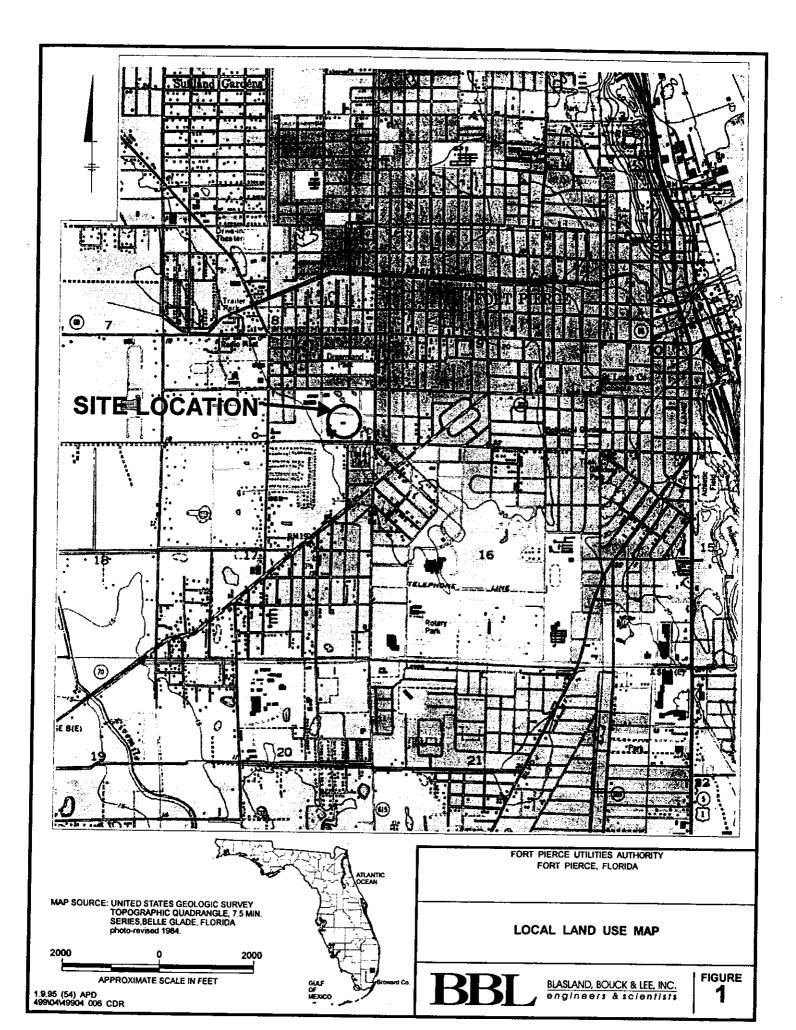
Construction and Testing of Floridan Aquifer Wells FB-3 & FB-4

Fort Pierce Utilities Authority Fort Pierce, Florida

February 1996







Transmitted Via U.S. Mail

February 16, 1996

Mr. David Mellert Senior Sanitary Engineer Fort Pierce Utilities Authority P.O. Box 3191 Fort Pierce, Florida 34948

Re: Final Report Construction and Testing of Floridan Aquifer Wells FB-3 & FB-4 Project #: 499.04

Dear Dave:

Enclosed are two copies of the above-referenced final report. We are pleased that both wells were successfully completed within the designated budget. This was accomplished because all parties involved worked together to achieve the desired goals. I also would like to commend you for your efforts and careful management of this project. It was truly a pleasure to work with you and others at Fort Pierce.

I have enclosed a client survey questionnaire. To help us provide the best service possible, I would appreciate any comments that you may have. I will keep your comments confidential if you desire.

Again, it was a pleasure working with you on this project, and I look forward to working with the Authority in the future as your plans for additional Floridan aquifer supply expand with increasing demands.

Sincerely,

BLASLAND, BOUCK & LEE, INC.

ederich W. Shickle for

Frederick W. Blickle, P.E. Vice President

FWB/st Enclosure m:\499\04\09660689.wpd

cc: Mr. Richard Stenberg, FPUA
Mr. Vaughan C. Weaver, FPUA (ltr only)
Mr. Elie J. Bourdeaux, III, P.E., (ltr only)
Mr. Gary E. Eichler, P.G, BBL (ltr only)
Mr. John R. Menhennett, BBL (ltr only)



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BLASLAND, BOUCK & LEE, INC. -ENGINEERS & SCIENTINTS

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### **Client Satisfaction Survey**

<u>Satisfaction</u> - How satisfied are you with BB&L's service: 1-Very Satisfied; 2-Satisfied; 3-Dissatisfied; 4-Very Dissatisfied <u>Importance</u> - How important is this attribute to you: 1-Critical Importance; 2-High Importance; 3-Low Importance; 4-No Importance <u>Rating</u> - Please circle appropriate number.;

	• QUALITY •				RATING	MP	ORTA	NCE	RATING
1.	Consistency of the quality of BB&L's reports, deliverables. engineering plans	1	2	3	4	1	2	3	4
2.	BB&L work products are delivered error free the first time	1	2	3	4	1	2	3	4
3.	Change orders are clearly and expediently defined and quantified	1	2	3	4	1	2	3	4
4.	Work products are delivered in accordance with mutually agreed upon schedules	1	2	3	4	1	2	3	4
5.	88&Lisable to accept and execute short turn-around requests	1	2	3	4	1	2	3	4
6.	Staff assigned to the project are technically capable	1	2	3	4	1	2	3	4
7.	Staff assigned to the project provide sound management	1	2	3	4	1	2	3	4
8.	Proposed project team members are maintained and used through- out critical project duration	Т	2	3	4	1	2	3	4
9.	Commitments made by project team members are kept	1	2	3	4	1	2	3	4
	VALUE •			SATISFACTION RATING IMPORTANCE RATI					ATING
1.	BB&L services are priced competitively	1	2	3	4	1	2	3	4
2.	Project team focuses beyond project costs to overall program costs and potential long-term savings	. 1	2	3	4	1	2	3	4
3.	Subcontractors are managed to your advantage	1	2	3	4	ı	2	3	4
4.	BB&L demonstrates ability to perform within the bounds of the project cost estimate	1	2	3	4	1	2	3	4
<b>5</b> .	BB&L project team provides creative solutions to problems	1	2	3	4	1	2	3	4
<b>6</b> .	BB&L acknowledges its weaknesses	1	2	3	4	1	2	3	4
<b>7</b> .	BB&L responds to client calls within one business day	1	2	3	4	1	2	3	4
8.	Location of BB&L staff to your project/offices	1	2	3	4	1	2	3	4
9.	Reputation of BB&L with regulatory agencies	1	2	3	4	1	2	3	4
10.	BB&L knows and understands your business and its organizational issues	1	2	3	4	1	2	3	4
<u>11.</u>	BB&L's commitment to do business with your Company	1	2	3	4	1	2	3	4
12.	Reputation of BB&Lin the marketplace	1	2	з	4	1	2	3	4

	TECHNICAL COMPETENCE	-	SFAC	TION	RATING	імр	ORTA	NCEI	LATING
١.	BB&L demonstrates a "big picture" client-based perspective		2	3	4	1	2	3	4
2.	BB&L demonstrates an in-depth knowledge and understanding of the ramifications of regulations being imposed on you	1	2	3	4	1	. 2	3	4
3.	BB&L demonstrates ability to anticipate and proactively respond to Issues, problems, or regulatory agency concerns	,	2	3	4	1	2	3	4
4.	BB&L demonstrates ability to negotiate on your behalf	1	2	3	4	1	2	3	4
5.	Project team technical performance meets or exceeds expectations	ו	2	3	4	1	2	3	4
٥.	Public participation/community relations capability (fapplicable)	1	2	3	4	1	2	3	4
	BUSINESS COMPETENCE	SATIS	FACT	ON I	ATING	IMPO	TAN	CE P/	
1.	Ease of doing business with BB&L								
	• contracting • invoicing • changing orders • proposais	1 1 1	2222	3 3 3 3	4 4 4	) 1 1 1	2222	3333	4444
2.	BB&Linvoices are clear and accurate and provide adequate detail	1	2	3	4	1	2	3	4
3.	BB&L Invoices are received in a timely fashion	1	2	3	4	1	2	3	4

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Are there other issues of BB&L's quality, service, and responsiveness you would like to comment on?

۱.	Would you hire BB&L again?	Yes	No
2.	Would you recommend BB&L to someone inside of your company?		
3.	Would you recommend BB&L to someone outside of your company?		
4.	Would you like to speak to someone concerning your response?		
	If yes, anyone in particular?		

Person Filling Out Form

. <u>.</u> .

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Date

Title

## Construction and Testing of Floridan Aquifer Wells FB-3 & FB-4

Fort Pierce Utilities Authority Fort Pierce, Florida

February 1996



185 N.W. Spanish River Boulevard, Suite 110 Boca Raton, Florida 33431-4230 (407) 750-3733

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Two 12-inch wells (FB-3 and FB-4) were constructed for the Fort Pierce Utilities Authority (FPUA) during the last quarter of 1995. These two new wells are part of a four-well system (FB-1, FB-2, FB-3, and FB-4) which provide water from the Floridan aquifer to the FPUA Water Treatment Plant (See Figure 1). The new production wells are each designed to produce approximately 1.4 million gallons per day (mgd). The Floridan aquifer in this area is slightly saline, and water from these wells contains chloride concentrations that are slightly higher than Drinking Water Standards. Consequently, the wells will be used to provide water that will supplement the surficial well field supply, which is fresh water. In the future, the Floridan aquifer wells may be used to supply water to a desalination plant.

Step drawdown tests and geophysical logging were conducted at each well upon completion of construction. The step drawdown tests were conducted at each well to determine the well's water-producing ability (expressed as specific capacity) so pumping and transmission systems can be properly designed, and to obtain water quality data. Geophysical logging was conducted to confirm formations, identify specific water production zones, and establish water quality for the production zones.

The water produced by FB-3 and FB-4 appears to be of similar acceptable quality to existing wells FB-1 and FB-2. Chloride, sodium total dissolved solids and odor exceeded the respective Drinking Water Standard. All other parameters tested were below the maximum contaminant levels (MCL) established in the National Interim Primary Drinking Water Regulations (NIPDWR), the Secondary Drinking Water Regulations, and the USEPA/Florida Priority Pollutant List. Well FB-3 free-flows at approximately 575 gallons per minute (gpm), while FB-4 free-flows at approximately 670 gpm.

Plans for future Floridan aquifer wells should include and consider information obtained during the construction of wells FB-3 and FB-4. Well construction techniques utilized were particularly successful. Chloride, sodium and total dissolved solids concentrations in well water, as well as the static piezometric surface should be monitored on a periodic basis to establish any trends that may occur. This data should be used to modify production schedules, if appropriate, and to form long-term estimations of Floridan aquifer supply potential and future desalination treatment techniques.

Wells FB-3 and FB-4 were successfully constructed and should be capable of producing design flow rates.

The intent of this report is to describe the purpose for the installation of Floridan Aquifer wells FB-3 and FB-4 as well as the processes used during installation. Both wells were installed to supplement the water supply for the City of Fort Pierce. Through a blending process of fresh water from surficial aquifer wells and the slightly brackish water from the upper region of the Floridan aquifer, the potential volume of potable water available to the city will be increased. Section 2 of this report will describe the various techniques used in the installation of water production wells FB-3 and FB-4. Blasland, Bouck & Lee (BBL) used two drilling techniques during the installation of wells FB-3 and FB-4: mud rotary and reverse air. A brief description of each drilling technique and the stages of drilling where they were used is described. Also described are the three phases of construction for each well: steel surface casing, PVC inner casing, and open hole. There are many factors that There are many factors that contribute to the success of a well. Using borehole contribute to the success of a geophysical logging, BBL was able to measure these factors quantitatively for wells well. FB-3 and FB-4. Section 3 discusses each geophysical logging technique and the results obtained. Section 4 describes the Regional Geology, and specifically the site geology formations that were encountered during the installation of FB-3 and FB-4. This information is critical in determining depth locations for the setting of the steel surface casing and inner PVC casing. Of particular note is the Avon Park Formation which is the water bearing unit for wells FB-3 and FB-4. Section 5 presents a description of the site hydrogeology. A careful analysis of the hydrogeology was necessary during the installation of wells FB-3 and B-4 to ensure that the quality of the water obtained could be used for the blending process. Section 6 summarizes the water quality characteristics of FB-3 and FB-4. Finally, BBL's conclusions about FB-3 and FB-4 and recommendations for future well construction are presented in Section 7.

### 2. Well Construction

2.1 General Construction Plan for Wells FB-3 and FB-4

an Ind	Installation of FB-3 and FB-4 began on September 20, 1995 and was completed on November 16, 1995. The wells were installed using a Midway 1500 rotary drill rig, which was operated by a minimum of three Drilling Services (DSI) personnel at all times. From 0 to 580 feet below land surface (BLS), the wells were installed by the mud-rotary, direct-circulation technique. From 580 feet to the final depth of each well, the reverse air drilling technique was used. The wells consist of an outer steel casing, an inner PVC casing, and an open hole section. The South Florida Water Management District Well Construction Permits (#SF080795D for FB-3 and #SF080795E for FB-4) and well completion reports are included in Appendix A.
	The general construction plan used for the construction of wells FB-3 and FB-4 was as follows:
	1. Drill 26-inch borehole by mud rotary method to an approximately 120 feet depth. Collect formation samples continuously in 10-foot increments.
	<ol> <li>Select appropriate depth at which to install the 20-inch diameter steel casing (ASTM A-53 Grade B).</li> </ol>
	3. Install and pressure-grout the 20-inch steel casing at the selected depth.
	4. Drill 19-inch borehole to a depth of approximately 500 feet, or until hard Floridan limestone is encountered. Collect formation samples continuously in ten-foot increments.
	<ol> <li>Install and pressure grout the 12-inch casing (Certainteed SDR 17 PVCCerta-Lock, ASTM Specification F-480) to a depth of approximately 500 feet, or until hard limestone is reached.</li> </ol>
	6. Proceed with drilling the 12-inch open borehole to a depth of approximately 900 feet or until water quality begins to degrade. Collect formation samples continuously in 10-foot increments. Collect water quality samples for chlorides, sulfates, pH, temperature, and conductivity every 60 feet or until a production zone is encountered.
	7. Perform geophysical logging after the well reaches complete depth in order to locate water production zones, production water quality, and formation locations.
	<ol> <li>Conduct and calculate specific capacity and step drawdown tests when the well reaches total depth. Collect water samples for primary, secondary, and priority pollutant drinking water standard analysis.</li> </ol>
	9. Cap well.
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2.2 Steel Surface Casing	Steel surface casing was installed to a depth of 121 feet for FB-4 and 123 feet for FB-3 to prevent formation collapse during the installation of the inner PVC casing. The steel surface casing, which is 20-inches in diameter with one-quarter-inch thick walls, was installed in the 26-inch diameter borehole. The borehole was drilled using the mud-rotary, direct circulation method, with a staged tricone drill bit. The drill cuttings were placed in a rolloff dumpster, hauled offsite by St. Lucie Waste Services, and disposed of at the St. Lucie County landfill.
Steel surface casing was installed to: • 123 feet BLS at FB-3 • 121 feet BLS at FB-4	The surface casing was set into the borehole in three 42-foot sections. After casing installation, there was two to five feet of stick-up above land surface depending on the depth of casing setting. The joints were arc-welded together as each section was lowered into the borehole. To ensure that the casing would be straight in the borehole, centralizers were welded onto the steel casing in sets of three at 120 degree intervals, every 60 feet starting from the bottom. Two-inch diameter PVC pipe was inserted inside of the casing to the bottom, and then used to pressure-grout the casing from bottom to land surface in one stage. ASTM C150 Type I cement was used with no curing additives. Following the curing of the cement (minimum of 8 hours), the plug was drilled through with a 19-inch diameter staged tricone drill bit to begin installation of the PVC inner casing.
2.3 PVC Inner Casing	A nominal 19-inch diameter staged tricone drill bit was used to extend the borehole from the bottom of the steel casing to the top of the Floridan aquifer, which occurs at approximately 500 feet below land surface. Once the top of the Floridan aquifer was encountered, the hole was advanced carefully into the rock approximately 1 to 3 feet. This allowed a precise casing set, which sealed off the clay confining strata completely, yet did not case out the upper most production zone of the Floridan aquifer. The drill cuttings were placed in a rolloff dumpster and hauled offsite by St. Lucie Waste Services and disposed of at the St. Lucie County landfill.
	The inner casing consisted of Certainteed 12-inch diameter Certa-Lok SDR 17 PVC well casing, 20 feet in length, with a casing wall thickness was 0.750-inches. Twenty-six sections were installed in each well. The sections were connected as they
	were lowered into the borehole by the insertion of a plastic spline through couplings located on the end of each section of pipe. The spline acts to hold the pipe in the coupling. To ensure that the casing would be set straight in the borehole, centralizers were strapped with 0.750-inch stainless steel banding at 120-degree intervals around the PVC pipe, every 60-feet starting from the bottom. For both wells, 503 feet of inner casing was installed. Inner casing was installed between October 2 and 3, 1995 at well FB-4, and between November 1 and 2, 1995 at well FB-3.
	For the primary grouting stages, a PVC header was attached to the top of the casing and secured to the drilling rig to stabilize the casing in the borehole during grouting. The header was equipped with a pressure gauge so grout fill-up could be tracked.

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The inner casing for FB-3 and FB-4 was pressure-grouted from 503 feet to a depth of approximately 100 feet BLS using the same technique and cement specifications used for the surface casing. During grouting of FB-4, the grout appeared to flash (i.e., set up quickly) at the end of the grouting stage. Although this did not affect the quality of the grouting, a cement curing inhibitor (WRC-79) was used for the first stage of pressure grouting for FB-3 to prevent flashing. The upper 100 feet was not grouted on the same day to avoid excessive heat of hydration which could damage the PVC casing. The remainder of the casing was grouted on the following day following the primary grouting by lowering a two-inch diameter PVC tremie line to a depth of approximately 100 feet BLS in the annular space between the inner and outer casings. Mud returns were observed throughout the grouting at both wells.

Following curing of the second stage, the cement plug inside the PVC casing was drilled out using a nominal 12-inch diameter tricone bit, which was also used to drill the open borehole in the Floridan aquifer. Once the drill bit passed the cement plug and entered the Floridan aquifer, drilling with direct mud rotary circulation continued until artesian conditions were encountered. At that point, the drilling method changed from direct mud rotary to the reverse air circulation method. Reverse air drilling, which creates a suction lift through the drill bit, allows water quality samples to be collected and drill cuttings to be brought rapidly to the surface, and creates low pressure in the borehole, thus developing the well as drilling proceeds. This method also provides a more rapid drilling rate in limestone than does mud rotary.

The open borehole section of the FB-3 and FB-4 was drilled using the reverse air circulation method into the upper Floridan aquifer extending from 503 to 890 feet BLS. A nominal 12-inch diameter tricone bit was used for this portion of the drilling.

The drill cuttings and formation water produced during drilling were directed into a rolloff dumpster, which was used to allow sediment to settle out of suspension. After the material settled to the bottom of the dumpster, the water was pumped into the storm drain, which was lined with a silt screen to catch any additional material present in the effluent. The storm sewer drain ran east to South 25th Street and then south to a drainage canal along Georgia Avenue, behind the FPUA Water Plant.

As drilling progressed, samples were taken every 60 feet or whenever a production zone was encountered (evident by an increase in flow). The first sampling point for FB-4 was 580 feet BLS because this was the first area where the well flowed naturally (artesian conditions). As drilling progressed, samples were taken approximately every 20 feet and analyzed for temperature, pH, conductivity, chlorides, and sulfates. This sampling program was designed to detect undesirable increases in salinity, which commonly increases with depth. The various sampling intervals and analytical results are presented in Table 1 for FB-4, and Table 2 for FB-3. At the end of the open hole drilling, FB-3 was estimated to be free-flowing

#### 2.4 Open Borehole

The open borehole extended from:

- 503 to 890 feet BLS at FB-3
- 503 to 890 feet BLS at FB-4
- FB-3 free-flowed at 575 gpm
- FB-4 free-flowed at 670 gpm

at approximately 575 gpm and FB-4 at approximately 670 gpm using flow estimation procedures provided by Driscoll (1986).

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BLASLAND, BOUCK & LEE, INC.

Date Analyzed by Laboratory	Time	Depth (ft. BLS)	pH	Temperature (oC)*	Conductivity <sup>1</sup> (umhos/cm)	Chloride <sup>1</sup> (mg/L)	Sulfates <sup>1</sup> (mg/L)
10/06/95	12:50	580	8.83	26.9	13.2	230	294
10/13/95	15:12	580²	7.43	26.0	1450	274	225
10/06/95	16:56	640	7.50	20.7	1572	250	356
10/13/95 ²	15:00	680 <sup>2</sup>	7.41	27.0	1450	308	273
10/09/95	18:20	700	7.60	20.9	1496	260	265
10/10/95	10:23	760	7.60	22.7	1414	265	232
10/13/95 ²	14:37	760²	7.40	27.5	1448	300	263
10/10/95	12:15	780	7.70	22.3	1370	265	200
10/10/95	15:08	820	7.70	25.0	1360	265	185
10/10/95	16:52	840	7.00	24.9	1520	330	188
10/11/95	12:00	860	7.64	28.0	1502	323	222
10/11/95	13:11	880	7.60	25.4	1502	320	166
10/13/95 <sup>2</sup>	14:15	889²	7.36	28.0	1385	295	248
10/11/95	15:03	890	7.65	25.6	1485	320	278

TABLE 1 FLORIDAN AQUIFER WELL FB-4 WELL CONSTRUCTION WATER QUALITY RESULTS FORT PIERCE UTILITIES AUTHORITY ...

