Contents

Exhibit **Page**

Appendix

Acronyms and Abbreviations

µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
µS	micro Siemens
APT	aquifer performance test
ASR	Aquifer Storage and Recovery
bls	below land surface
cfu/mL	colony forming unit per milliliter
cps	counts per second
cu	color unit
FAC	Florida Administrative Code
FAS	Floridan Aquifer System
FDEP	Florida Department of Environmental Protection
FKAA	Florida Keys Aqueduct Authority
FRP	Fiberglass reinforced pipe
ft	foot/feet
ft^2/d	square feet per day
gpm	gallons per minute
ICU	Intermediate Confining Unit
LPRO	low-pressure reverse osmosis
LSN-SP	long and short normal spontaneous potential
mg/L	milligrams per liter
NTU	nephelometric turbidity units
pCi/L	pico curies per liter
psi	pounds per square inch
SFWMD	South Florida Water Management District
TDS	total dissolved solids
TON	threshold odor number
UIC	Underground Injection Control
WTP	water treatment plant

SECTION 1.0

Introduction

1.1 Background Information

An exploratory well (FKAA-FC-EW-1; EW-1) was constructed in 2003 at the Florida Keys Aqueduct Authority's (FKAA's) J. Robert Dean Water Treatment Plant (WTP) in Florida City. The location of the J. Robert Dean WTP is depicted in Exhibit 1-1. A more detailed site layout is presented in Exhibit 1-2. Data from the test well showed the presence of two potential aquifer storage and recovery (ASR) intervals in the Floridan Aquifer System (FAS). The upper interval, located approximately 880 feet (ft) to 1,150 ft below land surface (bls) includes the Arcadia Formation of the Hawthorn Group and the Suwannee Limestone. Although water production from this interval was relatively poor, with a specific capacity of approximately 6 gallons per minute per foot (gpm/ft) of drawdown, water quality was relatively good. Chloride concentrations were approximately 1,500 milligrams per liter (mg/L), and total dissolved solids (TDS) concentrations were approximately 3,100 mg/L. A deeper interval, from 880 ft to 1,290 ft bls, within the Avon Park Formation, yielded a considerably higher specific capacity of 23 gpm/ft; however, chloride and TDS concentrations were on the order of 2,200 mg/L and 4,700 mg/L, respectively.

Due to recent modifications to the South Florida Water Management District's (SFWMD's) water use permitting rules concerning withdrawals from the Biscayne aquifer and the FKAA's exceedence of its permitted Biscayne aquifer allocation, the FKAA entered into a consent order agreement (Order No. 03-166-CO-WU) with the SFWMD to construct an ASR well. Additionally, the FKAA decided to collect additional data during the drilling of the well to evaluate the ASR well's potential for conversion to a supply well (if necessary) for a future low-pressure reverse-osmosis (LPRO) WTP.

During the course of drilling exploratory well FKAA-FC-EW-1, specific capacity data indicated that the interval in the Hawthorn Group would not provide sufficient capacity for either ASR or RO supply. In order to determine if the capacity of this interval could be improved, the corresponding interval of well FKAA-FC-FA-1 was acidized and retested. Unfortunately, the resulting specific capacity of 7.2 gpm/ft of drawdown was still not sufficient. Due to the lack of success in improving the upper zone's specific capacity and the FKAA's schedule for starting construction on its LPRO WTP; the FKAA decided to drill deeper into the Floridan aquifer and to complete the well as a Floridan aquifer supply well for the future LPRO WTP. The Florida Department of Environmental Protection (FDEP) was formally notified of the decision to abandon the Underground Injection Control (UIC) permit associated with the construction of the ASR well on May 16, 2007. An amendment to Consent Agreement Order No. 03-166-CO-WU (Order No. 2007-583-CO-WU) was approved by the SFWMD Governing Board on September 17, 2007. As a result of this change, the well will be referred to as a supply well (FKAA-FC-FA-1; FA-1) throughout this report, even though a substantial portion of the well was constructed as an ASR well (FKAA-FC-ASR-1; ASR-1) under UIC guidelines.

EXHIBIT 1-1
FKAA WTP Location Map

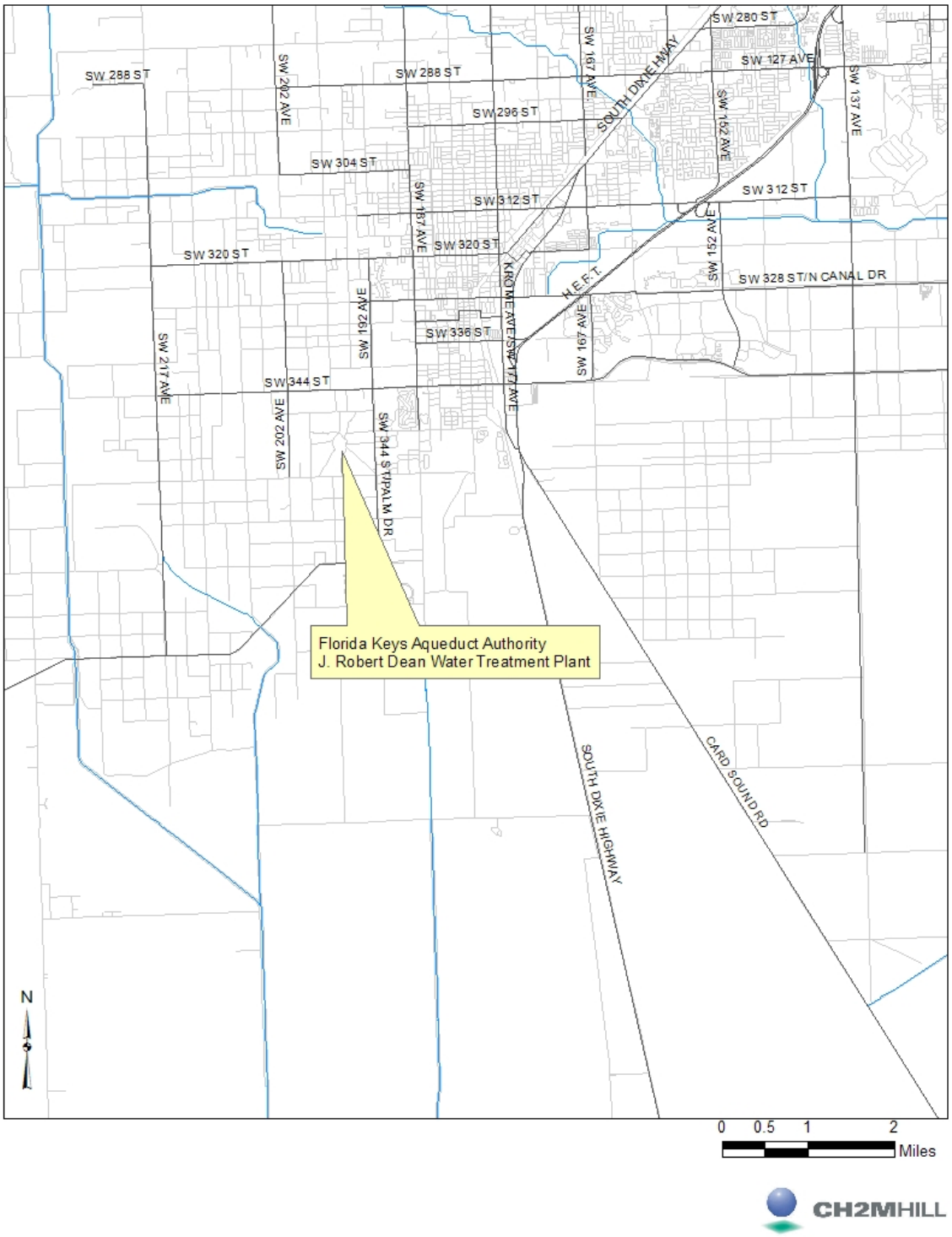
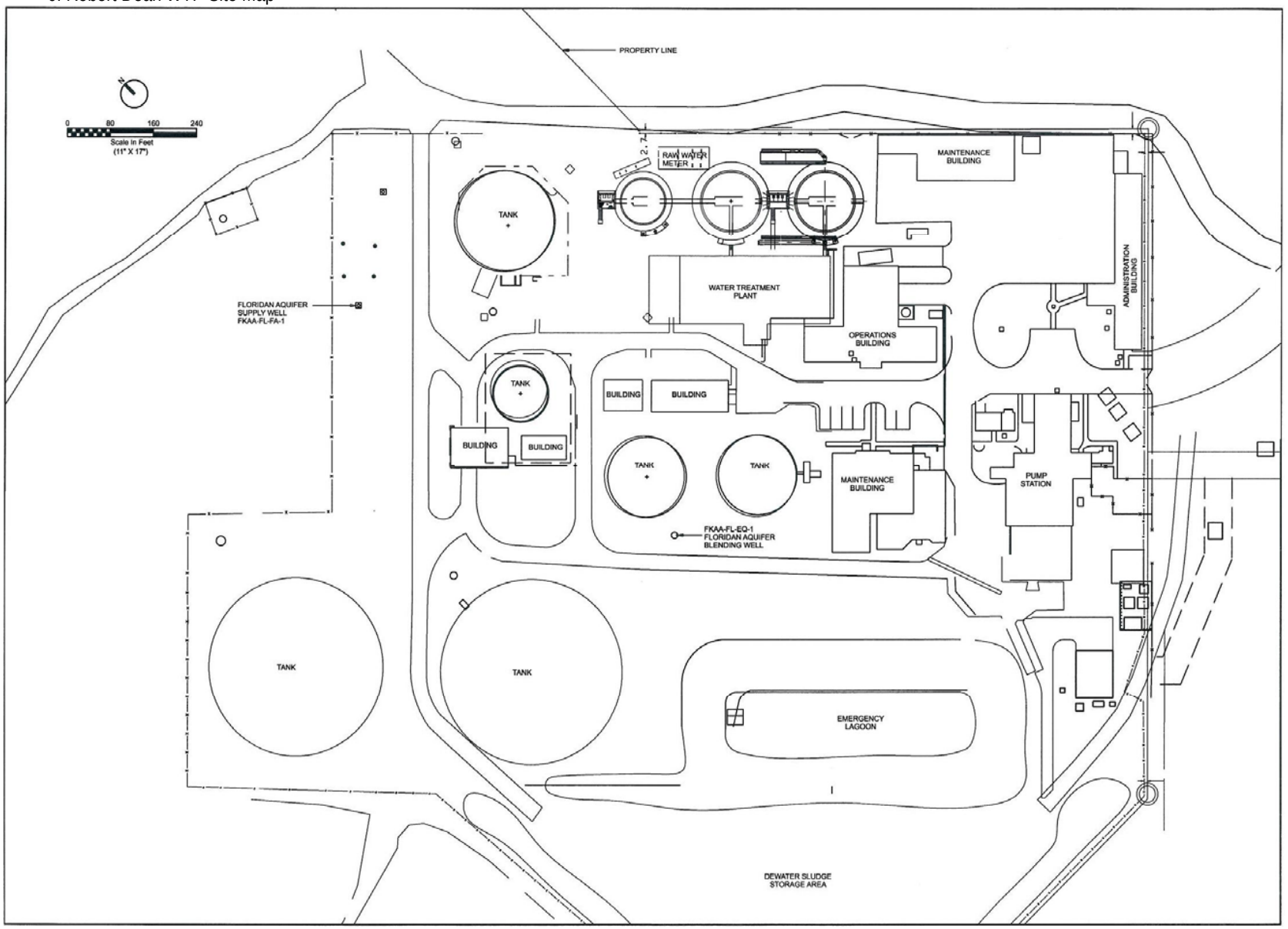


EXHIBIT 1-2
J. Robert Dean WTP Site Map



1.2 Project Description

CH2M HILL, Inc. served as the engineer of record for the design, permitting, and construction activities for supply well FKAA-FC-FA-1. Metro Equipment Services, Inc. (Metro) was selected as the low-bid contractor to construct both the well and surface facilities. Jaffer Associates, Ltd. (Jaffer) was Metro's well-drilling subcontractor.

Portions of the well were constructed in compliance with the guidelines for Class V, Group 7 injection wells as outlined in Section 62-528, Florida Administrative Code (FAC) and in compliance with FDEP Permit 189862-002-UC. A copy of the permit is included as Appendix A.

The well was constructed in accordance with the contract documents *Specifications for the Construction of the Aquifer Storage Recovery Well at the J. Robert Dean Water Treatment Plant* (CH2M HILL, 2005). A tabulated summary of construction activities is presented in Appendix B. Weekly summaries of the construction progress, up to the May 16, 2007 decision to abandon the FDEP UIC permit, are presented in Appendix C. The technical data required by the FDEP permit (for the portions of the well completed under the auspices of the FDEP permit) are presented in Appendixes D through I and are summarized in this report.

SECTION 2.0

Hydrogeology

This section summarizes the hydrogeology encountered during the construction and testing of well FKAA-FC-FA-1. Descriptions of the hydrogeologic information collected during the drilling and testing of the well is presented in Section 3. The information included drill cuttings, geophysical logs, pumping tests, and water quality sampling.

2.1 Geology

The lithology encountered during the drilling of FKAA-FC-FA-1 ranged from Holocene to Eocene and generally corresponded with that described by Fish (1988), Reese (1994), and Reese and Alvarez-Zarikian (2007). Several formation contacts were updated based on the work of Cunningham *et al.* (1998). Starting at land surface, the units identified consisted of the Miami Limestone (Pliestocene), the Fort Thompson Formation (Pleistocene), the Tamiami and/or Long Key Formation (Pliocene), the Hawthorn Group (Miocene), the Suwannee Limestone (Oligocene), and the Avon Park Formation (Middle Eocene).

2.1.1 Pleistocene-Pliocene Series

From land surface to a depth of approximately 130 ft bls, the lithology consists of poorly to well-consolidated sandstone and limestone. Formations that make up the Pleistocene-Pliocene series at this site include the Miami Limestone, the Fort Thompson Formation, and the Tamiami/Long Key Formation. The gamma-ray response in this interval is relatively low (0 to 50 counts per second [cps]), consistent with the low phosphate formations encountered. The base of the Tamiami Formation was identified at 130 ft bls.

2.1.2 Miocene-Late Oligocene

The top of the Hawthorn Group was identified at a depth of 130 ft bls based on the presence of carbonate mud and green clay. The high-phosphate interval between 1,125 ft to 1,180 ft bls is characterized by a regionally correlative spike in natural gamma ray activity associated with the base of the Hawthorn Group (Reese, 1994). The Hawthorn Group is variable in lithology and generally consists of interbedded sand, silt, clay, and limestone, with a characteristically high phosphate content. Scott (1988) upgraded the Hawthorn Formation to group status and described the group members throughout Florida. In this area, the Hawthorn Group is comprised of the Peace River and Arcadia formations. The Peace River Formation consists of interbedded quartz sands, clays, and carbonates. The Arcadia Formation lies disconformably below the Peace River Formation, and consists predominantly of limestone containing varying amounts of quartz sand, clay, and phosphate grains. Much of the Hawthorn Group constitutes what is referred to as the Intermediate Confining Unit (ICU) that confines the FAS.

2.1.3 Early Oligocene

Based on lithologic and geophysical data collected during the drilling of well FKAA-FC-FA-1, the Suwannee Limestone is identified from 1,130 ft to 1,180 ft bls. In general it is described as a yellowish fossiliferous limestone (Cooke and Mansfield, 1936). Cunningham et al. (1998) identified the Suwannee Limestone as a skeletal carbonate, primarily composed of low-magnesium calcite. The Suwannee Limestone is typically characterized by higher natural gamma-ray activity than the over- and underlying formations (Reese, 1994; Reese and Memberg, 2000).

2.1.4 Eocene

Chen (1965) described the Avon Park Formation of late Middle Eocene Series as being light brown to brown, porous, finely fragmental limestone, with abundant *Coskinolina sp.*, *Lituonella sp.*, *Dictyoconus sp.,* and other diagnostic foraminifera, and brown to dark brown, rather porous, very fine to medium crystalline, saccharoidal dolostone. A basal unit of dark brown, nonfossiliferous, crystalline dolostone also exists. The Avon Park Formation typically displays low natural gamma ray activity on the geophysical logs. Neutron logs indicate that the Avon Park Formation exhibits porosities as high as 50 percent that gradually decrease with depth (Reese, 1994). Miller (1986) observed that portions of the Avon Park Formation are fine-grained and have low permeability, thereby acting as an intra-aquifer confining unit within the FAS. At the FKAA WTP site, the Avon Park was identified from a depth of approximately 1,180 ft to 1,500 ft bls.

2.2 Hydrogeology

2.2.1 Surficial Aquifer System

The Surficial Aquifer System (SAS) was identified from land surface to approximately 130 ft bls using drill cuttings and geophysical logs. The lithology of the SAS at this location is a mixture of poorly to well-consolidated sandy limestone, shelly limestone, and quartz sand. The highly transmissive portion of the SAS that extends from land surface to a depth of approximately 80 ft bls is known as the Biscayne Aquifer (Fish, 1990). Two wells at the FKAA J. Robert Dean WTP (FKAA-FC-EW-1 and FKAA-FC-FA-1) encountered approximately 30 ft of greenish clay at depths of 130 ft bls. This serves as a confining unit beneath the SAS. Below this clay, the lithology grades into a calcareous siltstone. The SAS is Pleistocene and Pliocene Series and includes the Miami Limestone, the Fort Thompson Formation, and the vertically contiguous permeable beds of the Tamiami Formation. This depth is consistent with the hydrogeological framework developed by Fish (1990).

2.2.2 Intermediate Confining Unit

The Miocene Series Hawthorn Group the primary interval of confinement and low permeability between the SAS and the FAS. The Hawthorn Group sediments occur from approximately 130 ft to 1,125 ft bls and consist of dense, phosphatic, olive-colored clay and silt along with limestone and shell fragments. These low-permeability layers serve as a confining unit between the SAS and the FAS, which lies beneath the ICU.

2.2.3 Floridan Aquifer System

The FAS is found below the ICU. For this report, the lower Hawthorn producing zone located from 880 ft to approximately 960 ft bls is considered to be a part of the FAS. The Upper FAS includes the Suwannee Limestone and Avon Park Formation and is known to be present to at least 1,500 ft bls, the total depth of well FKAA-FC-EW-1.

SECTION 3.0

Construction Phase

This section describes the drilling and construction activities associated with Floridan aquifer supply well FKAA-FC-FA-1 at the FKAA's J. Robert Dean WTP. Construction of the well, including the installation of a concrete pad, was completed in July 2007.

3.1 Site Preparation

3.1.1 Containment Pad Construction and Biscayne Aquifer Monitor Wells

A temporary concrete drilling pad was constructed prior to the start of drilling. Four Biscayne aquifer monitor wells were installed to allow monitoring of shallow groundwater per the FDEP UIC permit. A typical surficial aquifer well construction diagram is provided as Exhibit 3-1. The location of each monitor well corresponded approximately to the corners of the temporary concrete drilling pad. Prior to the start of drilling, background samples were collected. During drilling operations, the wells were sampled weekly and field analyzed for TDS, conductivity, chlorides, and temperature. Results from the weekly water quality sampling at the Biscayne aquifer monitor wells are provided in Appendix D.

3.2 ASR-Well Construction

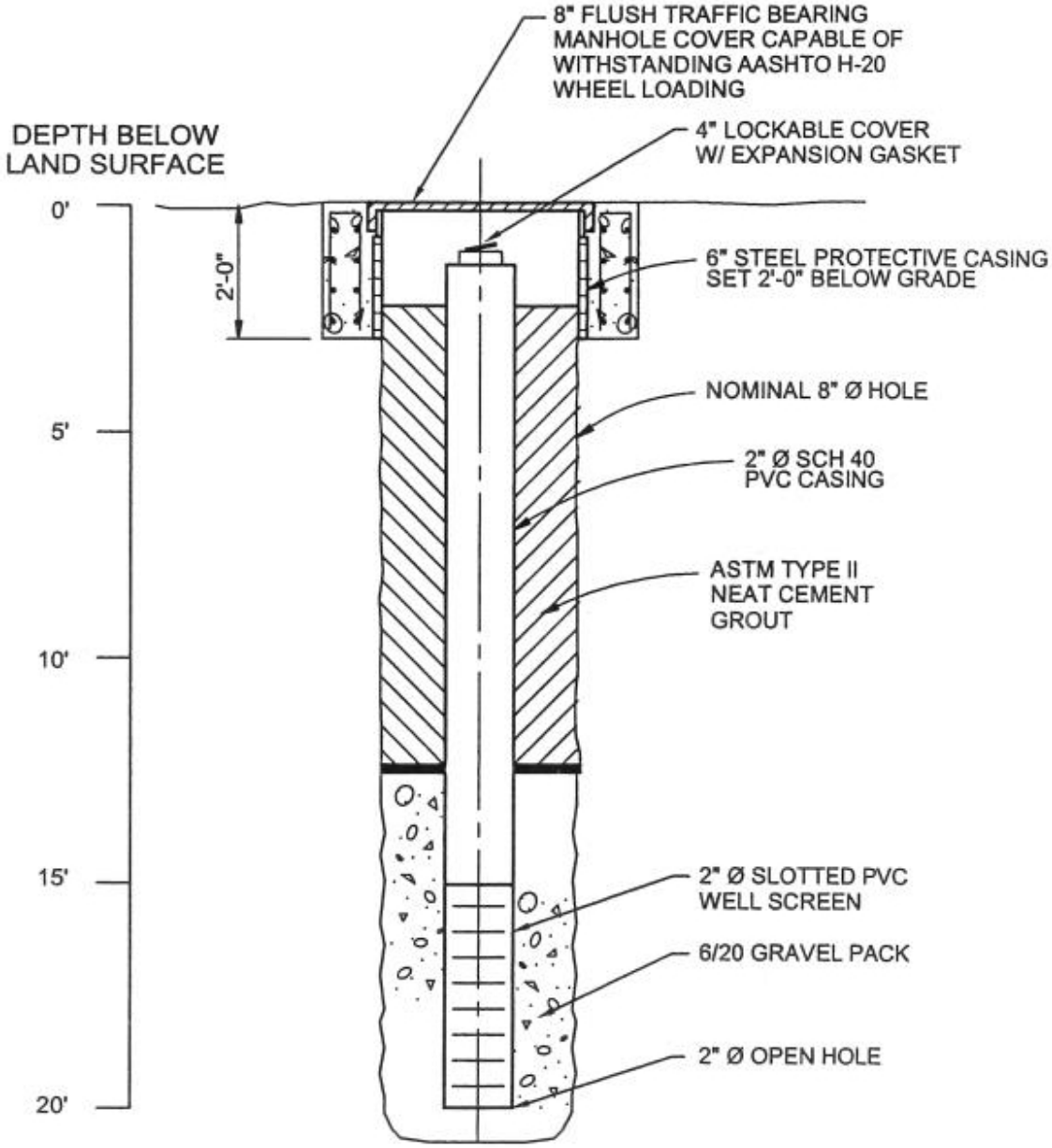
Construction of the ASR well was completed in five steps:

- Installation of the 38-inch-diameter steel casing through the water producing intervals (Miami Limestone and fossiliferous sediments) of the SAS into the clay at the top of the Tamiami Formation at a depth of 180 ft bls.
- Installation of the 24-inch-diameter fiberglass reinforced pipe (FRP) casing through the low-permeability confining sediments of the Hawthorn Group to a depth of 880 ft bls
- Drilling of a 12.25-inch pilot hole to a depth of 1,150 ft bls
- Acidization of the interval from 880 ft to 1,150 ft bls
- Drilling of a 12.25-inch pilot hole to a depth of 1,300 ft bls

A well completion diagram is provided in Exhibit 3-2.

The following subsections describe the drilling and installation methods used to complete construction of the ASR well. Summaries of the construction activities and weekly construction reports are provided in Appendixes B and C, respectively. A drilling time analysis is provided as Exhibit 3-3.

EXHIBIT 3-1
Typical Pad Monitor Well



3.2.1 General Drilling Methods

The ASR well was drilled using the mud rotary method from land surface to a depth of 880 ft bls and the reverse-air rotary drilling method from 880 ft to 1,300 ft bls.

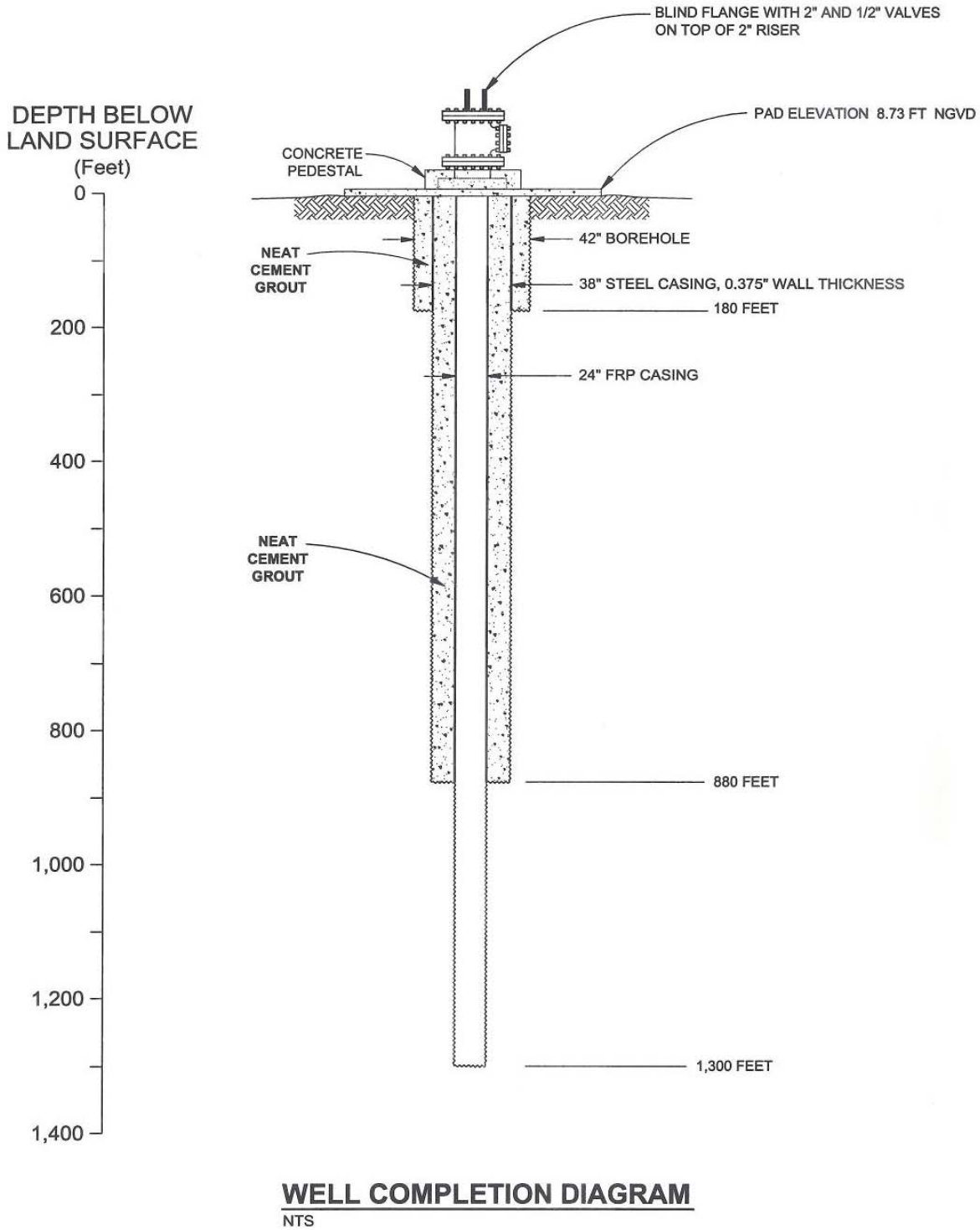
3.2.2 Drilling and Testing to Determine Setting Depth for the 38-inch-diameter Steel Casing

A 12.25-inch-diameter pilot hole was drilled to a depth of 210 ft bls and geophysical logging was conducted. The logs conducted were the caliper, natural gamma ray, and dual induction with spontaneous potential. Copies of these geophysical logs can be found in Appendix E. After evaluating the logs, a setting depth of 180 ft bls was selected for the 38-inch casing. The pilot hole was reamed to a nominal 44 inches in diameter to a depth of 199 ft. Upon completion of the reaming, a caliper geophysical log was conducted and the 38 inch casing was installed. A copy of the casing mill certificate can be found in Appendix F. The casing was cemented to land surface in 2 stages using neat cement. A record of the casing installation and grouting can be found in Appendix F.

3.2.3 Drilling and Testing to Determine Setting Depth for the 24-inch-diameter FRP Casing

A 12.25-inch-diameter pilot hole was drilled to a depth of 900 ft bls and followed by the performance of geophysical logging. The logs conducted were the caliper, natural gamma ray, dual induction with spontaneous potential, and borehole compensated sonic with variable density. Copies of these geophysical logs can be found in Appendix E. After evaluating the logs, a setting depth for the 24-inch FRP casing of 880 ft bls was submitted to the FDEP UIC Program for approval. This depth isolated the non-productive portions of the Hawthorn Group and allowed for the potential use of the lower Hawthorn (Upper FAS) producing zone as an ASR/supply interval. The pilot hole was reamed to a nominal 38 inches in diameter to a depth of 885 ft bls. Upon completion of the reaming, a caliper geophysical log was conducted and the 24-inch casing was installed. A copy of the inspection certificate for the 24-inch FRP casing can be found in Appendix F. The casing was cemented to land surface in four stages using neat cement and 4 percent bentonite cement. A record of the casing installation and grouting can be found in Appendix F. Upon completion of the cementing of the casing, multiple attempts were made to conduct a casing pressure test. A successful casing pressure test was conducted on October 18, 2006. During the one-hour test, 1.5 pounds per square inch (psi)—equivalent to 1.5 percent-- of the initial pressure of 100 psi were lost. The test was witnessed by Mr. Len Fishkin and Mr. Robert Fishkin of FDEP and by Mr. Mark Schilling of CH2M HILL. A copy of the pressure test log and pressure gauge calibration certificate can be found in Appendix G.

EXHIBIT 3-2
FKAA-FC-FA-1 Well Completion Diagram



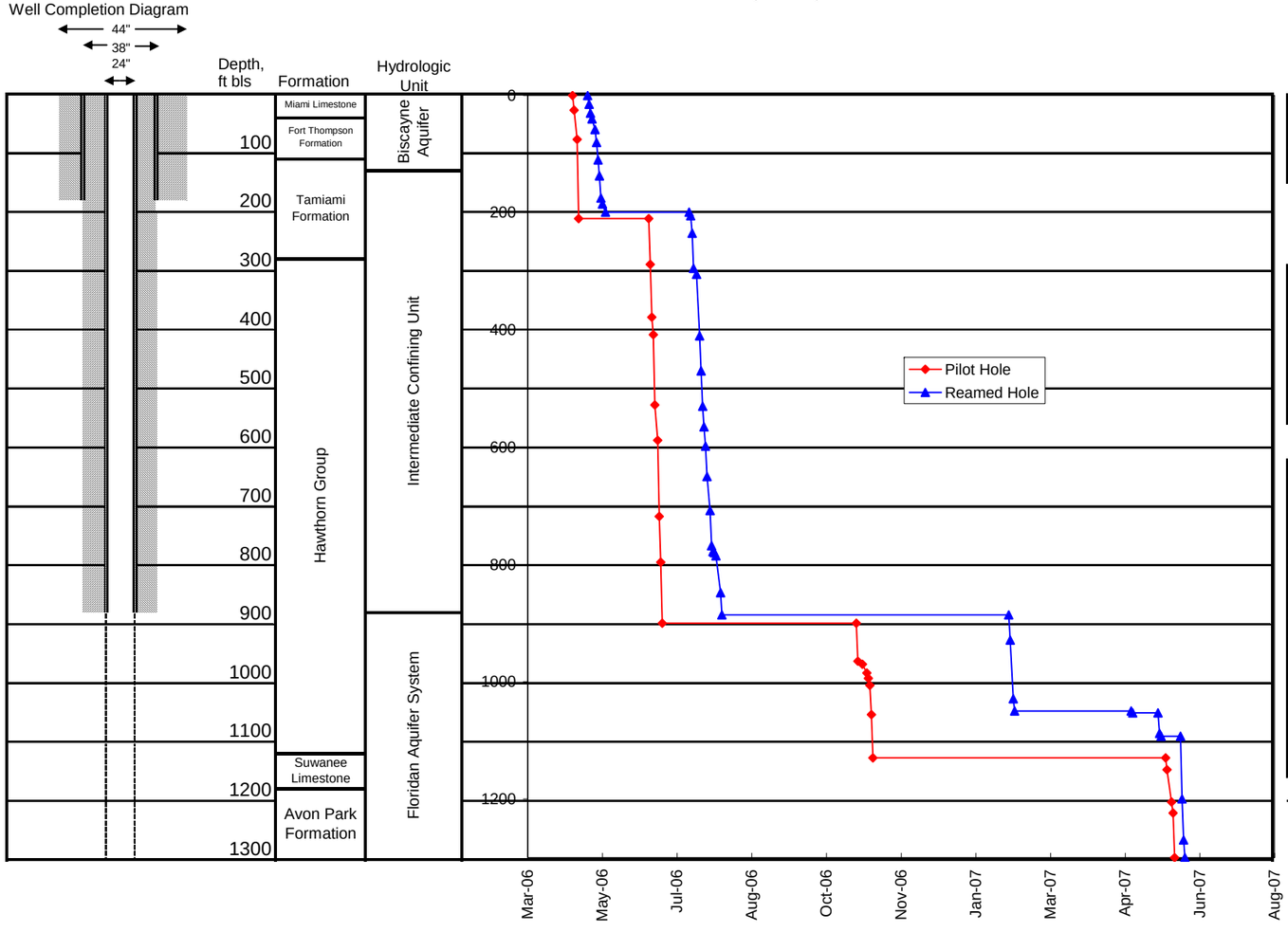
WELL COMPLETION DIAGRAM
NTS

EXHIBIT 3-3
Drilling Time Analysis

Well: FKAA-FC-FA-1
Owner: Florida Keys Aqueduct Authority
Engineer: CH2M HILL
Driller: Jaffer Associates Corp.

Start Drilling: 4/24/2006
Finish: 6/7/2007
Days Drilling: 409 days
Total Depth: 1300 ft
Average Drilling Rate: 3 ft/d

Well Completion Diagram



Casing Information

Diameter, inches	Thicknes, inches	Material
38	0.375	Steel
24	0.61	FRP

Cementing Summary

Casing Size, Inches	Hole Size, Inches	Stage	Volume Yards	Cement Type
38	42	1	12.5	Neat
38	42	2	8.5	Neat
24	38	1	12.5	Neat
24	38	2	5	Neat
24	38	3	35	Neat
24	38	4	19	Neat

Bit and Reamer Summary

Operation	Diameter, Inches	From	To	Footage
Drill	12.25	0	180	180
Ream	44	0	180	180
Drill	12.25	180	880	700
Ream	38	180	880	700
Drill	12.25	880	1300	420
Ream	24	880	1300	420

Geophysical Logging Summary

Date	Interval ft bls	Caliper	G	DI	SP	Temp.	Video	FRT	MD	CDN-L	SG	BCSP
5/1/06	0 - 211	X	X	X								
5/19/06	0 - 202	X	X									
6/10/06						X						
7/10/06	0 - 900	X	X	X	X							X
8/7/06	0 - 888	X	X									
8/16/06	0 - 889	X	X									
8/18/06						X						
8/19/06						X						
8/22/06						X						
8/23/06						X						
12/5/06	0 - 1130	X	X	X	X			X	X			X
12/7/06	0 - 1130						X					
12/14/06	0 - 1130									X	X	
06/02/07	0 -1300	X	X	X	X		X	X				X
08/20/07	0 - 1300	X	X				X	X				

G	Natural gamma	FRT	Fluid resistivity and temperature
DI	Dual induction	MD	Magnetic deviation
SP	Spontaneous Potential	CDN-L	Compensated neutron density and litholog
Temp.	Temperature	SG	Spectral gamma
BCSP	Borehole Compensated Sonic Porosity		

3.2.4 Drilling and Testing of the Proposed Upper Interval Storage Zone

Upon completion of the casing pressure test, a 12.25-inch pilot hole was drilled to a depth of 1,130 ft bls and geophysical logging was conducted. Geophysical logging of this interval included caliper, natural gamma ray, dual induction, spontaneous potential, fluid resistivity, temperature, magnetic deviation, compensated density neutron, digital borehole televiewer, spectral gamma, and video. Copies of these geophysical logs can be found in Appendix E. After evaluating the logs, three packer test intervals were selected: 1,045 ft to 1,130 ft bls; 880 ft to 1,040 ft bls; and 880 ft to 1,000 ft bls. The results of the packer tests are discussed in Section 4, Hydrologic Testing.

The packer testing results indicated that the interval above 1,130 ft bls did not have sufficient specific capacity for either ASR storage or RO supply. After reaming the borehole to a diameter of 24 inches and a depth of 1,050 ft bls, the borehole was acidized with 5,000 gallons of 28 percent hydrochloric acid was placed at a depth of 975 ft bls in an attempt to increase the yield of this interval. A review of a video log indicated the presence of multiple fractures, and it was believed that the injection of hydrochloric acid would dissolve the limestone, further widening the fractures and increasing the secondary permeability (and thus the water yield), of the formation.

After the removal and neutralization of the spent acid, a step drawdown test was conducted to evaluate the results of the upper zone (Hawthorn Group/Suwannee Limestone) acidization. The results of the step drawdown testing indicated that there was only a marginal increase in the specific capacity after acidization and that this interval would not be suitable for either ASR or RO supply. By this time, the FKAA had decided to utilize RO rather than ASR for its future water supply needs and, consequently, the well was drilled deeper into the Floridan aquifer for use as a RO supply well.

3.2.5 Drilling and Testing of the RO Supply Interval

A 12.25-inch pilot hole was then advanced to a depth of 1,300 ft bls. Geophysical logging conducted on the borehole included caliper, natural gamma, dual induction, spontaneous potential, borehole-compensated sonic porosity, temperature, fluid resistivity, and a video survey. Copies of the geophysical logs can be found in Appendix E. After logging, the pilot hole was reamed to a nominal 24 inches in diameter to the same depth of 1,300 ft bls. Upon completion of the reaming, a step drawdown test and an aquifer performance test (APT) were conducted. The results of both these tests are discussed further in Section 4, Hydrologic Testing.

SECTION 4.0

Hydrologic Testing

4.1 Formation Sampling

During the drilling operation and in accordance with the UIC permit, formation samples were collected at 10-foot intervals to a depth of 780 ft bls and at 5-ft intervals from 780 ft to the total depth of the well. Cuttings were collected from the drilling mud, or water, as it circulated out of the borehole and on to the shale shakers (a screened area used to separate the fluid from the cuttings). The cuttings were collected in cloth bags, labeled, and characterized for rock type, color, consolidation, hardness, and fossils. A complete lithologic description of the cuttings is presented in Appendix H.

4.2 Geophysical Logging

Geophysical logs were completed during the drilling of the well to identify hydrostratigraphic features and to obtain information about the condition of the borehole to aid in the construction of the well. It is particularly important to understand borehole conditions prior to setting casing. Logs included: caliper, natural gamma ray, long and short normal spontaneous potential (LSN-SP), dual-induction, and borehole compensated sonic logs. Digital borehole televiewer, compensated density neutron, and spectral gamma ray logs were also performed. In addition, caliper logs, temperature, and cement bond logs were used to evaluate cement placement around the casings. A magnetic deviation log was completed to verify borehole alignment. During construction of the well, fluid resistivity, and video survey logs were completed. A summary of all geophysical logs performed is provided in Exhibit 4-1. Exhibit 4-2 contains data for all geophysical logs run on the un-cased borehole excluding video and borehole televiewer logs. Copies of all geophysical logs are presented in Appendix E.

4.3 Pumping Tests

4.3.1 Packer Testing

Three packer tests were conducted during the drilling of the well. The intervals were selected to assess water quality and hydraulic parameters for the proposed storage zone and potential confining units below the proposed storage zone. The first packer test was conducted on the interval from 1,045 ft to 1,130 ft bls. This corresponds with a low-permeability zone below the proposed storage interval. A second packer test was conducted on the open interval from the base of the 24-inch casing at 880 ft bls, to a depth of 1,040 ft bls. This interval was selected to represent the proposed upper storage interval. The third packer test was conducted on the upper portion of the open interval, from 880 ft to 1,000 ft bls. The purpose of this test was to evaluate the water production and water quality characteristics immediately below the base of the casing.

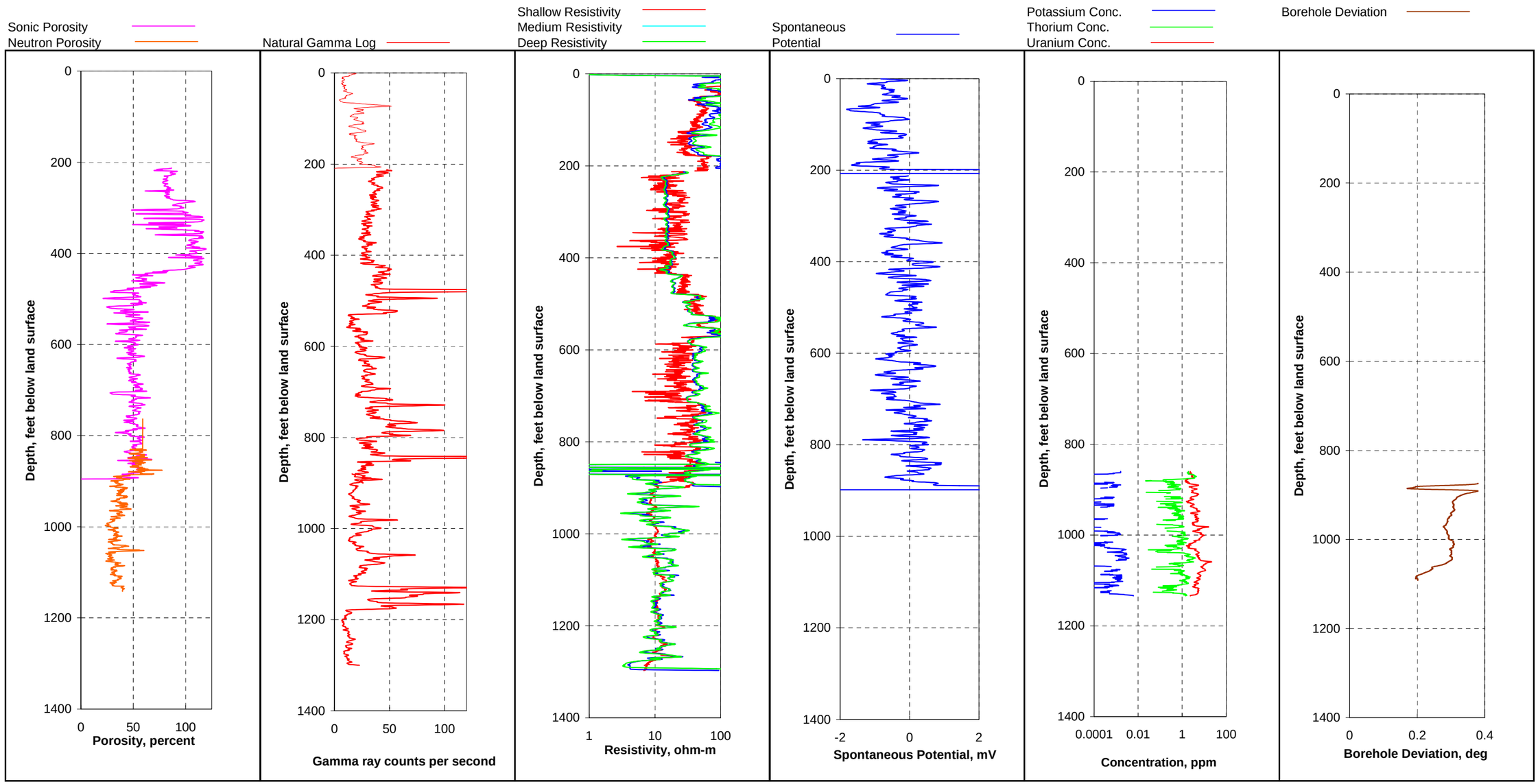
EXHIBIT 4-1
Geophysical Logging Summary

Logging Run	Date	Well Progress and Casing Depth	Logged Interval (ft bls)	Type of Log	Purpose
1	5/1/06	12.25-inch pilot hole to 211 ft bls	0 – 211	Caliper Gamma Dual-induction	Stratigraphic correlation
2	5/19/06	44-inch reamed borehole	0 – 202	Caliper Gamma	Evaluate borehole prior to setting 38-inch SAS casing
3	6/10/06	38-inch casing		Temperature	Estimate top of cement
4	7/10/06	12.25-inch pilot hole to 900 ft bls	0 – 900	Caliper Gamma Dual-induction Sonic porosity	Stratigraphic correlation; evaluate formation porosity
5	8/7/06	38-inch reamed borehole to 888 ft	0 – 888	Caliper Gamma	Evaluate borehole prior to installation of 24-inch FRP casing
6	8/16/06	38-inch reamed borehole to 888 ft	0 – 889	Caliper Gamma	Evaluate borehole prior to installation of 24-inch FRP casing; log re-run due to previous failed casing installation attempt
7	8/18/06	24-inch casing to 880 ft bls		Temperature	Estimate top of 1st stage of cement
8	8/19/06	24-inch casing to 880 ft bls		Temperature	Estimate top of 2nd stage of cement
9	8/22/06	24-inch casing to 880 ft bls		Temperature	Estimate top of 3rd stage of cement
10	8/23/06	24-inch casing to 880 ft bls		Temperature	Estimate top of 4th stage of cement
11	12/5/06	12.25-inch pilot hole to 1,130 ft bls	0 – 1,130	Static fluid resistivity and temperature Caliper Sonic porosity, Magnetic deviation, Dual-induction	Evaluate water quality and formation properties
12	12/7/06	12.25-inch pilot hole to 1,130 ft bls	0 – 1,130	Video	Visual record of the well
13	12/14/06	12.25-inch pilot hole to 1,130 ft bls	0 – 1,130	Compensated density neutron, spectral gamma, borehole televiewer, deviation	Evaluate formation properties and mineralogy for SFWMD regional study

EXHIBIT 4-1
Geophysical Logging Summary

Logging Run	Date	Well Progress and Casing Depth	Logged Interval (ft bls)	Type of Log	Purpose
14	6/2/07	24-inch reamed hole to 1,060 ft bls; 12.25-inch pilot hole to 1,300 ft bls	0 – 1,300	Caliper Gamma Dual induction Spontaneous potential Borehole compensated sonic Temperature (static) Fluid resistivity (static) Video survey	Evaluate water quality and formation properties
15	8/20/07	24-inch reamed hole to 1,300 ft bls	0 – 1,300	Caliper Gamma Static fluid resistivity and Temperature Video	Evaluate water quality and formation properties; visual record of the well

EXHIBIT 4-2
Geophysical Logs



Each packer test was conducted by isolating the tested interval with inflatable packers. Water levels were monitored in the pumped interval and the annulus with In-Situ Mini Trolls. Each interval was then pumped until the water level and field-measured water quality parameters (conductivity, chloride, and pH) had stabilized.

At the conclusion of pumping, the packer remained inflated while water level recovery data were collected. Recovery data from each packer test were evaluated using the Theis (1935) method of to calculate transmissivity. Exhibit 4-3 summarizes the hydraulic results of the packer testing.

EXHIBIT 4-3
Packer Testing Transmissivities

Date	Packer Test	Interval Tested (ft bls)	Pumping Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/ft)	Specific Capacity / ft tested	Calculated Transmissivity
1/10/07	1	1,045 – 1,130	50	126	0.4	0.0047	75 ft^2/d
2/3/07	2	880 – 1,040	920	131	7.0	0.04	549 ft^2/d
2/7/07	3	880 – 1,000	571	172	3.3	0.03	187 ft^2/d

Note: ft^2/d = square feet per day

Water quality samples taken at the conclusion of each packer test were sent for laboratory analysis; the results are included in Appendix I. Exhibit 4-4 summarizes the water quality result for each packer test.

