and sand, black	5	260
Rock, coarse, sand, black, and some clay, white	5	265
Clay, white and rock	10	275
Clay, gray	5	280
Clay, white	10	290
Clay, gray	5	295
Limestone, and shell	7	302
Cavity	4	306
Shell bed, water bearing, very salty	1	307
Limestone, white with shells	3	310
Limestone, crumbly, with very little clay	5	315
Limestone, crumbly	10	325
Limestone, fine	15	340
Limestone, hard, brown, fine	10	350
Limestone, white	5	355
Limestone, brown	4	359
Cavity	4	363
Limestone, brown	2	365
Cavity	2	367
Limestone, hard, brown, fine	13	380
Limestone, brown, with phosphatic sand streaks, 381 to 384	5	385
Limestone, brown, with clay	12	397
Clay, white, with limestone	8	405
Limestone, brown, and clay, white	8	413
USGS Well No. 9		Driller; M. Ballard
Osprey		
Sand, brown	15	15
Sand, brown, and shell	10	25
Sand, brown, and clay	11	36
Gravel	1	37
Limestone, White	2	39
Cavity	1	40
Limestone, white, and clay, gray	4	44
Clay, gray	5	49
Limestone, hard, white	3	52
Clay, gray	18	70
Clay, light gray, and limestone	19	89
Clay, gray	1	90

TABLE 1. Continued

USGS Well No. 9 (continued) Material	Thickness (feet)	Depth (feet)
Clay, white, and limestone	5	95
Limestone, hard	1	96
Limestone, soft, water bearing	2	98
Limestone, hard	9	107
Cavity	1	108
Limestone, hard	5	113
Cavity, water bearing	1	114
Limestone, hard	19	133
Limestone, and clay, white	11	144
Limestone	2	146
Limestone, and clay, gray	8	154
Limestone	1	155
Clay, gray, necessary to bail after drilling one foot	10	165
Clay, gray, and limestone	4	169
Limestone, hard	1	170
Cavity, water bearing	1	171
Limestone, hard	1	172
Clay, gray	16	188
Limestone	4	192
Clay, white	19	211
Clay, blue	6	217
Limestone, water bearing	1	218
Clay, white	2	220
Clay, gray	7	227
Limestone	4	231
Clay, gray	15	246
Clay, sand, and limestone	4	250
Sand, and limestone	5	255
USGS Well No. 10		Driller: M. Ballard
Cow Pen Slough, deep		
Sand	10	10
Sand, and shell	5	15
Sand, shell, clay, and gravel, mixed	5	20
Sand, fine	5	25
Clay, sand, and gravel, mixed	10	35
Clay, and gravel	4	39
Limestone, hard, water bearing	6	45
Limestone, hard	2	47
Clay, gray	4	51
Limestone		
USGS Well No. 11		Driller: M. Ballard
Cow Pen Slough, shallow		
Sand	10	10
Sand, and shell	5	15
Sand, clay, shell, and gravel	5	20

TABLE 1. Continued

USGS Well No. 11 (continued) Material	Thickness *(feet)*	Depth *(feet)*
Sand, fine	5	25
Finish: Fine gravel pack, 21 to 25		
USGS Well No. 12		Driller: M. Ballard
Big Slough, deep		
Sand	10	10
Sand, and little clay	15	25
Clay, blue	15	40
Clay, gray, sandy	7	47
Sand, shell, and some gravel, water bearing	12	59
Clay, blue, sandy	5	64
Limestone	1	65
Clay, gray, sandy	5	70
Clay, gray, sandy, with some gravel	8	78
Limestone, water bearing	5	83
Clay, gray	2	85
Limestone, crumbly, and clay	15	100
USGS Well No. 13		Driller: M. Ballard
Big Slough, shallow		
Sand	10	10
Sand, with little clay	15	25
Finish: Gravel packed 20 to 25		
USGS Well No. 14		Driller: Troutman
Florida 775		
Sand, with some shell	20	20
Sand, and shell	5	25
Gravel, shell, and some clay	5	30
Clay, gravel and shell	5	35
Gravel, and sand	6	41
Sandstone	3	44
Limestone, crumbly, and sandstone, water bearing	1	45
Limestone, hard	2	47
Limestone, crumbly, and sandstone	1	48
Limestone, hard	1	49
Limestone, crumbly, and sandstone	1	50
Limestone, hard	2	52
Clay, gray	1	53
Limestone	2	55
Clay, gray	10	65
Limestone	1	66
Clay, gray	7	73
Limestone	2	75
Clay, blue	20	95
Shale, gray	5	100
Shale, white	2	102

TABLE 1. Continued

USGS Well No. 14 (continued)

Material	Thickness (feet)	Depth (feet)
Limestone, brown, crumbly	3	105
Limestone, light gray	10	115
Limestone, gray, hard	5	120
Limestone, gray, firm	5	125
Limestone, brown, crumbly	5	130
Limestone, soft, crumbly	5	135
Shale, with limestone and shells	5	140
Shale, gray, muddy	15	155
Limestone, soft, gray	10	165
Limestone, firm, gray	5	170
Limestone, soft, gray	5	175
Shale, white	10	185
Limestone, light gray, water bearing	12	197
Shale, white	8	205
Shale, with limestone and shells	5	210
Limestone, with slate streaks	5	215
Limestone, firm, light gray, water bearing	5	220
Shale, muddy	7	227
Limestone, hard	3	230
Shale, muddy	10	240
Shale, with some shells	5	245
Limestone, brown, crumbly	5	250
Shale, white, with limestone, brown	10	260
Marl, with limestone streaks, and shells	8	268
Limestone, hard, light brown	7	275
Limestone, medium hard, light brown	5	280
Shale, soft, muddy	5	285
Limestone, medium to soft, brown, water bearing at 290	20	305

USGS Well No. 15 — Driller: J. R. Guest

Bee Ridge Extension

Sand and shell	20	20
Sand, muddy, light brown	15	35
Clay, gray, sandy, with limestone streaks, water bearing	20	55
Clay, green, and limestone streaks	5	60
Clay, gray, sandy, caving	6	66
Limestone, white	11	77
Clay, green, with limestone streaks, water bearing	13	90
Limestone, hard	2	92
Limestone, hard, brown, with gravel streaks	3	95
Limestone, white	5	100
Limestone, white and gray, mixed	5	105
Limestone, white, crumbly	5	110
Clay, white, and limestone, mixed	5	115
Limestone, white, and clay, water bearing	5	120

TABLE 1. Continued

USGS Well No. 16 Driller: Calloway
Bobby Jones, shallow

Material	Thickness (feet)	Depth (feet)
Landfill, and sand, light brown, mixed	10	10
Sand, light brown	9	19
Finish: Fine gravel pack from 12 to 19		

USGS Well No. 17 Driller: Calloway
Bobby Jones, deep

Landfill, and sand, light brown, mixed	10	10
Sand, light brown	9	19
Sand, gray	1	20
Sand, brown	3	23
Clay, muddy, green, and sand	6	29
Sand, gray	4	33
Sand and gravel	5	38
Finish: Open-bottom casing		

USGS Well No. 18 Driller: H. Revalee
Blackburn Ranch

Sand	10	10
Clay, white, sandy	5	15
Clay, green, and sand	5	20
Sand, white, water bearing	10	30
Sand, gray, and mud, white	5	35
Sand, white, and mud	6	41
Limestone, water bearing	5	46
Limestone, crumbly, sandy	14	60
Limestone, muddy	8	68
Clay, muddy, gray	6	74
Limestone, water bearing	5	79
Clay, gray and green	7	86
Clay, firm, white, sandy	27	113
Limestone, crumbly, white, water bearing	17	130
Limestone, hard, white	9	139
Clay, white	20	159
Limestone	6	165
Clay, white, sandy, with limestone streaks	14	179
Limestone, crumbly	5	184
Clay, white, sandy	7	191
Limestone, firm, white, water bearing	7	198
Clay, white, sandy	39	237
Rock	2	239
Clay, firm, white	26	265
Limestone, soft, white	17	282
Limestone, white	3	285
Clay, white	30	315
Limestone, light tan, many small cavities, water bearing	36	351

TABLE 1. Continued

USGS Well No. 19		Driller: Troutman
Material	Thickness *(feet)*	Depth *(feet)*
Sand and soil	5	5
Sand	10	15
Sand, brown	15	30
Sand, gray	20	50
Sand, gray, phosphatic, water bearing	5	55
Clay, greenish, sandy	5	60
Clay, blue	1	61
Limestone, firm, white	4	65
Limestone, gray, water bearing	5	70
Limestone, gray, crumbly	5	75
Limestone, hard	3	78
Sand, black	2	80
Limestone, hard	10	90
Limestone, white	8	98
Clay, white, sandy	7	105
Shale, muddy, blue	25	130
Shale, gray	5	135
Shale, white, with limestone and shells	5	140
Limestone, crumbly, water bearing	5	145
Limestone, white, water bearing	10	155
Limestone, coarse, white	5	160
Limestone, fine, light brown	10	170
Limestone, fine, gray	5	175
Limestone, white, with shale streaks	5	180
Limestone, medium hard, white, water bearing	15	195
Limestone, crumbly, gray, with shale streaks	15	210
Limestone, medium hard, white	5	215
Limestone, crumbly, light brown, water bearing	10	225
Limestone, medium hard, brown	10	235
Limestone, crumbly, white, with shale streaks	10	245
Sand, and shale, white, some phosphate	10	255
Sand, and shale, caving	5	260
Limestone, medium hard	5	265
Limestone,and shale streaks	5	270
Limestone, hard, fine, light brown, water bearing	30	300
USGS Well No. 20		Driller: Troutman
Playmore		
Surface sand	5	5
Sand, dark	5	10
Sand, water bearing	11	21
Limestone, crumbly	5	26
Sand, black	4	30
Limestone, hard	2	32
Limestone, water bearing	3	35
Limestone, and clay, sandy	5	40

TABLE 1. Continued

USGS Well No. 20 (continued) Material	Thickness *(feet)*	Depth *(feet)*
Clay, blue	5	45
Clay, blue, with limestone gravel, mixed	25	70
Clay, light green	7	77
Limestone, soft	1	78
Clay, gray	7	85
Limestone, hard	2	87
Clay, light gray, and limestone, mixed	8	95
Limestone, soft, water bearing	6	101
USGS Well No. 21		Driller: Troutman
Cady Grove		
Sand, medium to fine, and soil	10	10
Sand, medium to fine	10	20
Sand, medium to coarse, with some phosphate	5	25
Limestone, medium hard, brown, clay streaks, phosphatic	8	33
Clay, blue green, with streaks of limestone	9	42
Limestone, white to tan, and shell	1	43
Clay, blue green	12	55
Shale, gray green	5	60
Shale, with limestone and shells	10	70
Limestone, gray, water bearing at 70	30	100
Shale, white	2	102

APPENDIX B

The following table gives driller's notes made during drilling of each well.