<sup>1</sup>Analyzed by FPUA water treatment plant laboratory Point sample taken by depth sampler during geophysical logging BLS - Below Land Surface

mg/L - Milligrams per liter umhos/cm - micromhos per centimeter \* - Obtained by BBL personnel in the field

#### TABLE 2

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# FLORIDAN AQUIFER WELL FB-3 WELL CONSTRUCTION WATER QUALITY RESULTS FORT PIERCE UTILITIES AUTHORITY

Date Analyzed by Laboratory	Time	Depth (ft. BLS)	pĦ	Temperature (oC)*	Conductivity <sup>1</sup> (umhos/cm)	Chloride <sup>1</sup> (mg/L)	Sulfates <sup>1</sup> (mg/L)
11/14/95	13:56	560	7.30	24.5	1434	284	162
11/08/95	08:55	584	8.35	25.0	1502	250	284
11/08/95	11:25	640	8.28	25.2	1512	266	258
11/14/95 <sup>2</sup>	13:44	650²	7.30	24.5	1420	288	162
11/08/95	14:50	700	7.74	25.5	1528	260	247
11/09/95	08:30	760	7.81	23.8	1418	272	174
11/09/95	09:58	784	7.78	24.8	1390	268	221
11/09/95	11:56	821	7.80	25.0	1390	264	198
11/14/95 ²	13:30	830 <sup>2</sup>	7.20	24.5	1430	293	140
11/09/95	13:06	841	7.68	25.0	1394	268	209
11/09/95	14:18	862	7.65	25.0	1470	298	158
11/09/95	15:23	881	7.71	25.5	1474	300	296
11/10/95	10:86	890	7.49	25.4	1364	262	200
11/14/95 <sup>2</sup>	13:17	890²	7.40	24.5	1360	254	174

<sup>1</sup>Analyzed by FPUA water treatment plant laboratory <sup>2</sup>Point sample taken by depth sampler during geophysical logging BLS - Below Land Surface

mg/L - Milligrams per liter umhos/cm - micromhos per centimeter \* - Obtained by BBL personnel in the field

BLASLAND, BOUCK & LEE, INC. engineers & scientists

### 3. Well Characteristics Analyses

#### 3.1 Borehole Geophysical Logging

#### 3.1.1 Description of Geophysical Methods

Borehole geophysical well logging is the measurement of physical properties that can be interpreted in terms of the hydrogeologic characteristics of the strata penetrated by the well. Geophysical logging surveys conducted on FB-3 and FB-4 consisted of:

- electric spontaneous potential resistivity
- natural gamma ray
- borehole temperature while flowing
- fluid resistivity while flowing
- caliper
- borehole fluid velocity

All logs were run under natural, artesian flowing conditions.

An electric log is a record of the apparent resistivities of the subsurface formations and the spontaneous potentials generated in the borehole. Both are plotted against depth. These two properties are related to the lithology and to the quality of water found within each formation.

Natural gamma ray logging measures the emission of gamma rays from certain very low level radioactive elements that occur in very small, varying amounts in different lithologies. By measuring the emitted radiation, it is possible to identify and correlate subsurface formations penetrated by the well. Typically, due to the presence of phosphoritic material, clay formations produce a noticeably higher amount of gamma ray emissions, which in turn are associated with zones of low permeability.

The temperature log is a record of water temperature within the borehole versus its depth. Temperature logs run during flowing conditions may be used to locate zones of water entry into the borehole, to locate casing cement based on the heat of hydration, to determine the direction of borehole flow, and to identify geothermal gradients. Production zones may be identified from a temperature log if the producing zones water temperature is measurably different from the water upgradient in the borehole.

The fluid resistivity log run under flowing conditions is used to identify zones of water entry into the borehole. Similar to the temperature log, different production zones frequently posses different water quality which can be detected by the fluid resistivity log.

The caliper log is a record of the wells inside diameter versus depth. Caliper logs locate cavities, confirm casing diameters and lengths, and are necessary for quantitative interpretation of fluid velocity logs. Fluid velocity or flowmeter logs measure vertical flow of water in the well. Flows at various depths are measured by means of a propeller flowmeter that is lowered into the well at a known, constant

velocity. Data obtained from the fluid velocity logs are used to calculate the quantities of water released from, or accepted by, an aquifer at different production zones.

3.1.2 Results of Geophysical Logging

Four major production zones were identified at both wells.

#### FB-3

- 640-700 feet BLS
- 760-784 feet BLS
- 841-862 feet BLS
- 880-890 feet BLS

#### FB-4

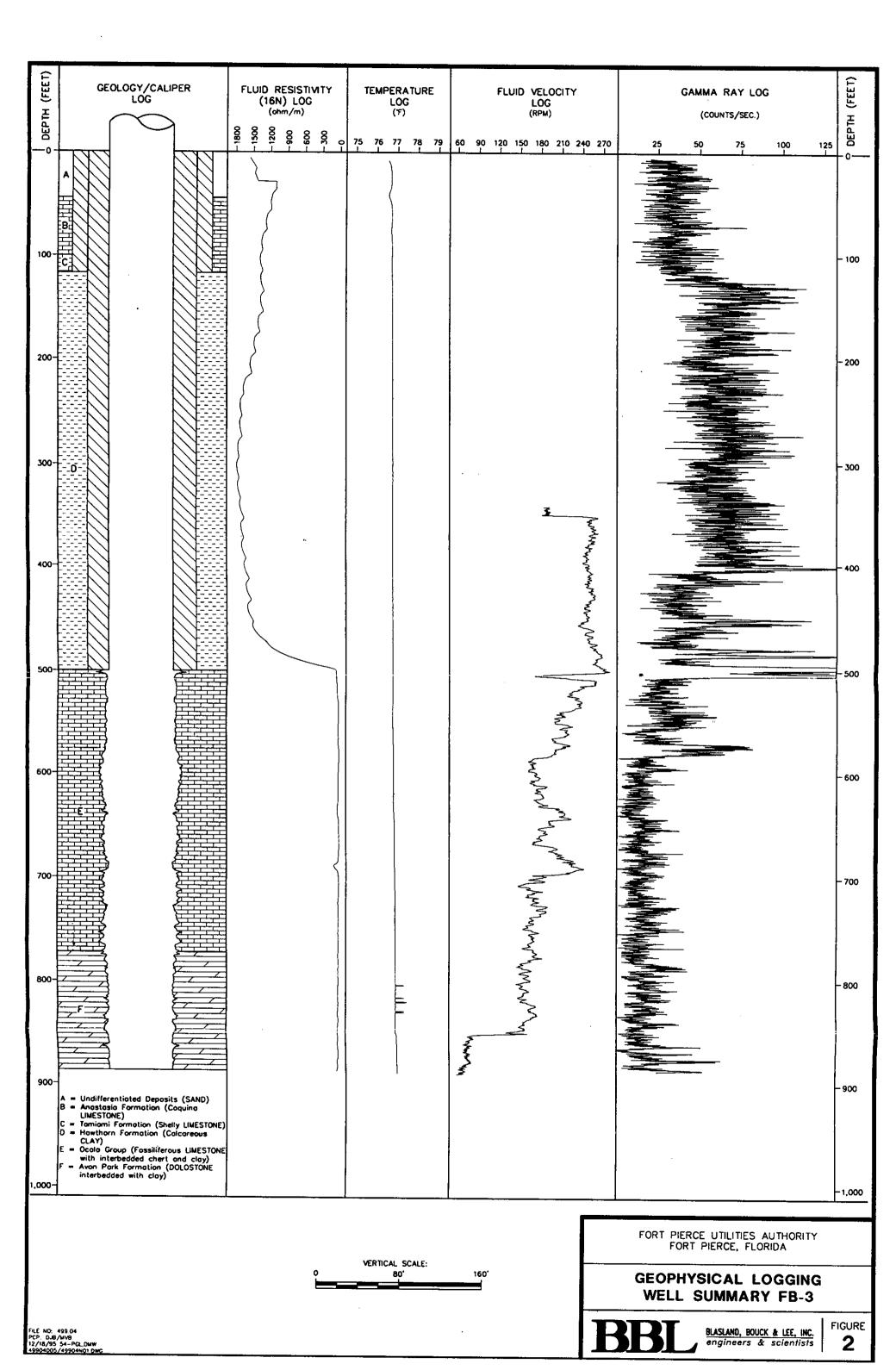
- 580-630 feet BLS
- 640-700 feet BLS
- 760-840 feet BLS
- 860-890 feet BLS

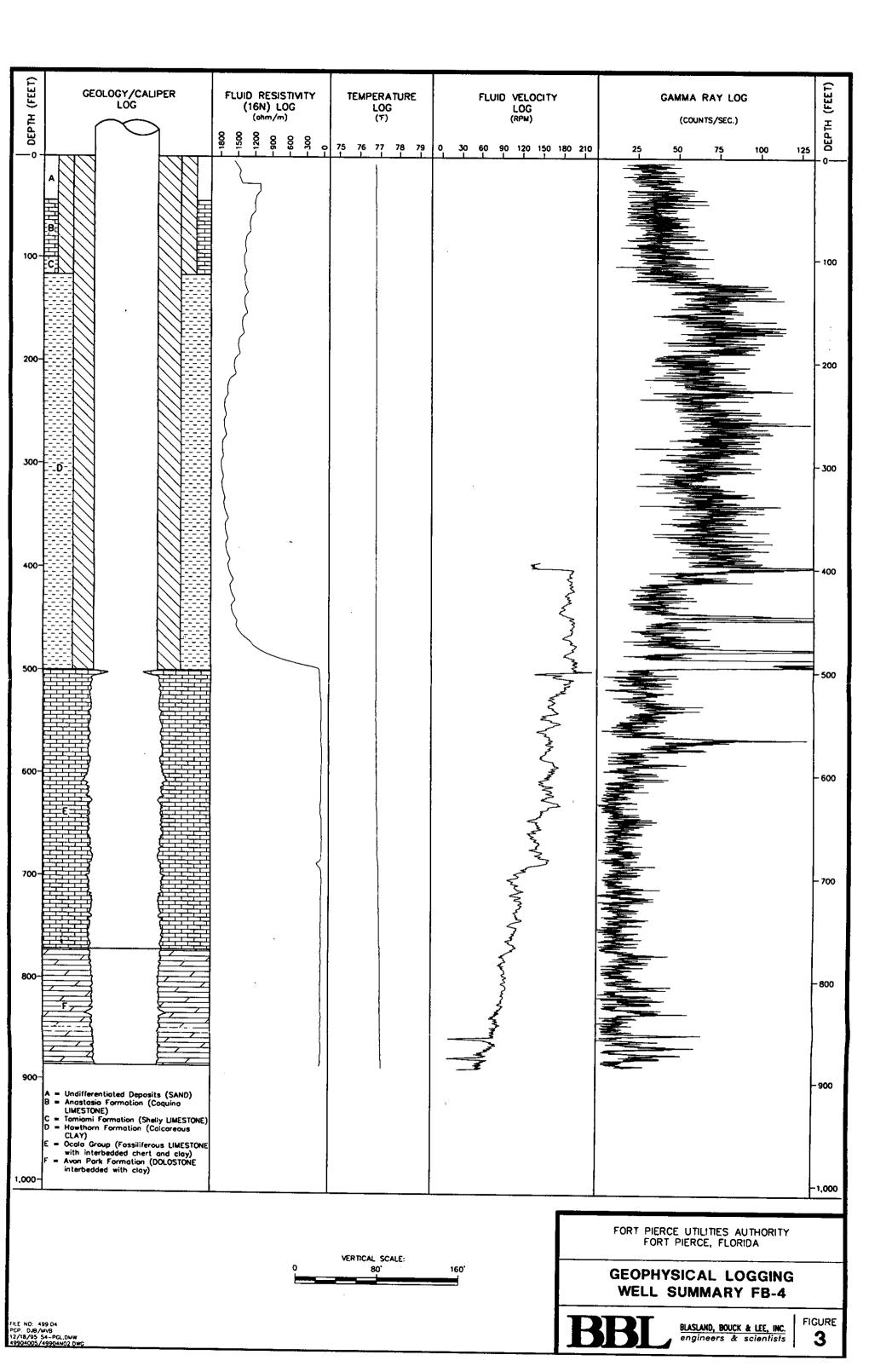
Geophysical logging is an important component of the proper development of the Floridan aquifer at Fort Pierce. The techniques used for FB-3 and FB-4 allowed for the optimization of flow, which is directly related to the quantity of water which can ultimately be developed, as well as optimization of water quality which directly impacts treatment costs. The geophysical logs and well construction details for FB-3 and FB-4 are illustrated on Figures 2 and 3. A complete set of the geophysical logs is included in Appendix B.

The gamma ray log was run to correlate stratigraphy with that recorded in the field from the well cuttings. This log was also useful in correlating geologic and geophysical logs from FB-2. A zone of high gamma ray emission occurs at the base of the Hawthorn formation. Underlying the lower Hawthorne formation beds is the Ocala Group, an Eocene limestone unit, which indicates the top of the Floridan aquifer. The Ocala formation is denoted by a marked decrease in gamma ray emission. This decrease indicates a formation change from a predominantly clay unit to a limestone unit, as was observed in the well cuttings.

The temperature log shows little variation throughout the borehole. The lack of variation is due to the large percentage of water entering at the bottom of the borehole. The temperature changed very little throughout the borehole because the major component of well flow originates near the bottom of the borehole and blends rapidly with water entering from shallower depths.

The fluid resistivity log indicates little change in fluid resistivity for reasons to those similar discussed for the temperature log results. The log results correspond to the field resistivity measurements collected during the reverse air drilling phase, which consistently ranged from 1300 to 1600 micromhos/cm. The caliper log is best used in conjunction with the flow log to determine production zones. FB-3 and FB-4 have fairly uniform borehole diameters. The diameter of the borehole at the interface of the PVC inner casing and the limestone appears to be the largest anomaly of the borehole. The remainder of the borehole from 505 to 770 feet (Ocala Group) is relatively uniform, with areas of minor variations in diameter. These minor variations are expected because the drilling and development process can loosen and remove sections of rock material from the outer edge of the borehole. The borehole diameter narrows and shows fewer variations from 770 to 890 feet (Avon Park Formation) due to the increased hardness of the formation. This narrowing of the borehole correlates with the flow increase experienced in this section of the borehole.





The fluid velocity log illustrates the approximate location of four major producing zones for FB-3 and FB-4, which are (feet BLS).

FB-3	<b>FB-4</b>
640 to 700	580 to 630
760 to 784	640 to 700
841 to 862	760 to 840
880 to 890	860 to 890

The production zones are indicated by significant increases in borehole flow rate.

On October 19, 1995 and November 16, 1995, step drawdown tests were performed on FB-4 and FB-3, respectively. The tests were run to determine the specific capacities of each well and to provide information for proper pump design and optimal pumping rates. Three steps were run during the test for FB-4: step 0 at 444 gpm; step 1 at 680 gpm; and step 2 at 1007 gpm. Each of the first two steps were run for approximately 120 minutes, while the third step was run for 160 minutes. After step 2 was completed, water level recovery data was collected until static conditions were re-established (93 minutes). Three steps were also run during the test for FB-3: step 0 at 421 gpm; step 1 at 596; and step 2 at 892 gpm. Each of the three steps was run for 120 minutes. After step 2 was completed, water level recovery data was collected until static conditions were re-established (116 minutes). Water levels were recorded with an In-Situ Hermit 2000 data logger. The well performance characteristics can be seen in Table 3. The results of each step and the recovery data are presented in Appendix C.

The specific capacity values calculated indicate that the wells are productive and lose little efficiency with increased well turbulence. As flow and drawdown increase, the specific capacity will decrease. This is evident in the fact that water levels in both wells rapidly stabilized after pumping rate steps.

3.2	Step Drawdown
	Tests

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#### TABLE 3

#### FLORIDAN AQUIFER WELL FB-3 AND FB-4 WELL PERFORMANCE CHARACTERISTICS FORT PIERCE UTILITIES AUTHORITY

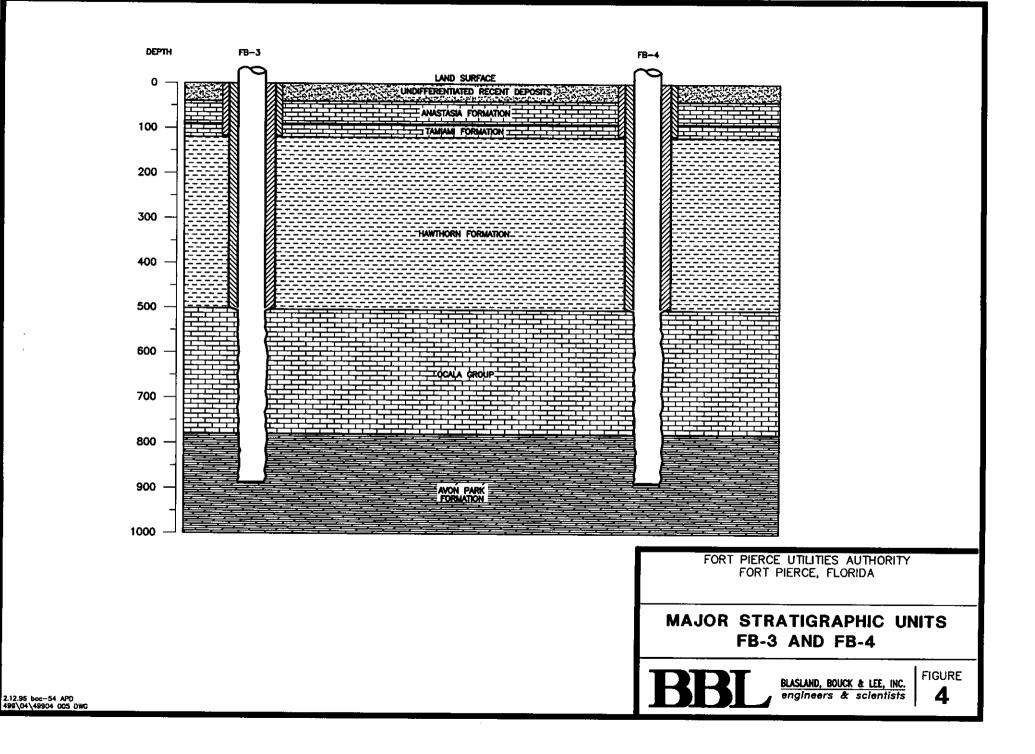
Well	Date	Test Step (#)	Pump Rate (gpm)	Maximum Drawdown (fl.)	Specific Capacity (gpm/fl.)	Well Efficiency (%)
FB-3	11/16/95	0	421	10.00	42	79
FB-3	11/16/95	1	596	16.50	36	68
FB-3	11/16/95	2	892	27.00	33	62
FB-4	11/19/95	0	444	15.28	29	79
FB-4	11/19/95	1	680	25.28	27	70
FB-4	11/19/95	2	1007	42.31	24	63

## 4. Geology

2

4.1 Regional Geology	The regional geology of Southeastern Florida consists primarily of interlayered sands, limestone, and clay formations. These formations were deposited primarily in a shallow sea environment.
	The upper 100 to 200 feet consists of interlayered sand, sandy limestone, limestone and coquina limestone. Beneath that is the Hawthorn Formation, which consists of approximately 400 feet of calcareous clay. Underlying the clay is several thousand feet of carbonates (limestones and dolostones) comprising the Lake City, Avon Park, Ocala, and Suwannee Formations.
4.2 Site Geology	The major stratigraphic units encountered in FB-3 and FB-4 are presented in Figure 4. The units encountered were the Avon Park Formation, Ocala Group, Hawthorn Formation, Tamiami Formation, Anastasia Formation, and undifferentiated deposits which range in age from middle Eocene to recent. The units are described below in order of deposition, from oldest to youngest. Lithologic logs for FB-3 and FB-4 can be found in Appendix F.
4.2.1 Avon Park Formation	The Avon Park Formation is of middle to late Eocene age (approximately 45 million years ago). It was encountered between 770 and 880 feet BLS. At FB-3 and FB-4, the Avon Park consists of white/gray/tan limestone and dolostone with interbedded clay. Various shell fragments occur continuously between 770 and 840 feet BLS with no dolostone. Below 840 feet BLS there are little or no shell fragments and dolostone is interbedded with limestone from 850 to 880 feet BLS.
4.2.2 Ocala Group	The Ocala Group is of late Eocene age (approximately 40 million years ago). It was encountered between 500 and 770 feet BLS. At FB-3 and FB-4, the Ocala Group consists primarily of gray/tan fossiliferous limestone. Interbedded throughout the Ocala Group are minor layers of chert and clay. Also found scattered throughout the formation are sharks teeth and coral fragments. Black phosphatic nodules occur near the top of the formation. Some of the fossils present are indistinguishable shell fragments, however, many of the shells are distinguishable as Lepidocyclina ocalana. Also present are <u>Heterostegina ocalana</u> and <u>Nummulites ocalanus</u> . Dolostone occurs in minor amounts between 590 and 700 feet BLS.
4.2.3 Hawthorn Formation	The Hawthorn formation is of Miocene age (approximately 15 million years ago). It was encountered between 120 and 500 feet BLS. At FB-3 and FB-4, it consists predominantly of green calcareous clay with minor shell fragments intermixed. From 360 to 450 feet BLS, the clay contains varying amounts of interbedded chert, limestone/dolostone and black phosphatic nodules. Chert is also interbedded between 450 and 500 feet BLS.
4.2.4 Tamiami Formation	The Tamiami formation is of Pliocene age (approximately 4 million years ago). It was encountered between 90 and 120 feet. At FB-3 and FB-4, it consists of gray/tan silty, shelly limestone.

		1		
4.2.5	Anastasia Formation	The Anastasia formation is of Pleistocene age (approximately 1 million years ago). It was encountered between 40 and 90 feet BLS. At FB-3 and FB-4, it consists of gray/tan silty coquina interbedded with varying percentages of limestone.		
4.2.6	Undifferentiated Recent Deposits	The upper 40 feet of FB-3 and FB-4 consist of fine to medium grained, moderately sorted, angular to sub-angular, rounded to sub-rounded quartzose sand. it has been deposited during the Holocene (the past 10,000 years).		