EXHIBIT 4-4
Water Quality Results from Packer Testing

	Packer Test 1 1,045 – 1,130 ft bls		Packer Test 2 880 – 1,040 ft bls		Packer Test 3 880 – 1,000 ft bls		
Parameter	Result	Code	Result	Code	Result	Code	Units
Metals							
Arsenic, Total	0.0043	U	0.0043	U	0.0043	U	mg/L
Barium, Total	0.012	I	0.0054	I	0.0040	I	mg/L
Cadmium, Total	0.0013	U					mg/L
Calcium, Total	68	J	0.0013	U	0.0013	U	mg/L
Chromium, Total	0.0012	U	0.0012	U	0.0012	U	mg/L
Iron, Total	1.4	V	0.064	V	0.027	I	mg/L
Lead, Total	0.0044	U	0.0044	U	0.0044	U	mg/L
Magnesium, Total	80	J,V	60		52		mg/L
Mercury, Total			0.000060	U,J	0.000060	U,J	mg/L
Potassium, Total	74	J	63		47		mg/L
Selenium, Total	0.0037	J,U	0.0037	U	0.0037	U	mg/L
Silver, Total	0.00057	U	0.00057	U	0.00057	U	mg/L
Sodium, Total	800	J	670		470		mg/L

EXHIBIT 4-4
Water Quality Results from Packer Testing

Parameter	Packer Test 1 1,045 – 1,130 ft bls Result	Code	Packer Test 2 880 – 1,040 ft bls Result	Code	Packer Test 3 880 – 1,000 ft bls Result	Code	Units
Inorganic Water Quality Parameters							
Bicarbonate Alkalinity	210		320		350		mg/L
Carbonate Alkalinity	5		5.0		5.0	U	mg/L
Chloride	1100	U	560		180		mg/L
Conductivity	3870		2620		3530		μmhos/cm
pH	7.71		7.60		7.61		
Solids, Total Dissolved	2800		2400		1700		mg/L
Sulfate	990		880		370		mg/L

Notes:
U = not detected
I = Value is between the reporting value and the detection limit
J = estimated value
V = parameter detected in both the sample and the method blank
mg/L = milligrams per liter
μmhos/cm = micromhos per centimeter

Exhibit 4-5 depicts the observed water levels in the test interval (1,045 ft – 1,130 ft bls) during Packer Test 1.

EXHIBIT 4-5
Observed Water Levels during Packer Test 1

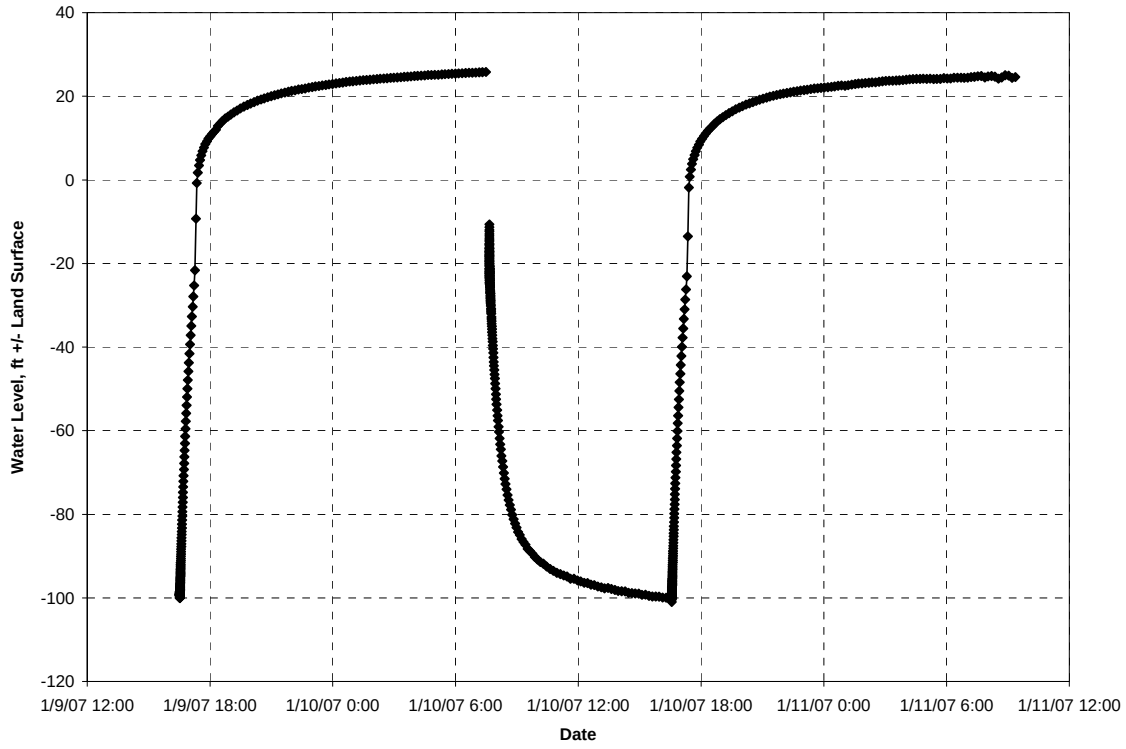


Exhibit 4-6 depicts the residual drawdown (recovery) analysis of the data collected during Packer Test 1 recovery.

EXHIBIT 4-6
Observed Water Levels during Packer Test 1 Recovery

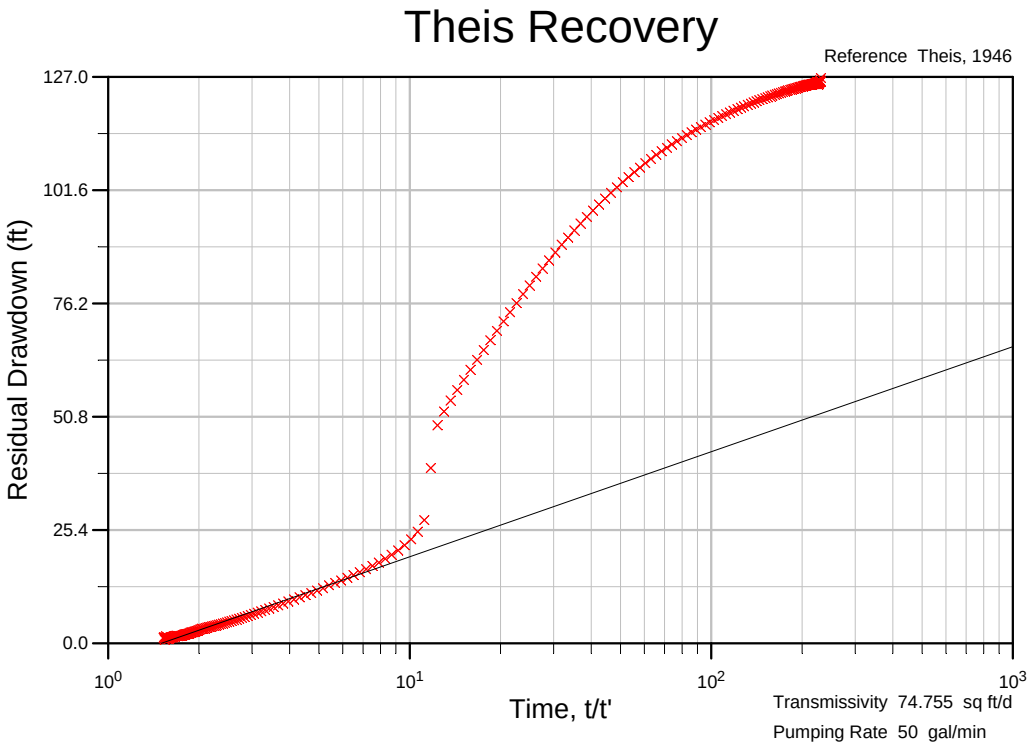


Exhibit 4-7 depicts water levels observed during Packer Test 2.

EXHIBIT 4-7
Observed Water Levels during Packer Test 2

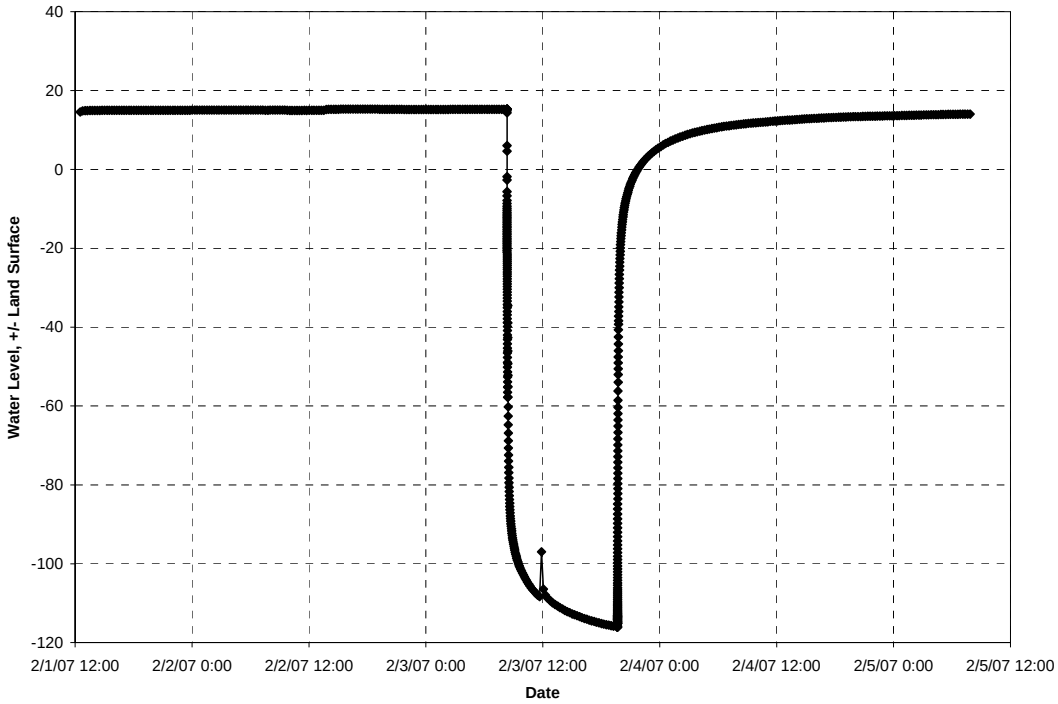


Exhibit 4-8 depicts the analysis of recovery data from Packer Test 2.

EXHIBIT 4-8
Recovery Data from Packer Test 2

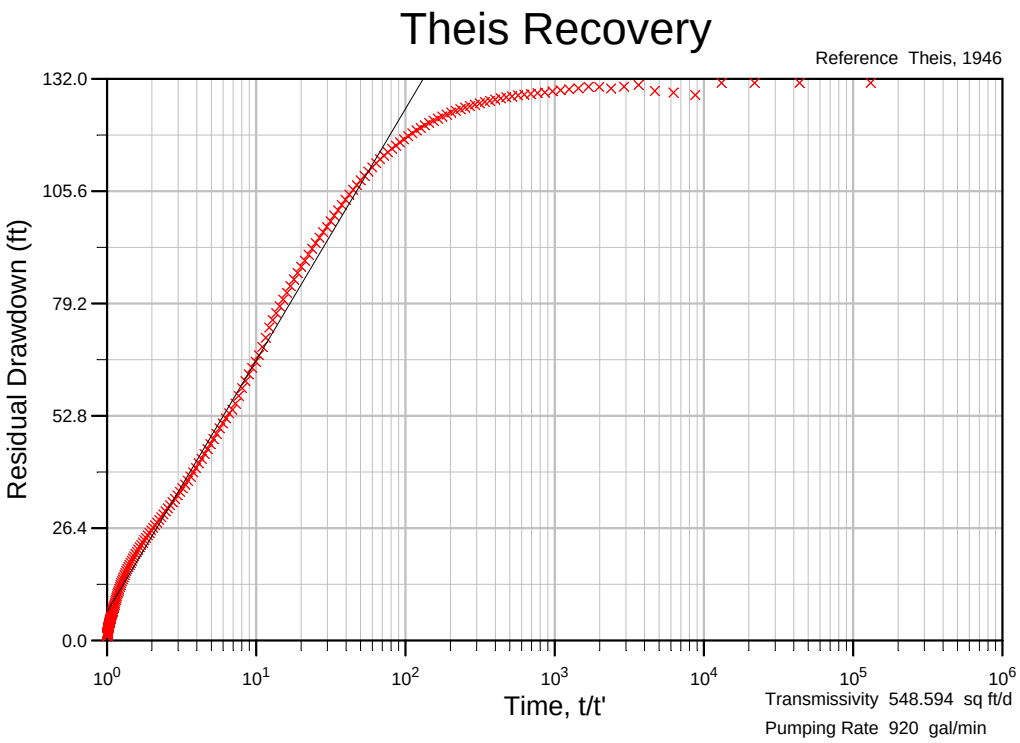


Exhibit 4-9 depicts water levels from Packer Test 3.

EXHIBIT 4-9
Observed Water Levels during Packer Test 3

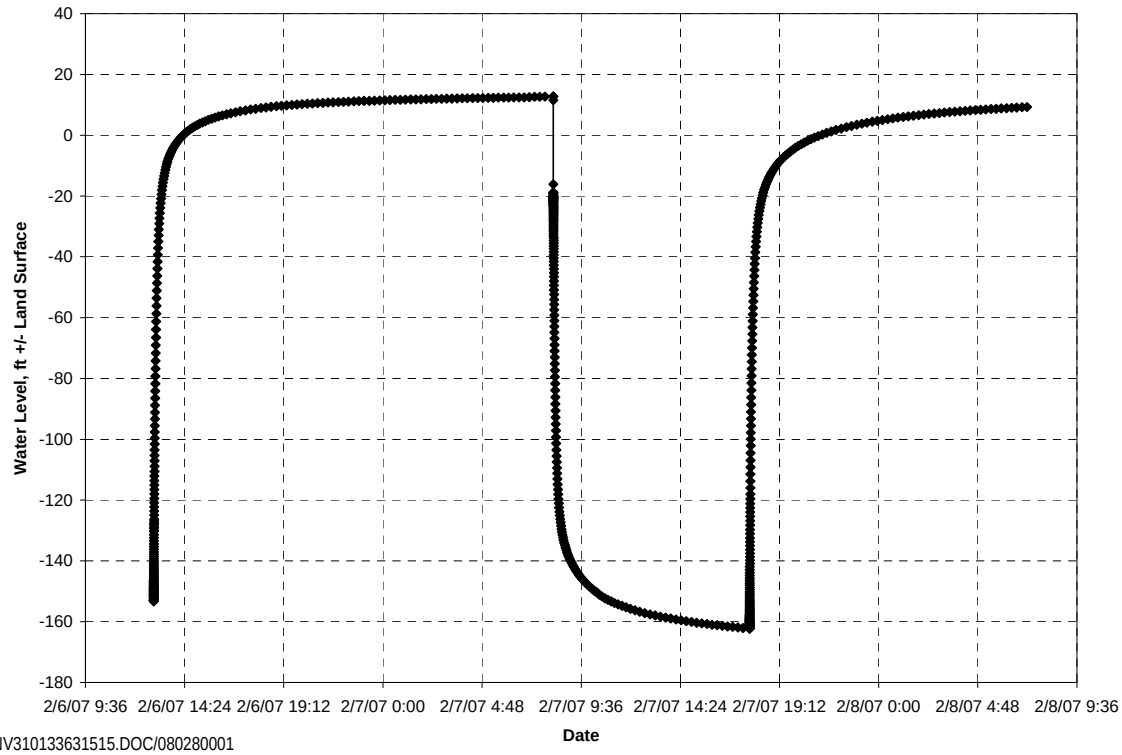
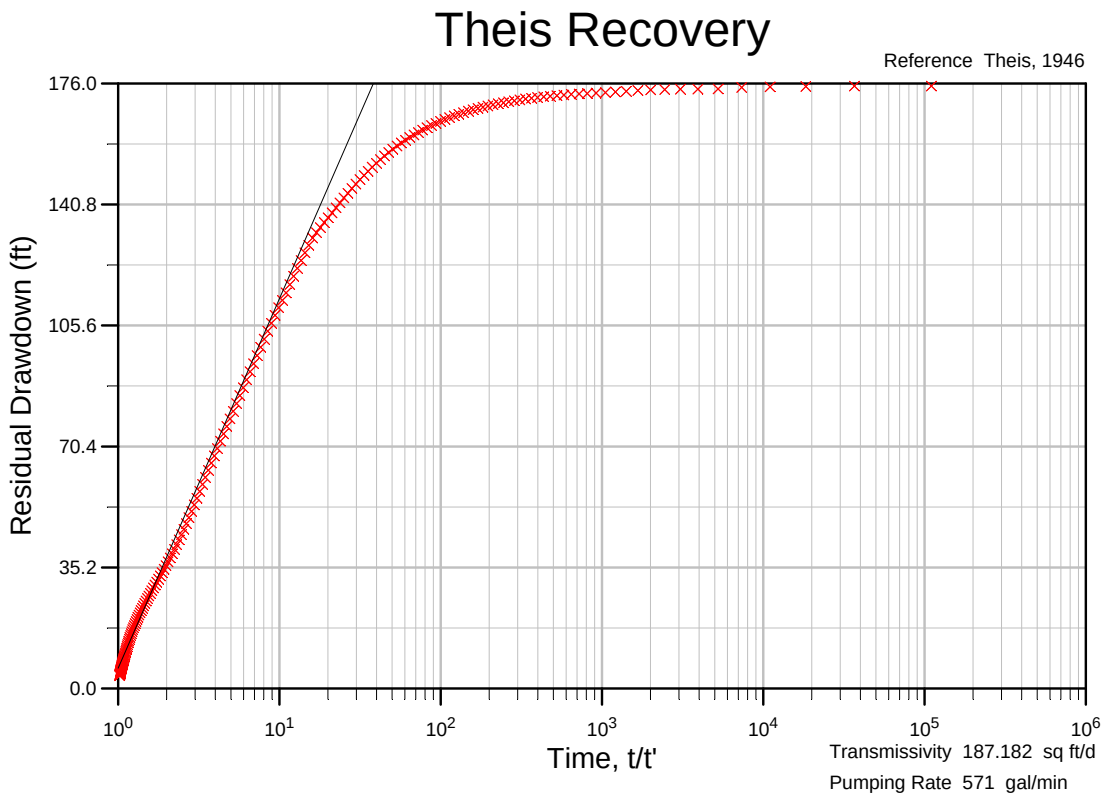


Exhibit 4-10 depicts the analysis of recovery data from Packer Test 3.

EXHIBIT 4-10
Recovery Data from Packer Test 3



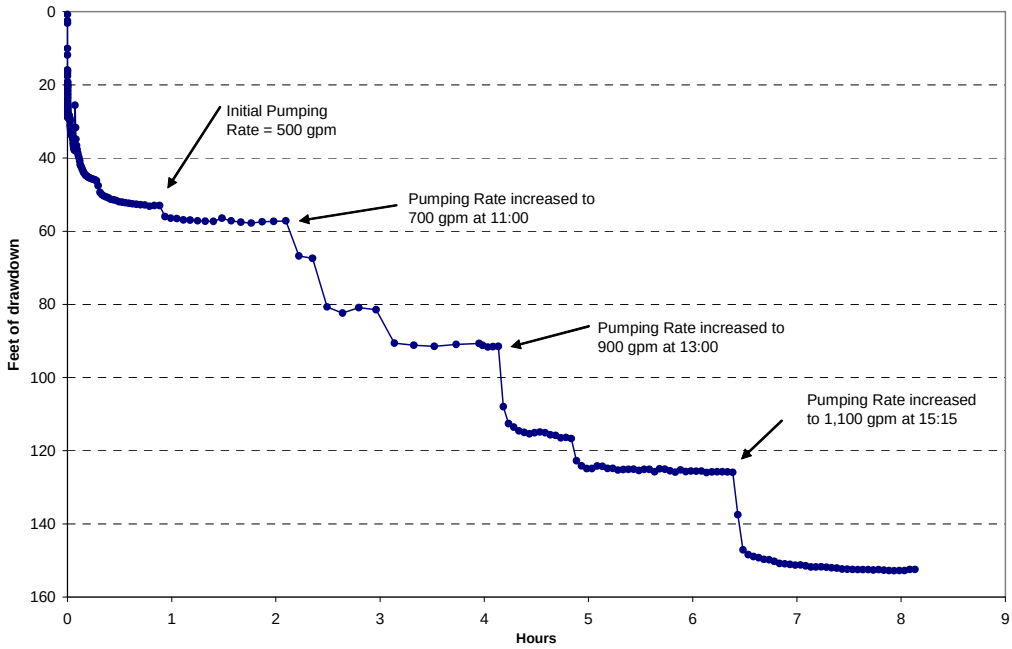
Pumping and water-quality data from the three packer tests indicate that the interval immediately below the base of the casing (880 ft to 1,000 ft bls) has better water quality than the other two intervals tested; however, it has a relatively low transmissivity (187 ft^2/d) and is not a viable source of water for the FKAA's needs. When the test zone is expanded to include another 40 feet (880 ft to 1,040 ft bls), the transmissivity of the formation increases to 549 ft^2/d; however, the quality of the water is significantly worse. This indicates the presence of a flow zone between 1,000 ft and 1.040 ft bls. A packer test conducted below this flow zone on the interval between 1,045 ft to 1,130 ft bls had the poorest water quality and the lowest transmissivity (75 ft^2/d), indicating that this is not a suitable zone for water supply.

4.3.2 Development Pumping Test

Following the acidization of the borehole from 880 ft to 1,050 ft bls, spent acid was removed from the borehole and neutralized; and the well was developed with a high-capacity vertical turbine pump. A water-level transducer was placed in the well to take advantage of this opportunity to collect additional data on the well performance. The pumping rate was increased from 500 gpm to approximately 1,100 gpm in approximately 200 gpm increments every two hours over an 8-hour period.

Exhibit 4-11 depicts the observed water level during the development step drawdown test. Minor fluctuations in water level are due to small variations in the discharge rate.

EXHIBIT 4-11
Water Levels during Post-Acidization Development



An analysis of the data was performed using Eden and Hazel's (1973) solution:

$$s_w = (a + b \log t)Q \tag{1}$$

$$a = \frac{2.3Q}{4\pi T} \log \frac{2.25Tt}{r_{ew}{}^2 S} \tag{2}$$

$$b = \frac{2.3}{4\pi T} \tag{3}$$

where:

s_w = drawdown in the pumped well
Q = discharge rate
T = transmissivity
t = time
r_{ew} = effective well radius
S = storage coefficient

The coefficient of turbulent head loss was also calculated for each pump test.

As a further check on the validity of the solution, the predicted well response was generated using the parameters calculated by the Eden and Hazel analysis. Exhibit 4-12 depicts the results of the Eden and Hazel analysis.

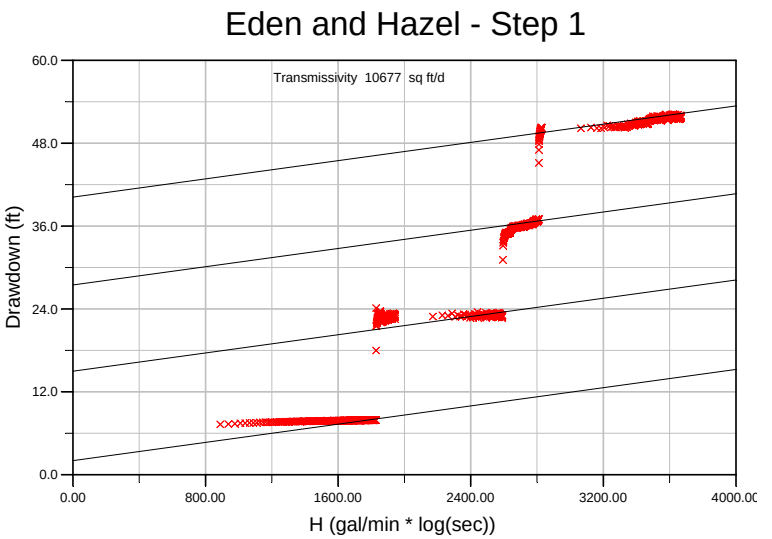
EXHIBIT 4-12
Step Test Analysis

Variable rate step test conducted April 19, 2007.

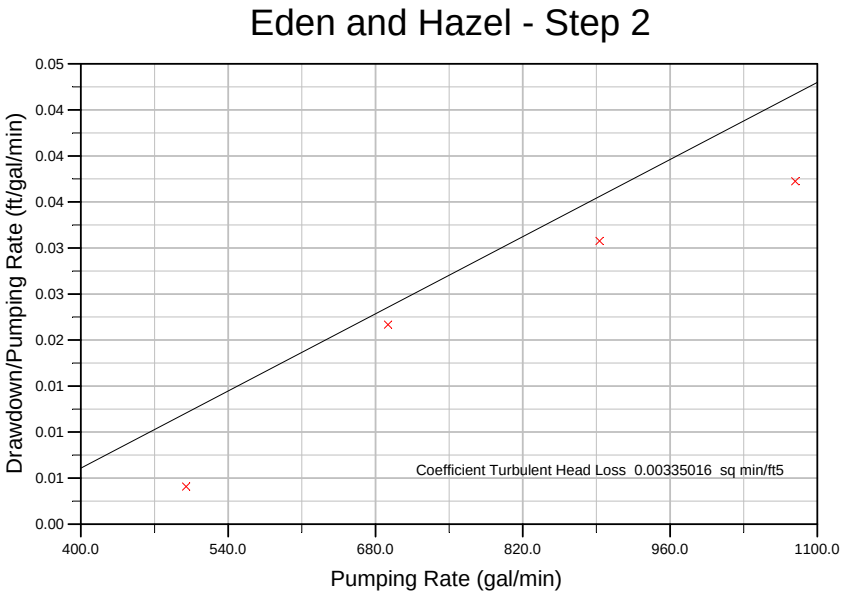
Open interval: 880 ft to 1,050 ft.

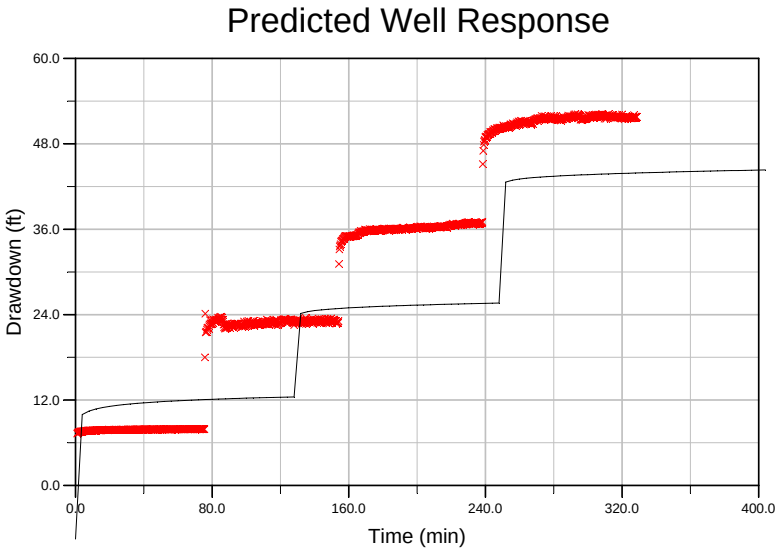
Duration	Average Pumping Rate
2 hours	500 gpm
2 hours	692 gpm
2 hours	893 gpm
2 hours	1,079 gpm

Approximate Calculated Transmissivity: 11,000 ft^2/d



Well FA-1, Eden and Hazel Analysis, Step 1





Well FA-1, Eden and Hazel Analysis - Predicted Well Response

The Eden and Hazel analysis of the step-test data indicated that the acidization did not substantially increase the flow rate that could be obtained from the upper interval of the FAS in this location. The calculated post-acidization transmissivity of 11,000 ft^2/d is lower than the transmissivity of approximately 30,000 ft^2/d observed in the blending Well EW-1 (which penetrates to over 1,300 ft bls) and is reported in other FAS wells in southeast Florida.

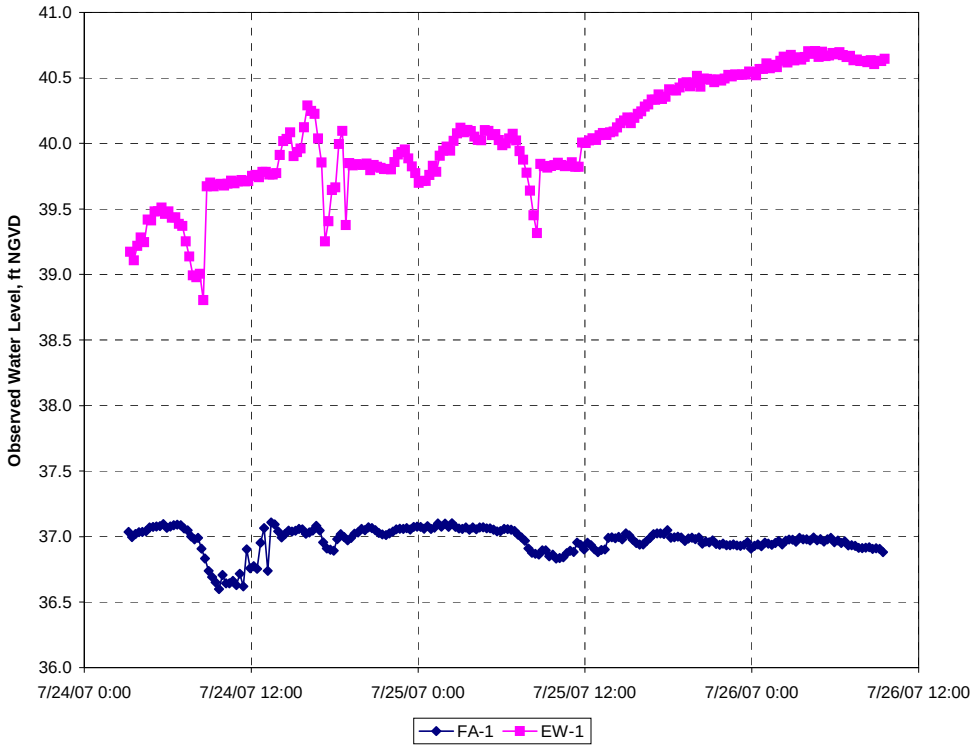
4.3.3 Aquifer Performance Test

After the well was completed to its final depth of 1,300 ft bls, a 72-hour APT was conducted to assess well performance.

4.3.3.1 Background Data Collection

Wells FA-1 and EW-1 were equipped with pressure transducers that recorded water levels at 15-minute intervals for two days prior to the APT. Exhibit 4-13 depicts the background water levels observed in each well.

EXHIBIT 4-13
Background Water Levels Observed Prior to Aquifer Performance Test



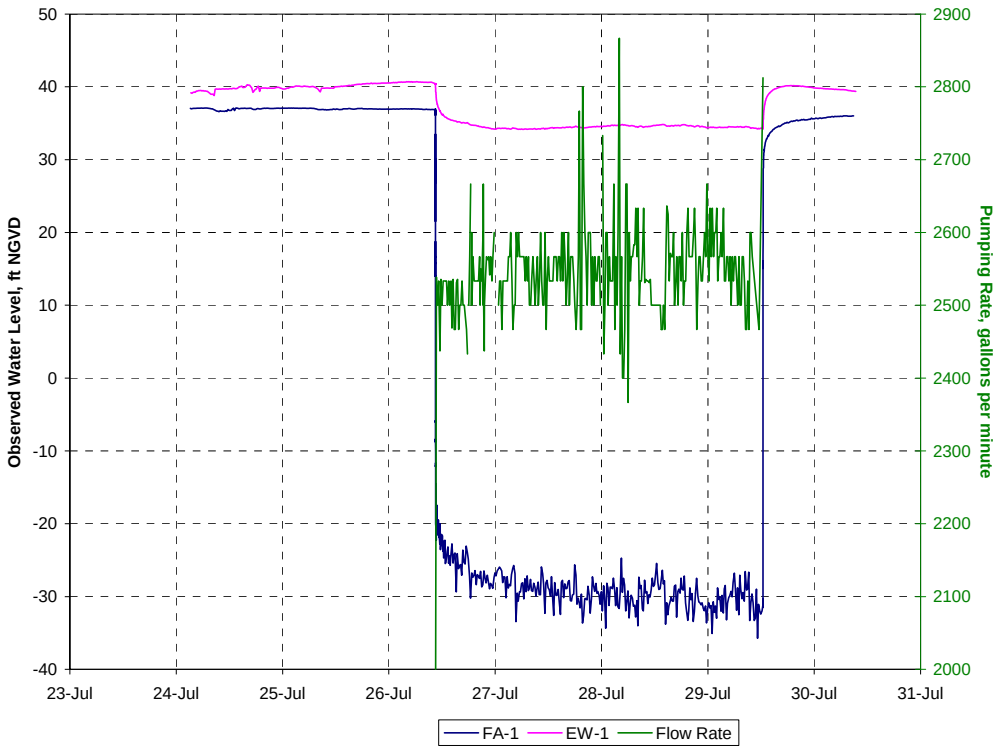
Water levels in Well FA-1 were relatively constant. The observed variation within a range of +/- 0.5 ft is likely due to a valve being opened briefly on July 24, 2007. The transducer in well EW-1 reported an apparent 0.5-ft rise in water levels from 12:00 P.M. on July 25, 2007, through the start of the test at 10:30 A.M. on July 26, 2007. During this time, no pumping or other activities occurred at the site that could have affected water levels in either well. The erratic water levels are attributed to a transducer malfunction.

4.3.3.2 APT Test

The test was conducted using a 15-inch vertical turbine pump with the bowls set at approximately 170 ft bls. The flow rate was measured with an in-line instantaneous flowmeter and totalizer. Water levels in the well were measured with a pressure transducer set 75 ft below the top of the wellhead.

Exhibit 4-14 depicts the water levels observed in Well EW-1 during the APT.

EXHIBIT 4-14
Water Levels Observed During Aquifer Performance Test



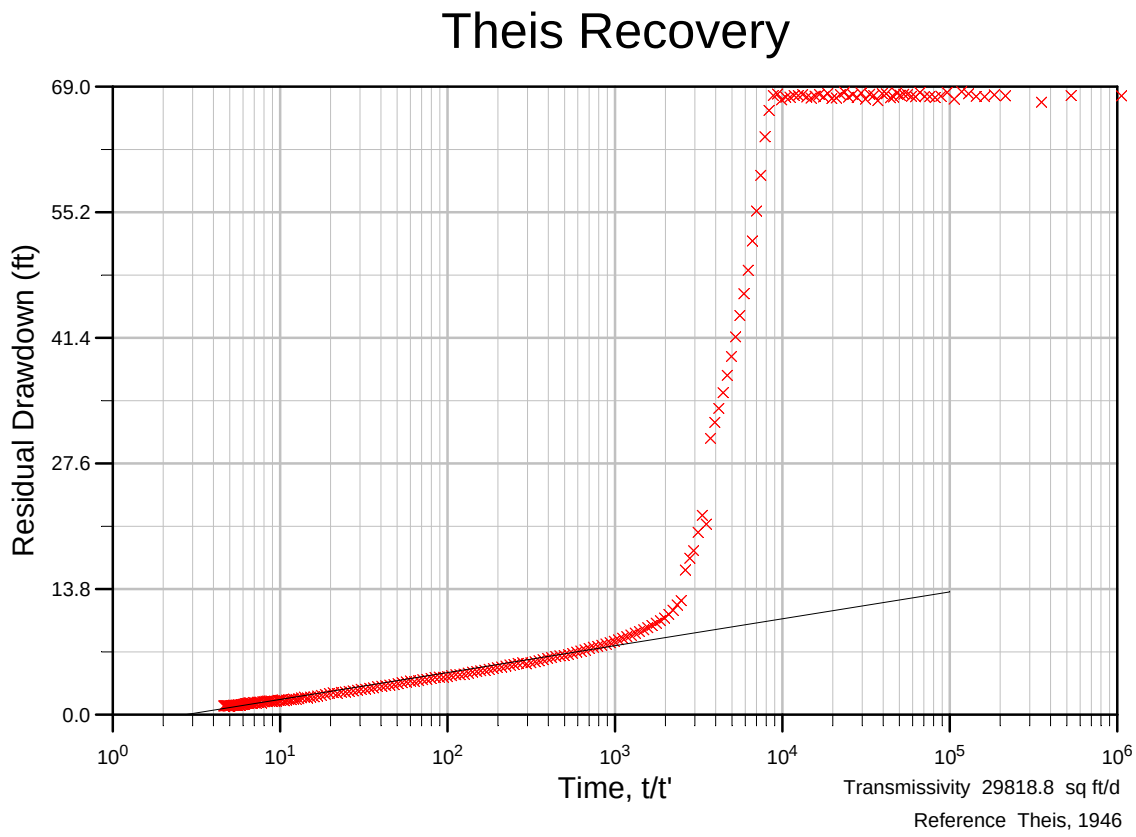
Variability observed in the pumping-water-level data was attributed to fluctuations in the discharge rate resulting from transient changes in the back-pressure on the water-disposal system. Pumped fluids were discharged into a Miami-Dade Water and Sewer Department force main via a nearly 4,000-ft temporary pipeline composed of 12-inch-diameter C-900 pipe and 18-inch-diameter steel pipe. An in-line booster pump was needed to generate sufficient pressure to overcome head losses due to friction in the pipe and the pressures in the force main. Any changes in pressure in the force main propagated back through the pipeline to the booster pump and then back to the vertical turbine pump used for the APT.

4.3.3.3 Recovery Data Analysis

The anomalous water level data from Well EW-1 and the high degree of variability in water levels from Well FA-1 raised questions regarding the accuracy of these data for establishing the hydraulic properties of the Floridan aquifer at the site. Consequently, water levels from the post-APT recovery in Well FA-1 were analyzed using the Theis (1935) recovery data

analysis method. These data are considered to be the most credible, as the aquifer was responding to the time averaged pumping rate and cumulative stress during recovery, not to the high frequency variations reflected in the drawdown during pumping. Exhibit 4-15 depicts the analysis of recovery data from the APT.

EXHIBIT 4-15
Analysis of Recovery Data



The residual drawdown analysis indicates a transmissivity of approximately 30,000 ft²/d. This is in good agreement with data from the exploratory well completed in 2003 and other Floridan aquifer wells in the area.

4.3.3.4 Water Quality Data

Exhibit 4-16 depicts water quality parameters recorded at 15-minute intervals using a YSI-600XLM sonde equipped with a flow-through cell. The pH and temperature remain relatively constant for the duration of the test. The conductivity increases from approximately 7,980 micro Siemens (µS) at the start of the test to approximately 8,080 µS at the conclusion of the test. This apparent 10 percent drift in the conductivity measurement can be attributed to a progressive decrease in the cell flow-through rate and analytical variability. Given these uncertainties, the reported minor increase in conductivity values probably does not reflect significant actual changes in the aquifer water quality during the test.

EXHIBIT 4-16
Water Quality Data Collected During the APT

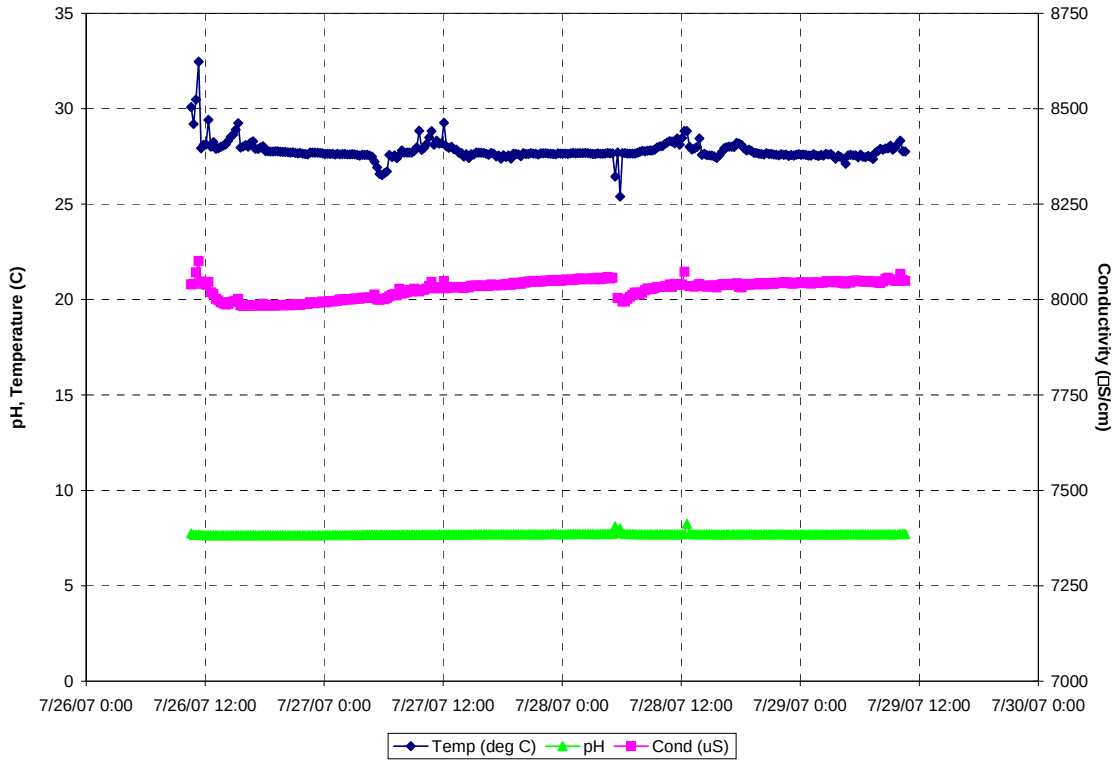


Exhibit 4-17 summarizes the results of water quality testing conducted on a sample collected at the conclusion of the APT.

EXHIBIT 4-17
Water Quality Results from APT

Parameter	Results	Unit	Q
Total Trihalomethanes			
Bromodichloromethane	0.156	µg/L	U
Bromoform	0.164	µg/L	U
Chlorodibromomethane	0.228	µg/L	U
Chloroform	0.301	µg/L	U
Trihalomethanes, Total	0.849	µg/L	U
Metals			
Aluminum, Total	0.035	mg/L	U
Barium, Total	0.0088	mg/L	I
Beryllium, Total	0.0018	mg/L	U
Cadmium, Total	0.0022	mg/L	I
Calcium, Total	130	mg/L	
Chromium, Total	0.0025	mg/L	U
Copper, Total	0.006	mg/L	U
Iron, Dissolved	0.029	mg/L	U
Lead	0.0016	mg/L	U
Magnesium, Total	160	mg/L	J, V

EXHIBIT 4-17
Water Quality Results from APT

Parameter	Results	Unit	Q
Manganese, Dissolved	0.0034	mg/L	U
Potassium, Total	110	mg/L	J
Strontium, Total	5.4	mg/L	
Inorganic Water Quality Parameters			
Alkalinity	170	mg/L	
Bicarbonate Alkalinity	170	mg/L	
Carbon Dioxide	490	mg/L	
Carbon, Total Organic	1.1	mg/L	
Carbonate Alkalinity	5	mg/L	U
Chloride	2200	mg/L	
Color	15	cu	
Conductivity	8.69	μmhos/cm	
Cyanide	0.22	mg/L	J
Fluoride	2.6	mg/L	
MBAS	0.2	mg/L	Q
Nitrogen, Ammonia (as N)	0.13	mg/L	
Nitrogen, Ammonia (Unionized)	0.015	mg/L	U
Nitrogen, Ammonium as NH4	0.13	mg/L	
Nitrogen, Nitrate (as N)	1.3	mg/L	Q, U
Nitrogen, Nitrite (as N)	2.2	mg/L	Q, I
Odor	0	TON	U
Orthophosphate as P	0.031	mg/L	Q, U
Phosphate, Total as P	0.043	mg/L	U
Solids, Total Dissolved	4700	mg/L	
Solids, Total Suspended	4	mg/L	I
Sulfate	640	mg/L	
Sulfide, Hydrogen	0.67	mg/L	Q, U
Turbidity	1.7	NTU	
Microbiology			
Plate Count (100 ml)	1	cfu/mL	Q, U
Radionuclides			
Gross Alpha	25.0+/-7.7	pCi/L	
Gross Beta	55.0+/-8.7	pCi/L	
Radium-226	16.3+/-0.6	pCi/L	
Radium-228	1.1+/-0.7	pCi/L	U
Uranium	0.9+/-0.7	pCi/L	U
Additional Metals			
Antimony	0.001	mg/L	U
Arsenic	0.001	mg/L	U
Selenium	0.001	mg/L	U
Thallium	0.001	mg/L	U
Silica	6.58	mg/L	
Miscellaneous			
Dibromoacetic Acid	0.95	μg/L	U
Dichloroacetic Acid	1.2	μg/L	U
Monobromoacetic Acid	1.1	μg/L	U
Monochloroacetic Acid	1.4	μg/L	U

EXHIBIT 4-17
Water Quality Results from APT

Parameter	Results	Unit	Q
Total HAA5	5.7	µg/L	U
Trichloroacetic Acid	1.2	µg/L	I

Notes:
cfu/mL = colony forming unit per milliliter
cu = color units
mg/L = milligrams per liter
NTU = nephelometric turbidity
pCi/L = picocunes per liter
TON = threshold odor number
µg/L = micrograms per liter
µmhos/cm = micromhos per centimeter

SECTION 5.0

Summary

This report documents the drilling and construction of Well FKAA-FC-FA-1. The well was originally drilled as an ASR well under FDEP Permit 189862-002-UC. During the course of the drilling, the FKAA elected to pursue LPRO instead of ASR for its future water supply needs, and the well was removed from the UIC Program and completed as a supply well.

The well was constructed with a 38-inch-diameter steel casing set from land surface to a depth of 180 ft bls; a 24-inch-diameter FRP casing from land surface to a depth of 880 ft bls; and a 24-inch-diameter open borehole to 1,300 ft bls. A pressure test was performed on the FRP casing to demonstrate mechanical integrity.

The hydrogeology at the site consists of the SAS from land surface to a depth of approximately 130 ft bls. The ICU, which separates the SAS from the FAS, is present from 130 ft to 880 ft bls. The top of the FAS at this location is considered to include the lower Hawthorn producing zone in the Arcadia Formation from 880 ft to 960 ft bls. The Suwannee Limestone extends from 1,125 ft to 1,180 ft bls, and the Avon Park Formation extends from 1,180 ft bls to the total depth of the well. The open interval of the well, from 880 ft to 1,300 ft bls, includes highly productive brackish zones in the Avon Park Formation and secondary contributions from mildly brackish (1,700 mg/L to 2,800 mg/L TDS) productive zones in the lower Hawthorn Formation. The resulting combined Upper Floridan Aquifer production interval at the site is characterized by 4,700 mg/L TDS water quality and a specific capacity for the well of approximately 37 gpm/ft of drawdown.

Data collected during the drilling and testing of Well FKAA-FC-FA-1 indicates that the Floridan aquifer interval from 880 ft to 1,300 ft bls is capable of producing sufficient quantities of water to meet the FKAA's future water supply needs. An acidization of the top portion of the upper FAS failed to increase the well's productivity enough to make it a viable supply source. It is expected that additional FAS wells constructed on site will be able to utilize the interval from 880 ft to 1,300 ft bls. As new wells are drilled, it is recommended that additional pumping tests be performed and the results used to refine and update a groundwater flow model of the FKAA's wellfield.

SECTION 6.0

Works Cited

CH2M HILL. 2003. *Final Report on the Construction and Testing of the Class V Exploratory Well a the Florida Keys Aqueduct Authority's J. Robert Dean Water Treatment Plant.*

CH2M HILL. 2005. *Specifications for the Construction of the Aquifer Storage Recovery Well at the J. Robert Dean Water Treatment Plant. Construction Documents and Specifications*.

Cooke, C.W., and W. C. Mansfield. 1936. Suwannee Limestone of Florida: Geological Society of America Proceedings, p. 71-72.

Chen, C.S., 1965. The Regional Lithostratigraphic Analysis of Paleocene and Eocene Rocks of Florida: Florida Geological Survey Bulletin 45.

Cunningham, K.J., D.F. McNeill, L.A. Guertin, and others. 1998. *A new Tertiary stratigraphy for the Florida Keys and southern peninsula of Florida*. Geological Society of America Bulletin, v. 110, 231-258.

Eden, R.N. and C.P. Hazel. 1973. "Computer and Graphical Analysis of Variable Discharge Pumping Test of Wells. Inst." *Engineers Australia, Civil Engineering Transactions*, pp. 5-10.

Fish, J.E. 1988. Hydrogeology, Aquifer Characteristics, and Ground-Water Flow of the Surficial Aquifer System, Broward County, Florida: U.S. Geological Survey Water-Resources Investigations Report 87-4034.

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

Reese, R.S. 1994. *Hydrogeology and the Distribution of and Origin of Salinity in the Floridan Aquifer System, Southeastern Florida*. U.S. Geological Survey Water-Resources Investigation Report. 94-4010: 1-86.

Reese, R.S., and C.A. Alvarez-Zarikian. 2007. Hydrogeology and Aquifer Storage and Recovery Performance in the Upper Floridan Aquifer, Southern Florida: U.S. Geological Survey Scientific Investigations Report 2006-5239.

Reese, R.S., and S.J. Memberg. 2000. Hydrogeology and the Distribution of Salinity in the Floridan Aquifer System, Palm Beach County, Florida: U.S. Geological Survey Water-Resources Investigations Report 99-4061.

Scott, T.M. 1988. The Lithostratigraphy of the Hawthorn Group (Miocene) of Florida: Florida Geological Survey Bulletin 59.

Theis, C.V. 1935. "The Relation Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage." *Transactions of the American Geophysical Union*. V. 16: 519-524.