TABLE 2. CHRONOLOGICAL AND WATER-LEVEL LOGS

(* Below or above (+) land-surface datum)

Date	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
(1965)					
Mar. 11	1:00 pm				Spud in
Mar. 15		70	76		Water sample
Mar. 16	8:00 am	106	121	48	
		106	122	90	Water sample, bailed 5 min. at 10 gpm
Mar. 17	8:00 am	106	136	13.36	Water sample
Mar. 19		141			Set 4 inch casing
Mar. 22		141	180		Water sample
Mar. 23		187			Reset 4 inch casing
		141	185		Water sample
Mar. 24	8:00 am	187	195	17.3	4 inch casing
	8:00 am	106	185	12	7 inch casing
	5:00 pm	187	225	20	Water sample
Mar. 29		241			Reset 4 inch casing
	5:00 pm	241	253	145	4 inch casing
	5:00 pm	106	250	12	7 inch casing
	5:00 pm	241	253	145	Water sample
Mar. 30	8:00 am	241	253	74	4 inch casing
	8:00 am	106	250	15	7 inch casing
	5:00 pm	241	309	42	4 inch casing
	5:00 pm	106	240	15.7	7 inch casing
	5:00 pm	241	300		Water sample
Apr. 1	8:00 am	241	309	14.2	Both pipes, seal broken
	5:00 pm	309			Reset 4 inch casing
	5:00 pm	309	315		Water sample
Apr. 2	8:00 am	309	315	35.7	4 inch casing
	8:00 am	106	305	16.5	7 inch casing
	2:00 pm	309	342	200	4 inch casing
	2:00 pm	106	305	16.4	7 inch casing
	2:00 pm	309	342		Water sample
Apr. 5-8					Crown sheve broken
Apr. 9	8:00 am	309	342	28.1	4 inch casing
	8:00 am	106	305	16.1	7 inch casing
		347			Reset 4 inch casing
	5:00 pm	347	347	17	4 inch casing
	5:00 pm	106	345	16.9	7 inch casing
		309	347		Water sample
		309	350		Water sample
Apr. 11	8:00 am	347	347	16.1	4 inch casing
	8:00 am	106	345	16.1	7 inch casing
		348			Redrove 4 inch casing
	5:00 pm	348	371	55.5	4 inch casing
	5:00 pm	106	345	17.2	7 inch casing
		348	360		Water sample
		348	372		Water sample
Apr. 12					No work

TABLE 2. Continued

USGS Well No. 1 (continued)

Date	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
(1965)					
Apr. 13	8:00 am	348	372	55.1	4 inch casing
	8:00 am	106	345	16.6	7 inch casing
	3:00 pm	348	400	55.6	4 inch casing
	3:00 pm	106	345	24.9	7 inch casing
		348	374		Water sample
		348	400		Water sample
Apr. 14	8:00 am	106	400	25.9	7 inch casing
	2:00 pm	106	392	19.2	7 inch casing
					Lost reaming tools
Apr. 15-26					Well closed for recovering tools and logging
Apr. 22	8:00 am	106	400	16.7	7 inch casing
	5:00 pm	106	400	19.2	7 inch casing
Apr. 27	8:00 am	106	400	18.4	7 inch casing
		409			Reset 4 inch casing
	5:00 pm	106	403	17.2	7 inch casing
		409	409	28.2	4 inch casing
Apr. 28	8:00 am	409	409	18.3	4 inch casing
		106	405	16.5	7 inch casing
Apr. 30	5:00 pm	106	405	17.5	7 inch casing
	5:00 pm	409	450	59.0	4 inch casing
May 27		409	450	52.0	Water sample
		409	450	85	45 min. pumping 7 gpm
		409	450	87	1½ hours pumping 7 gpm
		409	450	85	4 hours pumping 7 gpm
USGS Well No. 2					
Old Myakka					
May 17	6:00 pm	22	22		Spud in
May 18		17	22		Water sample
June 3		17	22	7	Pumped 3 gpm for 2 hours
USGS Well No. 3					
Edgeville, deep					
May 24					Spud in
May 25		35			Driving casing, broke drivehead
May 26					Repair drivehead
May 27		88			Drive casing
May 28		123			Drive casing
May 29-31					Not working-Holiday
June 2		145	145	12	Water sample
June 2		155	155	12	Water sample
		158			Drive casing
June 3-9					Out of casing
June 10		179			Drove casing, rain ½ day
June 11-12					Driller injured
June 14					Drove casing, sand heaved up to 119 feet

TABLE 2. Continued

USGS Well No. 3 (continued)

Date (1965)	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
June 15		194			Casing on ledge
June 16	6:00 pm	194	215	30	7 inch casing
June 17		198	215		Hole filled to 197 feet, shut down ½ day, rain
June 18		198	217		Hole filled again. Sand still heaving.
June 21	7:00 pm	198	215	14.8	7 inch casing „still caving
	6:00 pm	217	223	25.2	7 inch casing
June 22	6:00 am	217	223	9.5	7 inch casing
		217	224	9.5	Water sample
	6:00 pm	217	255	27.9	7 inch casing. Water sample
June 23	6:00 am	217	269	27.8	7 inch casing
		217	276		Water sample
		276			Set 4 inch casing
		276	327	28	Water sample
June 24	6:00 am	217	269	28.4	7 inch casing
		276	340	41.4	4 inch casing
		276	350		Water sample
		351			Reset 4 inch casing
June 25	6:00 am	217	351	27.6	7 inch casing
	6:00 am	351	351	42.8	4 inch casing
		351	365	37.2	Water sample
		351	385	37.2	Water sample
	6:00 pm	217	391	29.6	7 inch open hole
June 26	6:00 am	217	391	26	7 inch open hole
	3:20 pm	217	391	26.6	7 inch open hole, rained out
June 27	7:15 am	217	391	26.6	7 inch open hole
	2:00 pm	217	420	28.2	7 inch open hole. Rained out.
June 28	7:00 am	217	420	27.6	7 inch open hole
		416			4 inch casing reset.
	6:00 pm	217	416	25	7 inch casing
		416	430	65	4 inch casing
June 29	7:00 am	217	416	27.5	7 inch casing
		416	430	30.9	4 inch casing
		416	430		Water sample
June 29	6:00 pm	216	416	27.5	7 inch casing
		416	485	41.3	4 inch casing
June 30	6:00 am	217	416	30.1	7 inch casing. Pumped hole 8 hours dd 41.3 at 10 gpm. Broke derrick pulling pipe.
		416	485	27.2	4 inch casing
		416	485		Water sample
July 1-16					Rig in shop, putting on new derrick
July 17	6:00 am	217	485	25.5	7 inch open hole
	6:00 pm	217	460	26.1	7 inch open hole
July 19	6:00 am	217	460	25.3	7 inch open hole
	6:00 pm	217	485	26.2	7 inch open hole. Rain off and on all day

TABLE 2. Continued

Date	Time	Casing depth (feet)	Hole depth (feet)	Water level*	Remarks
USGS Well No. 3 (continued)					
(1965)					
July 20	6:00 am	217	485	25.4	7 inch open hole
		485			Reset 4 inch casing
		485	495	30.4	Water sample
	6:00 pm	217	485	25.2	7 inch casing
		485	505	30.4	4 inch casing
July 21	7:00 am	217	485	25.2	7 inch casing
		485	505	25.5	4 inch casing. Casing leaking. Drove again.
		485	510	25.2	Water sample
		485	520		Water sample
		485	530		Water sample
		485	540		Water sample
	2:00 pm	217	485	25.2	7 inch casing
July 21	2:00 pm	485	540	26.3	4 inch casing. Raining. Shut down.
July 22	6:30 am	217	485	25.2	7 inch casing
	6:30 am	485	540	25.9	4 inch casing. Drove 4 inch casing to seat
		485	575		Water sample
		485	600		Water sample
	6:00 pm	217	485	26.2	7 inch casing
		485	600	31.4	4 inch casing. Test pump 4 hours.
July 23-25					Not on rig
July 26	6:30 am	217	485	25	7 inch casing
	6:30 am	485	600	26.9	4 inch casing
	2:00 pm				Log hole until 6:00 pm
July 27					Reset casing and cement casing
July 28	6:30 am	217	485	24.7	7 inch casing
	6:30 am	485	600	25	4 inch casing
	6:00 pm	217	485	24.9	7 inch casing
	6:00 pm	485	600	31.3	4 inch casing
USGS Well No. 4					
Edgeville, shallow					
July 30		20	20		Spud in
July 31		70	70		Rain at 2:00 pm
Aug. 1-3					Too wet to work on location
Aug. 4		65	70		Set screen. Rain
Aug. 5		65	70		Swabbing and bailing. Water sample
USGS Well No. 5					
Myakka Head					
Aug. 25					Set up rig
Aug. 26		82			Drive casing
Aug. 27		116			Drive casing. Rain. Shut down at 2:00 pm
Aug. 30		116	120		Water sample. Rain. Shut down at 2:15 pm

TABLE 2. Continued

USGS Well No. 5 (continued)

Date (1965)	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
Aug. 31		162	150		Rain. Shut down at 4:40 pm
Sept. 1		162	165		Water sample
		186	200		Drive and drill
Sept. 2		186	255		Drill a head
Sept. 3	7:30 am	186	255	35.4	6 inch open hole
		225	228		Water sample
		227			Seated casing
		227	254		Water sample
		255			Set 4 inch casing
	5:00 pm	227	255	36.6	6 inch open hole
Sept. 7	7:00 am	227	255	33.0	6 inch casing
		255	255	58.4	4 inch casing
		255	270		Water sample
		255	295		Water sample
	6:00 pm	227	255	23	6 inch casing
		255	295	58.4	4 inch casing
Sept. 8	7:00 am	227	255	31.5	6 inch casing
		255	295	37.8	4 inch casing. Shut down. High wind and rain
Sept. 9		227	295	33	6 inch open hole. Shut down for rain at 10:00 am
Sept. 10	7:00 am	227	282	32.9	6 inch open hole
		295			Reset 4 inch casing
		295	300		Water sample
	5:00 pm	227	295	34.2	6 inch casing
		295	315	39	4 inch casing
Sept. 13	7:00 am	227	295	30	6 inch casing
		295	315	37.8	4 inch casing
		295	328		Water sample
		295	344		Water sample
	5:00 pm	227	295	35.1	6 inch casing
		295	344	34.9	4 inch casing
Sept. 14	7:00 am	227	295	31.3	6 inch casing
		295	344	31.4	4 inch casing
Sept. 15	7:00 am	227	344	32.9	6 inch open hole
		344			Reset 4 inch casing
		344	350		Water sample
		344	360		Water sample
	5:00 pm	227	344	32.7	6 inch casing
		344	360	42.8	4 inch casing
Sept. 16	7:00 am	227	344	30.6	6 inch casing
		344	360	39.4	4 inch casing
		344	379		Water sample
Sept. 16	5:00 pm	227	344	30.8	6 inch casing
		344	383	39.8	4 inch casing
Sept. 17	6:00 am	227	344	30.5	6 inch casing

TABLE 2. Continued

USGS Well No. 5 (continued)

