

**UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY**

**HYDROLOGIC RECORDS, VERNA WELL-FIELD
AREA, CITY OF SARASOTA, FLORIDA 1962-76—
A DATA REPORT**

OPEN-FILE REPORT 79-1259

**Prepared in cooperation with the
CITY of SARASOTA, FLORIDA**



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FLORIDA, 1962-76--A DATA REPORT

By H. Sutcliffe, Jr. and Anthony Buono

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Prepared in cooperation with the
CITY OF SARASOTA

Tallahassee, Florida

1979

UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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CONVERSION FACTORS

For use of those readers who prefer to use metric (SI) units rather than inch-pound units, the conversion factors for the terms used in this report are listed below:

<u>Multiply inch-pound unit</u>	<u>By</u>	<u>To obtain metric (SI) unit</u>
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square mile (mi ²)	2.590	square kilometer (km ²)
acre	0.4047	hectare (ha)
gallon per minute (gal/min)	0.06309	liter per second (L/s)
million gallons per day (Mgal/d)	0.0438	cubic meter per second (m ³ /s)
gallon per minute per foot [(gal/min)/ft]	0.207	liter per second per meter [(L/s)/m]
mean sea level (msl)	---	National Geodetic Vertical Datum of 1929 (NGVD)

HYDROLOGIC RECORDS, VERNA WELL-FIELD AREA,
CITY OF SARASOTA, FLORIDA, 1962-76--A DATA REPORT

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ABSTRACT

A short history of the development and operation of the Verna well field is presented. Also included are geological, drillers' and selected geophysical logs of test and production wells; chemical analyses; specific capacity tests; pumpage; physical dimensions of wells; and source for other data available as indicated.

INTRODUCTION

The city of Sarasota, on the west coast of Florida about 40 miles south of Tampa, began about 1900 to obtain its water supply from wells within 1 mile of the coast. There was no scarcity of supply; well yields were high and additional supplies were available merely by drilling more wells. However, the chemical quality of the water was poor, with high concentrations of sulfate and chloride.

To locate a supply of water whose chemical quality would conform with Florida State Board of Health standards, city officials selected two plots of land near Verna in northeastern Sarasota County for development as a well field. Test drilling in the well field began in 1962. Collection of hydrologic information in Sarasota County by the Geological Survey began in 1962, the same year that the city started its examination of the Verna area as a possible source of ground-water supply. Early participation by the Geological Survey was made possible through a cooperative program with the then Florida Geological Survey (now Florida Bureau of Geology) and the city of Sarasota. Data collection has been continuous through cooperation with the city.

This report presents hydrologic records collected at the Verna well field during 1962-76. Well records and logs, water levels, yield, and chemical analyses are tabulated. Well-location and water-level maps are presented.

The authors are indebted to Kenneth Thompson, Sarasota City Manager; Max Sturm, Utilities Director; Elgene Gainey, Well Field Superintendent, and his crew; E. T. Carlson, former Water Plant Director; Wiley Gillespie, Bill Lee and John Colyer of Smith and Gillespie Engineers, Inc.; and the many drillers who provided records and assistance during this investigation.

LOCATION OF VERNA WELL FIELD

The Verna well field is in the northeastern corner of Sarasota County, about 17 miles east of the city. Land-surface altitudes range from 60 to 95 feet above National Geodetic Vertical Datum of 1929 (NGVD). The well field consists of two parts and for this report will be referred to as part A and part B. Part A consists of the north halves of sections 2, 3, 4, and 5, and part B consists of the south half of section 1 and the north half of section 12, all in T.36S., R.20E. Parts A and B are collectively referred to in this report as the "Verna well field." The Verna well field occupies an area of about 1,900 acres, or 3 mi² (fig. 1).

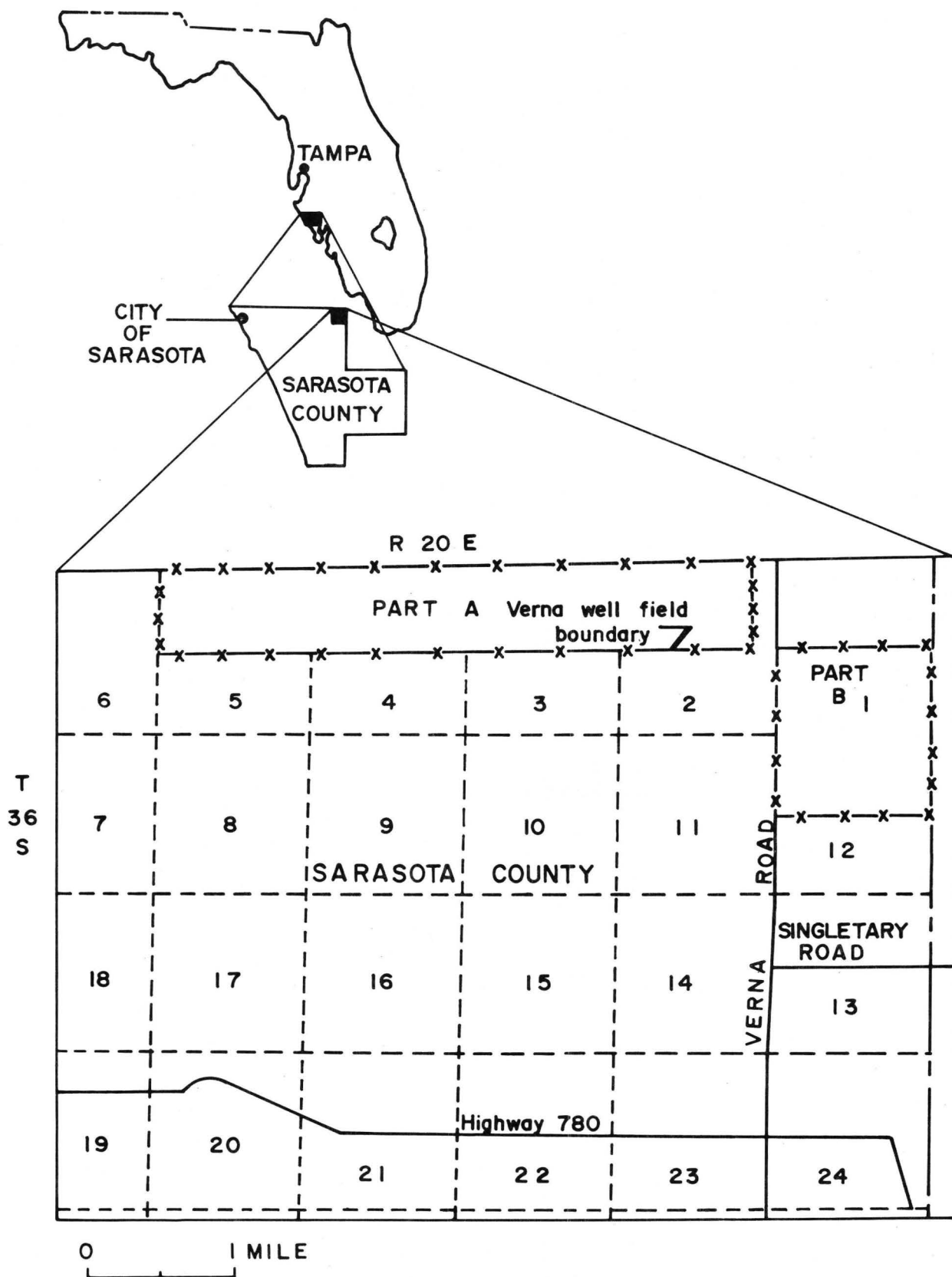


Figure 1.--Location of Verna well field.

GEOLOGIC FEATURES OF THE WELL-FIELD AREA

The Verna well field and contiguous area are underlain by unconsolidated deposits of sand, clay, and marl which are underlain by a very thick sequence of limestone that becomes dolomitic at depth. Geological names used in this report have not been reviewed or edited for conformity with U.S. Geological Survey stratigraphic nomenclature.

In the well field, the unconsolidated deposits generally are not more than 120 feet thick. This sequence comprises two aquifers: a surficial aquifer in which water is present under water-table conditions, and beneath, but separated from the surficial aquifer by material of relatively low permeability, a water-yielding zone referred to in this report as the "shallow-artesian aquifer."

Below the unconsolidated deposits, the stratigraphic units have been identified by examination of the drill cuttings. At exploration well E2, the uppermost stratigraphic unit, the Hawthorn Formation, occurs at the depth interval 100-396 feet. At this well, the base of the Tampa Limestone is at about 560 feet; the base of the Suwannee Limestone is at about 800 feet; and the base of the Ocala Group is at about 1,046 feet. A few wells in the Verna area are greater than 1,200 feet deep and penetrate the Avon Park Limestone. Relating lithology to stratigraphy during the data-collection phase of this drilling program was not emphasized and, in most logs presented in this report, identification of stratigraphic units was not attempted.

HISTORY OF DRILLING AND DEVELOPMENT

The first well of record in the Verna well field, the "Drain Well," was drilled as part of an artificial recharge experiment made in 1944 by the Palmer Corporation (fig. 2). The well was rehabilitated in the middle 1960's and further modified by deepening and installing a long string of casing in 1975. The well, 1,207 feet deep and cased to 820 feet, is used to observe water-level fluctuations in the Avon Park Limestone.

Between March 1963 and August 1964, 12 exploration-test wells were drilled in the Verna area. Wells E1, E2, and E3 (table 1 and fig. 2) were drilled into the Avon Park Limestone. The remaining nine wells are relatively shallow, tapping mostly the Hawthorn Formation and the Tampa Limestone. Details of well construction are shown in figure 3.

Drilling of the first production well was started in November 1965. Thirty-three wells were completed by June 1966 in part A of the well field, including four exploration-test wells which were converted to production wells by plugging back or by extending casing. After the original production-well drilling program was completed, 9 additional wells were drilled in part B, and by 1975, 39 wells were in production (table 2, fig. 4). Figure 3 shows the mode of construction.

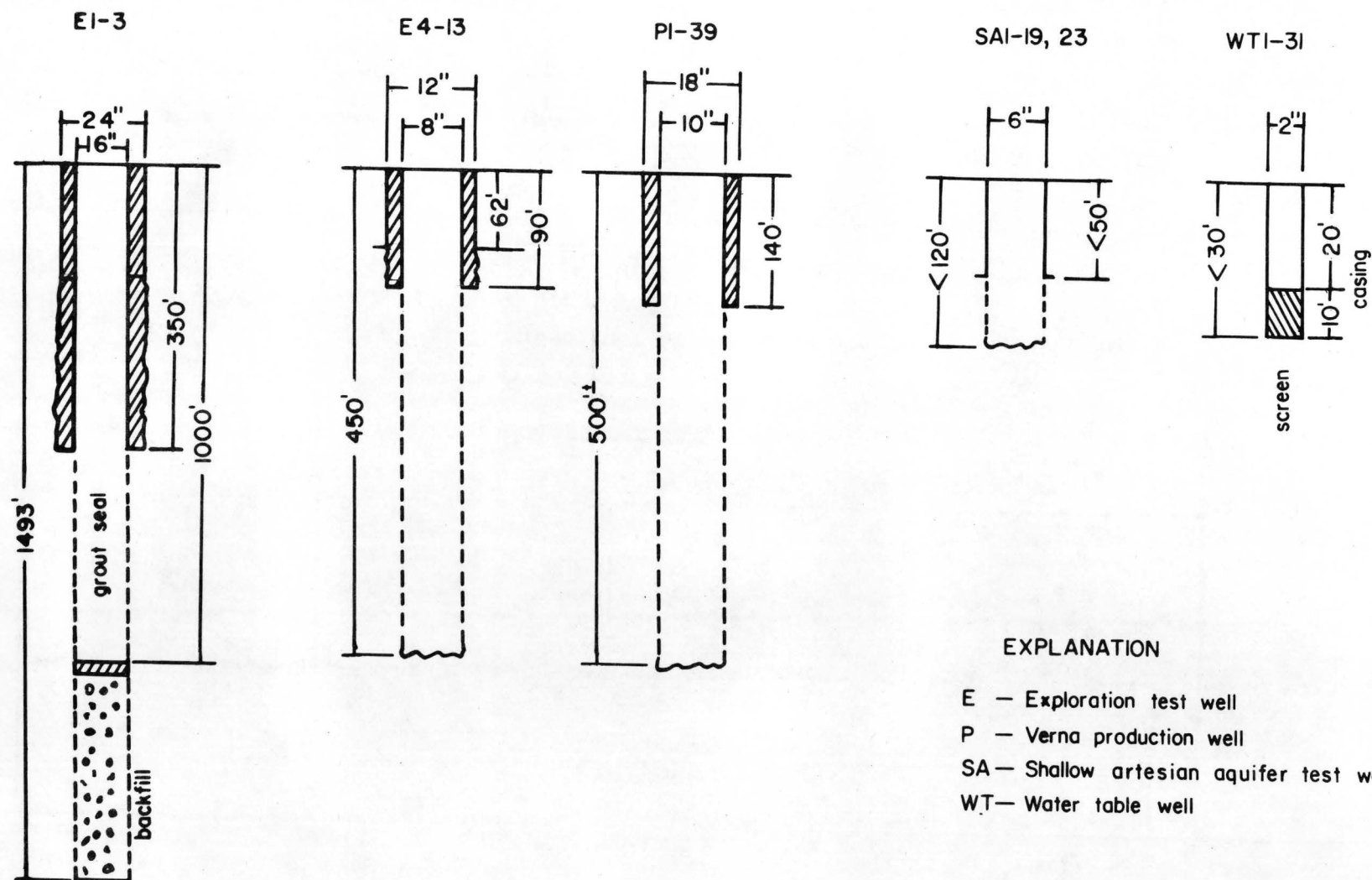


Figure 3.--Typical well construction (not to scale).

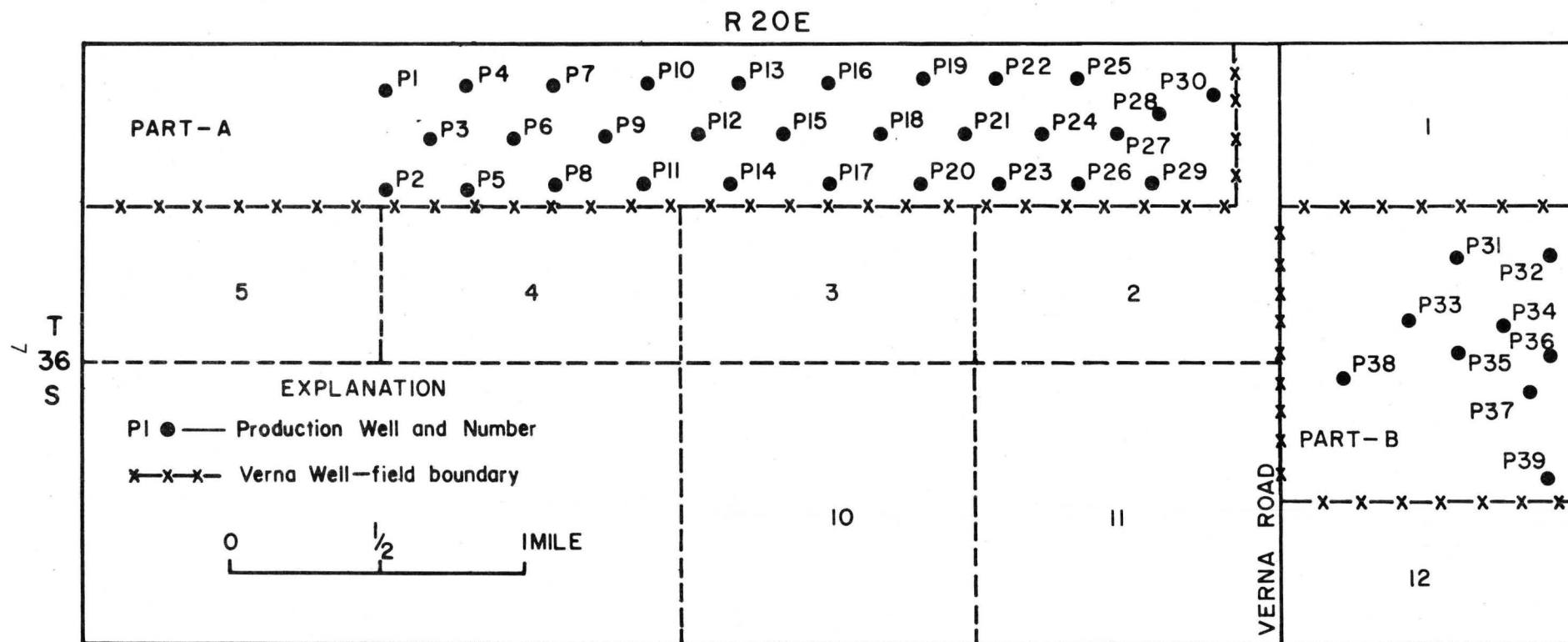


Figure 4.--Location of production wells.

Sixteen 6-inch wells were installed in 1970-71 in part A of the Verna well field to determine the availability and quality of water in the shallow-artesian aquifer. Well construction characteristics are listed in table 3 and locations are shown in figure 5.

The exploration program was continued in 1973 when 31 wells were augered in the Verna well field to determine the thickness of the unconfined surficial aquifer. These wells are listed in table 4 and their locations are shown in figure 6.

As of 1976, 10 of the existing wells in the Verna well field and 1 observation well about 1 mile north of the well field, are equipped with recorders that continuously monitor water levels in the various aquifers. Biannual water-level measurements are made in most of the test wells and in all the production wells which are not pumping during the time of measurement.

SCOPE OF DATA PRESENTED

Geologic and Geophysical Logs

Geologic logs of 4 deep wells and 16 shallow-artesian aquifer test wells are listed in table 5. The deep wells include two production wells and two exploration-test wells. Clarence Babcock of the Florida Bureau of Geology provided the geologic interpretation of well E2 (FBG W-6972). All other geologic logs are the work of William J. Lang of the U.S. Geological Survey. Cuttings were collected from all exploration and production wells and are on file with the Florida Bureau of Geology. The geologic logs of the 16 shallow-artesian aquifer test wells illustrate the complexity of the shallow sediments within the Verna well-field area. Drillers' logs of the production wells, shallow-artesian aquifer test wells and exploration-test wells are presented in table 6.

Geophysical logs were run on all the exploration-test wells and production wells in the Verna well field. The standard "electric" logs are available for most wells; gamma-ray, caliper, conductance, and temperature logs were run on some wells. Example logs are shown in figure 7 for exploration-test wells E1, E2, E3, and E4. Geophysical logs of the remaining wells are on file with the U.S. Geological Survey and the Florida Bureau of Geology.

Water Levels

Measurements of water levels were made during 1963-71 by the city of Sarasota in the exploration-test wells, the production wells, and two of the shallow-artesian wells. The measurements were made before and after pumping periods of varying duration to determine the specific capacity of

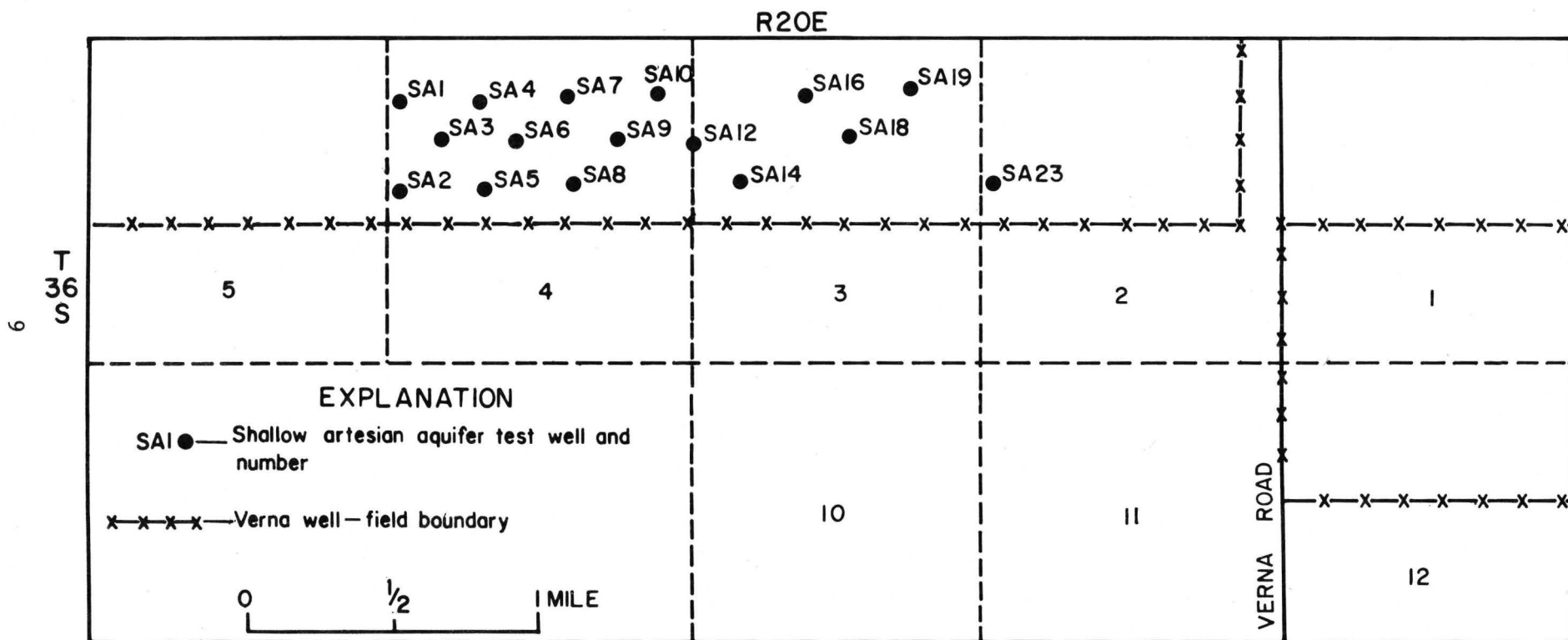


Figure 5.--Location of shallow-artesian aquifer test wells.

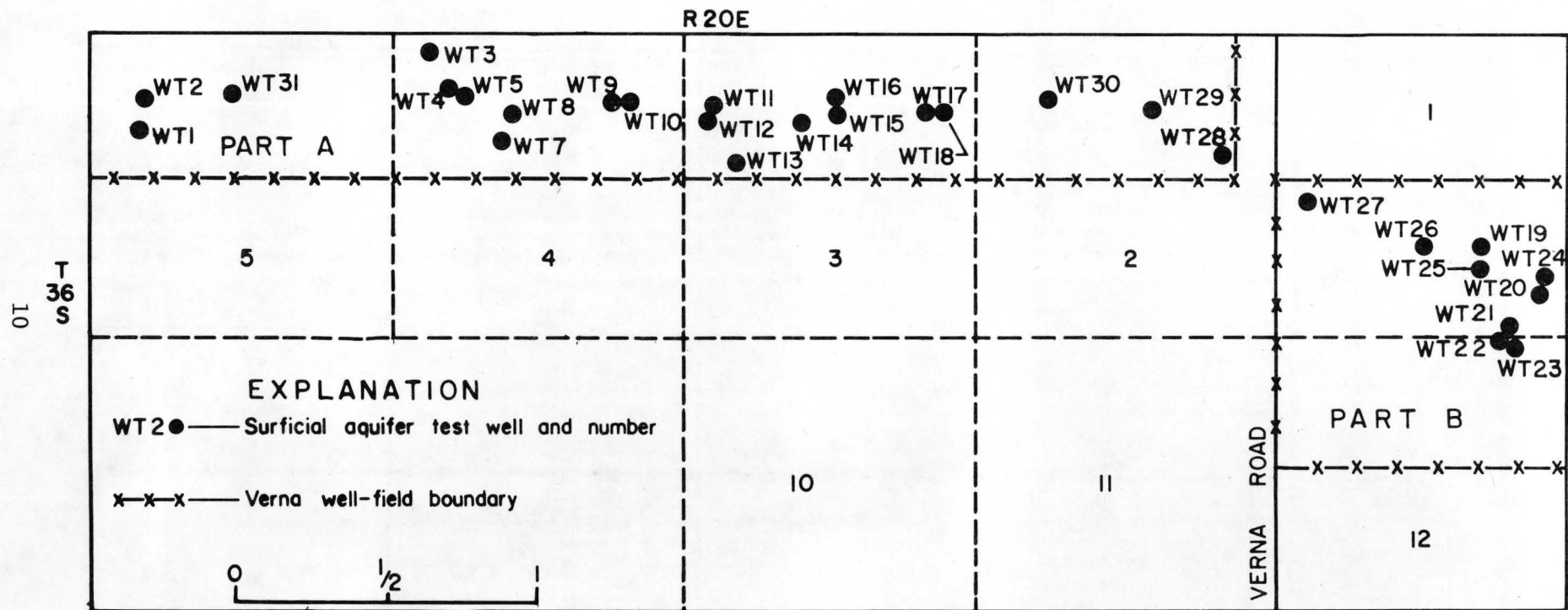


Figure 6.--Location of surficial (water-table) aquifer test wells.

each well. Samples of the water pumped from the wells were collected at the start of each pumping period and just before the pump was shut off. On all the exploration-test wells and most of the production wells, the tests were run at different depths as the wells were being drilled. The durations of the pumping periods ranged from 3 to 675 hours. Specific capacities ranged from 0.8 to 60.5 (gal/min)/ft. Water levels, well yields, and chemical analyses are listed in table 7. Hydrographs of four wells are shown in figure 8.

The configuration of the potentiometric surface of the aquifer tapped by the production wells (the Floridan aquifer) for May 1977 is shown in figure 9. The configuration of the water table in the surficial aquifer for May 1977 is shown in figure 10.

Pumpage

Pumpage of the Verna well field from September 1966 to December 1976 is shown in table 8. Pumpage varies seasonally--lowest in summer and highest in spring. Annual pumpage increased from 1967 to 1972, then varied only slightly from 1972 to 1976.