### 5. Hydrogeology

5.1 Regional Hydrogeology	The regional hydrogeology consists of three units. The Floridan Aquifer System, the Intermediate Confining System, and the Surficial Aquifer System. The Floridan aquifer as defined by Parker, et al. (1955), includes all or parts of the Lake City Limestone, Avon Park Limestone, Ocala Group, Suwannee Limestone, and permeable parts of the Hawthorne Formation that are in hydrologic contact with the rest of the aquifer.	
	The terminology used in this report coincides with that of the Florida Geological Survey Special Publication No. 28 on Hydrogeological Units of Florida (1986). In this publication, the Floridan aquifer system is defined as a thick carbonate sequence which includes all or part of the Paleocene and early Miocene Series and functions regionally as a water-yielding hydraulic unit. The top of the aquifer system coincides with the top of the Suwannee Limestone, where present, or the top of the Ocala Group. The publication also allows for the designation of one or more aquifers within the Floridan aquifer system based on vertical variations in water bearing properties.	
5.1.1 Upper Floridan Aquifer	The occurrence of a less permeable carbonate unit of sub-regional extent found particularly in south Florida separates the system into the two aquifers. The less permeable units may be very leaky to virtually non-leaky, depending upon the lithologic character of the rock comprising the unit (Miller, 1986). Meyer (1989) describes the Upper Floridan aquifer in southern Florida as consisting chiefly of permeable zones in the Tampa, Suwannee, Ocala Limestone and the upper part of the Avon Park Formation. The ground water is brackish, and the salinity generally increases with increasing depth and with distance downgradient and southward from central Florida.	
	The most significant ground-water movement occurs at or near the top of each formation. Ground-water movement is generally southward from the area of highest head near Polk City in central Florida to the Gulf of Mexico and to the Atlantic Ocean.	
5.1.2 Intermediate Confining Unit	Overlying the Upper Floridan aquifer is a thick sequence of clastic rocks of much lower permeability. The confining unit is up to 700 feet thick (400 feet locally) and retards the vertical movement of water between the surficial aquifer and the Floridan aquifer systems. An additional benefit of this thick confining unit is that contaminants found in the surficial aquifer cannot migrate to the Upper Floridan aquifer. The low permeability beds are Miocene in age and consist primarily of clays and clayey sands of the Hawthorn formation.	
5.1.3 Surficial Aquifer System	A surficial aquifer, which contains water under confined conditions is present throughout the region. The surficial aquifer in the region is comprised of a number of Plio-Pleistocene aged Units. These vary in thickness from 0 to greater than 200 feet thick. The bottom of the surficial aquifer is denoted by the presence of fine grained clastic material of Miocene age.	

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#### 5.2 Site Hydrogeology

#### 5.2.1 Floridan Aquifer System

160 g

The Floridan artesian aquifer is up to 3,000 feet thick in this region. The aquifer is highly productive, but water quality degrades with depth. FB-3 and FB-4 were drilled 380 feet into the upper Floridan aquifer, which contains the highest quality water in the aquifer. The water production zones in the Floridan aquifer are characteristically narrow zones and occur at formation contacts known as non-conformities. Weathering processes at the tops of formations creates a secondary permeability which often produce highly transmissive zones of narrow thickness relative to overlying and underlying strata, which are much lower in permeability.

The hydrogeology of the area consists of three units, the upper Floridan aquifer, the intermediate Hawthorn confining formation, and the surficial aquifer. The units are

described below in order of deposition, from oldest to youngest.

- 640 to 700
- 760 to 784
- 841 to 862
- 880 to 890

Well FB-4 produces the majority of its water from four zones, namely:

Well FB-3 produces the majority of its water from four zones, namely:

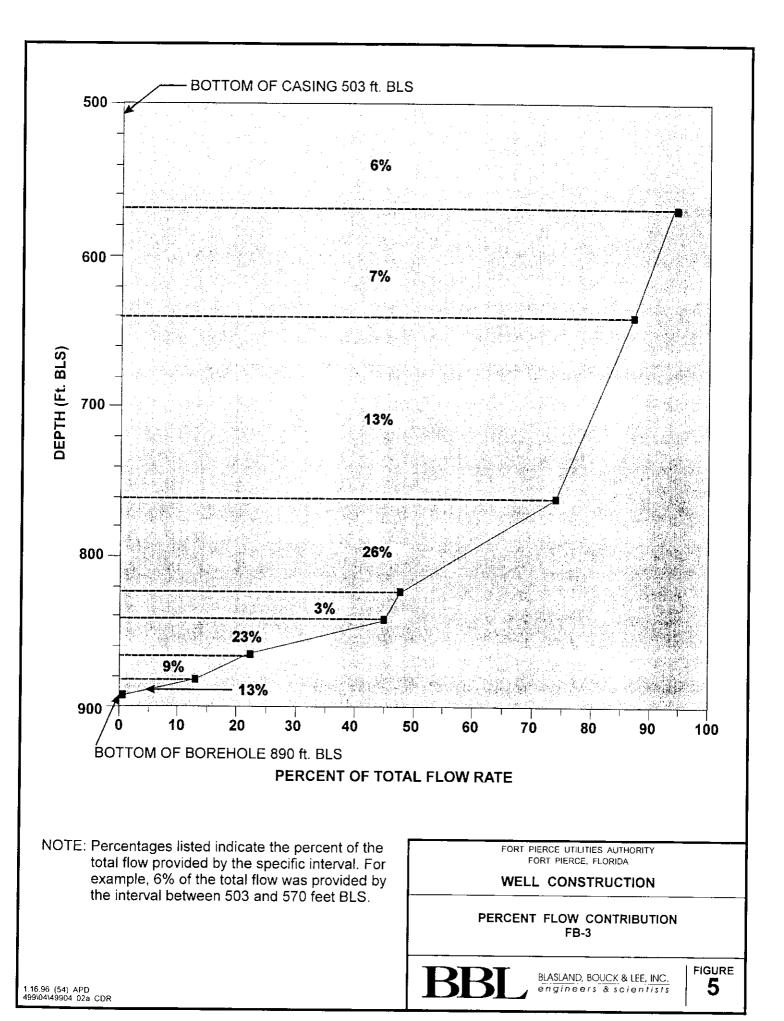
- 580 to 630
- 640 to 700
- 760 to 840
- 860 to 890

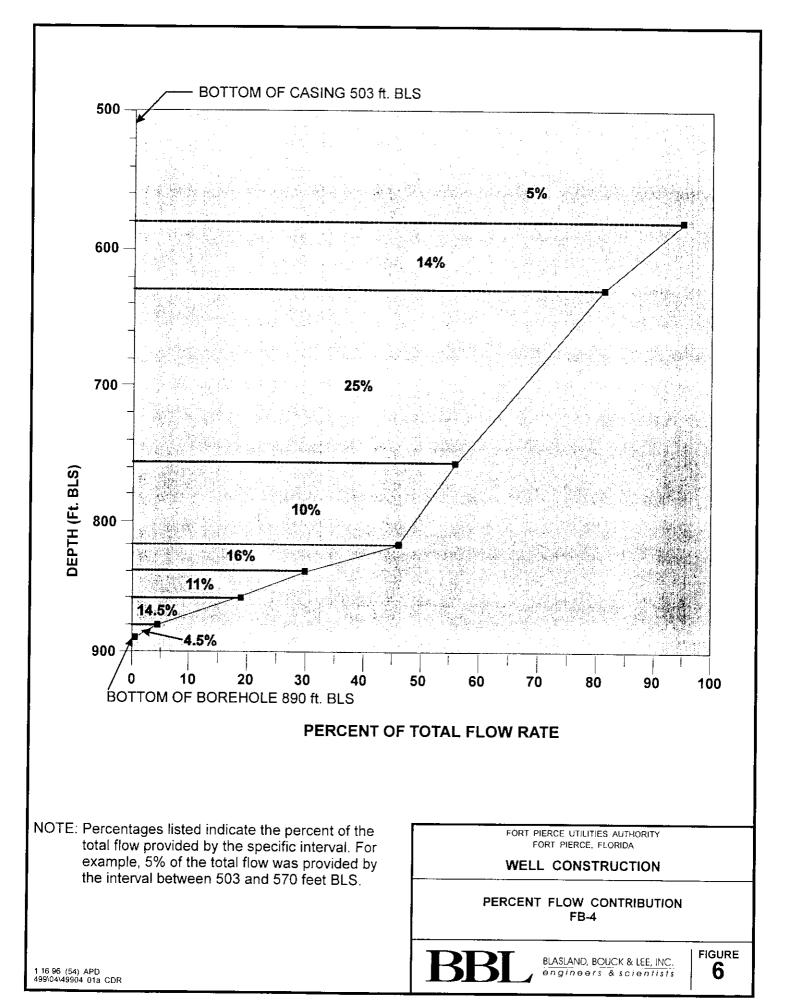
Approximately 75 percent of the total flow from FB-3 originates from these zones, which comprises just 30 percent of the well's open hole length of 387 feet (See Figure 5). Well FB-4 produces approximately 85 percent of its water from the four major production zones, which comprises 60 percent of the well's open hole length of 387 feet (See Figure 6).

The specific capacity of a production well drilled into the Floridan aquifer can vary significantly from well to well due to natural variations of the producing zones (i.e. formation contacts). At FB-3 the specific capacity based on the step drawdown test was 36 gpm/ft at 596 gpm. The specific capacity of FB-4 based on the step drawdown test is 27 gpm/ft at 680 gpm. A complete listing of the specific capacities based on pumping rates can be seen in Table 1. It is difficult to estimate transmissivity, storativity, or leakance for Well FB-3 and FB-4 since a pumping test was not performed. The step drawdown test does not adequately stress the aquifer to the point that valuable information regarding its characteristics can be obtained. Any attempt to estimate additional aquifer characteristics from a step drawdown would not be scientifically sound. The step drawdown test calculations and formulas for this report can be seen in Appendix D.

Approximately 75 percent of the total flow from FB-3 originates from four production zones, which comprises just 30 percent of the open borehole.

Approximately 85 percent of the total flow from FB-4 originates from four production zones, which comprises 60 percent of the open borehole.





5.2.2	Intermediate Confining Unit	The Hawthorn clay formation separates the Floridan aquifer and surficial aquifers, and is known as the Floridan Aquiclude. Due to its thickness (380 feet at FB-3 and FB-4) and low permeability (several orders of magnitude lower than the aquifer), the formation serves as a confining unit between the two aquifers. Due to its low permeability, the Hawthorn formation excludes the movement of water from the surficial aquifer to the Floridan aquifer, thus protecting the Floridan aquifer from surface sources of contamination.
5.2.3	Surficial Aquifer System	The surficial aquifer contains an upper sand unit and a lower, highly transmissive sand and shell zone which is used extensively for private and municipal production wells. The FPUA develops most of its present water supply from this aquifer.

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### 6. Water Quality

6.1 General Characteristics	The water quality of the Floridan aquifer generally worsens with depth. Therefore, it is necessary to periodically monitor water quality during the installation of a Floridan well. Water quality was monitored at least every 60 feet during the installation of FB-3 and FB-4. Water quality was also monitored during the step-drawdown test. Water-quality parameters analyzed in the field consisted of pH and temperature. Water samples collected for chlorides, sulfates, and conductivity analysis were delivered to the FPUA water plant laboratory. Analyses conducted for primary and secondary drinking water standards were performed by Envirometrics Incorporated at the request of FPUA. The laboratory analytical results from this sampling can be found in Appendix E.
6.2 Water Construction Water Quality	As drilling progressed in the Floridan aquifer, water quality was monitored every 60 feet from 580 feet to 820 feet BLS, and every 20 feet thereafter. Water samples were collected form the reverse air discharge pipe and analyzed for pH, temperature, conductivity, chlorides, and sulfates. Drilling was stopped for 5 to 10 minutes at each sampling point to allow the well to clear, after which time a representative sample was obtained from each depth.
Water quality did not vary significantly with depth at either well.	The water quality results (Tables 1 and 2) indicated that water quality did not vary significantly with depth in FB-3 and FB-4. The range of values recorded for pH, temperature, and conductivity in FB-3 were 7.49 to 8.35, 23.8°C to 25.5°C, and 1364 to 1528 unhos/cm respectively. Chloride concentrations ranged from 250 to 300 mg/l, and sulfates ranged from 158 to 296 mg/l. Graphs showing chloride concentrations with depth for FB-3 and FB-4 are shown in Figures 7 and 8. The range of values recorded for pH, temperature, and conductivity in FB-4 were 7.00 to 7.70, 20.7°C to 25.6°C, and 1312 to 1572 unhos/cm respectively. Chloride concentrations ranged from 230 to 330 mg/L, and sulfates were 166 to 356 mg/L. On October 13, 1995 and November 16, 1995 water quality grab samples were obtained during the geophysical logging of each well and analyzed for the same parameters as during the open hole construction. Results for these samples are also included in Tables 1 and 2.
Water samples from both wells were analyzed for Primary and Secondary Drinking Water Standards.	Samples were obtained for analysis of Primary and Secondary Drinking Water Standards. All of the constituents tested were below the Maximum Contaminant Levels (MCL) as published in DEP 17-550.310 (primary) and DEP 15-550.320 (secondary) with the exception of those listed in Table 4. Accordingly, water from FB-3 and FB-4 should be used for blending with fresh water or treated to remove sodium, chloride, and totally dissolved solids.

#### TABLE 4

#### FLORIDAN AQUIFER WELLS FB-3 AND FB-4 CONSTITUENTS ABOVE MAXIMUM CONCENTRATION LEVELS FORT PIERCE UTILITIES AUTHORITY

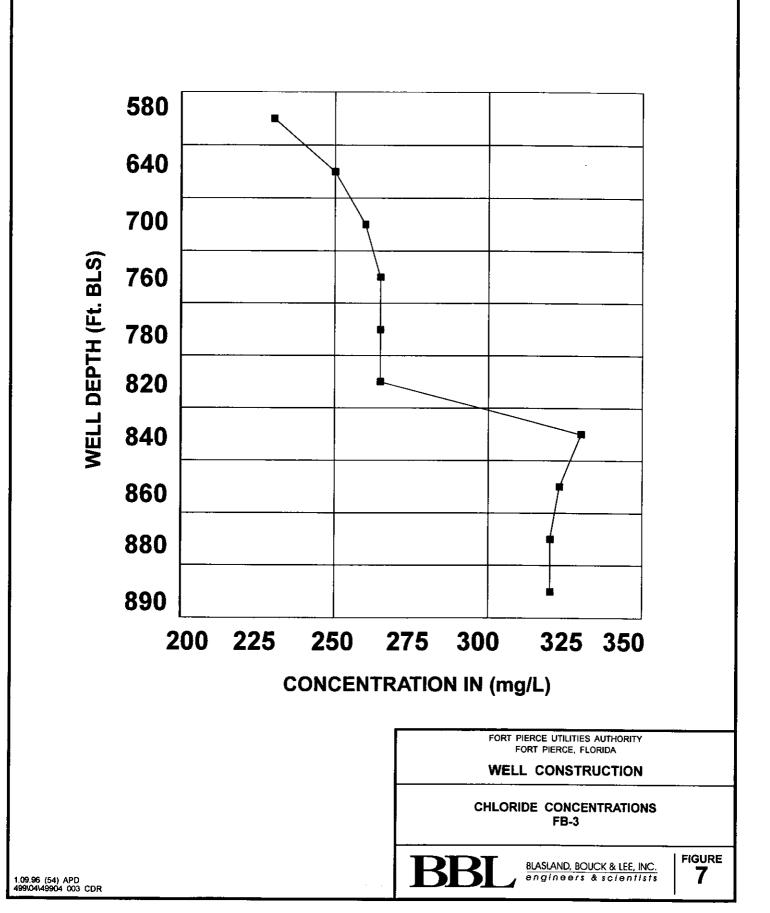
Constituent	Units	FB-3 11/16/95	FB-4 10/19/95	MCL
Sodium	mg/L	192	209	160
Chlorides	mg/L	282	261	250
Odor	mg/L	24	100	3
Totally Dissolved Solids	mg/L	866	866	500

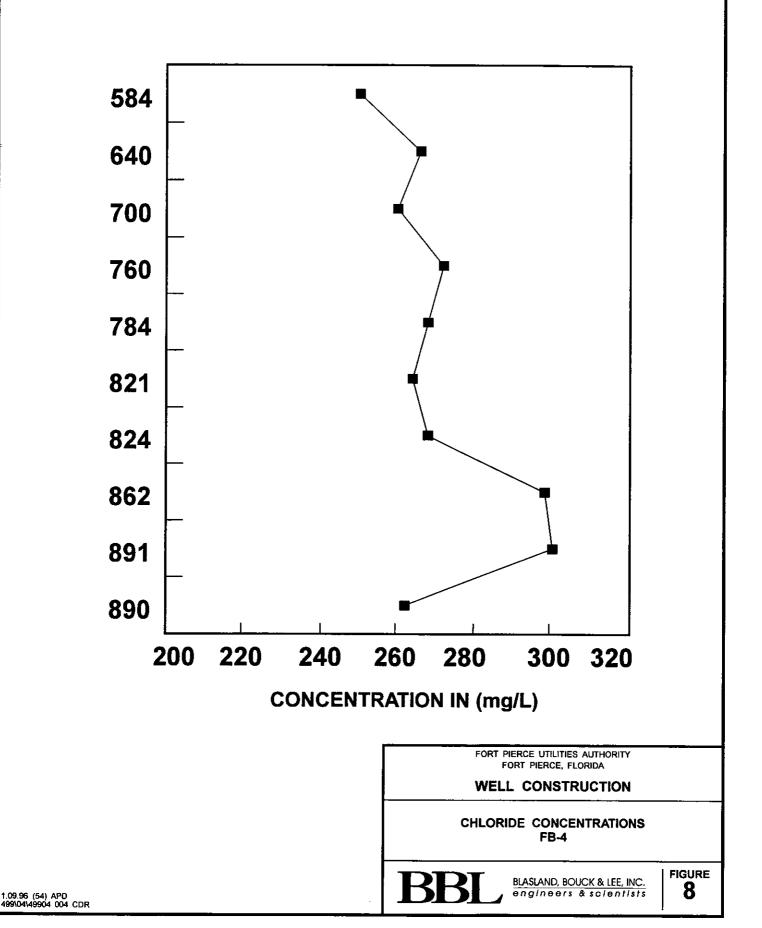
NA - None Available

mg/L - milligrams per liter

MCL - Florida Department of Environmental Protection Maximum Concentration Level

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Floridan aquifer wells FB-3 and FB-4 were successfully completed. Based on the information gathered during construction and testing of FB-3 and FB-4, the following conclusions are provided:

• Floridan aquifer wells FB-3 and FB-4 were successfully constructed with a nominal 12-inch diameter (11.070)-inch inside diameter) final inner PVC casing. Summary completion information is as follows:

	INNER CASING	OPEN HOLE	NATURAL(ARTESIAN)
<u>WELL</u>	DEPTH (Ft BLS)	DEPTH (FT BLS)	FLOW RATE (gpm)
FB-3	503	890	575
FB-4	503	890	670

- Water quality for both wells is acceptable for blending with surficial aquifer supply wells. Chloride, sodium, TDS, and odor were the only constituents that exceeded the respective Drinking Water Standard.
- Chloride, sodium, and TDS, as well as the static piezometric surface should be monitored at each well on a periodic basis in order to provide data that can be used to evaluate any changes in water quality or quantity. The data will also be needed for long-term projections of Floridan aquifer supply potential and future desalination treatment techniques. Short-term wellfield management decisions will also require this type of data.
- Well construction techniques used for these wells, especially geophysical logging, should be considered for future well constructions.

Blasland, Bouck & Lee, Inc. "Pre-Design Investigation Floridan Aquifer Wellfield Development." For Ft. Pierce Utilities Authority, (1990).

Blasland, Bouck & Lee, Inc. "Reverse Osmosis Potential of the Floridan Aquifer Lower East Coast Water Supply Planning Area." For the South Florida Water Management District, (1991).

Driscoll, Fletcher, G. "Ground Water and Wells." Johnson Division (1986).

"Hydrogeological Units of Florida." Florida Geological Society, (1986).

Kruseman, G.P. de Riddler, N.A. "Analysis and Evaluation of Pumping Test Data." *ILRI* Publication #47, (1994).

Meyer, F.W. "Hydrogeology, Ground Water Movement, and Subsurface Storage in the Floridan Aquifer System in Southern Florida." 1403-G,: U.S. Geological Survey Professional Paper, 1989.

Miller, J.A. "Hydrogeologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina." 1403-B, U.S. Geological Survey Professional Paper, 1986.

Parker, G.G., Ferguson, G.E., Love, S.K., and others. "Water Resources of Southeastern Florida." 1255, U.S. Geological Survey, Water Supply Paper, 1955.

## APPENDIX A PERMITS

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### South Florida Water Management District

3301 Gun Club Road, West Palm Beach, Florida 33406 • (407) 686-8800 • FL WATS 1-800-432-2044

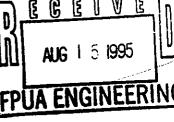
CON 24-06

August 14, 1995

#### PERMITTEE

FORT PIERCE UTILITIES AUTHORITY P.O. BOX 3191 FT PIERCE, FL 34948

#### CONTRACTOR



15

WEBB, DAVID E. 3504 INDUSTRIAL 33RD ST. FT. PIERCE, FL 34946 LICENSE NO:2145

#### WATER WELL CONSTRUCTION PERMIT # SF080795D EXPIRATION DATE: February 14, 1996

	PUBLIC WATER SUPPLY	ES FLORIDAN AQUIFER WELL	
COUNTY:	ST LUCIE	SEC: 8 TWP: 35	RGE: 40
WELL CONSTRUC	TION SPECIFICATIONS:	INNER	OUTER
CASING D	IAMETER:	12"	20"
CASING D	EPTH:	500.00'	115.00'
SCREENED	INTERVAL:	-	
OPEN HOL	E INTERVAL:	500' - 900'	
TOTAL DE	PTH OF WELL:	900.00'	
	QUIREMENT:		
	casing shall be grout		
Outer	casing shall be grout	ed bottom to top.	

See additional conditions of permit on attached sheet.

We appreciate your assistance and cooperation in better managing the water resources of the District. If you have any questions on this matter, please call Ann-Marie Superchi at extension 6929.