Date	Time	Casing depth (feet)	Hole depth (feet)	Water level*	Remarks
(1965)					
		344	383	38.0	4 inch casing
		344	383	37.8	Water sample. 5 hour P.T. at 10 gpm, DD 2 feet. Pull 4 inch casing
	5:00 pm	227	383	36.7	6 inch open hole
Sept. 20	7:00 am	227	383	36.7	6 inch open hole
	1:00 pm	227	383	37.6	6 inch open hole. Rain
Sept. 21	7:00 am	227	383	36.8	6 inch open hole
	5:00 pm	227	383	36.9	6 inch open hole
Sept. 22	7:00 am	227	383	36.6	6 inch open hole
		227	400		Water sample
		409			Reset 4 inch casing
	5:00 pm	227	409	36.8	6 inch casing
		409	409	36.8	4 inch casing
Sept. 23	7:00 am	227	409	36.5	6 inch casing
		409	409	36.5	4 inch casing
		409	415		Water sample
		409	429		Water sample
	5:00 pm	227	409	36.5	6 inch casing
		409	430	48.4	4 inch casing
Sept. 24	7:00 am	227	409	36.5	6 inch casing
		409	430	43.0	4 inch casing
		409	446		Water sample
Sept. 24	5:00 pm	227	409	36.5	6 inch casing
		409	447	44.6	4 inch casing
Sept. 27	7:00 am	227	409	36.3	6 inch casing
		409	447	40.2	4 inch casing
		409	447		Water sample. Pumped 4 hours at 10 gpm. Pulled 4 inch casing
	5:00 pm	227	447	36.3	6 inch hole
Sept. 28	7:00 am	227	447	36.2	6 inch hole
	3:00 pm	227	430	37.3	6 inch hole. Rain in pm
Sept. 29	7:00 am	227	430	36.6	6 inch hole
		446			Reset 4 inch casing
	5:00 pm	227	446	36.8	6 inch casing. Shut down 6 hours for rain
		446	448	41.3	4 inch casing
Sept. 30	7:00 am	227	446	36.4	6 inch casing
		446	448	41.3	4 inch casing
		446	450		Water sample
		446	456		Water sample
	3:30 pm	227	446	36.3	6 inch casing
		446	475	38.4	4 inch casing. Raining, Shutdown 3:30 pm
Oct. 1	7:00 am	227	446	36.2	6 inch casing
		446	475	38.5	4 inch casing
		446	496		Water sample
	5:00 pm	227	446	36.1	6 inch casing

TABLE 2. Continued

USGS Well No. 5 (continued)

Date (1965)	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
		446	509	37.5	4 inch casing
Oct. 4	7:00 am	227	446	36.1	6 inch casing
		446	509	39.6	4 inch casing
		446	509	39.6	Water sample. Pumped 1 hour at 10 gpm. Pulled 4 inch casing
	5:00 pm	227	509	36.8	6 inch open hole
Oct. 5	7:00 am	227	450	36	6 inch open hole
	5:00 pm	227	465	36.8	6 inch hole reaming
Oct. 6	7:00 am	227	465	36.1	6 inch hole. Reamed to 513 ft.
Oct. 7	7:00 am	227	513	36.3	6 inch open hole
		514			Install and cement 4 inch casing
Oct. 8	7:00 am	227	513	35.8	6 inch casing
		514	513	46.9	4 inch casing
	5:00 pm	227	513	36.8	6 inch casing
		514	530	55.9	4 inch casing
Oct. 11	7:00 am	227	513	35.8	6 inch hole
		514	530	46.8	4 inch hole
		514	550		Water sample. Contaminated with cement
		514	560		Water sample. Contaminated with cement
	5:00 pm	227	513	35.8	6 inch casing
		514	560	53.8	4 inch casing
Oct. 22	10:00 am	514	560	38.1	4 inch hole. Water sample. Pumped 1 hour at 10 gpm

USGS Well No. 6
Port Charlotte, deep

Nov. 4					Set up
Nov. 5		45			Drove casing
Nov. 8		88	88		Water sample
	6:00 pm	95	95		Drive and drill out
Nov. 9		125	176		Drive and drill
Nov. 10	2:30 pm	125	176	60	Water sample. Set 4 inch casing
	5:30 pm	183	190	5.15	Water sample. 4 inch casing. Test pumped 2 hours at 10 gpm
Nov. 11	12:00 noon	183	200	+	Water sample (flowing about 10 gpm)
		183	235		Water sample. Pull liner and ream
Nov. 12		247			Reset 4 inch casing
Nov. 15		247	280		Water sample
Nov. 16		247	317	+18	Water sample. 100 gpm, estimated
		247	317	+18	Water sample after 2 hours flow, 100 gpm
Nov. 17					Pulled casing and logged
Nov. 18		312			Set permanent 4 inch casing
Nov. 19		312			Grouted with 60 bags
Nov. 23-24		312			Checked well for grout and pulled sand casing

TABLE 2. Continued

USGS Well No. 6 (continued)

Date	time	Casing depth (feet)	Hole depth (feet)	Water level*	Remarks
(1965)					
Nov. 29		312	320		Water sample
		312	325		Water sample
		312	325		Water sample 30 min. later
Nov. 30		312	350	+22	
USGS Well No. 7					
Port Charlotte					
Dec. 2					Set up
	4:00 pm				Set screen and pump
	4:30 pm	83	88	22	Sample, pumping 2.5 gpm
USGS Well No. 8					
Placida					
Dec. 3	8:00 am				On location
	2:30 pm				Spud in
		22			Drove sand casing
Dec. 6	12:00 noon	42			Drove sand casing
	2:00 pm	42	42	5	Water sample
	5:00 pm	62	70	Land sur.	Water sample
Dec. 7	7:30 am	62	70	Land sur.	6 inch water level
	8:30 am	62	72		Water sample
	10:00 am	62	80		Water sample
	10:30 am	62	85		Water sample
	12:30 pm				Shut down
Dec. 8	12:30 pm	62	86	+.5	6 inch casing
	4:20 pm	84			Drove casing to cut off sand
		84	90		Water sample
		84	97		Water sample
Dec. 9	7:15 am	84	105	+1.5	6 inch casing
		84	112		Water sample
		84	125		Water sample
Dec. 10	9:00 am	84	135	+1.5	6 inch casing
	5:20 pm				Reaming hole
Dec. 14	10:00 am	84	135	+1.5	6 inch casing
	2:00 pm	136			Ran 4 inch casing
		136	148		Water sample
		136	155		Water sample
Dec. 14	6:00 pm	136	155	+2.0	4 inch casing
Dec. 15	7:00 am	136	155	+2.0	4 inch casing
		84	136	+1.5	6 inch casing
	5:30 pm	136	184		Water sample
		136	187	+1.5	4 inch casing

TABLE 2. Continued

USGS Well No. 8 (continued)

Date	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
(1965)					
Dec. 20	10:00 am	84	187	+3.0	6 inch casing
	1:00 pm	186			Run 4 inch casing
		186	195		Water sample
Dec. 21	6:45 am	84	185	+2.0	6 inch casing
		186	210	+3.5	4 inch casing
		186	212		Water sample
		186	225		Water sample
	10:00 am	186	240	+4.5	4 inch casing. Pulled 4 inch casing
Dec. 22	9:00 am	84	240	+2.0	6 inch casing. Ream hole
	4:15 pm	239			Install 4 inch casing
Dec. 23	7:15 am	84	239	+2.0	6 inch casing
		239	239	Dry	4 inch casing
		239	241		Water sample
		239	246		Water sample
		239	255		Water sample
		239	265		Water sample
Dec. 24-26					Shut down for Christmas
Dec. 27	9:30 am	84	239	+2	6 inch casing
		239	290	+3.5	4 inch casing. Pull casing & ream
Dec. 28	7:30 am	84	290	+2	6 inch casing
	10:30 am	291	290		Install 4 inch casing
		291	303		Water sample
	1:45 pm	291	310	4.9	4 inch casing
Dec. 29	10:30 am	291	310	+4.1	4 inch casing
		291	315		Water sample
		291	325		Water sample
		291	335		Water sample
	5:20 pm	291	335	+14.75	4 inch casing
Dec. 30	7:15 am	291	335	+15	4 inch casing
		291	340		Water sample
	11:30 am	291	340	+13.75	4 inch casing
(1966)					
Jan. 3	9:30 am	291	340	+14.5	4 inch casing
		291			Pull 4 inch casing
	1:45 pm	84	340	+5	6 inch casing
	2:00 pm				Logging
Jan. 4	8:25 am	84	340	+5	6 inch casing
	9:00 am				Logging
	5:00 pm	84	335	+5	Reaming, 6 inch casing
Jan. 5	10:10 am	84	335	+5.75	6 inch casing
	1:30 pm	341	340		Set and grout
					4 inch casing, 60 bags
Jan. 6	9:20 am	84	340	+4.5	6 inch casing
Jan. 7	1:30 pm				Add 60 bags grout
Jan. 10	10:00 am				Pull 6 inch casing
Jan. 11	9:00 am	341	342		Water sample
		341	350		Water sample

TABLE 2. Continued

USGS Well No. 8 (continued)

Date	Time	Casing depth (feet)	Hole depth (feet)	Water level*	Remarks
(1966)					
		341	363		Water sample
		341	367		Water sample
Jan. 12	9:30 am	341	367	+13.25	4 inch casing
		341	375		Water sample
		341	384		Water sample
Jan. 13	9:00 am	341	385	+12.5	4 inch casing
		341	392		Water sample
		341	413		Water sample
	12:30 pm	341	413	+12.5	4 inch casing. Tear down machine

USGS Well No. 9

Osprey					
Jan. 14					Set up rig
Jan. 18	8:00 am				Spud in
	12:00 noon	37			6 inch sand casing
		37	40		Water sample
		37	45		Water sample
Jan. 19	9:00 am	37	50	2.5	6 inch casing
		37	90		Water sample
	4:30 pm	37	90	3.0	6 inch casing
Jan. 20					Rained out
Jan. 21	8:30 am	37	90	1.8	6 inch casing
		94			Set 4 inch casing
	11:30-3:30				Rain
		94	100		Water sample
		94	110		Water sample
		37	94	2.6	6 inch casing
		94	110	1.8	4 inch casing
Jan. 24	8:30 am	37	94	1.2	6 inch casing
		94	110	0.3	4 inch casing
		94	115		Water sample
		94	125	3.0	Water sample
		94	154	16.8	Water sample
	5:30 pm	37	94	1.0	6 inch casing
		94	154	.4	4 inch casing
Jan. 25	9:15 am	37	94	2.3	6 inch casing
		94	154	.3	4 inch casing
	9:15 am				Pull casing
	10:00 am				Start logging
	3:30 pm				End logging
	4:30 pm	37	154	.6	6 inch casing
Jan. 26					Rained out
Jan. 27	8:00 am	37	154	.1	6 inch casing
	3:30 pm				Reaming
	5:15 pm	154			Set 4 inch casing
	6:15 pm	37	154	.3	6 inch casing

TABLE 2. Continued

Date (1965)	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
Jan. 28	10:30 am	37	154	.1	6 inch casing
	4:30 pm				Pulling sand casing
Feb. 1	8:00 am	154	154		Dry
		154	171	16.8	Water sample
	4:30 pm	154	175	16.8	4 inch hole
Feb. 2	8:00 am	154	175	+7.7	4 inch hole
	4:30 pm	154	217	12.9	
Feb. 3	8:00 am	154	217	+4.0	4 inch hole
		154	220		Water sample
		154	255		Water sample
	4:00 pm	154	255	+8.8	4 inch hole
USGS Well No. 10					
Cow Pen Slough, deep					
Feb. 10	8:00 am	38			6 inch casing
		38	45		Water sample
Feb. 11	8:00 am	38	51	2.6	6 inch hole
USGS Well No. 11					
Cow Pen Slough, shallow					
Feb. 11	2:00 pm	21	25	5	4 inch casing
		21	25		Water sample
USGS Well No. 12					
Big Slough, deep					
Feb. 14	8:00 am	22	30		Driving casing
Feb. 15		40	50		Water sample
		64	64		Drive 6 inch casing
Feb. 16		64	78		Water sample
	4:00 pm	64	78	.3	6 inch casing
Feb. 18	8:00 am	64	78	+.7	6 inch casing
		78	78		Set and cement. 4 inch casing
Feb. 21		78	100		Water sample
	12:30 pm	78	100	+.4	4 inch hole
USGS Well No. 13					
Big Slough, shallow					
Feb. 22	11:00 am	20	25	5.5	4 inch hole
		20	25		Water sample
USGS Well No. 14					
Florida 775					
Feb. 24	8:00 am				Spud in
		37	40		Water sample
	5:00 pm	41	40	7.2	6 inch casing
Feb. 25		41	45		Water sample
		41	55		Water sample
		41	75		Water sample