Chemical Analyses of Water

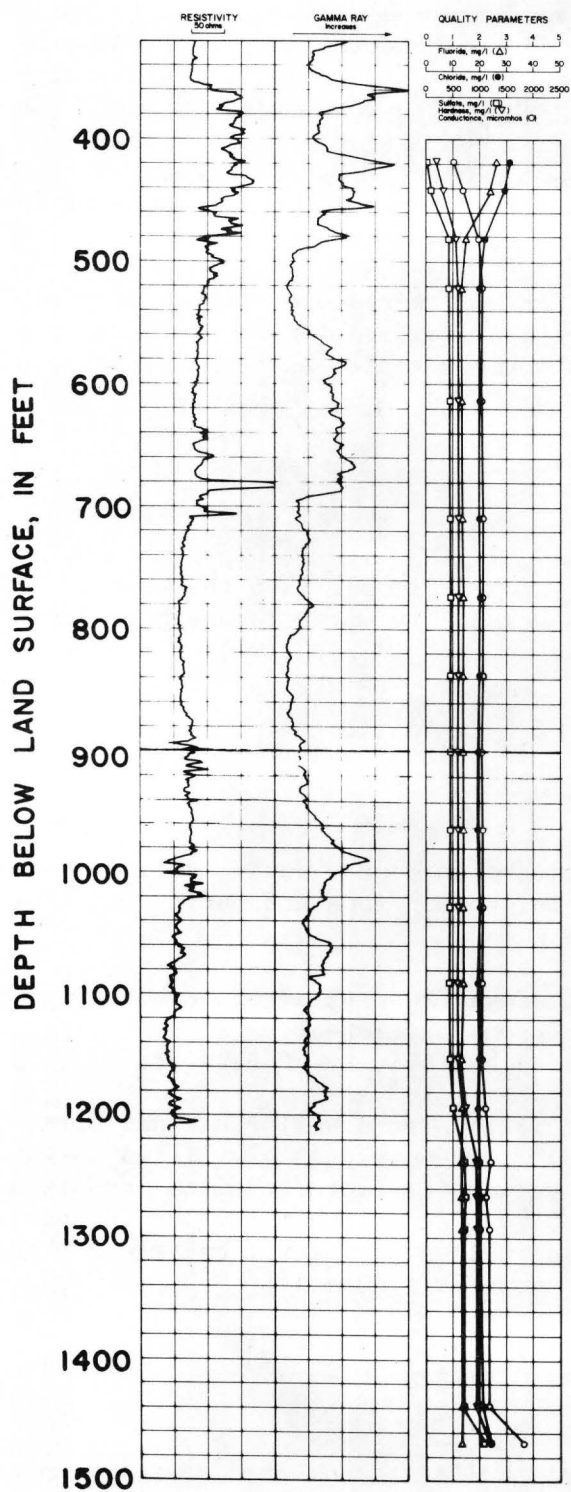
Water samples were collected at various depths during drilling of the exploration-test wells and analyzed for common ions and nutrients. The analyses are listed in table 9.

Table 10 shows partial analyses of water samples collected at various depths during drilling and testing of some shallow-artesian test wells. The samples were collected and analyzed by the city of Sarasota.

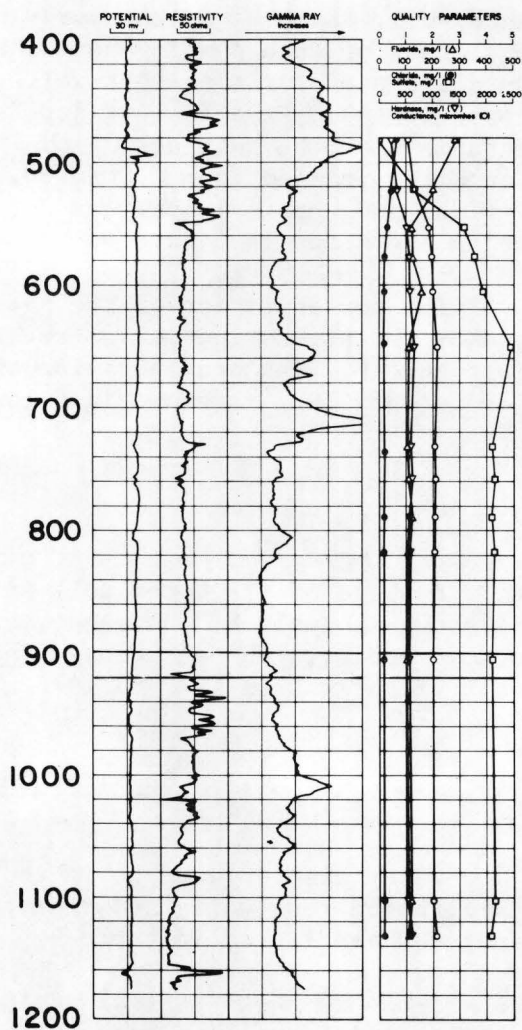
Water from the production wells in the Verna well field has been sampled periodically from 1966 to 1975. The analyses are listed in table 11 and average values and ranges in value of selected chemical constituents in the water are given in table 12. Variations with time in specific conductance, sulfate, and chloride values of water from selected production wells of various depths are shown in figure 11.

WELL-NUMBERING SYSTEM

For convenience of reference, all wells are numbered serially in the figures and tables. In addition to the serial numbers, all wells are keyed to a 12-character number that defines the latitude and longitude (table 13). The numbers are used to identify wells in the U.S. Geological Survey files and in computer storage. Only through the use of these numbers can the data for the wells be accessed.

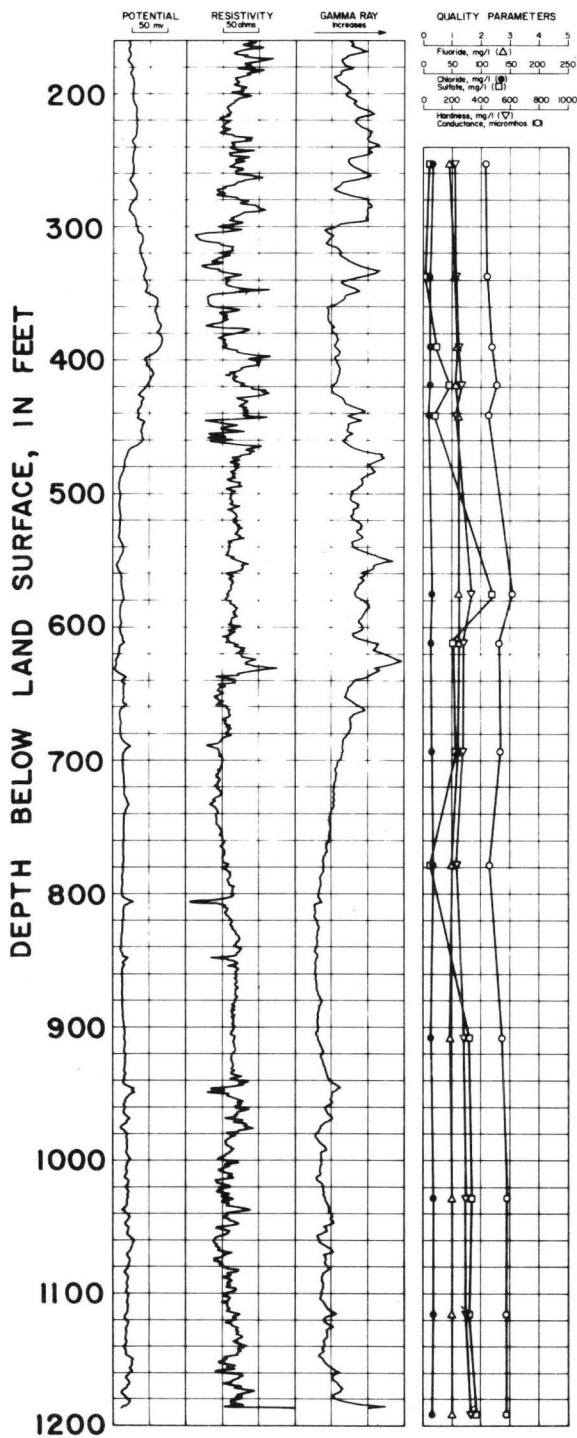


Exploration Test Well 1 (E1)

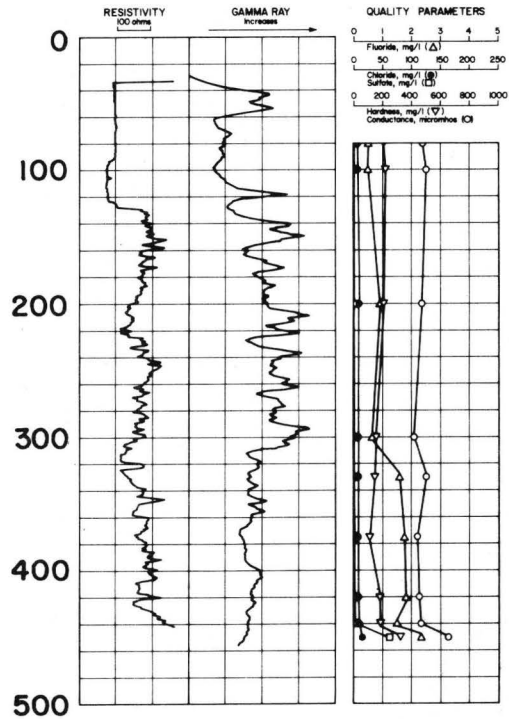


Exploration Test Well 2 (E2)

Figure 7.--Geophysical logs



Exploration Test Well 3 (E3)



Exploration Test Well 4 (E4)

of selected wells.

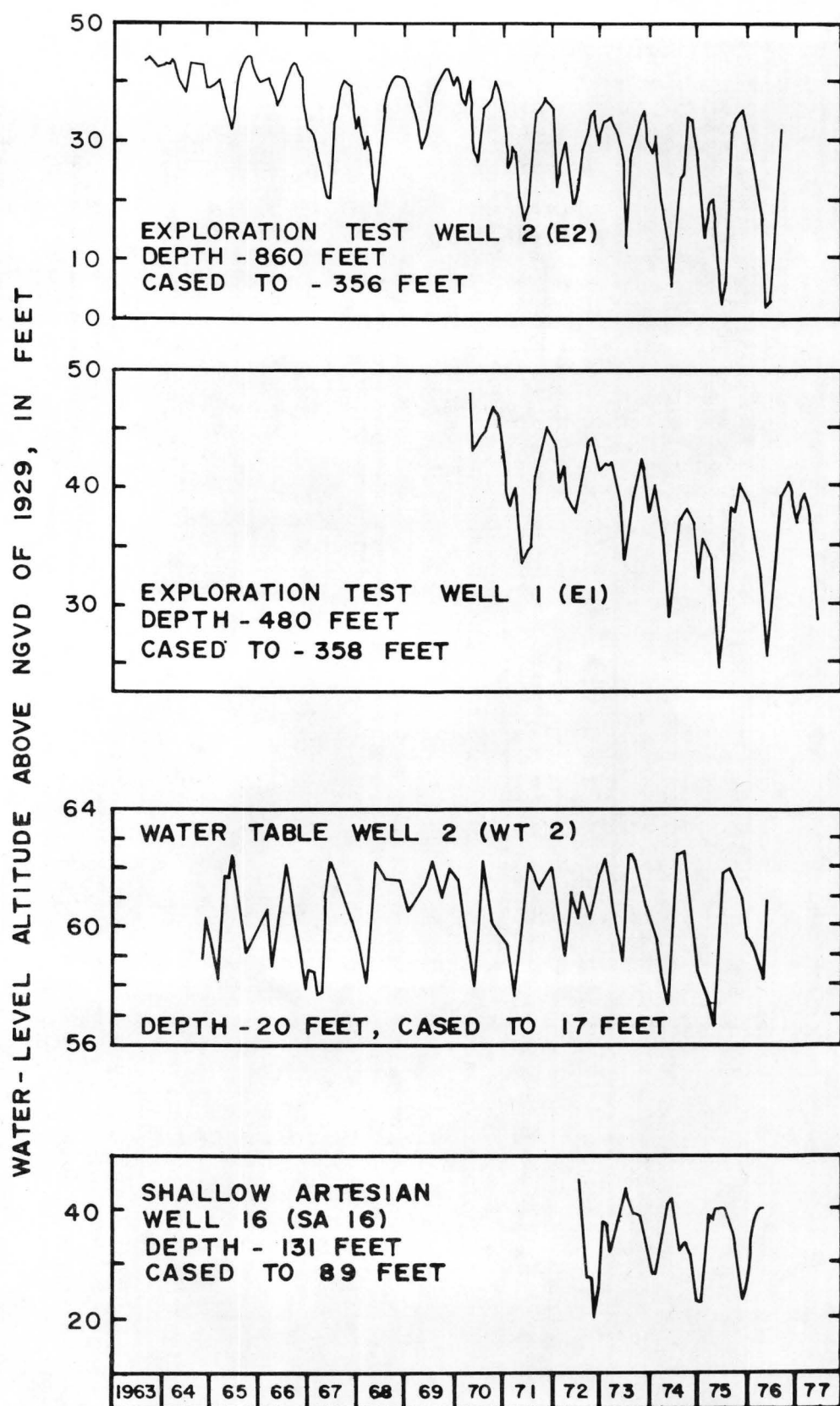


Figure 8.--Hydrographs of selected wells.

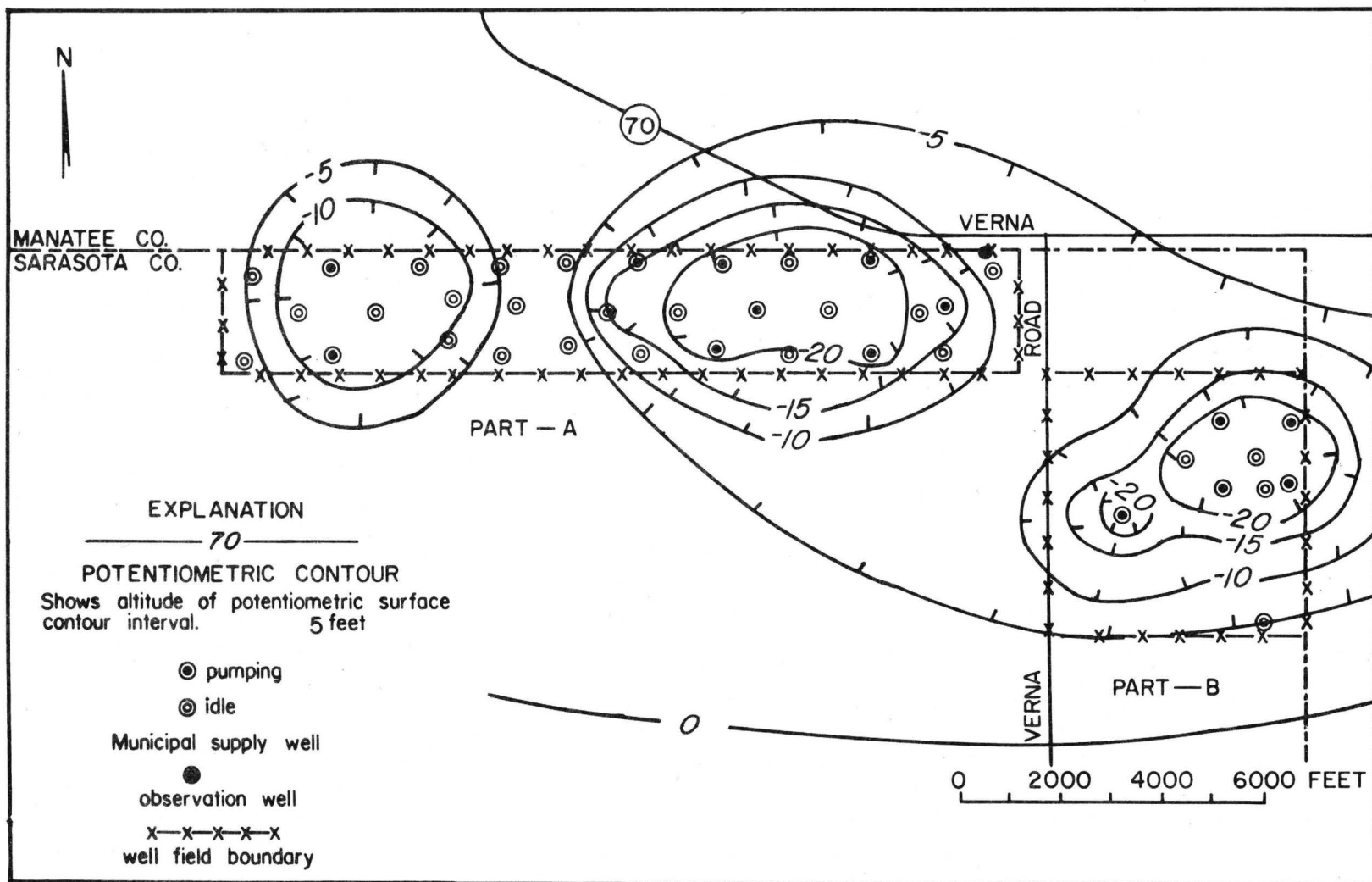


Figure 9.--Potentiometric surface of the Floridan aquifer, May 1977 (from Ryder and Mills, 1977).

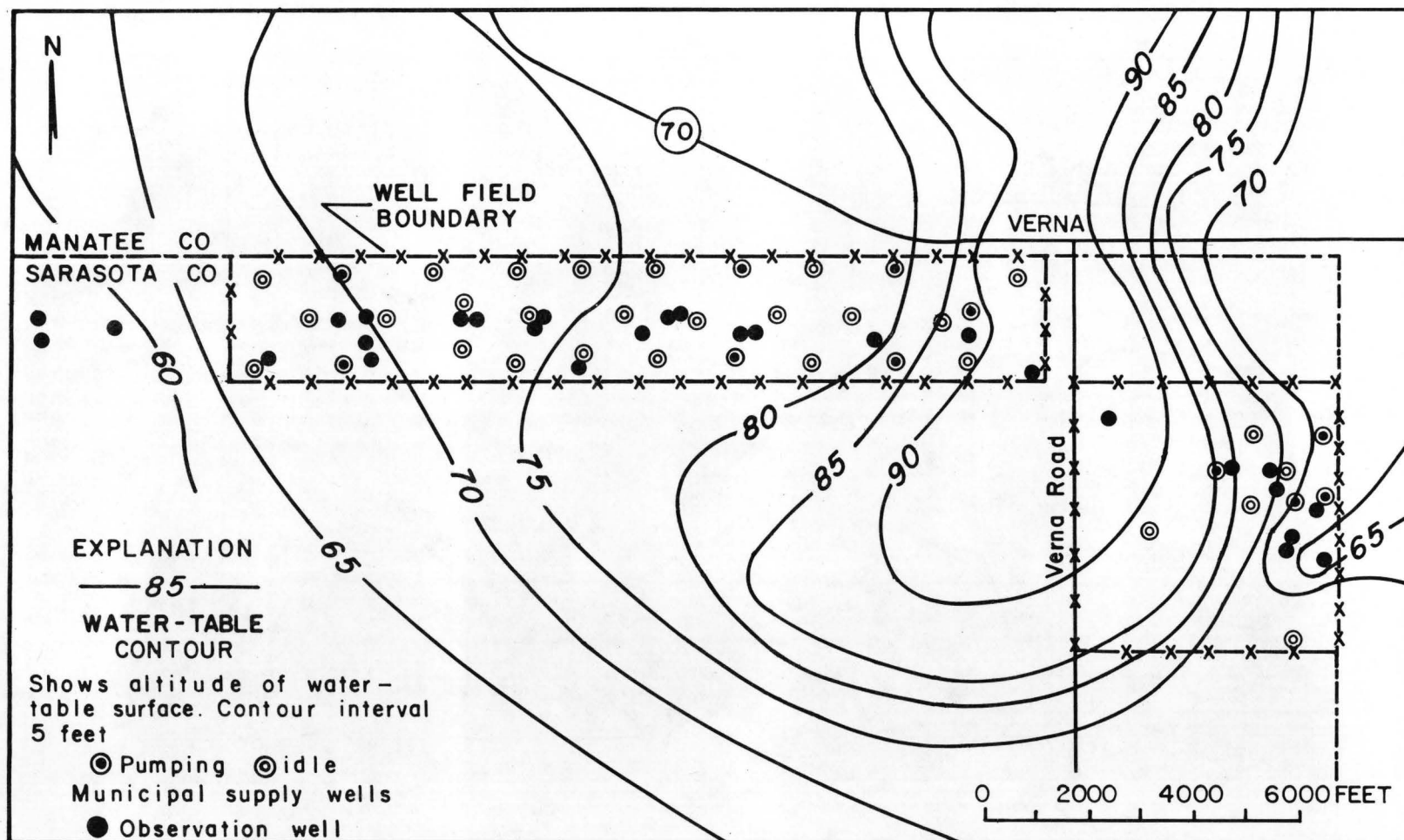


Figure 10.--Water table of the surficial aquifer, May 1977 (from Ryder and Mills, 1977).

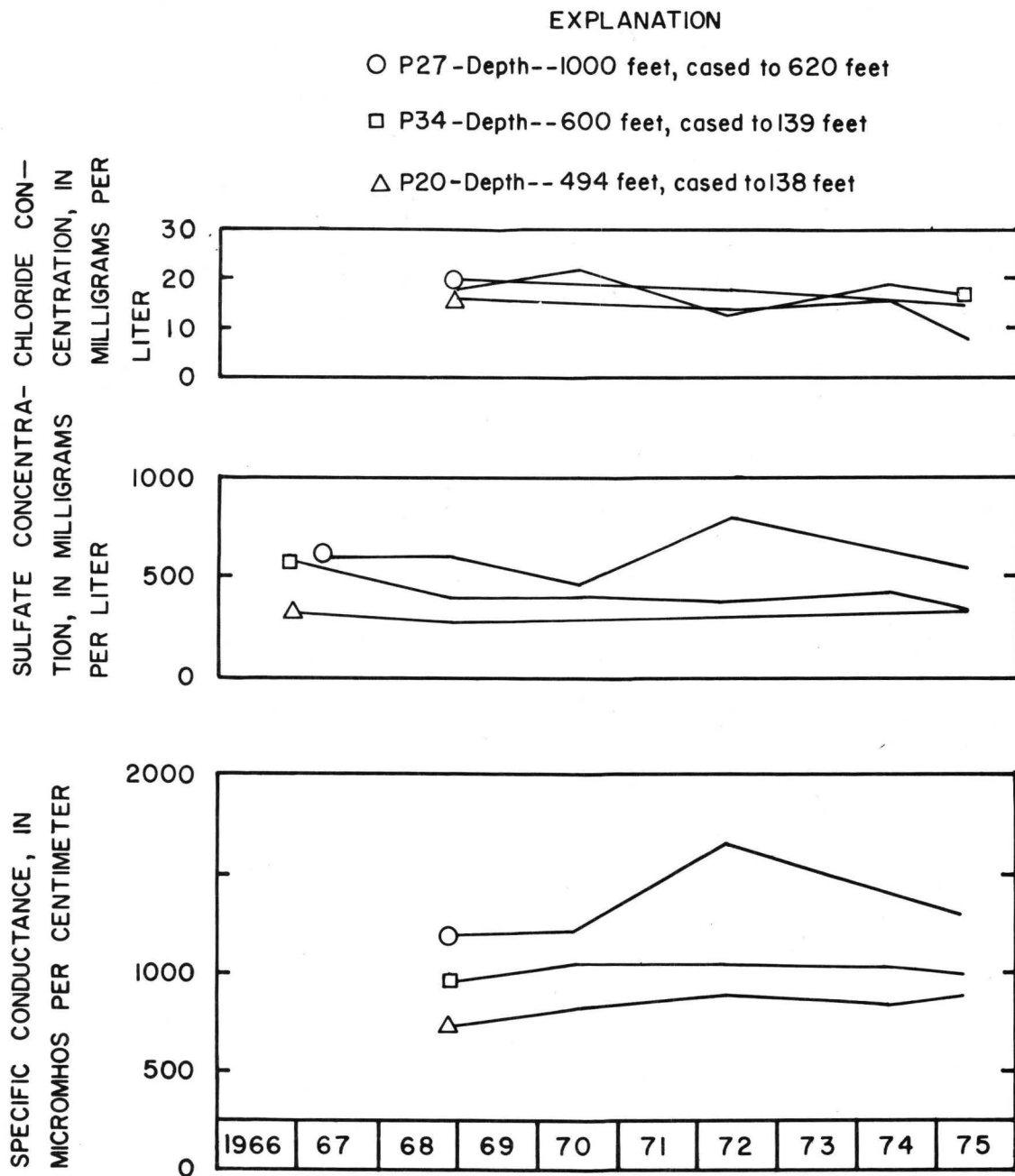


Figure 11.--Specific conductance, and sulfate and chloride concentrations in water from selected production wells, 1966-75.

SELECTED REFERENCES

- Geraghty and Miller, Inc., 1975, Ground-water resources of the Verna well field, Sarasota, Florida, 85 p.
- Ryder, P. D., and Mills, L. R., 1977, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, May 1977: U.S. Geological Survey Open-File Report 77-642, 15 p.
- Smith and Gillespie Engineers, Inc., 1964, Engineering report on new water supply for the city of Sarasota, Florida, 48 p.
- _____, 1975, Summary report, ground water resources available for raw water facilities, Water Works System, City of Sarasota, Florida, 17 p.

Table 1.--Records of exploration-test wells

[Locations of wells shown in figure 2.]