APPENDIX A

Well Construction Permit

Department of Environmental Protection

Jeb Bush
Governor

Southeast District
400 N. Congress Avenue, Suite 200
West Palm Beach, Florida 33401

Colleen M. Castille
Secretary

ELECTRONIC CORRESPONDENCE December 21, 2005

NOTICE OF PERMIT

Mr. James C. Reynolds, P.E. jreynolds@fkaa.com
Deputy Executive Director
Florida Keys Aqueduct Authority
P.O. Box 1239
1100 Kennedy Drive
Key West, FL 33041-1239

UIC - Florida Keys Aqueduct Authority Class V,
Group 7 ASR (FKAA-FC-ASR-1)
File: 189862-002-UC

Dear Mr. Reynolds:

Enclosed is Permit Number 189862-002-UC, to construct and test one Class V, Group 7 aquifer storage and recovery (ASR)/blending well, FKAA-FC-ASR-1, to be located at the J. Robert Dean Water Treatment Plant (WTP) in Florida City, Miami-Dade County, Florida. This permit is issued pursuant to Section(s) 403.087, Florida Statutes and Florida Administrative Codes 62-4, 62-520, 62-522, 62-528 and 62-550.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, Mail Stop 35, 3900 Commonwealth Blvd., Tallahassee, Florida 32399-3000; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department.

Should you have any questions, please contact Joe May, P.G. or Len Fishkin, P.G., of this office, telephone (561) 681-6691 or (561) 681-6750, respectively.

Executed in West Palm Beach, Florida.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

for Timothy Cash 11/28/05

Kevin R. Neal — Date
District Director
Southeast District

MLM:LAH:JRM:lf

cc: Nancy Marsh, USEPA/ATL	marsh.nancy@epa.gov	Ron Reese, USGS/FLL	rsreese@usgs.gov
Bob Renken, USGS/FLL	brenken@usgs.gov	Joseph May, FDEP/WPB	joseph.may@dep.state.fl.us
Richard Deuerling, FDEP/TLH	richard.deuerling@dep.state.fl.us	Joe Haberfeld, FDEP/TLH	Joe.Haberfeld@depstate.fl.us
Bart Bibler, FDOH/TLH	bart_bibler@doh.state.fl.us	Steve Anderson, SFWMD/WPB	sander@sfwmd.gov
Harvey Kottke, DERM/MIA	kottkh@co.miami-dade.fl.us	Steve Bell, SFWMD	sbell@sfwmd.gov
Omar Lopez, FKAA/KW	olopez@fkaa.com	Dave Smith, CH2M Hill/DB	dsmith10@ch2m.com
UIC Permitting File, FDEP/WPB			

CERTIFICATE OF SERVICE

This is to certify that this NOTICE OF PERMIT and all copies were mailed before the close of business on 12/21/05 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to the §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk

12/21/05
Date

Department of Environmental Protection

Jeb Bush
Governor

Southeast District
400 N. Congress Avenue, Suite 200
West Palm Beach, Florida 33401

Colleen M. Castille
Secretary

PERMITTEE:
Mr. James C. Reynolds, P.E.
Deputy Executive Director
Florida Keys Aqueduct Authority
P.O. Box 1239
1100 Kennedy Drive
Key West, FL 33041-1239

PERMIT/CERTIFICATION NUMBER: 189862-002-UC
DATE OF ISSUANCE: 12/21/05
EXPIRATION DATE: 12/20/08
COUNTY: Miami-Dade
LATITUDE/LONGITUDE: 25° 26 '36" N / 80° 30' 31" W
PROJECT: Florida Keys Aqueduct Authority
Class V, Group 7 ASR/Blending Well (FKAA-FC-ASR-1)

PROJECT: Aquifer storage and recovery (ASR) well permit to construct and test a Class V, Group 7 ASR/blending well, FKAA-FC-ASR-2, at the J. Robert Dean Water Treatment Plant (WTP), located near the intersection of Southwest 192nd Avenue and 354th Street, in Florida City, Miami-Dade County, Florida.

This permit is issued under the provisions of Chapter 403.087, Florida Statutes, and Florida Administrative Code (F.A.C.) Rules 62-4, 62-520, 62-522, 62-528 and 62-550. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

ASR Well FKAA-FC-ASR-1 will be completed into the selected zone in the upper Floridan aquifer. This ASR/blending well shall be constructed with thirty-inch outside diameter (O.D.) steel casing extending to a depth of approximately 180 feet below land surface (bls) or just below the Biscayne aquifer (top of the upper confining unit [Hawthorn Group]). A nominal eight-inch open borehole shall be drilled in stages to approximately 1,000 feet bls, reamed to forty-inches and the twenty-inch casing set at approximately 1,200 feet bls. A nominal 8-inch open borehole shall be drilled in stages from approximately 1,000 to 1,400 feet bls. Depending on the results of testing, the eight-inch open borehole may be partially plugged back to the base of the targeted zone(s). Final depths will be determined during construction and field testing, however, the approximate target ASR zone has been estimated 1,190 to 1,350 below the top of casing (btoc). Injection and recovery flow rates will be finalized based on data collected during construction. The recharge of water using FKAA-FC-ASR-1 will occur during months of the year when excess water supplies are available.

IN ACCORDANCE WITH: Exploratory well permit (189862-001-UC) was issued January 24, 2003; Application & supporting information for Class V ASR/blending well construction & testing permit received May 22, 2003 RFI Response received May 25, 2004; Revised drawings received on May 28, 2004; RFI dated June 25, 2004 sent electronically to applicant; RFI Response received on July 22, 2004; RFI dated July 23, 2004 sent electronically to applicant; application deemed complete as of August 23, 2004; Agent draft permit copy sent to applicant on October 28, 2004; Received comments concerning agent draft permit on November 22, 2004; FKAA requested the Department not to issue Draft Permit in December 2004; Planning meeting held at SED office on May 4, 2005; Draft Permit sent electronically on May 18, 2005; publication of the Notice of Draft Permit 0189862-002-UC in the Miami Herald newspaper on May 27, 2005; Draft Permit (re-)sent electronically on August 2, 2005; publication of the Notice of Draft Permit 0189862-002-UC in the Miami Herald and Sun Sentinel newspapers on August 3, 2005; in consideration of receipt of public comment received as a result of a public meeting held on September 6, 2005; and publication of the Notice of Intent to Issue Permit 0189862-001-UC in the Miami Herald newspaper on October 19, 2005.

LOCATED AT: the J. Robert Dean WTP, S.W. 192nd Avenue & 354th Street, Florida City, Miami-Dade County, FL.

TO SERVE: Florida Keys Aqueduct Authority Service Area, Monroe County, Florida.

SUBJECT TO: General Conditions 1-24 and Specific Conditions 1-10.

GENERAL CONDITIONS:

The following General Conditions are referenced in Florida Administrative Code Rule 62-528.307.

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit are "permit conditions" and are binding and enforceable pursuant to Section 403.141, F.S.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action.

3. As provided in Subsection 403.087(7), F.S., the issuance of this permit does not convey any vested rights or exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in this permit.

4. This permit conveys no title to land, water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefrom; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, or are required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the permitted activity is located or conducted to:

    a. Have access to and copy any records that must be kept under conditions of this permit;
    b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
    c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

    Reasonable time will depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

    a. A description of and cause of noncompliance; and
    b. The period of noncompliance, including dates and times; or, if not corrected the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent the recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Rules 62-4.120 and 62-528.350, F.A.C. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. The permittee shall comply with the following:

    a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records shall be extended automatically unless the Department determines that the records are no longer required.
    b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
    c. Records of monitoring information shall include:

        1) the date, exact place, and time of sampling or measurements;
        2) the person responsible for performing the sampling or measurements;
        3) the dates analyses were performed;
        4) the person responsible for performing the analyses;
        5) the analytical techniques or methods used
        6) the results of such analyses

    d. The permittee shall furnish to the Department, within the time requested in writing, any information which the Department requests to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.
    e. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

14. All applications, reports, or information required by the Department shall be certified as being true, accurate, and complete.

15. Reports of compliance or noncompliance with, or any progress reports on, requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each scheduled date.

16. Any permit noncompliance constitutes a violation of the Safe Drinking Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

17. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

18. The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

19. This permit may be modified, revoked and reissued, or terminated for cause, as provided in 40 C.F.R. Sections 144.39(a), 144.40(a), and 144.41 (1998). The filing of a request by the permittee for a permit modification, revocation or reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

20. The permittee shall retain all records of all monitoring information concerning the nature and composition of injected fluid until five years after completion of any plugging and abandonment procedures specified under Rule 62-528.435, F.A.C. The permittee shall deliver the records to the Department office that issued the permit at the conclusion of the retention period unless the permittee elects to continue retention of the records.

21. All reports and other submittals required to comply with this permit shall be signed by a person authorized under Rules 62-528.340(1) or (2), F.A.C. All reports shall contain the certification required in Rule 62-528.340(4), F.A.C.

22. The permittee shall notify the Department as soon as possible of any planned physical alterations or additions to the permitted facility. In addition, prior approval is required for activities described in Rule 62-528.410(1)(h).

23. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or injection activity that may result in noncompliance with permit requirements.

24. The permittee shall report any noncompliance which may endanger health or the environment including:

    a. Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or
    b. Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.

    Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

[space intentionally blank]

1. General Requirements

a. This permit is to construct and test a Class V, Group 7 aquifer storage and recovery (ASR)/blending well, referred to herein as Well FKAA-FC-ASR-1.

b. This permit approval is based upon evaluation of the data contained in the application and the plans and specifications submitted in support of the application. Any changes, except as provided elsewhere in this permit, must be approved by the Department before implementation.

c. The permittee shall be subject to all requirements and regulations of Miami-Dade County and the South Florida Water Management District regarding the construction and testing of this ASR/blending well. Those conditions imposed by the SFWMD in this project's Water Use Permit(s) regarding the testing of the ASR system remain in effect.

d. Four permanent surficial aquifer monitor wells, identified as Pad Monitor Wells (PMWs), shall be located near the corners of the pad to be constructed for Well FKAA-FC-ASR-1, and shall be identified by location number and pad location, i.e. NW, NE, SW, and SE. If located in a traffic area the well head(s) must be protected by traffic bearing enclosure(s) and cover(s). Each cover must lock and be specifically marked to identify the well and its purpose. The PMWs shall be sampled as follows:

1) During the construction and associated testing phases, the PMWs shall be sampled weekly for chlorides (mg/L), specific conductance (μmho/cm or μS/cm), temperature and water level (relative to the North American Vertical Datum of 1988 [NAVD 88]).
2) Initial PMW analyses shall be submitted prior to the onset of drilling activities.
3) The PMWs shall also be sampled for total dissolved solids (mg/L) during the first four weeks of PMW sampling; prior to events as described under Item 4) below; and at all times when specifically requested by the Department.
4) The PMWs shall be sampled 48 hours prior to any maintenance, testing (including mechanical integrity testing) or repairs to the system which represent an increased potential for accidental discharge to the surficial aquifer.

The results of the PMW analyses shall be submitted to the Department within 30 days of the completion of the activity. A summary sheet from the FDEP Southeast District is attached for your use when reporting the above information. The PMWs shall be retained in service throughout the construction phase of the project.

e. No fluid shall be injected without written authorization from the Department. The issuance of this construction and testing permit does not obligate the Department to authorize its operation, unless the well, monitoring system and surface appurtenances qualifies for an authorization.

f. No underground injection is allowed that causes or allows movement of fluid into an underground source of drinking water if such fluid movement may cause a violation of any primary drinking water standard or may otherwise adversely affect the health of persons.

g. If historical or archaeological artifacts, such as Indian canoes, are discovered at any time within the project site, the permittee shall notify the FDEP SED office in West Palm Beach and the Bureau of Historic Preservation, Division of Archives, History and Records Management, R. A. Gray Building, Tallahassee, Florida 32301, telephone number (850) 487-2073.

2. Construction and Testing Requirements

a. Prior to the commencement of any work, the name of the Florida-licensed water well contractors supervising the drilling operations and the water well contractors' registration number shall be submitted to the Department. The permittee or the engineer of record shall provide the Department with copies of all required federal, state or local permits prior to spudding Well FKAA-FC-ASR-1.

b. Blow-out preventers shall be installed on the ASR/blending well prior to penetration of the Floridan aquifer.

c. The measurement points for drilling and logging operations shall be surveyed and referenced to the NAVD 88 prior to the onset of drilling activities for the ASR/blending well.

d. No drilling operations shall begin without an approved disposal site for drilling fluids, cuttings, or waste. It shall be the permittee's responsibility to obtain any necessary Department and local agency approvals for disposal prior to the start of construction. Any formation waters discharged to surface or surficial aquifer waters during an aquifer performance test shall require an Industrial Wastewater permit from the Department.

e. The Department shall be notified within forty-eight (48) hours after work has commenced.

f. Hurricane Preparedness - Upon the issuance of a “Hurricane Watch” by the National Weather Service, the preparations to be made include but are not necessarily limited to the following:

    1) Secure all on-site salt and stockpiled additive materials to prevent surface and/or groundwater contamination.

    2) Properly secure drilling equipment and rig(s) to prevent damage to well(s) and on-site treatment process equipment.

g. Waters spilled during construction or testing of the ASR/blending well shall be contained and properly disposed.

h. Department approval and UIC-TAC review is required prior to the following stages of construction:

    1) Contract documents and spud date

    2) ASR/blending well FKAA-FC-ASR-1 final casing seat

    3) ASR/blending well FKAA-FC-ASR-1 uncased interval/storage zone selection

    4) Plugging back open hole in ASR/blending well FKAA-FC-ASR-1 (if needed)

i. The geophysical logging program, during the drilling of ASR/blending well FKAA-FC-ASR-1, shall at a minimum include:

    1) Pilot hole to approximately 180 feet bls (base of Biscayne aquifer):

        - Caliper
        - Natural gamma
        - Spontaneous potential
        - Dual induction

    2) Pilot hole from approximately 180 feet to approximately 1,200 feet bls:

        - Caliper
        - Natural gamma
        - Spectral gamma
        - Spontaneous potential
        - Borehole compensated sonic with VDL display
        - Dual induction

3) Reamed hole to approximately 1,200 feet bls:

- Caliper
- Natural gamma

4) Cased hole to approximately 1,200 feet bls:

- Natural gamma log after each stage of cementing
- Temperature log after each stage of cementing

5) Pilot hole below the final casing to approximately 1,400 feet bls:

- Caliper
- Natural gamma
- Spectral gamma
- Spontaneous potential
- Fluid resistivity
- Temperature
- Borehole compensated sonic with VDL display
- Dual induction
- Compensated Density-Neutron
- Digital Borehole Televiewer
- Downhole video survey with rotating lens
- Flowmeter (run under pumping and static conditions)

6) Completed well:

- Caliper
- Natural gamma
- Fluid resistivity
- Temperature
- Downhole video survey with rotating lens
- Flowmeter (run under pumping and static conditions)
- Cement Bond Log

j. Caliper and natural gamma logs shall be run on all reamed holes.

k. Temperature and natural gamma logs shall be run after each stage of cementing on all casings to identify the top of the cement.

l. In the ASR/blending well, a cement bond log shall be run after cementing the final casing.

m. Upon completion of well construction, background water quality sampling shall be performed to determine water quality characteristics (chlorides, conductivity, total dissolved solids, temperature and pH) as well as primary and secondary drinking water standards (Rule 62-550, FAC) as attached.

n. Hydrogeologic testing of the proposed storage/injection zone (from ~1,190 to 1,350 feet bls) shall include:

1) At least 3 interval/packer tests performed to determine the characteristics of the anticipated flow zones. A flow test shall be performed for each interval/packer test and a water quality sample collected to determine the hydraulic and water quality characteristics of the tested intervals. Samples shall be analyzed for chlorides, temperature adjusted specific conductance, TDS, major cations and anions, SiO_2, trace metals (including arsenic), and stable isotopes (including ^{18}O and deuterium). The flow test shall be of sufficient duration to achieve stabilization of water levels and water quality. Pre and post test monitoring shall be performed to achieve stabilization of water levels.

2) Aquifer performance test (APT) to include monitoring during:

   a) 7 to 14-day background phase.

   b) 72-hour constant rate drawdown phase.

   c) 48-hour recovery phase

o. Towards the evaluation of the potential for upconing of poorer quality water, water quality samples shall be collected at the beginning, middle and end of the constant rate drawdown phase of the APT. These samples shall be analyzed for chlorides (mg/L), temperature adjusted specific conductance (μmho/cm) and total dissolved solids (TDS, mg/L), at a minimum.

p. Mechanical integrity:

1) Injection is prohibited until the permittee affirmatively demonstrates that the well has mechanical integrity. Prior to operational testing the permittee shall establish the mechanical integrity of the well.

2) The Department shall be notified at least seventy-two (72) hours prior to all testing for mechanical integrity.

3) All testing for mechanical integrity must be initiated during normal business hours, Monday through Friday.

4) A pressure test for the final casing shall be performed. The pressure test for the final casing shall be accepted if tested for 60 minutes with a liquid filled casing at 1.5 times the operating pressure at which the well is to be permitted. A test tolerance of not greater than + or - 5% must be certified by the Engineer of Record. Verification of pressure gauge calibration must be provided to the Department representative at the time of the test and in the certified test report.

q. UIC-TAC meetings are scheduled on the 2nd and 4th Tuesday of each month subject to a five (5) working day prior notice and timely receipt of critical data by all UIC-TAC members and the USEPA, Region IV, Atlanta. Emergency meetings may be arranged when justified to avoid undue construction delays.

r. Department approval at a scheduled UIC-TAC meeting shall be based on the permittee's presentation that shows compliance with Department rules and this permit.

s. No fluids shall be injected without prior written authorization from the Department.

t. The only source of injectate shall be water meeting all Primary and Secondary drinking water quality standards and minimum criteria parameters unless otherwise exempted. All parameters which are not exempted under a water quality criteria exemption, variance or waiver, as appropriate, shall meet the appropriate standard at all times.

3. Quality Assurance/Quality Control Requirements

a. The permittee shall ensure that the construction of this facility shall be as described in the application and supporting documents. Any proposed modifications to this permit shall be submitted in writing to the Underground Injection Control program manager for review and clearance prior to implementation. Changes of negligible impact to the environment and staff time will be reviewed by the program manager, cleared when appropriate and incorporated into this permit. Changes or modifications other than those described above will require submission of a completed application and appropriate processing fee as per Rule 62-4.050, F.A.C.

b. A Florida registered professional engineer, pursuant to Chapter 471, Florida Statutes (F.S.), shall be retained throughout the construction period and operational testing to be responsible for the construction and operation and to certify the application, specifications and completion report and other related documents, pursuant to Rule 62-528.440(5), F.A.C. A professional engineer or professional geologist shall provide monitoring of the drilling and testing operation. The permittee shall notify the Department immediately of any change of the Engineer of Record.

c. In accordance with Section 492, Florida Statutes, all documents prepared for the geological/hydrogeological evaluation of the ASR/blending well shall be signed and sealed by a Florida Licensed Professional Geologist or qualified Florida Licensed Professional Engineer.

d. All water quality samples required in this permit shall be collected and analyzed in accordance with Department Standard Operating Procedures (SOP), pursuant to the FDEP Quality Assurance, Chapter 62-160, F.A.C. The various components of the collection of the FDEP SOPs are found in DEP-SOP-001/01 (Field Procedures) and DEP-SOP-002/-1 (Laboratory Procedures).

e. Continuous on-site supervision by qualified personnel (engineer or geologist) is required during all drilling, testing, geophysical logging and cementing operations.

f. The permittee shall calibrate all pressure gauge(s), flow meter(s) and other related measurement equipment associated with the injection well system on a semi-annual basis. The permittee shall maintain all monitoring equipment and shall ensure that the monitoring equipment is calibrated and in proper operating condition at all times. Laboratory equipment, methods, and quality control will follow EPA guidelines as expressed in Standard Methods for the Examination of Water and Wastewater. The pressure gauge(s), flow meter(s) and other related measurement equipment associated with the injection well system shall be calibrated using standard engineering methods.

g. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures.

4. Reporting Requirements

a. This project shall be monitored by the Department and the TAC, which consists of representatives of the following agencies:

- Department of Environmental Protection, West Palm Beach and Tallahassee
- South Florida Water Management District (SFWMD), West Palm Beach
- Florida Geological Survey, Tallahassee
- United States Geological Survey (USGS), Miami
- Miami-Dade County Dept. of Environmental Resources Management (DERM)
- Florida Department of Health (DOH), Tallahassee

b. The permittee shall provide copies of all correspondence relative to this permit to each member of the TAC and to the Atlanta office of EPA, Region IV. Such correspondence includes but is not limited to reports, schedules, analyses and geophysical logs required by the Department under the terms of this permit. The permittee is not required to provide specific correspondence to any TAC member who submits to the permittee a written request to be omitted as a recipient of specific correspondence.

c. Prior to site preparation for the ASR/blending well (FKAA-FC-ASR-1), the following items shall be submitted to the Department, all members of the UIC-TAC and to the Atlanta office of USEPA, Region IV:

1) A drilling and construction schedule;

2) Final contract documents;

d. Throughout the construction period allowed by this permit, daily progress reports shall be submitted to the Department, the USEPA, and the TAC each week. The reporting period shall run Friday through Thursday and reports shall be mailed on Friday of each week. The weekly progress reports, certified by a Florida Licensed Professional Geologist or qualified Florida Licensed Professional Engineer, pursuant to S.C.s 3.b. and 7.a., and shall include at a minimum the following information:

1) A cover letter summarizing each week's activities and a projection of activities for the next reporting period;

2) Description of daily footage drilled by diameter of bit or size of hole opener or reamer being used;

3) Description of work during installation and cementing of casing, including amounts of casing and cement used. Details of cementing operations shall include the number of cementing stages, and the following information for each stage of cementing: cement slurry composition, specific gravity, pumping rate, volume of cement pumped, theoretical fill depth, and actual tag depth. From both the physical tag and the geophysical logs, a percent fill shall be calculated. An explanation of any deviation between actual versus theoretical fill shall be provided;

4) Daily engineers report and driller's log with detailed descriptions of all drilling progress, cementing, testing, logging, and casing installation activities;

5) Lithologic log with cuttings description, formation and depth encountered;

6) Collection of drilling cuttings at least every 10 feet and at every formation change, with 5 foot sampling starting 100 feet above and continuing through the injection zone;

7) Well development records;

8) Water quality analyses, including but not limited to the weekly water quality analysis and water levels for the four PMWs;

9) Description of work and type of testing accomplished including geophysical and video logs and pumping tests;

10) Description of any construction problems that developed during the reporting period and current status;

11) Copies of the driller's log;

12) Description of any deviation survey conducted;

13) Details of any packer tests, pump tests and core analyses; and

14) Details of the additions of salt or other materials to suppress well flow, and include the date, depth and amount of material used.

e. If any problem develops that may seriously hinder compliance with this permit, construction progress or good construction practice, the Department shall be notified immediately. The Department may require a detailed written report describing what problems have occurred, the remedial measures applied to assure compliance and the measures taken to prevent recurrence of the problem.

f. Abnormal Events

1) In the event the permittee is temporarily unable to comply with any conditions of this permit due to breakdown of equipment, power outages, destruction by hazard of fire, wind or by other cause, the permittee shall notify the Department. Notification shall be made in person, by telephone or by electronic mail within 24 hours of breakdown or malfunction to the UIC Program staff, SED office in West Palm Beach.

2) A written report of any noncompliance referenced in Specific Condition (S.C.) 4.e above shall be submitted to the SED office within five days after discovery of the occurrence. The report shall describe the nature and cause of the breakdown or malfunction, the steps being taken or planned to be taken to correct the problem and prevent its reoccurrence, emergency procedures in use pending correction of the problem, and the time when the facility will again be operating in accordance with permit conditions.

g. Per Rules 62-528.410(4)(c) and 62-528.605(2), F.A.C., the selection of the final casing seat must be approved by the Department. In order to obtain an approval, the permittee shall submit a request to the Department. Each request shall be submitted concurrently to all members of the UIC-TAC and to the Atlanta and West Palm Beach offices of USEPA, Region IV. To the extent possible, the casing seat request shall be accompanied by technical justification, including but not limited to, the following items:

1) Lithologic and geophysical logs with interpretations, as the interpretations relate to the casing seat.
2) Water quality data.
3) Identification of confining unit(s), including hydrogeologic data and interpretations.
4) Identification of monitoring zone.
5) Casing depth evaluation (mechanically secure formation, potential for grout seal).
6) Lithologic drilling rate and weight on bit data, with interpretations (related to the casing seat).

h. The uncased (storage zone) interval request for the aquifer storage and recovery well, FKAA-FC-ASR-1 shall include, but not necessarily be limited to, the following:

1) Lithologic and geophysical logs with interpretations, as the interpretations relate to the requested storage zone.

2) Water quality of proposed storage zone.

3) Withdrawal test data for the storage zone, with interpretations and evaluation (including transmissivity or specific capacity calculated for proposed storage zone);

4) Identification of storage zone boundaries and characteristics; and

5) Identification of confining unit(s), including hydrogeologic data and interpretations, and evaluation of potential for upconing of poorer quality water.

i. A submittal for a request for approval to plug back the ASR/blending well open hole to modify the storage zone, if proposed, shall include:

1) Withdrawal test data for the storage zone, with interpretations and evaluation.

2) Water quality reports.

3) Geophysical log interpretations including flow analysis, as the interpretations relate to the request.

4) Identification of storage zone boundaries and characteristics.

5) Demonstration of confinement and evaluation of potential for upconing of poorer quality water.

j. A request to perform a injection test, if received, shall include:

1) Cement bond logs and interpretation

2) Final downhole television survey with interpretation

3) Demonstration of mechanical integrity (pressure test)

4) Planned injection procedures, including but not limited to duration of testing, and planned injection and recovery flow rates.

5) Water quality results for the proposed water to be used for the injection test, sampled within the last year for the specific water quality criteria listed for the source water in S.C. 5.b.4 and Background water quality results from the storage zone for the specific water quality criteria indicated in S.C. 5.b.5).

k. An interpretation of all test results must be submitted with all submittals.

l. Within 30 days of well completion of Well FKAA-FC-ASR-1, the permittee or the authorized representative shall submit to the Department the following information:

1) Certification of Class V Well Construction Completion, DEP Form 62-528.900(4);

2) A copy of the SFWMD permit to construct a well;

3) A copy of the SFWMD's Well Completion Report; and

4) A copy of the SFWMD's Water Use Permit.

m. Upon completion of construction of Well FKAA-FC-ASR-1, a complete set of as-built engineering drawings (Florida registered P.E. signed and sealed) shall be submitted to the Department's SED office in West Palm Beach and Tallahassee UIC Program.

n. After completion of construction and testing of Well FKAA-FC-ASR-1, the following requirements shall apply:

1) A final engineering report shall be submitted to the Department, the TAC and to the Atlanta office of EPA, Region IV. The report shall include, but not be limited to, all information and data collected under Rules 62-528.605, 62-528.615, and 62-528.635, F.A.C., with appropriate interpretations. Mill certificates for the casings shall be included in the report. To the extent possible, the transmissivity and storativity of the injection zone and the maximum capacity within safe pressure limits shall be estimated. This report shall also be signed and sealed by a Florida licensed professional engineer and professional geologist.

2) The permittee shall contact the UIC Section of the Department of Environmental Protection in Tallahassee to arrange for the transfer of the following items to the State Geologist at the Florida Geological Survey, 903 West Tennessee Street, Tallahassee, Florida 32304-7707:

a) Cuttings obtained during well construction;

b) Any cores obtained during well construction when no longer needed by the permittee;

c) Any geophysical logs run during well construction; and

d) A copy of the final report described in S.C. 4.n.1) above.

o. The Florida Geological Survey (FGS) is currently involved in a study that is investigating the effects of ASR on the storage aquifers. For this reason, it is requested that several 2½ gallon samples of ambient ground water be collected from the storage zone intervals where the interval/packer tests will be conducted for FGS analyses. Dr. Jon Arthur at the FGS will arrange for the samples to be collected. He can be contacted at the Florida Geological Survey at 903 West Tennessee Street, Tallahassee FL 32304-7700, phone number (850) 488-9380.

p. A 2½ gallon sample of formation fluid shall be collected from the completed well after development but before injection begins. Samples should be labeled as to well number, depth, type of sample and shipped to Dr. James Cowart, Department of Geology, Florida State University, Tallahassee, FL 32304.

q. Upon completion of construction and testing of the ASR/blending well, a final report shall be submitted to the Department, the UIC-TAC and to the Atlanta and West Palm Beach offices of USEPA, Region IV. The report shall include, but not be limited to, all information and data collected under Rules 62-528.605, 62-528.615, and 62-528.635, F.A.C., with appropriate interpretations. To the extent possible, the report should include:

1) Transmissivity test data for the storage zone, with evaluation.

2) Evaluation of the maximum ASR capacity within safe pressure limits.

3) Detailed results and analysis of aquifer performance testing.

4) Evaluation of confinement and potential for upconing of poorer quality water.

5) Record (as-built) drawings of the ASR/blending well FKAA-FC-ASR-1, surface equipment, instrumentation and appurtenances, if applicable, certified by the engineer of record.

6) Well location for FKAA-FC-ASR-1 surveyed relative to permanent reference points by a Florida registered land surveyor, and located on a site plan by latitude and longitude.

7) Factory or manufacturer certificates for all casing pipe, well screen and fittings FKAA-FC-ASR-1.

8) Summary of all water quality, water level and well testing data collected, with conclusions and recommendations.

r. A report evaluating the system's progress shall be submitted to the Department, each member of the TAC, and the Atlanta office of EPA, Region IV within one month of completion of the last planned cycle. A written, detailed evaluation of the ASR system performance shall be included with the report.

5. Pre-Operational Testing Requirements

a. The operational testing (cycle testing) of the ASR well system with treated potable water under this permit shall not commence without written authorization from the Department.

b. Prior to Department authorization of operational testing, the permittee shall submit at a minimum the following information (with a request for operational testing authorization) to the Atlanta office of EPA, Region IV and to each member of the TAC for review:

1) Draft operation and maintenance manual;

2) Lithologic and geophysical logs, and video surveys, with interpretations;

3) Results of pressure tests on the final casing for the ASR well, with interpretations;

4) Results of representative water quality analyses for raw water that will be recharged, sampled within six months of submission of the request for operational testing; parameters to include the following:

a) Primary and Secondary drinking water standards established in Chapter 62-550, Part III, F.A.C., (excluding asbestos, butachlor, acrylamide, epichlorohydrin and Dioxin), see Attachment;

b) dissolved oxygen (mg/L);

c) total uranium (µg/L);

d) fecal coliform and total coliform (cfu/100 mL);

e) potassium (mg/L);

f) calcium (mg/L);

g) magnesium (mg/L);

h) carbonate alkalinity (mg/L as $CaCO_3$)

i) turbidity (NTU);

j) total suspended solids, TSS (mg/L); and

k) E. coli, enterococci, Giardia lamblia, and cryptosporidium;

l) All other parameters not listed above, but required of a permitted drinking water treatment facility, shall also be submitted.

5) Results of the background ground water analyses from the storage zone for all parameters listed in S.C. 5.b.4) directly above. To meet this requirement, FKAA-FC-ASR-1 may be sampled for the listed parameters upon completion of well construction. Alternately, background ground water results previously ascertained for FKAA-FC-EW-1 may be submitted for Department review, provided that FKAA-FC-EW-1 and FKAA-FC-ASR-1 are completed into the same storage zone. If the previously obtained background results from FKAA-FC-EW-1 are submitted, then any parameters listed in S.C. 5.b.4) that had not been analyzed shall be analyzed from samples collected from FKAA-FC-ASR-1 upon completion of its construction;

6) Results of the background ground water analyses from the Biscayne monitoring well for all parameters listed in S.C. 5.b.4) directly above.
7) Aquifer test data (including hydrogeologic and withdrawal tests), analysis and evaluation;

8) Planned injection and recovery flow rates at which the permittee will operate (anticipated maximum flow rates and flow rates for normal operation), based on data collected during the construction and testing phases;

9) Detailed cycle testing plan including the number of cycles, duration of cycles and total volumes injected and recovered;

10) Surface equipment completion certification or certification of interim completion for the purposes of testing;

11) Signed and sealed record (as-built) engineering drawings of all well construction, subsurface and surface equipment, and appurtenances. The drawings shall include but not be limited to the wellhead, subsurface well components, and the location of permanent sampling points for both the injectate and the recovered waters;

12) A water use (consumptive use) permit and all other applicable permits;

13) Submittal of a plugging and abandonment plan; and

14) The permittee must obtain a detailed site plan from the water system describing the future use of the ASR well. This plan must be submitted to the Department before a final clearance is granted to place this project in service.

c. A cycle testing schedule shall be submitted to the FDEP for review and final authorization of cycle testing of ASR Well FKAA-FC-ASR-1. The schedule shall be submitted with a request for minor modification of this permit and the applicable processing fee.

d. Department or Department delegated local program potable water construction permits must be issued for all surface piping and appurtenances upstream of the wellhead for Well FKAA-FC-ASR-1. Bacteriological clearances must be performed prior to operational testing of ASR Well FKAA-FC-ASR-1.

e. Pressure gauges and flow meters must be installed on ASR Well FKAA-FC-ASR-1 well prior to initiating ASR activities using ASR Well FKAA-FC-ASR-1 at the site.

f. The Florida Geological Survey (FGS) is currently investigating the effects of ASR systems on storage zones. The Department requests that the permittee contact the Hydrogeology Program at the FGS (phone # 850-488-9380) at least 30 days prior to operational testing to allow the Survey to coordinate a sampling schedule during the operational testing phase of this project.

g. Before authorizing operational testing the Department shall conduct an inspection of the facility to determine if the conditions of this permit have been met. FKAA will contact the Underground Injection Control Section of the Department, SED, to arrange for the site inspection. The inspection will determine if all equipment necessary to operate and monitor FKAA-FC-ASR-1 in compliance with the permit and Department rules has been installed. During the inspection, reporting requirements shall be reviewed.

6. Operational Testing Conditions

a. The operational testing of the ASR well system shall be subject to the following conditions:

1) A qualified representative of the Engineer of Record must be present for the start-up operations and the Department must be notified in writing of the date that operational testing began for the subject well.

2) The Department and TAC will monitor the progress of the operational testing phase of this project. TAC meetings shall be held if necessary to aid the Department in determining if it may be necessary to modify the operational testing conditions. If requested by the Department, reports evaluating the system's progress shall be submitted to the Department, the TAC, and the Atlanta office of EPA, Region IV at least two weeks prior to the scheduled TAC meeting. The Department at each of these TAC review intervals may modify the conditions for the operational testing period.

3) Flows to the ASR well shall be monitored and controlled at all times to ensure the permitted rate of 3 MGD is not exceeded.

4) The pressure at the wellhead shall be monitored and controlled at all times to ensure the maximum pressure on the final casing does not exceed 66 percent (%) of the pressure at which the well was pressure tested. [See S.C. 2.p.4)]

5) Any failure of ASR system monitoring and recording equipment for a period of more than 48 hours shall be reported to the Department within 24 hours. A written report describing the incident shall also be submitted to the Department within five days of the start of the event. The written report shall contain a complete description of the occurrence, a discussion of its cause(s), and the steps being taken to reduce, eliminate, and prevent recurrence of the event, and all other information deemed necessary by the Department.

6) The following data shall be collected and reported to the Department in Monthly Operating Reports (MORs). The MORs shall be submitted to this office (FDEP, Southeast District Office, UIC Section, 400 N. Congress Avenue, Suite 200, West Palm Beach, FL 33401) and our Tallahassee office (FDEP, UIC Program, MS 3530, 2600 Blair Stone Road, Tallahassee, FL 32399-2400) no later than the last day of the month immediately following the month of record. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

   a) ASR well performance:

      Flow rate parameters:
      - average daily flow rate to/from ASR well (MGD)
      - daily peak hour flow rate (15 minute minimum) to/from ASR well (MGD)
      - daily minimum sustained flow rate (15 minute minimum) to/from ASR well (MGD)
      - monthly average of the daily flow rates (MGD) to and from ASR well (MGD)
      - monthly maximum of the peak hour flow rates to and from ASR well (MGD)
      - monthly minimum sustained flow rate to and from ASR well (MGD)

      Volume parameters:
      - total daily volume recharged (MG) – if recharge mode
      - total daily volume recovered (MG) – if recovery mode
      - total monthly volume recharged (MG)
      - total monthly volume recovered (MG)
      - monthly net storage volume (MG) for ASR well

Pressure parameters:

- daily average pressure at the ASR well (psig)
- daily maximum sustained (15 min. minimum) pressure at the ASR well (psig)
- daily minimum sustained (15 min. minimum) pressure at the ASR well (psig)
- monthly average pressure at ASR well (psig)
- monthly maximum sustained pressure at ASR well (psig)
- monthly minimum sustained pressure at ASR well (psig)

b) Monitor Wells FKAA-FC-EW-1 and BAMW-1

Monitor zone potentiometric surface or water table height relative to NAVD (feet of head) or pressure (psig) referenced to NAVD:

- daily maximum sustained pressure or water level
- daily minimum sustained pressure or water level
- daily average pressure or water level
- monthly maximum sustained pressure or water level
- monthly minimum sustained pressure or water level
- monthly average pressure or water level

c) Initial sampling schedule for operational testing during injection and recovery phases:

Cycle test data shall be submitted with technical interpretation. For Well FKAA-FC-ASR-1, the fluid monitored during injection shall be sampled under flowing conditions while it is being injected, whereas the fluid monitored during recovery phases shall be recovered ground water. Sampling of Well FKAA-FC-ASR-1 during recovery shall commence at the very onset of recovery. Sampling during storage phases (that last longer than a month) shall include monthly samples for all of the parameters required weekly, semimonthly, or monthly for the other modes.

Well FKAA-FC-ASR-1, Monitor Well FKAA-FC-EW-1 and Surficial Aquifer Well BAMW-1 shall be monitored during each injection and recovery phase, in accordance with the parameters and frequency listed below:

(1) Weekly sampling (except as noted):

Wells FKAA-FC-EW-1 and FKAA-FC-ASR-1:

- residue, total filterable (dried at 180° C) [total dissolved solids, TDS] (mg/L)
- specific conductance (μmho/cm or μS/cm)
- chlorides (mg/L)
- sulfates (mg/L)
- pH (standard units, s.u.)
- total iron (mg/L)
- color (color units)
- dissolved oxygen (mg/L)
- arsenic (μg/L) (twice weekly during recovery)
- turbidity (NTU)
- total suspended solids, TSS (mg/L)
- total coliform (colonies/100 ml) [+]
- fecal coliform (colonies/100 ml) [+]

[+] Weekly through cycle test 4, then twice monthly thereafter with Department written approval

(2) Twice monthly:

Wells FKAA-FC-EW-1 and FKAA-FC-ASR-1:

- carbonate alkalinity (mg/L as $CaCO_3$)
- hardness (mg/L as $CaCO_3$)
- sulfate (mg/L)
- calcium (mg/L)
- magnesium (mg/L)
- manganese (mg/L)
- sodium (mg/L)
- potassium (mg/L)
- nitrogen, ammonia, total as N (mg/L)
- nitrogen, total Kjeldahl as N (TKN, mg/L)
- nitrate (mg/L)
- nitrite (mg/L)
- odor (odor threshold number)

(3) Monthly sampling (and, for Well FKAA-FC-ASR-1, sampling at least once during each recovery cycle):

Wells FKAA-FC-EW-1 and FKAA-FC-ASR-1:

- total uranium (μg/L)
- gross alpha (ρCi/L)
- total radium (radium 226 and radium 228; ρCi/L) — Note: sampling for this parameter is required only if a sampling result for gross alpha equals or exceeds 15 ρCi/L. If — within either a recharge, storage or recovery phase — a gross alpha sampling result equals or exceeds 15 ρCi/L, sampling for total radium shall continue during that phase until the laboratory analytical data shows that gross alpha has declined to below 15 ρCi/L for at least three consecutive sampling events within that phase.

Well BAMW-1:

- residue, total filterable (dried at 180° C) [total dissolved solids, TDS] (mg/L)
- specific conductance (temperature compensated, μmho/cm or μS/cm)
- chlorides (mg/L)
- sulfates (mg/L)
- pH (standard units, s.u.)
- total iron (mg/L)
- color (color units)
- dissolved oxygen (mg/L)
- arsenic (μg/L)
- turbidity (NTU)
- total coliform (colonies/100 ml) [+]
- fecal coliform (colonies/100 ml) [+]

(4) Sampling at the end of a recovery cycle (Well FKAA-FC-ASR-1):

- chlorides (mg/L)

Samples shall be collected according to the frequency specified above during cycle testing until the Department authorizes a reduction in sampling frequency to a proposed alternative frequency. A request for reduction in sampling frequencies or parameters may be made once a sufficient number of cycle tests have been accomplished that adequately describe the hydrochemical behavior of the system. Should a request be submitted, the data collection should be representative of the normal operational schedule of the ASR system. The request shall be submitted to the Department, TAC and EPA for review and Department approval.

d) No more than one month prior to system start-up and the initiation of cycle testing, ground-water quality samples shall be obtained from Wells FKAA-FC-ASR-1, FKAA-FC-EW-1 and BAMW-1 for the following parameters:

Well FKAA-FC-ASR-1: TDS; specific conductance, chlorides, sulfates, pH, total iron, color, dissolved oxygen, arsenic, turbidity, TSS, total and fecal coliform, TKN, ammonia, total uranium, gross alpha, total radium, odor, hardness, total alkalinity;

Well FKAA-FC-EW-1: TDS; specific conductance, chlorides, sulfates, pH, total iron, color, dissolved oxygen, arsenic, turbidity, total and fecal coliform, TKN, ammonia, total uranium, gross alpha, total radium;

BAMW Well-1: TDS; specific conductance, chlorides, sulfates, pH, total iron, color, dissolved oxygen, arsenic, turbidity, TSS, total and fecal coliform.

e) The Department may require the monitoring of additional parameters if water quality monitoring of the Floridan aquifer indicates any of the following:

(1) results of the sampling indicate significant differences in water quality during consecutive sampling events; or

(2) results of the sampling indicate significant differences in water quality during consecutive sampling events; or

(3) a source of contamination to the ASR storage zone is discovered that was not addressed in the permit.

7) A minimum of three well volumes of fluid shall be evacuated from the FKAA-FC-EW-1 and BAMW-1 monitoring systems prior to sampling for the chemical parameters listed above. A State-certified laboratory shall analyze all samples. Sufficient purging shall have occurred when either of the following have occurred:

a) pH, specific conductivity and temperature when sampled, upon purging the third or subsequent well volume, each vary less than 5% from that sampled upon purging the previous well volume; or

b) upon purging the fifth well volume.

8) All ASR well system data submissions, including Monthly Operating Reports (MORs), shall be clearly identified on each page with: facility name, I.D. Number, permit number, operator's name, license number, daytime phone number, date of sampling/recording, and type of data. The lead plant operator or higher official must sign and date each submittal.

9) A source water analysis representative of the injectate (24-hour composite sample) shall be submitted annually (sampled in February and submitted on or before April 30). VOC parameters and biological parameters shall be sampled either in-situ or grab. The source water analysis shall include:

a) Primary and Secondary drinking water standards established in Chapter 62-550, Part III, F.A.C., (excluding asbestos, butachlor and dioxin), see Attachment;

b) dissolved oxygen (mg/L);

c) total uranium (µg/L);

d) fecal coliform and total coliform (cfu/100 mL);

e) potassium (mg/L);

f) calcium (mg/L);

g) magnesium (mg/L);

h) carbonate alkalinity (mg/L as $CaCO_3$);

i) turbidity (NTU);

j) total suspended solids, TSS (mg/L); and

k) All other parameters not listed above, but required of a permitted drinking water treatment facility, shall also be submitted.

b. The permittee shall conduct operational testing of the ASR well system to demonstrate that the ASR well can maintain water quality standards and assimilate the design daily flows prior to granting approval for full operation.

c. No fluids shall be injected without prior written authorization from the Department.

d. The only source of injectate (recharge water) shall be water meeting all Primary and Secondary drinking water quality standards (62-550, F.A.C.) and minimum criteria (62-520, F.A.C.) unless otherwise exempted. All parameters that are not exempted under a water quality criteria exemption, variance or waiver, as appropriate, shall meet the appropriate standard at all times.

7. Surface Equipment

a. The integrity of the ASR sampling system shall be maintained at all times. Sampling line(s) shall be clearly and unambiguously identified at the point at which samples are drawn. All reasonable and prudent precautions shall be taken to ensure that samples are properly identified and that samples obtained are representative. Sampling lines and equipment shall be kept free of contamination with independent discharges and no interconnections with any other lines.

b. The surface equipment for the ASR well system shall maintain access for logging and testing, and reliability and flexibility in the event of damage to the well and piping. A regular program of exercising the valves integral to the wellhead shall be instituted. At a minimum, all valves integral to the wellhead shall be exercised at the time of each cycle change.

c. The ASR/blending well surface equipment and piping shall be kept free of corrosion at all times.

d. Spillage onto the ASR/blending well pad during construction activities, and any waters spilled during mechanical integrity testing, other maintenance, testing or repairs to the system shall be contained by an impermeable wall around the edge of the pad and disposed of via approved and permitted methods.

e. The four surficial aquifer monitor wells installed at the corners of the well pad shall be secured, maintained, and retained in service throughout the construction phase of the project. During operational testing, they may be retained for subsequent sampling that may be needed (i.e., should there be an accidental discharge to the surficial aquifer); alternatively, the City may submit a request to the Department for cessation of sampling followed by capping, or plugging and abandonment of these wells.

8. Plugging and Abandonment and Alternate Use Plans

a. Permittees who are unable to operate the ASR well to meet its intended purpose shall within 180 days of FDEP notification:

1) Submit a plugging and abandonment permit application in accordance with Rules 62-528.625 and 62-528.645, F.A.C., or

2) Submit an alternate use plan for the well. Alternate use may commence after the plan has been approved by the Department, including any necessary permit or permit modifications as required by the Department or any other agency.

9. Signatories

a. All reports and other submittals required to comply with this permit shall be signed by a person authorized under Rules 62-528.340(1) or (2), F.A.C.

b. In accordance with Rule 62-528.340(4), F.A.C., all reports and submittals shall contain the following certification signed by a person authorized under Rules 62-528.340(1) or (2), F.A.C. or be included under such certification as may have been previously provided (i.e., responses to a Request for Information (RFI) which are simple clarifications are thereby certified):

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

10. Permit Extension(s) and Renewal(s)

a. Pursuant to Rule 62-4.080(3), a permittee may request that a permit be extended as a modification of an existing permit. A request for an extension is the responsibility of the permittee and shall be submitted to the Department before the expiration of the permit. In accordance with Rule 62-4.070(4), F.A.C., a permit cannot be extended beyond the maximum 5-year statutory limit.

b. If injection is to continue beyond the expiration date of this permit the permittee shall apply for, and obtain an operation permit. If necessary to complete construction or the operational testing period, the permittee shall apply for renewal of the construction permit at least 60 days prior to the expiration date of this permit.

c. Testing of this ASR/blending well shall cease upon expiration of this permit, unless a new permit is issued by the Department, or a timely renewal application (Rules 62-4.090, F.A.C. and 62-528.307(2)(a), F.A.C.) for a construction and testing permit has been submitted to the Department.

d. A written, detailed evaluation of the ASR system performance shall be submitted upon completion of the cycle testing authorized under this permit.