TABLE 2. Continued

Date (1965)	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
Feb. 25	5:00 pm	41	92	5.5	
Feb. 28		103			Set 103 ft. casing. Casing following drill
		102	103		Water sample, casing seated at 103
	5:00 pm	103	120	4.5	4 inch casing
Mar. 1	8:00 am	103	120	3.1	4 inch casing
			153		Pull casing and ream
		153			Set 4 inch casing
Mar. 2		163	190		Water sample, casing following drill to 163. Seated at 163
Mar. 3	8:00 am	163	190	1.1	4 inch casing
		163	203		Pull casing and ream
		203			Set 4 inch casing
Mar. 4		203	220	2.2	Water sample
			268		End drilling
Mar. 7		41	268		Pull casing and ream. Wait on logger
Mar. 8		41	252		Log
Mar. 9		262			Ream, set 4 inch casing
Mar. 10					Rained out
Mar. 11		262	305		Water sample
USGS Well No. 15 Bee Ridge Extension					
Mar. 18	8:00 am				Spud in
		45	65		6 inch casing
Mar. 22					Hole filling
		67			Ream, set 4 inch casing
		67	120		Water sample
USGS Well No. 16 Bobby Jones, shallow					
Mar. 24	8:00 am	12	19		
USGS Well No. 17 Bobby Jones, deep					
Mar. 24	11:00 am	34	38		
USGS Well No. 18 Blackburn Ranch					
Mar. 24					Spud in
		41	43		Water sample
	5:00 pm	41	43	1.3	6 inch casing
		41	75		Water sample
Mar. 25		84			Set 4 inch casing
		84	116		Water sample
		84	130		Water sample
	5:00 pm	41	84	1.3	6 inch casing

TABLE 2. Continued

USGS Well No. 18 (continued)

Date (1965)	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
Mar. 25		84	139	12	4 inch casing
Mar. 28	8:00 am	41	84	1.0	6 inch casing
		84	139	6.2	4 inch casing
		143			Set 4 inch casing
	5:00 pm	41	139	1.9	6 inch casing
		143	165	.0	4 inch casing
Mar. 29	7:00 am	41	139	1.0	6 inch casing
		143	165	+1.0	4 inch casing
		143	175		Water sample. Pull casing and ream
		193			Set 4 inch casing
		193	197		Water sample
	5:00 pm	41	193	3.0	6 inch casing
		193	265	.0	4 inch casing
Mar. 30	7:00 am	41	193	1.0	6 inch casing
		193	265	+2.5	4 inch casing. Pull 4 inch casing and ream
		41	282		Logging
		282			Set 4 inch casing
		282	285		Water sample
		282	340		Water sample
		282	350		Water sample
	5:00 pm	41	282	.12	6 inch casing
		282	351	+8.7	4 inch casing
USGS Well No. 19					
San Cassa					
Mar. 31	8:30 am				Spud in
		61			Drive 6 inch casing
Apr. 1	8:00 am	61	75		Water sample
Apr. 2	8:00 am	61	75	1.5	6 inch casing
		100			Set 4 inch casing
Apr. 4	8:00 am	61	100	1.6	6 inch casing. 4 inch casing - dry
		100	150		Water sample
Apr. 5	8:00 am	61	150	1.3	6 inch casing. Pull casing and ream
		162			Set 4 inch casing
		162	185	1.5	4 inch casing, water sample
		162	200		Water sample
Apr. 6					Pull casing and ream
		202			Ran 4 inch casing
Apr. 7		202	225		Water sample, pull 4 inch casing
Apr. 8		61	250		Logged
		258			Ran 4 inch casing
Apr. 11		258	285		Salty
Apr. 12	8:00 am	258	285	+12.25	4 inch casing
		258	300	+14	

TABLE 2. Continued

USGS Well No. 20
Playmore

Date (1965)	Time	Casing depth *(feet)*	Hole depth *(feet)*	Water level*	Remarks
Apr. 18	8:00 am				Spud in
		20	20		Water sample
Apr. 19	8:00 am	28	40	2.9	4 inch casing
		28	50		Water sample
		28	101		Water sample
	1:30 pm	28	101	1.8	4 inch casing
May 20	12:00 noon	28	101		Pump test
	12:05 pm	28	101		5 minutes at 25 gpm

USGS Well No. 21
Cady Grove

Apr. 20	9:10 am				Spud in
		32	55	7.2	6 inch casing
Apr. 21	8:30 am	32	55	6.8	6 inch casing
		58			Set 4 inch casing
		58	85		Water sample
	1:00 pm	58	102	7.5	

APPENDIX C

The following table gives results of chemical analysis of water samples taken from each well during drilling.

Table 3.--Chemical analyses of water

Analyses in parts per million except specific conductance, color, pH, and temperature

Date of collection	Depth of sample (feet)	Formation or deposit	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids: Calculated	Dissolved solids: Residue at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
TEST WELL NO. 1, VENICE, USGS NO. 272356N-0821813.1																						
3-15-65	70- 76	Recent	16	--	45	20	--	12	2.2	248	6.4	12	0.7	0.1	--	236	252	196	0	400	7.9	10
3-16-65	106-122	Hawthorn	22	--	43	25	--	14	2.2	260	4.0	12	.8	.2	--	249	268	204	0	410	7.8	15
3-17-65	106-136	Hawthorn	23	--	43	25	--	16	2.1	274	1.6	11	.6	.2	--	258	260	210	0	422	8.0	15
3-22-65	141-160	Hawthorn	9.3	0.01	44	20	--	18	2.3	247	9.9	14	.7	..	0.40	241	249	192	0	430	8.1	--
3-23-65	141-185	Hawthorn	36	.02	51	24	--	17	2.2	299	2.4	10	.7	.0	.82	291	--	224	0	470	8.0	10
3-24-65	187-225	Hawthorn	27	.02	42	17	--	18	1.9	226	18	12	1.0	.0	.00	248	--	176	0	400	7.6	5
3-29-65	241-253	Hawthorn	13	.01	50	20	--	19	2.2	264	.0	10	2.4	.0	.00	257	268	206	0	440	7.9	5
3-30-65	241-300	Hawthorn	40	.02	59	18	--	22	2.6	302	1.9	10	3.0	.5	.52	307	344	220	0	478	8.0	5
4- 1-65	309-315	Tampa	27	.06	50	21	--	17	2.3	267	2.4	10	2.5	.0	.00	264	--	212	0	430	7.9	5
4- 2-65	309-342	Tampa	5.8	.01	28	30	--	23	3.3	260	.0	11	2.8	.0	.00	232	244	192	0	405	7.7	5
4- 9-65	309-347	Tampa	--	--	--	--	--	--	--	276	.8	11	2.7	--	.10	--	--	--	--	435	7.9	--
4- 9-65	309-350	Tampa	28	.02	40	30	--	25	4.4	296	2.4	13	2.7	.2	.20	291	318	222	0	462	7.8	10
4-11-65	348-360	Tampa	--	--	--	--	--	--	--	267	.4	11	2.0	--	.30	--	--	--	--	422	8.1	--
4-11-65	348-372	Tampa	16	.01	32	26	--	17	2.4	244	3.2	12	1.4	.0	.20	230	248	188	0	390	7.5	5
4-13-65	348-374	Tampa	34	.01	26	39	--	28	4.0	312	5.6	13	3.7	.0	.00	309	324	230	0	500	8.1	5
4-13-65	348-400	Tampa	--	--	--	--	--	--	--	--	5.6	9.0	2.0	--	1.2	--	--	--	--	482	8.9	--
5-27-65	409-450	Tampa	39	.05	47	26	--	18	1.8	280	1.2	11	1.3	1.2	.20	265	294	226	0	455	8.0	10
TEST WELL NO. 2, OLD MYAKKA, USGS NO. 271821N-0821551.1																						
5-18-65	17- 22	Recent	15	.32	47	21	--	5.6	2.3	221	2.4	8.0	.9	.0	.70	212	220	204	23	370	8.0	5
6- 3-65	17- 22	Recent	16	.00	38	15	--	4.0	.6	185	.8	6.0	1.0	.0	.50	173	168	156	4	305	7.6	5
TEST WELL NO. 3, SYDEVILLE, USGS NO. 271812N-0820648.1																						
6- 2-65	145	Recent	13	.01	17	1.8	--	5.0	2.0	54	2.0	10	1.1	.4	.37	80	104	50	6	125	6.9	5
6- 2-65	155	Recent	4.3	.02	30	5.1	--	5.3	1.6	107	4.2	10	1.2	.0	.07	115	140	96	8	213	7.1	5
6-22-65	217-224	Hawthorn	.3	.02	29	7.2	--	.10	1.5	140	4.0	5.0	.2	.1	.16	126	194	102	0	235	7.4	70
6-22-65	217-255	Hawthorn	12	.04	32	14	--	15	.8	78	7.2	6.0	.3	1.2	.14	176	206	136	0	285	7.2	20

Table 3.--Continued

Date of collection	Depth of sample (feet)	Formation or deposit	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids: Calculated	Dissolved solids: Residue at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
TEST WELL NO. 3, EDGEVILLE, USGS NO. 271832N-0820648.1.--CONTINUED																						
6-23-65	217-276	Hawthorn	23	.01	48	21	--	22	1.6	280	4.4	9.0	.7	.0	.11	268	286	208	0	440	7.5	10
6-23-65	276-327	Hawthorn, Tampa	6.8	.01	36	14	--	8.4	1.5	168	3.2	12	1.0	.0	.11	166	186	148	10	309	7.1	10
6-24-65	276-350	Tampa	42	.02	51	32	--	23	3.0	316	4.4	30	2.9	.0	.23	345	356	260	1	550	7.5	10
6-25-65	351-365	Tampa	43	.03	50	33	--	23	3.2	320	4.8	26	2.6	.0	.24	344	368	260	0	545	7.7	5
6-25-65	351-385	Tampa	53	.03	55	37	--	22	3.4	344	4.0	29	3.0	1.4	.06	377	396	288	6	592	7.4	10
6-29-65	416-430	Tampa	34	.01	56	36	--	15	4.1	244	91	13	2.4	.0	.06	372	418	288	88	610	7.6	5
6-30-65	416-485	Tampa	25	.00	82	42	--	19	3.4	226	191	20	1.5	.0	.07	496	574	376	189	740	7.5	5
7-20-65	485-495	Tampa	23	--	50	30	6.1	17	6.0	180	114	16	1.9	.0	.09	353	378	256	108	570	8.0	5
7-21-65	485-510	Tampa	20	--	60	30	6.1	16	5.7	180	142	20	1.8	.0	.12	391	396	280	132	611	8.0	5
7-21-65	485-520	Tampa	17	--	51	28	5.9	14	4.5	180	108	16	1.8	.0	.07	335	342	248	101	545	8.0	5
7-21-65	485-530	Tampa	--	--	50	30	6.4	--	--	--	136	15	1.0	--	.06	--	--	248	--	550	--	--
7-21-65	485-540	Tampa	22	--	77	39	8.6	14	4.3	194	200	17	1.7	.0	.09	480	510	.02	204	740	8.0	5
7-22-65	485-575	Tampa	26	--	87	42	11	12	3.7	184	256	20	1.7	.0	.15	551	--	402	251	818	8.1	5
7-22-65	485-600	Tampa	25	--	91	44	12	12	3.7	176	284	20	1.5	.0	.08	580	612	422	278	850	8.1	5
8-23-66	487-600	Tampa	18	.04	84	31	7.9	20	3.8	184	184	22	1.4	.2	.00	455	544	346	195	735	7.9	40
TEST WELL NO. 4, EDGEVILLE SHALLOW WELL, USGS NO. 271832N-0820648.2																						
8-24-66	65-70	Recent	14	.05	83	29	7.4	16	3.4	180	162	18	1.2	.0	.00	416	506	325	188	693	7.8	50
TEST WELL NO. 5, MYAKKA HEAD, USGS NO. 272735N-0820834.1																						
8-30-65	116-120	Recent	26	--	50	25	.26	14	2.1	306	4.0	8.0	.7	.0	.12	262	--	225	0	475	8.1	5
9- 1-65	162-165	Recent	--	--	41	22	.57	--	--	--	6.0	13	.8	--	.12	--	--	194	--	465	--	--
9- 3-65	225-228	Hawthorn	--	--	29	26	.80	--	--	--	3.0	10	1.6	--	.11	--	--	180	--	480	--	--
9- 3-65	227-254	Hawthorn	34	--	49	24	.70	23	3.7	288	4.0	30	1.6	.0	.11	312	--	222	0	528	8.0	5