Sincerely

Steve D. Anderson, P.G., Supervising Professional Water Use Division, Regulation Department

Attachment: Additional Conditions of Permit MR. WES UPHAM-DEP c: MR. BOB CALLINO-HRS BLASLAND, BOUCK & LEE

Governing Board: Valerie Boyd, Chairman Frank Williamson, Jr., Vice Chairman William E. Graham

William Hammond Betsy Krant Richard A. Machek

Eugene K. Pettis Nathaniel P. Reed Miriam Singer

Samuel E. Poole III, Executive Director Michael Slayton, Deputy Executive Director



South Florida Water Management District

3301 Gun Club Road, West Palm Beach, Florida 33495 • (407) 686-8800 • FL WATS 1-800-432-2045

CON 24-06

August 14, 1995

**PERMITTEE** FORT PIERCE UTILITIES AUTHORITY P.O. BOX 3191 FT PIERCE, FL 34948

CONTRACTOR WEBB, DAVID E. 3504 INDUSTRIAL 33RD ST. FT. PIERCE, FL 34946 LICENSE NO:2145

#### WATER WELL CONSTRUCTION PERMIT # SF080795E EXPIRATION DATE: February 14, 1996

PROJECT: TYPE OF USE:		FLORIDAN AQUI	FER WELL I	FB-4
COUNTY:	ST LUCIE	SEC: 8	TWP: 35	RGE: 40
WELL CONSTRUC	TION SPECIFICATIONS:	INNER		OUTER
CASING D CASING D		12" 500.00'		20" 115.00'
SCREENED OPEN HOLI	INTERVAL: E INTERVAL:	-	- 900'	115.00
GROUT REC	PTH OF WELL: QUIREMENT:	· 900.00'		
Inner d Outer d	casing shall be grouted casing shall be grouted	bottom to to bottom to to	p. D.	

See additional conditions of permit on attached sheet.

We appreciate your assistance and cooperation in better managing the water resources of the District. If you have any questions on this matter, please call Ann-Marie Superchi at extension 6929.

Sincerely,

Steve D. Anderson, P.G., Supervising Professional Water Use Division, Regulation Department

Attachment: Additional Conditions of Permit c: MR. WES UPHAM-DEP MR. BOB CALLINO-HRS BLASLAND, BOUCK & LEE

William Hammond Betsy Krant Richard A. Machek Eugene K. Pettis Nathaniel P. Reed Miriam Singer

Jem 14904

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WELL COMPLETION REPORT	South Florida water management district
Omer Fort Pierce Utilities Autho P.O.Box 3191 Ft. Pierce, FL 34946	RECEIVEL DE N/A Completed 11/17/95
DRILLING SERVICES, INC.	DEC 04 1995 Tell 10 FB-3
viller Lenny Crocco centractor David E. Webb Licence No. MR 214	Casing Depth 503 Ft AFLASLAND, BOUCK & LEE Tell Depth 890 Ft POCA RATON FI Type of work Construct Hothof Rotary Mud
Castrastor's Elgestere	
ATERIALS GROUT	DRILL CUTTINGS LOG
ATER	
Punping Tater Lovel ft. after 8 hrs. at inp Size 109 h.p. Capacity 1200 gpm Com inp Type Turbine Intake Bepth 50 ft. Chl. Flowing 558 gpm	ter: Clear 1000 gan ndactivity 1400 lorides 280 ng/l
TLL LOCATION Freamland Park N. 25 St.	
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)Pm

44904

WELL COMPLETION REPORT SOUTH FLORIDA WATER MANAGEMENT DISTRICT Owaer Fort Pierce Utilities Authority Permit No SF080795E P.O.Box 3191 )tt N/A Ft. Pierce, FL 34946 Completed 10/18/95 fell fre Public Supply DRILLING SERVICES, INC. Vell 13 FB-4 Lenny Crocco friller. Casier Jepth 503 7t Contractor David E. Webb Licence No. JER 2145 Vell Jopth 890 Pt Type of vert Construct Tecchil Kethod Rotary Mud Contractor's Signature **ITERIALS** GROUT BRILL CUTTINGS LOG asing Dian. Type From (Ft) To Annulus From (Ft) To Depth (Ft) Type Color Grain Size lis iter -20 Steel 0 3 0 121 121 145 Pertland 1.1 See Attach 1882 12 PVC 0 3" 503 0 503 380 Fertland :788B Slot size . TER atic Tater Level +19 ft. below top of casing. later: Clear unping Valor Lovel ft. after 8 brs. at 1000 cm sup Size 109 h.p. Capacity 1200 gpm Conductivity 1400 mp Type Turbine Intake Bepth 50 ft. Chlorides 280 ag/l toning \$50 gpa TLL LOCATION reamland Park . 25 St. ubdivision Let Block miy St. Lucie e 1/f of the se 1/f of Section 8 Twp. 35 lange 40 at. Long. Cuttings sent to the District? No



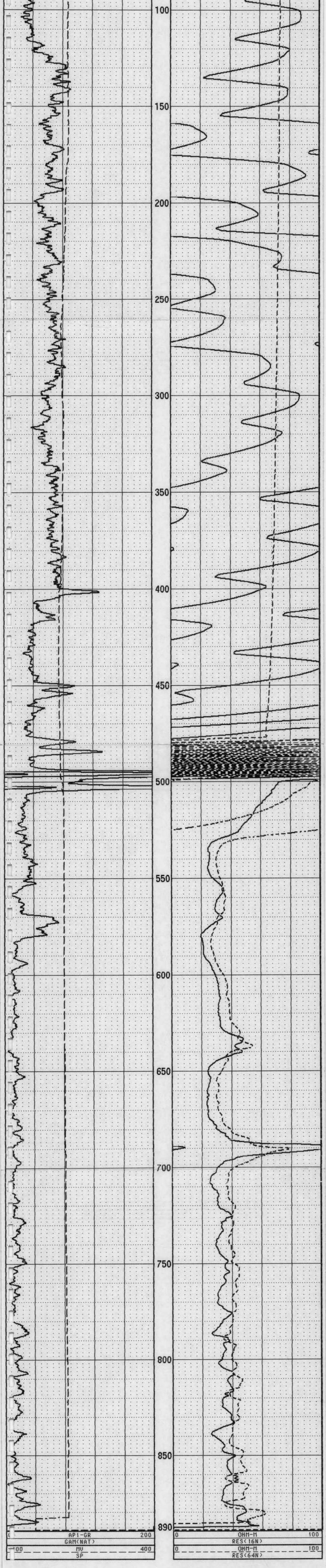
## **Appendix B**

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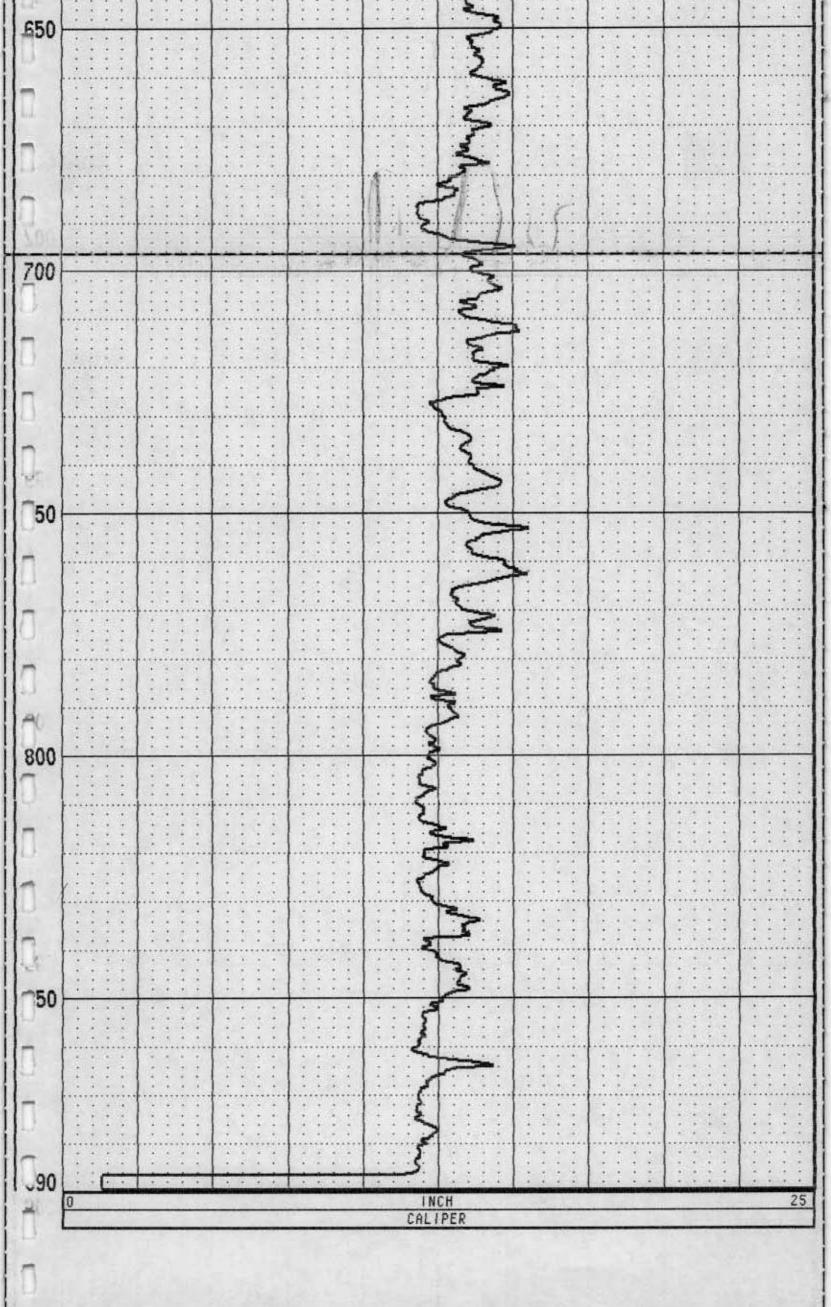
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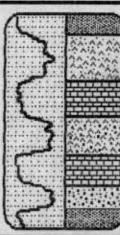
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# thern Resource **Exploration** Inc.

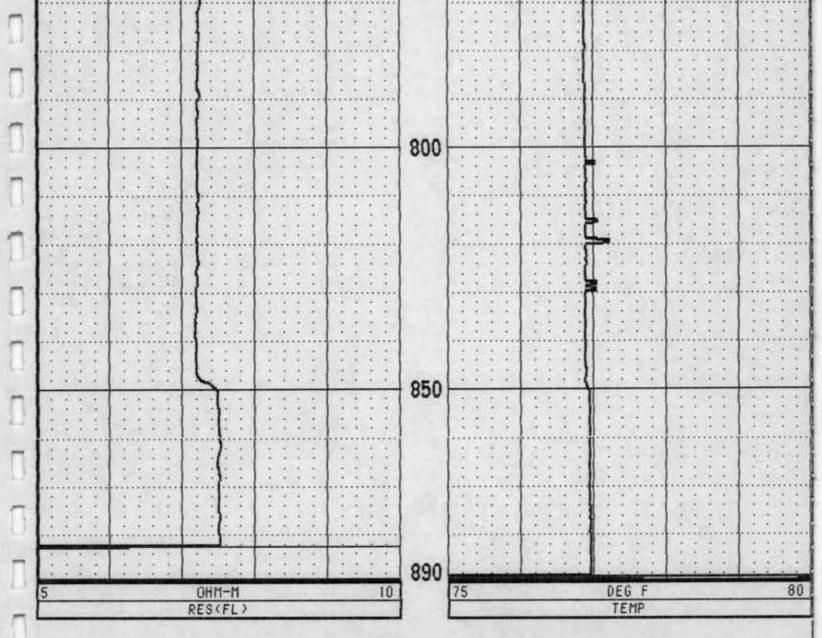
## TEMPERATURE-FLUID RES

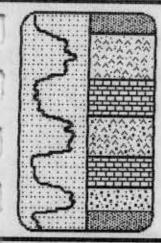
Southern

COMPRNY	:	DRILLING SER	WICES			OTHER SERV	ICES:	
HELL	:	FB-3						
LOCATION/FIELD	:	25TH ST./CIT	RUS AVE			1.1.1.1.1.1.1.1		
COUNTY	:	ST. LUCIE						12 1. 22 1. 2
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SECTION	:		TOUNSH	IP	:		RANGE	:
DATE	:	11/14/95	PERMAN	ENT DATUM	:	GL	ELEVAT	IONS
DEPTH DRILLER	:	890 '	ELEU.	PERM. DATL	IM:		KB	:
LOG BOTTOM	:	889.88	LOG ME	ASURED FRO	M:	GL	DF	:
LOG TOP	:	1.00	DRL ME	ASURED FRO	m:	GL	GL	1
CASING DRILLER	:	503	LOGGIN	G UNIT	:	вит		
CASING TYPE	1	ST.	FIELD	OFFICE	:	GUL		
CASING THICKNESS	3:	-	RECORD	ED BY	:	M. FRIED		
BIT SIZE	:	11.875	BOREHO	LE FLUID	ï	water	FILE	: ORIGINAL
MAGNETIC DECL.	:		RM		:		TYPE	: 9041A
MATRIX DENSITY	:		RM TEM	PERATURE	1		LOG	: 4
FLUID DENSITY	:	1	MATRIX	DELTA T	:	50	PLOT	: TEMP-FR Ø
NEUTRON MATRIX	:		FLUID	DELTA T	1	199	THRES	H: 5000
REMARKS	:							
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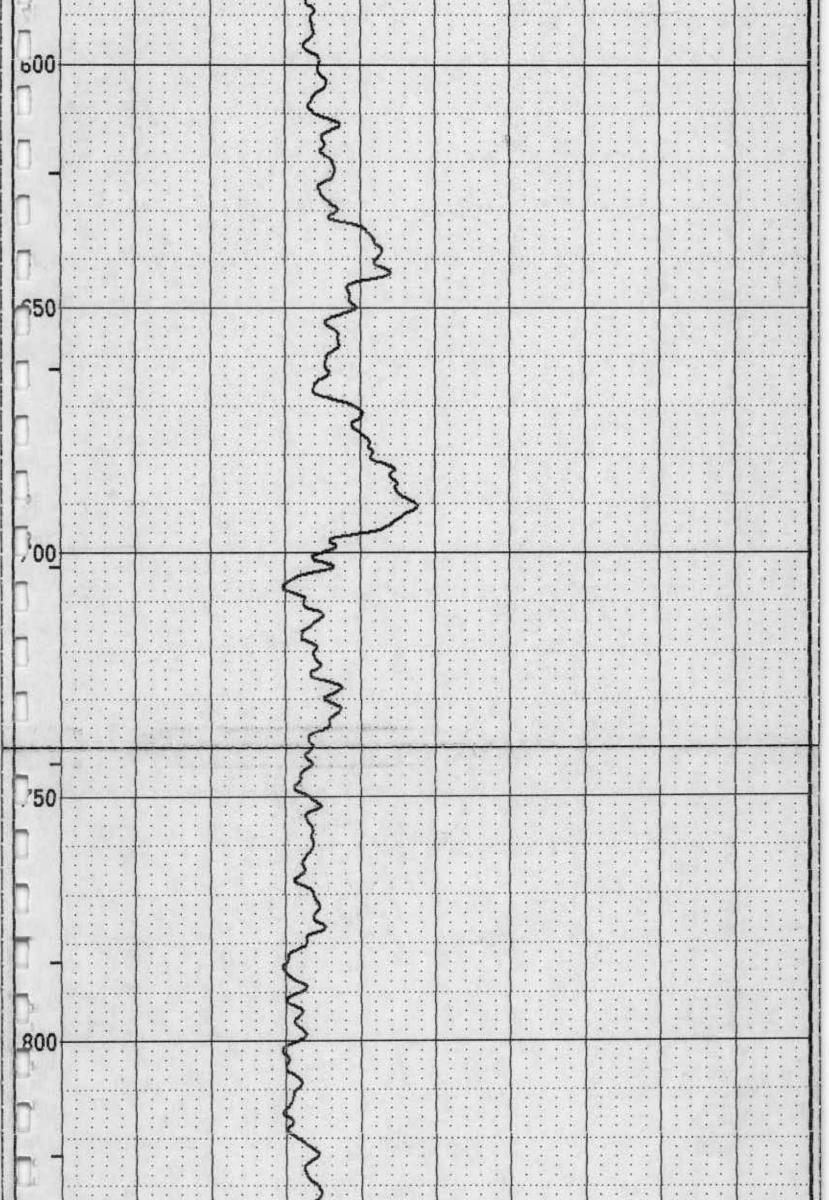
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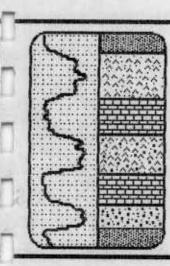
## **Exploration** Inc.

## FLOUMETER LOG

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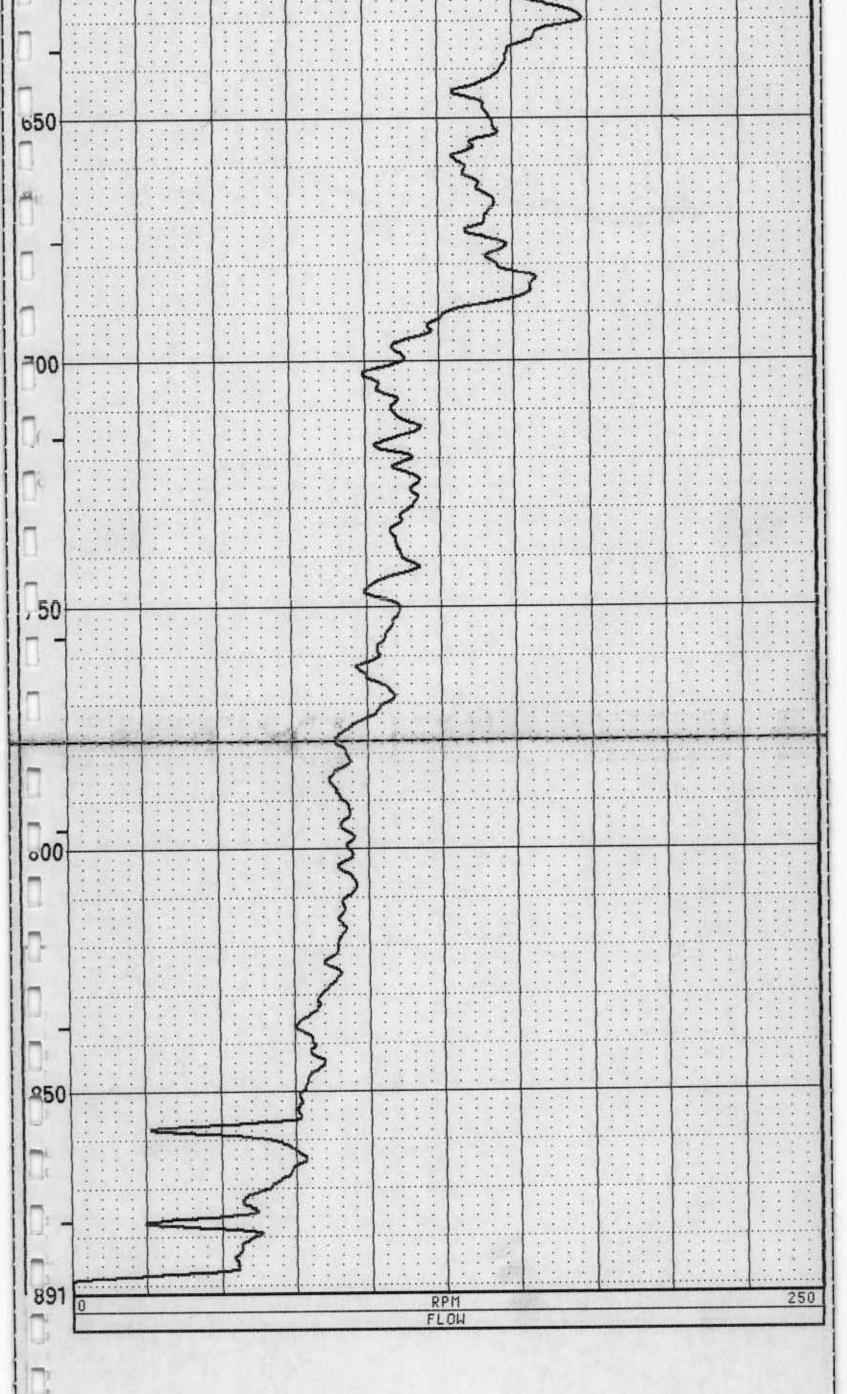
## FLOUMETER LOG

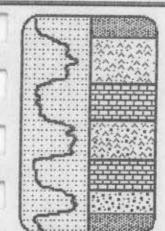
Resource

Southern

-COMPANY WELL		DRILLING FB-4	SERVICES		OTHER SEI	RUICES:	
LOCATION/FIELD	-	25TH ST					
COUNTY	:	ST LUCIE		2010			
STATE	1	FL					
SECTION	-		TOUNSHIP	:		RANGE	:
DATE	:	10/13/95	PERMANENT DATUM	:	GL	ELEVAT	IONS
DEPTH DRILLER	:	890	ELEV. PERM. DATU	M:		KB	:
LOG BOTTOM	:	891.60	LOG MEASURED FRO	M:	GL	DF	:
LOG TOP	-	390.20	DRL MEASURED FRO	M:	GL	GL	:
CASING DRILLER	:	503	LOGGING UNIT	:	BHT		
CASING TYPE	:	ST	FIELD OFFICE	:	GUL		
CASING THICKNESS	3:	.375	RECORDED BY	:	M.FRIED		
BIT SIZE	:	15	BOREHOLE FLUID	:	HATER	FILE	: ORIGINAL
MAGNETIC DECL.	:		RM	:		TYPE	: AN IMF
MATRIX DENSITY			RM TEMPERATURE	1		LOG	: 2
FLUID DENSITY	:	1	MATRIX DELTA T	:	50	PLOT	: FLOH 11
NEUTRON MATRIX	:		FLUID DELTA T	:	189	THRES	H: 5000
REMARKS	:						
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Southern Resource