Issued this 28 **day of** NOVEMBER**, 2005**

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

FOR

Kevin R. Neal
District Director
Southeast District

KRN/LAH/JRM/lf

SOUTHEAST DISTRICT UIC SECTION
SURFICIAL AQUIFER MONITORING WELL (SAMW) REPORT

FACILITY NAME _____

REPORT MONTH/YR. _____

OPERATOR NAME _____ LICENSE # _____

INJECTION WELL # _____ PERMIT # _____

SAMPLING DATE _____ TIME _____

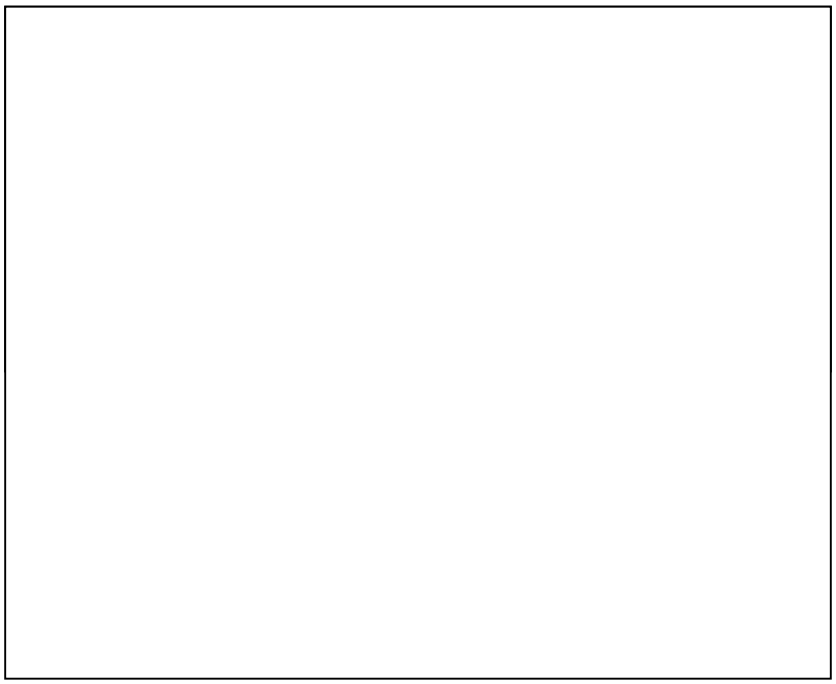
	SAMW #1	**SAMW #2**	**SAMW #3**	**SAMW #4**
LOCATION	**NE CORNER**	**NW CORNER**	**SE CORNER**	**SW CORNER**
ELEV. OF TOC* (NAVD 88)				
DEPTH TO WATER (TOC*)				
WATER LEVEL (NAVD 88)				
CHLORIDE (mg/l)				
CONDUCTIVITY(μmhos/cm)				
TOTAL DISOLV SOLIDS (mg/L)				
TEMPERATURE (° C)				

* TOC: indicates the "top of the casing" of the Surficial Aquifer Monitoring Well

ANALYZED BY_____ SAMPLED BY _____

PHONE # _____ TITLE _____

SITE PLAN OF SAMW LOCATIONS



PRIMARY & SECONDARY DRINKING WATER STANDARDS & MINIMUM CRITERIA

Updated May 6, 2002

PRIMARY DRINKING WATER STANDARDS

PARAMETER

Alachlor (Polychlorinated Biphenyl or PCB)
Aldicarb
Aldicarb sulfoxide
Aldicarb sulfone
Aroclors (Polychlorinated Biphenyls or PCBs)
Alpha, Gross
Antimony
Arsenic
Atrazine
Barium
Benzene
Benzo(a)pyrene
Beryllium
Bis(2-ethylhexyl) adipate (Di(2-ethylhexyl) adipate)
Bis(2-ethylhexyl) phthalate (Di(2-ethylhexyl) phthalate)
Cadmium
Carbofuran
Carbon Tetrachloride (Tetrachloromethane)
Chlordane
Chlorobenzene (Monochlorobenzene)
Chloroethylene (Vinyl Chloride)
Chromium
Coliforms, Total
Cyanide
2,4-D (2,4-Dichlorophenoxyacetic acid)
Dalapon (2,2-Dichloropropionic acid)
Dibromochloropropane (DBCP)
1,2-Dibromoethane (EDB, Ethylene Dibromide)
1,2-Dichlorobenzene (o-Dichlorobenzene)
1,4-Dichlorobenzene (p-Dichlorobenzene or Para Dichlorobenzene)
1,2-Dichloroethane (Ethylene dichloride)
1,1-Dichloroethylene (Vinylidene chloride)
1,2-Dichlorethylene (cis-1,2-Dichloroethylene or trans-1,2-Dichloroethylene)
cis-1,2-Dichloroethylene (1,2-Dichlorethylene)
trans-1,2-Dichloroethylene (1,2-Dichlorethylene)
Dichloromethane (Methylene chloride)
1,2-Dichloropropane
Di(2-ethylhexyl) adipate (Bis(2-ethylhexyl) adipate)
Di(2-ethylhexyl) phthalate (Bis(2-ethylhexyl) phthalate)
Dinoseb
Diquat
EDB (Ethylene dibromide, 1,2-Dibromoethane)
Endothall
Endrin
Ethylbenzene
Ethylene dichloride (1,2-Dichloroethane)
Fluoride
Glyphosate (Roundup)
Gross Alpha
Heptachlor
Heptachlor Epoxide
Hexachlorobenzene (HCB)
gamma-Hexachlorocyclohexane (Lindane)
Hexachlorocyclopentadiene
Lead

PRIMARY & SECONDARY DRINKING WATER STANDARDS & MINIMUM CRITERIA

Updated May 6, 2002

PRIMARY DRINKING WATER STANDARDS, CONTINUED

PARAMETER

Lindane (gamma-Hexachlorocyclohexane)
Mercury
Methoxychlor
Methylene chloride (Dichloromethane)
Monochlorobenzene (Chlorobenzene)
Nickel
Nitrate (as N)
Nitrite (as N)
Total Nitrate + Nitrite (as N)
Oxamyl
p-Dichlorobenzene or Para Dichlorobenzene (1,4-Dichlorobenzene)
Pentachlorophenol
Perchloroethylene (Tetrachloroethylene)
Picloram
Polychlorinated biphenyl (PCB or Aroclors)
Radium
Roundup (Glyphosate)
Selenium
Silver
Silvex (2,4,5-TP)
Simazine
Sodium
Styrene (Vinyl benzene)
Tetrachloroethylene (Perchloroethylene)
Tetrachloromethane (Carbon Tetrachloride)
Thallium
Toluene
Toxaphene
2,4,5-TP (Silvex)
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene (Trichloroethene, TCE)
Trihalomethanes (THM), Total
Vinyl Chloride (Chloroethylene)
Xylenes (total)

SECONDARY DRINKING WATER STANDARDS

PARAMETER

Aluminum
Chlorides
Color
Copper
Ethylbenzene
Fluoride
Foaming Agents (MBAS)
Iron
Manganese
Odor
pH
Silver
Sulfates
Toluene
Total Dissolved Solids (TDS) (residue, total filterable [dried at 180° C])
Xylenes
Zinc

PRIMARY & SECONDARY DRINKING WATER STANDARDS & MINIMUM CRITERIA

Updated May 6, 2002

MUNICIPAL WASTEWATER MINIMUM CRITERIA
GROUND WATER MONITORING PARAMETERS

INORGANICS

Ammonia
Nitrogen (organic)
Total Kjeldahl Nitrogen
Total Phosphorus (phosphate)

VOLATILE ORGANICS

Chloroethane
Chloroform
para-Dichlorobenzene (1,4 Dichlorobenzene)
1,2-Dichloroethylene (cis-1,2-Dichloroethylene or trans-1,2-Dichloroethylene)

BASE/NEUTRAL ORGANICS

Anthracene
Butylbenzylphthalate
Dimethylphthalate
Napthalene
Phenanthrene

PESTICIDES AND PCBs

Aldrin
Dieldrin

ACID EXTRACTABLES

2-chlorophenol
Phenol
2,4,6-trichlorophenol

OTHER

Specific Conductance
Biological Oxygen Demand
Chemical Oxygen Demand
Temperature

APPENDIX B

Summary of Construction Activities

Summary of Construction Activities Floridan Aquifer Test Well FKAA-FC-ASR-1 at the J. Robert Dean Water Treatment Plant Florida Keys Aqueduct Authority	
Date	**Milestone**
	Notice to Proceed issued to contractor
	Begin assembly of temporary drilling pad.
3/9/2006	Installation of surficial aquifer monitoring wells around the temporary drilling pad.
4/22/2006	Mobilize drilling rig to site.
	Finish assembling temporary drilling pad.
	Begin drilling FKAA-FC-ASRA-1, set 30-inch casing.
4/27/2006	Finish drilling 12-inch pilot hole to 210 ft bls
5/1/2006	Geophysical logging of pilot hole.
5/4/2006	Start reaming 44-inch borehole to 194 ft bls
5/15/2006	Finish reaming 44-inch borehole to 194 ft bls
5/19/2006	Geophysical logging of reamed hole
5/30/2006	Install and cement in place 38-inch steel casing to a depth of 194 ft bls
6/14/2006	Start drilling 12-inch pilot hole from 199 ft bls
6/22/2006	Finish drilling 12-inch pilot hole to 900 ft bls
7/10/2006	Geophysical logging of pilot hole.
7/11/2006	Begin reaming pilot hole to a nominal 38-inch borehole from 150 ft bls
8/1/2006	Finish reaming pilot hole to a nominal 38-inch borehole to a depth of 885 ft bls
8/7/2006	Geophysical logging of reamed hole.
2/24/2006	Install and cement in place 24-inch fiberglass casing to a depth of 880 ft bls.
10/18/2006	Conduct successful casing pressure test on the 24-inch fiberglass casing.
10/27/2006	Begin drilling 12-inch borehole from 880 ft bls
11/10/2006	Finish drilling 12-inch borehole to 1,130 ft bls
12/14/2006	Geophysical logging of borehole from 880 to 1,130 ft bls
2/7/2007	Complete a series of 3 packer tests on the interval from 880 to 1,130 ft bls.
2/10/2007	Begin reaming 24-inch diameter borehole to 1,050 ft bls
2/13/2007	Finish reaming 24-inch diameter borehole to 1,050 ft bls
3/26/2007	Acidize borehole.
4/19/2007	Conduct step drawdown test during removal of spent acid.
5/3/2007	Begin drilling 12-inch pilot hole to 1,300 ft bls.
5/31/2007	Finish drilling 12-inch borehole to 1,300 ft bls

6/2/2007	Geophysical logging of the borehole from 880 to 1,300 ft bls.
	Begin reaming borehole to 24-inch diameter to a depth of 1,300 ft bls.
6/7/2007	Finish reaming 24-inch borehole to a depth of 1,300 ft bls
7/26/2007	Begin 72-hour aquifer performance test (APT)
7/29/2007	Complete 72-hour aquifer performance test (APT)
	Demobilize drill rig.
8/9/2007	Complete wellhead, demobilize all construction equipment from site.

APPENDIX C

Weekly Construction Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: May 3, 2006

SUBJECT: Weekly Summary No. 1
April 21, 2006 through April 27, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

The mobilization of the drilling equipment was completed on Saturday, April 22nd, with the start of the pilot hole drilling commencing on Monday, April 24th. No work was conducted on Sunday, April 23rd. The target depth of 210 feet below land surface (bls) for the pilot hole drilling was reached at the end of the reporting period on Thursday, April 27th.

The surficial pad monitor wells were installed on March 8th and 9th and sampled for background data on April 11th.

During the next reporting period, it is anticipated that the geophysical logging of the pilot hole will be conducted and reaming of the pilot hole will commence.

Attachments: Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: May 8, 2006

SUBJECT: Weekly Summary No. 2
April 28, 2006 through May 4, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

The only activity at the site from Friday, April 28th and Saturday, April 29th was site work. There was no work conducted on Sunday, April 31st. On Monday, May 1st, geophysical logging of the pilot hole was conducted. There was no activity at the site on Tuesday, May 2nd and on Wednesday, May 3rd, the Sure-Shot deviation surveys were conducted on the pilot hole. The reaming of the pilot hole to a nominal 44-inch diameter was started on Thursday, May 4th reaching a depth of 15 feet below land surface (bls).

During the next reporting period, it is anticipated that the reaming of the pilot hole will be completed and installation of the 38-inch casing will commence.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports
Geophysical Logs

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: May 15, 2006

SUBJECT: Weekly Summary No. 3
May 5, 2006 through May 11, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

Reaming of the pilot hole to a nominal 44-inch diameter was conducted for the entire reporting period. The starting depth was 15 feet below land surface (bls) and the ending depth was 137 feet bls. There was no work conducted on Sunday, May 7th. The reaming was taking extra time due to the use of small drill pipe (5-inch) and numerous lost circulation zones.

During the next reporting period, it is anticipated that the reaming of the pilot hole will be completed and installation of the 38-inch casing will commence.

Attachments: Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: May 22, 2006

SUBJECT: Weekly Summary No. 4
May 12, 2006 through May 18, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, May 12th, reaming of the pilot hole to a nominal 44-inch diameter continued from a depth of 137 feet below land surface (bls) and was completed to the desired depth of 199 feet bls on Monday, May 15th. There was no work conducted on Sunday, May 14th. The remainder of the reporting period was spent conditioning the reamed borehole for the installation of the 38-inch casing.

During the next reporting period, it is anticipated that the installation and grouting of the 38-inch casing will be conducted.

Attachments: Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: May 29, 2006

SUBJECT: Weekly Summary No. 5
May 19, 2006 through May 25, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, May 19th, a caliper geophysical log was conducted on the nominal 44-inch diameter reamed borehole with the log indicating that the total depth and diameter coincided with drill bit size and drill pipe tally. The remainder of the reporting period was spent keeping the borehole conditioned for the installation of the 38-inch casing. There was no work conducted at the site on Saturday - May 20th, Sunday – May 21st, or Thursday, May 25th. The delay in the installation of the casing was due to drilling subcontractor personnel issues and administrative problems.

During the next reporting period, it is anticipated that the installation and grouting of the 38-inch casing will be conducted.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports
Geophysical Logs

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: June 5, 2006

SUBJECT: Weekly Summary No. 6
May 26, 2006 through June 1, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

There was no work at the site on Friday, May 26th and Saturday, May 27th due to drilling subcontractor personnel issues and administrative problems. There was no work conducted on Sunday, May 28th and Monday 29th due to the Memorial Day holiday. On Tuesday, May 30th, the 38-inch casing was installed to a depth of 194 feet below land surface (bls). The grouting of the casing began on Wednesday, May 31st and was completed to land surface on Thursday, June 1st.

During the next reporting period, it is anticipated that the pilot hole drilling below the base of the 38-inch casing will begin.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: June 12, 2006

SUBJECT: Weekly Summary No. 7
June 2, 2006 through June 8, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Saturday, June 3rd and Monday, June 5th, the grout that overflowed into the drill pad was removed, with no work being conducted on Friday, June 2nd or Sunday, June 4th. The nominal 38-inch diameter drill bit was installed on Tuesday, June 6th to drill out the cement plug at the base of the 38-inch casing, which was tagged at 176 feet below land surface (bls). The drilling out of the cement plug had advanced to 184 feet below bls, which was 10 feet above the base of the casing.

During the next reporting period, it is anticipated that the drilling out of the cement plug will be completed and the pilot hole drilling will resume from below the base of the casing.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: June 19, 2006

SUBJECT: Weekly Summary No. 8
June 9, 2006 through June 15, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, June 9th, the drilling out of the cement, using a nominal 38-inch diameter drill bit, was advanced to a depth of 192 feet below land surface (bls). The drill pad was prepared for the application of a sealant to the joint between the already poured drill pad and the newly poured area surrounding the 38-inch casing for the remainder of the day. On Saturday, June 10th, the sealant was applied and its 72-hour cure time was started. The cure time prohibited work from being conducted through late afternoon on Tuesday, June 13th. The pilot hole drilling from the base of the 38-inch casing resumed on Wednesday, June 14th and had reached a depth of 378 feet bls at the end of the reporting period.

During the next reporting period, it is anticipated that the pilot hole drilling will be completed to the target depth of 900 feet bls and the borehole will be geophysical logged.

Attachments: Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: June 27, 2006

SUBJECT: Weekly Summary No. 9
June 16, 2006 through June 22, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

Pilot hole drilling resumed on Friday, June 16th from a depth of 378 feet below land surface (bls) and continued for the entire reporting period. The desired depth of 900 feet bls was reached on Thursday, June 22nd.

During the next reporting period, it is anticipated that the pilot hole will be geophysical logged and reaming will begin.

Attachments: Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: July 6, 2006

SUBJECT: Weekly Summary No. 10
June 23, 2006 through June 29, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

The geophysical logs were originally scheduled to be conducted on Friday, June 23rd, however due to mechanical issues with the drill rig, it had to be rescheduled. Due to the lack of availability by a geophysical logging contractor, the only work conducted during this reporting period was borehole conditioning.

During the next reporting period, it is anticipated that the geophysical logging of the pilot hole will be completed and reaming will begin.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
David Smith/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: July 10, 2006

SUBJECT: Weekly Summary No. 11
June 30, 2006 through July 6, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

Due to the lack of availability by a geophysical logging contractor, borehole conditioning of the borehole was conducted on Friday, June 30th, Saturday, July 1st and Monday, July 3rd, with no work conducted on Sunday July 2nd and Tuesday, July 4th. On Wednesday, July 5th, geophysical logging was attempted but due to an obstruction in the borehole was unable to be advanced past the depth of 291 feet below land surface (bls). The remainder of reporting period was spent re-conditioning the borehole for the next attempt at conducting the geophysical logs.

During the next reporting period, it is anticipated that the geophysical logging of the pilot hole will be completed and reaming will begin.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: July 17, 2006

SUBJECT: Weekly Summary No. 12
July 7, 2006 through July 13, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

Due to the lack of availability by a geophysical logging contractor, borehole conditioning of the borehole was conducted on Friday, July 7th and Saturday, July 8th, with no work conducted on Sunday July 9th. On Monday, July 10th, the geophysical logging of the pilot hole was successfully conducted. The reaming, using a nominal 37-inch drill bit, began on Tuesday, July 11th and continued for the remainder of the reporting period reaching a depth of 295 feet below land surface (bls).

During the next reporting period, it is anticipated that the reaming will continue for the entire period.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports
Geophysical Logs (attached to the casing seat approval request)

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: July 24, 2006

SUBJECT: Weekly Summary No. 13
July 14, 2006 through July 20, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, July 14th and Saturday, July 15th, rig repairs were conducted with the reaming of the pilot hole resuming from a depth of 305 feet below land surface (bls) on Saturday. The reaming continued for the remainder of the reporting period reaching a depth of 565 feet bls on Thursday, July 20th.

During the next reporting period, it is anticipated that the reaming will be completed and the installation of the 24-inch FRP casing will be conducted.

Attachments: Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Richard Deuerling/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: August 1, 2006

SUBJECT: Weekly Summary No. 14
July 21, 2006 through July 27, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, July 21st, reaming of the pilot hole, using a nominal 37-inch diameter drill bit, continued from the depth of 565 feet below land surface (bls). Reaming was conducted for the entire reporting period reaching a depth of 780 feet bls on Thursday, July 27th.

During the next reporting period, it is anticipated that the reaming will be completed and the installation of the 24-inch FRP casing will be conducted.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Joe Haberfeld/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: August 11, 2006

SUBJECT: Weekly Summary No. 15
July 28, 2006 through August 3, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, July 21st, reaming of the pilot hole, using a nominal 37-inch diameter drill bit, continued from the depth of 780 feet below land surface (bls). The target depth for the completion of the reaming, 885 feet bls, was reached on Tuesday, August 1st. Deviation surveys were conducted, every 90 feet, in the reamed borehole, on Wednesday, August 2nd. On Thursday, August 3rd, the drill bit was removed from the borehole in anticipation of casing installation, however the installation was delayed due to the lack of availability of a geophysical logging contractor.

During the next reporting period, it is anticipated that the installation and grouting of the 24-inch FRP casing will be completed.

Attachments: Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Joe Haberfeld/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: August 18, 2006

SUBJECT: Weekly Summary No. 16
August 4, 2006 through August 10, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, August 4th, final preparations were made for the installation of the 24-inch FRP casing. No work was conducted on Saturday, August 5th. A wiper pass of the reamed borehole was conducted on Sunday, August 6th. On Monday, August 7th, an attempt was made to install the casing, but the attempt was aborted due to issues related to the assembly of the casing. The only work conducted on Tuesday, August 8th was the removal of the already installed casing and tremie pipe strings. On Wednesday, August 9th, another wiper pass of the reamed borehole was conducted and two tremie pipe strings were installed prior to the installation of the casing. Another unsuccessful attempt at installing the casing was conducted on Thursday, August 10th, but was also aborted due to additional issues related to the assembly of the casing.

During the next reporting period, it is anticipated that issues related to the assembly of the casing will be resolved and installation and grouting of the 24-inch FRP casing will be completed.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports
Geophysical Logs

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Joe Haberfeld/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: August 25, 2006

SUBJECT: Weekly Summary No. 17
August 11, 2006 through August 17, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, August 11th, the remaining joints of the 24-inch FRP casing, still in the borehole after the aborted installation attempt on August 10th, were removed. The reamed borehole conditioning resumed on Saturday, August 12th and was conducted through Tuesday, August 15th. Additionally, on Monday, August 14th, repairs were conducted on the 24-inch FRP casing in preparation of another installation attempt. On Wednesday, August 24th, the 24-inch FRP casing installation started and was completed to a depth of 880 feet below land surface (bls) on Thursday, August 17th. The 1st stage of cementing, pressure grouting, was also conducted on Thursday.

During the next reporting period, it is anticipated that the grouting of the 24-inch FRP casing will be completed and a pressure test of the casing will be conducted.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports
Geophysical Logs

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Joe Haberfeld/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: September 5, 2006

SUBJECT: Weekly Summary No. 18
August 18, 2006 through August 24, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, August 18th, the 2nd stage of cementing the 24-inch FRP casing, tremie grouting, was conducted. The 3rd stage of grouting was attempted on Saturday, August 19th, but was postponed due to issues with the quality of the pre-mixed grout that was delivered to the site. Due to the unavailability to obtain pre-mixed grout, no cement stage was conducted on Sunday, August 20th, however the annular space between the 24-inch FRP and the reamed borehole walls was circulated using the installed tremie pipe lines. On Monday, August 21st and Tuesday, August 22nd, the 3rd and 4th stages of cementing, respectively, were conducted. A hard tag of the top of cement was conducted on Wednesday, August 23rd with the top being identified at a depth of 40 feet below land surface (bls), which is in the annular space between the 38-inch steel and the 24-inch FRP casings. The only work conducted on Thursday, August 24th was site work.

During the next reporting period, it is anticipated that a cement bond log of the grouting and a casing pressure test will be conducted.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports
Geophysical Logs

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Joe Haberfeld/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: September 12, 2006

SUBJECT: Weekly Summary No. 19
August 25, 2006 through August 31, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, August 25th, the only work conducted at the site was site work while determining the availability of a cement bond geophysical logging contractor. There was no work conducted on Saturday, August 26th or Sunday, August 27th. On Monday, August 28th, preparations were made to drill out some of the cement plug at the base of the 24-inch FRP as it encased the connection of the bottom two pieces of the casing. The only work conducted on Tuesday, August 29th and Wednesday, August 30th was preparations for the approaching Tropical Storm Ernesto. Work resumed on Thursday, August 31st as the cement plug was drilled out to a depth below the connection.

During the next reporting period, it is anticipated that the casing pressure test of the 24-inch FRP casing will be conducted and pilot hole drilling will resume below the base of the casing.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Joe Haberfeld/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: October 3, 2006

SUBJECT: Weekly Summary No. 20
September 1, 2006 through September 7, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, September 1st, the cement plug was drilled out to a depth of 872 feet below land surface, which is 6 feet below the final casing connection. Also on Friday, the remaining 40 feet of open annulus between the 38-inch and 24-inch casings was cemented to land surface. There was no work conducted on Saturday, September 2nd, Sunday, September 3rd, or Monday, September 4th, due to the Labor Day holiday weekend. On Tuesday, September 5th through Thursday, September 7th, preparations were conducted for the pressure test on the 24-inch FRP casing.

During the next reporting period, it is anticipated that the casing pressure test of the 24-inch FRP casing will be conducted and pilot hole drilling will resume below the base of the casing.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Joe Haberfeld/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: October 3, 2006

SUBJECT: Weekly Summary No. 21
September 8, 2006 through September 14, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

From Friday, September 8th through Thursday, September 14th, the entire reporting period was spent attempting to conduct a pressure test on the 24-inch FRP casing.

During the next reporting period, it is anticipated that the casing pressure test of the 24-inch FRP casing will be conducted and pilot hole drilling will resume below the base of the casing.

Attachments: Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

CH2MHILL

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Joe Haberfeld/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: October 3, 2006

SUBJECT: Weekly Summary No. 22
September 15, 2006 through September 21, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, September 15th, a total of 14.5 ft^3 of neat cement was pumped on top of the cement plug at the base of the casing to seal any leaks through plug. No work was conducted on Saturday, September 16th or Sunday, September 17th. On Monday, September 18th, the top of the cement plug was tagged at 871 feet below land surface indicating a fill-up of 1 foot. Attempts to conduct a successful pressure test were conducted on Tuesday, September 19th. On Wednesday, September 20th, a total of fifty-five 50 lb bags of bentonite pellets were dropped into the 24-inch casing as a further attempt to seal the casing plug. The remainder of the reporting period was spent on attempts to conduct a successful pressure test.

During the next reporting period, it is anticipated that the casing pressure test of the 24-inch FRP casing will be conducted and pilot hole drilling will resume below the base of the casing.

Attachments:
Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

M E M O R A N D U M

TO: Omar Lopez/FKAA
Len Fishkin/FDEP-WPB
Joe Haberfeld/FDEP-TLH
Nancy Marsh/USEPA
Chris Peters/CH2M HILL
Joe May/FDEP-WBP
Steve Anderson/SFWMD
Ron Reese/USGS
Abbey Fiallo/Metro

FROM: Mark Schilling/CH2M HILL

DATE: October 3, 2006

SUBJECT: Weekly Summary No. 23
September 22, 2006 through September 28, 2006

PROJECT: ***Florida Keys Aqueduct Authority ASR-1***
FDEP UIC Permit Number 189862-002-UC

Summary of Engineer's/Driller's Log

On Friday, September 22nd, a pressure test was conducted on the 24-inch FRP casing with the bottommost casing connection encased in bentonite pellets. The casing was pressurized to 100 psi and lost 4.5 psi over a 60-minute timeframe. The remainder of the reporting period was spent on administrative issues regarding a variance to conduct the official pressure test without testing all of the casing connections. The casing remained pressurized to 100 psi throughout this time.

During the next reporting period, it is anticipated that a request for a variance to conduct the pressure test as currently configured will be submitted to the UIC for review. Based on the response it is anticipated that the casing pressure test of the 24-inch FRP casing will be conducted and pilot hole drilling will resume below the base of the casing.

Attachments: Engineer's Daily Reports
Driller's Daily Reports
Pad Monitor Wells Water Quality Reports

APPENDIX D

Weekly Water Quality Sampling Results

KSA Environmental Laboratory, Inc.

August 21, 2007

Jaffer Associates Corp.
Attn: Mattew Block
2801 NW 6th Aveune
Miami, FL 33127

RE: J. Robert Dean Water Treatment Plant
KSA Workorder: Q005263

Dear Mattew Block,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on 07/30/07 09:50.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

This data has been produced in accordance with NELAC standards. This report shall not be reproduced except in full, without the written approval of the Laboratory.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Ivelisse Gaud
Project Manager

Enclosure(s)

10200 USA Today Way • Miramar, Florida 33025
Phone: (954) 431-4550 • Fax: (954) 431-1959

CASE NARRATIVE

KSA Work Order #: Q005263
Project Name: J. Robert Dean Water Treatment Plant

I. Sample Receiving Notes

All samples listed on the Chain of Custody identified with KSA Work Order # Q005263 were received with containers intact, correctly preserved, and at the proper temperature for the requested analyses.

EPA 300.0: The samples for Nitrate and Nitrite were initially analyzed within holding time (07/31/07); however, because of failing Q.C., the samples were re-analyzed outside of holding time. These samples were flagged with the FDEP "Q" qualifier.

EPA 300.0: The "APT Test" sample for Ortho-Phosphorous was received in holding time. The sample was analyzed within holding time but results were not satisfactory. Due to short holding time period for Orthophosphorous, the sample was re-tested outside of holding time. The sample is flagged with the FDEP "Q" qualifier.

EPA 376.1: The sample for Sulfide, Hydrogen was received within holding time; however, due to instrumentation problems, the sample was analyzed out of hold. The sample is flagged with the FDEP "Q" qualifier.

II. Analytical Data Notes

The analyses were performed in accordance with KSA Environmental Laboratory SOP's and industry-standard methodologies in compliance with FDEP/NELAC criteria. There were no notable problems encountered in the analytical process.

EPA 200.8 and SM 5910B were subcontracted to Southern Analytical Laboratories, Inc., 110 Bayview Blvd, Oldsmar, FL 34677. NELAC/FDOH #84129. Results for SM 5910B can be found in Attachment A.

EPA 552.2 was subcontracted to Advance Environmental Laboratories, Inc., 6601 Southpoint Pky., Jacksonville, FL 32216. NELAC E82574

Gross Alpha (900.0) was subcontracted to Florida Radiochemistry Services, Inc. 5456 Hoffner Ave., Suite 201, Orlando, FL 32812. NELAC/FDOH #E83033

EPA 200.7 for Silicon, was subcontracted to Florida Environmental, 1460 W. McNab Rd. Ft. Lauderdale, FL 33309. FDOH/NELAC #E86006.

III. Quality Control Notes

EPA 335.4: The MS and MSD RPD for batch 7080037 recovered high for Cyanide; however, the LCS

recovered within acceptable limits. Sample "APT Test" was positive for Cyanide and may be biased slightly high. The associated sample data is flagged with the FDEP "J" qualifier.

EPA 200.7: There was no MS and MSD recovery for Strontium. The element was not present in the spike standard.

EPA 200.7: The MS/MSD RPD for batch 7070764 exceeded laboratory guidelines for Magnesium and Potassium; however, the LCS percent recoveries were within control limits. The associated sample is flagged with the FDEP "J" qualifier.

SAMPLE SUMMARY

	Client ID	Matrix	Sampled	Received
Q005263-01	APT TEST	Drinking Water	07/29/07 00:00	07/30/07 09:50

ANALYTICAL REPORT

Sample ID:	APT TEST	Project:	J. Robert Dean Water Treatment Plant
Lab #:	Q005263-01	Work Order #:	Q005263
Sampled:	07/29/07 0:00	Matrix:	Drinking Water

Total Trihalomethanes by GC/MS

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Bromodichloromethane	0.156 ug/L	U	1	0.156	0.500	524.2	07/30/07 12:00	07/30/07 15:14	7070736
Bromoform	0.164 ug/L	U	1	0.164	0.500	524.2	07/30/07 12:00	07/30/07 15:14	7070736
Chlorodibromomethane	0.228 ug/L	U	1	0.228	0.500	524.2	07/30/07 12:00	07/30/07 15:14	7070736
Chloroform	0.301 ug/L	U	1	0.301	0.500	524.2	07/30/07 12:00	07/30/07 15:14	7070736
Trihalomethanes, Total	0.849 ug/L	U	1	0.849	2.00	524.2	07/30/07 12:00	07/30/07 15:14	7070736

Surrogate Recovery	% Recovery	% Recovery Limits	
1,2-Dichlorobenzene-d4	108 %	0-200	7070736
4-Bromofluorobenzene	102 %	80-120	7070736

Metals

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Aluminum, Total	0.035 mg/L	U	1	0.035	0.20	200.7	07/31/07 11:01	08/01/07 16:15	7070764
Barium, Total	0.0088 mg/L	I	1	0.00098	0.050	200.7	07/31/07 11:01	08/01/07 16:15	7070764
Beryllium, Total	0.0018 mg/L	U	1	0.0018	0.0040	200.7	07/31/07 11:01	08/01/07 16:15	7070764
Cadmium, Total	0.0022 mg/L	I	1	0.0021	0.0050	200.7	07/31/07 11:01	08/01/07 16:15	7070764
Calcium, Total	130 mg/L		1	0.35	1.0	200.7	07/31/07 11:01	08/01/07 16:15	7070764
Chromium, Total	0.0025 mg/L	U	1	0.0025	0.0050	200.7	07/31/07 11:01	08/01/07 16:15	7070764
Copper, Total	0.0060 mg/L	U	1	0.0060	0.010	200.7	07/31/07 11:01	08/01/07 16:15	7070764
Iron, Dissolved	0.029 mg/L	U	1	0.029	0.050	200.7	07/31/07 11:01	08/01/07 4:19	7070764
Lead	0.0016 mg/L	U	1	0.0016	0.015	3113B	07/31/07 11:02	08/03/07 14:02	7070765
Magnesium, Total	160 mg/L	J, V	5	0.17	2.5	200.7	07/31/07 11:01	08/01/07 16:15	7070764
Manganese, Dissolved	0.0034 mg/L	U	1	0.0034	0.0050	200.7	07/31/07 11:01	08/01/07 4:19	7070764
Potassium, Total	110 mg/L	J	1	0.22	1.0	200.7	07/31/07 11:01	08/01/07 16:15	7070764
Strontium, Total	5.4 mg/L		1	0.0019	1.0	200.7	07/31/07 11:01	08/01/07 16:15	7070764

Wet Chemistry

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Alkalinity	170 mg/L		1	5.0	5.0	2320- B	08/01/07 11:00	08/01/07 11:00	7080018
Bicarbonate Alkalinity	170 mg/L		1	5.0	5.0	2320- B	08/01/07 11:00	08/01/07 12:31	7080018
Carbon Dioxide	490 mg/L		1			310.1	08/08/07 10:27	08/08/07 10:27	7080203
Carbon, Total Organic	1.1 mg/L		1	0.042	0.10	5310- B	08/01/07 17:00	08/01/07 17:00	7080054
Carbonate Alkalinity	5.0 mg/L	U	1	5.0	5.0	2320- B	08/01/07 11:00	08/01/07 12:31	7080018
Chloride	2200 mg/L		100	20	40	300.0	07/30/07 14:54	07/30/07 14:54	7070768
Color	15 cu		1	2.5	2.5	2120B	07/31/07 10:45	07/31/07 10:45	7070781
Conductivity	8.69 umhos/cm		1	0.00	0.00	120.1	07/31/07 20:53	07/31/07 20:53	7080202
Cyanide	0.22 mg/L	J	1	0.0040	0.0050	335.4	07/31/07 16:00	08/01/07 16:00	7080037

ANALYTICAL REPORT

Sample ID:	APT TEST	Project:	J. Robert Dean Water Treatment Plant
Lab #:	Q005263-01	Work Order #:	Q005263
Sampled:	07/29/07 0:00	Matrix:	Drinking Water

Wet Chemistry

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Fluoride	2.6 mg/L		10	0.54	2.0	300.0	07/30/07 14:54	07/30/07 14:54	7070768
MBAS	0.20 mg/L	Q	1	0.043	0.075	SM 5540- C	07/31/07 15:08	07/31/07 15:08	7080016
Nitrogen, Ammonia (as N)	0.13 mg/L		1	0.015	0.020	350.1	07/31/07 11:00	07/31/07 11:00	7070767
Nitrogen, Ammonia (Unionizec	0.015 mg/L	U	1	0.015	0.020	DEP SOP	07/31/07 18:00	07/31/07 18:00	7070787
Nitrogen, Ammonium as NH4	0.13 mg/L		1	0.015	0.020	[CALC]	07/31/07 18:00	07/31/07 18:00	[CALC]
Nitrogen, Nitrate (as N)	1.3 mg/L	Q, U	5	1.3	4.0	300.0	08/02/07 13:31	08/02/07 13:31	7080085
Nitrogen, Nitrite (as N)	2.2 mg/L	Q, I	5	0.15	2.5	300.0	08/02/07 13:31	08/02/07 13:31	7080085
Odor	0.0 t.o.n.	U	1	0.0	0.0	140.1	07/31/07 10:45	07/31/07 10:45	7070780
Orthophosphate as P	0.031 mg/L	Q, U	1	0.031	0.093	300.0	08/16/07 11:51	08/16/07 11:51	7080479
Phosphate, Total as P	0.043 mg/L	U	1	0.043	0.30	365.4	08/02/07 14:00	08/02/07 14:00	7080075
Solids, Total Dissolved	4700 mg/L		1	8.9	10	2540- C	08/01/07 22:52	08/01/07 22:52	7080104
Solids, Total Suspended	4.0 mg/L	I	1	3.5	5.0	2540- D	07/31/07 11:35	07/31/07 14:00	7080004
Sulfate	640 mg/L		10	0.67	2.0	EPA 300.0	07/30/07 14:54	07/30/07 14:54	7070768
Sulfide, Hydrogen	0.67 mg/L	Q, U	1	0.67	2.0	376.1	08/06/07 10:30	08/06/07 10:30	7080170
Turbidity	1.7 NTU		1	0.088	0.10	180.1	07/30/07 18:50	07/30/07 18:50	7070777

Microbiology

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Plate Count (100 ml)	1.0 cfu/ml	Q, U	1	1.0	1.0	9215B	07/30/07 14:15	07/30/07 14:15	7080051

Subcontract Data

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Gross Alpha	25.0+/-7.7 pCi/L		1	9.3		900	08/01/07 0:00	08/02/07 0:00	
Gross Beta	55.0+/-8.7 pCi/L		1	12.6		900	08/01/07 0:00	08/02/07 0:00	
Radium-226	16.3+/-0.6 pCi/L		1	0.1		903.1	08/07/07 0:00	08/14/07 0:00	
Radium-228	1.1+/-0.7 pCi/L	U	1	1.1		Ra-05	08/07/07 0:00	08/14/07 0:00	
Uranium	0.9+/-0.7 pCi/L	U	1	0.9		908	08/07/07 0:00	08/08/07 0:00	

Subcontract Data - 200.8

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Antimony	0.001 mg/L	U	1	0.001		3113B		08/06/07 17:10	
Arsenic	0.001 mg/L	U	1	0.001		206.2		08/06/07 0:00	
Selenium	0.001 mg/L	U	1	0.001		3113B		08/02/07 16:24	
Thallium	0.001 mg/L	U	1	0.001		200.9		08/06/07 15:13	

ANALYTICAL REPORT

Sample ID:	APT TEST	Project:	J. Robert Dean Water Treatment Plant
Lab #:	Q005263-01	Work Order #:	Q005263
Sampled:	07/29/07 0:00	Matrix:	Drinking Water

Subcontract Data - 200.8

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Silica	6.58 mg/L		1	0.004	0.012	200.7	07/31/07 0:00	07/31/07 13:14	

Subcontract Data

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Dibromoacetic Acid	0.95 ug/L	U	1	0.95	2	552.2		08/02/07 22:19	
Dichloroacetic Acid	1.2 ug/L	U	1	1.2	2	552.2		08/02/07 22:19	
Monobromoacetic Acid	1.1 ug/L	U	1	1.1	2	552.2		08/02/07 22:19	
Monochloroacetic Acid	1.4 ug/L	U	1	1.4	2	552.2		08/02/07 22:19	
Total HAA5	5.7 ug/L	U	1	5.7	10	552.2		08/02/07 22:19	
Trichloroacetic Acid	1.2 ug/L	I	1	1.1	2	552.2		08/02/07 22:19	

QUALITY CONTROL FOR :Q005263

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Total Trihalomethanes by GC/MS - Quality Control									
Blank (7070736-BLK1)						Prepared & Analyzed: 30-Jul-07			
Bromodichloromethane	0.156	U	0.156	0.500	ug/L				
Bromoform	0.164	U	0.164	0.500	ug/L				
Chlorodibromomethane	0.228	U	0.228	0.500	ug/L				
Chloroform	0.301	U	0.301	0.500	ug/L				
Trihalomethanes, Total	0.849	U	0.849	2.00	ug/L				
Surrogate: 1,2-Dichlorobenzene-d4						*104*	*0-200*		
Surrogate: 4-Bromofluorobenzene						*98.2*	*80-120*		
Total Trihalomethanes by GC/MS - Quality Control									
LCS (7070736-BS1)						Prepared & Analyzed: 30-Jul-07			
Bromodichloromethane						86.8	70-130		
Bromoform						81.6	70-130		
Chlorodibromomethane						86.8	70-130		
Chloroform						89.4	70-130		
Trihalomethanes, Total							70-130		
Surrogate: 1,2-Dichlorobenzene-d4						*92.0*	*0-200*		
Surrogate: 4-Bromofluorobenzene						*85.2*	*70-130*		
Total Trihalomethanes by GC/MS - Quality Control									
Duplicate (7070736-DUP1)				**Source: Q005165-01**		Prepared & Analyzed: 30-Jul-07			
Bromodichloromethane	0.156	U	0.156	0.500	ug/L				200
Bromoform	0.164	U	0.164	0.500	ug/L				200
Chlorodibromomethane	0.228	U	0.228	0.500	ug/L				200
Chloroform	0.301	U	0.301	0.500	ug/L				200
Trihalomethanes, Total	0.849	U	0.849	2.00	ug/L				200
Surrogate: 1,2-Dichlorobenzene-d4						*106*	*0-200*		
Surrogate: 4-Bromofluorobenzene						*99.5*	*80-120*		
Metals - Quality Control									
Blank (7070764-BLK1)						Prepared: 31-Jul-07 Analyzed: 01-Aug-07			
Aluminum, Total	0.035	U	0.035	0.20	mg/L				
Barium, Total	0.00098	U	0.00098	0.050	mg/L				
Beryllium, Total	0.0018	U	0.0018	0.0040	mg/L				
Cadmium, Total	0.0021	U	0.0021	0.0050	mg/L				
Calcium, Total	0.35	U	0.35	1.0	mg/L				
Chromium, Total	0.0025	U	0.0025	0.0050	mg/L				
Copper, Total	0.0060	U	0.0060	0.010	mg/L				
Iron, Dissolved	0.029	U	0.029	0.050	mg/L				
Magnesium, Total	0.066	I	0.033	0.50	mg/L				
Manganese, Dissolved	0.0034	U	0.0034	0.0050	mg/L				
Potassium, Total	0.22	U	0.22	1.0	mg/L				
Strontium, Total	0.0019	U	0.0019	1.0	mg/L				

QUALITY CONTROL FOR :Q005263

Analyte	Result	MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Metals - Quality Control								
LCS (7070764-BS1)					Prepared: 31-Jul-07 Analyzed: 01-Aug-07			
Aluminum, Total					95.6	85-115		
Barium, Total					94.5	85-115		
Beryllium, Total					97.7	85-115		
Cadmium, Total					102	85-115		
Calcium, Total					99.3	85-115		
Chromium, Total					99.6	85-115		
Copper, Total					95.4	85-115		
Magnesium, Total					101	85-115		
Potassium, Total					88.2	85-115		
Strontium, Total					99.7	85-115		
Metals - Quality Control								
Matrix Spike (7070764-MS1)				**Source: Q005263-01**	Prepared: 31-Jul-07 Analyzed: 01-Aug-07			
Aluminum, Total					129	70-130		
Barium, Total					94.4	70-130		
Beryllium, Total					100	70-130		
Cadmium, Total					103	70-130		
Calcium, Total					100	70-130		
Chromium, Total					102	70-130		
Copper, Total					106	70-130		
Magnesium, Total					400	70-130		
Potassium, Total					140	70-130		
Strontium, Total						70-130		
Metals - Quality Control								
Matrix Spike Dup (7070764-MSD1)				**Source: Q005263-01**	Prepared: 31-Jul-07 Analyzed: 01-Aug-07			
Aluminum, Total					130	70-130	0.772	20
Barium, Total					94.5	70-130	0.106	20
Beryllium, Total					100	70-130	0.00	20
Cadmium, Total					103	70-130	0.00	20
Calcium, Total					200	70-130	66.7	20
Chromium, Total					102	70-130	0.00	20
Copper, Total					107	70-130	0.939	20
Magnesium, Total					700	70-130	54.5	20
Potassium, Total					140	70-130	0.00	20
Strontium, Total						70-130		20
Metals - Quality Control								
Blank (7070765-BLK1)					Prepared: 31-Jul-07 Analyzed: 03-Aug-07			
Lead	0.0016	U	0.0016	0.015 mg/L				
Metals - Quality Control								
LCS (7070765-BS1)					Prepared: 31-Jul-07 Analyzed: 03-Aug-07			
Lead					85.0	80-120		
Metals - Quality Control								
Matrix Spike (7070765-MS1)				**Source: Q005263-01**	Prepared: 31-Jul-07 Analyzed: 03-Aug-07			
Lead					99.0	75-125		
Metals - Quality Control								
Matrix Spike Dup (7070765-MSD1)				**Source: Q005263-01**	Prepared: 31-Jul-07 Analyzed: 03-Aug-07			
Lead					99.0	75-125	0.00	20

QUALITY CONTROL FOR :Q005263

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Wet Chemistry - Quality Control									
Blank (7070767-BLK1)						Prepared & Analyzed: 31-Jul-07			
Nitrogen, Ammonia (as N)	0.015	U	0.015	0.020	mg/L				
Wet Chemistry - Quality Control									
LCS (7070767-BS1)						Prepared & Analyzed: 31-Jul-07			
Nitrogen, Ammonia (as N)						90.9	90-110		
Wet Chemistry - Quality Control									
Matrix Spike (7070767-MS1)					**Source: Q005250-05**	Prepared & Analyzed: 31-Jul-07			
Nitrogen, Ammonia (as N)						127	90-110		
Wet Chemistry - Quality Control									
Matrix Spike Dup (7070767-MSD1)					**Source: Q005250-05**	Prepared & Analyzed: 31-Jul-07			
Nitrogen, Ammonia (as N)						130	90-110	2.33	20
Wet Chemistry - Quality Control									
Blank (7070768-BLK1)						Prepared & Analyzed: 30-Jul-07			
Chloride	0.20	U	0.20	0.40	mg/L				
Fluoride	0.054	U	0.054	0.20	mg/L				
Orthophosphate as P	0.031	U	0.031	0.093	mg/L				
Sulfate	0.067	U	0.067	0.20	mg/L				
Wet Chemistry - Quality Control									
LCS (7070768-BS1)						Prepared & Analyzed: 30-Jul-07			
Chloride						96.7	90-110		
Fluoride						96.2	90-110		
Orthophosphate as P							90-110		
Sulfate						97.2	90-120		
Wet Chemistry - Quality Control									
LCS Dup (7070768-BSD1)						Prepared & Analyzed: 30-Jul-07			
Chloride						97.2	90-110	0.516	20
Fluoride						97.1	90-110	0.931	20
Sulfate						97.4	90-120	0.206	20
Wet Chemistry - Quality Control									
Blank (7070777-BLK1)						Prepared & Analyzed: 30-Jul-07			
Turbidity	0.088	U	0.088	0.10	NTU				
Wet Chemistry - Quality Control									
LCS (7070777-BS1)						Prepared & Analyzed: 30-Jul-07			
Turbidity						97.5	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7070777-BSD1)						Prepared & Analyzed: 30-Jul-07			
Turbidity						97.5	90-110	0.00	20
Wet Chemistry - Quality Control									
Duplicate (7070777-DUP1)					**Source: Q005263-01**	Prepared & Analyzed: 30-Jul-07			
Turbidity	1.64		0.088	0.10	NTU			3.59	20

QUALITY CONTROL FOR :Q005263

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Wet Chemistry - Quality Control									
Blank (7070780-BLK1)						Prepared & Analyzed: 31-Jul-07			
Odor	0.0	U	0.0	0.0	t.o.n.				
Wet Chemistry - Quality Control									
Blank (7070781-BLK1)						Prepared & Analyzed: 31-Jul-07			
Color	2.5	U	2.5	2.5	cu				
Wet Chemistry - Quality Control									
LCS (7070781-BS1)						Prepared & Analyzed: 31-Jul-07			
Color						100	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7070781-BSD1)						Prepared & Analyzed: 31-Jul-07			
Color						100	80-120	0.00	20
Wet Chemistry - Quality Control									
Duplicate (7070781-DUP1)				**Source: Q005263-01**		Prepared & Analyzed: 31-Jul-07			
Color	15.0		2.5	2.5	cu			0.00	20
Wet Chemistry - Quality Control									
Blank (7080004-BLK1)						Prepared & Analyzed: 31-Jul-07			
Solids, Total Suspended	3.5	U	3.5	5.0	mg/L				
Wet Chemistry - Quality Control									
LCS (7080004-BS1)						Prepared & Analyzed: 31-Jul-07			
Solids, Total Suspended						90.7	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7080004-BSD1)						Prepared & Analyzed: 31-Jul-07			
Solids, Total Suspended						90.7	80-120	0.00	20
Wet Chemistry - Quality Control									
Duplicate (7080004-DUP1)				**Source: Q005260-01**		Prepared & Analyzed: 31-Jul-07			
Solids, Total Suspended	3.5	U	3.5	5.0	mg/L				20
Wet Chemistry - Quality Control									
Blank (7080016-BLK1)						Prepared & Analyzed: 31-Jul-07			
MBAS	0.043	U	0.043	0.075	mg/L				
Wet Chemistry - Quality Control									
LCS (7080016-BS1)						Prepared & Analyzed: 31-Jul-07			
MBAS						105	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7080016-BSD1)						Prepared & Analyzed: 31-Jul-07			
MBAS						101	90-110	3.88	20
Wet Chemistry - Quality Control									
Duplicate (7080016-DUP1)				**Source: Q005255-01**		Prepared & Analyzed: 31-Jul-07			
MBAS	0.220		0.043	0.075	mg/L			0.00	20

QUALITY CONTROL FOR :Q005263

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Wet Chemistry - Quality Control									
Blank (7080018-BLK1)						Prepared & Analyzed: 01-Aug-07			
Alkalinity	5.0	U	5.0	5.0	mg/L				
Bicarbonate Alkalinity	5.0	U	5.0	5.0	mg/L				
Carbonate Alkalinity	5.0	U	5.0	5.0	mg/L				
Wet Chemistry - Quality Control									
LCS (7080018-BS1)						Prepared & Analyzed: 01-Aug-07			
Alkalinity						100	80-120		
Bicarbonate Alkalinity						100	80-120		
Carbonate Alkalinity						100	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7080018-BSD1)						Prepared & Analyzed: 01-Aug-07			
Alkalinity						100	80-120	0.00	20
Bicarbonate Alkalinity						100	80-120	0.00	20
Carbonate Alkalinity						100	80-120	0.00	20
Wet Chemistry - Quality Control									
Duplicate (7080018-DUP1)				**Source: Q005263-01**		Prepared & Analyzed: 01-Aug-07			
Alkalinity	168		5.0	5.0	mg/L			1.18	20
Bicarbonate Alkalinity	168		5.0	5.0	mg/L			1.18	20
Carbonate Alkalinity	168		5.0	5.0	mg/L				20
Wet Chemistry - Quality Control									
Blank (7080037-BLK1)						Prepared: 31-Jul-07 Analyzed: 01-Aug-07			
Cyanide	0.0040	U	0.0040	0.0050	mg/L				
Wet Chemistry - Quality Control									
LCS (7080037-BS1)						Prepared: 31-Jul-07 Analyzed: 01-Aug-07			
Cyanide						98.9	90-110		
Wet Chemistry - Quality Control									
Matrix Spike (7080037-MS1)						Prepared: 31-Jul-07 Analyzed: 01-Aug-07			
Cyanide						136	90-110		
Wet Chemistry - Quality Control									
Matrix Spike Dup (7080037-MSD1)						Prepared: 31-Jul-07 Analyzed: 01-Aug-07			
Cyanide						227	90-110	50.1	20
Wet Chemistry - Quality Control									
Blank (7080054-BLK1)						Prepared & Analyzed: 01-Aug-07			
Carbon, Total Organic	0.042	U	0.042	0.10	mg/L				
Wet Chemistry - Quality Control									
LCS (7080054-BS1)						Prepared & Analyzed: 01-Aug-07			
Carbon, Total Organic						107	90-110		
Wet Chemistry - Quality Control									
Blank (7080085-BLK1)						Prepared & Analyzed: 02-Aug-07			
Nitrogen, Nitrate (as N)	0.27	U	0.27	0.81	mg/L				
Nitrogen, Nitrite (as N)	0.030	U	0.030	0.50	mg/L				

QUALITY CONTROL FOR :Q005263

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Wet Chemistry - Quality Control									
LCS (7080085-BS1)						Prepared & Analyzed: 02-Aug-07			
Nitrogen, Nitrate (as N)						105	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7080085-BSD1)						Prepared & Analyzed: 02-Aug-07			
Nitrogen, Nitrate (as N)						104	90-110	0.957	20
Wet Chemistry - Quality Control									
Blank (7080104-BLK1)						Prepared & Analyzed: 01-Aug-07			
Solids, Total Dissolved	8.9	U	8.9	10	mg/L				
Wet Chemistry - Quality Control									
LCS (7080104-BS1)						Prepared & Analyzed: 01-Aug-07			
Solids, Total Dissolved						92.8	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7080104-BSD1)						Prepared & Analyzed: 01-Aug-07			
Solids, Total Dissolved						93.2	80-120	0.430	30
Wet Chemistry - Quality Control									
Blank (7080170-BLK1)						Prepared & Analyzed: 06-Aug-07			
Sulfide, Hydrogen	0.67	U	0.67	2.0	mg/L				
Wet Chemistry - Quality Control									
LCS (7080170-BS1)						Prepared & Analyzed: 06-Aug-07			
Sulfide, Hydrogen						100	0-200		
Wet Chemistry - Quality Control									
LCS Dup (7080170-BSD1)						Prepared & Analyzed: 06-Aug-07			
Sulfide, Hydrogen						131	0-200	26.8	200
Wet Chemistry - Quality Control									
Blank (7080202-BLK1)						Prepared & Analyzed: 31-Jul-07			
Conductivity	0.00		0.00	0.00	umhos/cm				
Wet Chemistry - Quality Control									
LCS (7080202-BS1)						Prepared & Analyzed: 31-Jul-07			
Conductivity						106	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7080202-BSD1)						Prepared & Analyzed: 31-Jul-07			
Conductivity						106	90-110	0.00	20
Wet Chemistry - Quality Control									
Duplicate (7080202-DUP1)				**Source: Q005263-01**		Prepared & Analyzed: 31-Jul-07			
Conductivity	8.67		0.00	0.00	umhos/cm			0.230	20
Wet Chemistry - Quality Control									
Blank (7080479-BLK1)						Prepared & Analyzed: 16-Aug-07			
Orthophosphate as P	0.031	U	0.031	0.093	mg/L				

QUALITY CONTROL FOR :Q005263

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Wet Chemistry - Quality Control									
LCS (7080479-BS1)						Prepared & Analyzed: 16-Aug-07			
Orthophosphate as P							90-110		
Microbiology - Quality Control									
Blank (7080051-BLK1)						Prepared & Analyzed: 27-Jul-07			
Plate Count (100 ml)	1.0	U	1.0	1.0	cfu/ml				

NOTES AND DEFINITIONS

RPD	Relative Percent Difference
%REC	Percent Recovery
DF	Dilution Factor
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
V	Indicates the analyte was detected in both the sample and the associated method blank. The value in the method blank is not subtracted from the associated samples.
U	Indicates the compound was analyzed for but not detected.
Q	[Undefined]
J	Estimated value. See accompanying case narrative for a complete description.
I	The reported value is between the laboratory method detection limit and the reporting limit.
#	Quality control recovered outside acceptance criteria.