Table 3.--Continued

Date of collection	Depth of sample (feet)	Formation or deposit	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids: Calculated	Dissolved solids: Residue at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
TEST WELL NO. 5, MYAKKA HEAD, USGS NO. 272745N-0820854.1.--CONTINUED																						
9- 7-65	255-270	Hawthorn	26	--	40	25	.78	25	3.9	256	6.0	28	1.9	.0	.00	287	294	204	0	499	8.3	5
9- 7-65	255-295	Hawthorn	--	--	41	26	.87	--	--	--	4.0	28	1.9	--	.12	--	--	210	--	501	--	--
9-10-65	295-300	Hawthorn	32	--	35	27	.78	23	7.2	236	24	28	2.5	.0	.15	294	301	194	0	472	8.4	5
9-13-65	295-328	Hawthorn	--	--	38	24	.83	--	--	--	2.0	26	2.0	--	.10	--	--	194	--	464	--	--
9-13-65	295-344	Hawthorn	--	--	44	24	.99	--	--	--	2.0	26	1.9	--	.11	--	--	210	--	482	--	--
9-15-65	344-350	Hawthorn	29	--	47	25	1.7	23	3.8	308	4.0	17	2.6	.0	.15	316	--	222	0	540	8.2	5
9-15-65	344-360	Hawthorn	--	--	34	33	1.8	--	--	--	4.0	17	2.9	--	.11	--	--	222	--	540	--	--
9-16-65	344-379	Hawthorn, Tampa	36	--	30	27	2.3	23	5.6	252	2.0	17	3.0	.0	.07	274	278	186	0	475	8.3	5
9-17-65	344-383	Hawthorn, Tampa	--	--	35	24	2.2	--	--	--	10	16	2.7	--	.09	--	--	186	--	497	--	--
9-22-65	227-400	Hawthorn, Tampa	--	--	31	26	2.7	--	--	--	.0	28	2.5	--	.06	--	--	186	--	488	--	--
9-23-65	409-415	Tampa	--	--	30	22	2.6	--	--	--	4.0	24	2.7	--	.05	--	--	168	--	465	--	--
9-23-65	409-429	Tampa	--	--	30	26	2.8	--	--	--	.0	28	2.7	--	.09	--	--	185	--	473	--	--
9-24-65	409-446	Tampa	--	--	31	24	3.0	--	--	--	2.0	24	1.9	--	.07	--	--	180	--	499	--	--
9-27-65	409-447	Tampa	38	--	44	25	4.3	22	4.0	248	54	16	1.8	.0	.05	389	--	218	8	520	8.3	5
9-30-65	446-450	Tampa	--	--	33	33	3.6	--	--	--	32	18	1.8	--	.08	--	--	222	--	531	--	--
9-30-65	446-456	Tampa	35	--	34	34	3.5	23	5.2	276	24	18	1.7	.0	.09	311	324	227	3	535	8.1	5
10- 1-65	446-496	Tampa	--	--	--	--	--	--	--	--	56	13	2.4	--	.00	--	--	--	--	488	--	--
10- 4-65	446-509	Tampa	--	--	34	26	4.1	--	--	276	32	16	1.7	--	.08	--	--	196	--	493	8.1	--
10-22-65	514-560	Suwannee	11	--	38	11	3.7	11	2.5	64	90	15	.6	.4	.30	212	232	144	92	382	7.9	5
8-24-66	512-560	Suwannee	1.4	.01	21	46	2.3	13	2.8	40	48	15	.9	.0	.00	127	170	74	41	244	7.8	0

Table 3.--Continued

Date of collection	Depth of sample (feet)	Formation or deposit	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids: Calculated	Dissolved solids: Residue at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
TEST WELL NO. 6, PORT CHARLOTTE, USGS NO. 270133N-0820346.1																						
11- 8-65	88	Recent	--	--	77	20	--	--	--	--	20	130	.9	--	.13	--	--	--	--	850	7.9	10
11-10-65	125-176	Hawthorn	21	.01	66	32	--	62	6.8	246	11	160	1.2	.0	.07	481	504	296	94	890	8.1	10
11-10-65	183-190	Hawthorn	--	--	57	42	--	--	--	--	11	240	1.8	--	.13	--	--	315	--	1,100	8.0	5
11-11-65	183-200	Hawthorn	--	--	60	38	--	--	--	--	10	215	1.6	--	.05	--	--	306	--	1,100	7.8	5
11-11-65	183-235	Hawthorn	22	.01	62	36	--	78	8.(	218	8.0	208	1.5	.0	.04	531	560	302	124	1,100	7.9	5
11-15-65	247-280	Hawthorn, Tampa	26	.00	78	--	--	170	9.2	196	192	330	1.7	.0	.05	965	1,020	446	285	1,700	7.7	5
11-16-65	247-317	Hawthorn, Tampa	--	--	106	81	--	--	--	--	264	640	1.2	--	.05	--	--	602	--	2,700	7.7	0
1/ 11-16-65	247-317	Hawthorn, Tampa	23	.00	92	71	--	248	8.5	164	230	510	1.3	1.8	.03	1,270	1,330	522	387	2,350	7.9	5
11-29-65	312-320	Tampa	--	--	103	85	--	--	--	--	288	700	1.0	--	.04	--	--	--	--	2,900	7.1	5
11-29-65	312-325	Tampa	--	--	109	77	--	--	--	--	282	680	1.0	--	.08	--	--	--	--	2,900	6.9	5
2/ 11-29-65	312-325	Tampa	21	--	75	84	25	385	14	156	274	720	1.1	1.7	.00	1,650	1,820	561	433	2,750	7.9	0
TEST WELL NO. 7, PORT CHARLOTTE, USGS NO. 270133N-0820434.62																						
12- 2-65	83- 88	Recent	23	--	105	26	2.5	90	3.1	340	32	185	.6	.8	.20	633	630	372	94	1,050	7.8	5
11-30-66	83- 88	Recent	1.1	--	32	36	--	193	7.1	52	74	378	.1	3.3	.01	751	804	228	186	1,420	7.1	5
TEST WELL NO. 8, FLACIDA, USGS NO. 265017N-0821537.1																						
12- 6-65	42	Recent	4.5	--	355	753	20	6,510	207	241	1,350	11,800	.5	15	.00	21,100	--	4,010	3,810	33,500	7.7	0
12- 6-65	62- 70	Recent	--	--	--	--	--	--	--	--	1,670	11,700	.5	--	.20	--	--	--	--	35,900	7.5	--
12- 7-65	62- 72	Recent	--	--	--	--	--	--	--	--	1,860	13,900	.4	--	.00	--	--	--	--	38,000	--	--
12- 7-65	62- 80	Recent	--	--	--	--	--	--	--	--	1,880	14,900	.7	--	.00	--	--	--	--	42,200	--	--
12- 7-65	62- 85	Recent	--	--	--	--	--	--	--	--	1,990	15,100	.6	--	.20	--	--	--	--	42,200	7.4	--
12- 8-65	84- 90	Recent	--	--	--	--	--	--	--	--	1,920	15,500	.9	--	.00	--	--	--	--	43,000	--	--
12- 8-65	84- 97	Recent	11	--	558	949	39	8,610	318	215	1,980	15,600	.8	19	.30	28,200	--	5,340	5,160	43,500	7.5	0
12- 9-65	84-112	Recent	14	--	490	773	38	7,040	241	151	1,500	12,700	.7	12	.40	22,800	--	4,450	4,320	36,000	7.7	0

Table 3.--Continued

Date of collection	Depth of sample (feet)	Formation or deposit	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids: Calculated	Dissolved solids: Residue at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
TEST WELL NO. 8, PLACIDA, USGS NO. 265017N-0821537.1.--CONTINUED																						
12- 9-65	84-125	Recent	--	--	--	--	--	--	--	--	1,120	12,600	.9	--	.80	--	--	--	--	37,000	7.7	--
12-14-65	136-148	Hawthorn	16	--	258	221	27	1,400	35	121	250	3,000	.7	2.5	.30	5,250	--	1,580	1,480	8,900	7.8	0
12-14-65	136-155	Hawthorn	--	--	--	--	--	--	--	--	202	2,950	.6	--	.00	--	--	--	--	8,700	--	0
12-15-65	136-184	Hawthorn	--	--	--	--	--	--	--	--	108	2,700	.8	--	.00	--	--	--	--	7,800	--	0
12-20-65	186-195	Hawthorn	19	--	250	202	23	1,340	42	118	114	2,930	1.2	2.5	.07	4,960	--	1,480	1,380	8,800	7.2	0
12-21-65	186-212	Hawthorn	21	--	238	184	24	1,160	38	144	38	2,750	1.2	2.3	.20	4,500	--	1,380	1,260	8,100	7.4	--
12-21-65	186-225	Hawthorn	--	--	--	--	--	--	--	--	82	3,470	1.9	--	.00	--	--	--	--	10,000	--	--
12-23-65	239-241	Hawthorn	--	--	--	--	--	--	--	--	76	2,980	1.5	--	.30	--	--	--	--	8,900	7.8	--
12-23-65	239-246	Hawthorn	--	--	--	--	--	--	--	--	200	3,350	1.0	--	.00	--	--	--	--	9,320	--	--
12-23-65	239-255	Hawthorn	25	--	288	228	26	1,550	55	150	238	3,300	1.6	2.5	.00	5,760	--	1,690	1,560	10,000	7.3	0
12-23-65	239-265	Hawthorn	--	--	--	--	--	--	--	--	32	4,040	1.9	--	.00	--	--	--	--	10,200	--	--
12-28-65	291-303	Hawthorn	19	--	280	203	27	1,360	32	164	72	3,100	1.3	15	.00	5,160	--	1,960	1,430	9,100	7.5	0
12-29-65	291-315	Hawthorn	--	--	--	--	--	--	--	--	30	3,350	1.1	--	.20	--	--	--	--	10,000	7.7	--
12-29-65	291-325	Hawthorn	--	--	--	--	--	--	--	--	66	4,190	1.0	--	.00	--	--	--	--	10,250	--	--
12-29-65	291-335	Hawthorn	15	--	363	311	29	2,430	45	177	156	5,040	1.0	6.2	.30	8,450	--	2,220	2,070	10,500	7.6	0
12-30-65	291-340	Hawthorn	--	--	--	--	--	--	--	--	383	6,600	1.0	--	.10	--	--	--	--	20,000	7.8	0
1-11-66	341-342	Hawthorn	16	--	427	491	44	3,940	83	176	545	7,880	1.0	9.5	.07	13,500	--	3,140	2,990	22,500	7.6	0
1-11-66	341-350	Hawthorn	--	--	--	--	--	--	--	--	533	7,930	1.1	--	.40	--	--	--	--	22,200	7.7	--
1-11-66	341-363	Hawthorn	16	--	443	577	54	4,730	109	182	781	9,150	1.0	14	.00	15,900	--	3,540	3,390	26,200	7.6	0
1-11-66	341-367	Hawthorn	--	--	--	--	--	--	--	--	683	8,610	1.0	--	.10	--	--	--	--	24,200	7.5	--
1-12-66	341-375	Hawthorn	14	--	444	638	56	5,310	128	177	997	10,200	1.0	14	.50	17,800	--	3,800	3,650	29,000	7.6	0
1-12-66	341-384	Hawthorn	--	--	--	--	--	--	--	--	997	10,600	1.1	--	.20	--	--	--	--	29,500	7.6	--
1-13-66	341-392	Hawthorn	11	--	441	648	54	5,530	148	182	1,030	10,600	1.1	11	.00	18,500	--	3,830	3,680	29,200	7.7	0
1-13-66	341-413	Tampa	11	--	296	442	40	3,730	103	167	467	7,150	1.2	14	.10	12,300	--	2,600	2,460	20,400	7.6	0