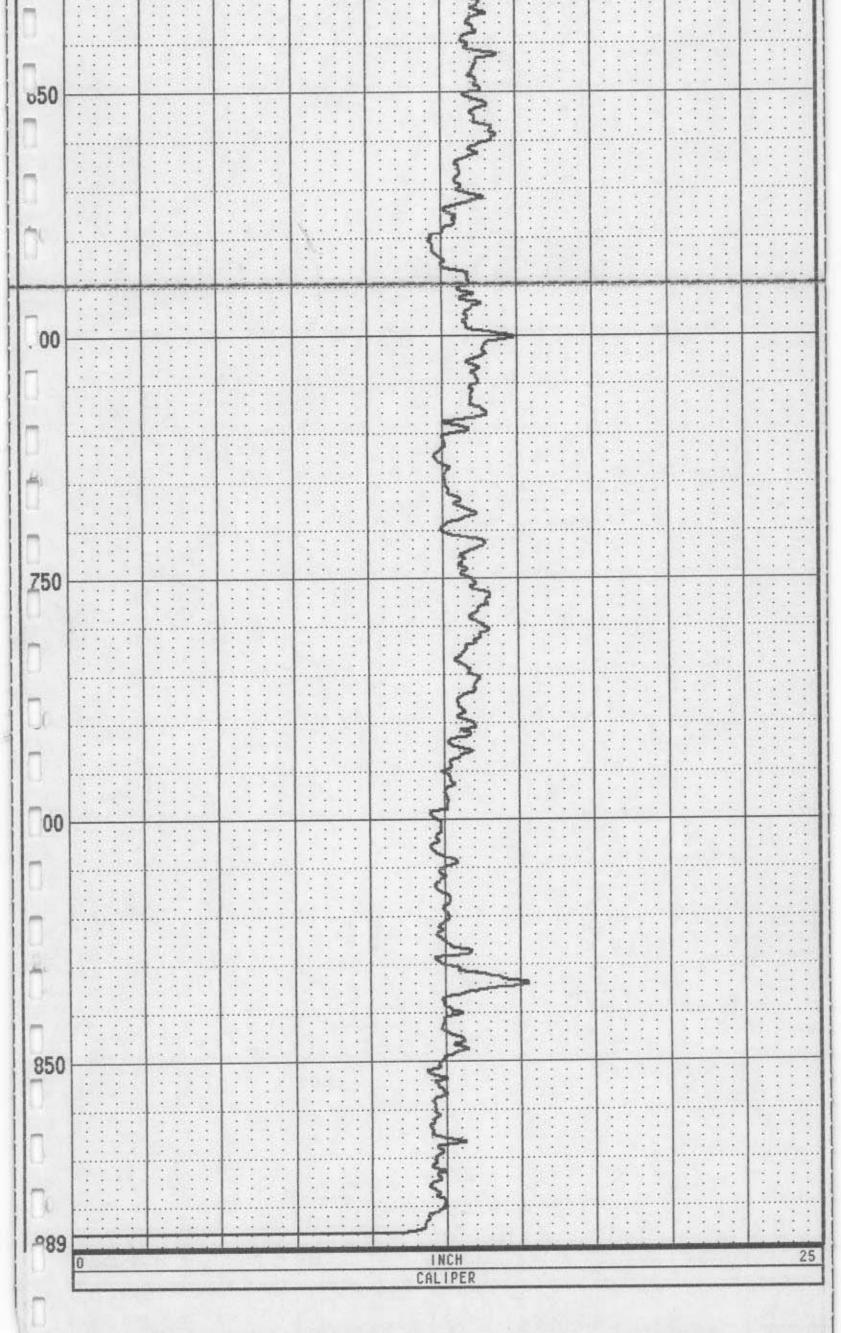
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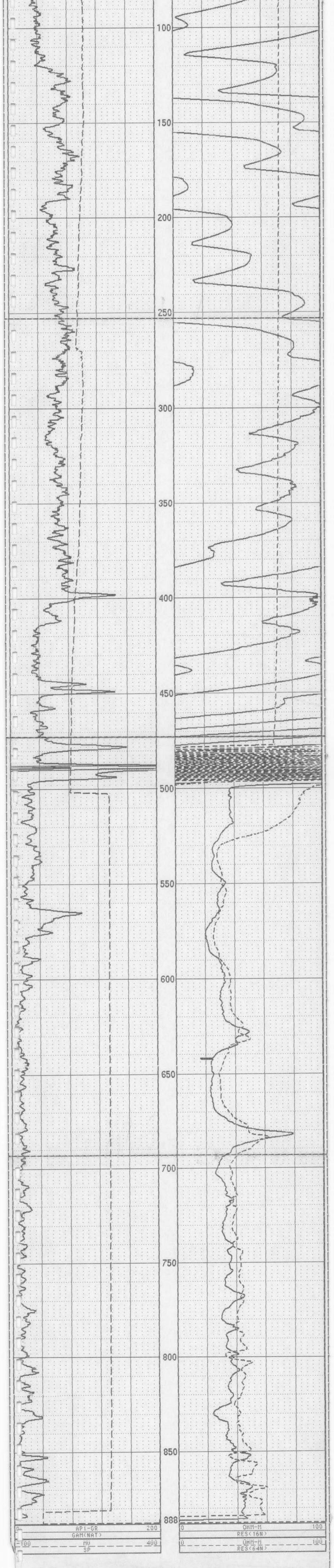
CALIPER LOG

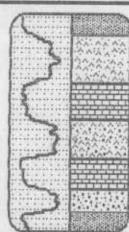
COMPANY	: DRILLING	SERVICES	OTHER SE	RUICES:	
WELL	: FB-4				
LOCATION/FIELD	: 25TH ST				
COUNTY	: ST LUCIE	2			
STATE	: FL			ALC: NOT	
SECTION	2	TOUNSHIP :		RANGE	:
DATE	: 10/13/95	FERMANENT DATUM	GI	ELEVAT	TONS
DEPTH DRILLER			100.00	KB	
LOG BOTTOM	: 889 00			DF	-
LOG TOP	: 4.40			CL	:
CASING DRILLER	: 503	LOGGING UNIT :	вит		
CASING TYPE	: PUC	FIELD OFFICE :	GUL		
CASING THICKNES	S: .375	RECORDED BY :	M.FRIED		
BIT SIZE	: 15	BOREHOLE FLUID :	NATER	FILE	: PROCESSED
MAGNETIC DECL.	2	BM :		TYPE	: ANIMC
_MATRIX DENSITY		RM TEMPERATURE :		LOG	: 0
FLUID DENSITY	: 1	MATRIX DELTA T :	50	PLOT	: CALIPER 2
NEUTRON MATRIX	:	FLUID DELTA T :	189	THRES	H: 5000

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## Southern Resource

P.O. Box 14311 Gainesville, Florida 32604 Phone 904-372-5950

# Exploration Inc.

TEMPERATURE-FLUID RES

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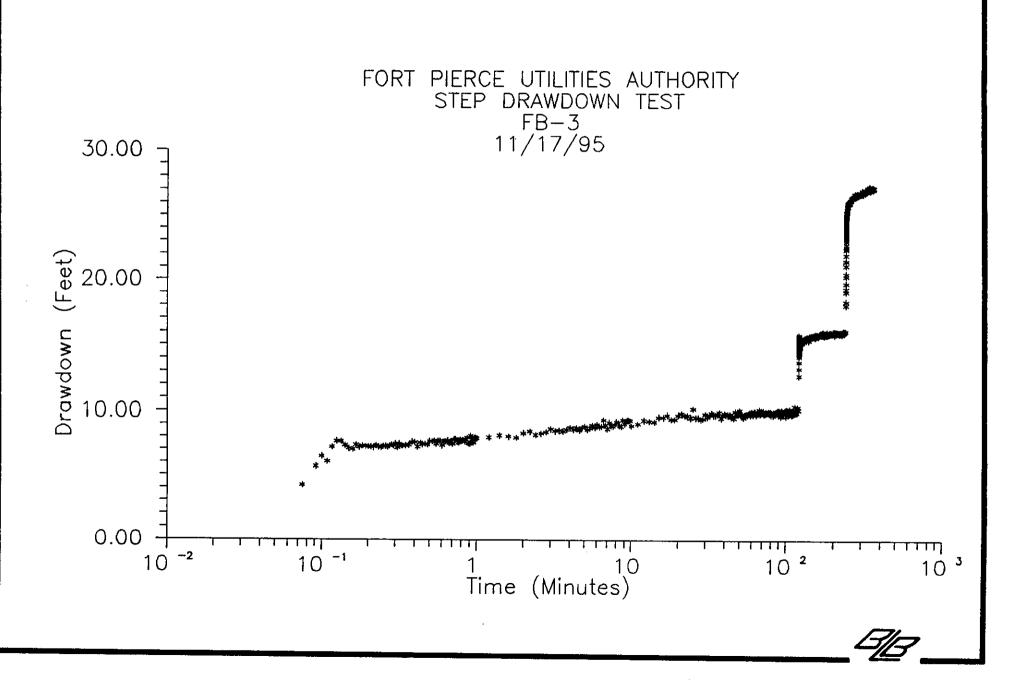
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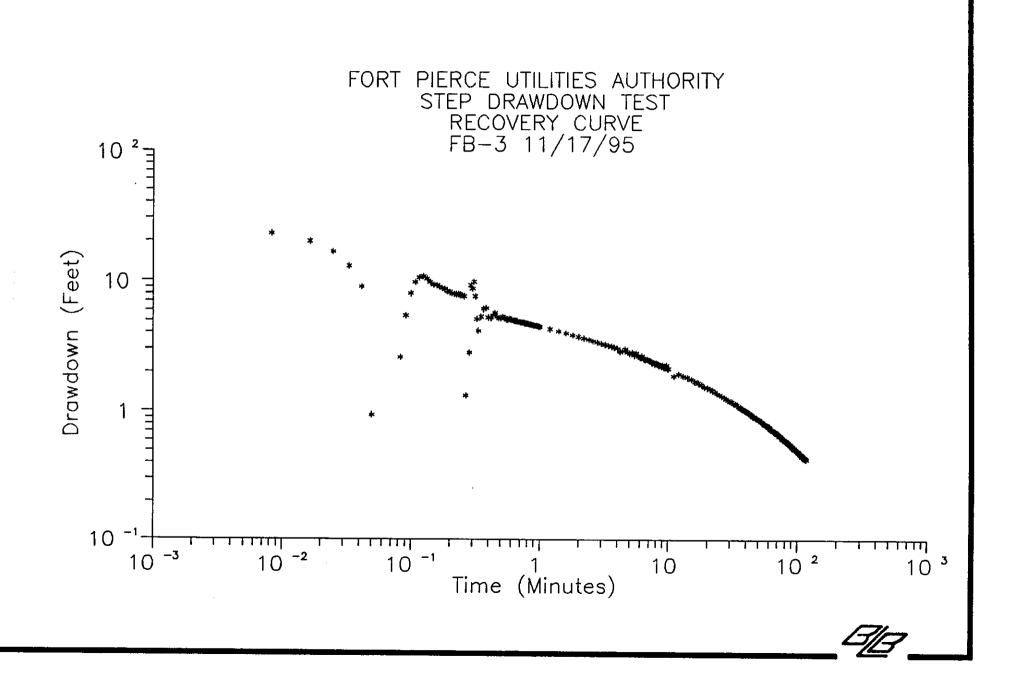
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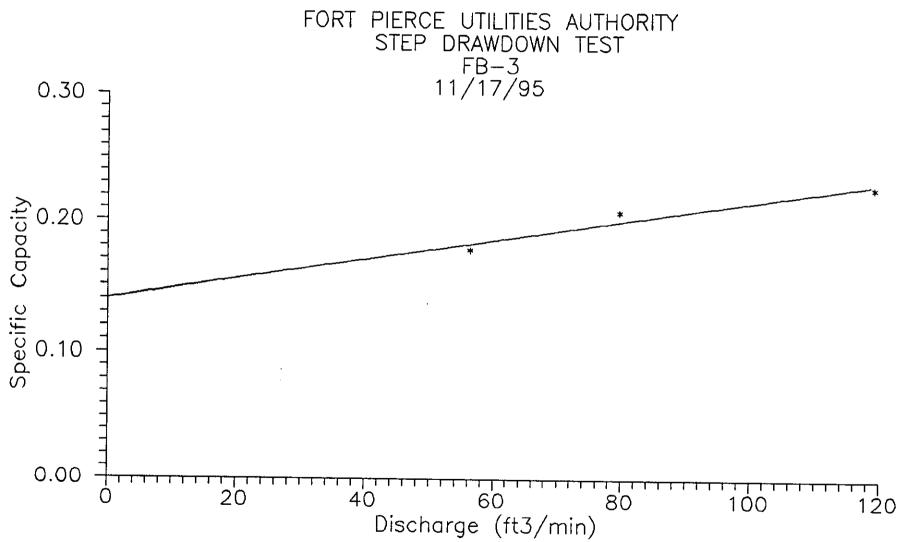
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### APPENDIX C STEP DRAWDOWN TEST AND RECOVERY RESULTS

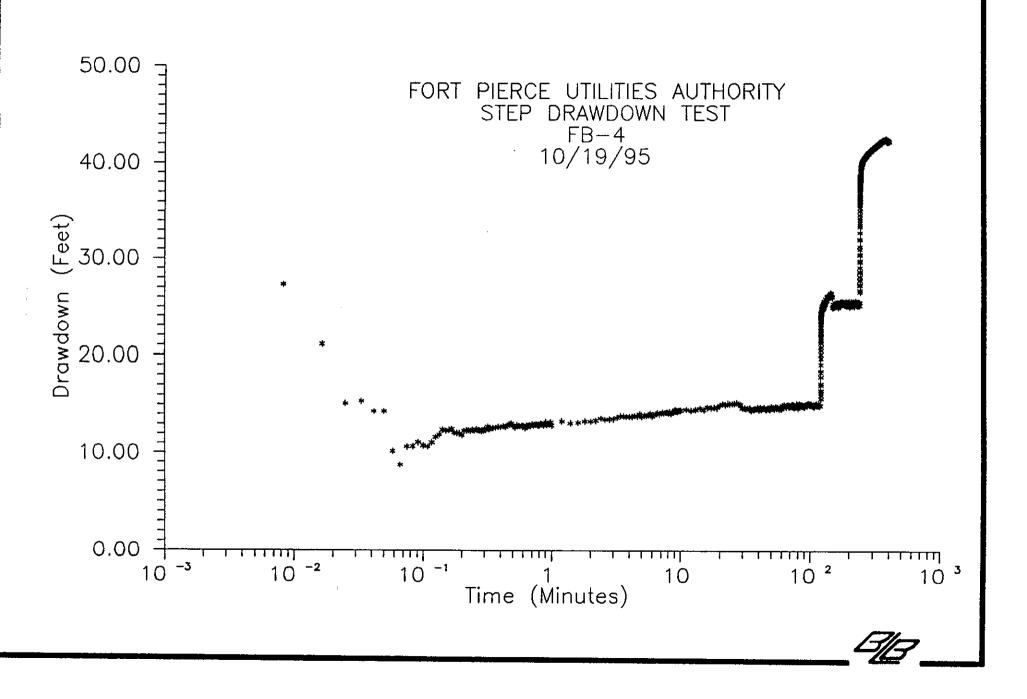
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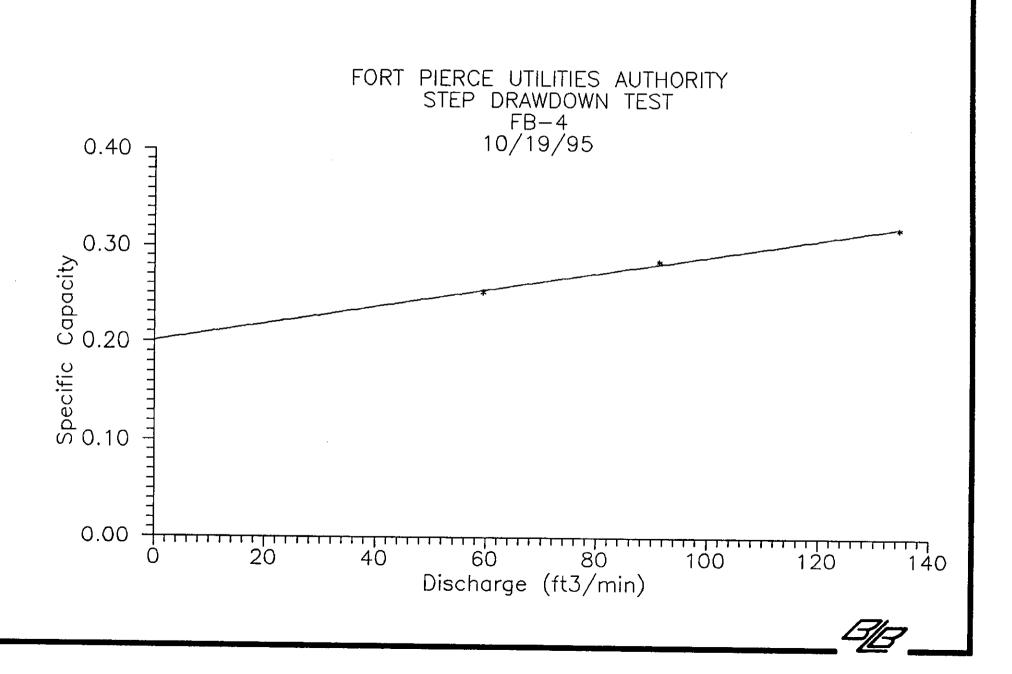


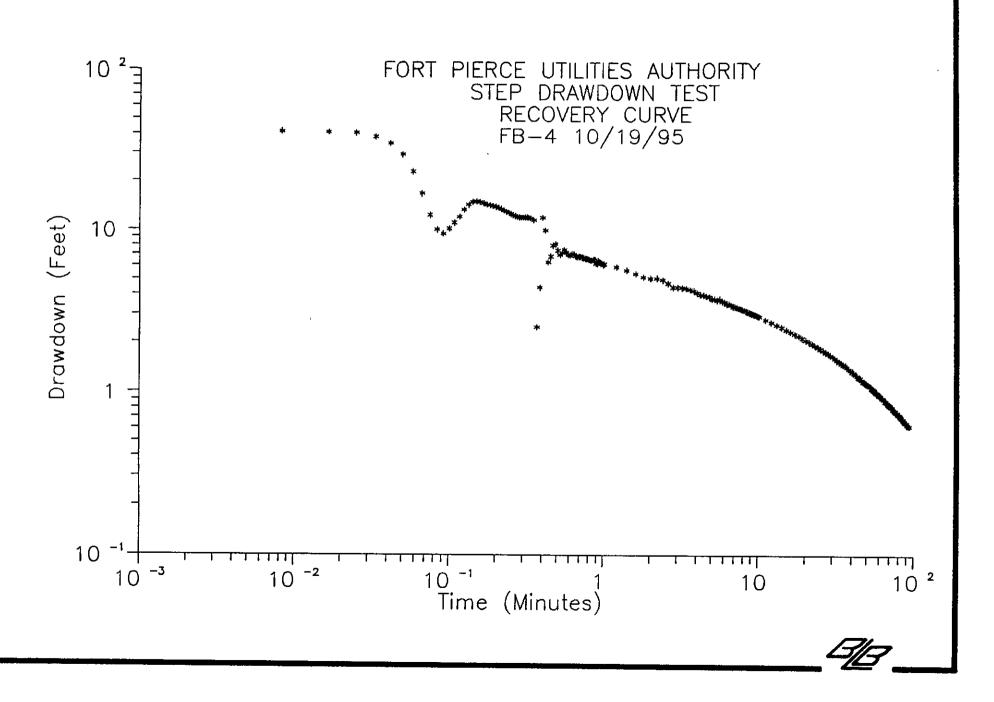




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## APPENDIX D EQUATIONS

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#### **STEP DRAWDOWN TEST EQUATIONS\***

#### FORT PIERCE UTILITIES AUTHORITY

#### **EQUATIONS USED:**

#### SPECIFIC CAPACITY

The actual specific capacity is calculated as:

Q = specific capacity S

Where:

Q = Discharge as determined during the step drawdown test (gpm). s = Maximum drawdown in well

#### WELL EFFICIENCY\*

## $\mathbf{E}\mathbf{w} = \underline{\mathbf{100 B O}}_{n}$ $\mathbf{S}\mathbf{w}_{(n)}$

Ew = Well efficiency (%) B = Specific capacity (min/ft<sup>2</sup>) Q<sub>n</sub> = Discharge as determined during the step drawdown test (ft<sup>3</sup>/min). Sw<sub>(n)</sub> = Cummulative drawdown

\* Method used to analyze the test was the Hantush-Bierschenk's method, "Analysis and Evaluation of Pumping Test Data", 1994.

## APPENDIX E LITHOLOGIC LOGS

- 640-650 same as above, but less hard.
- 650-660 same as above with abundant microfossils and shellrock traces.
- 660-670 5Y 8/2(pale yellow) limestone(hard) with microfossil traces and abundant shellrock.
- 670-680 same as above.
- 680-690 5Y 8/2(pale yellow) limestone(very hard), with shellrock and microfossil traces.
- 690-700 same as above.
- 700-710 same as above.
- 710-720 same as above.
- 720-730 same as above.
- 730-740 N9(white) limestone with traces of microfossils and shellrock.
- 740-750 5Y 8/2(pale yellow) limestone with traces of microfossils.
- 750-760 N9(white) limestone(hard) with microfossil traces.
- 760-770 same as above.
- 770-780 5Y 8/2 limestone with N9(white) limestone traces, microfossils and shellrock present.
- 780-790 same as above.
- 790-800 same as above, but with N9(white) clay nodules.
- same as above.
- 810-820 N9(white) limestone(very hard).
- 820-830 5Y 8/2(pale yellow) and N7(light gray) limestone with microfossil and shellrock fragments.
- 830-840 5Y 8/2(pale yellow), N7(light gray), N4(medium dark gray) limestone with traces of N9(white) clay.
- 840-850 same as above.
- 850-860 N8(very light gray) limestone with shellrock and microfossil traces.