Q0005263

CHAIN OF CUSTODY RECORD

KSA KSA Environmental Laboratory, Inc.
10200 USA Today Way - Miramar, Florida 33025
Phone (954)431-4550 Fax (954)431-1959

Nº 5999
NELAC / FDOH # : E86349

Work Order #: _____ COC#_____
Page _____ of _____

Client Name: Saffer Associates | Phone: | Fax:

Client Address: | Site Location:

Project Contact:

Project Number/Name: J. Robert Dean Water Treatment

Sampled By (print):

Sampler's Signature:

ITEM #	SAMPLE ID	Collected DATE	Collected TIME	MATRIX	# BOTTLES	524.2 THMS 552.2	Alkalinity Bicarbonate Alkanity Carbonate	Carbon Dioxide	Conductivity	Al/Sec. Inorganics	Heterotrophic Plate	Ca, Fe, Mg, Mg Diss. K, strentium, Si	N-Ammonia sulfide TOC, Hydrogen Turbidity Phosphate, Orthophos TSS	Gross Alpha, Beta Radium, Uranium	Sample Remarks	Lab No.
1	APT TEST	7/29/07		DW	31											
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																

Matrix Code:	Preservation code
A - Air	1 - Ice
GW - Groundwater	2 - HCl
S - Soil / Sediment	3 - H2SO4
WW - Wastewater	4 - HNO3
DW - Drinking Water	5 - NaOH
SW - Surface Water	6 - ZnAcetate
SL - Sludge	0 - Other
O - Other	

← Enter Preservation code

Special Instructions & Comments:

3°C

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
				KSA	7/30/07 9:50
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

APPENDIX A

APPENDIX A

SOUTHERN ANALYTICAL LABORATORIES, INC.
110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2218

KSA Environmental Laboratory Inc.
10200 USA Today Way
Miramar, FL 33025-

August 8, 2007
Project No: 73410

Laboratory Report

Project Name	**Q005263**	
Sample Description	**Q005263-01**	
Matrix	**Drinking Water**	
SAL Sample Number	**73410.01**	
Date/Time Collected	**07/29/07**	**00:00**
Date/Time Received	**08/03/07**	**09:00**

Parameters	Units	Results	Method	Detection Limit	Date/Time Analyzed	Date/Time Prep	Analyst
Inorganics							
UV254 Absorbance	cm-1	0.019 Q1	SM 5910 B	0.005	08/07/07 15:49		RKB

SOUTHERN ANALYTICAL LABORATORIES, INC.
110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2218

KSA Environmental Laboratory Inc.
10200 USA Today Way
Miramar, FL 33025-

August 8, 2007
Project No: 73410

Laboratory Report

Footnotes

*	Test results presented in this report meet all the requirements of the NELAC standards.
**	A statement of estimated uncertainty of test results is available upon request.
Q1	Sample received and analyzed beyond the accepted holding limit at client's request.

FDOH Laboratory No. E84129
NELAP Accredited

Approved By: **Francis I. Daniels, Laboratory Director**
Leslie C. Boardman, Q. A. Manager

SUBCONTRACT CHAIN OF CUSTODY

KSA Environmental Laboratory

O005263 73410

SENDING LABORATORY:

KSA Environmental Laboratory
10200 USA Today Way
Miramar, FL 33025
Phone: 954.431.4550
Fax: 954.431.1959
Project Manager: Ivelisse Gaud

RECEIVING LABORATORY:

Southern Analytical Laboratories, Inc. (E84129)
110 Bayview Blvd
Oldsmar, FL 34677
Phone :(813) 855-1844
Fax: (813) 855-2218

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: Q005263-01	**Drinking**	**Sampled:29-Jul-07 00:00**		
SUB - UV-254	02-Aug-07 16:00	30-Jul-07 00:00		Sub to SOUTHERN ANALYTICAL
~~SUB - 200.8 Thallium~~	~~02-Aug-07 16:00~~	~~25-Jan-08 00:00~~		
~~SUB - 200.8 Selenium~~	~~02-Aug-07 16:00~~	~~25-Jan-08 00:00~~		
~~SUB - 200.8 Arsenic~~	~~02-Aug-07 16:00~~	~~25-Jan-08 00:00~~		
~~SUB - 200.8 Antimony~~	~~02-Aug-07 16:00~~	~~25-Jan-08 00:00~~		
Containers Supplied:				
1L AGU (AK)	500mL P w/HNO3 (AL)			

01

ICP 8/3/07

already sent 7/30/07

Released By: [signature] Date: 8/2/07 Received By: Fed Ex Date:

Released By: Fed Ex Date: Received By: K Nudmark Date: 8/3/07 0900

3.4

SUBCONTRACT CHAIN OF CUSTODY

KSA Environmental Laboratory

Q005263

SENDING LABORATORY:

KSA Environmental Laboratory
10200 USA Today Way
Miramar, FL 33025
Phone: 954.431.4550
Fax: 954.431.1959
Project Manager: Ivelisse Gaud

RECEIVING LABORATORY:

Florida Radiochemistry Services, Inc. (E83033)
5456 Hoffner Ave, Suite 201
Orlando, FL 32812
Phone :(407) 382-7733
Fax: -

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: Q005263-01	**Drinking**	**Sampled:29-Jul-07 00:00**		
SUB - UV-254	02-Aug-07 16:00	30-Jul-07 00:00		Sub to Florida Radiochemistry Services
SUB - Uranium	06-Aug-07 16:00	25-Jan-08 00:00		Sub to Florida Radiochemistry Services
SUB - Radium 228 (RA05)	02-Aug-07 16:00	25-Jan-08 00:00		Sub to Florida Radiochemistry Services
SUB - Radium 226 (903.1)	02-Aug-07 16:00	25-Jan-08 00:00		Sub to Florida Radiochemistry Services
SUB - Gross Beta	02-Aug-07 16:00	25-Jan-08 00:00		Sub to Florida Radiochemistry Services
SUB - Gross Alpha (900.0)	02-Aug-07 16:00	25-Jan-08 00:00		Sub to Florida Radiochemistry Services
Containers Supplied:				
1L P w/HNO3 (AA)	1L P w/HNO3 (AB)	1L P w/HNO3 (Y)	1L P w/HNO3 (Z)	

Released By	Date	Received By	Date
	7/30/07		
Released By	Date	Received By	Date

CHAIN OF CUSTODY RECORD

KSA Environmental Laboratory, Inc.
10200 USA Today Way - Miramar, Florida 33025
Phone (954)431-4550 Fax (954)431-1959

№ 5999

NELAC / FDOH # : E86349

Work Order #: _____ COC#_____

Page _____ of _____

Client Name: Salter Associates | Phone: | Fax:

Client Address: | Site Location:

Project Contact:

Project Number/Name: J. Baker + Dan Baker Treatment

Sampled By (print):

Sampler's Signature:

ITEM #	SAMPLE ID	Collected DATE	Collected TIME	MATRIX	# BOTTLES	Analysis Required: SM4.2 THMS SM5.2 HAA5	Alkalinity, Dissolved	Alkalinity, Total	Carbon Dioxide	Conductivity	pH / Sec. Electrodes	Heterotrophic Plate Count	Free Chlorine mg/L SM4.5 & Titration	Free Chlorine, Total Chlorine, Hypochlorite Solution, Titration, 7.5	Total Chlorine mg/L SM4.5 & Titration	Gross Alpha, Beta & Radium 226 & 228 Combined	Sample Remarks	Lab No.
1	APT TEST	7/29/15																
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		

← Enter Preservation code

Matrix Code:
- **A** - Air
- **GW** - Groundwater
- **S** - Soil / Sediment
- **WW** - Wastewater
- **DW** - Drinking Water
- **SW** - Surface Water
- **SL** - Sludge
- **O** - Other

Preservation code
- **1** - Ice
- **2** - HCl
- **3** - H2SO4
- **4** - HNO3
- **5** - NaOH
- **6** - ZnAcetate
- **0** - Other

Special Instructions & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
				KSA	7/29/15 9:50
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

Gerhardt M.
Witt
& Associates, Inc.

1495 Forest Hill Blvd., Suite F
West Palm Beach, Florida 33406-6073
(561) 642-9923 Fax: (561) 642-3327

Sent Via: **FAX AND U.S. MAIL**

August 8, 2007

Mr. Gary Bielak
Rotary Division Administrator
Jaffer Associates Corporation
2801 NW 6th Avenue
Miami, Florida 33127-3937

RE: FLORIDA CITY WATER TREATMENT PLANT
FKAA RO/ASR WELL NO. FKAAFC-ASR 1
MICROBIOLOGICAL RESULTS

Dear Mr. Bielak:

Enclosed are the microbiological results for the sample obtained on July 28, 2007, collected during the Silt Density Index ("SDI") testing of the Florida City Water Treatment Plant's Aquifer Storage and Recovery ("ASR") well, FKAAFC-ASR-1. This sample was taken due to the evaluated SDI values being above the desired maximum of three (3). The samples were collected aseptically and delivered to Micrim Labs, Inc. ("Micrim") for analysis. The following is a short technical discussion of the results.

EXPLANATION OF MICROBIOLOGICAL TEST PARAMETERS

HPC: Heterotrophic Plate Count. This is an estimate of the number of heterotrophic bacteria found in the water sample. Heterotrophic bacteria are bacteria that utilize organic substances as principal sources of energy for growth and reproduction. This includes most bacteria encountered in nature. The HPC is reported in colony forming units per milliliter ("CFU/mL") and represents the number of viable organisms per milliliter of water. (*Standard Methods* 9215B)

TCC: Total Coliform Count. This is an estimate of the number of coliform bacteria present in the water sample. Coliform bacteria are defined as bacteria capable of fermenting lactose to acid and gas within 48 hours at 35°C (95°F). The presence of coliform bacteria indicates the presence of contaminating waste in the water sample. The

TCC is measured in colony forming units per 100 milliliters of water ("CFU/100mL"). (*Standard Methods* 9222B)

FCC: Fecal Coliform Count. This is an estimate of the number of fecal coliform bacteria present in the water sample. Fecal coliform bacteria are differentiated from total coliform bacteria by the fermentation of lactose to acid and gas within 24 hours at 44.5°C (112°F). The most widely known and often isolated fecal coliform is *Escherichia coli* (*"E. coli"*). Fecal coliforms are an indication of fecal contamination of the water sample. The FCC is measured in colony forming units per 100 milliliters of water ("CFU/100mL"). (*Standard Methods* 9222D)

Bacterial I.D.: This is a list of all of the bacterial species that were isolated (grown) from the sample.

TFC: Total Fungal Count. This is an estimate of the number of the fungal organisms found in the water sample. The TFC is measured in colony forming units per 100 milliliters of water ("CFU/100mL"). (*Standard Methods* 9215D)

Fungal I.D.: This is a list of all of the fungal species that were isolated from the sample. Certain types of fungi are considered pathogenic organisms.

Algal I.D.: This is a list of the algal morphologies that were identified by direct microscopic examination of the sample. The presence of algae in a water sample from a well usually indicates that there is a direct connection between the well and a surface water source. In addition to algae, bacterial species that are difficult to grow in the laboratory environment but are distinguishable by microscopic examination (such as the iron bacteria *Gallionella ferruginea* and *Sphaerotilus natans*) will also be identified in this section, if noted in the sample.

MICROBIOLOGICAL SAMPLE RESULTS

Five (5) bacterial species, one (1) fungal species, and one (1) yeast species were isolated from the water samples. All of the bacterial, fungal, and yeast species isolated occur naturally in soil and water sources. Two (2) of the bacterial species, *Bacillus sp* and *Klebsiella pneumoniae,* are

considered environmental contaminants. Three (3) of the bacterial species, *Klebsiella pneumoniae, Chryseomonas luteola,* and *Proteus mirabilis,* the fungal species, *Bipolaris sp,* and the yeast species *Rhodotorula aglutinus,* are considered opportunistic pathogens capable of causing disease in debilitated or susceptible people. No algal morphologies were observed, as would be expected from a Floridan aquifer water source in Southeast Florida. Three (3) of the bacterial species isolated, *Pseudomonas stutzeri, Chryseomonas luteola,* and *Klebsiella pneumoniae,* are considered biofouling organisms capable of producing biofilms by the production of extracellular polymeric substances such as alginate and capsules. Several significant problems can be caused by the presence of these biofilms (Characklis and Marshall, 1990):

1. Reduced Flow

   Biofilms can form in distribution pipes, column pipes, membranes, well screens, and the formation. The presence of biofilms in these locations will restrict water flow, thereby increasing energy costs for water withdrawal and transport.

2. Increased Capital Cost

   There are several ways that biofouling may lead to increased capital costs. First, additional extraction wells will be required to compensate for reduced flow. Second, unscheduled downtime and extended turnaround times to clean biofouled equipment will result in the use of expensive, temporary measures to compensate. Third, and most important, replacement of equipment due to biofouling and/or corrosion will be required prematurely. For example, a nuclear power plant had to replace a condenser after approximately six (6) years of operation because of severe corrosion due, in part, to microbial action (Geesey, et. al., 1994). The presence of biofilms can initiate and increase the rate of corrosion of certain materials, especially ferrous materials such as iron and stainless steel. Listed below are the main mechanisms of microbiologically influenced corrosion (Videla, 1996).

   a. Production of corrosive metabolites: Certain bacteria directly and/or indirectly produce acids or other corrosion enhancing products as a by-product of metabolism. These products can include hydrogen sulfide produced by sulfur-reducing bacteria (Cullimore, 1993), strong acids such as sulfuric acid produced by sulfur-oxidizing bacteria, and weak organic acids

produced by some *Pseudomonas*. The biofilm will trap and concentrate these corrosive by-products near the metal surface, thereby enhancing their corrosive action on the metal.

b. Establishment of differential aeration cells: As a biofilm matures, the areas around and beneath the biofilm will become depleted of oxygen. Areas of gelatination, and depleted oxygen will become anodic and will release metal ions to cathodic regions (oxygenated regions). In addition, the areas of depleted oxygen will be suitable environments for destructive anaerobic bacteria such as the sulfur-reducing bacteria.

3. Health Issues

Certain bacterial species that form biofilms are pathogenic to humans. The nature of the biofilm helps prevent the effective action of biocides and allows potentially harmful bacteria to flourish in biofouled systems.

Microbiological Results (attached) lists the results from the microbiological sample obtained from Florida City's ASR well, FKAA-ASR-1. The HPC for the sample was 20 CFU/mL, as can be seen in the attached data. The TCC for the sample was 7 CFU /100mL. The FCC was less than one (1) CFU/100mL. The TFC was 2 CFU/100mL. These final counts do not indicate a significant presence of fungal organisms in the ASR well water. However, the HPC count indicates the presence of biofouling organisms in the well water. The presence of the *Pseudomonas, Klebsiella,* and *Chryseomonas* species indicates a possible biofouling concern. There were no algal morphologies present, as is expected of the Floridan Aquifer System in Southeast Florida, as previously mentioned.

GMW&A's opinion is that these microbiological results demonstrate the potential reason for the high SDI results during the pre colloidal filter phase of the SDI testing. These results also indicate a necessity for CH2M Hill, The Florida Keys Aquifer Authority, or Jaffer Associates Corporation to disinfect the Florida City Water Treatment Plant well, FKAAFC-ASR-1.

Gerhardt M.
Witt
& Associates, Inc.

Should you have any questions, please call.

Respectfully,

GERHARDT M. WITT & ASSOCIATES, INC

Gerhardt M. Witt P.G. 08-08-07
Principal Hydrogeologist #347

c: Mathew Bloock, Jaffer Associates Corporation
Ivan Irizarry, Gerhardt M. Witt and Associates

MICRIM LABS INC.

TEST RESULT

REPORT NUMBER: E07G570-E07G575

DATE RECEIVED: 07-28-07

PROJECT NAME: CF WWTP

LAB I.D. CLIA # 10D0282547
HRS: 900001156
HRS: E86773

GERHARDT WITT
ATTN: IVAN IRIZARRY
1495 FOREST HILL BLVD STE. F
WEST PALM BEACH, FL 33406-6073

TEL: (561) 642-9923
FAX: (561) 642-3327

COMMENTS OR FINDINGS

PARAMETER	RESULTS	UNITS	METHOD
HPC:	20 CFU / ML		SM9215B
BACTERIAL IDENTIFICATION:	KLEBSIELLA PNEUMONIAE PSEUDOMONAS STUTZERI CHRYSEOMONAS LUTEOLA PROTEUS MIRABILIS BACILLUS SP.		SM9215D
TFC:	2 CFU/ 100 ML BIPOLARIS SP. YEAST: RHODOTORULA AGLUTINUS		SM9610H
	NO ALGAL MORPHOLOGIES SEEN		SM102000C
TCC:	7 CFU/ 100 ML		SM 9222 B
FCC:	< 1 CFU / 100 ML		SM9222D

[redacted]
J.V. Pisoni PhD
LABORATORY DIRECTOR

ALL ANALYSES CONFORM TO NELAC STANDARDS

SET UP DATE/TIME	ANALYSIS DATE	REPORTED DATE	ANALYST
07-28-07	08-04-07	08-04-07	

Gerhardt M.
Witt
& Associates, Inc.

1495 Forest Hill Blvd., Suite F
West Palm Beach, Florida 33406-6073
(561) 642-9923 Fax: (561) 642-3327

Sent via: **FAX AND U.S. MAIL**

August 3, 2007

Mr. Gary Bielak
Vice President
Rotary Division Administrator
Jaffer Associates Corporation
2801 NW 6th Avenue
Miami, Florida 33127-3937

RE: FLORIDA CITY WATER TREATMENT PLANT
FKAA RO/ASR WELL FKAAFC-ASR-1
SILT DENSITY INDEX AND SAND TESTING, AND BACTERIOLOGIC RESULTS

Dear Mr. Bielak:

On July 26, 2007, Jaffer Associates Corporation ("Jaffer") hired Gerhardt M. Witt and Associates, Inc. ("GMW&A") to perform silt density index ("SDI") and sand testing on one of the Florida City Water Treatment Plant's ("FCWTP") wells. GMW&A also obtained a microbiological sample from the well per Jaffer's instructions. The results of the testing and sampling are provided herein.

1.0 FIELD PROCEDURE

GMW&A was informed that the test was scheduled by Mr. Mark Schilling of CH2M Hill and Mr. Matthew Bloock, Field Superintendent of Jaffer, for Saturday, July 28, 2007, at 10:00 AM. Mr. Ivan Irizarry, Hydrogeologist of GMW&A, was assigned to perform the tests, and he arrived on-site at 10:00 AM. Mr. Irizarry was under the supervision of Mr. Gerhardt M. Witt, P.G., Principal Hydrogeologist of GMW&A.

After receiving instructions from Mr. Bloock on where to perform the SDI testing, Mr. Irizarry proceeded to assemble the colloidal SDI testing apparatus. After the initial assembly of the apparatus, Mr. Irizarry inquired about the size of the sample tap, to which the apparatus would be connected. He was informed by one of the site engineers from CH2M Hill that the tap was a one and one-half (1 ½) inch ball valve. Mr. Irizarry informed Mr. Bloock and Mr. Schilling that he did not have the adapter needed for that tap size and that he would go to a hardware store to obtain one. Mr. Irizarry left the site at 10:30 AM to obtain the necessary parts. While Mr. Irizarry was offsite,

Mr. Bloock called to inform Mr. Irizarry that he would be offsite for the remainder of the day. Mr Irizarry returned to the site at 10:58 AM, at which point Mr. Schilling was also going offsite. After inspecting the sample tap, Mr. Irizarry pointed out that Mr. Schilling had given him the incorrect tap size, and that it would be necessary to leave the site again in order to acquire the correct pieces for the assembly. Mr. Irizarry returned to the site at 11:42 AM. The colloidal SDI and sand tests were commenced at 12:04 PM.

2.0 SAND TESTING

A 30-minute sand test was performed on a Florida Keys Aqueduct Authority ("FKAA") production well in conjunction with a 72-hour pump test. The sand testing was performed using a Rossum Sand Tester. The Rossum Sand Tester, manufactured by Rosco Moss, is the American Water Works Association ("AWWA") standard to measure sand concentrations.

The purpose of sand testing is to determine the amount of sand being pumped from a well. This is important because sand, especially quartz sand, can adversely affect the longevity of pumps, motors, column pipes, and pipe lines due to its ability to abrade steel. The abrasion then has the ability to create points of potential corrosion by both electrolysis and bacteria. In a membrane plant, sand can also clog pre-filters (if present in the plant, or the membranes themselves if no pre-filters exist), and therefore sand production should be avoided. Sufficient removal of material from the aquifer can cause catastrophic collapse of the formation.

2.1 SAND STANDARDS

Under normal operating conditions, the concentration of sand produced by a water supply well should be less than the AWWA Standard for Water Wells A100-06 of 5.0 mg/L. Any recommendations for limiting sediment concentration must take into account the water use, the method of treatment, the type of sediment, and the source of the sediment. The U.S. Environmental Protection Agency and the National Water Well Association (1975) have recommended the following limits:

A. 1 mg/L — water to be used directly in contact with, or in the processing of, food and beverages.

B. 5 mg/L — water for homes, institutions, municipalities, and industries.

C. 10 mg/L — water for sprinkler irrigation systems, industrial evaporative cooling systems, and other uses where a moderate amount of sand is not especially harmful.

D. 15 mg/L — water for flood-type irrigation and where the nature of the water-bearing formations and the overlying strata are such that pumping this amount of sand will not seriously shorten the useful life of the well.

The limits suggest reasonable goals that can be achieved if good well design, construction, and development practices are followed. In older wells or wells in problem aquifers, a well may pump unacceptable amounts of sediment. If the well cannot be redeveloped by conventional techniques, a special sand separator can be installed as a permanent part of the well system. Although sand separators are efficient, they may not remove all sediment and should not be used as a substitute for good well design and construction practices.

There is no current standard for sand production for a membrane process well. However, sand can adversely impact the life expectancy of the pre-filters. Good well design and velocity control (less than 2.5 fps, GMW&A, 1993, or 3.0 fps, Missimer, 1994 for a membrane plant, and less than 5.0 fps in a non-membrane plant, according to AWWA standards) may limit sand production in a well. GMW&A recommends sand concentrations be maintained below 1.0 mg/L for reverse osmosis ("R.O.") production wells. The high velocities that are obtainable in the wells are possible under a number of occurrences. These occurrences are based on a number of functions, which may include induration of rock and/or the natural pore hole size below the casing. Velocities for an injection well or a water supply/irrigation well can be 10 to 12 fps provided that the appropriate analysis is performed. However, with certain high velocities, around 18 fps, and in certain types of casing cement, an unsuspended pipe harmonic hum can occur. Therefore, the velocity should be based on a number of factors including geologic, hydrologic, casing material, cement type, and rock stability and integrity. Minerals may be composed of quartz (SiO_2), Calcite ($CaCO_3$), Dolomite ($CaMg(CO_3)_2$) and others.

2.2 SAND TESTING PROCEDURES

Approximately 0.3 gallons per minute ("gpm") of water were diverted through the sand separator during the test. Upon completion of the 30 minute test, the sand that collected in the centrifuge tube of the Rossum Sand Tester was removed. These sand samples were dried and analyzed for weight. Sand is defined by a grain size range, and it may consist of any mineral that is consistent with that size range.

The amount of sand produced in milligrams per liter for each individual pumping rate is determined by the following equation *(Witt, 1984)*:

$$S = \frac{S_{wt}(1000)}{3.785Qt} \qquad (2.1)$$

where:

S	=	sand content, milligrams per liter
S_{wt}	=	weight of sand, grams
1000	=	equation constant, milligrams per gram
3.785	=	equation constant, liters per gallon
Q	=	rate through the sand separator, gallons per minute
t	=	time, minutes

The well was in the midst of being pumped for a period of 72 hours for a pump test. The sand was collected during the 48th hour of the pump test. The amount of sand that would be pumped during normal operation is reasonably reflected in the 30 minute sand sample. This sample is a realistic figure for the quantity of sand which will be produced during normal well operations.

It should be noted that the Rossum Sand Tester only removes sand particles in the range of 6.35 mm to 74 microns, and it does so with ninety-eight percent (98%) efficiency. This means that only particles less than 74 microns in diameter will pass through the sand separator and into a pre-filter in a membrane plant, which screens particles that are greater than 5.0 microns in size.

2.3 RESULTS OF SAND TESTING

The sand test was performed on Florida City's Floridan well, FKAAFC-ASR-1, during a 72-hour pump test using a Rossum Sand Tester. The sand concentration was 8.8 mg/L for the 30 minute sample.

Table 2-1: Sand Test Results presents the concentration of sand produced by the well during the 30 minute sand test.

Table 2-1
Sand Test Results

Test Number	Well No. 14	
	Pumping Rate (gpm)	Sand Concentration (mg/L)
30 min	2,500	8.8

3.0 SILT DENSITY INDEX TESTING

Silt Density Index ("SDI") testing, ASTM Standard D-4189, is an empirical measurement to test for the potential of silt, colloidals, bacteria, and other substances to foul a membrane at a pressure of 30 pounds per square inch ("psi"). The SDI test simply measures the decay in flow rate through a 47-millimeter ("mm") diameter, 0.45-micron ("μm") pore size membrane. The 0.45-micron membrane is used because it is more susceptible to clogging from colloidal matter than from hard particles such as sand and scale. Furthermore, the 0.45-micron size is smaller than the 5.0-micron size of the pre-filter, and therefore measures particles that would pass through the pre-filter and clog the membrane. (The membrane is approximately 0.5 microns in size.) The measured decay in flow rate is converted to a number between 1 and 100 (a general setup of the apparatus is included as Figure 1).

The SDI number is a function of the rate at which the filter (membrane) clogs with silt and colloidal material. The larger the SDI number, the greater the fouling tendency of the water. "*Generally, RO systems operating on feed water supplies with SDI values less than 1 run for years without problems, and those operating on supplies with SDI values less than 3 run for months without need*

of membrane cleaning. However, systems operating on supplies with values between 3 and 5 are cleaned regularly and are often considered problem systems. SDI values greater than 5 are not acceptable at this time." (Amjad, 1993)

During SDI testing of the ASR well, a colloidal filter was installed and SDI's were taken before and after the water had passed through the colloidal filter. The filter pore spaces are 5.0 microns in size. This colloidal filter size allows the capture of most clay- and silt-sized particles. This apparatus may be observed in Figure 2, as copyrighted by G. M. Witt on May 1994. The Rossum Sand Tester, which can be seen in Figure 3, was added to the apparatus to perform the aforementioned sand test.

3.1 CALCULATIONS

In order to calculate the SDI of a given water, the following formula is used:

$$SDI = \left(1 - \frac{T_1}{T_F}\right) \times 100 \div T_T \qquad \textbf{(3.1)}$$

where:

SDI	=	Silt Density Index (an empirical number between 1 and 100)
T_I	=	the initial time to fill 500 milliliters, seconds
T_F	=	the final time to fill 500 milliliters, seconds
T_T	=	the total time test is performed, minutes

In order to calculate the SDI if there is a break in the flow through the filter before the 15 minutes is over (meaning that the 0.45 micron membrane is clogged), the following formula is used:

$$SDI = \frac{100\%\, pluggage}{time} \qquad \textbf{(3.2)}$$

In this case, time is the amount of time it took for the filter to completely clog (causing a break in flow) from the beginning of the test.

3.2 RESULTS OF SDI TESTING

Three (3) SDI tests were performed on the new ASR well, and SDI values were obtained both before and after water passed through the 5.0 micron colloidal filter. **Table 3-1: SDI Results** presents the results of the SDI testing.

Pre- and post-colloidal filter SDI's were obtained three (3) times during the testing. The SDI values were above the desired 3.00 in each pre-filter test, ranging from 9 to 15. The post-colloidal SDI values ranged from 0.06 to 0.07. Only two post colloidal SDI's were collected due to failure of the pipe that connected the SDI filter to the colloidal pipe. The higher value of 0.07 occurred during the second test, which had the highest back pressure of the three (3) tests, 30 psi for the pre-filter sample port and 25 psi for the post filter sample port (30 psi for each is ideal). The SDI values of the pre-filter test compared to the corresponding post-filter test indicate that the size of a significant portion of the particles flowing through the testing apparatus was greater than 5.0 microns.

Table 3-1
SDI Results

Test Number	Pre / Post Filter	FKAAFC-ASR-1 SDI
Test 1	Pre	10
	Post	N/A
Test 2	Pre	15
	Post	0.074
Test 3	Pre	9
	Post	0.06

Based on the SDI test results for Well FKAA-FC-ASR-1, membrane fouling due to these silt sized particles may be a significant concern if pre-filters are not used to trap these particles prior to their entering the membrane. Continued development of the well as it is pumped may decrease the SDI values, however this will not be certain until the well has been in production for some time. SDI values are a function of a number of parameters, including particles 0.45 microns and larger. In

deep wells, which do not usually contain silt, the SDI values are generally low. According to Amjad, et al., 1993:

"The Silt Density Index (SDI) is the only widely accepted test for fouling prediction in the RO industry (Potts et al. 1981). A correlation of SDI data with biofouling is not yet established. However, a high SDI always has to be considered as an alarm sign, whereas a low SDI does not necessarily indicate the absence of a fouling potential (Nagel 1990)."

FKAAFC-ASR-1 was not disinfected before the testing was performed according to personal communication between Mr. Gary Witt, of GMW&A, and Mr. Gary Bielak, of Jaffer. Bacteria range from 0.5 to 2.0 microns in size. Silt has a size range of greater than 3.9 microns. Therefore, some silt and bacteria may be clogging the SDI filter. The high SDI values in FKAAFC-ASR-1 may have been due to biofouling and the fact that the test pump did not have a slow start function (water hammer). The SDI values were decreasing over time, and were being lowered to an acceptable value with the use of a pre-filter, as is obvious in the data. This concern should be addressed in an appropriate manner by the Engineer.

3.3 UPHOLE VELOCITY

One method of controlling the SDI is through the regulation of the uphole velocity of water in the well. Decreasing the velocity will decrease the SDI of the water. For membrane processes, an uphole velocity of less than 2.5 feet per second (GMWA 1993, 3.00 fps, Missimer 1994) ("fps") is recommended. The following formula is used to calculate the uphole velocity (Heald, 1994):

$$V = \frac{.4085\ Q}{d^2} \qquad \textbf{(3.3)}$$

where:

V	=	uphole velocity, feet per second
Q	=	pumpage rate, gallons per minute
d	=	inner diameter of the well, inches

Gerhardt M.
Witt
& Associates, Inc.

Using the pumping rate of 2,500 gpm used during the test, and a pipe minimum inner diameter of 24 inches, the calculation yields an uphole velocity of 1.77 fps for the new production well.

Should you have any questions, please call.

Respectfully yours,

GERHARDT M. WITT & ASSOCIATES, INC.

Gerhardt M. Witt, P.G. 08-03-07
Principal Hydrogeologist #347

c: Matthew Bloock, Jaffer Associates Corporation

Silt Density Index Apparatus

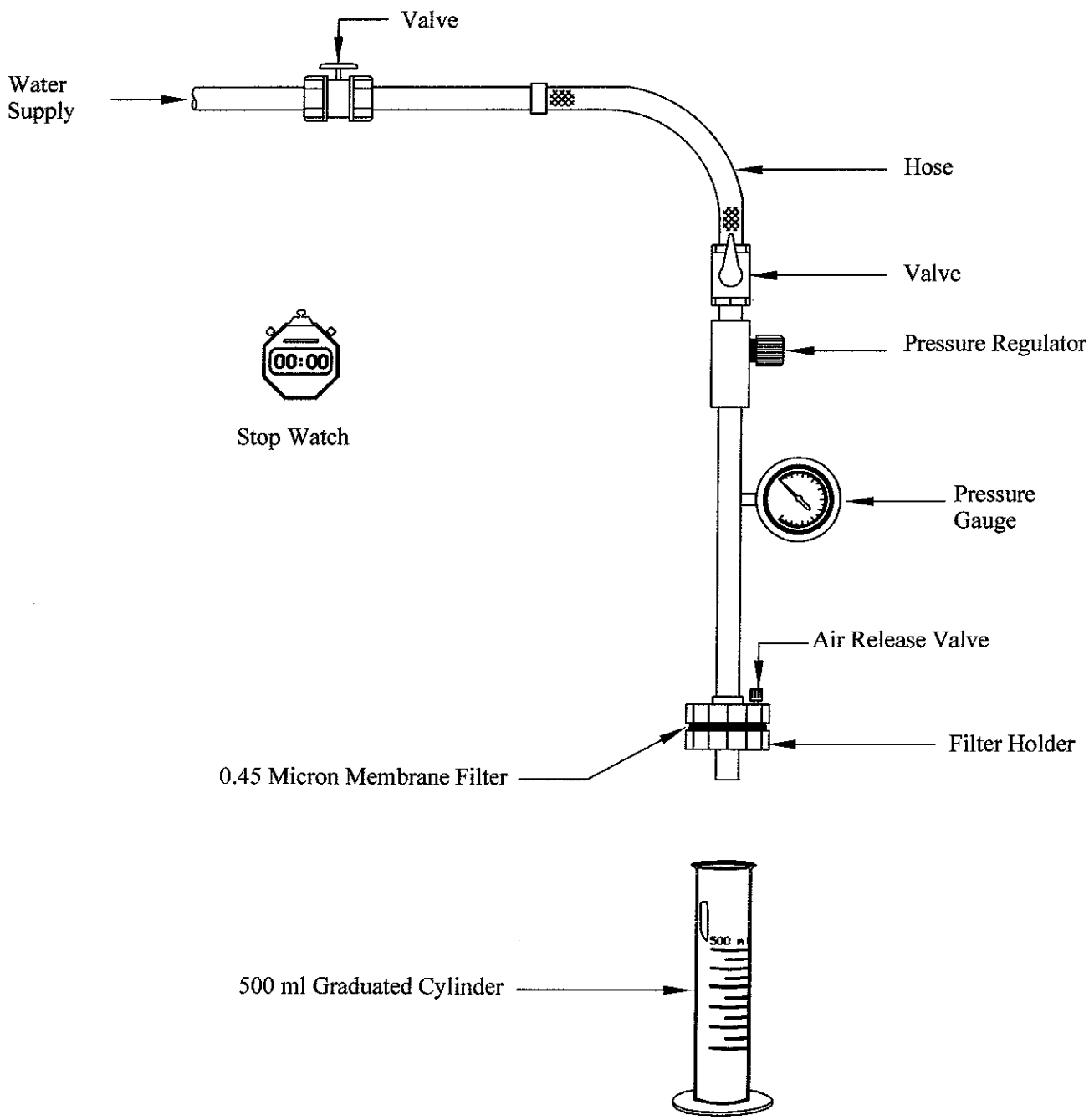


Figure 1

Gerhardt M. Witt & Associates, Inc.

Colloidal Tester

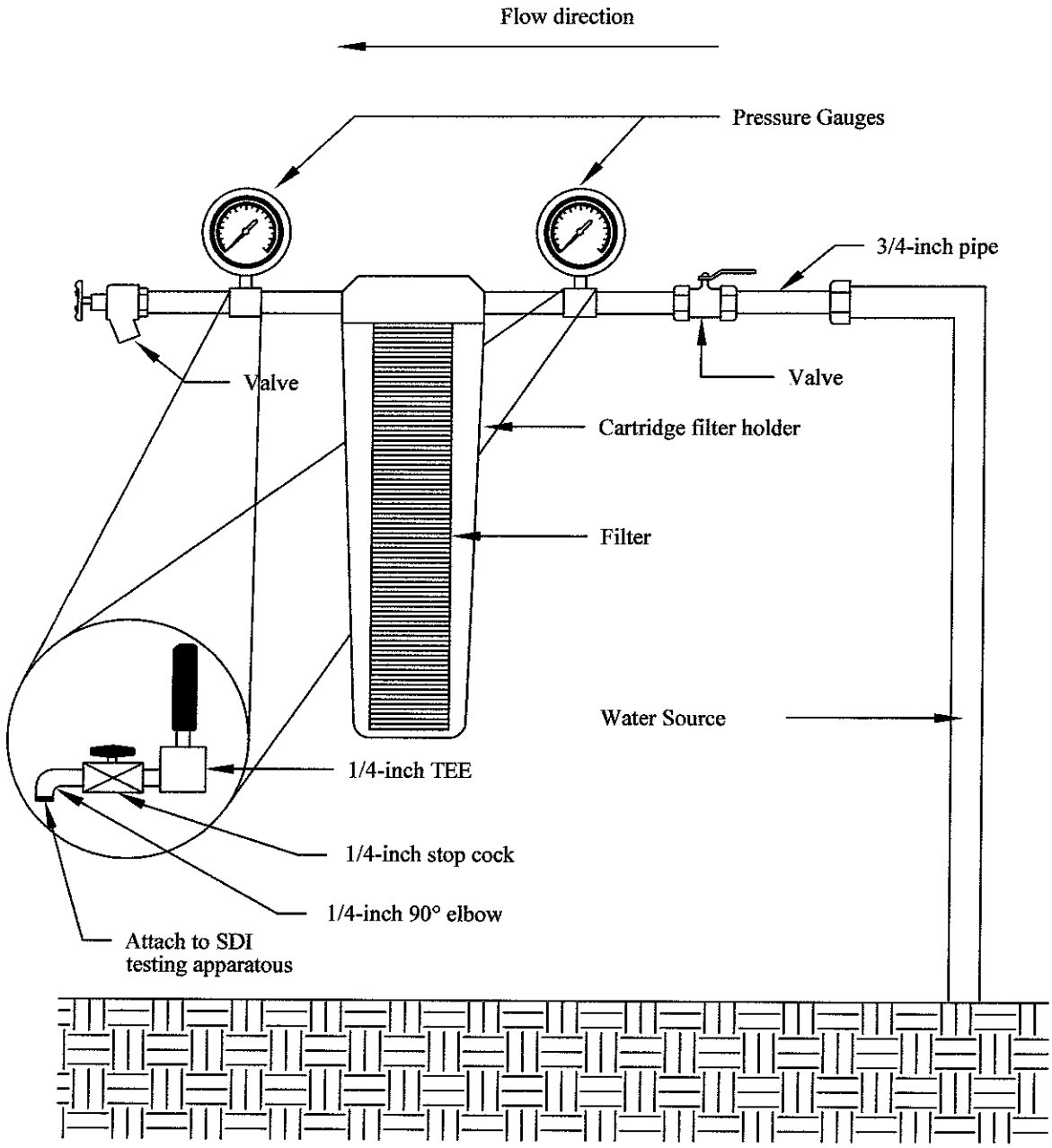
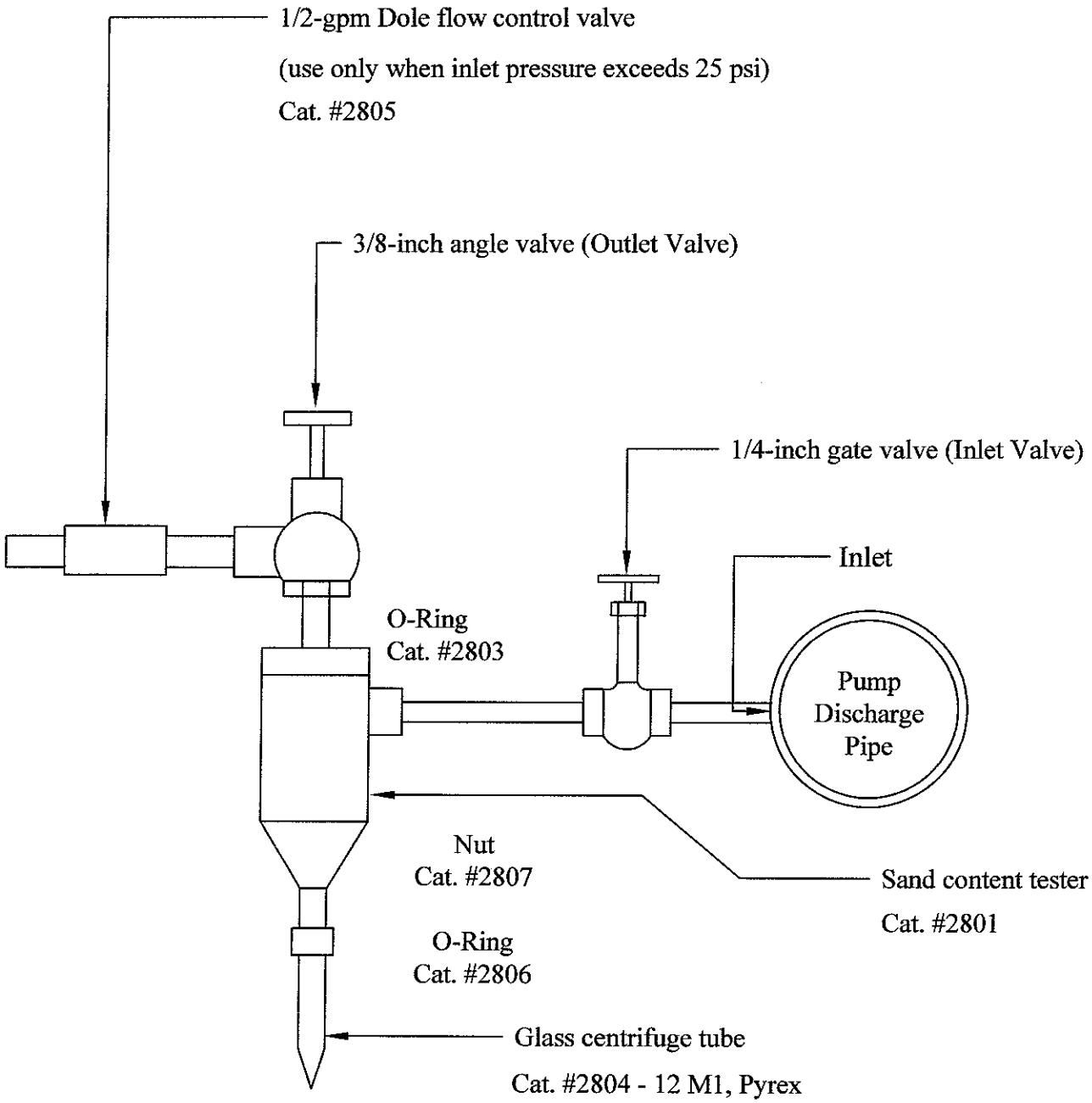


Figure 2

Gerhardt M. Witt & Associates, Inc.

Rossum Sand Tester



*From AWWA Standards A100-97

Figure 3

Gerhardt M. Witt & Associates, Inc.