Date of collection	Depth of sample (feet)	Formation or deposit	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids: Calculated	Dissolved solids: Residue at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
TEST WELL NO. 9, OSPREY, USGS NO. 271118N-0822853.1																						
1-18-66	37- 40	Hawthorn	27	.03	125	19	--	31	3.0	307	95	84	.5	.2	.00	536	508	390	138	890	7.9	15
1-18-66	37- 45	Hawthorn	28	.06	78	23	--	29	3.5	190	82	78	.5	.2	.00	416	440	289	134	700	8.0	10
1-19-66	37- 90	Hawthorn	29	--	101	25	.90	43	4.4	248	122	85	.5	.4	.10	532	616	356	153	888	8.0	10
1-21-66	94-100	Hawthorn	34	--	144	62	2.3	61	4.1	320	340	90	.8	.4	.00	894	1,030	617	355	1,360	7.9	10
1-21-66	94-110	Hawthorn	--	--	--	--	--	--	--	--	436	75	.6	--	.10	--	--	--	--	1,275	--	--
1-24-66	94-115	Hawthorn	28	--	200	81	3.8	59	4.4	276	588	95	.8	.3	.10	1,190	1,400	836	610	1,720	7.9	10
1-24-66	94-125	Hawthorn	--	--	--	--	--	--	--	--	588	90	.9	--	.10	--	--	--	--	1,700	--	--
1-24-66	94-154	Hawthorn	--	--	--	--	--	--	--	--	572	90	1.0	--	.10	--	--	--	--	1,700	7.9	--
2- 1-66	154-171	Hawthorn	44	--	56	25	1.4	41	4.8	276	14	62	2.0	.3	.00	385	381	244	18	670	8.1	5
2- 3-66	154-220	Hawthorn	--	--	--	--	--	--	--	--	25	68	2.3	--	.10	--	--	--	--	720	--	--
2- 3-66	154-255	Hawthorn, Tampa	27	.00	310	126	10	47	6.8	178	1,040	100	1.6	.1	.10	1,747	2,013	1,303	1,157	2,300	7.9	5
8-25-66	154-255	Hawthorn, Tampa	26	.02	450	158	13	59	6.2	168	1,540	110	1.4	.0	.04	2,430	2,860	1,788	1,650	2,835	7.5	0
TEST WELL NO. 10, COW PEN SLOUGH, USGS NO. 271456N-0822309.1																						
2-10-66	38- 45	Hawthorn	24	--	77	35	.50	55	3.1	346	45	90	.6	.2	.00	500	531	336	53	910	7.9	5
TEST WELL NO. 11, COW PEN SLOUGH, USGS NO. 271456N-0822309.2																						
11-29-66	21- 25	Recent	.7	--	11	4.4	--	14	2.0	64	.0	31	.1	.4	.02	96	84	46	0	238	7.1	10
TEST WELL NO. 12, BIG SLOUGH, USGS NO. 271134N-0820922.1																						
2-15-66	40- 50	Recent	23	--	69	19	.60	99	2.6	312	66	90	1.2	.4	.06	526	539	250	0	900	8.1	0
2-16-66	64- 78	Hawthorn	18	--	66	25	1.1	100	1.9	324	73	100	1.3	.2	.10	545	557	269	4	980	8.0	5
8-12-66	78-100	Hawthorn	45	.02	71	24	1.1	99	1.7	310	74	108	1.2	.2	.00	577	600	277	23	966	7.8	0

Table 3.--Continued

Date of collection	Depth of sample (feet)	Formation or deposit	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids: Calculated	Dissolved solids: Residue at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
TEST WELL NO. 13, BIG SLOUGH, USGS NO. 271134N-0820922.2																						
11-28-66	20- 25	Recent	1.2	--	6.3	12	--	63	1.5	116	26	52	1.9	.2	.06	221	208	65	0	410	7.9	5
TEST WELL NO. 14, STATE ROAD 775, USGS NO. 270137N-0822353.1																						
2-24-66	37- 40	Recent	19	.03	135	14	--	69	1.8	461	3.2	116	.8	.4	.03	586	584	394	16	1,050	8.0	45
2-25-66	41- 45	Hawthorn	--	--	--	--	--	--	--	--	3.2	138	.8	--	.00	--	574	--	--	1,070	--	45
2-25-66	41- 55	Hawthorn	--	--	--	--	--	--	--	--	1.8	134	.6	--	.00	--	584	--	--	1,090	--	45
2-25-66	41- 75	Hawthorn	--	--	--	--	--	--	--	--	.9	131	.5	--	.00	--	556	--	--	1,040	--	45
2-28-66	102-103	Hawthorn	32	.10	59	18	--	69	3.7	301	16	70	.8	.2	4.8	422	489	221	0	700	8.2	20
3- 2-66	163-190	Hawthorn	--	--	--	--	--	--	--	--	14	33	3.0	--	.10		306	--	--	481	--	5
3- 4-66	203-220	Hawthorn	42	.03	34	21	--	28	5.5	198	15	37	3.0	.2	.00	284	298	172	9	460	7.9	5
3-11-66	262-305	Tampa	--	--	--	--	--	--	--	--	52	60	3.2	--	.10		287	--	--	458	--	5
8-25-66	262-305	Tampa	6.7	.02	12	19	3.0	55	7.5	182	.8	56	.3	.1	.00	247	260	112	0	470	8.2	0
TEST WELL NO. 15, BEE RIDGE ROAD, USGS NO. 271757N-0822413.1																						
8-12-66	67-120	Hawthorn	25	.02	147	62	29	51	2.9	238	418	78	.9	.2	.01	902	1,150	626	430	1,312	7.7	5
TEST WELL NO. 17, BOBBY JONES, SARASOTA, USGS NO. 272048N-0822858.2																						
8-26-66	35- 38	Recent	19	.05	64	31	.43	32	2.4	380	4.0	55	.5	.4	.00	375	388	288	0	672	8.2	15
TEST WELL NO. 18, BLACKBURN RANCH, USGS NO. 270714N-0821552.1																						
3-24-66	41- 43	Hawthorn	12	.01	96	23	--	43	4.2	295	106	52	.9	.1	.00	482	443	334	92	800	7.8	5
3-25-66	41- 75	Hawthorn	24	.03	100	38	--	63	3.4	345	157	70	.8	.1	.01	626	486	406	124	1,010	7.9	10
3-25-66	84-116	Hawthorn	25	.03	54	25	--	49	3.8	260	36	64	1.0	.2	.00	386	367	238	24	660	7.9	10
3-25-66	84-130	Hawthorn	--	--	--	--	--	---	--	--	23	58	1.0	--	.00	--	361	--	--	650	--	10
3-29-66	143-175	Hawthorn	28	.02	38	24	--	47	4.5	251	7.8	57	1.9	.1	.00	332	323	194	0	580	8.0	5
3-29-66	193-197	Hawthorn	--	--	--	--	--	--	--	--	19	57	2.5	--	.02	--	374	--	--	609	--	5
3-30-66	282-285	Hawthorn	--	--	--	--	--	--	--	--	44	65	2.2	--	.00	--	381	--	--	660	--	5
3-30-66	282-340	Tampa	24	.20	104	80	--	63	5.3	165	412	118	2.2	.0	.00	890	858	588	454	1,350	8.0	5
3-30-66	282-350	Tampa	25	.06	141	87	--	71	4.4	176	506	142	1.8	.0	.02	1,065	1,190	710	566	1,610	7.7	5

Date of collection	Depth of sample (feet)	Formation or deposit	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids: Calculated	Dissolved solids: Residue at 180°C	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
TEST WELL NO. 19, SANCASSA, STATE ROAD 776, USGS NO. 265557N-0821622.1																						
4- 1-66	68- 75	Hawthorn	8.4	--	152	94	7.6	588	13	162	60	1,330	.5	.5	.13	2,330	--	774	641	4,450	7.5	0
4- 4-66	100-150	Hawthorn	17	--	187	100	18	602	16	184	80	1,410	.7	.2	.11	2,520	2,990	898	741	4,680	7.8	0
4- 5-66	162-185	Hawthorn	16	--	228	176	36	972	26	170	452	2,000	1.2	.2	.11	3,990	4,530	1,330	1,190	6,000	7.7	●
4- 5-66	162-200	Hawthorn	16	--	82	92	18	588	16	164	74	1,370	.7	.1	.11	2,440	2,860	853	718	4,500	7.7	0
4- 7-66	202-225	Hawthorn	15	--	264	189	39	1,220	26	176	424	2,550	1.3	.3	.15	4,820	5,360	1,480	1,340	8,550	7.6	0
TEST WELL NO. 20, PLAYMORE, STATE ROAD 777, USGS NO. 265944N-0821754.1																						
4-18-66	20	Recent	10	--	217	15	1.4	208	.9	356	36	510	.2	.7	.12	1,170	1,320	604	313	2,240	7.8	20
4-19-66	28- 50	Recent	16	--	204	50	3.8	332	5.8	362	72	766	.3	.4	.09	1,630	1,830	719	422	3,070	7.6	20
4-19-66	28-101	Hawthorn	16	--	164	104	8.2	645	14	200	74	1,420	.6	.3	.06	2,550	2,980	846	682	4,700	7.8	10
5-20-66	28-101	Hawthorn	8.4	--	148	98	7.6	588	13	156	58	1,340	.5	.4	.07	2,340	2,860	781	653	4,450	7.9	5
3/ 5-20-66	28-101	Hawthorn	9.0	--	201	62	3.3	490	7.4	194	180	1,060	.5	1.4	.12	2,110	2,580	760	602	3,890	7.5	0
8- 4-66	28-101	Hawthorn	40	.02	172	107	7.6	680	14	192	126	1,490	.5	1.4	.03	2,730	3,240	878	720	4,956	7.7	5
TEST WELL NO. 21, CADY GROVE, HWY. 72, USGS NO. 271608N-0822802.1																						
4-21-66	58- 85	Hawthorn	8.2	--	144	60	1.9	39	3.5	278	346	68	.8	1.6	.10	810	860	608	380	1,230	7.6	20
8- 4-66	58-102	Hawthorn	34	.04	164	67	3.2	40	3.6	240	442	60	.7	3.4	.03	933	1,176	688	492	1,376	7.7	20

1/ After 2 hours flow at 100 gallons per minute.