#### LITHOLOGIC LOG FOR FB-3

#### DEPTH(ft) DESCRIPTION

- 0-10 10YR 3/2(very dark grayish brown), fine to medium grained quartzose sand, moderately sorted, subangular(clear quartz is present).
- 10-20 10YR 5/1(grayish brown), medium grained quartzose sand, moderately sorted, subangular(some clear quartz present).
- 20-30 2.5Y 3/2(very dark grayish brown), medium grained quartzose sand with fines, moderately sorted, subangular to subrounded (some clear quartz present).
- 30-40 2.5Y 4/2(dark grayish brown), medium grained quartzose sand with abundant fines, moderately sorted, subangular to sub rounded(some clear quartz present).
- 40-50 5YR 3/3(dark reddish brown) fine to medium grained quartzose sand, moderately sorted, subrounded.
- 50-60 7.5YR 4/3(brown), fine grained quartzose sand, moderately sorted, subrounded.
- 60-70 N4(medium dark gray), N6(medium light gray), N8(very light gray), and N9(white) calcareous shellrock layer. organics present.
- 70-80 N2(grayish black), N4(white) to N5(medium gray) calcareous shellrock, small amount of organics present.
- 80-90 10YR 6/2(pale yellowish brown), N4(medium dark gray) to N6(medium light gray) calcareous shellrock. varying sizes present with no organics.
- 90-100 same as above.
- 100-110 same as above, without 10YR 6/2(pale yellowish brown) calcareous shellrock.
- 110-120 10YR 6/2(pale yellowish brown), N4(white) to N6(medium light gray) calcareous shellrock.
- 120-130 same as above.

- 130-140 5GY 3/2(grayish olive green) clay with 10YR 6/2(pale yellowish brown), N4(medium dark gray) to N6(medium light gray) and N9(white) calcareous shellrock fragments.same as above.
- 140-150 same as above, but less shellrock.
- 150-160 same as above, but with more abundant calcareous shellrock.
- 160-170 same as above.
- 170-180 same as above.
- 180-190 same as above, but less shellrock.
- 190-200 same as above, but less calcareous shellrock.
- 200-210 5GY 3/2(grayish olive green) clay, silt size particles.
- 210-220 same as above.
- 220-230 same as above.
- 230-240 same a above.
- same as above.
- same as above.
- 260-270 same as above.
- same as above.
- 280-290 same as above.
- 290-300 same as above.
- 300-310 same as above.
- 310-320 same as above.
- 320-330 same as above.
- 330-340 same as above.
- 340-350 same as above.
- 350-360 same as above.
- 360-370 same as above.

- 370-380 same as above.
- 380-390 same as above.
- 390-400 same as above.
- 400-410 10Y 4/1(dark greenish gray) clay.
- 410-420 10Y 5/1(greenish gray) clay.
- 420-430 same as above.
- 430-440 same as above.
- 440-450 same as above.
- 450-460 same as above.
- 460-470 same as above.
- 470-480 same as above.
- 480-490 same as above.
- 490-500 same as above, with 5Y 8/1 (white) limestone fragments
- 500-510 5Y 8/1 (white) limestone with traces of 5GY 3/2 (grayish olive green) clay.
- 510-520 5Y 8/1 (white)-very soft with traces of hard rock and shellrock.
- 520-530 same as above, but less hard rock.
- 530-540 same as above.
- 540-550 same as above.
- 550-560 same as above.
- 560-570 same as above, with more hard rock.
- 570-580 same as above.
- 580-590 5Y 8/1 (white) soft limestone, with some clay nodules and shellrock and microfossil traces.
- 590-600 5Y 8/1 (white) limestone with shellrock traces and 1GLEY 8/1 clay traces.
- 600-610 same as above, hard limestone.

- 610-620 same as above, but shellrock present.
- 620-630 5Y 8/1 (white) limestone (hard) with shellrock and traces of microfossils.
- 630-640 5Y 8/2(pale yellow) limestone(hard) with shellrock and microfossils.
- 640-650 same as above, but less hard.
- 650-660 same as above with abundant microfossils and shellrock traces.
- 660-670 5Y 8/2(pale yellow) limestone(hard) with microfossil traces and abundant shellrock.
- 670-680 same as above.
- 680-690 5Y 8/2(pale yellow) limestone(very hard), with shellrock and microfossil traces.
- 690-700 same as above, but soft limestone.
- 700-710 same as above.
- 710-720 same as above, limestone is hardening.
- 720-730 same as above.
- 730-740 N9(white) limestone with traces of microfossils and shellrock.
- 740-750 5Y 8/2(pale yellow) and N9(white) limestone with traces of microfossils.
- 750-760 N9(white) limestone(hard) with microfossil traces.
- 760-770 same as above.
- 770-780 5Y 8/2 limestone with N9(white) limestone traces, microfossils and shellrock present.
- 780-790 same as above, less shellrock.
- 790-800 same as above, but with N9(white) clay nodules.
- 800-810 same as above.
- 810-820 N9(white) limestone(very hard).

- 820-830 5Y 8/2(pale yellow) and N7(light gray) limestone with microfossils.
- 830-840 5Y 8/2(pale yellow), N7(light gray), N4(medium dark gray) limestone with traces of N9(white) clay.
- same as above, with N7(light gray) clay.
- 850-860 N8(very light gray) limestone with shellrock and microfossil traces.
- 860-870 5Y 8/2 limestone(very hard) with shellrock and microfossils.
- 870-880 N8(very light gray) limestone with shellrock and microfossils.
- same as above.

\*Source- Munsell Soil Color Chart, 1994. Rock Color Chart, Geological Society of America, 1991.

#### LITHOLOGIC LOG FOR FB-4

#### DEPTH(ft) DESCRIPTION

- 0-10 10YR 3/2(very dark grayish brown), medium grained quartzose sand, moderately sorted, subangular(clear quartz is present).
- 10-20 10YR 3/1(very dark gray), medium grained quartzose sand, moderately sorted, subangular(some clear quartz present).
- 20-30 2.5Y 3/2(very dark grayish brown), medium grained quartzose sand with fines, moderately sorted, subangular to subrounded (some clear quartz present).
- 30-40 2.5Y 4/2(dark grayish brown), medium grained quartzose sand with abundant fines, moderately sorted, subangular to sub rounded(some clear quartz present).
- 40-50 10YR 8/2(very pale orange) and 10YR 6/2(pale yellowish brown) calcareous shellrock layer, large and small pieces, organics present.
- 50-60 same as above.
- 60-70 N4(medium dark gray), N6(medium light gray), N8(very light gray), and N9(white) calcareous shellrock layer. organics present.
- 70-80 N2(grayish black) to N5(medium gray) calcareous shellrock, small amount of organics present.
- 80-90 10YR 6/2(pale yellowish brown), N4(medium dark gray) to N6(medium light gray) calcareous shellrock. varying sizes present with no organics.
- 90-100 same as above.
- 100-110 same as above.
- 110-120 same as above, but traces of 5GY 3/2(grayish olive green) clay.
- 120-130 5GY 3/2(grayish olive green) clay with 10YR 6/2(pale yellowish brown), N4(medium dark gray) to N6(medium light gray) and N9(white) calcareous shellrock fragments.
- 130-140 same as above.
- 140-150 same as above.

- 150-160 same as above, but with more abundant calcareous shellrock.
- 160-170 same as above.
- 170-180 same as above.
- 180-190 same as above.

190-200 same as above, but less calcareous shellrock.

- 200-210 5GY 3/2(grayish olive green) clay, silt size particles.
- 210-220 same as above.
- same as above.
- same a above.
- same as above.
- same as above.
- same as above.
- 270-280 same as above.
- 280-290 same as above.
- 290-300 same as above.
- 300-310 same as above.
- 310-320 same as above.
- 320-330 same as above.
- 330-340 same as above.
- 340-350 same as above.
- 350-360 same as above.
- 360-370 same as above.
- 370-380 same as above.
- 380-390 same as above.
- 390-400 same as above.
- ----
- 400-410 same as above.

- 410-420 same as above.
- 420-430 same as above.
- 430-440 same as above.
- 440-450 same as above.
- 450-460 same as above.
- 460-470 same as above.
- 470-480 same as above.
- 480-490 same as above.
- 490-500 same as above, with 5Y 8/1 (white) limestone fragments
- 500-510 5Y 8/1(white) limestone with traces of 5GY 3/2(grayish olive green) clay.
- 510-520 5Y 8/1(white)-very soft with traces of hardrock and shellrock.
- 520-530 same as above, but less hard rock.
- 530-540 same as above.
- 540-550 same as above.
- 550-560 same as above, with more hard rock.
- 560-570 same as above.
- 570-580 same as above.
- 580-590 1GLEY 8/1 (light greenish gray) clay with shellrock and traces of 5Y 8/1 (white) soft limestone.
- 590-600 5Y 8/1 (white) limestone with shellrock traces and 1GLEY 8/1 clay traces.
- 600-610 same as above, no clay present.
- 610-620 same as above, but shellrock present.
- 620-630 5Y 8/1(white) limestone(hard) with shellrock and traces of microfossils.
- 630-640 5Y 8/2(pale yellow) limestone(hard) with shellrock and microfossils.

860-870 5Y 8/2 limestone(very hard) with shellrock and microfossils.
870-880 N8(very light gray) limestone with shellrock and microfossils.
880-890 same as above.

#### m:\499\04\04051173.w51

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### APPENDIX F PRIMARY AND SECONDARY DRINKING WATER LABORATORY RESULTS

## PUBLIC DRINKING WATER ANALYSIS REPORTING FORMARECEIVED

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Public water system inform	ATION (to be completed by	system or lab)	- FEB 09 1996	
System Name:Ft. Pie			456 0490	: <b>E</b>
Address: 206 South 6t Type (aback one): ( ) Community	h St. { ) Nontrensient Noncor	nmunity () Noncomm	(40 BOCARATON, FL	
SAMPLE INFORMATION (to be con	npleted by sempler)			. '
Sample Date (MMDDYY): 11/16		00		
Sample Location (be specific);]	FB-3 WELL	••••••••••••••••••••••••••••••••••••••		
Sampler Name and Phone: B. 2	Austin (4	07) 466-1600		
Sempler's Signature:		Title: Field	sampler/Lab Tech	
Check Type(s): { } Distribution { } Clearence { } Distrib entry	( ) Recheck of MCL ( ) Jhm Mex Ree Th	( ) Recemple at	Lab Invalidated Sample	
LABORATORY CERTIFICATION INF	DRMATION (to be complete	d by leb) - ATTACH HRE A		
Lab Name: ENVIROMETRICS	1	LIDE #83214	6-30-96	÷
Address: 683. SW 27TH	AVE, VERO BEACH	, FL Phone #: (4(	07) 562-1968	
Subcontracted Leb Name & HRS #: ANALYSIS INFORMATION (to be co Date Sample(s) Received: <u>11/16</u> ( ) Nitrate Only	mpleted by labi 🛶 SAMP(	LE NUMBER: 9512170 ( Karr in: ed & Results attachéd for con	Enviro) Southern 08 95110129-1 mpliance with 82-880, F.A.C.:	8525-01
Inolganica <sup>M/a</sup> ASBESTas ( ) All 17 (/) Partial		( ) Asbestos Only ; Sgoondaries (/ ) All 14 ( ) Partial	{ } Trihelomethenes Pesticids/PCBs {\j All 30 { } Partial	
Group   Unregulateda {/} All 13  } Partial	(•) All 23 ( ) Pertial	Group III Unregulatede { // All 11 ( ) Partial Iemical sample dates & locati	Radiochemicele ( ) Single Sample ( ) Otrly Composite * one for each quarter	ł
. GRACE TREADN	<u> </u>		ed ensittical data are correct.	
Signature				
Title <u>CHE</u>	MIST	Dete	12/04/95	
COMPLIANCE INFORMATION (to be	completed by State)	V		
Semple Collection Setisfactory:		Analysia Batlafastanu		
Resample Requested for:		<b>D</b>	—	
Person notified to resemple:		Date Notified:		
DEP/HRS Reviewing Officials				I
			Effective September 1994	

# Turbidity Analysis 62-550.310(3) (PWS026)

South County Utiliti

Para ID	meter Name		Sample #	Result A mg/l	Analytical Method	Det.Li Used	t. Analysi Date
0100	Turbidi	 ty	9512170	0.56	180.1	0.1	11/16
			Inorg	anic Anal	vsis		
			17-	-550.310(1 PWS030)			
Dener			,	Anal.			
ID		MCL ng/l	Sample #	Result mg/l	Method	MDL	Date
 1005	Arsenic	.05	9512170	< 0.001	206.2	.001	11/29
1010	Barium	2	9512170		SM3113B		
	Cadmium						11/21
		.005	9512170	< 0.0001	SM3113B	.0001	11/20
1020	Chromium	0.1	9512170	< 0.001	SM3113B	.001	11/28
1024	Cyanide	0.2	9512170	< 0.02	SN4500CM	NE .02	11/27
1025	Fluoride	4	9512170	1.11	SM4500FC	2 0.1	12/01
L030	Lead	0.015	9512170	0.004	SM3113B	.001	11/20
L035	Mercury	0.002	9512170	< 0.0002	245.1	.0002	11/30
.036	Nickel	0.1	9512170	< 0.001	SM3113B	.001	11/28
.040	Nitrate,N	10	9512170	< 0.05	353.2	0.05	11/22
.041	Nitrite,N	1	9512170	< 0.05		0.05	11/17
.045	Selenium	0.05		0.002	SM3113B		•
.052	Sodium	160	9512170	192	SM3111B	1.0	
074	Antimony	0.006	9512170		SM3113B		
075 ) (per	Beryllium HRS 84269	- 0.004 9) -			200.7	0.002	
085	Fhallium	0.002	9512170	< 0.0007	200.9	.0007	11/17

1 9512170 < 0.0007 200.9.0007 11/17 -----1094 Asbestos 7 MFL ---- ---- --------\_\_\_\_ ----------

## D-10

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## Secondary Chemical Analysis 62-550.320 (PWS031)

Ft. Pierce Utilities Well FB-3

N.	ert tp-3						
Para ID 		MCL mg/l	Sample #	<b>.</b>	Method	MDL	
1002	Aluminum	0.2	9512170	0.063	SM3113B	0.001	 11/28
1017	Chloride	250	9512170		SM4500CLB	1.0	 11/21
1022	Copper	1		0.004	SM3113B	0.001	 11/20
1025	Fluoride	2.0	9512170		SM4500FC	0.1	 12/01
1028	Iron		9512170	0.017	SM3113B	0.001	 11/20
1032	Manganese	0.05	9512170	< 0.001	SM3113B	0.001	 11/20
1050	Silver	0.1	9512170			0.0002	 11/29
1055	Sulfate	250		167	375.4	1.0	 11/20
1095	Zinc	5	9512170		289.1	0.001	•
	Color, PCC Color Unit		9512170	0	SM2121B	0	 11/16
	Odor, (tota						
			9512170		SM2150	1.0	11/16
1925	pH, Lab (6.5-8.5)	I	9512170	7.65	150.1	0.01	11/16
1930	Total Dis- d Solids	•	9512170	866	160.1		11/20
2905	Foaming ag	rents			425.1	0.05	11/17

# **KARR Environmental Inc.**

	1 · ·	1495 South Vo	olusia Ave. Suite 101
	I	Orange City, Fl	
		• •	Fax 904-775-4470
	•	,	•
		BRINKING WATER ANALYS MATION ( to be completed by syst	
System Name: <u>H. R</u>	eice Utilities		і. р. н <u>: 4560+90</u>
Address:	_		Phone #: 407 466 1 600
Type (chec	kone): (H) Community ()	Nontransient Noncommunity	() Noncommunity
SAMPLE INFORMATION (to be com	pleted by sampler)	•	
Sample Date (MMDDYY): (1/1495	Sample Time: 1500	_	
Sample Location (be specific):	eliFB-3		
Sampler Name and Phone:	h Accolin	407-466-1600	
Sampler's Signature:	· · · · · · · · · · · · · · · · · · ·	THE: Field Samp	lev 1 fet July
Check Type(s): ( ) Distribution ( ) Clearance ( ) Distrib entry pt	() Recheck of MCL () Thm Max Res Time () Raw () Co	() Resample of Lab Invalidat () Plant Tap mposite of Multiple Sites-Attach a	
LABORATORY CERTIFICATION IN	NFORMATION (to be completed	d by (ab) — ATTACH HRS ANAL	YTE SHEET.
Lab Name: KARR Environmental, Inc.	HRS #: 82472 Expir	ration Date: June 31, 1996	
Address: 1495 S. Volusia Ave., Orange C	City Phone #: 904-775	5-0144	in the second se
Subcontracted Lab IIRS #: 84269	ATTACH HRS ANALYTI	E SHEET FOR SUBCONTRACT	TED LAB, TOO •
ANALYSIS INFORMATION ( to be co Date Sample (s) Received: 11-20-95	mpleted by lab) - SAMPLE N	UMBER: <u>-95/10/29 - 1</u> tached for compliance with 62-550,	F.A.C .: 100 * 08525
() Nitrate Only	() Nitrite Only	( ) Asbestos Only	() Trihalomethanes
Inorganics () All 17 () Partial	Volatile Organcis- (r) All 21 () Partial	Secondaries () All 14 () Partial	Pesticide/PCBs- (*) All 30 ()Partial
Group I Unregulateds- (*) All 13 ( ) Partial	Group II Unregulateds- () All 23 () Partial	Group III Unregulateds- (*) All 11 ( ) Partial	Radiochemicals- ( ) Single Sample ( ) Qtrly Composite**
· · ·	** Provide radioch	emical sample dates & location for	
I. Robert L. Sullivan	do HEREBY CERTIFY ()	at all attached analytical data a	re correct.
Signature Colu	th full		
• <u> </u>	boratory Manager	Date _ 12_20_9	6

COMPLIANCE INFORMATION (to be completed by State)

Sample Collection Satisfactory:	Sample Analysis Satisfactory:
Resample Requested for:	Resson:
Person notified to resample: Di	ite Notified:

DEP/IIRS Reviewing Official:

\* All HRS lab # s and their HRS Analyte Sheet for labs performing the attached water analyses must be provided. Failure to do so will result in rejection of the analyses and possible enforcement against the public water system for failure to sample. Effective January 1995

QA PLAN 910047 G

# SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 34677 813-855-1844

KARR Environmental 1495 South Volusia Avenue Orange City, Florida 32774-1008

December 11, 1995 Project No. 08525 Page 1 of 7

### LABORATORY REPORT

Project Description: KARR Project No. 9511-129 Sample Description: 01 - Water, KARR No. 9511-129-1, sampled 11/16/95 Date Received: 11/21/95, 1315

- DEP Report Forms Attached

Francis I. Daniels Laboratory Director

FHRS Environmental Lab No. E84129 FHRS Drinking Water Lab No. 84269 Comprehensive QA Plan No. 870317G



# RADIOLOGICAL ANALYSIS

Public Water System I.D. Number: <u>4560490</u> Laboratory Sample Number: <u>4129</u>

Contam.	PARAMETER	Analysis	Analysis	Analytical	Analysi:
ID		<u>Results (pCi/L)</u>	<u>Error</u>	<u>Method</u>	Date
4000	Gross Alpha	0.0	1.0	900.0	11/18/9:

NOTE: Methods are from "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," USEPA, EPA-600/4-80-032, unless noted.

PWSA.06 Effective 06/01/89

## PESTICIDE & PCB CHEMICAL ANALYSIS 62-550.310(2)(c) (PWS029)

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Para <u>ID</u>	meter <u>NAME (MCL ug/l)</u>	Sample <u>Number</u>	Analysis <u>Result(ug/l</u>	Analyt. ) Method	Analysis Date	MDL	Lab ID
2005	(-)	08525-01	0.1 U	EPA 508	11/22/95	0.1	84269
2010	()	08525-01	0.1 U	EPA 508	11/22/95		84269
2015	Methoxychlor (40)	08525-01	0.2 U	EPA 508	11/22/95		84269
2020	Toxaphene (3)	08525-01	2 U	EPA 508	11/22/95		84269
2031	Dalapon (200)	08525-01	1 U	EPA 515.1	11/28/95		84269
2032	Diquat (20)	08525-01	4 U	EPA 549.1	11/22/95	4	84269
2033	Endothall (100)	08525-01	20 U	EPA 548	11/22/95		84269
2034	Glyphosate (700)	08525-01	10 U	EPA 547	11/29/95	10	84269
2035	Di(2-ethylhexyl)adipate (400)	08525-01	5 U	EPA 506	11/22/95	5	84269
2036	Oxamyl (Vydate) (200)	08525-01	1 U	EPA 531.1	11/29/95	1	84269
2037	Simazine (4)	08525-01	0.2 U	EPA 507	11/22/95	0.2	84269
2039	Di(2-ethylhexyl)phthalate (6)	08525-01	5 U	EPA 506	11/22/95	5	84269
2040	Picloram (500)	08525-01	0.2 U	EPA 515.1	11/28/95	0.2	84269
2041	Dinoseb (7)	08525-01	0.2 U	EPA 515.1	11/28/95	0.2	84269
2042	Hexachlorocyclopentadiene (50)	08525-01	0.1 U	EPA 505	11/27/95	0.1	84269
2046	Carbofuran (40)	08525-01	1 U	EPA 531.1	11/29/95	1	84269
2050	Atrazine (3)	08525-01	0.2 U	EPA 507	11/22/95	0.2	84269
2051	Alachlor (2)	08525-01	1 U	EPA 507	11/22/95	1	84269
2065	Heptachlor (.4)	08525-01	0.1 U	EPA 508	11/22/95	0.1	84269
2067	Heptachlor epoxide (.2)	08525-01	0.1 U	EPA 508	11/22/95	0.1	84269
2105	2,4-D (70)	08525-01	0.5 U	EPA 515.1	11/28/95	0.5	84269
2110	2,4,5-TP (Silvex) (50)	08525-01	0.05 U	EPA 515.1	11/28/95	0.05	84269
2274	Hexachlorobenzene (1)	08525-01	0.1 U	EPA 508	11/22/95	0.1	84269
2306	Benzo(a)pyrene (.2)	08525-01	0.01 U	EPA 550	11/22/95	0.01	84269
2326	Pentachlorophenol (1)	08525-01	0.05 U	EPA 515.1	11/28/95	0.05	84269
2383	PCBs (.5)	08525-01	0.5 U	EPA 508	11/22/95	0.5	84269
2931	Dibromochloropropane (.2)	08525-01	0.005 U	EPA 504	11/27/95	0.005	84269
2946	Ethylene dibromide (.02)	08525-01		EPA 504	11/27/95	0.005	84269
2959	Chlordane (2)	08525-01		EPA 508	11/22/95	2	84269

U - Analyte was not detected; indicated concentration is method detection limit.