Project: Florida Keys Aqueduct Authority (FKAA) ASR (UIC Permit # 189862-002-UC)

Surficial Monitor Well Water Quality Data
Northeast Pad Monitor Well

Date	Time (hours)	Depth to Water (ft-btoc)	Elevation (NGVD)	Depth to Water (NGVD)	Conductivity (umhos/cm)	Chloride (mg/L)	TDS (mg/L)	Temperature (degrees C)	Remarks	Sampled By
4/11/2006	1400	9.47	11.03	1.56	609	20	451	24.0	Initial sampling before drilling begins.	CH2M/FKAA
4/25/2006	0838	9.50	11.03	1.53	611	21	452	23.0		CH2M/FKAA
5/4/2006	1005	9.47	11.03	1.56	590	22	437	23.0		CH2M/FKAA
5/8/2006	1120	9.40	11.03	1.63	594	22	440	23.0		CH2M/FKAA
5/12/2006	0945	9.23	11.03	1.80	597	24	442	23.0		CH2M/FKAA
5/19/2006	1300	8.60	11.03	2.43	604	34	447	22.0		CH2M/FKAA
5/26/2006	1030	8.58	11.03	2.45	610	36	451	23.0		CH2M/FKAA
6/2/2006	0900	8.57	11.03	2.46	612	36	453	22.0		CH2M/FKAA
6/9/2006	0850	8.86	11.03	2.17	609	38	451	22.0		CH2M/FKAA
6/16/2006	0820	8.82	11.03	2.21	619	17	458	22.0		CH2M/FKAA
6/23/2006	0830	9.11	11.03	1.92	621	31	460	23.0		CH2M/FKAA
7/5/2006	1000	8.89	11.03	2.14	618	30	457	23.0		CH2M/FKAA
7/10/2006	1340	8.73	11.03	2.30	624	32	462	24.0		CH2M/FKAA
7/19/2006	1505	8.51	11.03	2.52	609	30	451	23.0		CH2M/FKAA
7/26/2006	1000	8.58	11.03	2.45	616	32	456	24.0		FKAA
8/1/2006	1045	8.62	11.03	2.41	628	29	465	23.0		CH2M/FKAA
8/8/2006	0910	8.61	11.03	2.42	625	30	463	24.0		CH2M/FKAA
8/14/2006	0855	8.47	11.03	2.56	618	30	457	23.0		CH2M/FKAA
8/23/2006	1100	8.42	11.03	2.61	619	29	458	23.0		CH2M/FKAA
8/31/2006	0830	8.43	11.03	2.60	618	31	457	23.0		CH2M/FKAA
9/7/2006	1440	8.55	11.03	2.48	625	32	463	24.0		CH2M/FKAA
9/11/2006	1410	8.50	11.03	2.53	620	30	459	23.0		CH2M/FKAA
9/21/2006	1610	8.48	11.03	2.55	621	29	460	24.0		CH2M/FKAA
9/27/2006	1325	8.52	11.03	2.51	623	31	461	23.0		CH2M/FKAA

ft-btoc: feet below top of casing
umhos/cm: micromhos per centimeter
mg/L: milligrams per liter
C: Celsius
S.U.: standard units
TOC: Top of Casing

Project: Florida Keys Aqueduct Authority (FKAA) ASR (UIC Permit # 189862-002-UC)

Surficial Monitor Well Water Quality Data
Northwest Pad Monitor Well

Date	Time (hours)	Depth to Water (ft-btoc)	Elevation (NGVD)	Depth to Water (NGVD)	Conductivity (umhos/cm)	Chloride (mg/L)	TDS (mg/L)	Temperature (degrees C)	Remarks	Sampled By
4/11/2006	1440	8.78	10.50	1.72	615	20	455	24.0	Initial sampling before drilling begins.	CH2M/FKAA
4/25/2006	0830	8.93	10.50	1.57	617	20	457	23.0		CH2M/FKAA
5/4/2006	1020	8.90	10.50	1.60	596	24	441	22.0		CH2M/FKAA
5/8/2006	1130	8.84	10.50	1.66	604	23	447	23.0		CH2M/FKAA
5/12/2006	0930	8.69	10.50	1.81	603	26	446	22.0		CH2M/FKAA
5/19/2006	1315	8.04	10.50	2.46	608	36	450	22.0		CH2M/FKAA
5/26/2006	1020	8.02	10.50	2.48	606	34	448	23.0		CH2M/FKAA
6/2/2006	0910	8.02	10.50	2.48	612	33	453	23.0		CH2M/FKAA
6/9/2006	0900	8.32	10.50	2.18	610	31	451	22.0		CH2M/FKAA
6/16/2006	0830	8.24	10.50	2.26	586	32	434	22.0		CH2M/FKAA
6/23/2006	0820	8.58	10.50	1.92	624	36	462	23.0		CH2M/FKAA
7/5/2006	0950	8.40	10.50	2.10	612	34	453	23.0		CH2M/FKAA
7/10/2006	1330	8.25	10.50	2.25	621	33	460	23.0		CH2M/FKAA
7/19/2006	1455	7.98	10.50	2.52	602	29	445	23.0		CH2M/FKAA
7/26/2006	1010	8.07	10.50	2.43	615	31	455	24.0		FKAA
8/1/2006	1055	8.12	10.50	2.38	621	32	460	23.0		CH2M/FKAA
8/8/2006	0920	8.09	10.50	2.41	619	29	458	24.0		CH2M/FKAA
8/14/2006	0905	7.96	10.50	2.54	603	25	446	23.0		CH2M/FKAA
8/23/2006	1115	7.92	10.50	2.58	600	26	444	24.0		CH2M/FKAA
8/31/2006	0840	7.94	10.50	2.56	609	28	451	23.0		CH2M/FKAA
9/7/2006	1450	8.05	10.50	2.45	621	32	460	24.0		CH2M/FKAA
9/11/2006	1420	7.99	10.50	2.51	614	28	454	24.0		CH2M/FKAA
9/21/2006	1620	7.96	10.50	2.54	612	27	453	23.0		CH2M/FKAA
9/27/2001	1335	8.00	10.50	2.50	615	29	455	23.0		CH2M/FKAA

ft-btoc:	feet below top of casing
umhos/cm:	micromhos per centimeter
mg/L:	milligrams per liter
C:	Celsius
S.U.:	standard units
TOC:	Top of Casing

Project: Florida Keys Aqueduct Authority (FKAA) ASR (UIC Permit # 189862-002-UC)

Surficial Monitor Well Water Quality Data
Southeast Pad Monitor Well

Date	Time (hours)	Depth to Water (ft-btoc)	Elevation (NGVD)	Depth to Water (NGVD)	Conductivity (umhos/cm)	Chloride (mg/L)	TDS (mg/L)	Temperature (degrees C)	Remarks	Sampled By
4/11/2006	1450	9.97	10.82	0.85	615	20	455	24.0	Initial sampling before drilling begins.	CH2M/FKAA
4/25/2006	0815	10.31	10.82	0.51	619	21	458	23.0		CH2M/FKAA
5/4/2006	0950	10.25	10.82	0.57	593	22	439	22.0		CH2M/FKAA
5/8/2006	1110	10.18	10.82	0.64	597	21	442	23.0		CH2M/FKAA
5/12/2006	0915	9.89	10.82	0.93	602	24	445	23.0		CH2M/FKAA
5/19/2006	1330	8.43	10.82	2.39	629	35	465	22.0		CH2M/FKAA
5/26/2006	1010	8.40	10.82	2.42	634	32	469	23.0		CH2M/FKAA
6/2/2006	0920	8.38	10.82	2.44	640	33	474	22.0		CH2M/FKAA
6/9/2006	0840	8.66	10.82	2.16	625	36	463	22.0		CH2M/FKAA
6/16/2006	0810	8.62	10.82	2.20	620	28	459	22.0		CH2M/FKAA
6/23/2006	0810	8.94	10.82	1.88	623	33	461	23.0		CH2M/FKAA
7/5/2006	1010	9.73	10.82	1.09	622	31	460	23.0		CH2M/FKAA
7/10/2006	1350	9.57	10.82	1.25	634	34	469	24.0		CH2M/FKAA
7/19/2006	1515	9.21	10.82	1.61	620	29	459	23.0		CH2M/FKAA
7/26/2006	1020	9.29	10.82	1.53	630	33	466	24.0		FKAA
8/1/2006	1035	9.35	10.82	1.47	637	34	471	23.0		CH2M/FKAA
8/8/2006	0900	9.34	10.82	1.48	631	30	467	24.0		CH2M/FKAA
8/14/2006	0845	9.21	10.82	1.61	620	28	459	23.0		CH2M/FKAA
8/23/2006	1045	9.16	10.82	1.66	622	29	460	24.0		CH2M/FKAA
8/31/2006	0820	9.15	10.82	1.67	627	32	464	23.0		CH2M/FKAA
9/7/2006	1430	9.27	10.82	1.55	633	34	468	24.0		CH2M/FKAA
9/11/2006	1400	9.22	10.82	1.60	625	32	463	23.0		CH2M/FKAA
9/21/2006	1600	9.19	10.82	1.63	625	31	463	24.0		CH2M/FKAA
9/27/2006	1315	9.23	10.82	1.59	630	31	466	24.0		CH2M/FKAA

ft-btoc: feet below top of casing
umhos/cm: micromhos per centimeter
mg/L: milligrams per liter
C: Celsius
S.U.: standard units
TOC: Top of Casing

Project: Florida Keys Aqueduct Authority (FKAA) ASR (UIC Permit # 189862-002-UC)

Surficial Monitor Well Water Quality Data
Southwest Pad Monitor Well

Date	Time (hours)	Depth to Water (ft-btoc)	Elevation (NGVD)	Depth to Water (NGVD)	Conductivity (umhos/cm)	Chloride (mg/L)	TDS (mg/L)	Temperature (degrees C)	Remarks	Sampled By
4/11/2006	1500	8.85	10.50	1.65	615	22	455	24.0	Initial sampling before drilling begins.	CH2M/FKAA
4/25/2006	0822	9.00	10.50	1.50	617	22	457	23.0		CH2M/FKAA
5/4/2006	0935	8.98	10.50	1.52	606	23	448	22.0		CH2M/FKAA
5/8/2006	1100	8.92	10.50	1.58	610	23	451	23.0		CH2M/FKAA
5/12/2006	0900	8.74	10.50	1.76	623	26	461	22.0		CH2M/FKAA
5/19/2006	1345	8.13	10.50	2.37	656	37	485	22.0		CH2M/FKAA
5/26/2006	1000	8.10	10.50	2.40	662	33	490	23.0		CH2M/FKAA
6/2/2006	0930	8.08	10.50	2.42	671	31	497	22.0		CH2M/FKAA
6/9/2006	0830	8.37	10.50	2.13	636	38	471	22.0		CH2M/FKAA
6/16/2006	0800	8.31	10.50	2.19	632	19	468	22.0		CH2M/FKAA
6/23/2006	0800	8.64	10.50	1.86	634	33	469	23.0		CH2M/FKAA
7/5/2006	0940	8.44	10.50	2.06	632	31	468	23.0		CH2M/FKAA
7/10/2006	1320	8.30	10.50	2.20	637	32	471	23.0		CH2M/FKAA
7/19/2006	1445	7.99	10.50	2.51	621	28	460	23.0		CH2M/FKAA
7/26/2006	1030	8.06	10.50	2.44	634	31	469	24.0		FKAA
8/1/2006	1025	8.11	10.50	2.39	638	30	472	23.0		CH2M/FKAA
8/8/2006	0850	8.09	10.50	2.41	635	31	470	24.0		CH2M/FKAA
8/14/2006	0835	7.96	10.50	2.54	624	28	462	23.0		CH2M/FKAA
8/23/2006	1130	7.92	10.50	2.58	619	28	458	24.0		CH2M/FKAA
8/31/2006	0850	7.93	10.50	2.57	630	31	466	23.0		CH2M/FKAA
9/7/2006	1500	8.04	10.50	2.46	637	33	471	24.0		CH2M/FKAA
9/11/2006	1430	7.99	10.50	2.51	628	30	465	23.0		CH2M/FKAA
9/21/2006	1630	7.96	10.50	2.54	630	30	466	24.0		CH2M/FKAA
9/27/2006	1345	8.00	10.50	2.50	633	31	468	24.0		CH2M/FKAA

ft-btoc: feet below top of casing
umhos/cm: micromhos per centimeter
mg/L: milligrams per liter
C: Celsius
S.U.: standard units
TOC: Top of Casing

APPENDIX E

Geophysical Logs

MV Geophysical

DUAL INDUCTION LL3 / SP LOG

Company	Jaffer Associates Corporation
Well	FKAA ASR
Field	Florida City
County	Miami-Dade
State/Prv	Florida
Location	J. Robert Dean Water Treatment Plant, Florida Keys Aqueduct Authority, CH2M Hill, Inc.
Other Services	XY/GR

		Elevation
Permanent Datum	G.L.	
Log Measured From	G.L.	
Drilling Measured From	G.L.	

Elevation: K.B. / D.F. / G.L.

Date	1-MAY-2006
Run Number	ONE
Depth Driller	210'
Depth Logger	211'
Bottom Logged Interval	209'
Top Log Interval	SURFACE
Open Hole Size	12.25"
Type Fluid	MUD
Density / Viscosity	NA/NA
Max. Recorded Temp.	na
Estimated Cement Top	NA
Time Well Ready	13:00 5/1/2006
Time Logger on Bottom	13:45 5/1/2006
Equipment Number	MVGS-1
Location	Ft. Myers
Recorded By	S.Miller
Witnessed By	M.Schilling (CH2M) Terry/Manny (JAC)

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To
ONE	12.25"	SURFACE	210' 211' Logger				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	NA			
Prot. String				
Production String				
Liner				

Invoice No.	P.O. #:	Job No.:	* FIELD PRINT *
2006124			

<<< Fold Here >>>

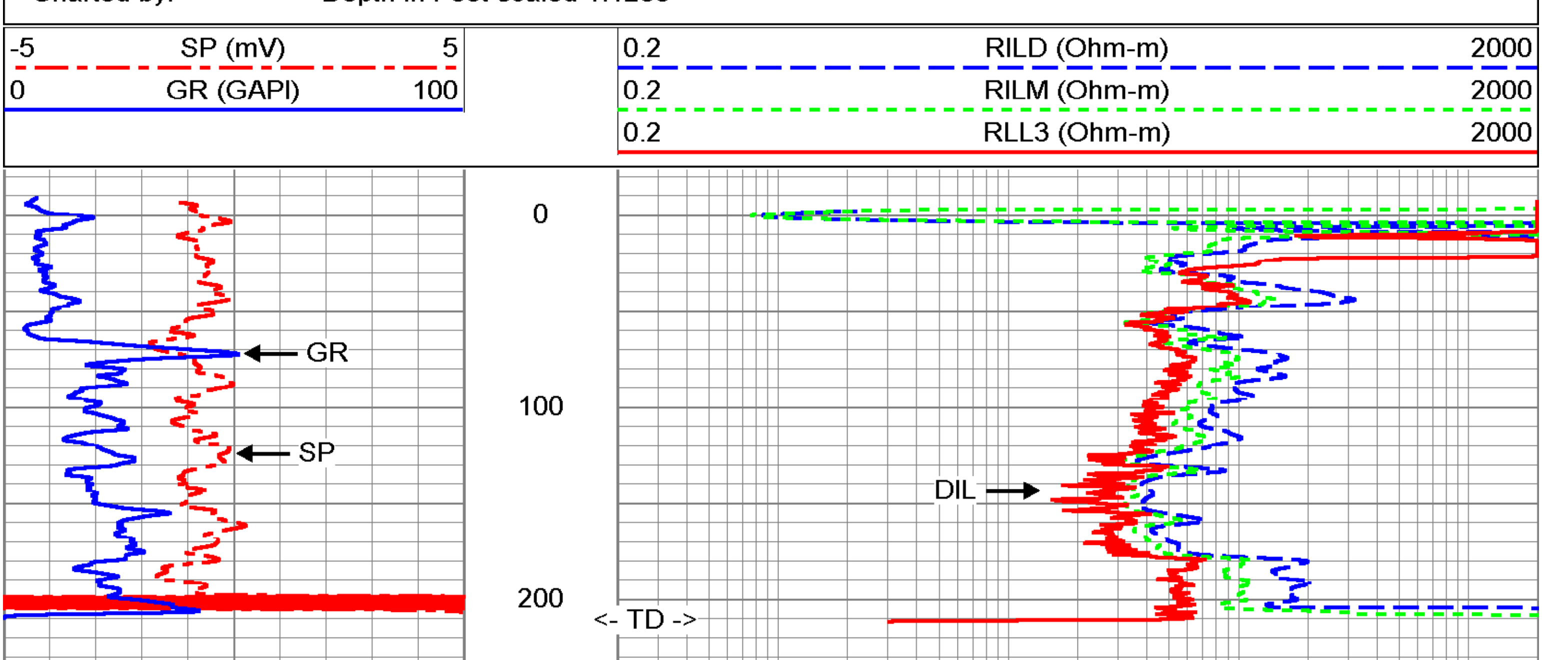
All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

Rm=7.548 ohm-m @ 82.1 degF

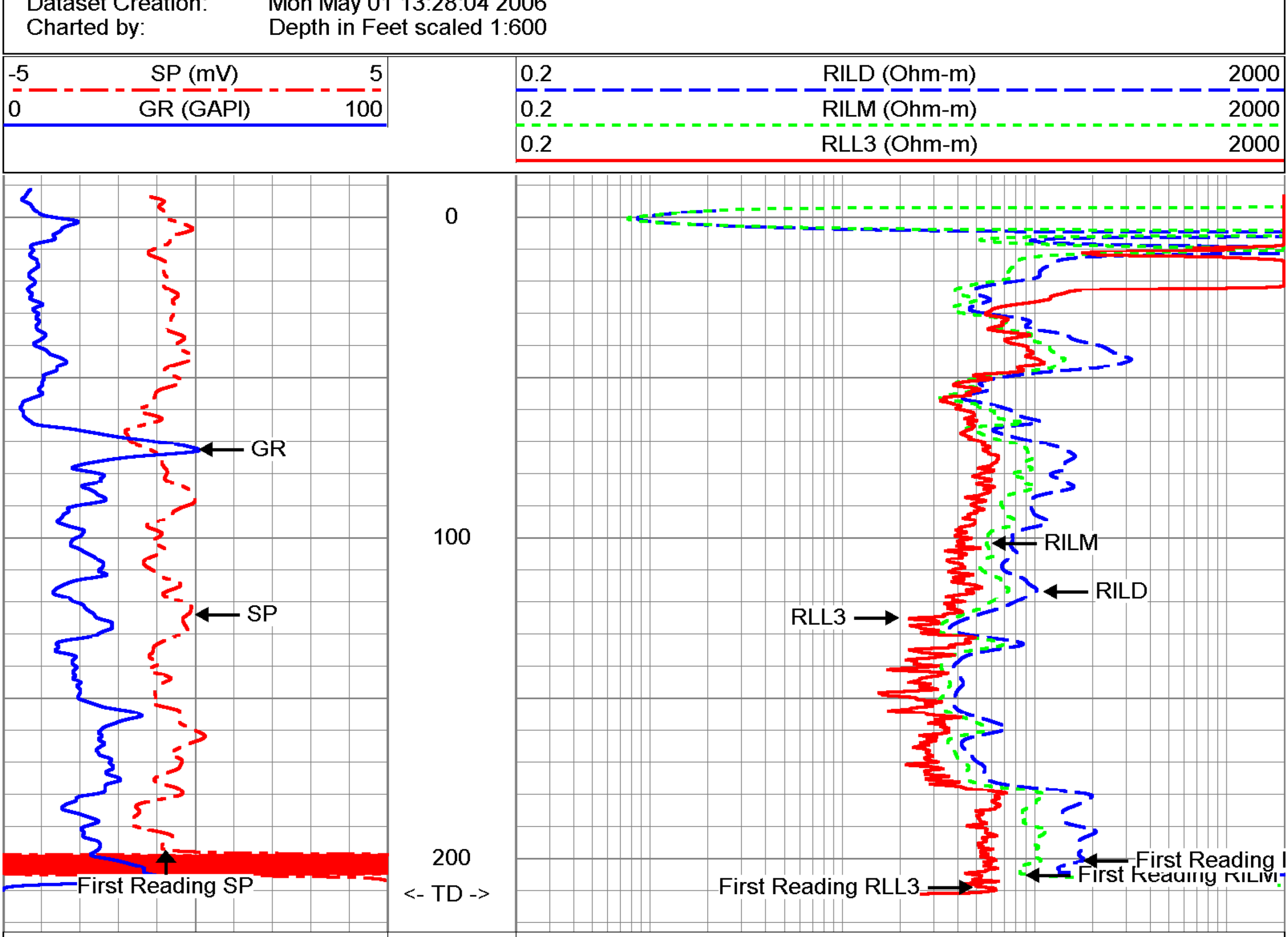
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: MAIN
Presentation Format: DIL-1
Dataset Creation: Mon May 01 13:28:04 2006
Charted by: Depth in Feet scaled 1:1200



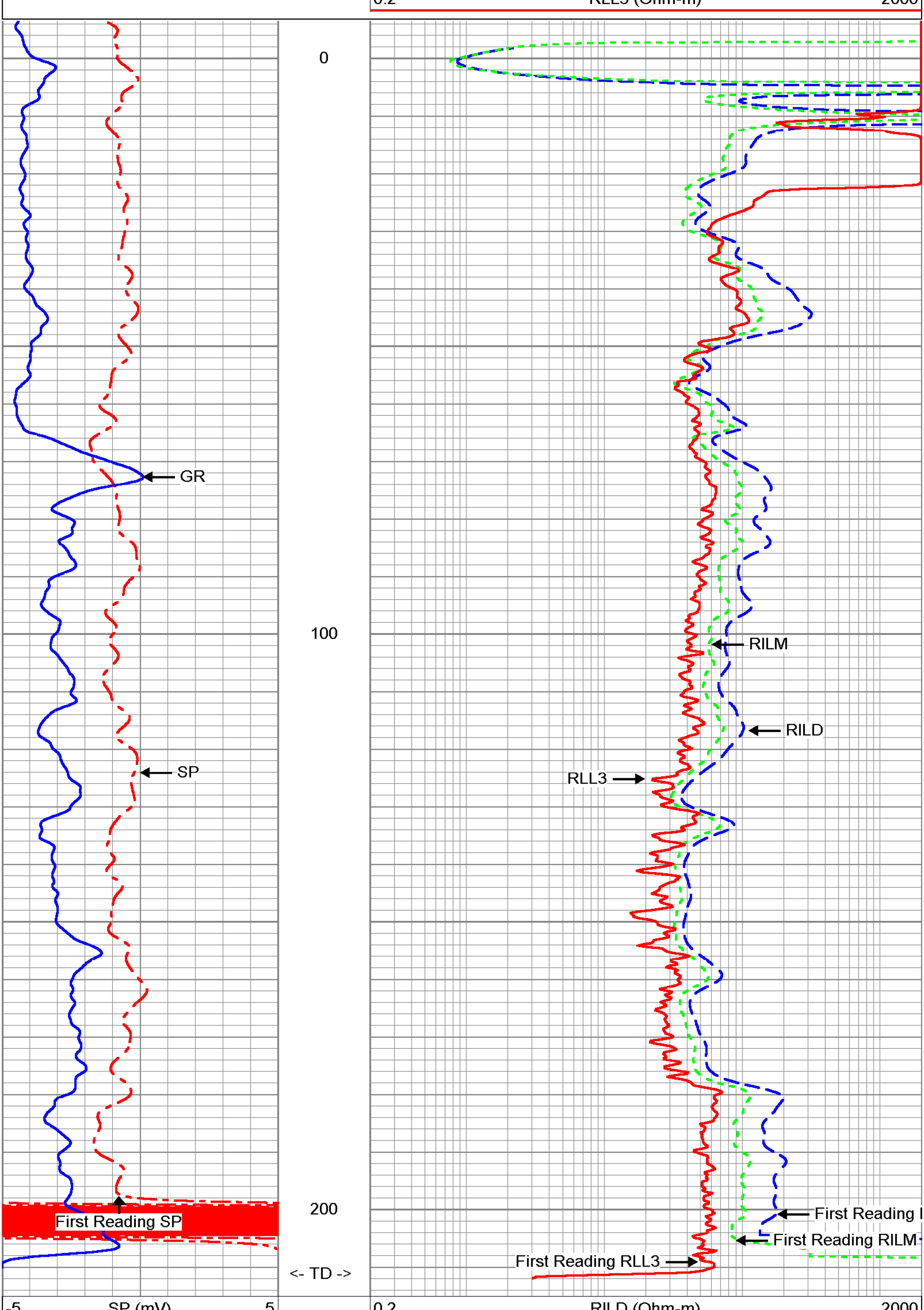
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: MAIN
Presentation Format: DIL
Dataset Creation: Mon May 01 13:28:04 2006
Charted by: Depth in Feet scaled 1:600



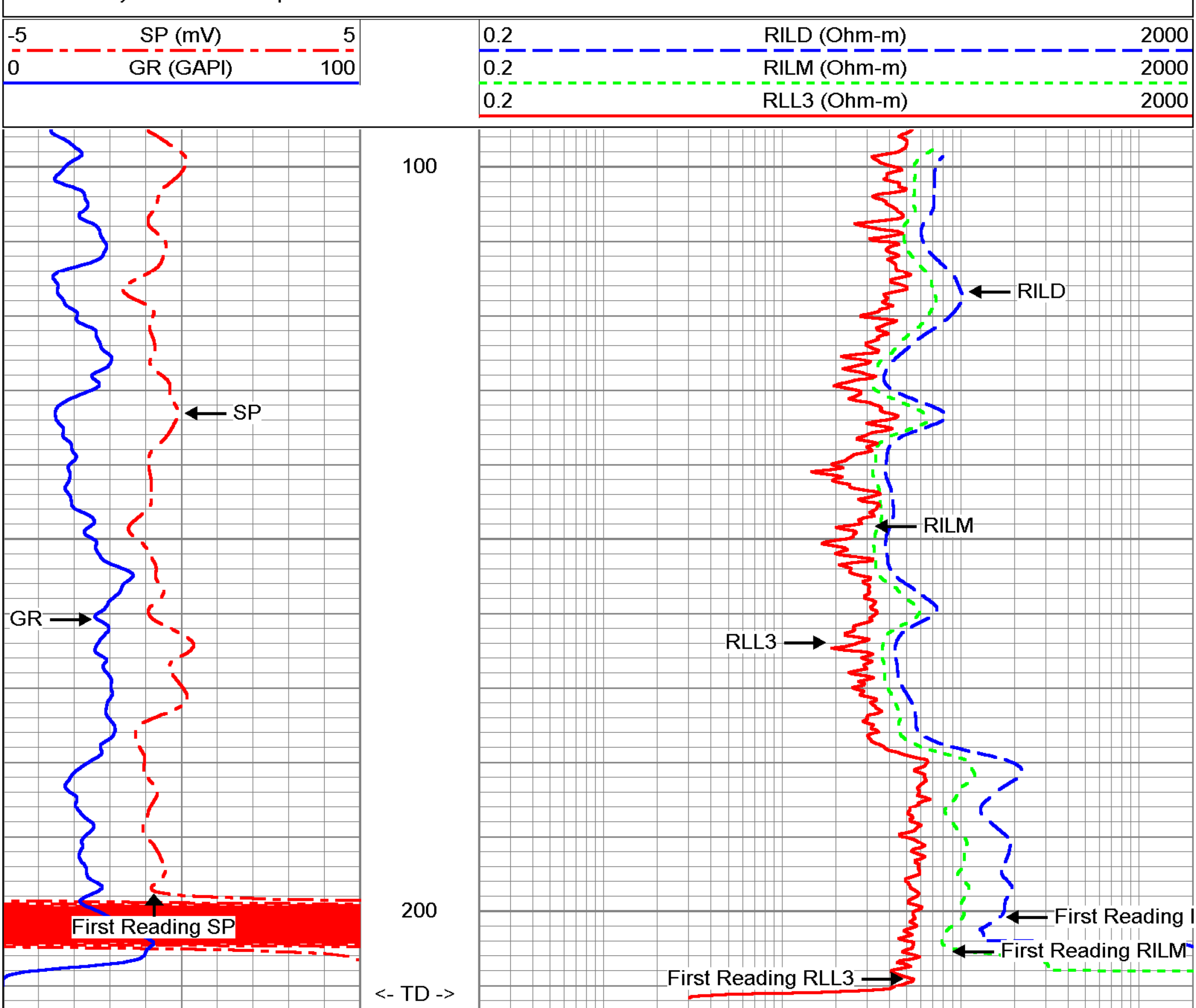
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: MAIN
Presentation Format: DIL
Dataset Creation: Mon May 01 13:28:04 2006
Charted by: Depth in Feet scaled 1:240



MV Geophysical — REPEAT SECTION

Database File: jaffkaa1.db
Dataset Pathname: REPEAT
Presentation Format: DIL
Dataset Creation: Mon May 01 13:12:09 2006
Charted by: Depth in Feet scaled 1:240



Dual Induction Calibration Report

Serial-Model: 5390-R
Surface Cal Performed: Sun Jan 16 21:49:43 2005
Downhole Cal Performed: Thu Mar 02 08:33:17 2006
After Survey Verification Performed: Thu Mar 02 09:07:55 2006

Surface Calibration

Loop:	Readings Air	Readings Loop		References Air	References Loop		Results m	Results b
Deep	0.050	0.646	V	0.000	400.000	mmho-m	671.771	-33.646
Medium	0.001	0.732	V	0.000	464.000	mmho-m	634.710	-0.492

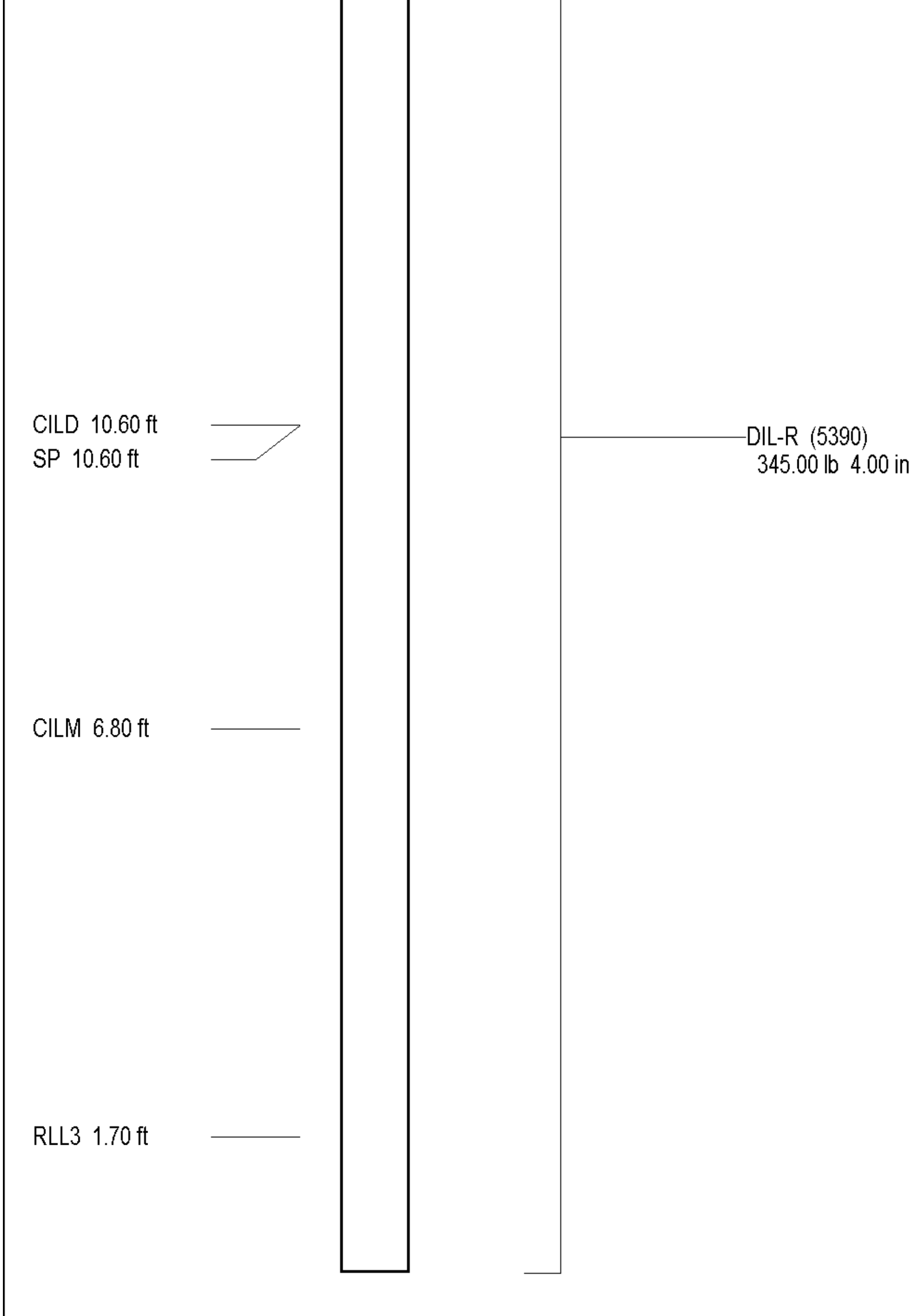
Internal:	Zero	Cal		Zero	Cal		m	b
Deep	0.011	0.641	V	0.000	400.000	mmho-m	634.996	-7.104
Medium	-0.009	0.738	V	0.000	464.000	mmho-m	620.900	5.734

Downhole Calibration

Internal:	Readings Zero	Readings Cal		References Zero	References Cal		Results m	Results b
Deep	-26.171	398.056	mmho-m	-26.130	397.036	mmho-m	0.997	-0.024
Medium	-6.919	468.912	mmho-m	-6.353	467.967	mmho-m	0.997	0.544
Shallow	0.010	0.005	V	494.500	2.000	Ohm-m	86951.773	-398.156

After Survey Verification

Internal:	Readings Zero	Readings Cal		Targets Zero	Targets Cal		Results m'	Results b'
Deep	-26.106	396.761	mmho-m	-26.171	398.056	mmho-m	0.997	-0.024
Medium	-5.784	469.505	mmho-m	-6.919	468.912	mmho-m	0.997	0.544
Shallow	554.471	-7.022	Ohm-m	494.500	2.000	Ohm-m	0.877	8.159



Dataset: run1/pass5
Total Length: 20.90 ft
Total Weight: 345.00 lb
O.D.: 4.00 in

Company	Jaffer Associates Corp.
Well	FKAA ASR
Field	Florida City
County	Miami-Dade
State/Prv	Florida

MV Geophysical

X-Y CALIPER GAMMA RAY LOG

Company	Jaffer Associates Corporation
Well	FKAA ASR
Field	Florida City
County	Miami-Dade
State/Prv	Florida
Location	J. Robert Dean Water Treatment Plant, Florida Keys Aqueduct Authority, CH2M Hill, Inc.
Other Services	DIL/SP

		Elevation		Elevation
Permanent Datum	G.L.		K.B.	
Log Measured From	G.L.		D.F.	
Drilling Measured From	G.L.		G.L.	

Date	1-MAY-2006
Run Number	ONE
Depth Driller	210'
Depth Logger	211'
Bottom Logged Interval	211'
Top Log Interval	SURFACE
Open Hole Size	12.25"
Type Fluid	MUD
Density / Viscosity	NA/NA
Max. Recorded Temp.	na
Estimated Cement Top	NA
Time Well Ready	13:00 5/1/2006
Time Logger on Bottom	13:00 5/1/2006
Equipment Number	MVGS-1
Location	Ft. Myers
Recorded By	S.Miller
Witnessed By	M.Schilling (CH2M) Terry/Manny (JAC)

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To
ONE	12.25"	SURFACE	210' 211' Logger				

	Size	Wgt/Ft	Top	Bottom
Casing Record	NA			
Surface String				
Prot. String				
Production String				
Liner				

Invoice No. 2006124 P.O. #: Job No.: * FIELD PRINT *

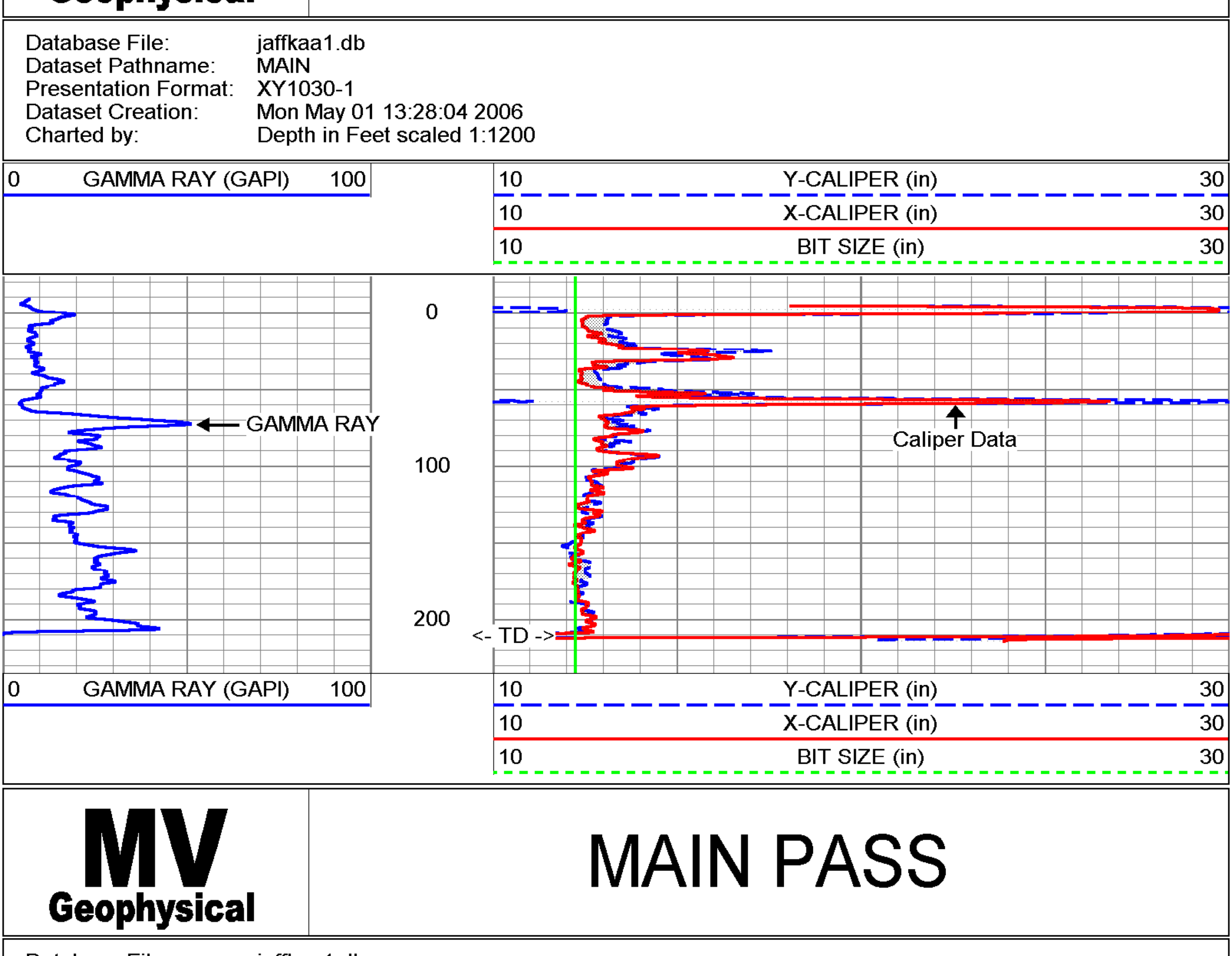
<<< Fold Here >>>

Comments

X-Y Caliper Arm Extensions: 33"

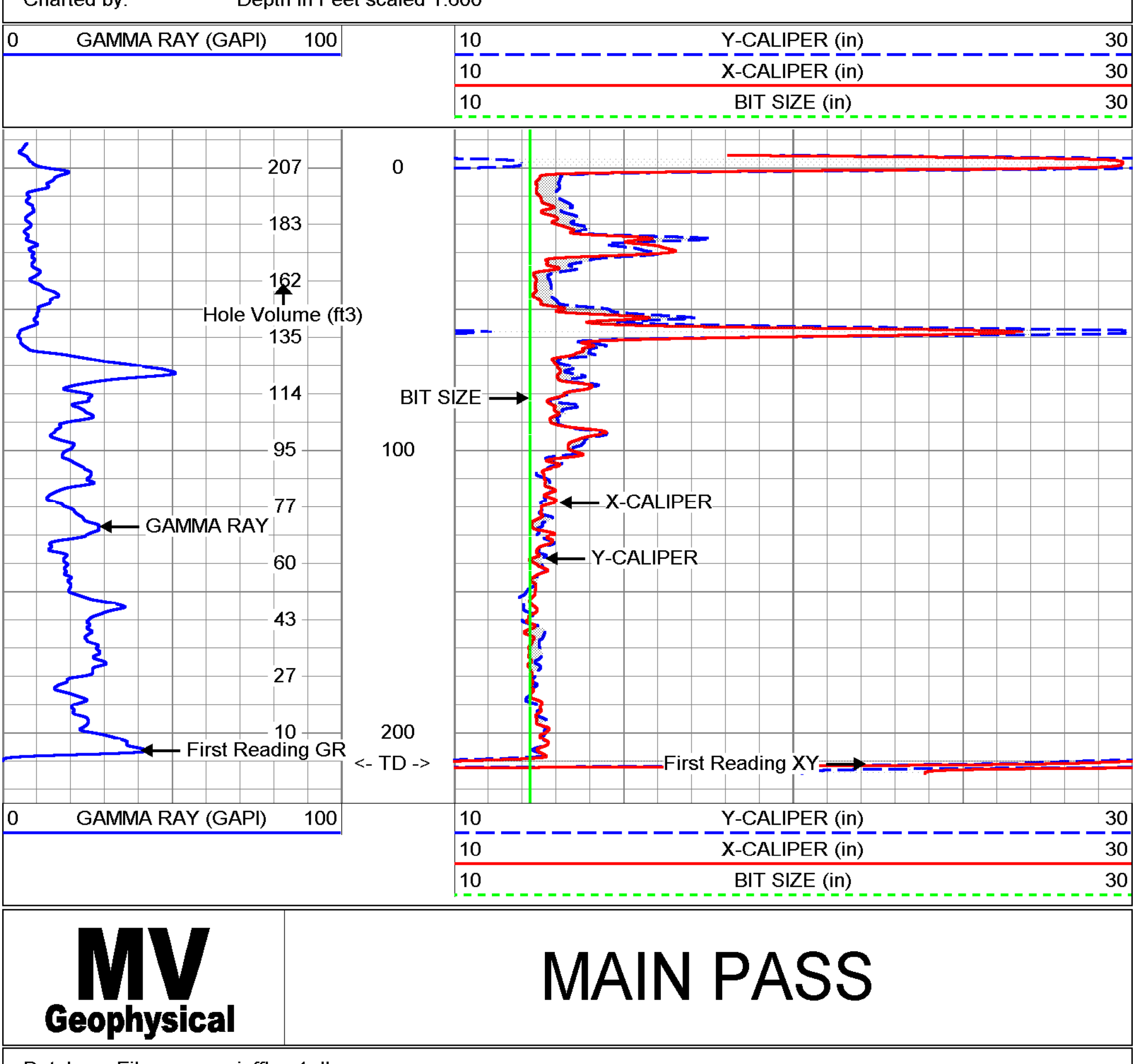
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: MAIN
Presentation Format: XY1030-1
Dataset Creation: Mon May 01 13:28:04 2006
Charted by: Depth in Feet scaled 1:1200



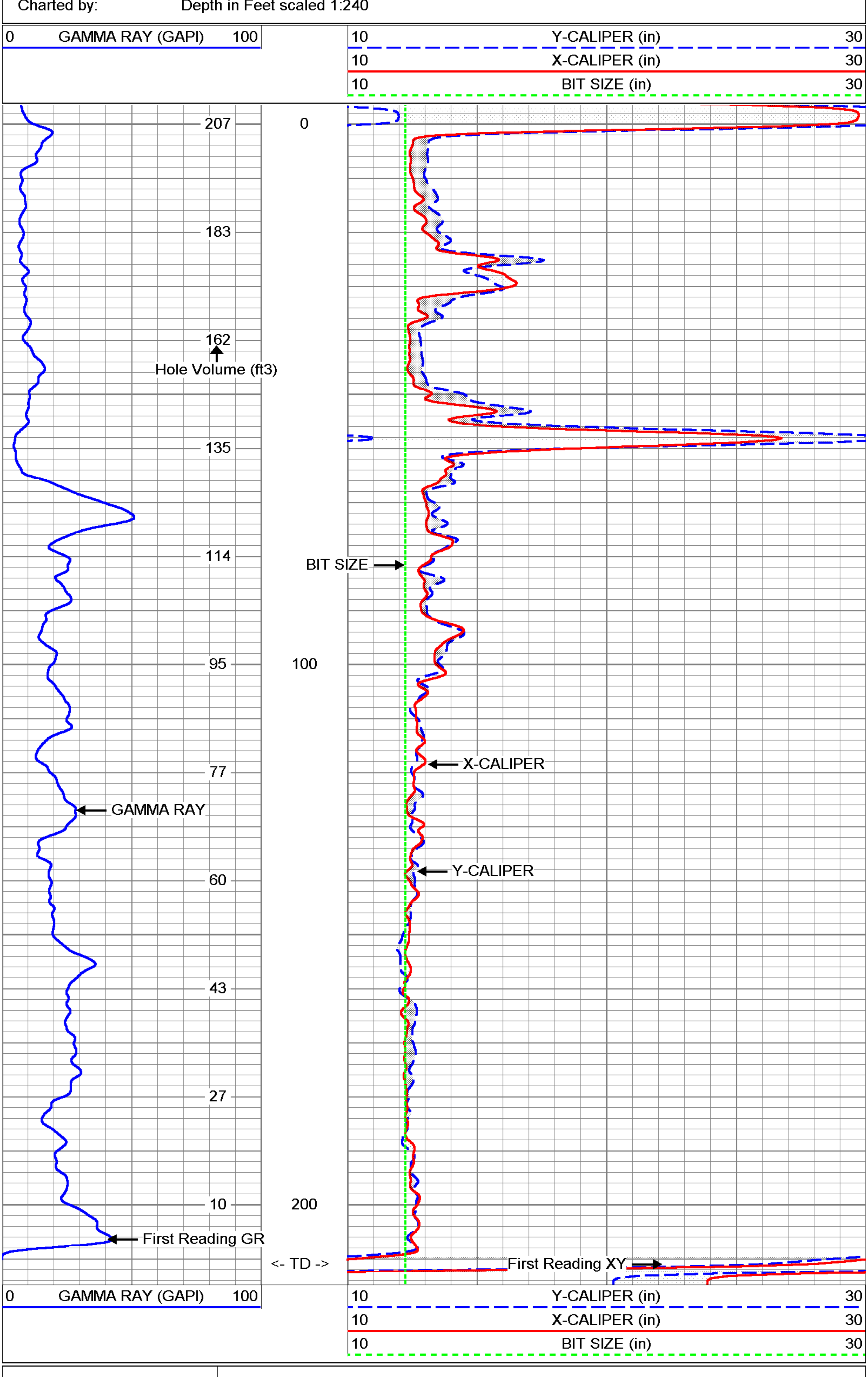
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: MAIN
Presentation Format: XY1030-5
Dataset Creation: Mon May 01 13:28:04 2006
Charted by: Depth in Feet scaled 1:600



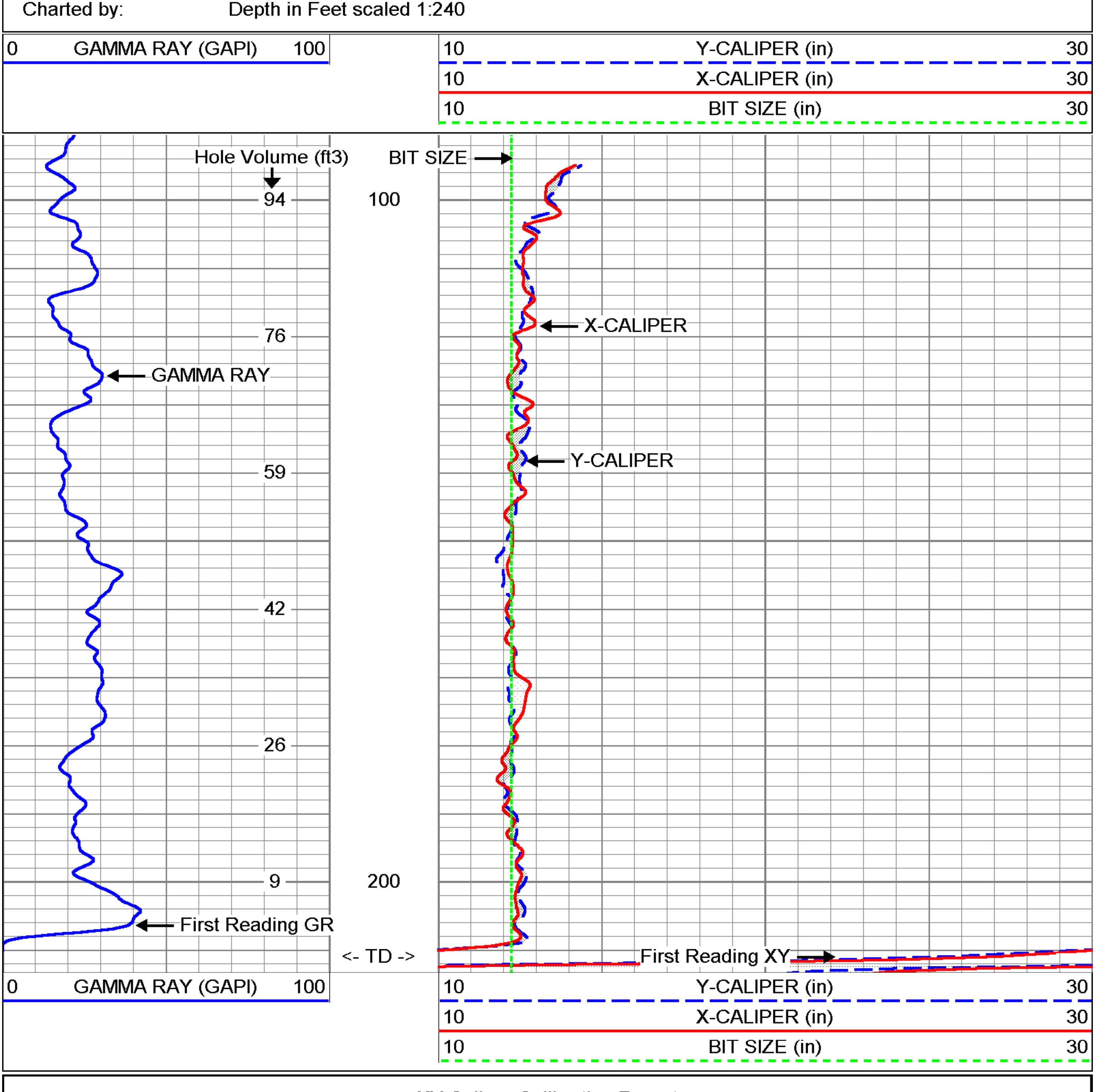
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: MAIN
Presentation Format: XY1030-5
Dataset Creation: Mon May 01 13:28:04 2006
Charted by: Depth in Feet scaled 1:240



MV Geophysical — REPEAT SECTION

Database File: jaffkaa1.db
Dataset Pathname: REPEAT
Presentation Format: XY1030-5
Dataset Creation: Mon May 01 13:12:09 2006
Charted by: Depth in Feet scaled 1:240

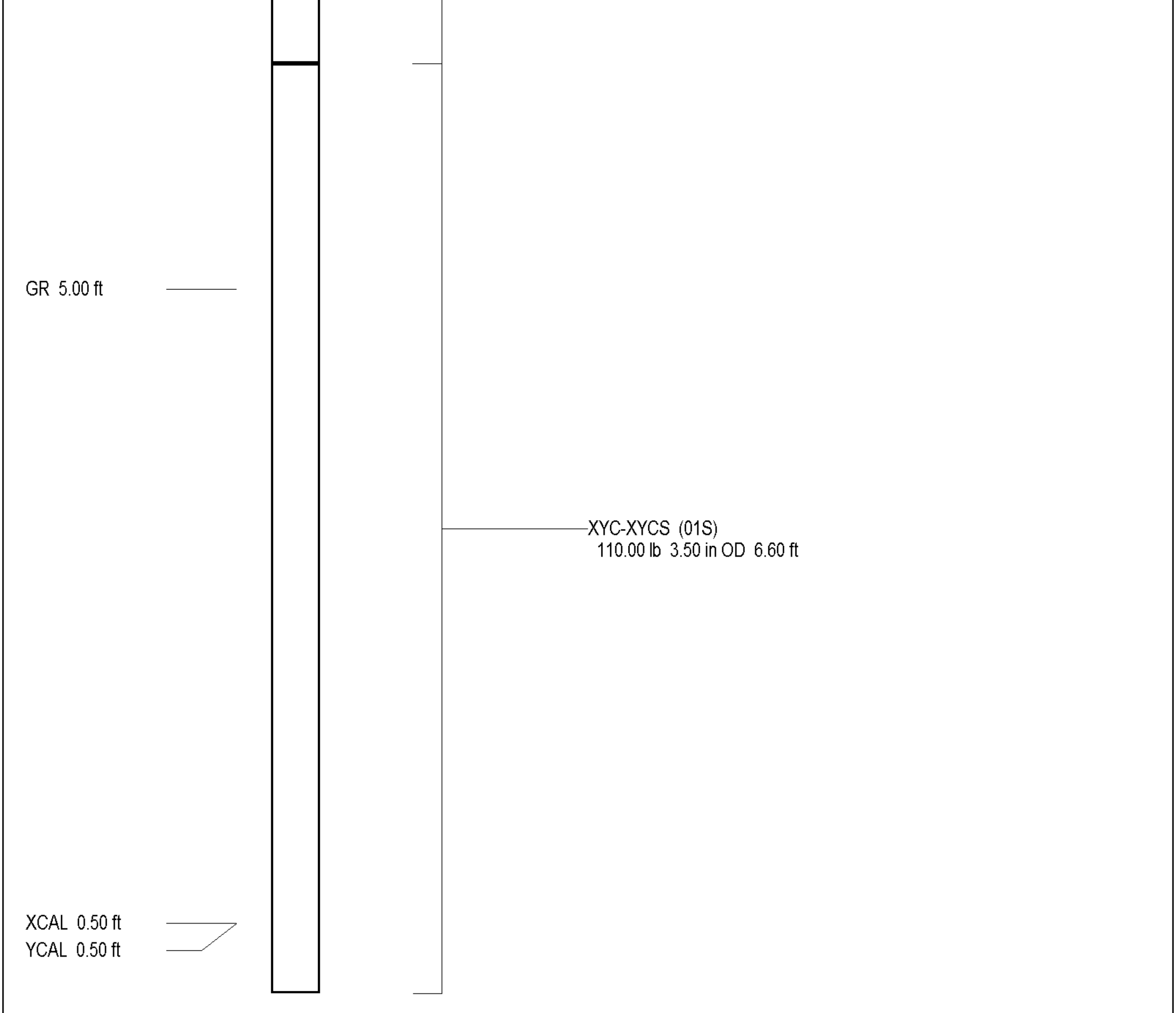


XY Caliper Calibration Report

Serial Number:	01S		
Tool Model:	XYCS		
Performed:	Mon May 01 13:18:16 2006		
Small Ring:	12.25	in	
Large Ring:	33	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	640.3	666.7	cps
Reading with Large Ring:	1108.5	1098.9	cps
Gain:	0.0443187	0.0480102	
Offset:	-16.1272	-19.7584	

Gamma Ray Calibration Report

Serial Number:	01	
Tool Model:	GROH	
Performed:	Fri Apr 28 09:42:29 2006	
Calibrator Value:	120	GAPI
Background Reading:	3.5691	cps
Calibrator Reading:	123.117	cps
Sensitivity:	1.00378	GAPI/cps



Dataset: run1/pass3
Total Length: 9.35 ft
Total Weight: 150.00 lb
O.D. 3.50 in

Company Jaffer Associates Corp.
Well FKAA ASR
Field Florida City
County Miami-Dade
State/Prv Florida

MV Geophysical

X-Y CALIPER GAMMA RAY LOG

Company	Jaffer Associates Corporation
Well	FKAA ASR
Field	Florida City
County	Miami-Dade
State/Prv	Florida
Location	J. Robert Dean Water Treatment Plant Florida Keys Aqueduct Authority CH2M Hill, Inc.
Other Services	NONE

Permanent Datum	G.L.	Elevation	
Log Measured From	G.L.		
Drilling Measured From	G.L.		
Elevation	K.B.	D.F.	G.L.