Well number	Depth of well (ft)	Casing		Water level		Altitude of land surface (ft)
		Depth (ft)	Diameter (in)	Depth below land surface (ft)	Date of measurement	
E1	860	358	16	28	4-23-63	54
E2	860	356	16	41	6-05-63	71
E3	1,191	620	16-12	59	8-08-63	91
E4	450	90	8	27	10-07-63	62
E6	1,073	142	8	55	5-02-66	80
E7	550	141	6	38	2-18-64	80
E8	490	146	8	61	2-24-64	95
E9	570	123	10	36	3-10-64	70
E10	445	126	6	56	5-12-64	95
E11	440	91	6	17	10-03-63	62
E12	900	120	12	45	5-19-64	77
E13	575	123	4	54	5-05-66	72

Table 2.--Records of production wells

[Locations of wells shown in figure 4.]

Well number	Depth of well (ft)	Casing		Water level		Altitude of land surface (ft)
		Depth (ft)	Diameter (in)	Depth below land surface (ft)	Date of measurement	
P1	600	133	10	54	5-05-66	70
P2	607	140	10	52	5-18-66	70
P3	609	140	10	57	5-24-66	65
P4	535	140	10	40	1-21-66	73
P5	606	140	10	55	5-23-66	74
P6	610	140	10	41	1-21-66	75
P7	500	140	10	44	1-20-66	76
P8	585	140	10	58	4-28-66	76
P9	570	140	10	46	1-20-66	79
P10	540	138	10	55	4-26-66	80
P11	^a 550	142	10	55	5-02-66	75
P12	542	141	10	53	4-28-66	70
P13	520	139	10	49	1-12-66	79
P14	578	139	10	58	11-23-65	79
P15	500	139	10	50	1-13-66	78
P16	503	139	10	51	11-14-66	78
P17	500	139	10	58	5-19-66	75
P18	515	139	10	53	1-21-66	78
P19	503	139	10	48	1-14-66	82
P20	494	138	10	50	1-19-66	80
P21	501	139	10	47	1-17-66	78
P22	505	139	10	49	1-17-66	80
P23	500	140	10	50	1-05-66	83
P24	500	141	10	45	11-30-65	83
P25	500	140	10	58	11-18-65	82
P26	460	140	10	57	4-16-66	85
P27	^b 1,000	620	16-12	59	8-08-63	85
P28	474	140	10	61	2-22-66	88
P29	481	140	10	55	11-16-65	93
P30	^c 476	146	8	61	2-24-64	90

Table 2.--Records of production wells - continued

Well number	Depth of well (ft)	Casing		Water level		Altitude of land surface (ft)
		Depth (ft)	Diameter (in)	Depth below land surface (ft)	Date of measurement	
P31	600	140	10	46	3-03-66	79
P32	600	142	10	43	3-12-66	70
P33	600	138	10	57	2-23-66	86
P34	598	139	10	45	3-05-66	75
P35	603	140	10	47	3-07-66	78
P36	^d 570	140	10	36	3-10-66	70
P37	714	156	12	53	2-16-75	65
P38	602	173	12	74	6-23-72	92
P39	641	152	12	65	10-05-76	89

a Exploration well E6; plugged back from 1,073 feet.

b Exploration well E3; plugged back from 1,191 feet.

c Exploration well E8; plugged back from 490 feet.

d Exploration well E9; casing extended to 140 feet.

Table 3.--Records of shallow-artesian aquifer test wells

[Locations of wells shown in figure 5.]

Well number	Depth of well (ft)	Casing		Water level		Altitude of land surface (ft)
		Depth (ft)	Diameter (in)	Depth below land surface (ft)	Date of measurement	
SA1	87	85	6	14	5-11-77	75
SA2	145	94	6	15	5-11-77	76
SA3	106	103	6	10	5-11-77	72
SA4	120	92	6	11	5-11-77	74
SA5	130	77	6	7	5-11-77	74
SA6	99	89	6	13	5-11-77	75
SA7	120	92	6	12	5-11-77	77
SA8	113	113	6	14	12-22-71	76
SA9	107	86	6	19	5-11-77	79
SA10	130	86	6	16	5-11-77	78
SA12	131	118	6	53	5-11-77	81
SA14	109	84	6	53	5-12-77	82
SA16	131	89	6	53	5-12-77	81
SA18	91	62	6	20	5-17-77	79
SA19	130	45	6	31	5-12-77	81
SA23	131	63	6	76	5-12-77	82

Table 4.--Records of surficial (water-table) aquifer test wells

[Location of wells shown in figure 6.]

Well number	Depth of well (ft)	Casing		Water level		Altitude of land surface (ft)
		Depth (ft)	Diameter (in)	Depth below land surface (ft)	Date of measurement	
WT1	20	17	2	4	5-11-77	63
WT2	20	17	2	5	5-11-77	62
WT3	414	36	2	4	5-11-77	72
WT4	24	19	2	1	5-11-77	72
WT5	41	36	2	2	5-11-77	72
WT6	35	30	2	7	5-11-77	74
WT7	85	21	8	3	5-11-77	74
WT8	42	21	8	4	5-11-77	74
WT9	42	21	8	3	5-11-77	79
WT10	40	20	8	3	5-11-77	79
WT11	21	18	2	4	5-11-77	79
WT12	30	10	8	4	5-11-77	79
WT13	68	41	8	6	5-11-77	81
WT14	39	34	2	3	5-12-77	80
WT15	29	24	2	2	5-11-77	79
WT16	25	20	2	2	5-11-77	78
WT17	28	18	4	2	5-11-78	78
WT18	26	21	2	1	5-11-77	77
WT19	44	28	8	5	5-12-77	78
WT20	24	19	2	1	5-12-77	68
WT21	30	25	2	2	5-12-77	68
WT22	41	20	8	3	5-12-77	68
WT23	24	19	2	3	5-11-77	65
WT24	20	15	2	2	5-11-77	70
WT25	20	15	2	4	5-11-77	78
WT26	20	15	2	4	5-11-77	88
WT27	20	15	2	0	5-11-77	95
WT28	20	15	2	2	5-11-77	95
WT29	26	15	2	3	5-11-77	90
WT30	20	15	2	2	5-11-77	80
WT31	20	15	2	3	5-11-77	63

Table 5.--Geologic logs of selected wells

Exploration test well E1

[Location, SW1/4 SW1/4 SW1/4, sec. 8, T.36S., R.20E.; land-surface altitude about 52 feet; drilled by Layne Atlantic Drilling Company.]

0- 10	<u>Sand</u>	- fine to coarse grain, pebbles, clear
10- 40		- very coarse grain, pebbles of quartz and phosphate
40- 60		- same, about 70 percent phosphate pebbles
60- 80	<u>Marl</u>	- very sandy, grey buff, pebbles, phosphate
80- 90		- slightly sandy, some chalky, cream buff, phosphate
90-100	<u>Clay</u>	- sandy, limey, grey, phosphate
100-110		- same, with much <u>sand</u> , trace of <u>limestone</u> - marly, white
110-130	<u>Marl</u>	- chalky, silty, some <u>clay</u> , phosphate
130-140		- sandy, some <u>limestone</u> , phosphate
140-150	<u>Limestone</u>	- chalky, slightly marly, fossils, cream, phosphate
150-160		- chalky, fossils, <u>chert</u> , phosphate
160-200		- same, and sandy
200-230		- same, some marly
230-250		- same, some large pebbles of phosphate
250-260		- sucrosic (dolomitic) sandy, fossils, <u>chert</u> , phosphate
260-270	<u>Marl</u>	- sandy, cream grey; <u>chert</u> , phosphate
270-280	<u>Limestone</u>	- sandy, cherty, fossils, cream, phosphate
280-290		- same, some marly
290-300	<u>Marl</u>	- sandy, cherty, cream grey, phosphate
300-310	<u>Limestone</u>	- chalky, slightly marly, cream buff
310-320		- same, some <u>chert</u> , fossils, and phosphate
320-340		- no samples
340-350	<u>Limestone</u>	- very cherty, slightly sandy, cream grey, phosphate
350-360		- same, some fossils
360-370		- very sandy, granular, cream, phosphate, T. Tampa 360'

Table 5.--Geologic logs of selected wells - continued

Exploration test well E1 - continued

370- 390	<u>Limestone</u>	- same, slightly fossiliferous, some vugular
390- 400		- same, more fossils
400- 430		- chalky, sandy, fossils, vugular, cream, phosphate
430- 440		- same, trace of <u>chert</u>
440- 460	<u>Sand</u>	- fine to medium grain, clear; some <u>limestone</u> - with fossils; <u>chert</u> ; phosphate
460- 470	<u>Limestone</u>	- dense to crystalline, brown; some <u>sand</u> , phosphate
470- 490		- same, some fossils, <u>chert</u>
490- 510		- very fossiliferous, nodular, cream, T. Suwannee 490'
510- 520		- same, some vugular
520- 540		- same, coquinooid in part
540- 600		- same, some calcite crystals
600- 670		- granular to finely oolitic, fossiliferous, cream buff
670- 690		- same, some <u>dolomite</u> - finely crystalline, yellow brown
690- 700	<u>Dolomite</u>	- dense, cherty, grey tan; some <u>limestone</u> - fossiliferous, cream
700- 730	<u>Limestone</u>	- granular, nodular, fossiliferous, cream, <i>Lepidocyclina</i> (T. Ocala) 700'
730- 740		- same, <u>camerina</u> 730'
740- 810		- chalky, grey, some nodular, oolitic, fossiliferous, cream
810- 830		- same, some quartz, <u>sand</u> - coarse grain, clear
830- 880		- chalky, granular, some nodular, very fossiliferous, cream
880- 940	<u>Dolomite</u>	- sucrosic, some vugular, yellow brown
940- 950		- same, some <u>limestone</u> - chalky, fossiliferous, cream
950- 970	<u>Limestone</u>	- fossiliferous, some dolomitic
970- 990	<u>Dolomite</u>	- and dolomitic <u>limestone</u> - yellow to cream, some hard, cherty, some fossils

Table 5.--Geologic logs of selected wells - continued

Exploration test well E1 - continued

990-1010	<u>Limestone</u>	- crystalline to chalky, some nodular, fossiliferous, dolomitic
1010-1030	<u>Dolomite</u>	- plus dolomitic <u>limestone</u> , and fossiliferous <u>limestone</u>
1030-1060	<u>Limestone</u>	- chalky, nodular, fossiliferous, cream, some calcite fragments - yellow; dictyconus, T. Avon Park 1030'
1060-1080		- same, and dolomitic <u>limestone</u> - yellow
1080-1180		- chalky, nodular, some oolitic, fossiliferous, yellow, cream
1180-1210		- same, and <u>dolomite</u> - fine to coarsely crystalline, cherty, yellow brown
1210-1240	<u>Dolomite</u>	- dense, cherty, some coarsely crystalline, some vugular, yellow, brown, black
1240-1270		- dense, cherty, brown, black, mottled
1270-1400		- same, some coarsely crystalline, vugular, some platy
1400-1450		- same, and trace of black material (lignite)
1450-1490		- fine to coarsely crystalline, some vugular, some dense, cherty, brown

(TD samples 1490')

Table 5.--Geologic logs of selected wells - continued

Exploration test well E2

[Location, NE1/4 S1/2, sec. 5, T.36S., R.20E.; land-surface datum about 71 feet; drilled by Layne Atlantic Drilling Company.]

0- 22	<u>Quartz sand</u>	- clear with very slightly tannish cast, loose quartz, small amount of organic material loosely disseminated through the sand
22- 44	<u>Quartz sand</u>	- clear loose quartzitic; <u>phosphorite land pebbles</u> , fine to coarse grained size, black
44- 66	<u>Quartz</u>	- as above, but a large percentage is medium grained size and subrounded; <u>phosphorite</u> as above, <u>macrofossils</u>
66- 88		- as above
88-100	<u>Calcilutite</u>	- medium hard, very pale orange, some slightly sandy and slightly phosphoritic; <u>quartz sand</u> as above; <u>phosphorite</u> as above
TOP HAWTHORN		
100-110		- as above
110-132	<u>Calcilutite</u>	- medium to hard, very pale orange, mostly sandy, slightly phosphoritic; <u>quartz sand</u> as above; <u>phosphorite</u> as above
132-154	<u>Calcilutite</u>	- medium to hard, gray orange, partially recrystallized, sandy, slightly phosphoritic (generally as above); <u>phosphorite</u> as above
154-176	<u>Calcilutite</u>	- partially recrystallized impure, medium hard, slightly brittle, slightly glazed surface, grayish orange pink, very phosphoritic, slightly sandy (generally as above)
176-198	<u>Calcilutite</u>	- partially recrystallized impure as above; <u>phosphorite</u> as above; trace gray <u>chert</u>
198-220	<u>Calcilutite</u>	- partially recrystallized impure as above; <u>phosphorite</u> as above; <u>quartz sand</u> as above
220-242		- as above; trace light tan <u>chert</u>
242-264		- as above; very strong trace tannish gray <u>chert</u>
264-286		- as above
286-308		- as above
308-330	<u>Calcilutite</u>	- partially recrystallized, medium hard grayish orange pink, phosphoritic and slightly sandy; trace gray <u>chert</u>

Table 5.--Geologic logs of selected wells - continued

Exploration test well E2 - continued

330-352	<u>Calcilutite</u>	- partially recrystallized, medium hard, grayish orange pink, slightly phosphoritic; trace gray <u>chert</u>
352-374	<u>Calcilutite</u>	- partially recrystallized, medium hard, grayish orange pink, slightly phosphoritic, sucrosic; trace gray opaque <u>chert</u>
374-396	<u>Calcilutite</u>	- partially recrystallized sandy, hard, very pale orange
TOP TAMPA		
396-418	<u>Quartz sand</u>	- as above; partially recrystallized sandy <u>calcarenite</u> , very pale orange, hard, nodular
418-440	<u>Calcilutite</u>	- partially recrystallized, very pale orange, hard slightly sandy; partially recrystallized <u>calcarenite</u> , very pale orange, hard, slightly sandy, slightly nodular
440-475	<u>Quartz sand</u>	- as above; partially recrystallized sandy <u>calcilutite</u> as above; trace <u>phosphorite</u>
475-510	<u>Calcarenite</u>	- partially recrystallized sandy, very pale orange, hard; <u>quartz sand</u> as above; <u>chert</u> , some tan, some gray, some brown
510-545	<u>Calcarenite</u>	- partially recrystallized, hard very pale orange, slightly sandy, slightly nodular
545-563	<u>Calcarenite</u>	- partially recrystallized, hard, very pale orange, tending to white; micro-fossiliferous, nodular; <u>sorites</u> , miliolid
TOP SUWANNEE		
563-580		- as above
580-615		- as above
615-650		- as above; <u>discorinopsis</u>
650-685		- as above
685-720		- as above; miliolid
720-755		- as above; several <u>Rotalia byramensis</u>
755-790	<u>Calcilutite</u>	- partially recrystallized, very pale red, hard partially recrystallized, as above; <u>Rotalia byramensis</u>
790-808	<u>Calcarenite</u>	- partially recrystallized, very pale orange, medium hard, nodular; <u>Gypsina globula</u>

Table 5.--Geologic logs of selected wells - continued

Exploration test well E2 - continued

TOP OCALA GROUP

808- 825		- as above
825- 860	<u>Calcarenite</u>	- partially recrystallized, medium hard (crumbles with finger pressure), very pale orange, nodular; <u>Camerina sp.</u>
860- 895	<u>Calcarenite</u>	- partially recrystallized as above; <u>Lepidocyclinas</u>
895- 930	<u>Calcarenite</u>	- dolomitic, pale red, hard nodular
930- 965	<u>Calcilutite</u>	- dolomitic, pale red, hard
965-1000	<u>Calcarenite</u>	- partially recrystallized, very pale orange, hard nodular; <u>Camerina sp.</u> , <u>Sorites</u>
1000-1031	<u>Calcarenite</u>	- dolomitic, very pale red, hard nodular; <u>Camerina sp.</u>
1031-1046	<u>Calcarenite</u>	- partially recrystallized, very pale red, hard, nodular; several <u>Dictyoconus</u>

TOP AVON PARK

1046-1062		- as above
1062-1087	<u>Calcilutite</u>	- dolomitic, pale red, hard; dolomitic and partially recrystallized <u>calcarenite</u> , very pale orange to (underlying) pale yellowish brown, hard, nodular; <u>Dictyoconus</u>
1087-1115	<u>Calcarenite</u>	- partially recrystallized, very pale orange, hard, nodular; many <u>Dictyoconus</u>
115-1144	<u>Calcarenite</u>	- partially recrystallized, as above; <u>calcirudite</u> shell hash; many <u>Dictyoconus</u>
1144-1175	<u>Calcarenite</u>	- partially recrystallized, as above; dolomitic <u>calcilutite</u> , very pale red, hard; <u>Dictyoconus</u>

W-6972 SUMMARY

Post-Hawthorn	0 - 100
Hawthorn	100 - 396
Tampa	396 - 563?
Suwannee	563?- 808
Ocala GR	808 -1046
Avon Park	1046 -

Table 5.--Geologic logs of selected wells - continued

Production well P37

0- 15	<u>Sand</u>	- fine grain, some medium to coarse grain, clayey, brown
15- 20		- silty
20- 25		- some pebbles, grey; phosphate
25- 30	<u>Clay</u>	- hard, compact, waxy, dark green black
30- 35	<u>Sand</u>	- fine grain, silty, clayey; phosphate
55- 65	<u>Clay</u>	- silty, sandy, grey; phosphate
65- 70		- same
70- 75	<u>Marl</u>	- sandy, grey buff; phosphate
75- 85	<u>Clay</u>	- calcareous, sandy, pebbly, grey
85- 90	<u>Marl</u>	- sandy, pebbly, grey buff; phosphate
90-110	<u>Sand</u>	- marly, pebbly; phosphate
110-115	<u>Clay</u>	- sandy, pebbly, grey; phosphate
115-120	<u>Marl</u>	- sandy, pebbly, buff; becoming phosphate
120-135		- soft, chalky, cream white
135-140	<u>Limestone</u>	- slightly sandy, slightly dolomitic, chalky, white
140-145	<u>Clay</u>	- hard, compact, calcareous, pale green grey
145-155	<u>Marl</u>	- very sandy, pebbly, cream; phosphate
155-170		- chalky, soft, slightly sandy, cream white
170-175		- no samples
175-180	<u>Marl</u>	- same
180-190		- trace chert, white
190-195		- same
195-215	<u>Marl</u>	- sandy, white; trace chert; phosphate
215-235		- more clayey, more chert, sandy, pebbly, cream buff
235-240	<u>Clay</u>	- pebbly, compact, grey; phosphate
240-245	<u>Marl</u>	- much chert, sandy, pebbly; phosphate
245-255		- no sample
255-275		- chalky, sugary, grey buff, becoming clay in parts
275-280	<u>Clay</u>	- marly, sandy, pebbly, grey

Table 5.--Geologic logs of selected wells - continued

Production well P37 - continued

280-290	<u>Marl</u>	- clayey, sugary, sandy, pebbly, grey
290-305	<u>Limestone</u>	- sandy, chalky, cherty, cream
305-310	<u>Clay</u>	- hard, compact, slightly limey, pale grey
310-315		- much chert
315-325	<u>Marl</u>	- chalky, slightly sandy, cream white
325-335		- some clay-hard, blue, compact
335-340	<u>Marl</u>	- chalky, slightly sandy, pebbly, grey buff
340-345	<u>Limestone</u>	- slightly sandy, gritty, pebbly, cream buff, grey
345-380		- very sandy, chalky, grainy, cream
Note - some phosphate in samples from 20 - 360 feet.		
380-390		- fragmental, cherty, cream, grey brown
390-405		- same, fossiliferous
405-410		- dense, hard, fossiliferous, yellow brown
410-420		- nodular, fragmental, fossiliferous
420-425		- chalky, white, pastey, pebbly
425-435		- chalky, pasty, pebbly, dense to crystalline, white
435-485		- nodular, fragmental, very fossiliferous, cream white
485-490		- finely oolitic, slightly sandy
490-530		- chalky, nodular, granular, fossiliferous, white, becoming cream buff
530-535		- fragmental, fossiliferous, buff
535-540		- granular, nodular, oolitic, fossiliferous
540-550		- fragmental, platy
550-560		- oolitic, nodular, fossiliferous
560-570		- conquinoid
570-585		- granular, oolitic, nodular, fossiliferous
585-600		- fragmental
600-610		- oolitic, nodular, grey buff
610-620		- granular to fragmental, fossiliferous
620-625		- becoming clayey

Table 5.--Geologic logs of selected wells - continued

Production well P37 - continued

625-655	<u>Limestone</u>	- pasty, chalky
655-660		- grainy, slightly sandy
660-680		- platy, fragmental, gritty, Lep. fossils at 660'
680-700		- slightly oolitic (TD) Cam. fossils at 700' (abundant) almost 100 percent Cam. in the lower portion
700-720		- fossil
Total depth of well 720'		

Production well P38

0- 40	<u>Sand</u>	- fine grain, some medium to coarse and pebbly, slightly silty, brown
40- 60	<u>Clay</u>	- waxy, slightly silty, black, trace of pyrita
60-110		- limey, waxy, slightly silty to marly, sandy, micaceous; phosphate
110-130	<u>Marl</u>	- some pebbles (quartz and phosphate), some clay, grey; trace of limestone
130-140	<u>Limestone</u>	- very sandy; some marl; phosphate
140-150		- fossiliferous, cream; marl and chert
150-160		- very sandy; phosphate
160-170		- hard, dense, cream; trace of clay
170-180		- slightly sucrosic, fossiliferous, trace of sand
180-190		- slightly nodular, cherty, fos., some sand, slightly vugular; phosphate
190-210		- hard, dense, cherty, slightly fossiliferous, some sand, phosphate
210-220	<u>Sand</u>	- medium to coarse grain, much phosphate, some limestone - dense, fossiliferous
220-225	<u>Limestone</u>	- chert, sand, phosphate
225-250		- very fossiliferous, very sandy, chert, conglomeratic, as much as 60 percent phosphate

Table 5.--Geologic logs of selected wells - continued

Production well P38 - continued

250-270	<u>Clay</u>	- limey, waxy, slightly grainy, some conglomerate as above, grey to green; phosphate
270-280	<u>Sand</u>	- clay, limestone; phosphate
280-290	<u>Clay</u>	- waxy, green; some sand and phosphate
290-300		- very limey, pale green; limestone and phosphate
300-310	<u>Clay</u>	- waxy, slightly limey, pale to dark green
310-320	<u>Limestone</u>	- hard, dense, sandy, cream; phosphate
320-360	<u>Marl</u>	- slightly sandy, chert and phosphate pebbles, some sucrosic, cream white
360-370	<u>Sand</u>	- fine to medium grain, clear
370-390	<u>Limestone</u>	- finely crystalline, very sandy, fossiliferous, brown to cream; phosphate
390-400		- hard, dense, fossiliferous
400-410		- same, with much sand; phosphate
410-430		- nodular, fossiliferous, some vugular, cream
430-500		- same, some fragmental, some finely oolitic and coquinoid, cream
500-540		- same, some large fossils (Gastro., et. al.)
540-550		- same, some hard, dense, cherty
550-590		- same, many Echinois spines
590-600		- same, some platy
600-610		- very finely oolitic, granular, microfossils?

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA1

[Location, NW1/4 NW1/4 NW1/4, sec. 4, T.36S., R.20E.; land-surface altitude about 74 feet.]