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## VOLATILE ORGANIC ANALYSIS 62-550.310(2)(b) (PWS028)

Paran <u>ID</u>	neter <u>NAME (MCL_ug/l)</u>	Sample <u>Number</u>	Analysis <u>Result(ug/</u> 1)	Analyt. <u>Method</u>	Analysis Date	<u>. MD</u> L	Lab <u>I</u> D
					<u></u>		_ 10
2378	1,2,4-Trichlorobenzene (70)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2380	cis-1,2-Dichloroethene (70)	08525-01	0.2 U	EPA 502.2	11/27/95	0.2	84269
2955	Xylenes (Total) (10,000)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2964	Dichloromethane (5)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2968	o-Dichlorobenzene (600)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2969	p-Dichlorobenzene (75)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2976	Vinyl chloride (1)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2977	1,1-Dichloroethene (7)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2979	trans-1,2-Dichloroethene (100)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2980	1,2-Dichloroethane (3)	08525-01	0.2 U	EPA 502.2	11/27/95	0.2	84269
2981	1,1,1-Trichloroethane (200)	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2982	Carbon tetrachloride (3)	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2983	1,2-Dichloropropane (5)	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2984	Trichloroethene (3)	08525-01	0.2 U	EPA 502.2	11/27/95	0.2	84269
2985	1,1,2-Trichloroethane (5)	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2987	Tetrachloroethene (3)	08525-01	0.2 U	EPA 502.2	11/27/95	0.2	84269
2989	Monochlorobenzene (100)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2990	Benzene (1)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2991	Toluene (1,000)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2992	Ethylbenzene (700)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2996	Styrene (100)	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269

## UNREGULATED GROUP I ANALYSIS 62-550.405 (PWS035)

Parar <u>ID</u>	neter <u>NAME (MCL ug/l)</u>	Sample <u>Number</u>	Analysis <u>Result (ug/l)</u>	Analyt. <u>Method</u>	Analysis Date	MDL	Lab ID
2021	Carbary1	08525-01	1 U	EPA 531.1	11/29/95	1	84269
2022	Methomyl	08525-01	1 U	EPA 531.1	11/29/95	1	84269
2043	Aldicarb sulfoxide	08525-01	0.5 U	EPA 531.1	11/29/95	0.5	84269
2044	Aldicarb sulfone	08525-01	0.5 U	EPA 531.1	11/29/95	0.5	84269
2045	Metolachlor	08525-01	1 U	EPA 507	11/22/95	1	84269
2047	Aldicarb	08525-01	0.5 U	EPA 531.1	11/29/95	0.5	84269
2066	3-Hydroxycarbofuran	08525-01	1 U	EPA 531.1	11/29/95	1	84269
2077	Propachlor	08525-01	0.5 U	EPA 508	11/22/95	0.5	84269
2356	Aldrin	08525-01	0.1 U	EPA 508	11/22/95	0.1	84269
2364	Dieldrin	08525-01	0.1 U	EPA 508	11/22/95	0.1	84269
2440	Dicamba	08525-01	0.05 U	EPA 515.1	11/28/95	0.05	84269
2595	Metribuzin	08525-01	0.5 U	EPA 507	11/22/95	0.5	84269

## UNREGULATED GROUP II ANALYSIS 62-550.410 (PWS034)

Paran <u>ID</u>	neter <u>NAME (MCL ug/l)</u>	Sample <u>Number</u>	Analysis <u>Result(ug/l)</u>	Analyt. <u>Method</u>	Analysis Date	_MDL	Lab ID
2210	Chloromethane	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2212	Dichlorodifluoromethane	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2214	Bromomethane	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2216	Chloroethane	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2218	Trichlorofluoromethane	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2251	Methyl-tert-butyl-ether	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2408	Dibromomethane	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2410	1,1-Dichloropropene	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2412	1,3-Dichloropropane	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2413	1,3-Dichloropropene	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2414	1,2,3-Trichloropropane	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2416	2,2-Dichloropropane	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2941	Chloroform	08525-01	0.2 U	EPA 502.2	11/27/95	0.2	84269
2942	Bromoform	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2943	Bromodichloromethane	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2944	Dibromochloromethane	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2965	o-Chlorotoluene	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2966	p-Chlorotoluene	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2967	m-Dichlorobenzene	08525-01	0.5 U	EPA 502.2	11/27/95	0.5	84269
2978	1,1-Dichloroethane	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2986	1,1,1,2-Tetrachloroethane	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2988	1,1,2,2-Tetrachloroethane	08525-01	0.3 U	EPA 502.2	11/27/95	0.3	84269
2993	Bromobenzene	08525-01		EPA 502.2	11/27/95	0.5	84269

## UNREGULATED GROUP III ANALYSIS 62-550.415 (PWSO36 & O37\*)

Param	eter	Sample	Analysis	Analyt.	Analysis		1-1
IĎ	NAME (MCL ug/1)	Number	Result(ug/1)	Method	Date	MDL	Lab
					<u>5476</u>		<u>ID</u>
2262	Isophorone	08525-01	5 U	EPA 609	11/22/95	5	84269
2270	2,4-Dinitrotoluene	08525-01	1 U	EPA 609	11/22/95	1	84269
2282	Dimethylphthalate	08525-01	5 U	EPA 506	11/22/95	5	84269
2284	Diethylphthalate	08525-01	5 U	EPA 506	11/22/95	5	84269
2290	Di-n-butylphthalate	08525-01	5 U	EPA 506	11/22/95	5	84269
2294	Butyl benzyl phthalate	08525-01	5 U	EPA 506	11/22/95	5	84269
9089	Di-n-octylphthalate	08525-01	5 U	EPA 506	11/22/95	5	84269
9108*	2-Chlorophenol	08525-01	5 U	EPA 604	11/22/95	5	84269
9112*	2-Methy1-4,6-dinitropheno1	08525-01	20 U	EPA 604	11/22/95	20	84269
	Pheno 1	08525-01	5 U	EPA 604	11/22/95	5	84269
9116*	2,4,6-Trichlorophenol	08525-01	10 U	EPA 604	11/22/95	10	84269

## INORGANIC ANALYSIS 62-550.310(1) (PWSO30)

Paran	neter	Sample	Analysis	Analyt.	Analysis	MDL	Lab
<u>ID</u>	<u>NAME (MCL mg/l)</u>	<u>Number</u>	<u>Result (mg/l)</u>	Method	<u>Date</u>		ID
1075	Beryllium (0.004)	08525-01	0.002 U	EPA 200.7	11/29/95	0.002	84269

## SATE DRINKING WATER ANALYTE SHEET



# STATE OF FLORIDA DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

	1/1.4 / 1							•••••
EARCOATORY :	SOUTHERN	VNVFALLC	AL LABOR	ATORY		HARCH U4, HARCH 2, 1		
		HETHODS			Supersodes previous analyte sheat dated:	MARCH CF 1	773	
Hiraria tol our y Renoraria Filter		5119078						
ALL ALL MALE		5H900A			X Indicates ANALYIE CERTIFIED			
	Bencarron	HHO-HUG					GC/HS	HP1 C
X 1800 1000 .		1110 1100			PESILCIDES AND PCB'S	GC	007113	
Γ/Α		\$11708C			1. INSECTICIDES	507		
X Fornl/E.Coli		3117000			X ALACHEDR			••···· •••
		AA(FUR)	100	OTHER	X ATRAZINE	507		
FRIHARY INORGANIC	M(FL)	MALINA	1.41		X CHLORDANE	508 508		
t, HETALS		201 3			X ENDRIN	508		
X ANT LHONY	<u></u>	204.2			X HEPTACHLOR			
X ARSENIC		206.2	200.7		X HEPTACHLOR EPOXIDE	508		
X BARTUH	208.1				X LINUAUE	5()8 ton	····	·····
K BERYILIUH		210.2	200.7		X HEIROVICICON	508	<b></b>	••••
X CADREDIN		213.2	200.7		X IVAAPaens	508		
x clipotitum		218.2	200,7		X HEXACILLOROBENZENE	508		'
X LEAD	<u> </u>	239.2			X HEXACHLOROCYCLUFENTADIEN	505		····
X HERCURY				245.1	X STHAZINE	507		
X HICKEL	249.1		200.7		•			
X SELENIUH		270.2		·				
x scolut	273.1		200.7		Z. HERBICIDES			
X THALLTUH		279.Z			Υ <u></u> χ 2,4-0	515.1		•
A TIMELISIN					X FENTACHLOROPHEHOL	515.1		<u> </u>
2. LEAD AND COPPER					X 2,4,3-17 (SILVEX)	515.1		
X LEAD		239.2			X DALAPON	515.1		
X CONTER	220.1		200.7		X DINOSEB	515.1		
					X PICLORAH	515.1		
3. HEIRATE AND RETRETE	E			353.2				
X HITRATE				353.2/35	54 <b>1</b>			
X HETREFE				353.2755	3, CARBANATES			531.1
x TOTAL NOZ-NO3				333.6	X CARBOFURAH		No. 1. 1	551.1
<b>F</b>					X OXAMYL (VYDATE)			
4. CYANIDE								
X CYANIDE				335.2				
R CHARTER					4. DISINFECTANT BY-PRODUCTS/	/06'8		
e europite					v 1 2-h (RRONO-3-CHLOROPKUP)	146 304		
5. FLUORIDE				340.2	X ETHYLENE DIBROHIDE	504		
X FLUORIDE			• <b>•</b> ••••					
					5. HISCELLANEOUS SOC'S			
6. ASBESTOS					- X DIQUAT	·		547
ASBESTOS					X ENDOTHALL	548		<b>.</b>
	AA(TL)	AA(FUR)	1 C P	OTHER	X GLYPHOSAIE			547
SECONDARY INORGANIC	202.1	202.2	200.7					
X ALUMINUM		8000-	_	325.2	6. FC8/5			
X CHLORIDE	-A			5H2U4A	X DECACHLOROAIPHEHYL	508		
x color	220.1		200.7					
X COFFER X FLUORIDE	26411			340.7				
X FOAMENG AGENIS				5H512B	7. ADIFATES AND PHIHALATES			
X LAUN	236.1		200.7		w DICZ-ETHYLHEXYL) ADISATE	50 <del>6</del> •= 504		•- <b></b> -
X HANGANESE	243.1	<u> </u>	200.7	011207	X DI(Z-ETHYLHEXYL) PHTHALA	TE 506		
X ODDR	<b></b>	L		5H2O7				
x pH				150.1			•	
X SILVER	272.1	272.2	200.7					
X SULFATE				375.4	O, FAH			\$50/.1
X 105				160.1	X BENZOCAJPYREHE			
x 21HC	287.1	·	200.7					
A (1995)				1401	GONVILLE, FLORIDA 32231			



# STATE OF FLORIDA DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

t AB	IORATURY: SOUTHERN	ANALYTIC	AL LABO	RAFORY	CERTIFICAT	ION NUMB	ER: 84269 DATEI	MARCH 04,	
					Supersedes previou	is analyt	-	HARCH 2, 1	
					X ind	licatés A	NALYTE CERTIFIED		
	ER REGULATED CONTANINANTS	GC	GC/HS				• .		
	VOLATILE ORGANIC COMPOUNDS	50Z.2					REGULATED CONTAM	INANTS	66 /NZ
	IR I CHLUROE THYLENE	502.2			1.	PURGEAB	LES	6C	GC/MS
	1ETRACHLOROETHYLENE	502.2						t - 1 - 8	
X	CARBON TETRACHLORIDE	502.2			X			502.2	
X	VINYL CHLORIDE	502.2			X	BROMOD	CHLOROMETHANE	502.2	
	1, 1, 1- TRICHLOROETHANE	502.2			X			502. <b>2</b>	
X	1, 2-DICHLOROETHANE		,		X			502.2	Processon in the local division of the local
X	BENZENE	502.2	<del></del>		X	CHLOROE	THANE	502.2	·
X	p-DICHLOROBENZENE	502.2			X	CHLORO	FORH .	502.2	
X	1, 1 - DICHLOROETHYLENE	502.2	<del></del>		X	CHLORO	KE THANE	502.Z	
Х	cis-1,2-DICHLOROETHYLENE	502.Z			X	0 J BROHO	CHLOROHETHANE	502.2	
х	1,2-DICHLOROPROPANE	502.Z			x	DICHLOR	ODIFLUOROMETHANE	\$02.2	•
X	ETHYLBENZENE	502.2			x		OTOLUENE	502.Z	
X	CHLOROBENZENE	502. <b>2</b>			x	DIAROHO	HETHANE	502.2	
Ŷ	0.DICILOROBENZENE	502.2			x		HLOROETHANE	502.Z	
x	STYRENE	502.2			×	trans-1	3-DICHLOROPROPEN	E 502.2	
x	TOLUENE	502.2			x	1.3.D10	HLOROPROPENE	375.5	
Ŷ	trans-1,2-DICHLOROETHYLENE	50Z.Z			x	1.3-DJC	ILOROPROPANE	502.2	
x	TOTAL XYLENES	502.Z			· X	cla•1.3	-DICHLOROPROPENE	502.2	
x	DICHLOROMETHANE	502.2			x	2.2.010	HLOROPROPANE	502.2	
Ŷ	1, 2, 4 - TRICHLOROBENZENE	502.2			x	TRICHLO	ROFLUOROHETHANE	502.2	<u> </u>
x	1, 1, 2- TRICHLORDETHANE	502.2			x	1.2.3-1	RICHLOROPROPANE	502.Z	
^	1,1,2 10,200,000				x	m-DICIIL	OROBENZENE	502.2	
2	IR THALOHET HANES				×	1.1.1.2	-TETRACHLORDETHAN	E 502.2	
Σ. Χ	BROHODICHLOROMETHANE	502,2			X	1.1.2.2	-TETRACHLORDETHAN	E 302.2	
x	BROHOFORH (TRIBROMOHETHANE)	502.2			Y Y	METRYL	tert-BUTYL ETHER	302.6	
	CHLDROD I BROHOHET HANE	502.2			¥	1.1-D10	HLOROPROPENE	502.2	
X	CHEUROFORM (TRICHLORONETHANE)	)502.2			×	O-CHLOR	OTOLUENE	502.2	
- X - U	TOTAL TRIHALOHETHANES	502.2			^	Q LILON			
X	TOTAL PRIME ONE TRANED								
					Ζ.	BASE/NEU	TRAL EXTRACTABLES	FOL	
GRO	UP I UNREGULATED CONTAMINANTS			NET 4	X	BUITYL B	ENZYL PHTHALATE	200	
	CARBANATES	GC	GC/H9	HPLC	X	D]-n-QU	ITYL PHTHALATE	506	
	ALDICARE			531.1	x	DIETHYL	PHTHALATE	506	<b>.</b>
Ŷ	ALDICARB SULFOXIDE			531.1	· X	DINETHY	LPHTHALATE	506	
	ALDICARB SULFONE			531.1	X	Z.4-DIN	ITROTOLUENE	609	
	CARBARYL			531.1	X	DI-n-00	TYL PHTHALATE	506	
Ŷ	3-HIDROXICARBOFURAN		<u> </u>	531.1	, X		ONE	607	
x	HETHONYL			531.1					
					•	ACIN EXT	RACTABLES		
	HEABICIDES	508			5.	Z-CIILOR	OPHENOL	604	········
	ALDRIN	507			X	2-00LUN 2.02104	L-4,6-DINITROPHEN	OL 604	
X	BUTACILOR	515.1		·····		PHENOL		604	
X	DICAHBA	508			Ŷ	7.4.6-1	RICHLOROPHENOL	604	
X	DIELDRIN HETOLACHLOR	507			^	-1.14.1			
X	METRIBUZIN	507		·					
X	FROPACILOR	508		·	וומ	DXIN			u
X						_2,3,7,8	- TETRACHLOROO I BEN	20-9-01081	N

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STATE OF FLORIDA DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

LABORATORY:	ENVIROMETRICS	CERTIFICATION NUMBER:	83214 EPA:	FL00208
		DATE:	JULY 21, 1998	
		Supersedes previous analyte sheet dated:	JUNE 9, 1996	
OTHER REGULAT	ED CONTAMINANTS			

## 1. VOLATILE ORGANIC COMPOUNDS

#### OC/M8 OC. X TRICHLOROETHYLENE 602.2 X TETRACHLOROETHYLENE 802.2 X CARBON TETRACHLORIDE 602.2 X VINYL CHLORIDE 602.2 X 1,1,1-TRICHLOROETHANE 602.2 X 1,2-DICHLOROETHANE 602.2 X BENZENE 602.2 X p-DICHLOROBENZENE 602.2 X 1,1-DICHLOROETHYLENE 602.2 X cle-1,2-DICHLOROETHYLENE 802.2 X 1,2-DICHLOROPROPANE 602.2 X ETHYLBENZENE 602.2 X CHLOROBENZENE 602.2 X o-DICHLOROBENZENE 802.2 X STYRENE 602.2 X TOLUENE 802.Z X trans-1,2-DICHLOROETHYLENE 602.2 X TOTAL XYLENES 602.2 X DICHLOROMETHANE 802.2 X 1,2,4-TRICHLOROBENZENE 502.2 X 1,1,2-TRICHLOROETHANE 602.2

#### 2. TRIHALOMETHANES

X BROMODICHLOROMETHANE	602.2	
X BROMOFORM	602.2	
X CHLORODIBROMOMETHANE	602.2	
X CHLOROFORM	602.2	
X TOTAL TRIHALOMETHANES	602.2	

#### **GROUP I UNREGULATED CONTAMINANTS**

1. CARBAMATES		
	OC .	GC/MS
_ ALDICARB		
_ ALDICARB SULFOXIDE		
ALDICARE SULFONE		
CARBARYL		
J-HYDROXYCARBOFURAN		
_ METHOMYL		

#### 2. HERBICIDES

ALDRIN		
BUTACHLOR		 
DICAMBA		 
DIELORIN		 
METOLACHLOR	·	 
METRIBUZIN		 <u> </u>
PROPACHLOR	·	 <u> </u>
-		 

### GROUP IN UNREGULATED CONTAMINANTS

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		GC	gc/M\$
_	BROMOBENZENE		
X	BROMODICHLOROMETHANE	602.2	
X	BROMOFORM	602.2	
_	BROMOMETHANE	•	•
-	CHLOROETHANE		· ·····
7	CHLOROFORM	• <del></del>	
-	CHLOROMETHANE	·	
x	DIBROMOCHLOROMETHANE	502.2	·
	DICHLORODIFLUOROMETHANE		
-	p-CHLOROTOLUENE		
_	DIBROMOMETHANE		
	1.1-DICHLOROETHÂNE		
-	1.3-DICHLOROPROPÉNE		
	1.3-DICHLOROPROPANE	·	
-	2.2 DICHLOROPROPANE		·
-	TRICHLOROFLUOROMETHANE		
-	1,2,5-TRICHLOROPROPANE		
-	m-DICHLOROBENZENE		
-	1,1,1,2-TETRACHLOROETHANE	·	
-	1.1.2.2-TETRACHLOROETHANE		
-	METHYL MATBUTYL ETHER		·
-	1,1-DICHLOROPROPENE	·····	
-	B-CHLOROTOLUENE	<u> </u>	
_	0-GHLUKUTULUENE		

#### GROUP III UNREGULATED CONTAMINANTS

#### 1. BASE/NEUTRAL EXTRACTABLES

BUTYL BENZYL PHTHALATE	
DI-H-BUTYL PHTHALATE	
DIMETHYL PHTHALATE	·
2,4-DINITROTOLUENE	
DI-IN-OCTYL PHTHALATE	
<b>-</b>	
2. ACID EXTRACTABLES	
2-CHLOROPHENOL	
2-METHYL-4.8-DINITROPHENOL	<u> </u>
PHENOL	
2,4,8-TRICHLOROPHENOL	-

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#### LASSTON CHILES, GOVERNOR

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HPLC

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# STATE OF FLORIDA DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