Date	19-MAY-2006
Run Number	TWO
Depth Driller	199'
Depth Logger	202'
Bottom Logged Interval	200'
Top Log Interval	SURFACE
Open Hole Size	44"
Type Fluid	MUD
Density / Viscosity	NA/NA
Max. Recorded Temp.	na
Estimated Cement Top	NA
Time Well Ready	12:30 5/19/2006
Time Logger on Bottom	12:30 5/19/2006
Equipment Number	MVGS-1
Location	Ft. Myers
Recorded By	S.Miller
Witnessed By	M.Schilling (CH2M) Gary/Manny (JAC)

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To
ONE	12.25"	SURFACE	210'				
TWO	44"	SURFACE	199'				
			202' Logger				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	NA			
Prot. String				
Production String				
Liner				

Invoice No. 2006145	P.O. #:	Job No.:	* FINAL PRINT *

<<< Fold Here >>>

Comments

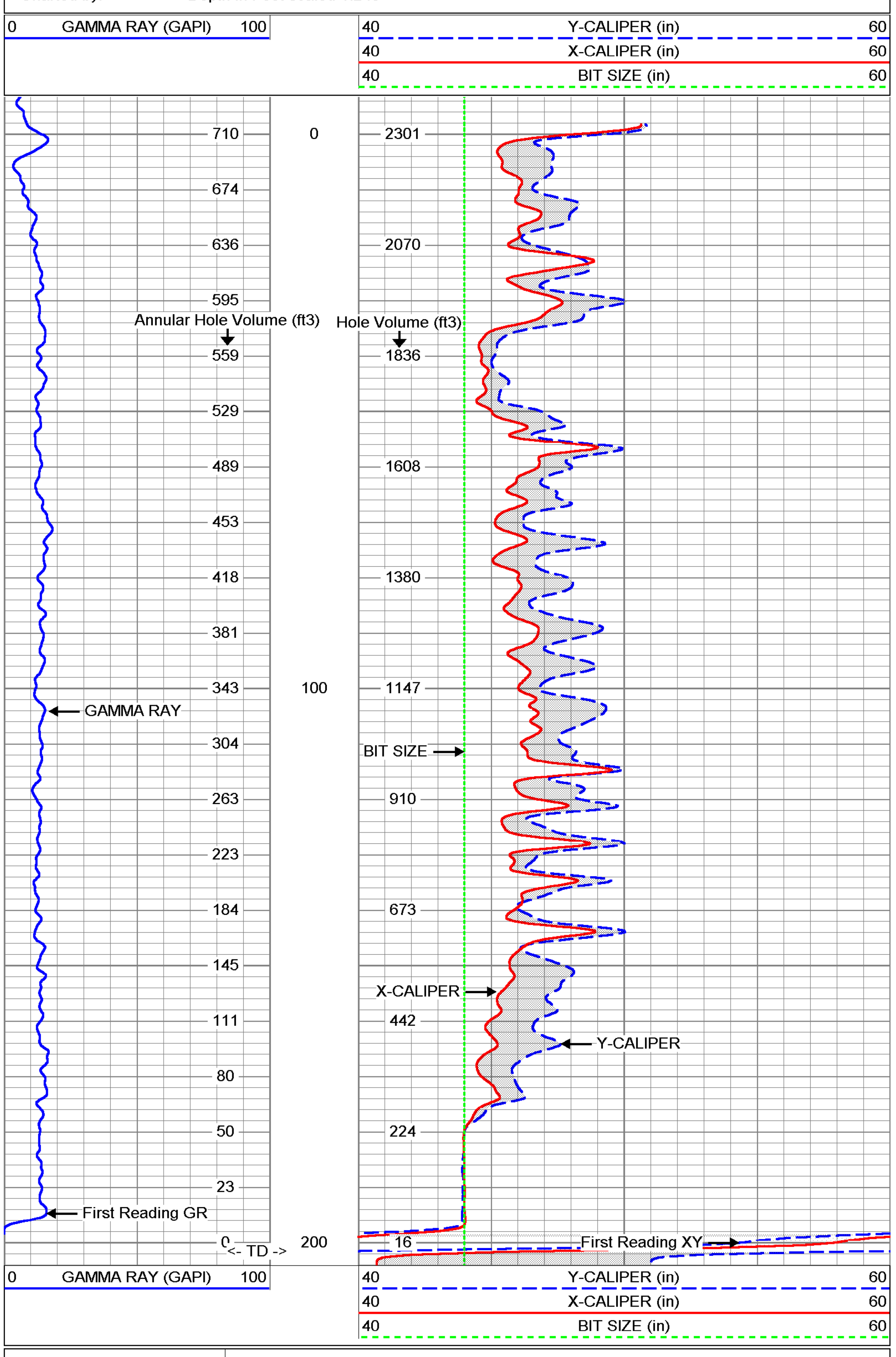
X-Y Caliper Arm Extensions: 51"

FUTURE CASING SIZE: 44"

MV Geophysical

MAIN PASS

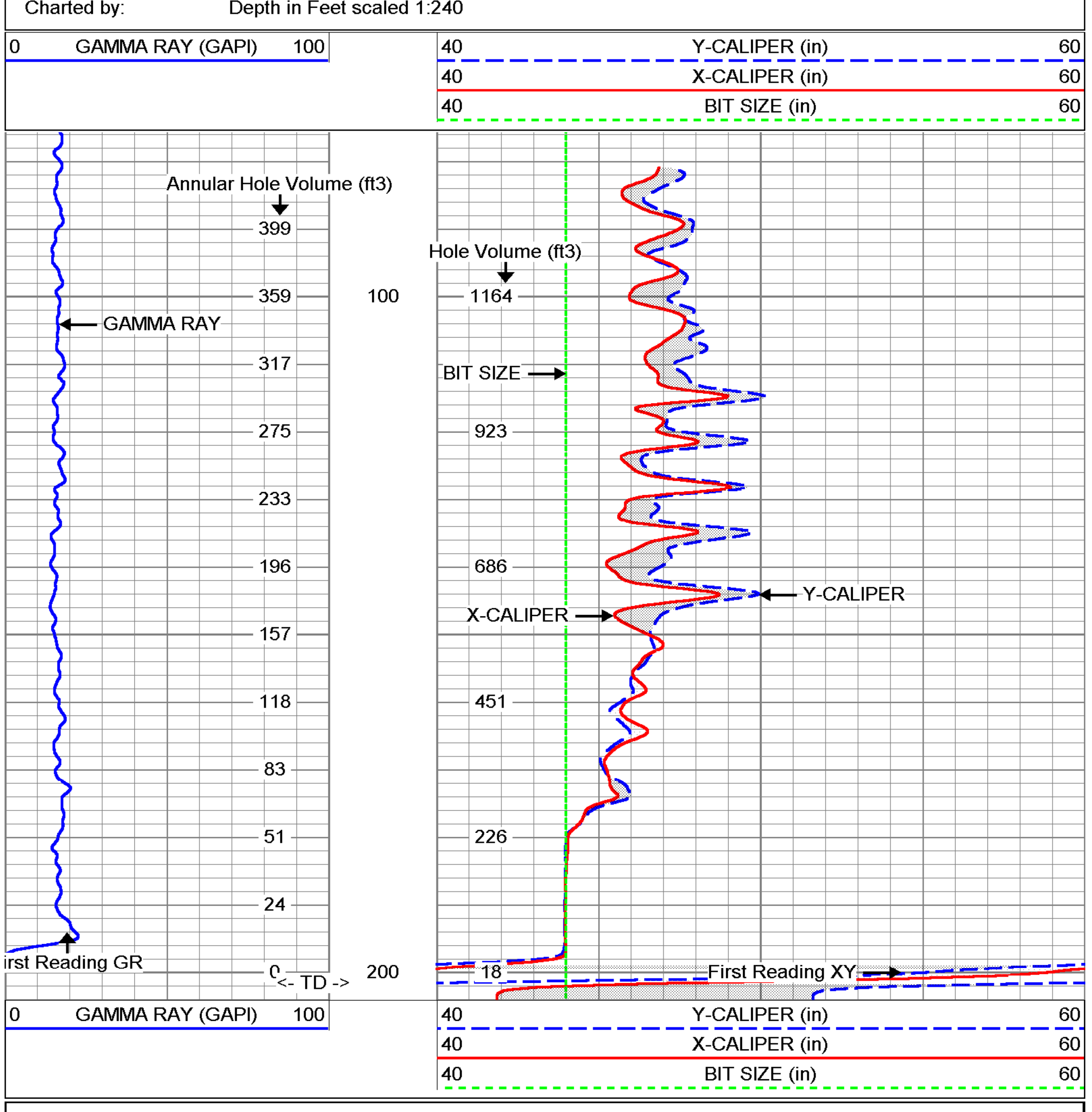
Database File:	jaffkaa1.db
Dataset Pathname:	run2/main
Presentation Format:	XY4060-5
Dataset Creation:	Fri May 19 12:47:24 2006
Charted by:	Depth in Feet scaled 1:240



MV Geophysical

REPEAT SECTION

Database File:	jaffkaa1.db
Dataset Pathname:	run2/REPEAT
Presentation Format:	XY4060-5
Dataset Creation:	Fri May 19 13:02:20 2006
Charted by:	Depth in Feet scaled 1:240

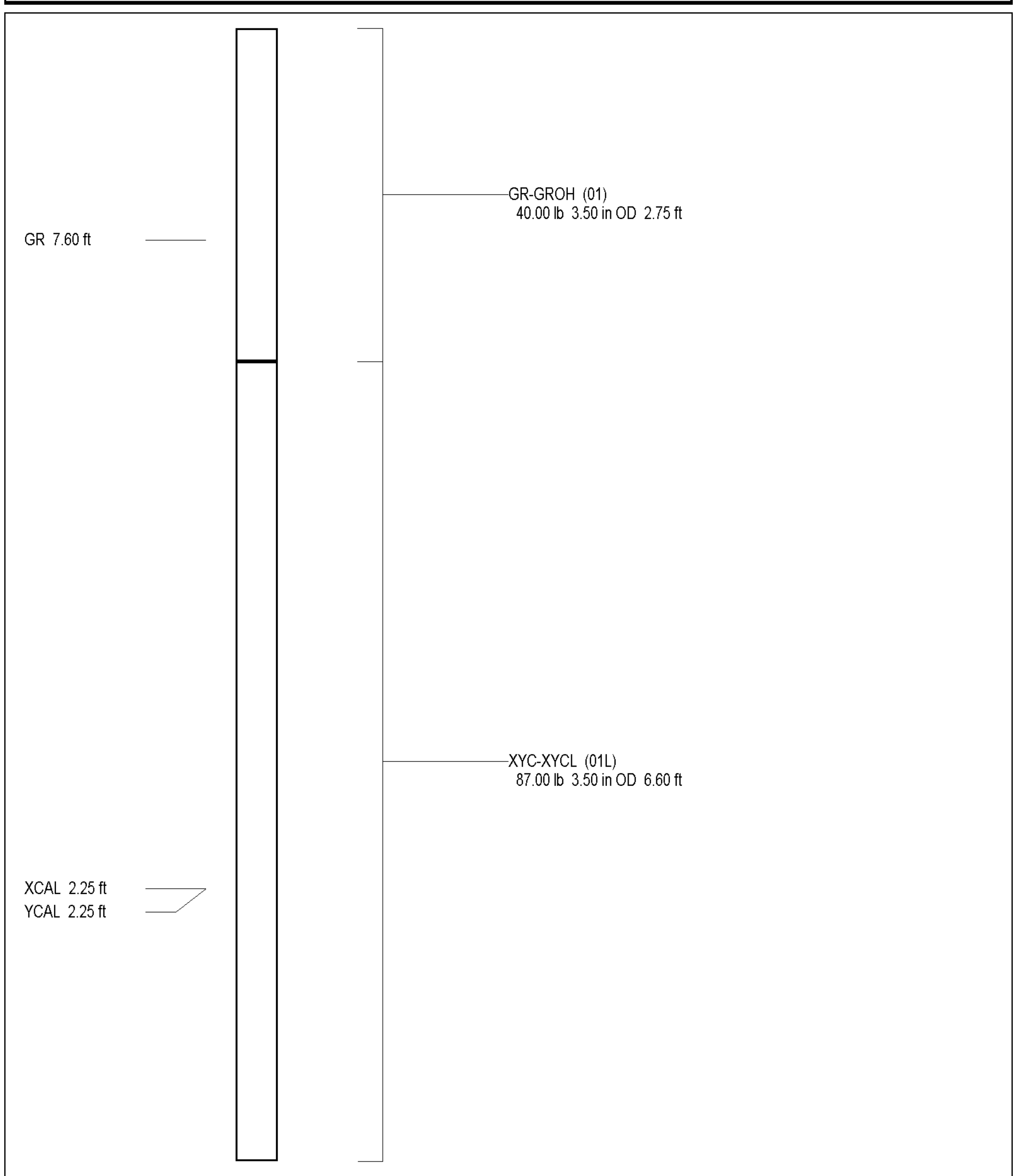


XY Caliper Calibration Report

Serial Number:	01L		
Tool Model:	XYCL		
Performed:	Fri May 19 12:52:26 2006		
Small Ring:	44		in
Large Ring:	51		in
	X Caliper	Y Caliper	
Reading with Small Ring:	818.5	894.1	cps
Reading with Large Ring:	1077.1	1087.3	cps
Gain:	0.0270688	0.0362319	
Offset:	21.8442	11.6051	

Gamma Ray Calibration Report

Serial Number:	01	
Tool Model:	GROH	
Performed:	Fri May 19 08:32:15 2006	
Calibrator Value:	120	GAPI
Background Reading:	4.691	cps
Calibrator Reading:	123.692	cps
Sensitivity:	1.00839	GAPI/cps



Dataset:	run2/pass2
Total Length:	9.35 ft
Total Weight:	127.00 lb
O.D.	3.50 in

MV Geophysical

CEMENT TOP LOG
HIGH RESOLUTION TEMPERATURE GAMMA RAY

Company Jaffer Associates Corporation
Well FKAA ASR
Field Florida City
County Miami-Dade State/Prv Florida
Location
J. Robert Dean Water Treatment Plant
Florida Keys Aqueduct Authority
CH2M Hill, Inc.

Other Services: NONE

Elevation: K.B. / D.F. / G.L.

Permanent Datum G.L. Elevation
Log Measured From G.L.
Drilling Measured From G.L.

Company Jaffer Associates Corp.
Well FKAA ASR
Field Florida City
County Miami-Dade
State/Prv Florida

Date	1-JUN-2006
Run Number	THREE-1
Depth Driller	190'
Depth Logger	171' Cmt Plg
Bottom Logged Interval	171'
Top Log Interval	SURFACE
Open Hole Size	44"
Type Fluid	MUD
Density / Viscosity	NA/NA
Max. Recorded Temp.	92.5 degF
Estimated Cement Top	157'
Time Well Ready	07:00 6/1/2006
Time Logger on Bottom	07:00 6/1/2006
Equipment Number	MVGS-1
Location	Ft. Myers
Recorded By	S.Miller
Witnessed By	M.Schilling (CH2M)

Borehole Record

Run Number	Bit	From	To
ONE	12.25"	SURFACE	210'
TWO	44"	SURFACE	199'
			202' Logger

Tubing Record

Size	Weight	From	To

Casing Record

	Size	Wgt/Ft	Top	Bottom
Surface String	38"	.375"	SURFACE	195'
Prot. String				
Production String				
Liner				

Invoice No. 2006161 P.O. #: Job No.: * FINAL PRINT *

<<< Fold Here >>>

Comments

Cement Tops

Stage	CTL	TAG
1	157'	'

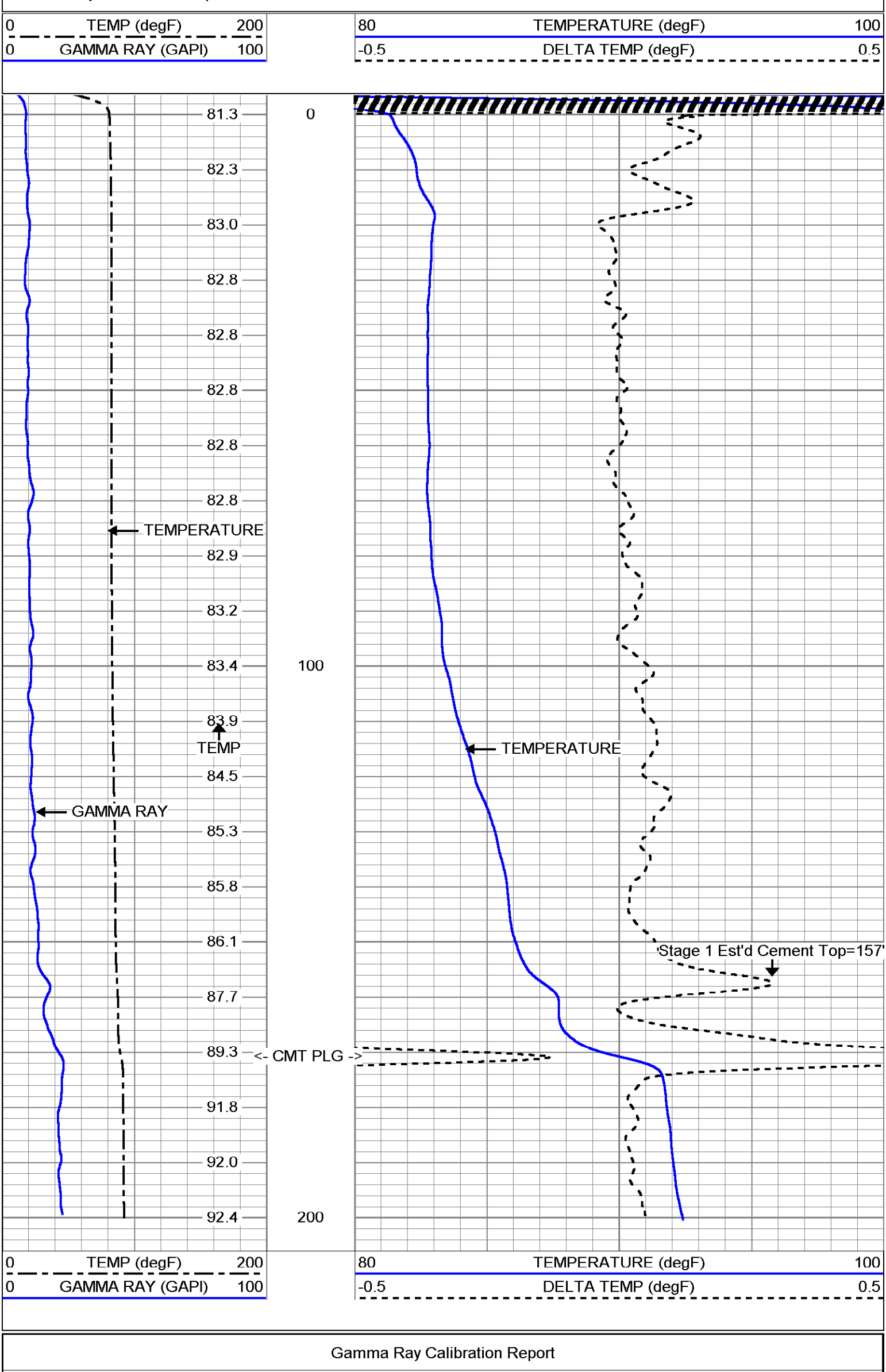
TEMPERATURE CALIBRATION REPORT
(Performed: 25-MAY-05 19:15)

DEG-F	CPS
34.2	143.134
148.3	2693.13

MV Geophysical

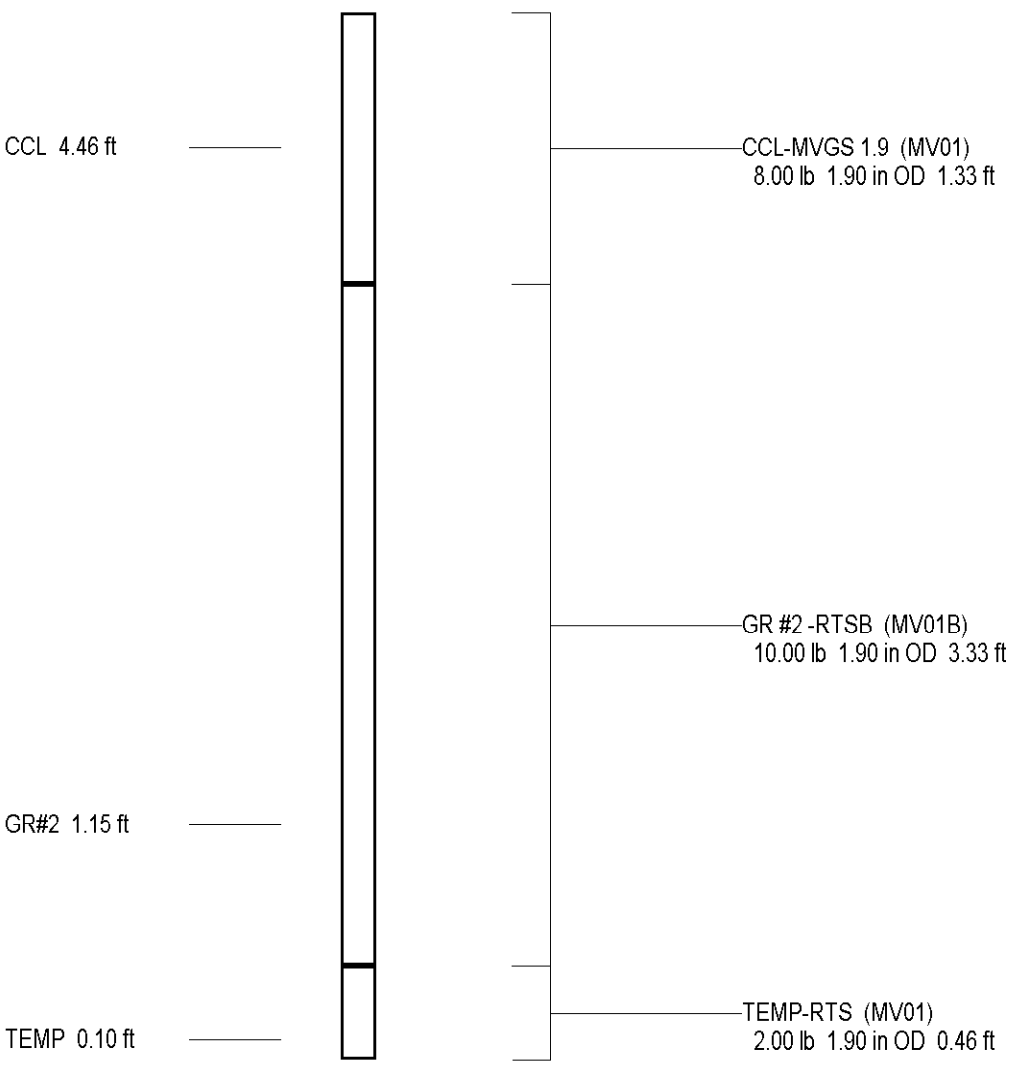
Stage 1 Est'd Top: 157'

Database File: jaffkaa1.db
Dataset Pathname: run3/pass2
Presentation Format: CTL-1
Dataset Creation: Thu Jun 01 07:56:29 2006 by Log VER_5.3
Charted by: Depth in Feet scaled 1:240



Gamma Ray Calibration Report

Serial Number:	MV01B	
Tool Model:	RTSB	
Performed:	Thu May 25 10:53:09 2006	
Calibrator Value:	120	GAPI
Background Reading:	18.2831	cps
Calibrator Reading:	188.721	cps
Sensitivity:	0.704069	GAPI/cps



Dataset: run3/pass1
Total Length: 5.12 ft
Total Weight: 20.00 lb
O.D. 1.90 in

Company Jaffer Associates Corp.
Well FKAA ASR
Field Florida City
County Miami-Dade
State/Prv Florida

MV Geophysical

BOREHOLE COMPENSATED SONIC w/ VARIABLE DENSITY LOG

Company	Jaffer Associates Corporation
Well	FKAA ASR
Field	Florida City
County	Miami-Dade
State/Prv	Florida
Location	J. Robert Dean Water Treatment Plant, Florida Keys Aqueduct Authority, CH2M Hill, Inc.

Permanent Datum: G.L. Elevation
Log Measured From: G.L.
Drilling Measured From: G.L.

Elevation: K.B. / D.F. / G.L.

Other Services: XY/GR, DLAT, BHC/VDL

Date	10-Jul-2006
Run Number	FOUR
Depth Driller	900'
Depth Logger	900'
Bottom Logged Interval	900'
Top Log Interval	190'
Open Hole Size	12.25"
Type Fluid	WATER
Density / Viscosity	NA
Max. Recorded Temp.	NA
Estimated Cement Top	NA
Time Well Ready	15:15 7/10/2006
Time Logger on Bottom	16:15 7/10/2006
Equipment Number	BHC
Location	Ft. Myers
Recorded By	M. Chalangas (MCM)
Witnessed By	Tom Howard (JAC)

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To
	12.25"	SURFACE	190'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	36"		SURFACE	190'
Prot. String				
Production String				
Liner				

Invoice No. 2006166 P.O. # Job No.

<<< Fold Here >>>

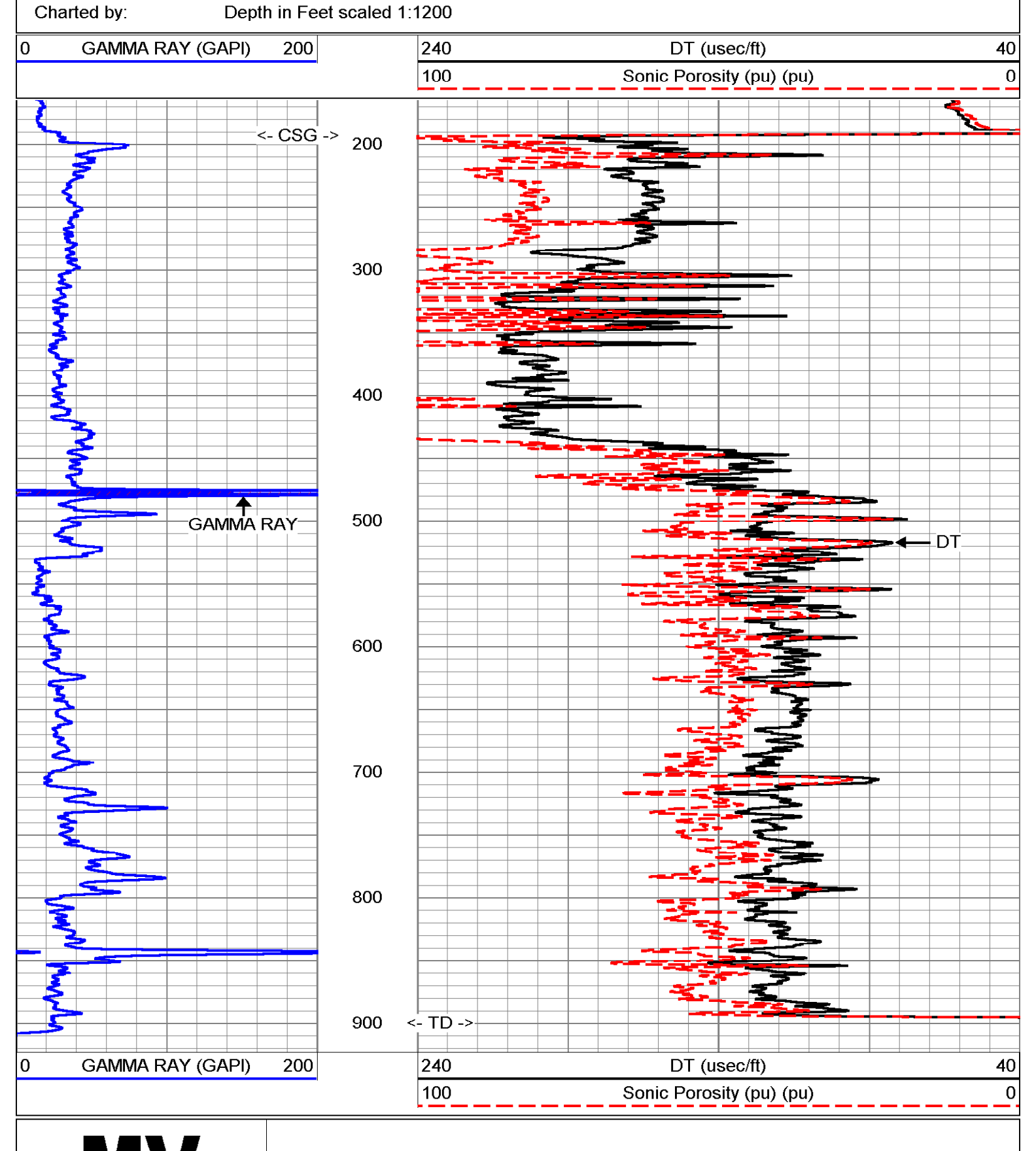
Comments

Sonic Porosity was run on a Limestone Matrix (=47.5)

MV Geophysical

MAIN PASS

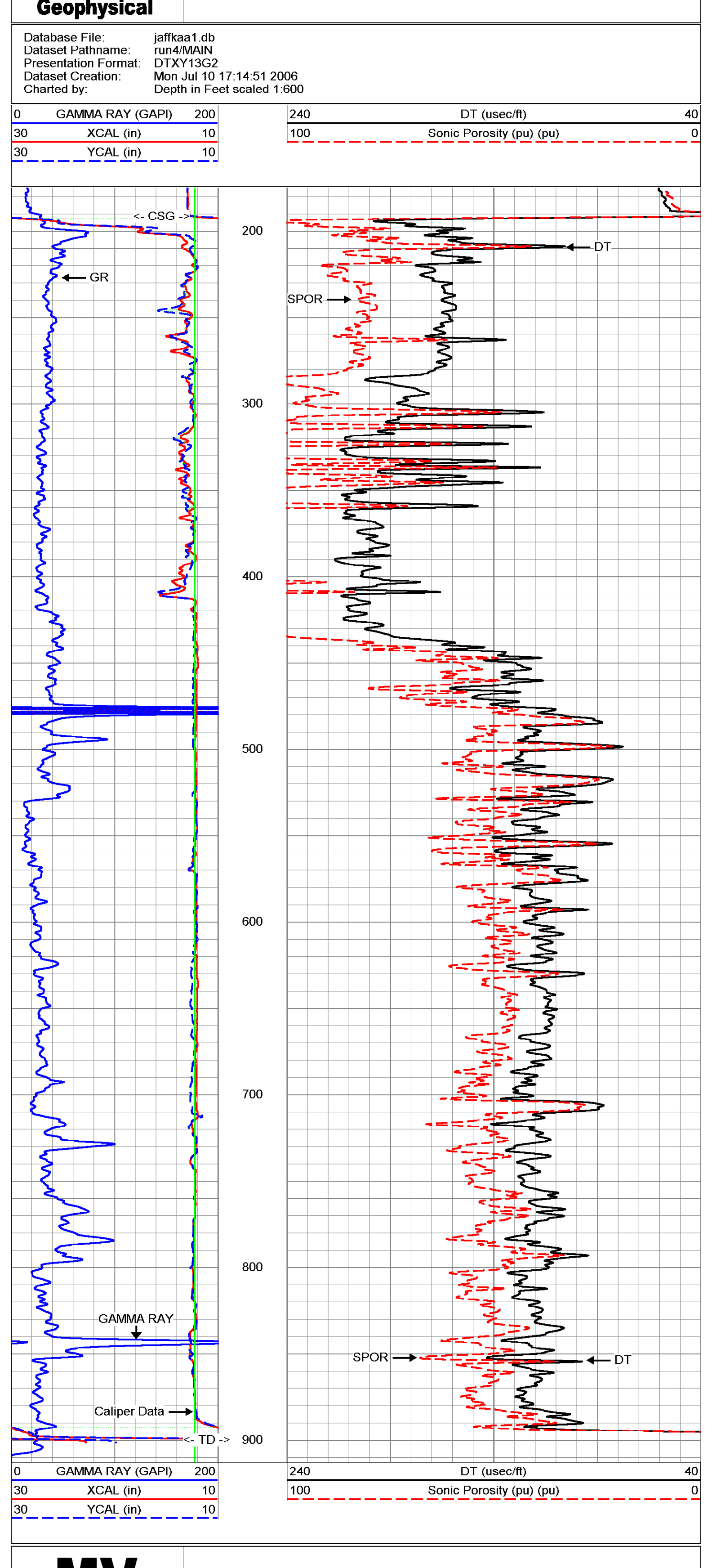
Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: DTG-12
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:1200



MV Geophysical

MAIN PASS

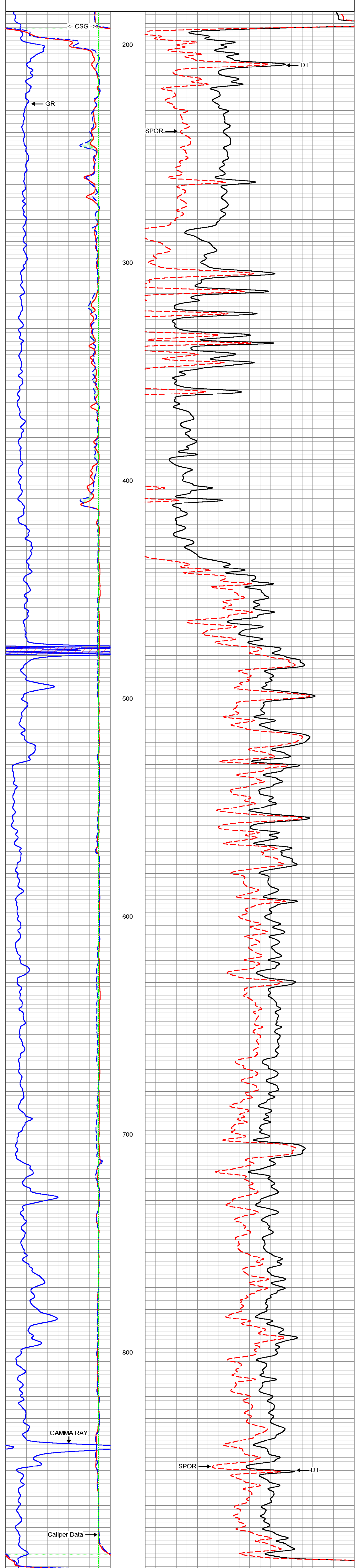
Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: DTXY13G2
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:600



MV Geophysical

MAIN PASS

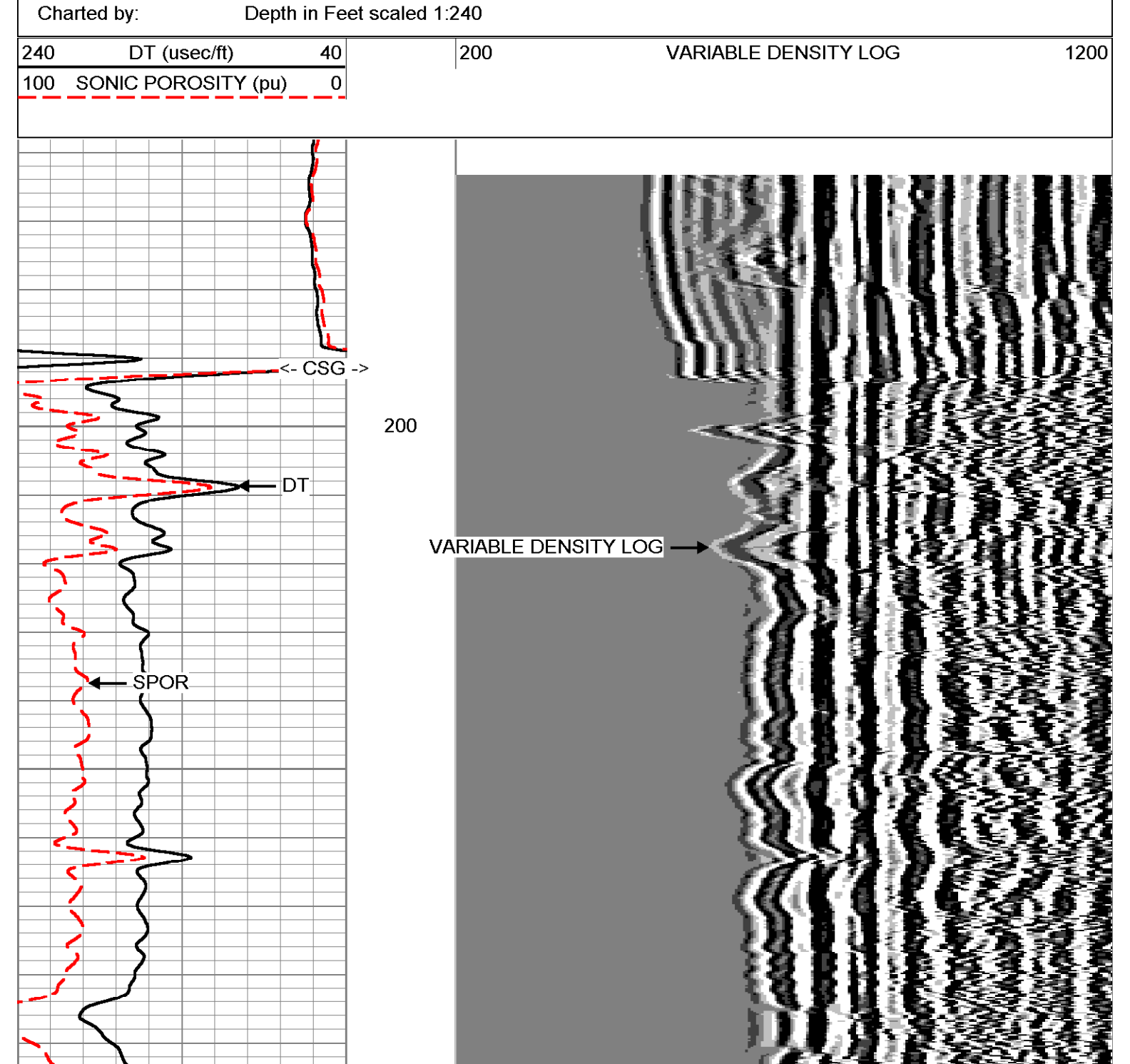
Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: DTXY13G2
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:240



MV Geophysical

MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: SON_VDL
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:240



Company Jaffer Associates Corp.
Well FKAA ASR
Field Florida City
County Miami-Dade
State/Prv Florida

MV Geophysical

DUAL INDUCTION LL3 / SP LOG

Company	Jaffer Associates Corporation
Well	FKAA ASR
Field	Florida City
County	Miami-Dade
State/Prv	Florida
Location	J. Robert Dean Water Treatment Plant, Florida Keys Aqueduct Authority, CH2M Hill, Inc.
Other Services	XY/GR, DIL/SP, BHC/VDL
Permanent Datum	G.L.
Log Measured From	G.L.
Drilling Measured From	G.L.
Elevation	K.B. / D.F. / G.L.