0- 30	<u>Sand</u>	- fine grain, some medium to coarse grain and pebbly, brown, slightly silty
30- 35		- very fine grain, silty, slightly clayey; phosphate; dark grey brown
35- 45		- limey, silty, clayey, some medium to coarse grain, pebbly; phosphate; shells
45- 50		- very coarse, pebbles (quartz) and phosphate, grey buff
50- 60		- limey, silty to fine grain; phosphate
60- 65		- limey, fine to medium grain, slightly silty, some coarse grain and pebbly; phosphate
65- 70		- limey, clayey, silty, fine to pebbly, green grey; phosphate; trace clay
70- 75		- limey, marly, silty to pebbly, grey buff; phosphate; trace clay
75- 80	<u>Marl</u>	- sandy, or marly sand, silty to pebbly, green grey
80- 85	<u>Clay</u>	- limey, slightly sandy, soft, sticky, grey green
85- 90		- very sandy, or clayey sand, slightly limey, green grey; phosphate
90- 95	<u>Sand</u>	- limey, slightly clayey, fine to medium grain, some coarse grain, green grey; phosphate
95-100		- medium to coarse grain, clear; phosphate (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA2

0- 15	<u>Sand</u>	- fine to coarse grain, brown, large grains round and frosted
15- 30		- fine grain, some medium to coarse grain and pebbly, dark brown, sooty
30- 35		- clayey
35- 40		- silty
40- 45		- some very coarse grain and pebbly
45- 50		- some phosphate pebbles
50- 55		- clayey, pebbly; phosphate
55- 60		- large phosphate pebbles, abundant
60- 70	<u>Clay</u>	- sandy, marly, pebbly; some compact, hard, black; some buff to dark grey
70- 80	<u>Sand</u>	- medium grain, clear; phosphate grains same size
80- 85		- slightly clayey
85- 90	<u>Clay</u>	- sandy, pebbly
90- 95	<u>Marl</u>	- chalky, sandy, pebbly
95-120	<u>Sand</u>	- gravel, very coarse grain and pebbly, frosted, round; abundant phosphate
120-125	<u>Marl</u>	- sandy, pebbly, cream buff
125-130		- trace chert, some limestone, chalky
130-135		- chalky, soft, pebbly (quartz and phosphate), cream buff
135-140	<u>Clay</u>	- compact, hard, slightly waxy, pebbly (quartz and phosphate), green grey
140-150	<u>Marl</u>	- chalky, soft, pebbly, cream buff to grey buff (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA3

0- 15	<u>Sand</u>	- fine to medium grain, some coarse grain, clear to light brown
15- 20		- fine grain to silty, some medium to coarse grain and pebbly, slightly clayey
20- 25		- very fine grain, silty, grey brown; some peat - black, sooty
25- 35		- fine grain, silty, pebbly, clayey, dark grey brown
35- 40		- phosphate; shell
40- 45		- fine to coarse grain, pebbly, clayey; phosphate; shells; trace limestone - cherty
45- 55		- fine to medium grain, some coarse grain and pebbly, slightly clayey, green
55- 60	<u>Limestone</u>	- hard, dense, cherty, and phosphate pebbles (about 80 percent)
60- 65	<u>Clay</u>	- waxy, plastic, grey green
65- 70		- shaly, waxy, thin sand streaks
70- 75		- very sandy, or clayey sand
75- 80	<u>Sand</u>	- medium to coarse grain, clayey; phosphate; grey
80- 85		- medium to coarse grain, clear; clay - soft, green
85-100		- limey, marly, coarse grain to pebbly; much phosphate
100-105		- very coarse grain, pebbly; phosphate 30 percent -
105-110		- medium to coarse grain, pebbly, marly, fossils (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA4

0- 15	<u>Sand</u>	- fine to coarse grain and pebbly, slightly silty or clayey, light brown
15- 25		- fine grain, some medium to coarse, clear
25- 30		- fine to coarse grain, slightly pebbly, brown
30- 35		- same, but clear
35- 40		- fine to coarse grain and pebbly, clayey; phosphate, dark grey
40- 45		- fine to coarse, pebbly; much phosphate
45- 55		- marly
55- 60	<u>Conglomerate</u>	- phosphate and chert pebbles
60- 65	<u>Marl</u>	- sandy, pebbly; phosphate
65- 75		- sandy, or marly sand
75- 80	<u>Sand</u>	- fine grain, slightly marly; phosphate
80- 85		- clear, with phosphate grains
85- 95		- fine to coarse and pebbly, marly; phosphate pebbles
95-100		- coarse, pebbly, slightly marly
100-105		- clayey
105-110		- fine to medium grain, marly
110-115		- clayey, slightly silty, grey
115-120		- medium grain, slightly limey, angular, frosted to clear; phosphate (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA5

0- 10	<u>Sand</u>	- fine to medium grain; some coarse and pebbly, clear to light brown
10- 15		- more coarse grain
15- 20		- fine, silty, some coarse and pebbly, slightly clayey, dark brown
20- 35		- sooty, silty, pebbly
35- 40		- fine, silty, clayey, pebbly; phosphate; dark grey brown
40- 45	<u>Clay</u>	- plastic, slightly waxy, grey green
45- 50	<u>Sand</u>	- medium grain, some coarse and pebbly, slightly clayey; phosphate, grey green
50- 55		- fine to coarse and pebbly, slightly limey; much phosphate (80 percent)
55- 60		- fine grain, clayey, slightly limey, pebbly; much phosphate; green grey
60- 65	<u>Limestone</u>	- marly; sand and phosphate pebbles
65- 70	<u>Clay</u>	- plastic, waxy, dark grey green
70- 90	<u>Sand</u>	- marly, coarse to pebbly; phosphate
90-100		- fine to medium, slightly clayey, marly
100-110		- pebbly; phosphate
110-115	<u>Clay</u>	- compact, grey, sandy in part
115-120		- slightly limey
120-125	<u>Sand</u>	- fine, some medium to coarse, clear; phosphate; some clay
125-130	<u>Limestone</u>	- hard, dense, cherty; phosphate; sand - as above (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA6

0-10	<u>Sand</u>	- fine grain, some medium to coarse, slightly silty, light brown
10-30		- fine to coarse grain and pebbly
30-40		- grey black, slightly clayey; phosphate
40-50		- some large phosphate pebbles
50-55	<u>Marl</u>	- slightly chalky, sandy, pebbly, grey buff; phosphate
55-60	<u>Clay</u>	- waxy, plastic, dark green - black
60-65		- sandy; phosphate
65-70		- very sandy or clayey sand
70-75	<u>Sand</u>	- clayey; phosphate - sand grain size
75-80		- slightly clayey, medium to coarse grain and pebbly
80-85		- limey, clayey, pebbly; much phosphate
85-90	<u>Marl</u>	- sandy, pebbly, grey; phosphate
90-95	<u>Sand</u>	- medium to coarse grain and pebbly, marly, limey, light grey white (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA7

0- 20	<u>Sand</u>	- fine grain, some medium to coarse, silty, brown
20- 25		- slightly clayey, dark brown to black
25- 30		- fine to coarse grain, pebbly, clear
30- 35		- silty, dark grey
35- 45		- same, with phosphate
45- 50		- medium to coarse grain and pebbly; large phosphate pebbles
50- 55		- fine grain, marly, grey buff; phosphate
55- 65		- less marly, green grey black; much phosphate
65- 70	<u>Clay</u>	- marly, sandy, dark grey green; phosphate
70- 80		- medium to coarse sand and pebbles
80-105	<u>Sand</u>	- medium to coarse grain and pebbly, slightly calcareous; phosphate
105-110		- marly; some clay - grey green
110-115	<u>Marl</u>	- sandy, soft, grey green (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA8

0- 15	<u>Sand</u>	- fine grain, silty, some medium to coarse grain, dark brown
15- 25		- some pebbles, light brown
25- 30		- fine to coarse grain and pebbly
30- 35		- fine grain, silty, some medium to coarse, grey brown
35- 55		- same, with phosphate
55- 60	<u>Clay</u>	- waxy, dark green - black; some sand as above
60- 70	<u>Sand</u>	- silty, clayey, fine grain, some medium to coarse grain and pebbly; phosphate
70- 75		- silty, clayey, medium to coarse grain, slightly calcareous, dark grey; phosphate
75- 90	<u>Marl</u>	- sandy, pebbly, grey buff, phosphate
90- 95	<u>Sand</u>	- medium to coarse and pebbly, clear
95-100		- marly; phosphate
100-105		- slightly marly
105-110		- fine grain, some medium to coarse and pebbly, slightly marly
110-120	<u>Clay</u>	- waxy, slightly sandy, silty, or gritty, grey green; phosphate
120-130	<u>Sand</u>	- fine to coarse grain, calcareous or marly; phosphate (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA9

0- 20	<u>Sand</u>	- fine grain, some medium to coarse grain, clayey, brown
20- 25		- fine to medium and coarse, clear to light brown
25- 30		- same, but some pebbles
30- 35		- fine grain to silty, some medium to coarse, grey; phosphate
35- 45		- dark grey to black; much phosphate
45- 50		- medium to coarse grain and pebbly; much phosphate
50- 60		- slightly marly
60- 65		- medium fine grain and pebbles
65- 70	<u>Marl</u>	- very sandy, chalky, soft, grey buff; phosphate specks
70- 75	<u>Sand</u>	- fine to medium grain, clear; phosphate
75- 80		- same; trace clay - waxy, grey
80- 85	<u>Clay</u>	- marly to waxy, green grey; large phosphate pebbles
85- 90	<u>Sand</u>	- fine to coarse, pebbly, marly; phosphate
90-100	<u>Marl</u>	- very sandy, pebbly; phosphate
100-105	<u>Sand</u>	- fine grain, silty, marly; phosphate
105-110		- some medium to coarse
110-120		- some pebbles
120-130	<u>Marl</u>	- very sandy, chalky, soft, pebbly, buff; phosphate (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA10

0- 15	<u>Sand</u>	- fine grain, some medium to coarse, slightly clayey and silty, brown
15- 20		- some pebbles
20- 30		- light brown
30- 35		- dark grey; phosphate
35- 40		- medium to coarse and pebbly, clear to light grey; phosphate
40- 60		- same, and silty
60- 65		- fine grain, some medium to coarse, green grey; phosphate
65- 70		- medium to coarse, clear; phosphate
70- 75		- same; trace of clay - waxy, green
75- 85	<u>Clay</u>	- waxy, plastic, green
85- 90	<u>Marl</u>	- sandy, grainy, grey buff; phosphate
90- 95	<u>Sand</u>	- coarse, pebbly, conglomeratic; much phosphate; trace limestone - white
95-100	<u>Clay</u>	- waxy, pebbly, green; phosphate
100-105		- waxy, sandy in part, green; some marl and limestone - white; phosphate
105-115	<u>Marl</u>	- chalky, slightly sandy, pale green grey to cream; phosphate
115-120	<u>Limestone</u>	- marly, chalky, cherty, slightly sandy, cream grey; phosphate
120-125	<u>Marl</u>	- chalky, sandy, pebbly, cream; phosphate
125-130		- clayey, pasty, pebbly, cream grey, phosphate (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA12

0- 15	<u>Sand</u>	- fine grain, some medium to coarse grain and pebbly, clayey, brown
15- 20		- fine to medium grain, some coarse and pebbly, slightly silty, light brown
20- 25		- clear
25- 30		- slightly clayey, fine grain to silty, some medium to coarse and pebbly, light brown
30- 35	<u>Clay</u>	- sandy, fine to silty, grey green; phosphate
35- 40	<u>Sand</u>	- clayey, fine to silty, pebbly, grey green; phosphate
40- 55		- very clayey, fine to silty, some medium to coarse and pebbly, green grey; much phosphate
55- 60		- clayey, fine to silty, some pebbles; phosphate
60- 65	<u>Dolomite</u>	- cherty, dense; sand - very coarse grain and pebbly; much phosphate
65- 70	<u>Clay</u>	- sandy, grey green; much phosphate
70- 80	<u>Sand</u>	- limey, clayey, medium to coarse grain, cream buff; phosphate
80- 85		- mostly coarse grain and pebbly
85- 90	<u>Clay</u>	- sandy, silty, green grey; phosphate
90- 95	<u>Sand</u>	- medium grain; clay - silty; phosphate
95-100		- medium to coarse; much phosphate; some clay
100-105	<u>Clay</u>	- sandy, silty, large phosphate pebbles
105-115	<u>Sand</u>	- clayey, slightly marly, dolomitic, cherty
115-120	<u>Dolomite</u>	- sandy, cherty, cream to pale grey; sand
120-125	<u>Sand</u>	- clayey, limey, medium to coarse grain
125-130	<u>Clay</u>	- silty, specked, grey to grey green (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA14

0- 15	<u>Sand</u>	- clayey, fine grain, some medium to coarse, dark brown
15- 20		- slightly clayey, light brown
20- 25		- more coarse grain and pebbly
25- 30		- pale brown to clear
30- 35		- silty, clayey, fine to medium, some coarse to pebbly, yellow brown
35- 40	<u>Clay</u>	- very sandy, silty, some pebbles, green grey; phosphate
40- 50	<u>Sand</u>	- medium to coarse grain and pebbly, clear; much phosphate
50- 60		- clayey, fine to medium, some coarse and pebbly, grey; phosphate
60- 65		- more clayey
65- 70	<u>Clay</u>	- sandy, slightly pebbly, green grey; phosphate
70- 75		- very sandy, fine to silty; phosphate
75- 85		- sandy, silty, green grey; phosphate
85- 90	<u>Sand</u>	- fine grain, clayey, phosphate specks
90- 95	<u>Clay</u>	- sandy, fine grain, silty, green grey; phosphate
95-100		- slightly sandy, grey green; phosphate
100-110		- silty, sticky, pale green grey; phosphate
110-120		- slightly limey, pebbly; phosphate
120-130	<u>Sand</u>	- fine to medium, clear; and sandstone - limey, cherty, very fine, tight; phosphate (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA16

0- 15	<u>Sand</u>	- fine grain, silty, some medium to coarse, dark brown
15- 25		- light brown to clear, some quartz pebbles
25- 30		- slightly silty, trace phosphate
30- 35		- slightly clayey, medium coarse grain and pebbly, green grey; some phosphate
35- 40		- dark grey; more phosphate
40- 55		- slightly limey; phosphate
55- 75	<u>Clay</u>	- sandy, silty, slightly waxy, dark grey green; phosphate
75- 80		- waxy, green
80- 85		- slightly limey, slightly sandy, pale green grey; phosphate
85- 90	<u>Marl</u>	- sandy, pale green grey; phosphate
90-105	<u>Clay</u>	- waxy, green; some phosphate
105-120	<u>Marl</u>	- soft, slightly silty, pale grey to cream; phosphate
120-130	<u>Dolomite</u>	- dense to finely sucrosic, cherty, pale green; trace sand - clear; phosphate (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA18

0- 15	<u>Sand</u>	- fine, silty, some medium to coarse grain, grey brown
15- 20		- same, some pebbles
20- 25		- mostly fine grain
25- 30		- fine, some medium to coarse, clear; phosphate
30- 40	<u>Clay</u>	- marly, sandy, soft, buff; phosphate
40- 45	<u>Sand</u>	- clayey, fine grain, buff grey; phosphate
45- 50	<u>Clay</u>	- sandy, soft, green; phosphate
50- 55	<u>Sand</u>	- clayey, fine to silty, some pebbles; phosphate
55- 60		- fine, silty, to medium and coarse, pebbles, grey buff; phosphate
60- 70	<u>Clay</u>	- sandy (fine to silty), green grey; phosphate
70- 75		- compact, waxy, dark green
75- 80		- slightly sandy
80- 85	<u>Sand</u>	- fine to medium, clayey, green grey; phosphate
85- 90		- some coarse to pebbly, grey green; phosphate
90- 95	<u>Clay</u>	- compact, waxy, pebbly, light grey green
95-100		- slightly sandy, silty
100-105		- same, trace chert; phosphate
105-110		- sandy, silty, soft, grey green; phosphate
110-120	<u>Sand</u>	- clayey, silty, slightly limey, green grey; phosphate
120-125	<u>Clay</u>	- silty, limey, slightly pebbly, yellow green
125-128	<u>Sand</u>	- fine to coarse and pebbly, clear; phosphate
128-130	<u>Limestone</u>	- dense, hard, cream; chert; conglomerate - (quartz and phosphate), (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA19

0- 20	<u>Sand</u>	- fine grain, some medium to coarse and pebbly, silty, brown
20- 25		- same, some large quartz pebbles
25- 30		- slightly clayey
30- 35		- very fine, silty, pebbles (quartz and phosphate)
35- 45	<u>Marl</u>	- soft, silty, pebbly (quartz and phosphate)
45- 55		- silty, sandy; clay - slightly waxy, green
55- 60		- quite sandy; clay - waxy, green, phosphate
60- 70	<u>Clay</u>	- slight silty, slightly marly, gy; clay - waxy, dark green; phosphate
70- 80	<u>Marl</u>	- chalky, quartz, and phosphate grains and pebbles, cream
80- 85		- and conglomerate (quartz and phosphate pebbles)
85- 95	<u>Clay</u>	- waxy, slightly calcareous, pebbly, grey green; phosphate
95-100		- same, some marl - silty, pebbly
100-105	<u>Marl</u>	- silty, sandy, pebbly, light grey; phosphate
105-120		- soft, chalky, pebbly (quartz and phosphate), cream buff
120-125	<u>Limestone</u>	- chalky, cream; marl - as above; phosphate
125-130		- marly, slightly pebbly, cream buff; phosphate (TD)

Table 5.--Geologic logs of selected wells - continued

Shallow artesian aquifer test well SA23

0- 10	<u>Sand</u>	- fine grain, silty, some medium to coarse, brown
10- 20		- light brown, some pebbles
20- 25		- fine grain, clayey, some medium to coarse and pebbly, green
25- 35		- more clayey; sandy clay
35- 40	<u>Clay</u>	- sandy, fine to very coarse and pebbly; much phosphate
40- 45	<u>Sand</u>	- slightly clayey, fine to medium; phosphate
45- 70	<u>Clay</u>	- some waxy, slightly sandy in part, some pebbly, stickey when wet, grey green; phosphate
70- 75		- some sandy streaks
75- 85	<u>Sand</u>	- fine grain, clayey, green grey; phosphate
85-100	<u>Clay</u>	- slightly waxy, stickey, green; phosphate
100-110		- silty, pebbly, slightly limey; phosphate
110-115	<u>Dolomite</u>	- sugary, buff brown; phosphate pebbles; some clay - compact, green
115-120	<u>Limestone and Chert</u>	- dense, hard, cream buff and grey; phosphate
120-125	<u>Limestone</u>	- marly, or marl, soft, buff
125-130	<u>Clay</u>	- soft, specked with phosphate, grey to green grey (TD)

Table 6.--Drillers' logs of wells

Verna Well Field Production Well P1

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	14	14
Hardpan, water surface high in acidity	3	17
Sand	40	57
Green clay	2	59
Sandy shell, phosphate	20	79
Green clay	6	85
Soft rock	2	87
Green clay	3	90
Green clay, soft rock	10	100
Green clay	10	110
Hard rock	10	120
White clay, hard rock	16	136
Green clay, water here	4	140
Rock	4	144
Green clay	4	148
Rock, water at 191 ft	45	193
Clay	2	195
Lime rock	12	207
Soft rock, clay	10	217
Clay	3	220
Rock	10	230
Clay	10	240
Rock	13	253
White clay, water at 264 ft	20	273
Rock	20	293
Clay	10	303
Rock, water at 312 ft	14	317
Clay	17	334
Rock (flint)	10	344
Clay	1	345
Rock	15	360
Clay	3	363
Rock	17	380
Clay	10	390
Hard brown lime rock	55	445
Hard brown rock	6	451
Soft lime mud	2	453
Gummy lime rock, mud	6	459
Hard white lime rock	5	464
Gummy white lime, mud	7	471
Soft grey lime rock	5	476
Hard grey rock	10	486
Grey mud, fine sand	5	491
Hard light brown rock	16	507

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P1 - continued

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Hard light tan rock	6	513
Hard white lime rock	8	521
Second drilling		
Clay, rock	5	526
Lime rock	5	531
Soft brown lime rock	30	561
Third drilling		
Hard brown lime rock	4	570
Hard brown lime rock	15	585
Medium hard brown lime rock	5	590
Soft white lime rock	10	600

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P2

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	15	15
Hardpan	35	50
Sand, phosphate	35	85
Green clay	9	94
Soft rock	6	100
Sand	10	110
Clay	10	120
Soft rock	3	123
Rock (hard)	4	127
Clay	2	129
Rock	3	132
Clay	2	134
Rock	1	135
Green clay, incased at 141 ft	5	140
Clay	5	145
Hard rock	15	160
Soft lime rock	12	172
Hard rock	6	178
Clay	9	187
Hard rock	13	200
Soft lime rock	15	215
Hard rock	15	230
Salt and pepper sand	5	235
Hard rock	25	260
Soft lime rock	10	270
Hard rock	45	315
Soft lime rock	15	330
Hard rock	10	340
Lime rock	15	355
Clay	15	370
Hard rock	30	400
Soft lime rock	85	485
Hard lime rock	8	493
Second drilling		
Soft lime rock	40	533
Soft lime rock, clay	7	540
Medium hard brown lime rock	10	550
Soft brown lime rock, clay	5	555
Soft brown lime rock, clay	5	560
Hard brown lime rock	3	563
Cavity	2	565
Brown water sand	3	568
Hard brown lime rock	7	575
Hard light brown lime rock	17	592
Soft light brown lime rock	15	607

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P3

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	15	15
Hardpan	25	40
Sand, shale	55	95
Shale, sand, phosphate	10	105
Green clay	3	108
Gravel rock	7	115
Green clay	9	124
Hard rock	13	137
Green clay	3	140
Hard brown rock	60	200
Rock, phosphate	80	280
Medium hard lime rock	20	300
Rock, mud	100	400
Soft lime rock	96	496
Medium hard lime rock	4	500
Second drilling		
Soft lime rock	5	505
Hard white lime rock	11	516
Soft white lime rock	3	519
Hard white lime rock	4	523
Soft white lime rock	7	530
Third drilling		
Medium soft light brown lime rock	20	550
Hard light brown lime rock	10	560
Hard light brown lime rock	2	562
Medium hard light brown lime rock	5	567
Hard light brown lime rock	1	568
Medium soft light brown lime rock	9	577
Green shale	3	580
Soft light brown lime rock	10	590
Hard light brown lime rock	3	593
Soft light brown lime rock	4	597
Medium hard light brown lime rock	3	600
Soft light brown rock	9	609

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P4

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	5	5
Hardpan	15	20
Sand, phosphate	35	55
Gravel, phosphate	20	75
Clay	25	100
Rock	7	107
Clay	10	117
Rock	3	120
Clay	2	122
Rock	10	132
Clay	2	134
Rock	4	138
Clay	2	140
Hard grey lime rock	20	160
Hard grey lime rock	40	200
Medium hard white lime rock	40	240
Rock, mud	160	400
Soft white rock	60	460
Soft white lime rock	40	500
Second drilling		
Grey sand	8	508
Grey water sand	10	518
Brown lime rock	3	521
Brown clay	1	522
Hard brown lime rock	4	526
Brown clay with flint	1	527
Hard brown lime rock	6	533
Medium hard white lime rock	2	535

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P5

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	35	35
Clay	5	40
Phosphate, sand	35	75
Clay	13	88
Rock	5	93
Clay	4	97
Gravel, phosphate	3	100
Clay	15	115
Rock	10	125
Clay	3	128
Rock	2	130
Clay	10	140
Clay	10	150
Rock	75	225
Soft lime rock	20	245
Hard rock	20	265
Salt and pepper sand	2	267
Hard rock	11	278
Flint rock	5	283
Hard brown rock	31	314
Soft lime rock	36	350
Hard lime rock	25	375
Soft lime rock	25	400
Hard brown rock	50	450
Soft lime rock	30	480
Hard brown rock	13	493
Soft white lime rock	10	503
Second drilling		
Soft brown lime rock	10	513
Medium hard brown lime rock with flint	10	523
Soft brown lime rock	10	533
Soft brown lime rock, sand	5	538
Third drilling		
Medium hard light brown lime rock	12	550
Soft light brown lime rock	10	560
Hard brown flint	2	562
Green shale	2	564
Hard light brown lime rock	4	568
Green shale	2	570
Soft light brown lime rock	10	580
Hard light brown lime rock	5	585
Soft light brown lime rock	21	606

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P6

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	5	5
Hardpan	10	15
Sand, phosphate	65	80
Clay	10	90
Rock	5	95
Hard rock	4	99
Clay	31	130
Rock	5	135
Clay	5	140
Hard grey rock	40	180
Medium soft grey rock	60	240
Rock, mud	80	320
Soft rock, phosphate	40	360
Medium hard rock	40	400
Soft white lime rock	40	440
Medium hard white lime rock	40	480
Soft white lime rock	20	500
Second drilling		
Soft white lime rock	5	505
Hard white lime rock	10	515
Hard white lime rock	10	525
Hard brown lime rock	15	540
Salt and pepper lime rock	5	545
Soft brown lime rock	5	550
Hard brown lime rock	10	560
Grey lime rock	13	573
Cavity	3	576
Soft brown and grey lime rock	19	595
Soft light brown lime rock	5	600

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P7

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Fine sand	60	60
Phosphate, pepper sand	20	80
Rock	20	100
Rock, sand	20	120
Phosphate, lime	15	135
Rock, hard lime	5	140
Lime, clay	1	141
Hard grey rock	79	220
Soft lime rock	40	260
Hard grey lime rock	20	280
Rock, mud	20	300
Blue mud	20	320
Mud, rock	60	380
Soft white lime rock	120	500

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P8

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	10	10
Shell	12	22
Shell, trace of phosphate	28	50
Clay	15	65
Gravel, phosphate	35	100
Clay	20	120
Rock	5	125
Clay	5	130
Rock	5	135
Clay	5	140
Hard brown rock	20	160
Hard grey rock	40	200
Soft white lime	80	280
Hard white lime	60	340
Rock, clay	40	380
Soft white lime rock	120	500
Second drilling		
Soft white lime rock	5	505
Hard white lime rock	25	530
Hard brown lime rock	10	540
Soft white lime rock	15	555
Hard brown lime rock	5	560
Hard white lime rock	5	565
Hard brown lime rock, clay	5	570
Hard brown lime rock, clay	5	575
Soft white lime rock	10	585

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P9

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	40	40
Clay	2	42
Sand	21	63
Clay	3	66
Phosphate, sand	46	112
Rock	2	114
Clay	6	120
Rock	10	130
Clay	2	132
Rock	4	136
Clay	4	140
Hard rock, clay	20	160
Hard grey rock	100	260
Rock, mud	60	320
Soft grey rock	35	355
Hard brown flint	5	360
Medium hard rock	20	380
Soft grey rock	80	460
Hard lime rock	20	480
Soft white lime rock	20	500
Second drilling		
Soft light brown lime rock	10	510
Soft brown rock	10	520
Hard brown rock	5	525
Hard brown lime rock	5	530
Medium hard lime rock, clay	10	540
Coarse brown lime rock	5	545
Soft white lime rock	11	556
Hard brown lime rock	7	563
Soft white lime rock	7	570

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P10

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Fine brown sand	20	20
Fine sand	20	40
Pepper sand	40	80
Phosphate, lime	15	95
Grey clay, lime	15	110
Clay rock	5	115
Rock	5	120
Hard lime	10	130
Clay	11	141
Hard grey rock	59	200
Medium hard rock	20	220
Soft rock, mud	60	280
Soft grey rock	60	340
Soft rock, phosphate	60	400
Soft white lime rock	100	500
Second drilling		
White clay	3	503
Brown lime, clay, some flint	10	513
Medium hard light brown lime rock	15	528
Hard brown lime rock	8	536
Medium light brown lime rock	4	540