2/ After 30 minutes flow at 10 gallons per minute.

3/ After 5 minutes pumping at 25 gallons per minute.

APPENDIX D

The following graphs show data obtained from geophysical logging of 13 test wells drilled under the program.

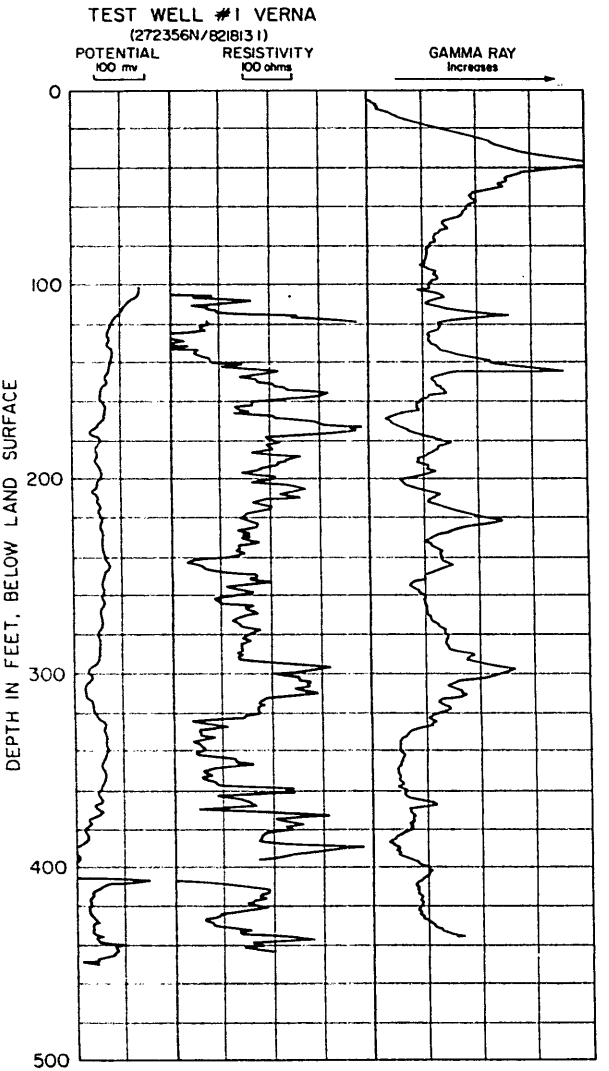


Figure 3. Geophysical log of test well No. 1, Verna.

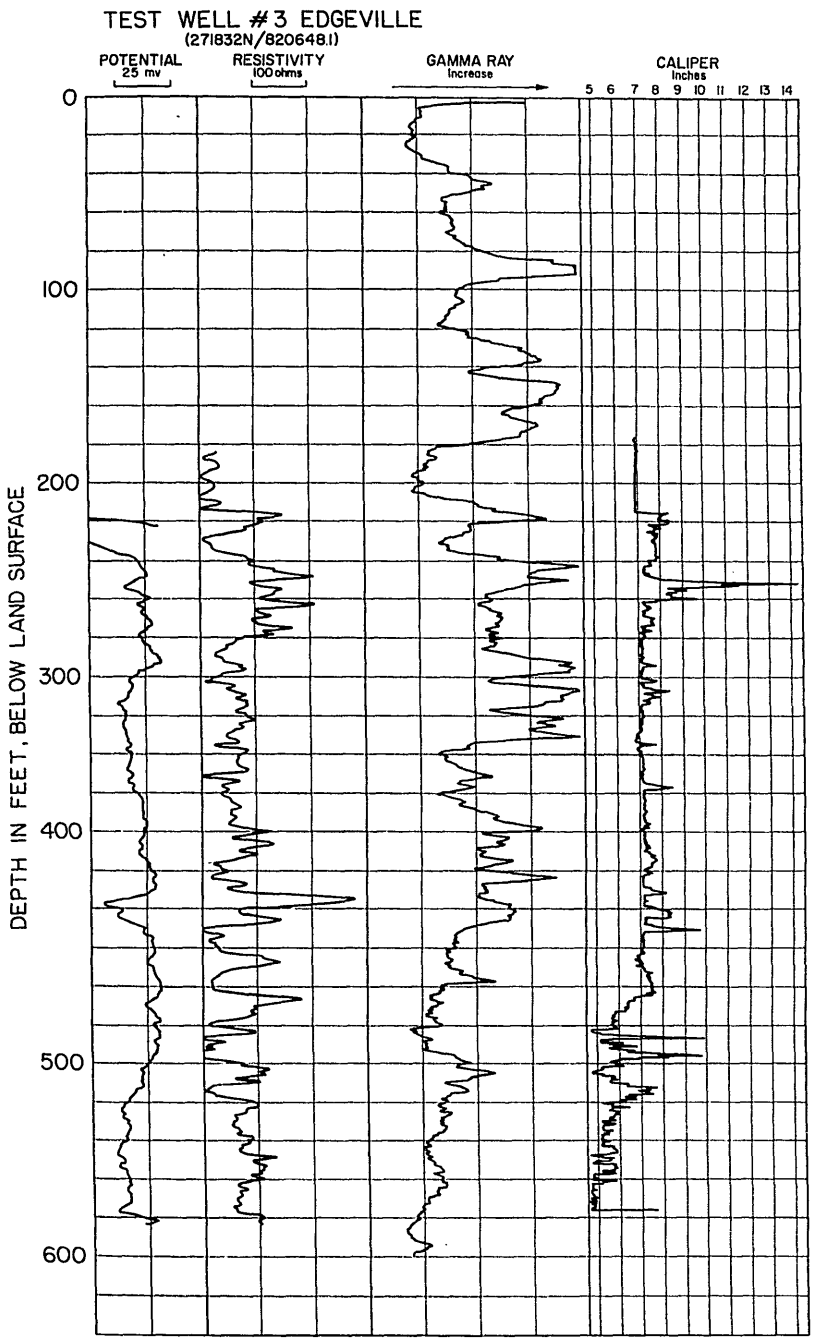


Figure 4. Geophysical log of test well No. 3, Edgeville.

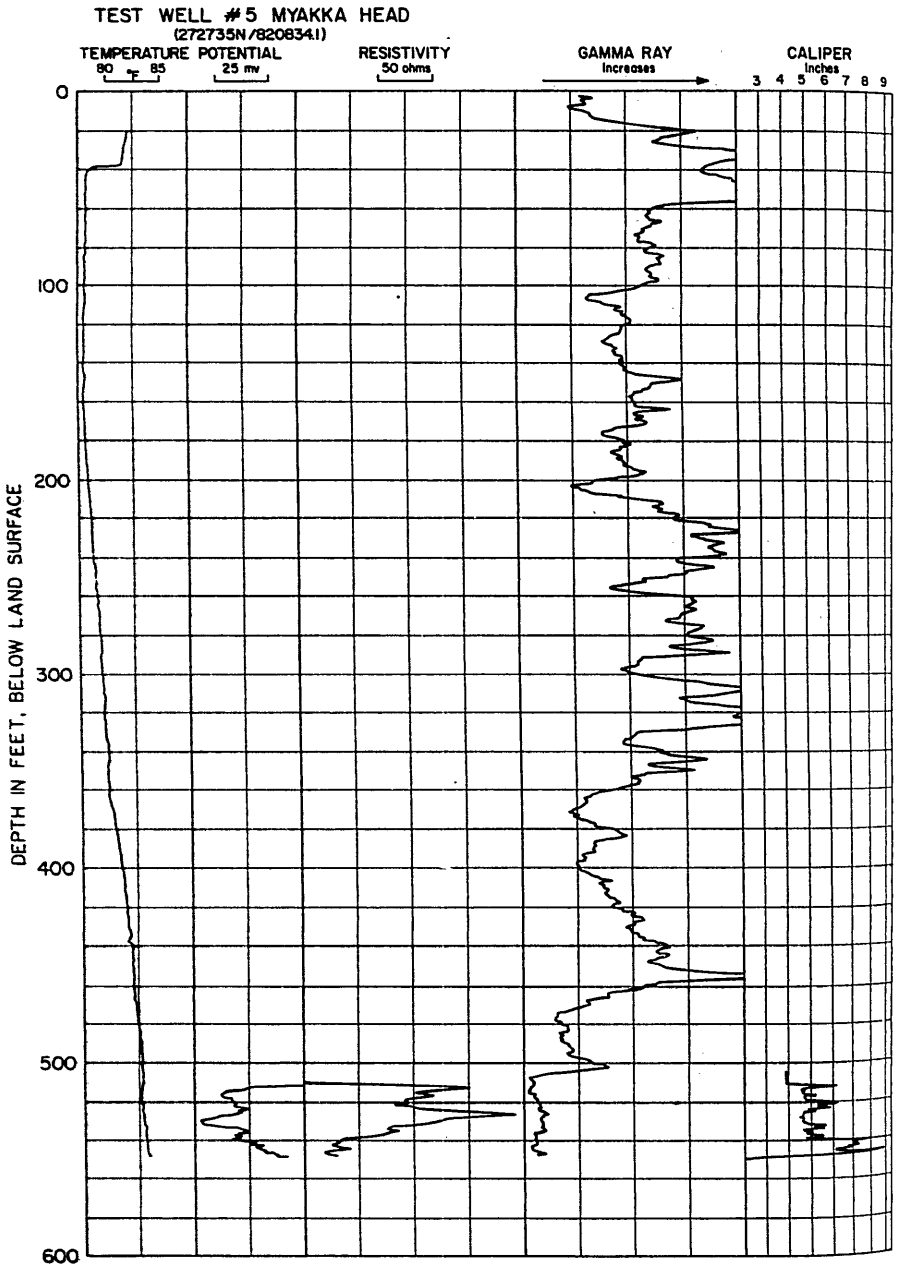


Figure 5. Geophysical log of test well No. 5, Myakka Head.

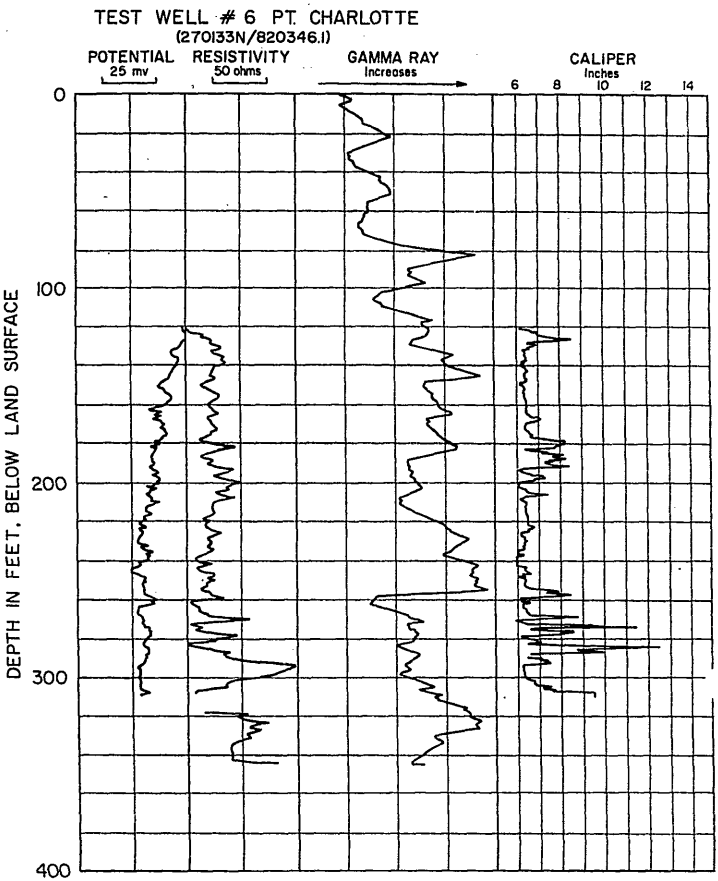


Figure 6. Geophysical log of test well No. 6, Port Charlotte.