	LABORATORY:	ENVIROME	TRICS			CERTIFICATION	NUMBER: DATE:	i 83214 JULY 21, 19	EPA :	FL00208
	MICROBIOLOGY		METHODS		SUPERSEDES PREV	NOUS ANALYTE SHEE		JUNE 8, 189		• •
X	Membrane Filter Multiple Tube Ferme	ntetion	SM9222B							
	Fecal/E. coll MMO-MUG P/A		SM9221E, (1 SM9228	la); MUG		PESTICIDES AND	PCBS	GC 1	GC/M8	HPLC
	PRIMARY INORGAN	c				1. INSECTICIDES				
	1. METALS	AA(FUR)	ic P	ICP/MS	OTHER	_ ALACHLOR _ ATRAZINE				
x	ANTIMONY	SM3113B			•	_ CHLORDANE ENDRIN		<del></del>		
	ARSENIC	SM3113B	·			HEPTACHLOR		<u>-</u>		
	BARIUM <sup>12</sup>	SM3113B			SM3111D		OXIDE			
_	BERYLLIUM									
	CADMIUM	\$M3113B		<u> </u>		_ METHOXYCHLOR	t i i i i i i i i i i i i i i i i i i i			
	CHROMIUM	SM3113B	<u>`</u>			_ TOXAPHENE				
	LEAD	SM31138				_ HEXACHLOROBE				
	MERCURY				245.1		CLOPENTADIENE			
	NICKEL SELENIUM	SM3113B SM3113B	<u> </u>		SM3111B	_ SIMAZINE	•	<u> </u>	<u> </u>	
	SODIUM	8M3113B			SM3111B	2. HERBICIDES				,
	THALLIUM	200.9			SMOTTE	1. HERDIGIDED				
			·			2.4-0				
	2. LEAD AND COPI	PER				PENTACHLOROP	HENOL	·		
						2,4,5-TP (SILVEX)				
X	LEAD	SM31138				DALAPON				····
X	COPPER	SM3113B			SM3111B	DINOSEB				
						_ PICLORAM				
	3. CYANIDE	iC .	ISE	UV-VIS	OTHER					
¥	CYANIDE			SM4500CN	•	3. CARBAMATES				
^	CTANIDE			SMHOOUGH		CARBOFURAN				
	4. NITRATE AND NIT	RITE				OXAMYL (VYDAT	E)			
x	NITRATE			363.2		4. DISINFECTAN	TBY-PRODUCTS/V	00:5		
X	NITRITE			353.2, 364.1						
X	TOTAL NO2-NO3			353.2		_ 1,2-D/BROMO-3-C	HLOROPROPANE			
						ETHYLENE DIBRO	DMIDE			
	5. FLUORIDE									
•	ti liopint					8. MISCELLANEC	ous soc's			
^	FLUORIDE		SM4500F C	<u> </u>		0101117				
	6. ASBESTOS					_ DIQUAT ENDOTHALL				
	4. NODEOTOG					GLYPHOSATE		•		
_	ASBESTOS					_ GETTIOGATE				·····
-						6. PCB'S				
	SECONDARY INORG	ANIC								
			,i			_ AROCHLORS				
		AA(FUR)	ЮР	UV-VIS	OTHER	_ DECACHLOROBI	PHENYL			
	ALUMINUM	SM31138	<u></u>		SM3111D	7. ADIPATES ANI	D PHTHALATES			
	CHLORIDE	<u></u>			SM4500CI- B					
	COLOR			SM2120B		_ DH2-ETHYLHEXY				
	FLUORIDE	SM31130	<u> </u>	<u></u>	SM3111B	_ DI(2-ETHYLHEXY	L) PHTHALATE		<u> </u>	
	FOAMING AGENTS		<del></del>	SM6640C	SM4600F C	8. PAH				
	IRON	8M31138	<del></del>	31100400	SM3111B	0. FAU				
	MANGANESE	8M31138	<del></del>			_ BENZO(a)PYREN	F			
	ODOR				SM2150B		-			
	рН				150.1	DIOXIN				
	SILVER	SM31138			SM31118					
	SULFATE				376.4	_ 2,3,7,8-TETRACH	LORODIBENZO-p-t	NXIN		
	TDS THE	÷	<u> </u>	••••••	SM2540C		2			
×	ZINC	<u></u>			8M31118					

HR8-H FORM 1041, MARCH, 95

P.O. BOX 210	JACKSONVILLE,	FLORIDA 32231
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LAWTON CHILES, GOVERNOR

# PUBLIC DRINKING WATER ANALYSIS REPORTING FORMAT

PUBLIC WATER BYSTEM INFORMA	TION (IS be completed by a	ydiem et labl	• •
System Names Ft. Pierc	e Utilities		456 0490
Address: 205 South Type (shock ens): [] Community	6th St. 1 Montrensient Nensena	Phone munity ( ) Hensemmun	n (407)466-1600
SAMPLE INFORMÁTION (to be som	plated by earnplant		
Semple Date (MMDDVV), 10,199	5 Sample Times 1300		
Sample Location (bà épselfie):	ell FB-4		
Sampler Hame and Phone:	m Dalberg	(407) 562-1968	)
Bempler's Signatures	TRA	min Field	Supervisor
Chack Typeleit I Distribution ( ) Cleasenes ( ) Distrib entry (	f ) Rochock of MCL t ) Thm May Rob Tim b t/) Row t ) Col	L   Resemple of	Léb Invalidéisi Sémple neh é fermét fot ééch sité
LABORATONY CERTIFICATION INF	MMATION (to be completed	i by Isb) - ATTACII HRB AN	IALYTE BHEET
Lob Name: ENVIROHETRICS		HAS #83214 Explicat	ion Date: 6-30-96
Address: 683. SW 27TH	AVE, VERO BEACH,	FL Phone #: (40	7) 562-1968
Address: 683. SW 27TH Subcontracted Lob Name & HRS Jr ANALYSIS INFORMATION (to be ex	Eovilian 8 14215- AT	TACHINA ANALYTE BHEET	FOR BUBCONTRACTED LAN -
ANALYSIS INFORMATION (16 56 44	mpleted by tubt - BAMPL	Environici INVANEN: 9511273	KNL/ 85985
Date Samplete) Réceivéd: _10/19			bouttern/9510110-1 nollenge with 82-880, F.A.C.:
( ) Miroto Only	t t Mirité Only	1 ] Asbeetes Only	f ) Trihéfomáthanse
Inorganics { ) AN 17 (V) Partial	Volatila Orgánias ( ) All 21    {  } Partiál	Beenderles- (V) All 14 ( ) Perilet	Postioido/PCBa E 5 AH 30 E 5 Partial
Group i Unicquierada t ) All 13 () Partiet	Oroup II Unrégulátodo- ( ) All 23 : ( ) Pértioi	Oroup Hi Unréguláládá E 3 AR 11 — E 3 Párilai	Ngdlochémiaátá [V] Single Sámpia [-] Gtify Composité <sup>4</sup>
	*Pravide satissh	amical admpié détés & laosti	anê far êkah quêrter
I. <u>GRACE TREADI</u>	IAY A. do HE	REBY CENTIFY that all atlach	ad ensivitasi date eré corrèct.
Signetuiê			
title <u>CITE</u>	MIST /	Dats 1	1/17/95
COMPLIANCE INFORMATION (10 50	completed by State)	•	
Semple Collection Batisfectory:		Analysis Sétisfactory:	
Recemple Requested for:		Reeson:	
Presen notified to recomples		Date Hotified:	• • • • • • • • • • • • • • • • • • • •
DEP/IRS Reviewing Official:			_
			Elleative Baptember 1994

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Turbidity Analysis 62-550.310(3) (PWS026)

Parai ID	neter Name		Sample #		Analytical Method	Det.Lt Used	• Analys: Date
0100	Turbidi	ty	9511273	0.27	180.1	0.1	10/19
			********		 	*	*****
			17-	anic Anal 550.310()			
			[]	PWS030) Anal.			
		MCL		Result			
ID 	Name :	mg/1	Sample #	mg/1	Hethod	MDL	Date
1005	Arsenic	.05	9511273	0.009	SM3113B	.001	10/25
1010	Barium	2	9511273		SM3111B	.002	10/26
1015	Cadmium	.005	9511273			.0002	11/03
1020	Chromium	0.1	9511273		SM3113B		10/25
1024	Cyanide	0.2	9511273	< 0.020	SN4500C		10/23
1025	Fluoride	4	9511273		SM4500F(	C 0.1	10/26
1030	Lead	0.015	9511273		SM3113B		10/24
1035	Mercury	0.002			2 245.1	.0002	11/03
1036	Nickel	0.1	9511273	< 0.001	SM3113B		
1040	Nitrate,	N 10	9511273		353.2	0.05	10/25
1041	Nitrite,	N 1			354.1	0.05	10/20
1045	Selenium	0.05	9511273	< 0.002		.002	10/25
1052	Sodium	160	9511273	209	SM3111B	1.0	10/23
1074	Antimony	0.006	9511273		2 SM3113B	.002	10/31
	Berylliu r HRS 842			< 0.002	2 210.2	.002	10/27
1085	Thallium	0.002	9511273	< 0.000	07 SM3113B	.0007	10/31
100/	Asbestos	7 WPT					

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D-10

## Secondary Chemical Analysis 62-550.320 (PWS031)

Ft. Pierce Utilities Well FB4

		Sample #		Method	MDL	Date
1002 Aluminum		9511273	0.178		0.001	 10/26
1017 Chloride	250	9511273			1.0	10/23
1022 Copper	1	9511273	< 0.001	SN3113B	0.001	10/24
1025 Fluoride	2.0	9511273	1.19	SH4500FC	0.1	10/26
1028 Iron				SM3111B	0.001	
1032 Manganese	0.05	9511273		SM3113B	0.001	10/26
1050 Silver	0.1			SN3113B		11/02
1055 Sulfate	250	9511273	+	375.4	-0002 1.0	
1095 Zinc	.5	9511273	< 0.001	SM3111B	0.001	
1905 Color, PCU Color Unit	.s	9511273			0	10/19
1920 Odor,(tota odor #)	3	9511273	<b>+</b>	SH2150	1.0	
1925 pH, Lab (6.5-8.5)		9511273 			0.01	/
1930 Total Dis- solved Solids		9511273	866	2540C	0.1	10/24
2905 Foaming ag	ents	9511273	0.16	SM5540C	0.05	
Hydrogen Sulfide				376.1	0.02	10/20

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NG WATER ANALYSIB REPORT
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completed by system or sampler)
$\frac{110.11}{1000000000000000000000000000000$
There do there will shad
acommunity ()Nontransient Noncommunity
Sampler)
Sample Time: 1300
Sample Time: /300
FB-4
FB-4 FLBERG 407 562 1768
TIETON FIEND SUPERV
() Recheck of HCL (->) Rew
( ) Distrib entry of
e Sites-Attach a format for each site
be completed by lab) Attach Analyte Sheet RS#: <u>84252</u> Expiration Date: <u>June Renewal</u> Phone #: <u>813-229-2879</u>
ups Analyzed:
ups Analyzed:
1ab) KNL Sample No. 85985
Group(s) Analyzed:
( ) Tribelomethanes [field Ct. )
( ) Tribelomethanes [field Cl,]
Secondaries Pesticides & PCB's ( ) All 14 ( ) All 30
() Pertial () All except distance
[field p#] () Partial
Group III Unregulateds Rediochemicals ( ) All 11 (V) Single Semple
() All 11 (V) Single Sample () Partial () Otrly Composite"
vide radiomnemical sample dates & locations for each quarter
y that all attached analytical data are
NOV -2 1
Title: Laboratory Hgr. Date:
by State)
Sample Analysis Satisfactory
Reason:
Date Notified

## RADIOCHEMICAL ANALYSIS

## 62-550.310(4)

## (PWS033)

Parameter ID Name	Sample Number	Analysis Result (pCi/l)	Analytical Method	Analysis Error	Analysis Date
4000 Gross Alpha	85985	4.5	EPA 900.0	± 1.7	10-31-95
4100 Gross Beta	85985	15.5	EPA 900.0	± 1.8	10-31-95

Alpha Standard: Th-230 Bets Standard: CS-137

1997 - E.

	I	·	-
	111		
	4	- 1495 Sou	th Volusia Ave. Suite 101
		Orange Cl	ly, Florida 32763
•		904-775-0	144 Fax 904-775-4470
•.	,	•	· · · · · · · · · · · · · · · · · · ·
	LAB FORMAT FOR REPORT	TING DRINKING WATER AN	11 Voe
<b>6</b>	1, -> '	FORMATION ( 10 be completed i	by system or jub)
System Names	t. there Ute		
, Address		•	10. # 4560490
	check one): ( ) Community	() Nontranalent Noncommuni	Phone #
SAMPLE INFORMATION (10 be	completed by sampler)		ty () Noncommunity
Sample Dale (MMDDYY) 0.11	95 Sample Times 1300		
		<u> </u>	•
Bample Location (be specific):			
Bampier Name and Phones	in Dalber		
Sampler's Signatures	h h	1 0/11	
		_ The Field On	Cercison .
Check Type(s): ( ) Distribution ( ) Clearance	() Recheck of MCL	() Resample of Lab Inval	idated formation
( ) Distrib entry pt	() Thm Max Res Time ()Raw		
LABORATORY CERTIFICATION		Composite of Multiple Sites-Attac	h a formul for each sile
LABORATORY CERTIFICATION	INFORMATION (is to complet	ied by lab) — ATTACII IIRS AN	ALYTE SHEET.
the date Entra Canadal, In	n. IIRS#: #2472 Exp	irotion Dates June 31, 1996	•
Address: 1495 S. Volusia Ave., Orange	City Phone #1 904-77		· · · · · · · · · · · · · · · · · · ·
Subcontracted Lab JIRS #: 8426			فسعيدون
		E SHEET FOR SUBCONTRA	CIED LAR TOO .
ANALYSIS INFORMATION ( to be a Date Sample (s) Received: 10.2.3.9	amplefed by Lab) - BAMPLE N	UMBER: - 9510/10	/
	2 Oroup (s) Analyzed & Results a	ttached for compliance with 62-55	OFAC:
( ) Nitrate Only	( ) Nitrite Only	( ) Asbestos Only	-
Inorganics-	Volatile Organole-	•	( ) Trihalomethanas
' () Alt 17 () Partial	() All 21 , () Partial	Secondaries () All 14 () Partial	Pasticide/PCBa-
Group   Unregulateda-	Group II Unregulatede-		() Alt30 ()Partial
() Alt 13 () Partial	() All 23 () Partial	Group #1 Uoregulateda ( ) Ali   1 ( ) Partial	Rediochemicale.
			() Single Sample
· · ·	Provide radioche	unical sample dates & location for	() Qtrly Composite**
L Robert L. Sullivan		at all attacked analytical data as	
Signature Rahes	H L. 00.		* correct.
	monum	<u> </u>	
Tiu. Lat	oratory Manager	_ Delo _11_14_95	<b>5</b>
COMPLIANCE INFORMATION (10 M			· · ·
Bample Collection Setlefactory:	comparies of Mate)	· .	
· · · · · · · · · · · · · · · · · · ·	Bample An	iyale Setlafectory;	<b>`</b>
Resample Requested fors			
Person notified to resamples	······································		
	Dale Notified:		·
DEPITRS Reviewing Official:		•	• • •
<ul> <li>All HRS lab # a and their HRS Analyte 6</li> <li>do so will result in rejection of the analyses</li> </ul>	beet for lobe performing at		• · · ·
do so will result in rejection of the analyses	and possible enforcement opin	erned water analyses must be pr	ovided. Failure to
	-	Effective January 1995	unre to sample.
	1 · · · ·		

ENVIRONMENTAL CERTIFICATION E13325

QA M.AN 910047 C

DRINKING WATER OFFICE

		511700A			CONTINUE FROM
x nultiple tuba Ferr	neficat i ofi	HHO-HUG			
X IND IND					PESIICIDES AND PCS'S
<u></u>		SHOOC			1. INSECTICIDES
X Fecul/E.Coll		\$117000			X ALACHLUR
		AA(TUR)	ICP	OTHER	X ATRAZTHE
FRIMARY INORGANIC	M(FL)	MA( 1 UN 2		•••	X CHLORDANE
1. HETALS		204.2			X EHDRIN
K ANTINONY		206.2			X HEPTACHLOR
X ARSENIC	200.1	CAD'S	200.7		X REPTACHLOR EPOXIDE
X BARIUN -	200.1	210.2	200.7		X LINDANE
Y BERTLEJIM		213.2	200.7		X HETHOXYCHLOR
х сарний	····-	218.2	200.7		X IUXAPHENE
x chronium	·	239.2	••••		X HEXACHLOROBENZENE
X LEAD		237.5		265.1	# NEXACILLOROCYCLOPENTAL
X HEACURY			200.7	-	X SIMAZINE
x HICKEL	749.1	270.2			
X SELEHIUN		<b>4</b> 10.2	200.7		
X SIDIUN	273.1	279.2			2. HEROJCIDES
X THALLTUN		617.5			x 2,4-0
					X PENTACHLOROPHENOL
7. LEAD AND COPPER		239.2			X 2,4,5-1P (BILVEX)
x 1640	229.1	237.4	200.7		X DALAPON X D1HOSED
X CULTER	267.1				x PICLORAH
	E				# FICEONNE
3. HILRATE AND NETATI	E			353.2	
X HITRATE				353.2/354.1	J. CARBAHATES
X HETRETE				353.2	X CARBOFURAN
X TUTAL NOZ-HOS					K OXAHYL (VYDAIE)
4. CTANIDE				335.2	
X CTANIDE	·				4. DISINFECTANE BY-PRODU
					x 1,2-DISRONO-J-CHLORO
5, FLUCRIDE		•		340.2	X ETHATENE DIBUCHIDE
X ILUORIDE					X ETHILENE DISKOULDS
					5. HISCELLANEOUS SOC'S
6. ASBESTOS					
ASBES103					X DIQUAT X ENOUTHALL
	AA(FL)	AACTUR	) 109	OTHER	X GLYPHOSAIE
SECONDARY INORGANIC	202.1	202.2	200.7		x activities
X ALIMINUM	242.1			325.2	6. PC#19
X CHIONIDE				5H2O4A	A DECACHLORDAIPHENTL
x color X coffer	220.1		200.7		
X COFFER		·		540.2 5H512#	
X FOATING AGENIS			7.005	503120	7. ADIPATES AND PHINALA
X LROM	236.1		200.7		X DICZ-ETHYLHEXYL) AD
X HANGANESE	243.1			SH207	R DI(2-ETHYLMENTL) TH
g acon				150.1	
X pH		373 3	200.7		
X SILVER	272.1	272.2	200.1	375.4	
X SULFATE				160.1	A. FAN
X 105			200.7	•	K BENZO( .) PYRENE
¥ EINC	289.1				HELE, FLONDA 32231
ny,1		P.O. 1	JOX 21	0 · JACKSUNV	ILLE, FLOINDA 32231
• • · · ·				LAWION CHILES.	COVERNON
				LAN 1997	

M PREVIOUS PAGE 001

ÇC.

OC/HS BFLC

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507 \_\_\_\_\_ ------507 508 508 ----. 1 208 -----50ā -----208 -----508 505 ITADIENE 307 ······ . 515.1 -----515.1 \_\_\_\_ -----515.1 \_ ----515.1 - -\_ \_\_\_\_ 515.1 ---~-515.1 - -. 531.1 . 551.1 DUCTS/VUC'S OROPROPAHE 504 504 E 1 549 548 \_\_\_\_\_ 347 508 متحصيت وسيعن L LATES 306 ADIPATE PHTRALATE 506 مستعدينا أحسبتين .

LAWION CHILES, GOV

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## SAFE DRINKING WATER ANALYTE SHEET

Page 1

-4

1

	HRS	STAT		LORIDA	)E  -IE A	LTH AND REHABILITAT	1VF 9	RVICI	=5
ы	BORATORY:		<u> </u>			CERTIFICATION NUMBER:	1 V L 31	EPA:	FL8020
M	CROBIOLOGY		METHODS		Supersede	DATE: PREVIOUS ANALYTE SHEET DATED:	JUNE 0, 19		
	mbrane Filler		\$M92228						
Fø	iltipia Tube Feinne cel/E. coli NO-MUC A	ntalion	\$M0221E,{ \$M0228	la); MUQ		PESTICIDES AND PCB B	GC	OC/N	HPLC
	umary Norgan	iC				1. INSECTICIDES			
1.	METALS	AA(FUR)	ICP	ICP/M8	OTHER	_ ALACHLOR _ ATRAZINE _ CHE DEDAME	·		
	TIMONY	6M31138	_ <u></u>		, 	_ CHLORDANE _ ENDRIN			
	RSENIC	BM31138 BM31138			8M3111D	HEPTACHLOR			
-	LINUN ERYLLIUN	900113 <b>0</b>			emailiu	_ LINDANE			
ÇJ	ADMIUM '	SM31138				METHOXYCHLOR			
	HROMIUN EAD	\$M31138 \$M31138	, <u> </u>			_ TOXAPHENE HEXACHLOROBENZENE			
	ERCURY	ama11 <b>38</b>	·		246.1	HEXACHLOROCYCLOPENTADIEN	·		
M	CICEL	SM31138	·		SM31110	SIMAZINE			· ·
	elenium Donum	SM31138		·	8M31118	2. HERBICIDES			
	SALLING	200.5	· • • • • • • • • • • • • • • • • • • •			E. I'LI'LENG'E'E'			
•						_ <b>1.4-D</b>			
2.	LEAD AND COP	7ER				_ PENTÁCHLOROPHENOL _ 2.4.8-TP (SILVEX)			
μ	EAD	SM31138	•			_ Z, G, G-IP (SILVEN) _ DALAPON		·	
_	OPPER	\$M31138			SMOTION	DINOSEB			<u></u>
		10		1		PICLORAM		·	
3.	CYANIDE	IC	196	UV-VIS	OTHER	1. CARBAMATES			
C	YANDE			SHABOOCH	1 <b>B</b>				
4.	NITRATE AND N	TRITE				_ CARBOFURAN _ OXANYL (VYDATE)	-	-	
-	ITRATE			181.1		4. DISINFECTANT BY PRODUCTS	vocrá		
N	TRUTE		·	199.2, 264.	.1		-		
-	OTAL NOZ-NOS		• •	363.2	<u> </u>	_ 1,2-DIBRONO-J-CHLOROPROPÄN _ ETHYLENE DIBROMDE	·		
8.	. Fluoride			,		ë, Miscellaneous soc's			
l F	LUORIDE		_ SNHEOOF C		·				-
	ASBESTOR					_ DIQUAT ENDOYHALL		·	
-		•				GLYPHOBATE			
. 🖊	SHESTOS			·	. <u></u>	8. PCFS			
	ECONDARY NOR	GANIC				5, FVD #			
			د	•••		AROCHLORS	·	•	
		AA(FUR)	ICP	UV-VIS	OTHER	DECACHLOROBIPHENVL		-	
	LUNINUHÍ	8M31130			1M3111D	T. ADIPATES AND PHTHALATES			
C	HLORIDE			· · · · · · · · · · · · · · · · · · ·	SM4500CI-				
	OLOR			BM2129B	8101118	_ DI(2-ETHYLHEXYL) ADIPATE _ DI(2-ETHYLHEXYL) PHTHALATE			•
	COPPER LUORIDE	\$M31158			_ \$344500F C	_ DESTRICTENTLY TO ALL			-
	GAMING AGENTS			SM8840C	-	8. PAH			
	RON	8N31138			_ \$M31110	CONTRACTOR DE LA CONTRACTOR			
-	Kanganese Doort	2M3113D			81421503	_ BENZO(o)PYRENE			
k i K j				-	150.1	DIOXIN			
ĸ	RVER	SM31130			BM3111D	2.1.7.1-TETRACHLORODIBENZO-	DIOVILI		
	BULFATE IDS				378.4	2,3,7,1-TE HAGHLORODIBENZO			-
¥ =					5 M2646C				

HRS-H FORM 1041, MARCH, 98