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P11

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	40	40
Green sand	10	50
Green sand, clay	12	62
Green sand, little clay	8	70
Green sandy clay, gravel	10	80
Sandy white clay (water)	2	82
Green sandy clay	13	95
Hard grey clay, sand	14	109
Green grey clay	9	118
Grey clay	7	125
Light green clay	5	130
Hard green clay	7	137
Light green rock	3	140
Grey clay, rock	10	150
Grey clay, white rock	10	160
Green clay	10	170
Grey and white clay, rock	10	180
White sandy clay, rock	10	190
White clay rock (water)	30	220
White sandy clay, rock	10	230
Grey sandy clay	20	250
Grey clay, rock	15	265
Light grey clay, rock	5	270
White clay	10	280
Light grey clay, rock (water)	20	300
Light sandy grey clay, rock	30	330
Grey brown clay	7	337
Grey clay	3	340
Light grey clay, gravel	10	350
Light grey clay, rock	10	360
Green clay, white rock, white clay	10	370
Light grey clay, rock	30	400
White clay, white rock	30	430
White clay, brown rock	20	450
White clay, white rock (water)	90	540
Brown rock, light green clay	10	550
Grey clay, green clay, white rock	10	560
White clay, white rock	70	630
White clay, brown rock	40	670
White clay, light brown rock	30	700
White clay, white rock (hard)	40	740

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P11 - continued

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Light brown rock, light brown clay	10	750
White clay, white rock	10	760
White clay, brown rock	10	770
Light brown light grey rock, white clay	10	780
Sealed here		
	10	790
Light brown rock, light brown clay	50	840
Light brown shell	10	850
Soft white clay, light tan rock	50	900
Light tan clay, light tan rock	90	990
Hard brown rock	72	1,062
Brown sandy rock	11	1,073

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P12

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	3	3
Brown and black hardpan	25	28
Blue and white clay, some sand	2	30
Blue clay, sand	15	45
Blue clay, black pebble rock	25	70
Black pebble rock, white clay	15	85
Blue clay, sand	5	90
Rock chords	1	91
Tough blue clay	10	101
Rock	1	102
Blue clay, some white	3	105
Rock	2	107
White clay, thin streaks of rock, water at 112 ft	3	110
Hard rock	12	122
Blue clay, rock streaks	1	123
Blue clay and pepper	3	126
Rock	2	128
Blue clay and pepper	1	129
Rock	5	134
Blue clay	2	136
Rock	2	138
White and blue clay, water at 268 ft	41	179
Rock	60	239
Clay, white lime (water)	20	259
Grey clay, lime	40	299
Phosphate, clay (water)	40	339
Grey clay	20	359
Grey lime, sandy	20	379
White lime clay	20	399
Brown lime	49	448
Suwannee lime	2	450
Second drilling		
Hard grey lime rock	5	455
Salt and pepper lime rock	10	465
Salt and pepper lime rock	10	475
Hard brown flint	5	480
Soft brown lime rock	5	485
Hard brown lime rock	18	503
Cavity	2	505
Hard light brown lime rock	15	520
Medium hard light brown lime rock	20	540
Soft light brown lime rock	2	542

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P13

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Fine sand	10	10
Yellow sand	10	20
Fine sand	18	38
Pepper sand	12	50
Grey clay	10	60
Phosphate	10	70
Grey clay	10	80
Lime clay	10	90
Hard lime	3	93
Grey clay	7	100
Grey lime, clay	10	110
Hard rock	4	114
Grey rock	6	120
Hard rock	5	125
Grey clay	5	130
Sand, grey clay	12	142
Medium hard rock	38	180
Rock, mud	80	260
Rock, mud	160	420
Soft brown lime rock	20	440
Soft light brown lime rock	20	460
Medium hard white lime rock	40	500
Hard white lime rock	15	515
Soft white lime rock	5	520

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P14

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Grey sand	10	10
Sand rock	13	23
Clay, sand	7	30
Sand, grey clay	20	50
Phosphate, sand	20	70
Phosphate, grey clay	10	80
Grey clay	10	90
Hard rock	2	92
Grey clay	18	110
Limestone	10	120
Sandstone	10	130
Sandstone, clay	13	143
Medium hard grey lime	4	147
Gummy grey lime	9	156
Blue clay hard	5	161
Medium hard rock	9	170
Hard rock	5	175
Medium soft grey lime	20	195
Hard rock, flint	5	200
Gummy white lime	28	228
Medium hard lime, phosphate	72	300
Medium hard	10	310
Medium hard gummy	10	320
Hard gummy	10	330
Blue morrel rock	20	350
Hard white lime rock	30	380
Medium hard lime rock	5	385
Hard lime rock	5	390
Soft lime rock	5	395
Soft lime rock	15	410
Soft lime rock, water at 420 ft	20	430
Brown lime rock	5	435
Extra hard lime rock	5	440
Hard lime rock	20	460
Hard white lime rock, water at 410 ft	10	470
Hard brown lime rock	5	475
Hard brown lime rock	10	485
Soft brown lime rock	5	490
Soft light brown lime rock	5	495
Second drilling		
Medium hard light brown lime rock	3	498
Green shale	4	502

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P14 - continued

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Hard brown flint	6	508
Medium hard light brown lime rock	2	510
Soft light brown lime rock	2	512
Hard light brown lime rock	25	537
Hard light brown lime rock	8	545
Hard light brown lime rock	6	551
Mixed gravel	2	553
Hard light brown lime rock	2	555
Medium hard grey lime rock	10	565
Soft light grey lime rock	13	578

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P15

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand, clay	10	10
Fine sand	30	40
Pepper sand	20	60
Grey clay	20	80
Hard rock	4	84
Grey clay, phosphate	6	90
Grey clay	10	100
Rock	30	130
Grey clay	13	143
Rock, mud	37	180
Soft lime rock	40	220
Rock, mud	20	240
Blue mud, rock	20	260
Rock, mud	60	320
Hard rock	20	340
Medium rock	80	420
Soft white lime rock	40	460
Hard lime rock	10	470
Cavity (no water) (lost mud)	10	480
Hard lime rock	20	500

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P16

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	4	4
Hardpan	4	8
Sand	11	19
Clay	3	22
Sand	18	40
Sand, phosphate	30	70
Clay	6	76
Gravel, phosphate	7	83
Clay	15	98
Rock	1	99
Clay	6	105
Rock	27	132
Clay	2	134
Rock	6	140
Hard rock	35	175
Flint rock	5	180
Hard rock	20	200
Soft lime rock	23	223
Hard lime rock	17	240
Soft lime rock	15	255
Hard rock	25	280
Clay	5	285
Hard rock	10	295
Flint rock	5	300
Soft lime rock	10	310
Hard rock	5	315
Soft lime rock	20	335
Clay	11	346
Hard rock	84	430
Flint rock	5	435
Soft lime rock	8	443
Hard rock	10	453
Soft lime rock	5	458
Hard rock	17	475
Brown water rock	20	495
Soft white lime rock	8	503

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P17

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	6	6
Clay, sand, phosphate	54	60
Blue clay	25	85
Rock	2	87
Clay	29	116
White lime	24	140
Streaks of blue clay	5	145
Blue clay	35	180
White lime	60	240
Sand, grey clay	30	270
Phosphate, lime, clay	30	300
Phosphate, lime	40	340
Sand, clay	60	400
Little grey clay	44	444
Suwannee, lime	12	456
Second drilling		
Hard light brown lime rock	8	464
Green shale, clay	5	469
Medium hard light brown lime	8	477
Medium soft light brown lime	3	480
Very soft light brown lime	2	482
Hard brown flint	1	483
Hard brown lime, flint	5	488
Medium hard light brown lime rock	2	490
Soft white lime rock	10	500

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P18

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand, some rock	20	20
Clay, shell, phosphate	66	86
Rock	2	88
Clay	12	100
Rock	12	112
Clay	2	114
Rock	24	138
White clay	2	140
Hard grey rock	20	160
Medium hard white rock	60	220
White rock, mud	100	320
Hard grey rock	20	340
Rock, blue mud	20	360
Soft white lime rock	40	400
Hard white rock	40	440
Soft white lime rock	40	480
Hard white rock	20	500
Soft white lime rock	15	515

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P19

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	30	30
Black rock	1	31
Clay	39	70
Rock	5	75
Clay	3	78
Rock	4	82
Clay	13	95
Rock	4	99
Clay	4	103
Rock	2	105
Clay	5	110
Rock	19	129
Clay	11	140
Rock	65	205
Lime rock	15	220
Rock	1	221
Salt and pepper sand	4	225
Lime rock	3	228
White clay	10	238
Flint rock	2	240
Rock	30	270
Lime rock	30	300
White clay	36	336
Lime rock	7	343
Hard rock	2	345
Lime rock	40	385
Rock	11	396
Lime rock	44	440
Hard lime rock	58	498
Soft lime rock	5	503

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P20

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	5	5
Hardpan	15	20
Clay	3	23
Sand, phosphate	32	55
Clay	4	59
Rock	2	61
Clay	12	73
Rock	2	75
Clay	37	112
Rock	3	115
Hard rock	7	122
Clay	7	129
Rock	1	130
Clay	5	135
Rock	5	140
Hard white lime rock	20	160
Rock, mud	40	200
Medium white lime rock	20	220
Grey mud, lime rock	50	270
Blue mud	10	280
White lime	20	300
Hard white lime	40	340
Rock, mud	60	400
Soft white lime	40	440
Soft white lime rock	60	500

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P21

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	2	2
Hardpan	2	4
Clay	31	35
Shell, phosphate	5	40
Clay	6	46
Rock	2	48
Clay	22	70
Rock	2	72
Clay	28	100
Rock	25	125
Clay	5	130
Rock	8	138
Clay	2	140
Hard rock	50	190
Clay	5	195
Soft lime rock	28	223
Hard lime rock	2	225
Soft lime rock	20	245
Medium hard rock	23	268
Clay	5	273
Lime rock	15	288
Clay	6	294
Soft lime rock	6	300
Clay	30	330
Rock	50	380
Hard rock	10	390
Lime rock	20	410
Brown water rock	25	435
Hard lime rock	50	485
Brown flint	8	493
Soft white lime rock	10	503

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P22

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	2	2
Hardpan	2	4
Clay	2	6
Sand	29	35
Sand, phosphate	30	65
Clay	5	70
Rock	13	83
Clay	11	94
Rock	26	120
Clay	8	128
Rock	2	130
Clay	3	133
Rock	3	136
Clay	4	140
Rock	45	185
Soft lime rock	35	220
Rock	40	260
Flint rock	26	286
Salt and pepper sand	2	288
Hard rock	12	300
Clay	3	303
Soft rock	17	320
Hard rock	80	400
Salt and pepper sand	2	402
Lime rock	35	437
Hard white rock	50	487
Soft white rock	18	505

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P23

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	10	10
Hardpan	10	20
Phosphate, sand	20	40
Phosphate, sand, shale	6	46
Clay	4	50
Rock	2	52
Phosphate, sand	9	61
Clay	9	70
Rock	3	73
Clay	2	75
Rock	3	78
Salt and pepper sand	9	87
Clay	3	90
Rock	2	92
Phosphate, gravel	8	100
Clay	5	105
Rock	2	107
Clay	6	113
Rock	7	120
Clay	15	135
Rock	6	141
Soft lime rock	59	200
White rock, phosphate	35	235
Extra hard grey rock	5	240
Hard grey rock	20	260
Rock, clay	40	300
Hard rock	20	320
Soft rock, mud	60	380
Soft lime rock	60	440
Soft white lime rock	60	500

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P24

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Fine sand	20	20
Grey sand	10	30
Pepper sand	20	50
Phosphate	10	60
Grey lime, clay	10	70
Rock, little clay	5	75
Blue clay	23	98
Rock	2	100
Rock, blue clay	5	105
Blue clay	9	114
Rock	16	130
Grey clay	12	142
Hard rock, clay	29	171
Medium hard rock, mud	9	180
White mud	20	200
White mud, soft lime	50	250
Hard white lime	10	260
Light grey mud	10	270
Hard grey rock	40	310
Blue clay	10	320
Rock, mud	60	380
Rock, gravel	60	440
Hard white lime rock	20	460
Medium hard white rock	40	500

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P25

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Grey sand	20	20
Grey sand, phosphate	20	40
Phosphate	10	50
Phosphate, sand	10	60
Iron rock	5	65
Blue clay	5	70
Hard lime clay	5	75
Grey clay, lime	5	80
Grey clay	10	90
Grey rock	10	100
Grey rock, clay	19	119
Clay	1	120
Clay, lime	10	130
Rock	11	141
Grey lime rock	29	170
Soft lime rock, clay	15	185
Grey mud	15	200
Clay, sand	9	209
White rock, clay	11	220
Phosphate, clay	5	225
Grey clay, lime rock	15	240
White hard lime rock	10	250
White mud, water at 260 ft	10	260
Hard white rock, mud	10	270
Blue clay	30	300
Grey mud	20	320
White soft lime rock	120	440
Hard white lime rock	20	460
Soft white lime rock	40	500

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P26

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	5	5
Hardpan	19	24
Sand	40	64
Phosphate, sand	21	85
Grey clay	15	100
Hard lime rock	12	112
Grey clay	6	118
Rock	10	128
Grey clay	13	141
White lime, clay	19	160
Sandy grey clay	15	175
Hard lime rock	3	178
Sandy clay	17	195
Grey lime, clay	5	200
Sandy lime, clay	20	220
Grey sandy clay	11	231
Hard lime rock	4	235
Hard lime rock	9	244
Soft lime rock	16	260
Hard lime rock	5	265
Soft lime rock, clay	5	270
Blue clay	10	280
Grey clay	10	290
Hard lime rock	24	314
Blue clay	24	338
Hard lime rock	2	340
Grey clay	20	360
Grey clay	8	368
White lime, clay	19	387
Grey lime, clay	13	400
White lime, clay	10	410
Rock	4	414
White hard lime rock	16	430
White sandy lime rock	10	440
Hard white lime rock	10	450
Soft white lime rock	7	457
Water cavity, lost mud	3	460

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P27

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Muddy sand	15	15
Clay	3	18
Sand	24	42
Sandy clay	18	60
Clay	33	93
Rock	5	98
Clay	5	103
Rock	2	105
Clay, sand, shell rock	5	110
Clay rock	7	117
White lime hard	2	119
White lime hard	22	141
Lime rock	5	146
White lime soft	6	152
Lime, clay streaks	13	165
Lime hard	4	169
Lime, clay streaks	6	175
Lime hard	3	178
Lime medium soft streaks	92	270
Hard lime	8	278
Hard lime, clay streaks	32	310
White lime, soft	17	327
Blue clay	3	330
Lime rock, clay streaks	20	350
Lime sand, clay streaks	6	356
White lime rock	24	380
Hard lime rock	6	386
Soft lime rock	10	396
Hard lime rock	4	400
Medium lime rock	30	430
Soft lime rock	12	442
Medium lime, clay streaks	5	447
Hard lime rock	9	456
Lime rock, clay streaks	19	475
Soft lime rock	127	602
Shell rock	18	620
Light brown lime, soft	160	780
Light brown lime, some white, soft	49	829
Light brown lime, medium	168	997
White lime, soft	26	1,023
Brown lime, hard streaks	49	1,072
Brown lime, soft	95	1,167
White lime, soft	6	1,173
Brown lime, soft	17	1,190
Dark brown lime rock (hard)	1	1,191

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P28

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	10	10
Hardpan	20	30
Phosphate, gravel	35	65
Clay	13	78
Rock	3	81
Clay	7	88
Rock	6	94
Salt and pepper	2	96
Clay	9	105
Rock	2	107
Clay	7	114
Rock	11	125
Clay	5	130
Rock	1	131
Clay	2	133
Rock	7	140
Grey lime, clay	19	159
Grey clay	20	179
Grey lime	20	199
Fine sand, clay	20	219
Brown lime, water at 239 ft	60	279
Grey lime	20	299
Blue clay	20	319
Sandy clay	20	339
Grey clay	40	379
Sandstone	20	399
Sand, clay, water, lost mud pit	40	439
Grey clay	34	473
Suwannee, lime	1	474

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P29

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	10	10
Hardpan	25	35
Sand, trace of phosphate	20	55
Shell, phosphate	5	60
Shall, phosphate, gravel	8	68
Green clay	10	78
Rock	1	79
Green clay	14	93
Rock	5	98
Clay	6	104
Rock, water at 110 ft	6	110
Clay	8	118
Rock	4	122
Clay	8	130
Rock	4	134
Black grey sand	5	139
Grey lime, hard, water	40	179
Black sandy lime	40	219
Grey clay, white lime	20	239
Grey clay	40	279
White and grey clay	40	319
White lime, sand	80	399
Hard lime, brown	20	419
Brown hard lime	20	439
Sand, brown lime	40	479
Sand, soft lime rock	2	481

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P30

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	45	45
Green sand, clay	5	50
Green clay	20	70
Green clay, sand	10	80
Light green sand, clay	20	100
Green sand, clay	10	110
Light green clay	10	120
Light green rock	30	150
Green clay	10	160
Light green clay, rock (water)	20	180
Soft grey rock, clay	20	200
Grey clay	10	210
Soft lime rock, green clay	10	220
Green sandy clay	20	240
Grey clay, rock	10	250
Green clay	10	260
Light green clay	30	290
Hard green clay	20	310
Soft green clay	10	320
Soft grey clay	30	350
Grey sandy clay	10	360
Grey sandy lime	10	370
Lime rock, sandy clay	10	380
Sandy lime rock	20	400
Hard lime clay	20	420
Hard clay, brown quartz, water	5	425

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P31

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Grey sand	10	10
Brown sand	20	30
Grey sand	20	50
Pepper sand	10	60
Pepper sand, clay	10	70
Phosphate	10	80
Blue clay	35	115
Rock, blue flint	1	116
Blue clay	24	140
Rock	1	141
Rock, water at 160 ft	19	160
Grey lime rock	10	170
Phosphate, lime rock	10	180
Hard lime rock	20	200
White lime rock	10	210
Phosphate, lime rock	10	220
White lime rock	5	225
Grey clay	5	230
Hard lime rock, clay	6	236
Hard lime rock	4	240
Phosphate, mud	10	250
Hard, stiff grey mud	21	271
Hard blue mud	9	280
Hard grey lime rock	23	303
Light grey lime rock	17	320
Light grey lime rock, mud	12	332
Heavy lime mud, white rock	9	341
Hard grey lime rock	9	350
Gummy grey mud	14	364
Light brown lime rock	7	371
Hard white lime rock	14	385
Hard white lime, some spots	11	396
Hard brown lime rock	21	417
Soft brown lime rock	6	423
Hard lime rock	2	425
Soft brown and grey lime rock	5	430
Soft brown lime rock	7	437
Hard brown and grey rock	9	446
Soft white and brown lime rock	49	495
Hard white lime rock, shell	8	503
Soft white lime rock, shell	51	554
Hard white lime rock	9	563
Soft lime rock, shell	20	583
Hard lime rock	6	589
Soft lime rock with some hard spots	11	600

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P32

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	20	20
Fine grey sand	40	60
Pepper sand	15	75
Lime clay	5	80
Phosphate, clay	8	88
Blue clay	12	100
Sandy blue clay	12	112
Phosphate, blue clay	6	118
Hard lime rock	2	120
Grey lime rock, clay	21	141
Salt and pepper lime rock	11	152
Green mud	11	163
Hard white lime rock	11	174
Grey lime, mud	7	181
Hard white lime rock	19	200
Soft white lime rock	6	206
Hard lime rock	19	225
Green mud	9	234
Hard grey lime rock	8	242
Stiff grey mud	27	269
Stiff green mud	6	275
Grey and white lime rock	18	293
Hard grey mud, gravel	8	301
Hard white lime rock	23	324
Hard lime rock	16	340
Hard grey lime rock	18	358
Hard brown lime rock	7	365
Hard green lime rock, mud	7	372
Hard white mud	9	381
Hard white lime rock	47	428
Hard brown and grey lime rock	11	439
Soft white lime rock	53	492
Hard white lime rock	9	501
Soft light brown lime rock	56	557
Hard white lime rock	6	563
Soft white lime rock, water at 575 ft	12	575
Soft light brown lime rock	22	597
Hard white lime rock	3	600

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P33

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Fine brown sand	40	40
Sandy blue clay	20	60
Phosphate, grey clay	10	70
Sandy blue clay	10	80
Blue clay	20	100
Rock	6	106
Blue clay	9	115
Rock	17	132
Blue clay, lime rock	5	137
Hard grey lime rock	1	138
Hard grey rock	102	240
Rock, mud	120	360
Soft white lime rock	210	570
Medium hard lime rock	30	600

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P34

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Fine brown sand	60	60
Blue clay	5	65
Hard lime rock, blue clay	15	80
Sandy clay	30	110
Hard lime rock, clay	8	118
Hard lime rock	10	128
Sandy lime, clay	2	130
Hard lime rock	5	135
White sandy lime rock, grey clay	4	139
Hard grey lime rock	8	147
Green mud	29	176
Hard lime rock	18	194
Light grey mud	14	208
Hard white lime rock	8	216
Light grey mud	43	259
Hard green mud, gravel	11	270
Hard grey lime rock	7	277
Stiff grey mud	22	299
Hard white lime rock	7	306
Hard stiff lime mud	17	323
White lime rock	11	334
Hard stiff lime, mud	11	345
Hard stiff brown mud	5	350
Hard stiff white lime, mud	10	360
Hard white lime rock (water)	13	373
Hard brown lime rock (water)	24	397
Stiff lime mud	6	403
Hard lime rock	17	420
Soft white lime rock	6	426
Hard white lime rock	8	434
Soft brown lime rock	58	492
Hard white lime rock	10	502
Soft white lime rock	35	537
Light grey lime rock	12	549
Hard white lime rock (water)	34	583
Soft light tan lime rock	17	600

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P35

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	70	70
Blue sandy clay	20	90
Blue clay, lime rock	10	100
Phosphate, clay	18	118
White lime rock	2	120
Hard lime rock, grey clay	12	132
Grey clay, lime rock	9	141
Stiff green mud	24	165
Stiff grey mud	8	173
Hard grey lime rock	9	182
Soft white lime rock	12	194
Hard white lime rock	9	203
Hard stiff white lime mud	11	214
Stiff grey mud	65	279
Hard stiff grey mud	53	332
Hard white and grey lime rock	3	335
Hard stiff blue mud	8	343
Hard stiff grey mud	14	357
Hard light grey lime rock	9	366
Soft white lime rock	8	374
Stiff white lime rock	11	385
Hard white lime rock	24	409
Soft white lime rock	50	459
Hard white lime rock	6	465
Soft white lime rock	18	483
Hard white lime rock	7	490
Soft brown lime rock (water)	59	549
Soft white lime rock	51	600

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P36

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Installed 12 in casing (122'8")	120	120
Hard rock	3'6"	123.6
Light grey clay	6'8"	130
Light green clay, rock (water)	16	146
Green clay, rock	4	150
Light green clay, rock	10	160
Grey clay	3	163
Hard rock	3	166
Grey clay	4	170
Medium hard white rock	2	172
Hard grey clay	2	174
Medium hard white rock	1	175
Grey clay	16	191
Medium hard white rock	4	195
White clay	25	220
Grey sandy clay	29	249
Medium hard rock	3	252
Grey sandy clay	4	256
Medium hard rock	2	258
Grey sandy clay	3	261
Medium hard rock	1	262
Grey sandy clay	8	270
Blue clay, gravel	10	280
Grey sandy clay	3	283
Hard rock	2	285
Grey sandy clay	6	291
Hard rock	1	292
White clay	3	295
Hard rock	1	296
White clay	4	300
Hard white clay	7	307
Medium hard rock	2	309
Grey clay, gravel	6	315
Medium hard rock	2	317
Grey clay	4	321
Medium hard rock	1	322
Grey clay	8	330
White clay	5	335
Hard rock	2	337
White clay	3	340
Hard white clay	19	359
Medium hard white rock	1	360
Hard white clay	5	365

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P36 - continued

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Hard brown quartz	2	367
Hard white clay	3	370
Soft white and grey clay, gravel (water)	10	380
Soft white rock	3	383
Hard white clay	3	386
Medium hard white rock	4	390
White clay	7	397
Hard brown clay	1	398
White clay	18	416
Hard brown rock	4	420
Hard white clay	4	424
Soft brown rock	1	425
White clay	6	431
Medium hard brown rock	3	434
White clay	27	461
Medium hard brown rock	2	463
White clay	4	467
Medium hard brown rock	2	469
White clay	19	488
Hard brown rock	8	496
Light brown clay, soft rock	14	510
White clay, soft brown rock	10	520
Soft light brown rock	10	530
Light brown clay, soft rock	10	540
White clay, soft brown rock	18	558
Hard brown rock	1	559
White clay, soft brown rock	11	570

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P37

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	15	15
Brown sand, gravel (water)	2	17
Brown sand	11	28
Green clay	8	36
Green clay, sand, phosphate	11	47
Light green clay, sand, phosphate mixed	11	58
Light green clay, 1/4 in pebbles	19	77
Light green clay, phosphate	4	81
Light green clay with phosphate (with limestone shale)	39	120
Gray clay, sandy, limestone shale	5	125
Grey clay	9	134
Grey clay, phosphate	2	136
Light green clay, some phosphate pebbles	17	153
Green clay, some phosphates	2	155
Lime rock, dark grey rock	1	156
Limestone	1	157
Grey clay, limestone shells	18	175
Limestone with clay	15	190
Sandy limestone	15	205
Sandy limestone with clay	12	217
Grey clay, limestone	13	230
Soft limestone, clay breaks	4	234
Grey clay	4	238
Green clay	4	242
Soft limestone	5	247
Grey clay	8	255
Green clay	4	259
Soft limestone, clay breaks	14	273
Green clay	5	278
Green clay	5	283
Limestone, clay, phosphate gravel	25	308
Green clay	4	312
Limestone with clay	16	328
Dark grey clay	10	338
Light grey clay, limestone, phosphate	11	349
Light limestone, clay, phosphate	3	352
White limestone, clay, phosphate	8	360
White limestone, brown limestone breaks	15	375
White limestone, clay	13	383
White limestone, brown breaks "water"	5	388
Brown limestone, hard	5	393
Brown limestone	5	398