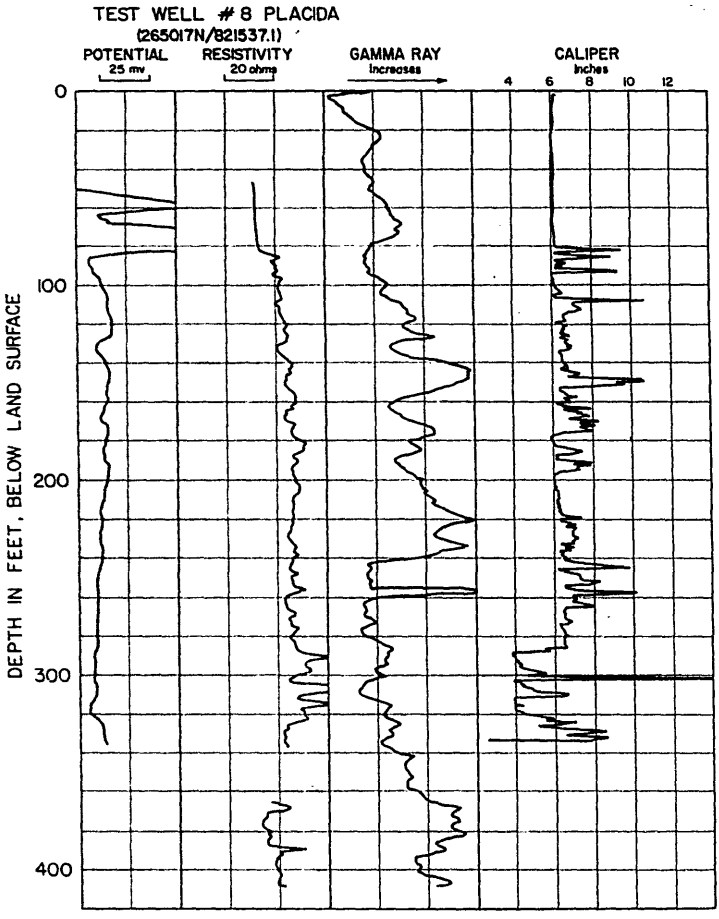


Figure 7. Geophysical log of test well No. 8, Placida.

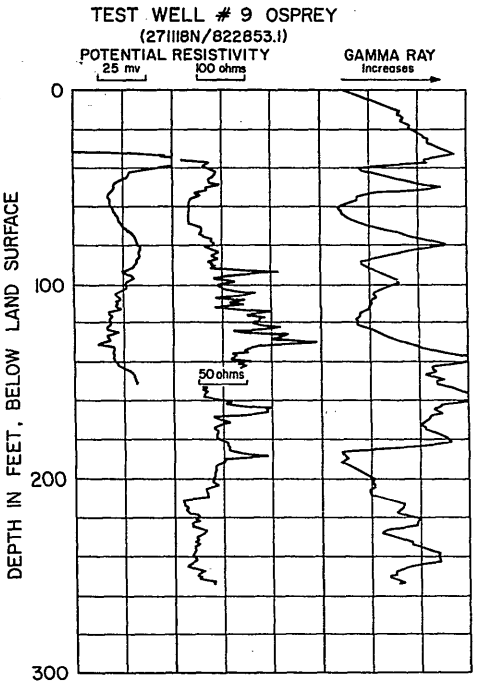


Figure 8. Geophysical log of test well No. 9, Osprey.

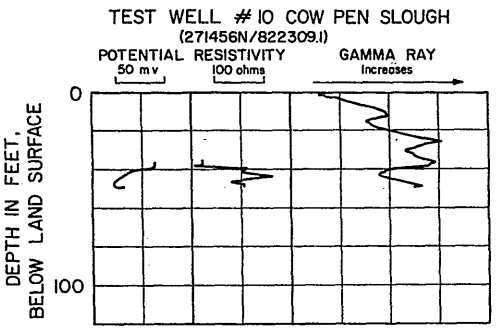


Figure 9. Geophysical log of test well No. 10, Cow Pen Slough.

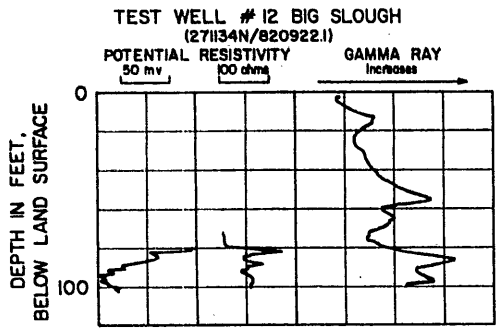


Figure 10. Geophysical log of test well No. 12, Big Slough.

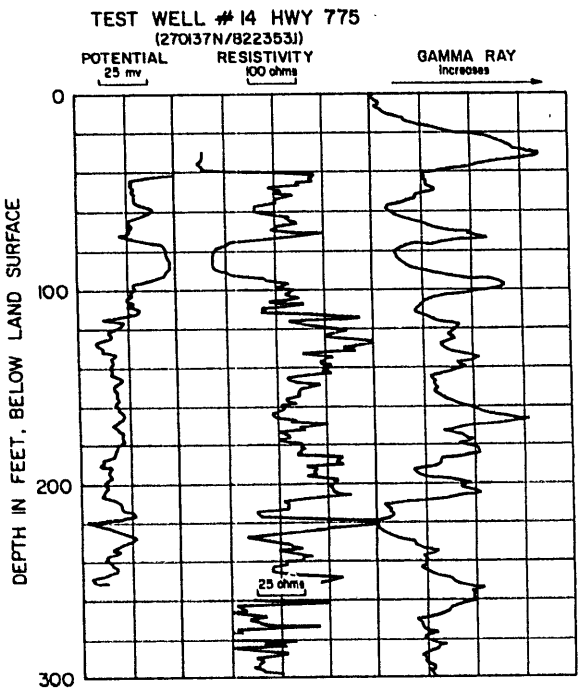


Figure 11. Geophysical log of test well No. 14, Florida 775.

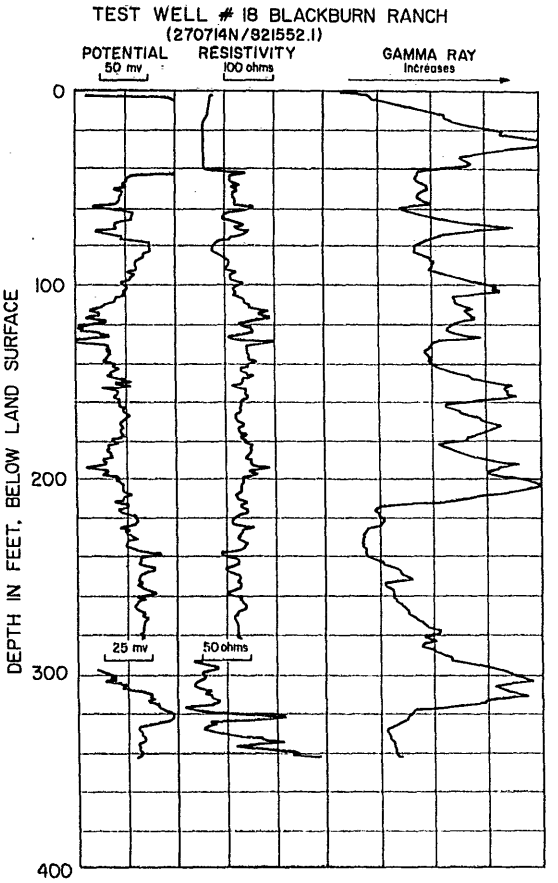


Figure 12. Geophysical log of test well No. 18, Blackburn Ranch.

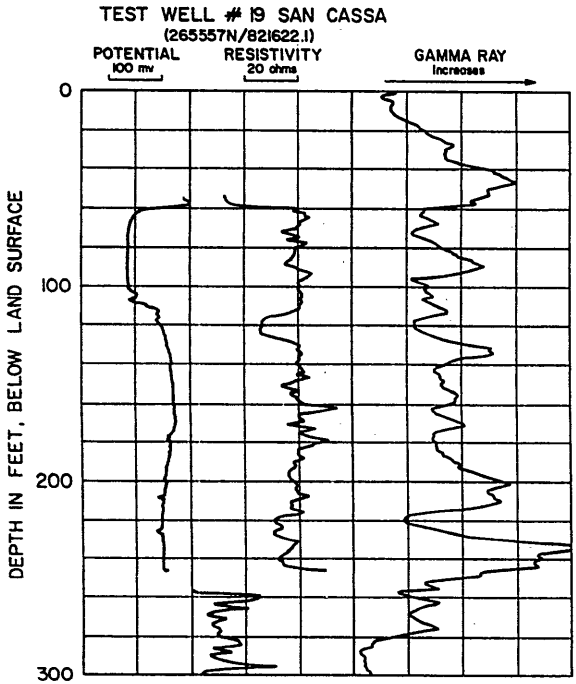


Figure 13. Geophysical log of test well No. 19, San Cassa.

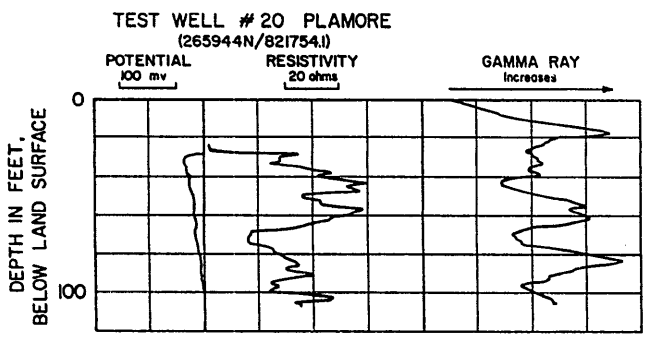


Figure 14. Geophysical log of test well No. 20, Plamore.

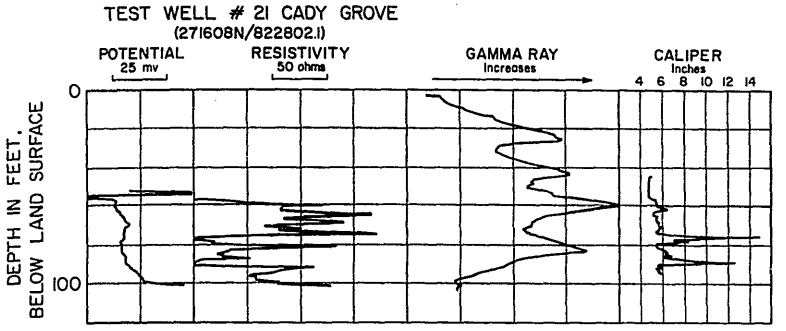
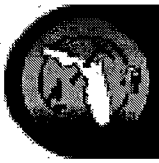


Figure 15. Geophysical log of test well No. 21, Cady Grove.



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