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P37 - continued

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown limestone, white clay	6	404
Brown limestone	2	406
Brown limestone, white clay, water	16	422
White limestone, clay with brown streaks	2	424
Brown limestone, white clay	2	426
Grey limestone, white clay	8	434
Light brown limestone, white hard clay, water	3	437
Brown limestone, soft	16	453
Brown limestone, clay "soft"	19	472
Brown limestone, medium	7	479
White limestone, clay	16	495
White limestone	5	500
Limestone, white, hard with brown streaks	4	504
White soft limestone, white clay	31	535
Light brown limestone, white medium clay	10	545
Light brown limestone with shell, soft clay	26	571
White limestone, clay	14	585
White limestone, clay with brown breaks	5	590
Brown limestone, shell	7	597
Hard brown limestone, shell, phosphate gravel	7	604
Light brown soft limestone (cleft at 607 ft)	13	617
Brown limestone	1	618
White limestone, shell, clay (out of cleft)	4	622
Brown limestone, white clay	5	627
White clay	5	632
Clay with lime breaks	9	641
White clay, limestone breaks, water	13	654
Light brown limestone, shell	26	680
Light brown limestone, shell	23	703
Light brown limestone, shell with clay	11	714
White sandy clay	6	720

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P38

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand muck	10	10
Brown sand	30	40
Grey sand	10	50
Clay	30	80
Sand, clay	20	100
Clay	18	118
Lime	4	122
Lime, clay	18	140
Clay	20	160
Clay, lime	5	165
White lime	20	185
Dark lime	12	197
Brown lime	53	250
Green clay	20	270
Clay, sand	10	280
Green clay	20	300
Lime, sand	40	340
Clay, lime, shells	15	355
Sand, clay	40	395
Sand	20	415
Sand, brown lime	100	515
White lime	59	574
Hard white lime	31	605

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P39

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	43	43
Sandy green clay	10	53
Sand with clay	22	75
Grey clay with gravel	5	80
Limestone	1	81
Grey clay	6	87
Limestone, smooth clay break	6	93
Grey clay, sandy	7	100
Dark grey clay	15	115
Grey clay	15	130
Medium hard limestone	4	134
Limestone (soft water)	4	138
Grey clay	4	142
Limestone	1	143
Grey clay, with limestone shells	12	155
Limestone	7	162
Grey clay	12	174
Limestone (firm with soft breaks)	16	190
Limestone, water	27	217
White clay, with limestone shells	8	225
Grey clay with limestone shells	10	235
Limestone	7	242
Grey clay, limestone streaks	23	265
Grey clay	10	275
Clay shell	10	285
Clay shell	6	291
Limestone	4	295
Grey clay	39	334
Limestone	3	337
Grey clay	28	365
Limestone	2	367
Grey clay, limestone streaks	8	375
Limestone	10	385
White clay	5	390
Limestone (some water)	10	400
Limestone (hard)	14	414
Limestone	6	420
Limestone (firm)	10	430
Limestone (hard)	10	440
Limestone (medium)	20	460
Limestone (hard)	13	473
Limestone (medium)	7	480
Limestone (hard)	9	489

Table 6.--Drillers' logs of wells - continued

Verna Well Field Production Well P39 - continued

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Water rock	31	520
Limestone (hard)	15	535
Water rock	30	565
Limestone	25	590
Limestone (hard)	7	597
Limestone (medium)	8	605
Limestone (hard)	3	608
Limestone (soft break)	1	609
Limestone (hard)	1	610
Tan limestone, white clay	5	615
Hard tan limestone, white clay	5	620
Soft tan limestone, some clay	12	632
Soft tan limestone, shell and clay	8	640
Tan limestone, some medium clay	12	652
White clay	1	653
Light tan clay	1	654
Medium hard limestone, clay	1	655

Table 6.--Drillers' logs of wells - continued

Shallow Artesian Aquifer Test Well SA1

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	20	20
Light brown sand (water level 3 ft below surface)	10	30
Green sandy clay	5	35
Green sandy clay, shell	5	40
Green sandy clay, phosphate	5	45
Green clay, phosphate	5	50
Green sandy clay, phosphate	15	65
Green clay, sand, phosphate, thin rock	5	70
Green sandy clay, phosphate, total casing depth 75 ft 5 in (hit water at 80 ft)	10	80
Grey sandy clay, phosphate (final water level 12 ft 15 in)	15	95
Sand, phosphate (water level 12 ft 6 in)	5	100

Shallow Artesian Aquifer Test Well SA2

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	30	30
Brown sandy clay	10	40
Green sandy clay	15	55
Green clay, phosphate pebbles	5	60
Green clay, phosphate	10	70
Green sandy clay, mostly sand	10	80
Green sandy clay	5	85
Green clay, phosphate	5	90
Rock, phosphate	5	95
Sand, clay	5	100
Sandy clay, phosphate	20	120
Grey sandy clay, rock	5	125
Grey sand, phosphate, little rock	5	130
Clay, phosphate	5	135
Green clay, phosphate	5	140
Grey clay, phosphate	10	150

Table 6.--Drillers' logs of wells - continued

Shallow Artesian Aquifer Test Well SA3

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	20	20
Brown sand with dark clay	5	25
Brown sand	10	35
Shell	5	40
Shell, clay	5	45
Shell, clay, phosphate	5	50
Green sandy clay, phosphate	5	55
Thin rock, phosphate	5	60
Grey clay, phosphate	10	70
Grey clay, sand, phosphate	5	75
Grey sandy clay, phosphate	25	100
Sand, rock, phosphate (water at 105 ft)	10	110
Sand, rock, phosphate, clay	16	116

Shallow Artesian Aquifer Test Well SA4

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	25	25
Fine brown sand	5	30
Light brown sand	5	35
Green sandy clay, mostly sand	5	40
Green sandy clay, phosphate	15	55
Rock, clay, phosphate	5	60
Sandy clay, phosphate	10	70
Clay, phosphate	10	80
Sandy clay, phosphate	15	95
Sandy clay, phosphate, rock	5	100
Sandy clay, phosphate	5	105
Rock, sand, phosphate	5	110
Sandy clay, phosphate	5	115
Sand, clay, phosphate	5	120

Table 6.--Drillers' logs of wells - continued

Shallow Artesian Aquifer Test Well SA5

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	25	25
Grey sand	10	35
Green sandy clay, mostly sand	5	40
Green clay	5	45
Green sandy clay, phosphate	5	50
Rock, phosphate	5	55
Green sandy clay	5	60
Grey clay, sand, rock	5	65
Green clay	5	70
Grey clay, phosphate	10	80
Grey sandy clay, phosphate, mostly sand	10	90
Grey clay, phosphate	30	120
Sandy clay, phosphate (water found between 85-100 ft)	5	125
Rock, clay, phosphate	5	130

Shallow Artesian Aquifer Test Well SA6

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	30	30
Green clay, sand	5	35
Green clay, sand, phosphate	15	50
Grey sandy clay, phosphate	10	60
Clay, some sand	5	65
Sand, clay, rock	5	70
Sandy clay, phosphate (water at 75 ft)	5	75
Sandy clay, phosphate	5	80
Sand, clay, phosphate, rock	10	90
Sandy clay, phosphate (water level 14 ft)	5	95

Table 6.--Drillers' logs of wells - continued

Shallow Artesian Aquifer Test Well SA7

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	15	15
Brown sand, clay	10	25
Brown sand	5	30
Green sandy clay	15	45
Rock, phosphate	5	50
Grey sandy clay, phosphate	20	70
Green sandy clay, phosphate	10	80
Sandy clay, phosphate	10	90
Grey sandy clay, phosphate	15	105
Grey sandy clay, phosphate, rock	5	110
Grey sandy clay, phosphate	10	120

Shallow Artesian Aquifer Test Well SA8

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	30	30
Brown sand, some phosphate	5	35
Sandy clay, phosphate	15	50
Phosphate, sand, sandy clay	5	55
Phosphate, grey sand, sandy clay	10	65
Grey sandy clay	5	70
Grey sandy clay, phosphate	5	75
Light grey sandy clay, gravel	10	85
Grey clay, phosphate, gravel	5	90
Black and grey sand, clay, gravel	5	95
Sand, clay, gravel	5	100
Grey sand, clay, phosphate	5	105
Sandy clay	15	120
Sand, grey clay (sand heavy)	5	125
Grey sandy clay, phosphate	5	130

Table 6.--Drillers' logs of wells - continued

Shallow Artesian Aquifer Test Well SA9

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	30	30
Green sandy clay	15	45
Green sandy clay, phosphate	20	65
Green sandy clay, phosphate, mostly clay	5	70
Sand	5	75
Sand, little clay	5	80
Sandy clay, phosphate	50'6"	130'6"

Shallow Artesian Aquifer Test Well SA12

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	20	20
Light brown sand	5	25
Brown sand, clay, mostly sand (water between 26-32 ft)	5	30
Green sandy clay	10	40
Green sandy clay, very small black rocks	5	45
Green sandy clay, phosphate specks	5	50
Green sandy clay, larger phosphate bits	5	55
Green sandy clay, many phosphate bits	5	60
Sand, phosphate, clay, rock	3	63
20 in light grey rock	1'8"	64'8"
Light grey rock, sand, phosphate, clay (water level at 25 ft 4 in)	5	70
Soft rock, sand, clay, phosphate (water at 22 ft 2 in)	5	75
Grey sandy clay, phosphate	5	80
Small layer of grey rock grey sandy clay, phosphate (water level 21 ft 4 in)	5	85
Grey sandy clay, mostly sand, phosphate, some grey rock	5	90
Grey sandy clay (water level at 70 ft)	5	95
Green sandy clay (water level 32 ft 7 in)	5	100
Green sandy clay, soft rock, phosphate	1	101
Green sandy clay, mostly sand	4	105
Soft rock	10"	105'10"
Green sandy clay, mostly sand, rock, phosphate (water level at 38 ft)	4'2"	110
Soft rock layer, 1-1/2 - 2 " thick	2'6"	112'6"
Salt and pepper sand, soft rock	2	115
Salt and pepper sand, rock bits (water level 50 ft)	5	120
Grey clay, some sand, thin rock	5	125
Grey clay	5	130

Table 6.--Drillers' logs of wells - continued

Shallow Artesian Aquifer Test Well SA16

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	25	25
Sand, clay	10	35
Clay, phosphate	20	55
Sandy clay	20	75
Clay, phosphate	5	80
Sandy clay, phosphate	10	90
Clay, phosphate	15	105
Sandy clay, phosphate	15	120
Rock	10	130

Shallow Artesian Aquifer Test Well SA18

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	15	15
Light brown sand	5	20
Green sandy clay	15	35
Grey sandy clay	5	40
Grey sandy clay, phosphate	5	45
Green clay, sand	10	55
Green sandy clay	5	60
Green grey sandy clay	5	65
Green clay, sand, very little water	5	70
Green clay, little sand (water level 9 ft 5 in before drilling)	5	75
Green clay	10	85
Green clay, phosphate specks	5	90
Green clay, some sand, phosphate	10	100
Green clay	9	109
Thin rock 5 in	1	110
Green clay	5	115
Hard green clay	3	118
Medium soft rock, 1 ft thick	1	119
Green clay	3	122
Very soft rock	3	125
Sand with little green clay (water level 47 ft 2 in before drilling)	3	128
Hard rock	3	131

Table 6.--Drillers' logs of wells - continued

Shallow Artesian Aquifer Test Well SA19

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	20	20
Sand, clay	25	45
Clay	25	70
Clay, phosphate	10	80
Sandy clay, phosphate	5	85
Clay, phosphate, thin rocks	15	100
Sandy clay, phosphate	30	130

Shallow Artesian Aquifer Test Well SA23

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	20	20
Brown sand, clay	5	25
Grey sandy clay	5	30
Green sandy clay	5	35
Green sandy clay, phosphate	15	50
Green clay	5	55
Green sandy clay	3	58
Soft rock	1	59
Green sandy clay	1	60
Green clay	15	75
Green clay, phosphate	5	80
Green sandy clay, phosphate	5	85
Green clay, phosphate	15	100
Green clay, phosphate, thin rock	5	105
Soft rock, clay, phosphate pebbles	5	110
Green clay, soft rock, phosphate	5	115
Hard rock (water level at 50 ft)	5	120
Rock with pockets	5	125
Grey clay, phosphate	5	130

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E1

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Muddy sand	10	10
Clay	2	12
Sand	28	40
Sandy clay	17	57
Clay	30	87
Rock	8	95
Clay	11	106
Rock	6	112
Clay, rock streak	8	120
White clay or lime	22	142
Lime rock hard	4	146
White grey clay, lime streak hard	102	248
Harder lime	12	260
Lime soft and hard	21	281
Clay, lime streak, little sandy	23	304
Clay, rock	22	326
Lime hard, small soft streak	32	358
Lime rock	97	455
Blue clay	2	457
Lime rock	33	490
Lime rock soft and hard	164	654
Lime rock dark grey	29	683
Hard dolomite rock	8	691
White lime and white clay	2	693
White lime rock	2	695
White clay with streak, lime rock	8	703
Hard dolomite	5	708
White clay	169	877
Dark brown lime rock	60	937
Brown and white lime	27	964
Brown lime	40	1,004
Lime rock	197	1,201
Hard brown dolomite	6	1,207
White lime	3	1,210
Brown dolomite hard, medium hard	10	1,220
Brown and black lime rock	20	1,240
Dolomite hard	5	1,245
Hard dolomite with 2 in to 5 in soft streak	61	1,306
Cavity	1	1,307
Hard dolomite	40	1,347
Medium hard grey lime to hard	31	1,378
Hard rock dolomite, lime	7	1,385
Medium hard rock	108	1,493

Table 6.--Drillers logs of wells - continued

Exploration Test Well E2

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sandy clay	43	43
Sand, shell, clay	3	46
Salt and pepper sand	31	77
Lime rock hard	3	80
Streak sand, streak clay	17	97
Hard rock	5	102
Medium hard rock	15	117
Hard rock	8	125
Medium hard rock	7	132
Clay	7	139
Hard lime rock	8	147
Clay	3	150
Hard lime	4	154
Medium hard lime	23	177
Hard lime	16	193
Medium hard lime	17	210
Hard lime	2	212
Medium hard lime, clay	22	234
Hard lime rock	6	240
Hard soft streak lime	66	306
Medium hard lime	23	329
Hard lime	14	343
Medium hard lime	6	349
Hard lime rock	25	374
Medium soft lime	30	404
Hard lime rock	72	476
Sand, clay, lime	7	483
Hard lime rock	19	502
Medium soft lime	13	515
Hard lime rock	50	565
Soft white lime	152	717
Hard lime rock	25	742
Medium hard lime	154	896
White lime soft	44	940
Brown lime medium hard, some white	60	1,000
Medium hard lime with hard streak brown	80	1,080
Hard dolomite rock	6	1,086
Medium hard white lime	31	1,117
Soft white lime	35	1,152
Hard lime rock	24	1,176

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E3

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Muddy sand	15	15
Clay	3	18
Sand	24	42
Sandy clay	18	60
Clay	33	93
Rock	5	98
Clay	5	103
Rock	2	105
Clay, sand, shell rock	5	110
Clay rock	7	117
White lime hard	2	119
White lime hard	22	141
Lime rock	5	146
White lime soft	6	152
Lime, clay streaks	13	165
Lime hard	4	169
Lime, clay streaks	6	175
Lime hard	3	178
Lime, medium soft streaks	92	270
Hard lime	8	278
Hard lime, clay streaks	32	310
White lime, soft	17	327
Blue clay	3	330
Lime rock, clay streaks	20	350
Lime, sand, clay streaks	6	356
White lime soft	24	380
Hard lime rock	6	386
Soft lime rock	10	396
Hard lime rock	4	400
Medium lime rock	30	430
Soft lime rock	12	442
Medium lime, clay streaks	5	447
Hard lime rock	9	456
Lime rock, clay streaks	19	475
Soft lime rock	127	602
Shell rock	18	620
Light brown lime soft	160	780
Light brown lime, some white soft	49	829
Light brown lime, medium	168	997
White lime, soft	26	1,023
Brown lime, hard streaks	49	1,072
Brown lime, soft	95	1,167
White lime, soft	6	1,173
Brown lime, soft	17	1,190
Dark brown lime rock (hard)	1	1,191

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E4

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	10	10
Grey sand, gravel	13	23
Green sand, gravel	7	30
Green clay, sand	10	40
Little green clay, sand	7	47
Light green clay, sand	5	52
Green sandy clay, gravel	8	60
Green sandy clay	10	70
Light grey clay	10	80
Green clay, hard rock	7	87
Grey clay, rock	4	91
White clay, rock	9	100
Grey clay, hard rock	10	110
Hard green, light green clay	10	120
White rock, white clay	10	130
White clay, hard rock	40	170
White sandy clay, little gravel	10	180
White sandy clay	10	190
White sandy, little rock	10	200
Grey clay, rock	20	220
Green clay, hard (rock)	10	230
Grey clay (rock)	10	240
White sandy clay, rock	10	250
White clay, little gravel	10	260
White clay, rock	10	270
White clay	10	280
Grey clay	10	290
White clay, rock	10	300
Green clay, trace of shale	10	310
Green clay, little shell, white rock	10	320
Green clay	10	330
Green white clay, rock	10	340
White clay, white rock	10	350
White rock, white clay	20	370
White rock, white clay	10	380
Hard rock	10	390
White rock, white clay	50	440
White hard rock	10	450

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E6

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	40	40
Green sand	10	50
Green sand, clay	12	62
Green sand, little clay	8	70
Green sand, sandy clay, gravel	10	80
Sandy white clay (water)	2	82
Green sandy clay	13	95
Hard grey clay, sand	14	109
Green grey clay	9	118
Grey clay	7	125
Light green clay	5	130
Hard grey clay	7	137
Light green rock	3	140
Grey clay, rock	10	150
Grey clay, white rock	10	160
Green clay	10	170
Grey and white clay, rock	10	180
White sandy clay, rock	10	190
White clay, rock (water)	30	220
White sandy clay, rock	10	230
Grey sandy clay	20	250
Grey clay, rock	15	265
Light grey clay, rock	5	270
White clay	10	280
Light grey clay, rock (water)	20	300
Light sandy grey clay, rock	30	330
Grey brown clay	7	337
Grey clay	3	340
Light grey clay, gravel	10	350
Light grey clay, rock	10	360
Green clay, white rock, white clay	10	370
Light grey clay, rock	30	400
White clay, white rock	30	430
White clay, brown rock	20	450
White clay, white rock (water)	90	540
Brown rock, light green clay	10	550
Grey clay, green clay, white rock	10	560
White clay, white rock	70	630
White clay, brown rock	40	670
White clay, light brown rock	30	700
White clay, white rock (hard)	40	740
Light brown rock, light brown clay	10	750
White clay, white rock	10	760

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E6 - continued

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
White clay, brown rock	10	770
Light brown, light grey rock, white clay	10	780
Flares of white rock, white clay	10	790
Light brown rock, light brown clay	50	840
Light brown shell rock, fossil added	10	850
Soft white clay, light tan rock	50	900
Light tan clay, light tan rock	90	990
Hard brown rock	72	1,062
Brown sandy rock	11	1,073

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E7

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	30	30
Green sandy gravel	40	70
Clay, sand, gravel	10	80
Grey sandy clay, gravel	20	100
Grey clay, gravel	10	110
Green clay, rock	20	130
Grey sandy clay, rock	20	150
Green clay	10	160
Grey sandy clay, rock	30	190
Rock, sandy grey clay	10	200
Rock, sandy white clay	20	220
Grey sandy clay	20	240
Grey sandy clay, rock	20	260
Sandy gravel, rock	20	280
Sandy clay, gravel, rock	20	300
Grey sandy clay, rock	30	330
Grey brown clay, rock	20	350
Grey sandy clay, rock	30	380
Light grey clay, rock	20	400
White sandy clay, rock	70	470
White sandy clay, rock	30	500
Hard brown rock	10	510
White clay	3	513
Hard brown rock	7	520
Hard brown clay, rock	20	540
White sandy clay, rock	10	550

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E8

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	45	45
Green sand, clay	5	50
Green clay	20	70
Green clay, sand	10	80
Light green sand, clay	20	100
Green sand, clay	10	110
Light green clay	10	120
Light green rock	30	150
Green clay	10	160
Light green clay, rock (water)	20	180
Soft grey rock, clay	20	200
Grey clay	10	210
Soft lime rock, green clay	10	220
Green sandy clay	20	240
Grey clay, rock	10	250
Green clay	10	260
Light green clay	30	290
Hard green clay	20	310
Soft green clay	10	320
Soft grey soft clay	30	350
Grey sandy clay	10	360
Grey sandy clay, lime	10	370
Lime rock, sandy clay	10	380
Sandy lime rock	20	400
Hard lime, clay	20	420
Hard clay, brown quartz (water)	5	425
Hard lime rock	25	450
Hard brown rock	14	464
Soft white rock	7	471

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E9

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Installed 12-in casing	120	120
Hard rock	3'6"	123'6"
Light grey clay	6'8"	130
Light green clay, rock (water)	16	146
Green clay rock	4	150
Light green clay, rock	10	160
Grey clay	3	163
Hard rock	3	166
Grey clay	4	170
Medium hard white rock	2	172
Hard grey clay	2	174
Medium hard white rock	1	175
Grey clay	16	191
Medium hard white rock	4	195
White clay	25	220
Grey sandy clay	29	249
Medium hard rock	3	252
Grey sandy clay	4	256
Medium hard rock	2	258
Grey sandy clay	3	261
Medium hard rock	1	262
Grey sandy clay	8	270
Blue clay, gravel	10	280
Grey sandy clay	3	283
Hard rock	2	285
Grey sandy clay	6	291
Hard rock	1	292
White clay	3	295
Hard rock	1	296
White clay	4	300
Hard white clay	7	307
Medium hard rock	2	309
Grey clay, gravel	6	315
Medium hard rock	2	317
Grey clay	4	321
Medium hard rock	1	322
Grey clay	8	330
White clay	5	335
Hard rock	2	337
White clay	3	340
Hard white clay	19	359
Medium hard white rock	1	360

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E9 - continued

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Hard white clay	5	365
Hard brown quartz	2	367
Hard white clay	3	370
Soft white and grey clay, gravel (water)	10	380
Soft white rock	3	383
Hard white clay	3	386
Medium hard white rock	4	390
White clay	7	397
Hard brown clay	1	398
White clay	18	416
Hard brown rock	4	420
Hard white clay	4	424
Soft brown clay	1	425
White clay	6	431
Medium hard brown rock	3	434
White clay	27	461
Medium hard brown rock	2	463
White clay	4	467
Medium hard brown rock	2	469
White clay	19	488
Hard brown rock	8	496
Light brown clay, soft rock	14	510
White clay, soft brown rock	10	520
Soft light brown rock	10	530
Light brown clay, soft rock	10	540
White clay, soft brown rock	18	558
Hard brown rock	1	559
White clay, soft brown rock	11	570

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E10

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Sand	43	43
Green sand	21	64
Green sand, clay	11	75
Hard green clay	27	102
Green clay, gravel	21	123
Medium grey rock	1	124
Green clay	6	130
Green clay	8	138
Medium grey clay, rock	2	140
Green clay	7	147
Medium grey rock	1	148
Green clay	2	150
Light grey hard rock	1	151
Light green rock, clay	2	153
Light green rock, clay	3	156
Light green rock, clay	5	161
Green clay	9	170
Grey clay	8	178
Medium grey rock	4	182
Medium lime rock	8	190
Soft lime rock	7	197
Hard lime rock	3	200
Grey clay	28	228
Medium hard grey rock	2	230
Medium grey rock	20	250
Sand, grey clay	5	255
Hard grey rock	5	260
Green clay	15	275
Medium grey rock	3	278
Grey clay	2	280
Hard grey rock	10	290
Green clay	6	296
Hard grey rock	4	300
Hard grey clay	20	320
Green clay	15	335
Hard grey clay	5	340
Soft grey clay	10	350
Grey clay	8	358
Hard grey rock	2	360
Grey clay	10	370
White lime, sand	15	385
Hard lime rock	15	400

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E11

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Brown sand	20	20
Green sand	10	30
Green sand, sandy grey clay	10	40
Sand, grey clay	10	50
Sandy clay	20	70
Sandy grey blue clay, light grey clay	10	80
Light grey clay, light grey rock	10	90
Grey rock grey clay, white rock	10	100
Grey clay, white rock, green clay	10	110
Green clay, white rock, grey clay	10	120
White rock, white clay	20	140
White clay, white rock	26	166
Hard white rock	2	168
White clay, rock	13	181
Hard rock	2	183
White clay rock	8	191
Hard rock	2	193
White clay	2	195
Rocky clay	35	230
Clay, rock	32	262
Rock	2	264
Rock, clay	26	290
Rock	5	295
Rock, clay	5	300
Blue clay	60	360
Clay, rock	20	380
Hard rock	12	392
Medium rock	4	396
Hard rock	9	405

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E12

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Light grey rock	3	123
Grey clay	4	127
Medium grey rock	2	129
Grey clay	2	131
Green clay	13	144
Medium grey rock	1	145
Green clay	3	148
Hard grey rock	4	152
Grey clay	6	158
Hard grey rock	3	161
White clay	9	170
Light grey clay	14	184
Hard white rock	3	187
Light grey clay	3	190
Hard grey clay	6	196
Medium hard grey	1	197
Hard grey clay, gravel	3	200
Green sandy clay	20	220
Light grey clay	10	230
Light green clay, gravel	10	240
Hard grey clay, gravel	20	260
Green clay, gravel	20	280
Hard white clay, gravel	20	300
Light grey clay	2	302
Medium white rock	2	304
Light grey clay	6	310
Hard green clay	10	320
Hard grey clay, gravel	12	332
Medium white rock	3	335
Light grey sandy clay	19	354
Medium white rock	3	357
White soft sandy limestone	37	394
Hard white rock	3	397
Hard white clay	3	400
Hard white lime rock	8	408
Medium soft lime rock, mud	4	412
Hard white rock	3	415
Medium soft lime rock, mud	22	437
Hard white rock	4	441
Soft lime rock, mud	9	450
Medium hard white rock	20	470

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E12 - continued

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Soft white limestone, mud	10	480
Hard brown rock	10	490
Soft white limestone, mud	40	530
Medium white rock	2	532
Soft white limestone, mud	18	550
Soft sandy limestone	100	650
Hard white limestone	20	670
Hard light brown rock	15	685
Soft light brown rock	20	705
Hard white lime rock	5	710
Medium hard white lime rock	10	720
Hard brown lime rock	10	730
Hard brown rock	2	732
Medium hard white rock	18	750
Medium soft white rock	150	900

Table 6.--Drillers' logs of wells - continued

Exploration Test Well E13

<u>Material</u>	<u>Thickness (ft)</u>	<u>Depth (ft)</u>
Medium hard white rock	7	129
Green clay	1	130
Medium soft white rock	1	131
Green clay	9	140
Green sandy clay (water at 148 ft)	10	150
Green clay	14	164
Medium soft white rock	1	165
Grey sandy clay	4	169
Medium white rock	1	170
Grey clay	2	172
White medium rock	3	175
Grey clay	3	178
White medium rock	1	179
Grey clay	3	182
Medium hard white rock (water at 182 ft)	1	183
White clay	7	190
Hard white rock	4	194
White sandy clay	3	197
Medium hard white rock	2	199
Grey sandy clay	48	247
Medium hard white rock	2	249
Grey sandy clay	2	251
Medium hard white rock	1	252
Grey sandy clay	8	260
Bluish grey sandy clay	20	280
Medium hard white rock	2	282
Grey sandy clay	1	283
Medium hard white rock	1	284
Grey sandy clay, gravel	1	285
Medium hard white rock	5	290
Grey sandy clay, gravel	2	292
Hard white rock	3	295
Grey sandy clay, gravel	19	314
Medium hard white rock	1	315
Grey sandy clay, gravel	35	350
Brown sandy clay, gravel	7	357
Soft brown rock	1	358
Brown sandy clay, gravel	2	360
White clay, brown gravel	23	383
Soft brown rock	6	389
White clay, brown gravel	3	392
Hard brown rock	27	419
White clay, brown gravel	70	489
Medium hard brown rock	4	493
Brown water, rock	82	575

Table 7.--Water levels, yield, and chemical analyses of water from selected wells

[Chemical analyses by city of Sarasota; depths of well and casing are in feet; mg/L, milligrams per liter; gal/min, gallons per minute; (gal/min)/ft, gallons per minute per foot of drawdown.]

Well number	Depth of well	Depth of casing	Date of test		Length of test (hours)	Maximum yield (gal/min)	Water level (ft below mp)		Specific capacity [(gal/min)/ft]	Sulfate SO ₄ (mg/L)		Chloride Cl (mg/L)		Fluoride F (mg/L)	
			Begin	End			Begin	End		Begin	End	Begin	End	Begin	End
Exploration Test Wells															
E1	No test														
E2	1,176	356	6-12-63	6-14-63	55	1,500	44	110	22.73	439	432	5	15		
	860	356	6-27-63	7-01-63	24	1,000	41	91	20.	441	432	20	5		
			5-29-64	6-04-64	149	210	43	50	30.	24	360	60	20		
E3	612	119	7-29-63	7-29-63	8	1,000	54	106	19.23	62	345	15	5		
	442	119	8-19-63	8-19-63	8	250	42	102	4.15	27	29	20	15		
	442	119	8-20-63	8-21-63	24	245	42	105	3.89	26	58	15	5		
	1,191	620	9-26-63	9-27-63	26	458	42	97	8.33	99	363	20	30		
	1,191	620	6-01-64	6-04-64	72	214	54	82	7.64	36	44	5	25	1.2	0.9
E4	440	90	10-03-63	10-03-63	3	64	19	100	0.8	33	48	35	35		
	450	90	10-06-63	10-06-63	4	236	20	100	2.95	120	139	45	40		
	450	90	10-07-63	10-08-63	24	275	27	100	3.77	34	134	25	45		
	450	90	10-10-63	10-10-63	8	329	24	100	4.33	77	145	35	45		
	450	90	10-21-63	10-21-63	3	261	15	100	3.07	101	83	35	40		
	450	90	4-16-64	5-14-64	675	278	34	97	4.41	14	122	10	25	1.6	1.7
E6	510	142	11-11-63	11-11-63	3	160	28			24	38	60	60		
	1,073	142	1-02-64	1-03-64	14	1,014	47	96	20.69	34	510	55	30	1.3	
	1,073	142	1-04-64	1-04-64		525	41	56	35.	19	403	55	30		
	976	142	1-08-64	1-08-64	3	261	42	72	8.7	20	151	55	45		
	976	142	1-09-64	1-09-64	7	504	38	100	8.13	11	300	55	35		
	780	142	1-25-64	1-25-64	8	357	28	100	4.96	14	220	70	50		
	780	142	1-27-64	1-27-64	8	247	35	72	6.68	16	196	65	45		
	780	142	1-28-64	1-29-64	24	200	35	63	7.14	14	205	65	35		1.4
	780	142	2-15-64	2-16-64	36	496	41	75	14.59	57	240	41	40		1.65

Table 7.--Water levels, yield, and chemical analyses of water from selected wells - continued

Well number	Depth of well	Depth of casing	Date of test		Length of test (hours)	Maximum yield (gal/min)	Water level (ft below mp)		Specific capacity [(gal/min)/ft]	Sulfate SO ₄ (mg/L)		Chloride Cl (mg/L)		Fluoride F (mg/L)	
			Begin	End			Begin	End		Begin	End	Begin	End	Begin	End
E6	550	142	3-06-64	3-07-64	11	346	47	110	5.49	64	108	50	45		2.25
	550	142	3-20-64	3-20-64	12	295	48	100	5.67	32	70	50	50		1.6
	550	142	5-18-64	5-18-64	7	200	49	83	5.88	14	26	50	55		1.4
E7	550	141	2-12-64	2-13-64	25	349	37	96	5.92	44	144	70	45		
	550	141	2-18-64	2-18-64	6	325	38	90	6.25	68	104	75	60		
E8	464	146	2-19-64	2-20-64	16	185	55	110	3.36	14	170	10	10		
	490	146	2-24-64	2-25-64	15	200	61	89	7.14	36	300	10	5		
	490	146	3-24-64	3-31-64	168	289	62	100	7.61	30	360	5	15	1.9	2.3
	490	146	5-18-64	5-26-64	193	222	64	87	9.65	84	326	5	5	2.0	1.75
E9	570	123	3-05-64	3-06-64	18	304	33	63	10.13	20	144	10	10		1.15
	570	123	3-10-64	3-11-64	24	776	37	100	12.32	14	150	10	20		1.05
	570	123	4-28-64	5-01-64	65	744	40	120	9.30	16	130	40	10		1.0
	570	123	5-05-64	5-18-64	207.5	768	40	98	13.24	14	136	45	10		1.3
E10	No test														
E11	No test														
E12	650	120	4-21-64	4-22-64	31	517	36	105	7.49	26	260	30	5		1.8
	370	120	4-24-64	4-26-64	47	524	40	105	8.06	150	210	10	20		1.42
	900	120	5-08-64	5-09-64	32	577	36	105	8.36	24	204	15	10		2.1
	900	120	5-19-64	5-26-64	168	851	45	84	21.82	18	240	10	10	2.1	1.7
E13	No test														

Table 7.--Water levels, yield, and chemical analyses of water from selected wells - continued

Well number	Depth of well	Depth of casing	Date of test		Length of test (hours)	Maximum yield (gal/min)	Water level (ft below mp)		Specific capacity [(gal/min)/ft]	Sulfate SO ₄ (mg/L)		Chloride Cl (mg/L)		Fluoride F (mg/L)	
			Begin	End			Begin	End		Begin	End	Begin	End	Begin	End
Production Wells															
P1	600	133	5-05-66	5-06-66	24.5	448	54	106	8.62	18	116	25	20	1.7	1.9
P2	607	140	5-18-66	5-19-66	24.5	249	52	123	3.51	44	174	60	5	1.7	2.1
P3	500	140	2-04-66	2-05-66	24	144	50	113	2.29	24	56	55	55	2.0	2.2
	609	140	5-24-66	5-25-66	24	352	57	119	5.66	8	126	65	35	1.7	2.0
P4	500	140	2-08-66	2-09-66	24	271	43	113	3.87	30	40	35	30	3.0	2.6
	535	140	5-03-66	5-04-66	24	234	53	105	4.50	24	18	25	30	2.2	2.6
P5	503	140	2-17-66	2-18-66	24	203	45	110	3.12	58	44	30	40	1.8	2.1
	606	140	5-23-66	5-24-66	24	634	55	104	12.94	36	200	50	10	2.2	1.9
P6	500	140	2-07-66	2-08-66	24	144	46	113	2.15	38	44	45	50	2.1	3.1
	610	140	5-02-66	5-03-66	24	440	55	105	8.8					2.2	2.2
P7	500	140	2-14-66	2-15-66	24	340	45	110	5.23	18	30	40	35	2.4	2.6
P8	585	140	4-28-66	4-29-66	24	205	58	125	3.06	30	54	50	40	2.1	1.9
P9	500	140	2-15-66	2-16-66	24	72	56	110	1.33	42	28	40	35	2.3	3.8
	570	140	4-29-66	4-30-66	24	413	57	87	13.77	182	384	30	20	2.2	1.8
P10	500	138	2-16-66	2-17-66	24	203	54	110	3.63	26	30	25	10	2.6	2.8
	540	138	4-26-66	4-27-66	24	385	55	108	7.26	52	112	30	5	2.6	2.5
P12	450	141	11-04-65	11-05-65	25	110	85	102	6.47	20	24	35	35	2.2	1.94
	542	141	4-20-66	4-21-66	12	469	53	99	10.20	40	170	50	30		1.8
	542	141	4-27-66	4-27-66	8	517	55	102	11.0	48	152	50	30	2.3	2.4

Table 7.--Water levels, yield, and chemical analyses of water from selected wells - continued

Well number	Depth of well	Depth of casing	Date of test		Length of test (hours)	Maximum yield (gal/min)	Water level (ft below mp)		Specific capacity [(gal/min)/ft]	Sulfate SO ₄ (mg/L)		Chloride Cl (mg/L)		Fluoride F (mg/L)	
			Begin	End			Begin	End		Begin	End	Begin	End	Begin	End
P13	520	139	1-24-66	1-25-66	24	690	55	90	19.71	30	184	40	10	2.0	2.2
P14	494	139			25	161	35	84	3.29	12	24	40	20	1.0	2.5
	578	139	5-20-66	5-21-66	24	528	59	104	11.73	34	62	40	35	1.6	1.9
P15	500	139	1-21-66	1-22-66	24	643	57	92	18.37	44	200	60	20	2.6	2.0
P16	503	139	1-18-66	1-19-66	24	566	45	99	10.48	80	112	55	20	2.5	2.1
P17	500	139	5-19-66	5-20-66	24	557	58	124	8.44	52	78	40	35	1.9	2.0
P18	515	139	1-19-66	1-20-66	24	352	53	112	5.97	18	38	20	10	1.5	1.7
P19	503	139	1-17-66	1-18-66	24	344	51	113	5.55	175	80	30	25	2.3	2.8
P20	494	138	1-20-66	1-21-66	24	305	49	79	10.17	160	120	15	10	1.8	1.7
P21	501	139	1-14-66	1-15-66	24	547	49	110	8.97	20	380	25	15	1.9	2.1
P22	505	139	11-30-65	12-01-65	24	477	50	112	7.69	300	255	20	9	1.6	1.9
P23	500	140	1-05-66	1-06-66	24	477	41	105	7.45	18	360	40	8	1.9	2.1
P24	500	141	11-26-65	11-27-65	24	453	45	97	8.71	300	450	5	20	2.3	2.0
P25	500	140	11-18-65	11-19-65	24	651	58	103	14.47	156	340	22	18	1.9	1.8
P26	460	140	4-15-66	4-16-66	24	457	57	107	9.14	400	360	15	15	1.6	1.7
P28	474	140	11-12-65	11-13-65	24	167				82	110	10	5	2.4	2.0

Table 7.--Water levels, yield, and chemical analyses of water from selected wells - continued

Well number	Depth of well	Depth of casing	Date of test		Length of test (hours)	Maximum yield (gal/min)	Water level (ft below mp)		Specific capacity [(gal/min)/ft]	Sulfate SO ₄ (mg/L)		Chloride Cl (mg/L)		Fluoride F (mg/L)	
			Begin	End			Begin	End		Begin	End	Begin	End	Begin	End
P28	474	140	2-21-66	2-22-66	24	357	61	109	7.44	60	122	10	5	2.5	2.6
P29	481	140	11-09-65	11-10-65	24	263	57	86	9.07	52	154	15	2	2.2	1.7
P31	600	140	3-03-66	3-04-66	24	659	46	86	16.48	150	380	15	5	1.9	1.3
P32	600	142	3-11-66	3-12-66	24	575	43	93	11.50	40	364	25	15	1.5	1.7
P33	600	138	2-22-66	2-23-66	24	528	57	108	10.35	98	425	10	5	1.4	1.7
P34	600	139	3-04-66	3-05-66	24	681	45	93	14.19	84	380	10	15	1.6	1.1
P35	603	140	3-07-66	3-08-66	24	659	47	86	16.90	164	320	5	10	1.7	1.8
P36	570	140	3-09-66	3-10-66	24	617	36	98	9.95	42	54	75	85	.9	.9
P37	714	156	12-13-71	12-15-71	40	818	42	58	51.13	130	160	8	10	1.3	.9
	714	156	12-15-71	12-20-71	124	818	42	55	62.92	135	130	8	12	1.1	1.1
	714	156	12-21-71	12-28-71	174	842		59	49.53	130	140	22	22	1.1	1.1
P38	602	173	6-10-72	6-12-72	37	706	79	103	29.42	175	150	22	12	1.4	1.3
P39	641	152	8-07-76	8-24-76	168	720	67	79	60.0		235		18		1.0
Shallow Artesian Aquifer Test Wells															
SA1	100	85	5-27-71	5-28-71	24	108	14	49	3.09	30	30	20	20	0.9	1.1
	90	85	7-07-71	7-07-71	5	178	16	64	3.71	12	12	22	20	1.1	.7
	90	85	7-07-71	7-08-71	7	207	18	74	3.70	13	12	24	18	1.1	.7
	90	85	7-09-71	7-09-71	6	192	18	72	3.6	12	9	20	20	1.1	.9
SA3	110	103	6-18-71	6-18-71	7	162	16	51	4.63	5	5	16	16	1.1	.8
	110	103	6-24-71	6-24-71	5	205	15	63	4.27	5	5	16	16	1.1	.7
	110	103	6-28-71	6-28-71	8	221	16	64	4.60	40	35	16	16	1.3	1.2

Table 8.--Pumpage from the Verna well field, 1966-76

[millions of gallons]

Month	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	Average
January	--	145.4	165.8	165.5	160.6	187.8	225.4	211.6	241.1	216.3	223.2	194.2
February	--	134.1	166.0	157.5	151.1	183.0	197.7	195.7	215.7	205.0	223.9	182.9
March	--	170.7	170.3	162.7	163.8	226.3	229.6	239.9	246.1	246.3	260.5	211.6
April	--	180.0	177.6	162.5	176.2	223.1	238.7	227.3	253.6	264.5	234.5	213.8
May	--	185.4	156.0	156.5	195.3	229.2	243.2	263.8	245.6	250.7	213.4	213.9
June	--	147.7	144.6	155.5	165.8	207.9	222.3	231.8	231.0	220.7	206.0	193.3
July	--	160.2	125.8	154.8	191.4	207.4	220.7	221.8	222.9	221.7	221.3	194.8
August	--	129.4	152.2	148.5	167.6	210.1	210.5	207.0	211.7	207.7	187.9	183.3
September	118.7	141.5	169.7	144.2	158.5	193.9	224.7	185.1	214.3	192.5	193.1	176.0
October	142.2	145.3	177.5	148.5	168.4	213.3	247.5	231.7	234.8	203.2	201.8	192.2
November	146.3	165.2	176.5	154.5	180.2	221.5	226.3	226.6	225.1	208.3	192.4	193.0
December	139.5	163.0	168.5	152.0	207.4	222.4	233.5	226.8	213.1	217.3	193.8	194.3
Total pumpage	--	1,867.9	1,950.5	1,862.7	2,086.3	2,525.9	2,720.1	2,669.1	2,755.0	2,654.2	2,551.8	
Average monthly pumpage	--	155.7	162.5	155.2	173.9	210.5	226.7	222.4	224.6	221.2	212.65	
Average daily pumpage	--	5.1	5.3	5.1	5.7	6.9	7.5	7.3	7.5	7.3	7.0	

Table 9.--Chemical analyses of water from exploration test wells, 1963

[Analyses are by U.S. Geological Survey. Except as noted, quantities of constituents listed are in milligrams per liter.]

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature	Color (Pt-co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)
E1	3-26-63	427	537	7.9			228	2					276	0	18	31	2.6					0.11	
	3-26-63	449	661	7.7			302	102					244	0	110	29	2.4					0.02	
	3-29-63	489	987	7.8			554	394					196	0	380	22	1.5					0.03	
	3-30-63	512	1020																				
	3-30-63	530	1020	7.7			596	445					184	0	412	20	1.3					0.03	
	3-30-63	555	1040																				
	3-30-63	558	1030																				
	3-30-63	622	1050	7.7			620	472					180	0	444	20	2.3					0.03	
	4-01-63	657	1020																				
	4-02-63	691	1060																				
	4-02-63	718	1040	7.8			616	485					160	0	452	20	1.3					0.14	
	4-02-63	740	1060																				
	4-02-63	761	1040																				
	4-02-63	781	1060	7.8	27		630	484					178	0	452	20	1.3					0.01	
	4-02-63	802	1050																				
	4-02-63	824	1060																				
		845	1050	7.8	27		620	484					166	0	452	20	1.3					0.00	
		866	1060																				
		888	1050																				
	4-03-63	908	1050				620	476					176	0	488	19	1.3					0.00	

Table 9.--Chemical analyses of water from exploration test wells, 1963 - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)
124 E1	4-03-63	930	1050																				
	4-03-63	951	1040																				
	4-03-63	972	1050	7.9			628	478					176	0	488	19	1.3					0.00	
	4-03-63	994	1050																				
	4-08-63	1015	1040																				
	4-08-63	1046	1050	7.9			620	478					174	0	456	20	1.3					0.01	
	4-08-63	1056	1040																				
	4-08-63	1077	1040																				
	4-08-63	1098	1040	7.8			616	476					170	0	436	19	1.3					0.04	
	4-08-63	1119	1020																				
	4-08-63	1140	1050																				
	4-09-63	1160	1040	7.9			616	472					176	0	444	20	1.2					0.00	
	4-09-63	1180	1030																				
	4-09-63	1201	1140	7.9			696	554					174	0	524	19	1.3					0.00	
	4-09-63	1220	1140																				
	4-09-63	1249	1370	7.8			886	758					156	0	708	20	1.3						
	4-09-63	1273	1170	7.7			880	762					144	0	716	21	1.2					0.00	
	4-09-63	1300	1340	7.8			890	768					148	0	700	20	1.3					0.05	
	4-22-63	1327	1360																				
	4-22-63	1414	1340																				
		1447	1360	7.6	30		890	754					166	0	696	21	1.3					0.04	
		1477	1860	7.7	31		1340	1220					148	0.06	1150	24	1.2					0.00	

Table 9.--Chemical analyses of water from exploration test wells, 1963 - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)
E2	5-30-63	481	568	8.3		8	226	26	27	39	36	5.0	236		5.2	66	2.8	41	360	342	0.0	0.00	0.00
	5-31-63	536	693	8.2		10	326	139	59	44	31	4.0	228		130	45	2.0	34	488	461	0.0	0.07	0.00
	5-31-63	568	910	8.0		10	502	333	96	64	21	2.7	206		332	26	1.2	26	672	660	0.0	0.04	0.00
	5-31-63	586	944	8.1		10	532	366	102	67	20	2.6	202		356	24	1.2	26	738	699	0.0	0.03	0.00
	5-31-63	624	971	8.2		10	550	394	112	66	19	2.6	190		386	23	1.6	25	762	729	0.0	0.04	0.00
	6-01-63	716	1090	8.1		8	654	503	142	73	17	2.4	184		488	20	1.1	26	894	860	0.0	0.00	0.00
	6-01-63	747	1020	8.1		5	592	436	133	63	18	2.4	190		424	22	1.1	25	850	782	0.0	0.00	0.00
	6-01-63	770	1020	8.2		5	594	435	128	67	18	2.6	194		432	22	1.1	24	822	791	0.0	0.05	0.00
	6-01-63	800	1020																				
	6-01-63	831	1010	8.0		8	586	434	128	65	18	2.6	186		422	22	1.2	25	804	776	0.0	0.00	0.00
	6-01-63	859	1010	8.1		3																	
	6-01-63	888	1010				580	429	126	65		2.6	184		430	22	1.1	25	810	781	0.0	0.00	0.00
	6-01-63	949	1010																				
	6-02-63	1000	1010																				
	6-04-63	1000	1010												24								0.00
E3	6-04-63	1117	1000			5	578	427	122	67	18	2.6	184		430	22	1.2	24	820	779	0.0	0.04	0.00
	6-04-63	1114	1010																				
	6-04-63	1175	1020	8.1		3	584	432	118	70	18	2.6	186		418	22	1.1	24	802	766	0.0	0.00	0.00
	7-20-63	253	440	7.9		40	220	0	51	23	22	1.9	290		8.4	13	0.9	32	251	296	0.2	0.09	0.17
	7-20-63	337	442	7.8		20	230	0	50	26	20	1.6	286		3.6	12	1.1	35	364	290	0.1	0.03	0.01
	7-24-63	390	475	7.9		15	246	15	52	28	20	1.9	282		22	12	1.2	35	324	311	0.1	0.07	0.04
	7-24-63	419	510	7.9		20	260	30	58	28	19	1.9	280		42	12	1.1	34	332	334	0.1	0.04	0.03
	7-26-63	575	615	8.2		10	332	114	74	36	18	1.9	266		116	14	1.0	33	437	425	0.1	0.01	0.01
	7-29-63	612	940	7.7		5	540	362	127	54	16	2.3	218		357	16	1.0	27	754	707	0.0	0.03	0.00

Table 9.--Chemical analyses of water from exploration test wells, 1963 - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)
126	E3	8-06-63 612	525	7.8		15	272	44	62	29	19	1.9	279		52	12	1.0	33	343	347	0.0	0.04	0.01
		8-06-63 693	540	8.0		15	274	43	63	28	18	2.0	282		58	13	0.9	33	360	355	0.1	0.00	0.02
		8-06-63 779	445	7.9		15	236	0	51	27	18	1.9	292		12	13	1.0	35	297	303	0.1	0.03	0.01
		8-06-63 908	545	8.0		10	288	60	66	30	18	1.9	278		76	12	0.9	32	384	374	0.0	0.00	0.02
		8-07-63 1028	575	8.0		10	296	68	68	31	18	2.1	278		82	14	1.0	32	402	385	0.0	0.01	0.04
		8-08-63 1116	570	8.0	5		290	62	68	29	18	2.0	278		78	14	1.0	34	412	381	0.0	0.00	0.03
	E4	100	500	7.8	20		220	0	51	23	44	2.4	312		3.6	18	0.5	31	302	328	0.2	0.02	0.00
		125	495																				
		150	498																				
		175	502																				
		200	472	7.7	10		220	0	42	23	45	2.4	280		4.4	20	0.9	37	322	313	0.2	0.06	0.00
E6		225	489																				
		275	501																				
		300	420	7.5	10		168	0	38	18	43	2.2	268		4.8	18	0.7	16	260	274	0.6	0.16	0.04
		300	515																				
		325	484																				
		330	501	7.6	20		200	0	42	23	50	4.0	276		6.8	22	1.6	46	344	333	2.0	0.06	0.10
		350	491																				
		375	440	7.8	10		176	0	34	22	44	5.0	264		36	18	1.7	36	294	294	0.1	0.3	0.03
		400	476																				
		420	451	7.6	10		180	0	35	22	45	4.4	272		40	21	1.8	47	308	315	0.7	0.05	0.11
		440	452	7.6	10		180	0	35	22	46	3.1	270		40	20	1.5	46	302	311	0.5	0.04	0.01
	10-31-63	140	798	8.0			296	72	78	25	47	3.6	273		5.6	116	0.2	26	460	436	0.1	0.28	0.01
E6	11-02-63	150	650	7.8			282	30	62	31	32	3.4	308		0.8	68	1.0	29	398	379	0.0	0.21	0.04
	11-05-63	210	700	8.2			304	52	58	39	35	3.6	307		3.2	88	1.1	42	444	421	0.0	0.31	0.02

Table 9.--Chemical analyses of water from exploration test wells, 1963 - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)
E6 127	11-06-63	325	620	8.0			276	44	50	37	28	4.4	284		4.0	64	1.1	48	388	377	0.0	0.07	0.10
	11-08-63	425	987	8.2			244	0	48	30	119	4.9	300		4.0	166	4.0	37	604	562	1.5	0.05	0.02
	11-13-63	530	521	8.0			220	36	46	26	26	4.7	225		9.6	58	1.0	36	331	319	0.0	0.34	0.00
	11-18-63	630	586	7.7			256	68	59	27	24	3.9	230		34	57	1.0	19	375	338	0.0	0.10	0.00
	11-21-63	730	596	7.5			262	68	59	28	26	3.3	237		31	58	2.1	36	420	361	0.0	1.23	0.00

Table 10.--Chemical analyses of water from shallow-artesian aquifer test wells, 1971-72

[Analyses are from city of Sarasota. Except as noted, quantities of constituents listed are in milligrams per liter.]

Well number	Date of sample	Depth of well (feet)	Ca + Mg hardness as CaCO_3	Alkalinity as CaCO_3	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Residue at 180°C
SA1	5-19-71	30	120		20	24	0.9	120
	5-24-71	90	350		60	22	0.9	547
	5-24-71	95	360		55	22	0.7	547
	5-25-71	100	280		28	20	0.9	428
SA2	6-29-71	105	300	252	12	18	1.1	408
	6-29-71	110	310	272	13	18	0.9	428
	6-29-71	115	270	274	14	18	0.9	428
	6-30-71	120	260	268	17	16	0.9	402
	6-30-71	130	290	256	17	18	0.9	422
	6-30-71	135	280	260	18	18	0.7	413
	6-30-71	140	280	250	2	20	0.7	399
	6-30-71	145	260	250	1	20	0.8	399
	6-30-71	150	270	250	5	18	0.9	399
	SA3	6-02-71	65	250	25	22	1.1	456
	SA4	7-23-71	120	290	24	22	0.6	428
SA5	7-71	95	270	260	7	20	0.7	399
	7-71	100	300	258	18	18	0.7	399
	7-71	105	280	258	10	12	0.7	396
	7-71	110	280	260	6	14	0.9	399
	7-71	115	290	274	9	16	0.5	413
	7-71	120	280	270	6	16	0.6	422
	7-71	125	270	262	11	16	0.5	399
	7-71	130	280	260	9	18	0.8	413
	SA6	8-02-71	75	300	12	18	1.1	442
		8-03-71	95	280	16	20	1.1	256
SA7	10-14-71	95	290	258	5	24	0.8	399
SA8	10-22-71	115	300	244	0	36	0.9	428
SA12	10-71	65	250		5	16	1.5	370
	10-71	80	270		10	14	1.3	399
	10-71	90	260		5	18	1.1	399

Table 10.--Chemical analyses of water from shallow-artesian
aquifer test wells, 1971-72 - continued

Well number	Date of sample	Depth of well (feet)	Ca + Mg hardness as CaCO_3	Alkalinity as CaCO_3	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Residue at 180°C
SA12	10-71	95	260		5	18	1.0	399
	10-71	100	250		5	14	1.0	385
	10-71	105	250		5	12	0.8	399
	10-71	110	250		10	12	0.9	399
	10-71	115	230		5	16	0.9	342
	10-71	120	320		5	16	1.2	428
	10-71	125	300		5	16	1.0	413
	10-71	130	260		5	16	0.9	408
SA14	5-05-71	45	160		5	26	1.3	285
	5-11-71	80	290		5	26	1.1	456
	5-11-71	95	300		5	28	0.4	456
	5-11-71	100	290		5	32	0.4	456
	5-11-71	105	290		5	34	0.4	456
	5-11-71	110	280		5	36	0.3	461
	5-11-71	115	280		5	36	0.3	461
	5-11-71	120	280		5	36	0.5	461
SA18	5-12-71	125	290		5	36	0.3	484
	5-12-71	130	290		5	38	0.3	510
	4-21-71	60	190		5	20	1.1	291
	4-22-71	70	210		5	20	1.3	314
	4-22-71	75	210		5	20	1.1	314
	4-22-71	85	210		5	18	0.9	319
	4-22-71	90	210		5	20	0.8	333
	4-22-71	95	210		5	20	0.7	336
	4-22-71	100	210		5	20	0.7	331
	4-22-71	105	200		5	22	0.7	331
	4-22-71	110	210		5	20	0.7	333
	4-22-71	115	210		5	20	0.7	333
	4-22-71	120	220		5	18	0.7	333
	4-22-71	125	220		5	18	0.7	333

Table 10.--Chemical analyses of water from shallow-artesian
aquifer test wells, 1971-72 - continued

Well number	Date of sample	Depth of well (feet)	Ca + Mg hardness as CaCO_3	Alkalinity as CaCO_3	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Residue at 180°C
SA18	4-22-71	128	210		5	20	0.9	286
	4-23-71	131	220		5	20	0.7	342
SA23	4-28-71	95	300		5	22	1.1	456
	4-28-71	100	290		5	22	1.2	436
	4-28-71	105	300		5	24	0.9	445
	4-28-71	110	280		5	24	0.9	428
	4-28-71	115	280		5	26	0.9	399
	4-28-72	120	290		5	26	0.9	399
	4-29-72	125	280		5	26	0.9	456
	4-29-72	130	280		5	28	0.8	456

Table 11.--Chemical analyses of water from production wells

[Analyses are from city of Sarasota and quantities of constituents are in milligrams per liter except as otherwise indicated.]

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-Co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)	Strontium (Sr)
P1	^a 12-31-66	600		7.9			470								360		1.0							
	^a 2-25-68			7.7	25.0	5	598	438	124	62	19	2.9	196	161	430	21	1.3	26	840	813	0.0	0.04		30
	10-22-68		960												393	20	1.3					0.01		
	10-00-69			7.9			550								340		1.7							
	^a 6-22-70	1110		7.9	28.0	0	623	461	124	69	19	2.9	196	162	428	21	1.2	28	916	817	0.0	0.0		26
	5-12-72	1119		7.7			650						188	154	472	20	1.2							
	^a 5-09-74	1125		7.5	28.0		630	470	150	56					450	24	1.2							24
	^a 4-28-75	1240		7.5	28.5		690	530	150	68				158	480	19	1.8							29
	^a 12-31-66	607		7.9			460								330		0.6							
	^a 1-25-68	1020		7.9	26.0	5	738	388	114	58	18	2.6	199	163	272		1.5	27	763		0.2	0.0		25
P2	6-22-70	1050		7.6	27.5		570								366		1.4					0.01		
	5-12-72	1090		7.8			600						156	128	424	16	1.9							
	^a 5-08-74	1060		7.5	27.0		610	450	140	55			192	162	420	21	1.3							26
	^a 4-28-75	1080		7.6	27.0		590	430	130	64			197	162	400	17	1.5							3
	^a 12-31-66	609		7.9			450								340		0.9							
	^a 1-25-68	960		7.7	26.0	5	518	348	107	54	20	3.0	208	171	330	27	1.5	28	710	699	0.9	0.03		26
	10-22-68	840													288	30	1.5					0.01		
	6-00-70	960		7.6	27.5		488								306		1.4					0.01		
	5-12-72	1000		7.8			490						204	167	308	20	1.4							
	^a 5-08-74	940		7.6	27.0		510	340	110	50			206		310	26	1.5							26

Footnote is at end of table.

Table 11.--Chemical analyses of water from production wells - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-Co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)	Strontium (Sr)
P3	4-28-75		1000	7.4	27.0		530	360	110	53			206	169	300	24	1.4							30
P4	a 11-30-66	535		7.9			240								18		1.5							
	a 1-25-68		510	7.8		20	302	0	43	23	34	1.8	253	208	27		1.1	44	326	324	0.4	0.02		0.64
	6-22-70		670	7.6	26.5		292								102		2.0							
	a 5-08-74		650	7.6	25.0		200	10	28	32			237		120	29	1.9							2.6
	a 4-28-75		650	7.6			340	150	73	38			240	197	150	29	1.7							5.2
P5	a 11-30-66	606		7.9			530								500		1.1							
	10-22-68		950												390	25	1.5						0.01	
	6-00-70		1030	7.6	27.5		550								350		1.5						0.01	
	5-12-72		1120	7.8			590						192	157	392	15	1.5							
	a 5-08-74		1030	7.7	27.0		370	210	55	50			196		380	21	1.5							24
P6	a 4-28-75		1100	7.5	27.0		610	440	130	60			199	163	370	18	1.7							30
	a 11-30-66	610		7.9			420								420		1.7							
	6-22-70		900	7.6	27.0		456								252		1.7					0.0		
	5-12-72		970	7.9			470						212	174	296	22	1.6							
	a 5-08-74		910	7.6	26.5		500	320	110	49			216		310	26	1.6							21
	a 4-28-75		1000	7.4	26.5		500	320	110	54			214	176	320	24	1.7							2.8
P7	a 11-30-66	500		7.9			260								22		1.9							
	10-22-68		475												12	39	2.1					0.40		
	a 6-00-70		593	8.1	25.5	5	237	34	49	27	30	2.7	248	203	58	13	2.1	54	389	361	0.0	0.01		29
	5-02-72		590	8.0			230						265	217	24	32	2.5							
	a 5-31-74		710	7.9			350	160	81	36			237		120	27	1.9							3.8
	a 4-28-75		650	7.5	25.5		260	48	54	30			257	211	65	32	1.4							0.3
P8	a 11-30-66	585		7.9			400								140		2.2							
	a 1-25-68		670	7.7	25.0	5	316	112	61	37	23	3.4	250	205	94	36	2.6	37	431	429	0.6	0.01		11

Table 11.--Chemical analyses of water from production wells - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-Co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)	Strontium (Sr)
P8	10-22-68		800												394	27	1.3					0.0		
	6-22-70		580	7.7			260								32		0.4					0.0		
	5-12-72		760	8.0			340						236	194	152	24	2.4							
	a 5-31-74		720	7.8			350	140	74	37			255		110	35	1.9							9.3
P9	a 11-30-66	570		7.9			530								500		1.7							
	10-22-68		1100												528	20	1.3					0.01		
	6-22-70		1210	7.5	28.0		680								499		1.3							
	5-12-72		1250	7.6			670						180	148	512	16	1.4							
	a 5-31-74		1220	7.5			630	480	120	72			183		500	17	1.3							27
	a 4-28-75		1260	7.5	27.0		690	540	150	72			184	151	490	17	1.4							15
P10	a 11-30-66	540		7.9			450								300		1.5							
	a 1-25-68		970	7.7	25.0	0	524	360	106	56	16	2.6	200	164	344	19	1.7	26	724	696	0.3	0.01		25
	6-22-70		840	7.8	27.0		393								234		2.2					0.0		
	5-12-72		910	8.0			430						219	158	268	20	2.1							
	a 4-28-75		820	7.5	26.5		440	250	85	48			230	189	240	21	2.0							27
P11	a 11-30-66	550		7.9			390								250		1.3							
	10-22-68		1100												476	25	1.4					0.0		
	6-22-70		1140	7.7	28.5		635								416		1.3							
	a 4-28-75		1200	7.5			670	500	150	66			212	174	440	25	1.4							20
P12	a 11-30-66	542		7.9			450								370		1.4							
	a 1-25-68		1020	7.7		5	548	388	119	54	15	28	194	159	376	19	1.7	26	776	735	0.3	0.0		25
	10-22-68		940												390	20	1.7					0.1		
	6-22-70		1000	7.6	27.0		495								353		1.7					0.0		
	5-12-72		1100	7.9			570						193	158	408	20	1.7							
P13	a 11-30-66	520		7.9			500								450		1.5							

Table 11.--Chemical analyses of water from production wells - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO _e)	Phosphate (PO ₄)	Iron (Fe)	Strontium (Sr)
P13	10-22-68		880												354	22	1.8				0.1			
	6-22-70		987	8.0	27.0	0	537	373	112	56	16	3.1	200	164	356	18	1.8	29	800	714	0.0	0.01		23
	5-12-72			7.9			520						197	162	352	10	1.8							
	a 5-08-74		950		26.5		560	390	120	56			202		350	14	1.8							23
	a 4-28-75		1040	7.3	26.5		550	390	110	60			200	164	340	16	1.7							25
P14	a 11-30-66	484		7.9			410								260		2.3							
	a 1-25-68		870	7.7		0	466	293	92	52	17	3.1	212	174	276	20	2.1	28	632	615	0.4	0.01		20
	10-22-68		750												222	22	2.3				0.01			
	5-12-72		940	8.0			460						206	169	296	16	2.0							
	a 5-08-74		860		26.0		470	290	100	47			216		270	21	2.0							20
P15	a 4-28-75		980	7.5	26.0		500	340	100	55			205	168	330	18	1.8							24
	a 11-30-66	470		7.9			480								410		1.6							
	10-22-68		880												324	18	1.9					0.01		
	6-22-70		1000	7.7	26.5		472								368		1.9				0.0			
	5-12-72		1100	7.9			590						185	152	404	15	1.8							
P16	a 5-08-74		1040	7.5	26.0		630		130	55			192	470	450	0.6	1.9							67
	a 4-28-75		1100	7.4			640	480	130	69			189	155	440	17	1.8							24
	a 11-30-66	490		7.9			350								260		1.6							
	10-22-68		675												244	19	1.7				0.01			
	6-22-70		800	7.7	26.0		346								260		1.7				0.0			
P17	5-12-72		970	7.9			490						174	143	340	15	1.6							
	a 4-28-75		960	7.5	26.0		520	370	110	54			187	153	360	17	1.9							10
	a 11-30-66	405		7.9			390								160		1.7							
	10-22-68		730												220	30	1.9				0.01			
	5-11-72		470	7.9			470						194	159	307	16	1.9							

Table 11.--Chemical analyses of water from production wells - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-Co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)	Strontium (Sr)
P17	^a 5-08-74		770	7.6	25.0		260	79	33	39			219		210	27	1.9							14
	^a 4-28-75		850	7.5	26.0		420	88	47				219	180	230	26	1.9							1.5
P18	^a 11-30-66	515		7.9			260								52		1.5							
	10-23-68		465												112	20	1.7					0.01		
	6-22-70		600	7.6	26.0		292								161		1.6							
	^a 5-12-72		740	7.9			350						140	115	236	14	1.5							
P19	^a 4-30-75	503	790	7.5	26.5		430	320	97	41			138	113	260	14	1.2							15
	^a 11-30-66			7.9			250								20		1.7							
	^a 6-23-70		485	8.2	26.5	5	211	0	37	27	20	2.9	274	225	4.8	21	3.3	47	308	304	0.0	0.0		6
	5-12-72		810	7.9			390						168	138	244	12	1.8							
	^a 5-08-74		730	7.5	25.5		390	210	85	39			211		2	20	2.3							13
P20	^a 4-30-75		570	7.5	25.5		280	71	51	34			251	206	62	20	3.0							8
	^a 11-30-66	494		7.9			440								318		1.4							
	10-24-68		740												268	16	1.4					0.01		
	6-23-70		830	7.4	27.0		366								281		1.4					0.0		
	^a 5-12-72		880	7.9			440						158	130	312	14	1.3							
	^a 5-09-74		850	7.6	26.0		300	170	47	40			166		330	16	1.3							19
P21	^a 4-30-75		890	7.4	26.0		470	330	100	48			171	140	330	8.3	1.4							19
	^a 11-30-66	501		7.9			480								460		1.3							
	10-24-68		1020												408	20	1.5						0.31	
	6-23-70		1140	7.4	26.5		531								469		1.5					0.0		
	^a 5-12-72		1300	7.9			710						172	141	544	16	1.4							
	^a 5-09-74		1240	7.6	26.5		420	280	65	56			175		580	18	1.9							23
P22	^a 4-30-75		1300	7.4	27.0		800	660	180	78			176	144	580	18	1.4							2.6
	^a 11-30-66	505		7.9			330								100		1.0							

Table 11.--Chemical analyses of water from production wells - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-Co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)	Strontium (Sr)
P22	10-24-68		905												368	20	1.7						0.39	
	6-23-70		900	7.6	26.5		374								300		1.8						0.0	
P23	^a 11-30-66	500		7.9			290								92		0.6							
	10-24-68		785												300	19	1.9						0.27	
	6-23-70		850	7.6	26.0		452								258		2.0						0.0	
	5-12-72		960	8.0			470						206	169	316	18	1.8							
	^a 5-08-74		920	7.5	26.5		500	330	110	50			208		310	18	1.1							16
	^a 4-30-75		970	7.5	26.0		530	360	110	57			208	171	350	18	1.9							19
P24	^a 11-30-66	500					640								560		0.07							
	10-24-68		1100												416	35	1.5						0.01	
	6-23-70		1070	7.5	27.0		595								376		1.6							
	5-12-72		1060	8.0			550						204	167	380	16	1.4							
	^a 4-30-75		1100	7.5	26.5		630	470	140	62			198	162	320	14	1.5							20
P25	^a 11-30-66	500		7.9			620								540		0.9							
	^a 6-23-70		1110	8.0	27.0	0	650	491	139	68	14	2.7	194	159	450	18	1.3	26	926	835	0.0	0.0		20
	^a 4-30-75		1120	7.5	26.5		630	480	140	62			190	156	420	16	1.4							23
P26	^a 11-30-66	460		7.9			600								590		1.4							
	10-24-68		940												392	18	1.3						0.00	
	6-23-70		1050	7.3			490								396		1.2						10	
	5-12-72		1100	7.8			570						184	151	412	15	1.2							
	^a 5-09-74		1080	7.4	26.5		470	620	140	62			182		440	20	1.2							23
	^a 4-30-75		1100	7.5	26.5		470	620	140	59			186	153	400	15	1.3							25
P27	^a 4-30-67	1191		7.9			720								580		0.9							
	10-27-68		1200												604	20	1.1					0.01		
	6-23-70		1220	7.5	28.0		542								472		1.0					0.01		

Table 11.--Chemical analyses of water from production wells - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-Co units)	Ca + Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)	Strontium (Sr)
P27	5-12-72		1650	7.9			970						168	138	804	18	1.2							
	^a 4-30-75		1300	7.5	28.5		780	620	180	75			194	159	560	15	1.1							18
P28	^a 11-30-66	474		7.9			250								60		1.1							
	10-23-68		910												344	15	1.8				0.00			
	6-23-70		1010	7.8	26.5		490								348		1.9				0.0			
	^a 5-12-72		1170	7.9			630						186	153	456	15	1.7							
	^a 5-09-74		1020	7.5	26.0		350	180	50	48			207		380	18	1.8						21	
	^a 4-30-75			7.4	27.0		550	380	120	56			215	176	270	15	1.9						20	
P29	^a 11-30-66	465		7.9			380								350		0.8							
	10-23-68		970												426	15	1.3					0.01		
	^a 5-09-74		1060	7.4	26.5		600	440	140	54			185		390		1.4						21	
	^a 4-30-75		1200	7.5	28.0		640	480	140	63			188	154	420	16	1.2						24	
P31	^a 11-30-66	600		7.9			500								450		0.07							
	10-25-68		1100												450	20	1.1					0.01		
	6-24-70		1010	7.6	28.0		454								431		1.1					0.0		
	^a 5-12-72		1140	7.9			620						182	149	464	15	1.0							
	^a 4-30-75		1140	7.4	28.0		640	480	140	64			192	157	400	16	1.2						20	
P32	^a 11-30-66	600		7.9			340								32		0.5							
	10-25-68		950												388	20	1.3					0.01		
	6-24-70		1010	7.5	27.5		470								374		1.2					0.01		
	^a 5-12-72		1050	8.0			560						195	160	388	16	1.2							
	^a 4-30-75		1100	7.5	28.0		560	400	120	58			199	163	340	16	1.4						18	
P33	^a 11-30-66	600		7.9			680								610		0.6							
	^a 1-25-68		1130	7.7	26.0	5	652	471	143	66	15	2.3	222	180	464	17	1.1	24	881	860	0	0.01		20
	5-12-72		1000	8.0			510						209	171	348	15	1.0							

Table 11.--Chemical analyses of water from production wells - continued

Well number	Date of sample	Depth of well (feet)	Specific conductance (umhos/cm at 25°C)	pH (units)	Temperature (°C)	Color (Pt-Co units)	Ca +Mg hardness as CaCO ₃	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Alkalinity as CaCO ₃	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Silica (SiO ₂)	Residue at 180°C	Calculated sum of constituents	Nitrate (NO ₃)	Phosphate (PO ₄)	Iron (Fe)	Strontium (Sr)
P33	^a 5-09-74		890	7.5	26.5		510	330	120	46			221		320	17	1.0							15
	^a 4-30-75		990	7.4	26.5		560	390	120	57			206	169	340	17	1.1							18
P34	^a 11-30-66	600		7.9			580								570		0.7							
	10-24-68		960				610								396	18	1.1					0.00		
	^a 6-24-70		1050	8.0	28.0	0	572	418	128	56	14	2.5	188	154	406	22	1.1	26	857	768	0.0	0.01		19
	5-12-72		1050	8.0			560						190	156	392	13	1.0							
	^a 5-09-74		1040	7.4	27.0		380	220	59	50			187		430	19	1.1							21
	^a 4-30-75		1000	7.4	27.0		600	440	130	60			191	157	350	17	1.3							21
P35	^a 11-30-66	600		7.9			300								96		0.8							
	10-25-68		820												328	18	1.1					0.01		
	5-12-72		1050	8.0			550						187	153	388	16	1.1							
	^a 5-09-74		930	7.5	27.0		530	360	120	49			196				1.2							21
	^a 5-01-75		930	7.4	28.0		510	340	110	52			201	165	300	17	1.2							18
P36	^a 11-30-66	570		7.9			350								70		0.9							
	10-25-68		640												168	24	1.2					0.01		
	6-24-70		710	7.6	27.0		290								166		1.7					0.0		
	5-12-72		740	8.1			340						212	174	168	22	1.1							
	^a 5-09-74		700	7.5	26.5		240	66	33				213		180	25	1.1							16
	^a 5-01-75		720	7.5	26.5		350	170	73	36			222	182	160	29	1.2							19
P38	^a 5-09-74	602	860	7.5	27.0		57	0	15	4.7			198		340	17	1.2							0.18
	^a 5-01-75		750	7.6	26.5		390	210	81	39			217		200	17	1.3							20

a Analysis by U.S. Geological Survey.

Table 12.--Averages and ranges for concentrations of selected constituents in water from production wells (values are in milligrams per liter except as otherwise indicated)

Constituent	1966			1968			1970		
	Number of samples	Average	Range	Number of samples	Average	Range	Number of samples	Average	Range
Specific conductance (micromhos per centimeter at 25°C)	--	--	--	34	890	465-1200	30	930	485-1220
Hardness	34	430	240-680	9	530	300- 740	30	460	211- 680
Sulfate	34	296	18-610	32	329	12- 604	30	309	48- 499
Chloride	--	--	--	30	22	15- 39	6	19	13- 22

Constituent	1972			1974			1975		
	Number of samples	Average	Range	Number of samples	Average	Range	Number of samples	Average	Range
Specific conductance (micromhos per centimeter at 25°C)	29	1000	470-1650	25	930	650-1290	31	1000	570-1300
Hardness	30	520	230- 970	24	430	57- 630	32	540	260- 800
Sulfate	30	360	24- 804	24	321	20- 580	33	334	62- 580
Chloride	30	17	10- 32	23	21	0.6- 35	33	19	8.3- 32

Table 13.--U.S. Geological Survey well numbers

EXPLORATION TEST WELLS

E1	2721280822003.01	E8 (P30)	2723040821618.01
E2	2723010821914.01	E9 (P36)	2722200821512.01
E3 (P27)	2722560821635.01	E10	2723080821618.01
E4	2722530821954.01	E11	2722580821953.01
E6 (P11)	2722480821808.01	E12	2721230821538.01
E7	2722480821804.01	E13	2722200821514.01

PRODUCTION WELLS

P1	2723050821903.01	P21	2722570821710.01
P2	2722480821903.01	P22	2723070821702.01
P3	2722570821854.01	P23	2722470821702.01
P4	2723060821846.01	P24	2722570821654.01
P5	2722480821846.01	P25	2723070821645.01
P6	2722570821836.01	P26	2722480821645.01
P7	2723060821827.01	P27 (E3)	2722560821635.01
P8	2722480821817.01	P28	2722570821628.01
P9	2722570821818.01	P29	2722480821628.01
P10	2723070821809.01	P30 (E8)	2723040821618.01
P11 (E6)	2722480821808.01	P31	2722330821527.01
P12	2722570821802.01	P32	2722330821511.01
P13	2723070821753.01	P33	2722250821535.01
P14	2722480821753.01	P34	2722250821520.01
P15	2722570821744.01	P35	2722180821527.01
P16	2723070821737.01	P36 (E9)	2722200821512.01
P17	2722480821736.01	P37	2722190821517.01
P18	2722570821728.01	P38	2722130821549.01
P19	2723070821718.01	P39	2721510821518.01
P20	2722480821719.01		

SHALLOW-ARTESIAN AQUIFER TEST WELLS

SA1	2723050821902.01	SA9	2722570821816.01
SA2	2722480821902.01	SA10	2723070821808.01
SA3	2722570821853.01	SA12	2722550821802.01
SA4	2723060821845.01	SA14	2722480821752.01
SA5	2722480821845.01	SA16	2723070821738.01
SA6	2722570821835.01	SA18	2722570821729.01
SA7	2723060821826.01	SA19	2723070821717.01
SA8	2722490821826.01	SA23	2722480821701.01

Table 13.--U.S. Geological Survey well numbers - continued

WATER-TABLE TEST WELLS

WT1	2722530821954.02	WT17	2722540821717.01
WT2	2722580821953.02	WT18	2722540821716.01
WT3	2723050821857.01	WT19	2722250821522.01
WT4	2722580821849.02	WT20	2722180821512.01
WT5	2722580821849.01	WT21	2722110821519.01
WT6	2722510821840.01	WT22	2722090821520.01
WT7	2722480821903.02	WT23	2722060821511.01
WT8	2722560821837.01	WT24	2722180821509.01
WT9	2722580821817.01	WT25	2722230821522.01
WT10	2722580821817.02	WT26	2722260821534.01
WT11	2722570821802.02	WT27	2722360821558.01
WT12	2722550821802.02	WT28	2722450821615.01
WT13	2722470821753.01	WT29	2722530821630.01
WT14	2722530821740.01	WT30	2722520821650.01
WT15	2722560821734.01	WT31	2722580821936.01
WT16	2722570821733.01		

MISCELLANEOUS WELLS

Drain		Verna	
Well	2722550821722.01	Obs.	2723560821813.02

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