Date	10-JUL-2006
Run Number	FOUR
Depth Driller	900'
Depth Logger	900'
Bottom Logged Interval	898'
Top Log Interval	183'
Open Hole Size	12.25"
Type Fluid	MUD
Density / Viscosity	NA / NA
Max. Recorded Temp	NA
Estimated Cement Top	NA
Time Well Ready	15:00 7/10/2006
Time Logger on Bottom	17:15 7/10/2006
Equipment Number	MXS-1
Location	Ft Myers
Recorded By	S Miller / C Miller
Witnessed By	A Chatterjee (JAC) / Tom Howard (JAC)

Borehole Record

Run Number	Bit	From	To
ONE	12.25"	SURFACE	210'
TWO	44"	SURFACE	195'
THREE	12.25"	SURFACE	900'

Tubing Record: Size / Weight / From / To

Casing Record

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	30"	.375"	SURFACE	195'
Prod. String				
Liner				

Invoice No. 2006199 | P.O. # | Job No. | * FIELD PRINT *

<<< Fold Here >>>

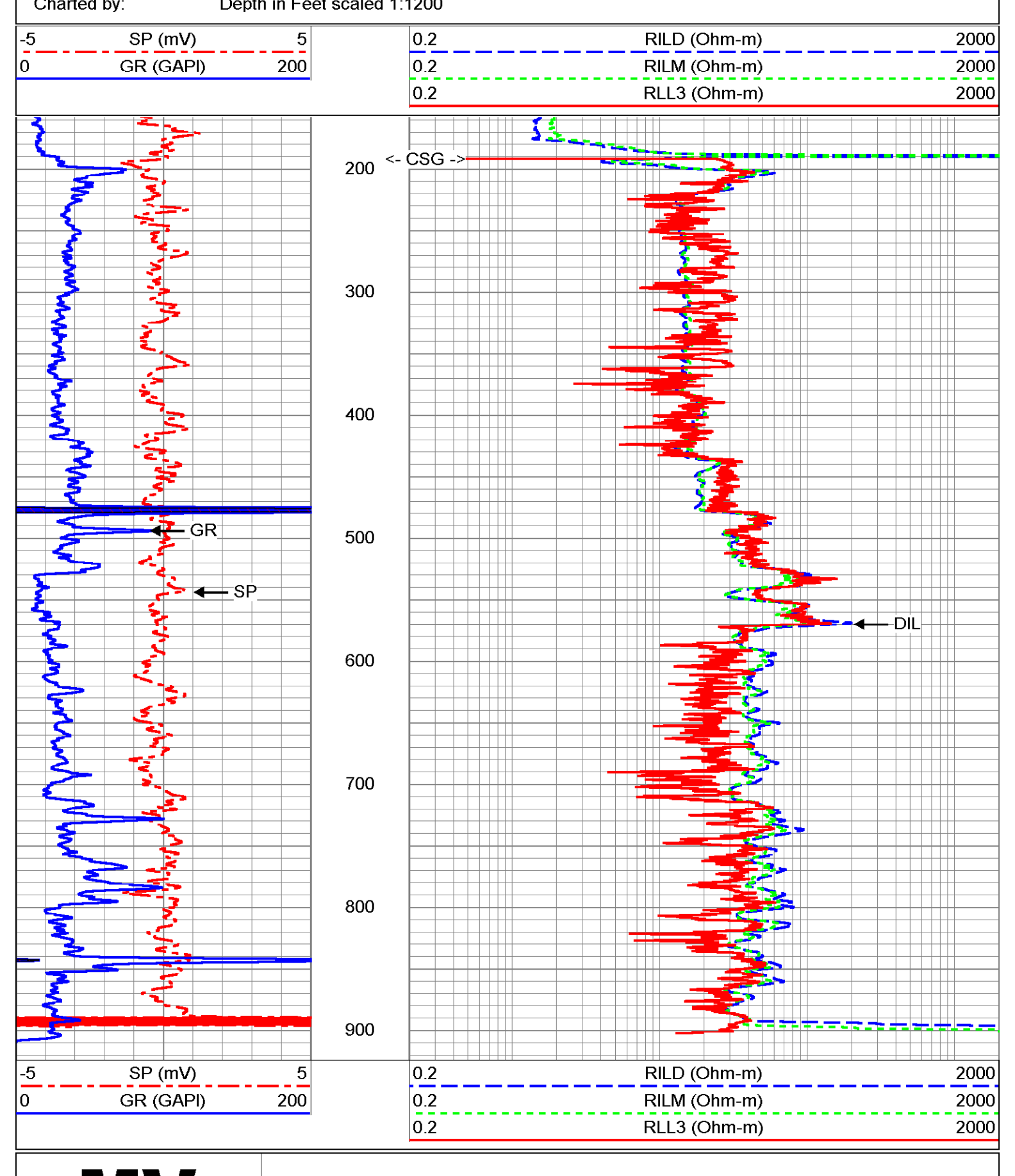
All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

Rm=ohm-m @ degF

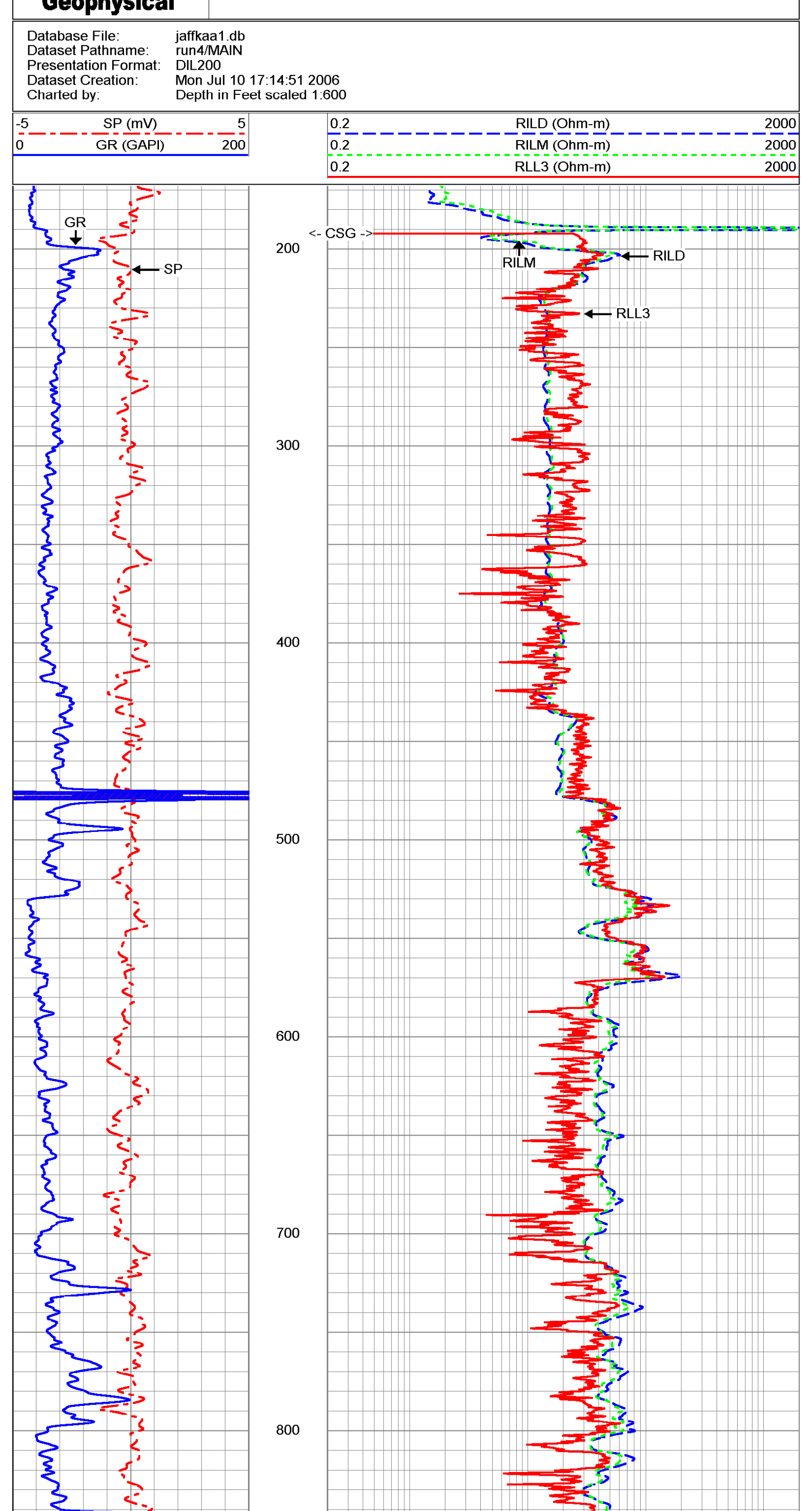
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: DIL1200
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:1200



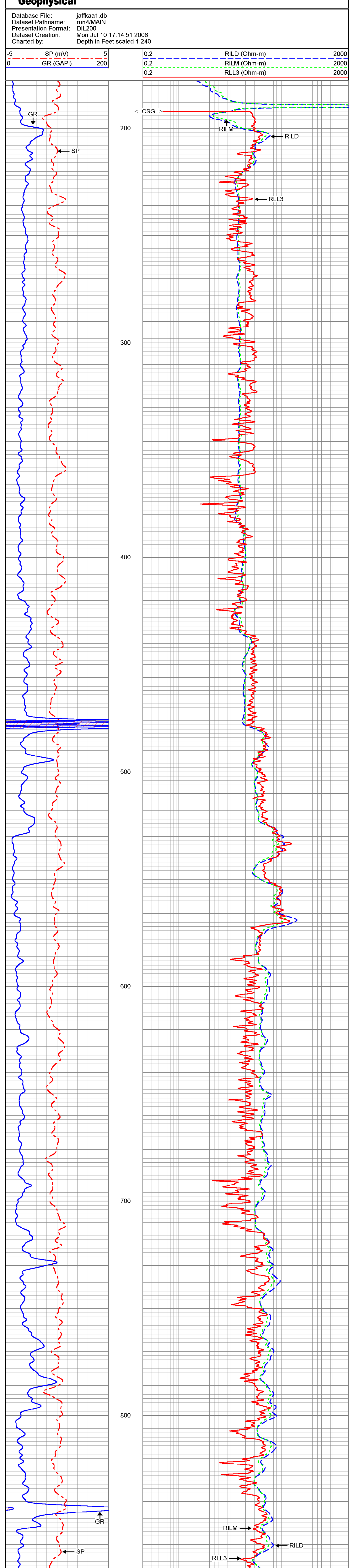
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: DIL200
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:600



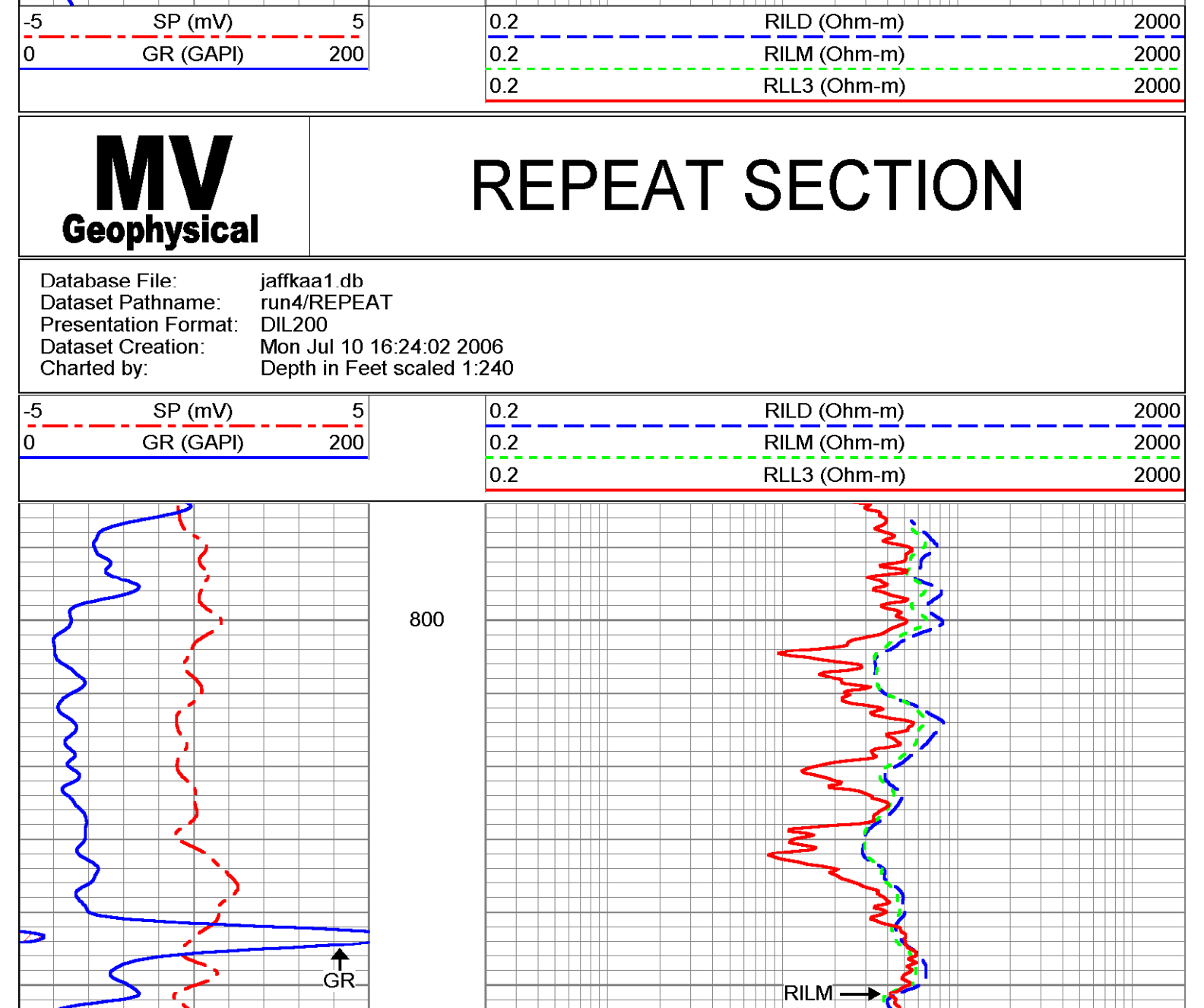
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: DIL200
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:240



MV Geophysical — REPEAT SECTION

Database File: jaffkaa1.db
Dataset Pathname: run4/REPEAT
Presentation Format: DIL200
Dataset Creation: Mon Jul 10 16:24:02 2006
Charted by: Depth in Feet scaled 1:240



Dual Induction Calibration Report

Serial-Model: 5390-R
Surface Cal Performed: Sun Jan 16 21:49:43 2005
Downhole Cal Performed: Thu Mar 02 08:33:17 2006
After Survey Verification Performed: Thu Mar 02 09:07:55 2006

Surface Calibration

Loop:	Readings Air	Readings Loop		References Air	References Loop		Results m	Results b
Deep	0.050	0.646	V	0.000	400.000	mmho-m	671.771	-33.646
Medium	0.001	0.732	V	0.000	464.000	mmho-m	634.710	-0.492

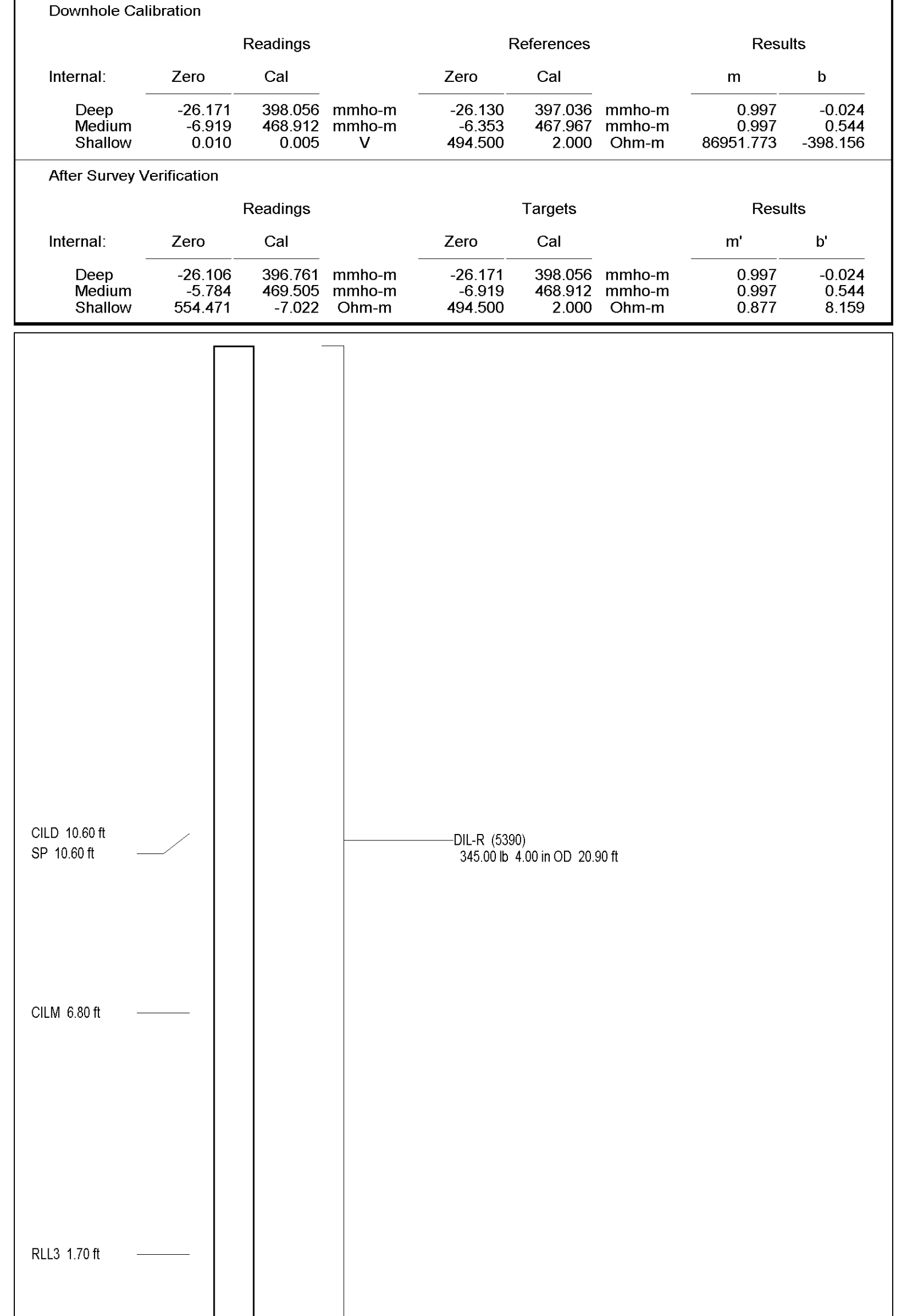
Internal:	Readings Zero	Readings Cal		References Zero	References Cal		Results m	Results b
Deep	0.011	0.641	V	0.000	400.000	mmho-m	634.996	-7.104
Medium	-0.009	0.738	V	0.000	464.000	mmho-m	620.900	5.734

Downhole Calibration

Internal:	Readings Zero	Readings Cal		References Zero	References Cal		Results m	Results b
Deep	-26.171	398.056	mmho-m	-26.130	397.036	mmho-m	0.997	-0.024
Medium	-6.919	468.912	mmho-m	-6.353	467.967	mmho-m	0.997	0.544
Shallow	0.010	0.005	V	494.500	2.000	Ohm-m	86951.773	-398.156

After Survey Verification

Internal:	Readings Zero	Readings Cal		Targets Zero	Targets Cal		Results m'	Results b'
Deep	-26.106	396.761	mmho-m	-26.171	398.056	mmho-m	0.997	-0.024
Medium	-5.784	469.505	mmho-m	-6.919	468.912	mmho-m	0.997	0.544
Shallow	554.471	-7.022	Ohm-m	494.500	2.000	Ohm-m	0.877	8.159



Dataset: run1/pass5
Total Length: 20.90 ft
Total Weight: 345.00 lb
O.D.: 4.00 in

Company Jaffer Associates Corp.
Well FKAA ASR
Field Florida City
County Miami-Dade
State/Prv Florida

MV Geophysical

X-Y CALIPER GAMMA RAY LOG

Company Jaffer Associates Corporation
Well FKAA ASR
Field Florida City
County Miami-Dade State/Prv Florida
Location J. Robert Dean Water Treatment Plant, Florida Keys Aqueduct Authority, CH2M Hill, Inc.

Permanent Datum G.L.; Log Measured From G.L.; Drilling Measured From G.L.
Elevation K.B. / D.F. / G.L.
Other Services: XY/GR, DLL/SP, BHC/VDL

Date	10-JUL-2006
Run Number	FOUR
Depth Driller	900
Depth Logger	900
Bottom Logged Interval	900
Top Log Interval	SURFACE
Open Hole Size	12.25"
Type Fluid	MUD
Density / Viscosity	NA/NA
Max. Recorded Temp.	NA
Estimated Cement Top	NA
Time Well Ready	15:00 7/10/2006
Time Logger on Bottom	15:00 7/10/2006
Equipment Number	MV01
Location	R. Myers
Recorded By	S.Miller / C.Miller
Witnessed By	M. Cronkhite (CH2M), A. Chatterjee (CH2M)

Borehole Record

Run Number	Bit	From	To
ONE	12.25"	SURFACE	210'
TWO	40"	SURFACE	190'
THREE	12.25"	SURFACE	900'

Tubing Record

Size	Weight	From	To

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	30"	3/8"	SURFACE	193' Logger
Prot. String				
Production String				
Liner				

Invoice No. 2006169   P.O. #   Job No.   * FIELD PRINT *

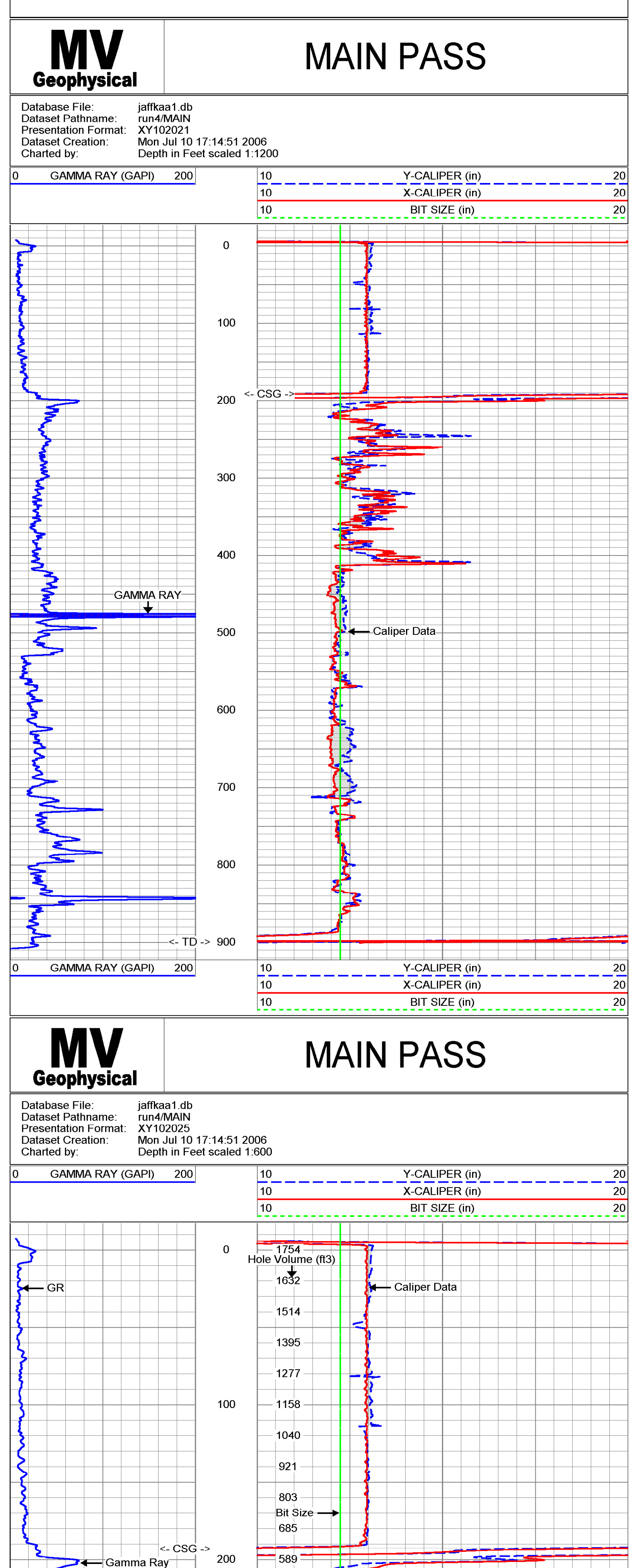
<<< Fold Here >>>

Comments

X-Y Caliper Arm Extensions: 33"

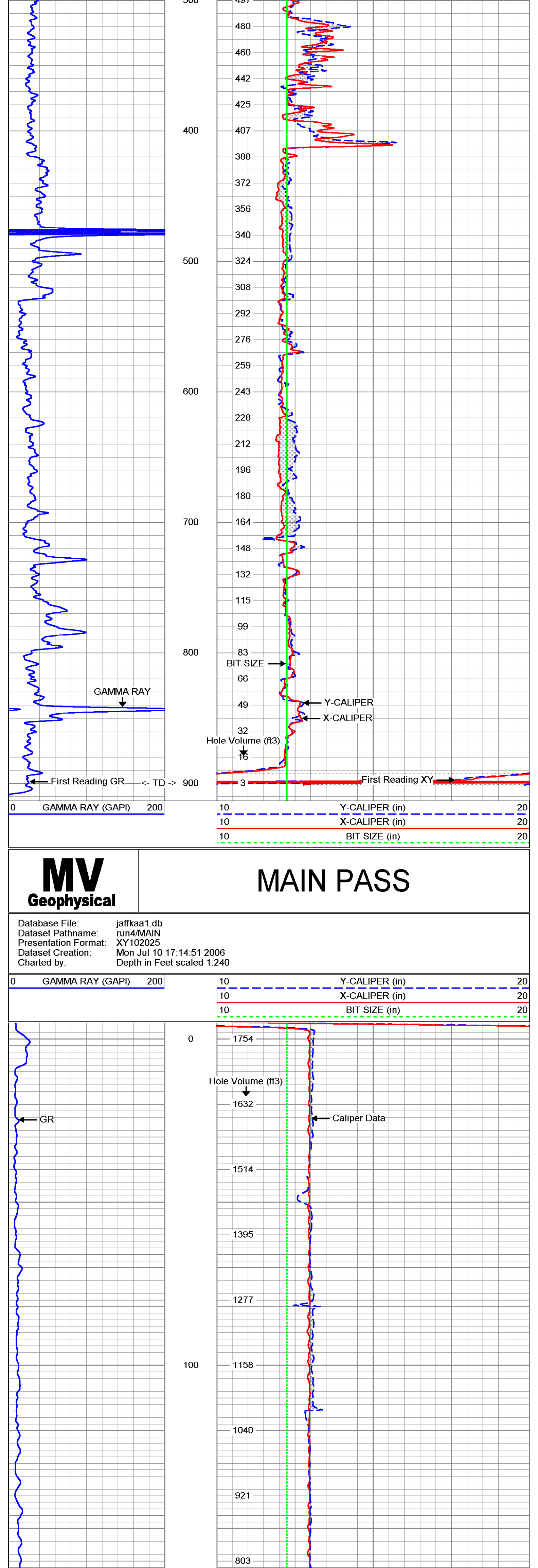
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: XY102021
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:1200



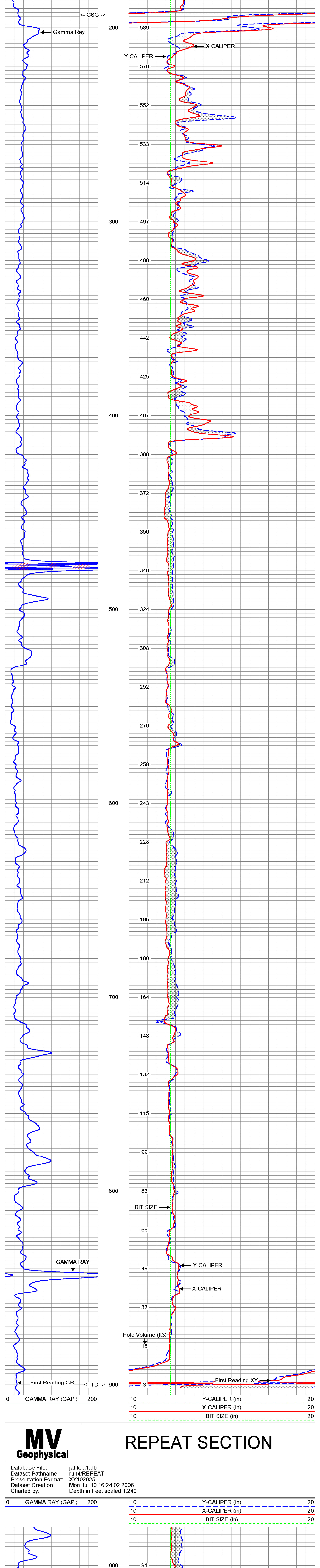
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: XY102025
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:600



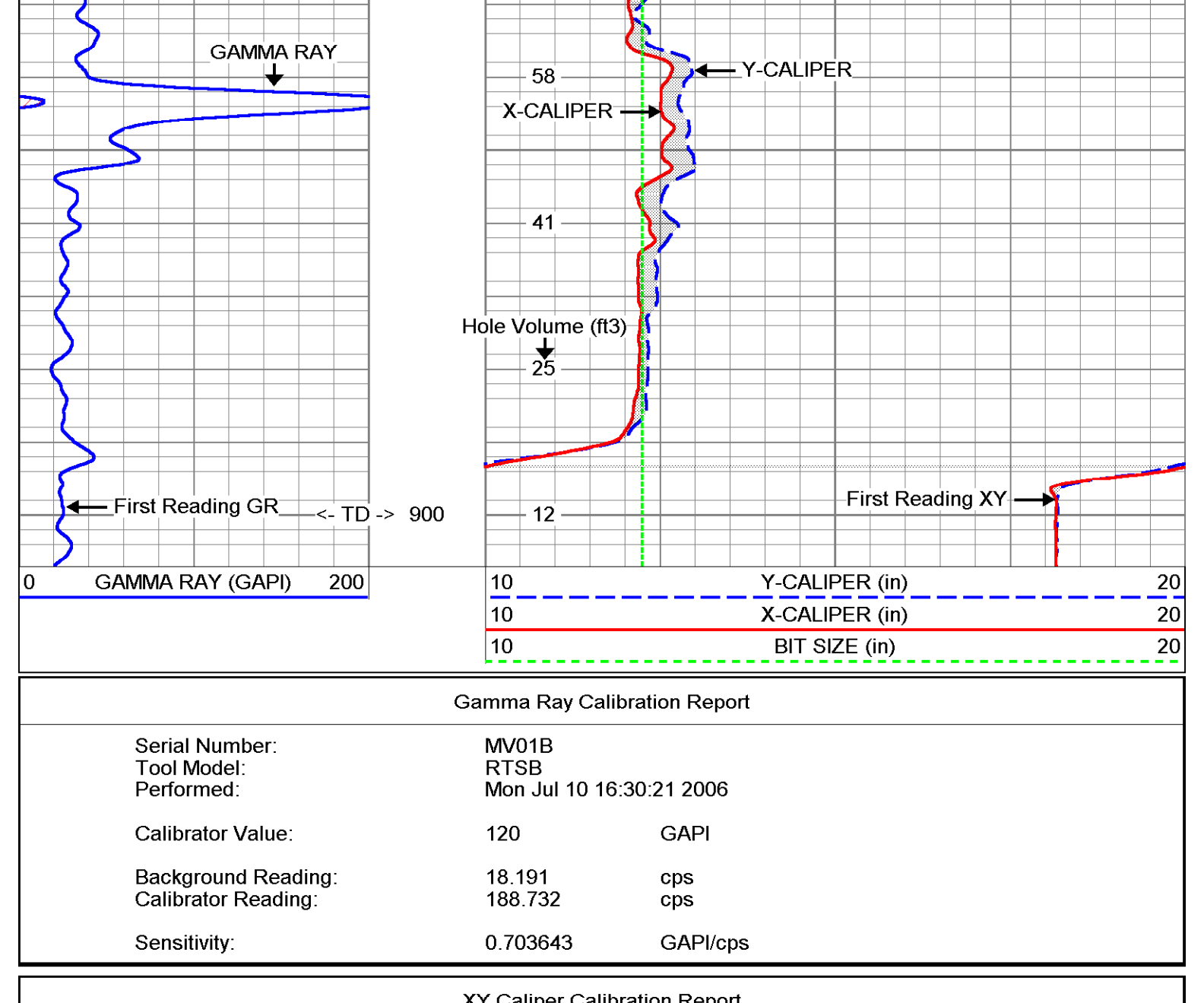
MV Geophysical — MAIN PASS

Database File: jaffkaa1.db
Dataset Pathname: run4/MAIN
Presentation Format: XY102025
Dataset Creation: Mon Jul 10 17:14:51 2006
Charted by: Depth in Feet scaled 1:240



MV Geophysical — REPEAT SECTION

Database File: jaffkaa1.db
Dataset Pathname: run4/REPEAT
Presentation Format: XY102025
Dataset Creation: Mon Jul 10 16:24:02 2006
Charted by: Depth in Feet scaled 1:240



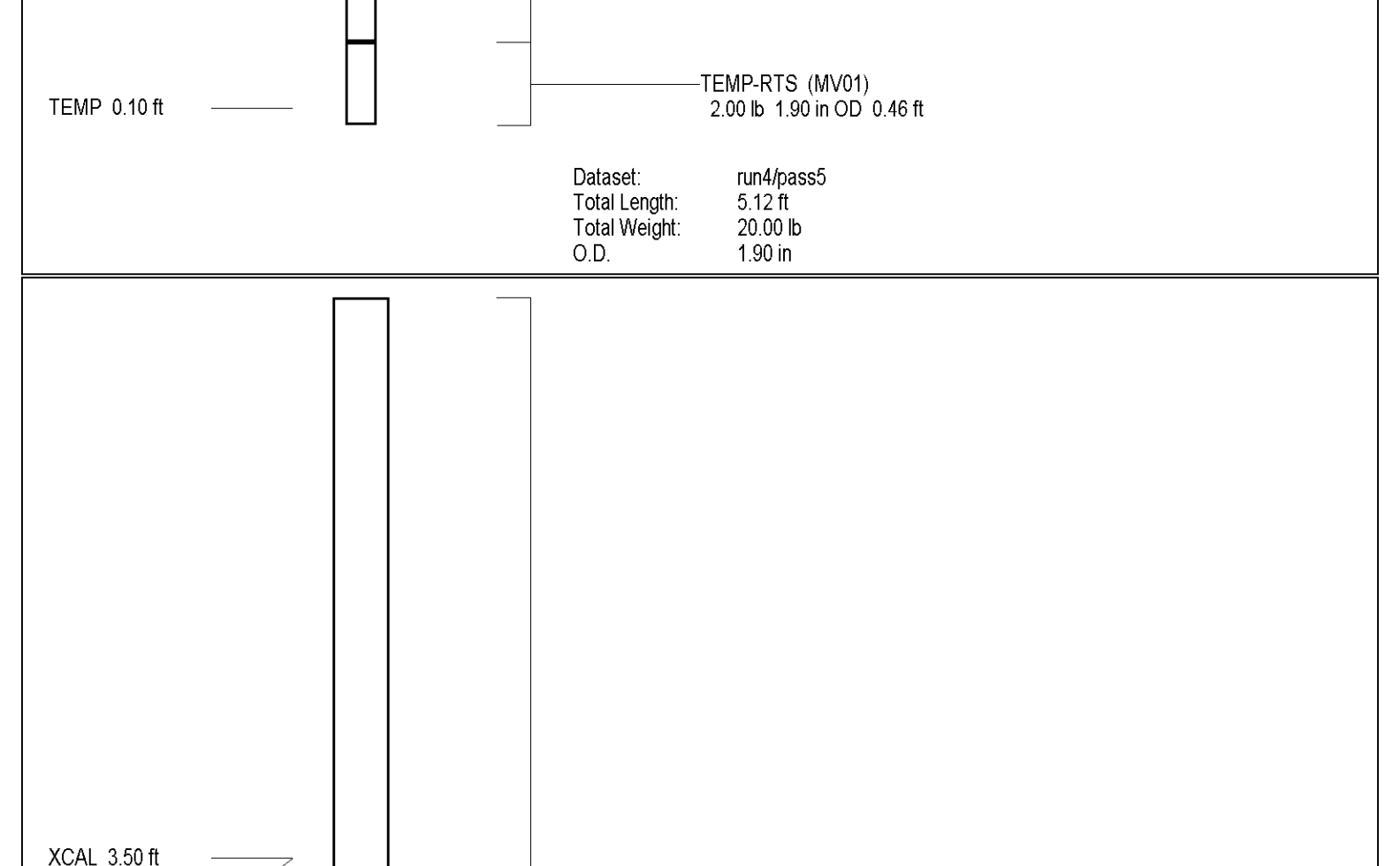
Gamma Ray Calibration Report

Serial Number:	MV01B	
Tool Model:	RTSB	
Performed:	Mon Jul 10 16:30:21 2006	
Calibrator Value:	120	GAPI
Background Reading:	18.191	cps
Calibrator Reading:	188.732	cps
Sensitivity:	0.703643	GAPI/cps

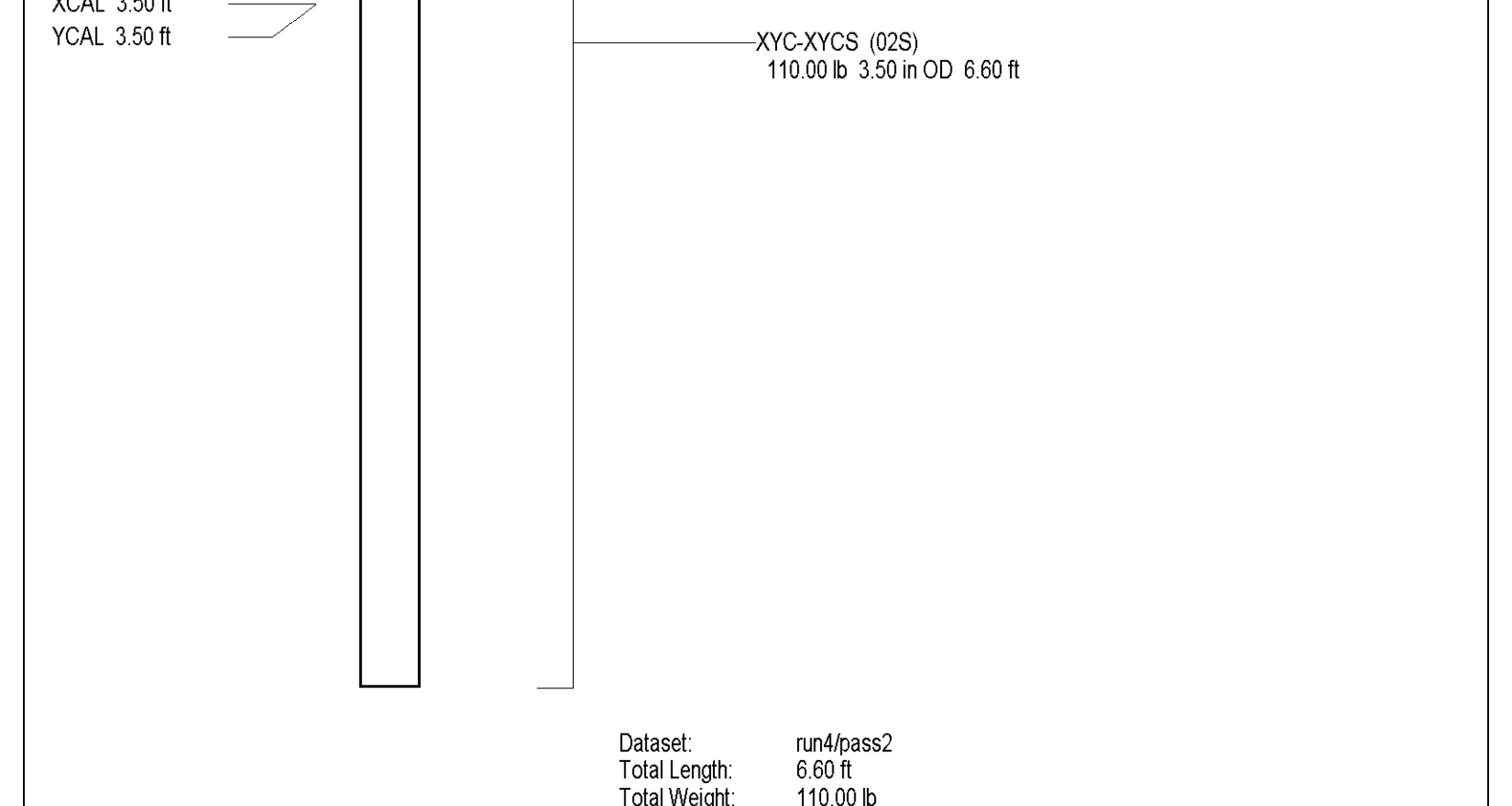
XY Caliper Calibration Report

Serial Number: 02S
Tool Model: XYCS
Performed: Mon Jul 10 15:33:58 2006

Small Ring:	12.25		in
Large Ring:	33		in
	X Caliper	Y Caliper	
Reading with Small Ring:	652.6	850.4	cps
Reading with Large Ring:	1111.9	1395	cps
Gain:	0.0451774	0.0381014	
Offset:	-17.2328	-20.1514	



Dataset: run4/pass5
Total Length: 5.12 ft
Total Weight: 20.00 lb
O.D.: 1.90 in



Dataset: run4/pass2
Total Length: 6.60 ft
Total Weight: 110.00 lb
O.D.: 3.50 in

APPENDIX F

Casing Mill Certificate and Inspection Records

ERSHIGS
A Denali company
The Leader in FRP Systems

CERTIFICATE OF COMPLIANCE

Ershigs hereby certifies that the 920 LF of 24" ID FRP Well Casing Piping provided under Metro Equipment Service Purchase Order AF13006-1 for Florida Keys Aqueduct Authority for the J. Robert Dean ASR Well location in Florida City, Florida has been manufactured in accordance with Ershigs standard manufacturing practices for Well Casing Pipe and our fabrication drawings B-06006, Sheets 1 through 8, Rev. 0.

Ted Radke
Q.C. Inspector

Date: 6/7/06

Ershigs' W.O. #10726, CN 2958

鋼管検査証明書

INSPECTION CERTIFICATE

KAWASAKI STEEL CORPORATION
千葉製鉄所
CHIBA WORKS
(〒260-0835) 千葉市中央区川崎町1番地
1,KAWASAKI-CHO, CHUO-KU, CHIBA, JAPAN

CERTIFICATE No. : 1X1508
CONTRACT No. : 61K2-A1X0D-08(43879450A4+)
SHIPPER : ITOCHU CORPORATION
CUSTOMER :
NAME OF ARTICLE : DSAW STEEL LINEPIPE, API 5L GR.B/X42 (42ND EDITION PSL-2, JANUARY 2000)
SIZE and QUANTITY : OD38" X 0.375" X 40'   26 PIECES   1,040.0 FEET   71,162KG

DATE: 2001-11-15

HEAT No.	TEST PIPE No. (SEQUENCE No.)	LOT No.		TENSILE TEST: YIELD STRENGTH (KSI)	TENSILE STRENGTH (KSI)	ELONGATION (%)	YS/TS (%)	BEND / FLATTENING		IMPACT TEST FT-LBS (1 BT +32°F 2V 10X6.7; 2 BT +14°F 2V 10X6.7)			EACH	AVE.	DROP WEIGHT TEAR TEST S.A.(%) EACH	AVE.	HARDNESS
			BT	42.0 -65.0	60.0 110.0	28.0 MIN.	93 MAX.	GOOD					10.0 MIN.	13.4 MIN.	MIN.	MIN.	HV(10) B 248 W 248 H 248 MAX.
			WT		60.0 MIN.												
26-1039	AXW02114 (24)		BT	47.1	73.1	41	64	G	G	2	69.4	70.2	68.8	69.9			B 169
			WT		77.0												W 171
										1	73.8	70.2	66.5	70.2			H 153
26-1039	AXW02158 (23)																

CHEMICAL COMPOSITION (%)
*1 : V+NB+TI
PCM(X100)

HEAT No.		C	Si	Mn	P	S	Mo	V	Nb	Al	Ti	*1	PCM	Cu	Ni	Cr	B	N	Ca
		×100	×100	×100	×1000	×1000	×1000	×1000	×1000	×1000	×1000	×1000	×100	×100	×100	×100	×10000	×10000	×10000
	HA	22 MAX		120 MAX	25 MAX	15 MAX						150 MAX	25 MAX		99 MAX				43 MAX
	PA	22 MAX		120 MAX	25 MAX	15 MAX						150 MAX	25 MAX		99 MAX				43 MAX
26-1039	HA	15	24	105	18	2		4	2	1	1	4	22	1	2	3	1		34
	PA	15	24	105	16	2		3	3	1	5	5	22	1	4	3	1		34
26-1039	HA	15	24	105	18	2		4	2	1	1	4	22	1	2	3	1		34
	PA	15	23	109	17	2		2	3	1	2	5	22	1	2	3	1		34

NDT REFERENCE STANDARD
UT(LONGI.):3.2MM DIA. DRILLED HOLE
RT:API STANDARD 2% PENETRAMETER

* DETAILS AS PER PACKING LIST *

WE CONFIRM TO COMPLY WITH HARDNESS REQUIREMENT (MAX.HRC22) AND NI CONTENT REQUIREMENT (MAX.1.0%) WHICH ARE REQUIRED IN NACE-MR0175. (HV248 IS EQUIVALENT TO HRC22)

HYDROSTATIC TEST	ULTRASONIC INSPECTION	RADIOGRAPHIC INSPECTION	VISUAL & DIMENSION INSPECTION
GOOD (750 PSI 10 SEC.)	GOOD	GOOD	GOOD

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN SATISFACTORILY TESTED IN ACCORDANCE WITH THE SPECIFICATION.

N. Yamada
QUALITY SYSTEMS SECTION

NOTES: [illegible]

38-inch Casing

Casing Tally

38-inch Steel Casing - Tally
FKAA ASR-1
May 30, 2006

Joint Number	Joint Length (feet)	String Length (feet)	Time Hanging	Time in Well	Heat Number	Centralizer Location on Casing String	Comments
1	40.10	40.10	1355	1413	26-1039	5 feet, 20 feet from bottom	
2	40.10	80.20	1425	1604	26-1039	On weld between Joints 1 & 2	During installation, the casing was hung up at approximately 45 feet bls. With pushing casing toward the east side of the pad, casing went by. There were several other tight spots at approximately 60 and 73 feet bls as joint was lowered
3	40.10	120.30	1616	1732	26-1039		
4	40.15	160.45	1746	1907	26-1039	On weld between Joints 3 & 4	
5	40.15	200.60	1918	2053	26-1039		During installation, the casing was hung up at approximately 180 feet bls. With pushing casing toward the south side of the pad, casing went by.

Casing Length	201.60	Feet
Floor	5.75	Feet
Support Beams	1.98	Feet
Casing Seat	193.87	Feet

Cementing Log

FKAA ASR PROJECT

ASR WELL
1st STAGE OF CEMENTING LOG
38-INCH STEEL CASING
May 31, 2006

Time	Density	Pumping Rate (BBLs/min)	Total Pumped (YDS^3)	Wellhead Pressure (psi)	Comments
1216					1st cement truck arrives at the site with 6.5 yds^3
1221	16.2				Due to high density, start adding water to truck
1239	15.7				Density acceptable after adding 35 gallons of water to truck
1328					2nd cement truck arrives at the site with 6.5 yds^3 of neat cement
1337	15				Density of 2nd truck measured
1343	15.7				Due to delay in pumping, an additional 50 gallons of water was added to 1st truck. Density remeasured. Start pumping from 1st truck.
1349			3		The cement is starting to set-up and will not pour freely down truck chute. Cement rejected and pumping is stopped. It is estimated by Tom Howard and Mark Schilling approximately 3 yds^3 was pumped from 1st truck. 3rd cement truck with 3 yds^3 of neat cement arrives at the site.
1350				6	Start pumping from the 2nd truck
1354					Circulation is noted
1401				15	
1405			9.5		2nd truck empty. Stop pumping
1406	16				Density of 3rd truck measured. Start adding water to bring density and thickness down.
1409	15.3				A total of 15 gallons of water was added to the truck. Start pumping from the 3rd truck.
1410				30	
1416			12.5	35	3rd truck empty. Start pumping water as chase.
1429			~600 gals	36	Stop chase, seal in well and pull tremie pipe up 30 feet in the derrick.

FKAA ASR PROJECT

ASR WELL
2nd STAGE OF CEMENTING LOG
38-INCH STEEL CASING
June 1, 2006

Time	Density	Pumping Rate (BBLs/min)	Total Pumped (YDS^3)	Comments
1615				Cement trucks #1 and #2 arrive at the site with 6.5 yds^3 of neat each
1620	15			Density of 1st truck measured
1621				Start pumping neat cement from the 1st truck
1623				Circulation of annulus is established
1627				3rd truck with 6.5 yds^3 of neat arrives
1651				1st truck empty
1652			6.5	Stop pumping and pull one joint of tremie pipe
1658	15.1			Density of 2nd truck measured
1700				Start pumping neat cement from the 2nd truck
1708				Cement pump cannot overcome build-up of pressure in tremie string. Stop pumping. Cement traces are noted at land surface.
1710				Remove another joint of tremie pipe and inspect the 1" X 2" reducer/elbow for debris. It is filled with rock and pressure dehydrated cement.
1720				Resume pumping from 2nd truck. Heavy mud returns are noted at land surface.
1725				Pressure increases again and restricts pumping
1727				Stop pumping as JAC rejected the remainder of the 2nd truck's load due to excessive aggregate in the mix.
1733			8.5	2nd truck unloads approximately 4.5 yds^3 of cement
1740				Jaffer rejects the 3rd truck due to excessive aggregate in the mix without pumping any additional into the annulus.

24-inch Casing

Casing Tally

24-inch FRP Casing - Tally
FKAA ASR-1
August 16, 2006

Joint Number	Joint Length (feet)	Effective Length of Joint (feet)	String Length (feet)	Final Position of top of Joint in Well (ft bls)	Time Hanging	Time in Well	Pressure Tested Connection	Centralizer Location on Casing String	Comments
1	14.22	14.22	14.22	868.83	1527	1539	30 secs @ 35 psi	5 feet from bottom of joint	Sand coated
2	40.10	39.03	53.25	829.80	1540	1602	30 secs @ 70 psi	10 feet from bottom of joint and 10 feet from top of joint	Sand coated.
3	40.17	39.10	92.35	790.70	1605	1624	30 secs @ 30 psi		Sand coated
4	40.25	39.18	131.53	751.52	1627	2023	30 secs @ 35 psi		Sand coated. Repaired joint. Difficulty in installation due to spigot diameter being out of specifications
5	40.13	39.06	170.59	712.46	2025	2050	30 secs @ 40 psi	10 feet from top of joint	Repaired joint
6	40.13	39.06	209.65	673.40	2052	2108	30 secs @ 40 psi		
7	40.10	39.03	248.68	634.37	2111	2126	30 secs @ 55 psi		
8	40.10	39.03	287.71	595.34	2141	2210	30 secs @ 65 psi	10 feet from bottom of joint	
9	40.15	39.08	326.79	556.26	2214	2230	30 secs @ 50 psi		
10	40.10	39.03	365.82	517.23	2233	2255	30 secs @ 40 psi	10 feet from top of joint	
11	40.10	39.03	404.85	478.20	2259	2315	30 secs @ 60 psi		

24-inch FRP Casing - Tally
FKAA ASR-1
August 16, 2006

Joint Number	Joint Length (feet)	Effective Length of Joint (feet)	String Length (feet)	Final Position of top of Joint in Well (ft bls)	Time Hanging	Time in Well	Pressure Tested Connection	Centralizer Location on Casing String	Comments
12	40.13	39.06	443.91	439.14	2318	2335	30 secs @ 60 psi		
13	40.05	38.98	482.89	400.16	2338	2359	30 secs @ 60 psi	10 feet from bottom of joint	
14	40.04	38.97	521.86	361.19	0002	0022	30 secs @ 60 psi		
15	40.25	39.18	561.04	322.01	0025	0042	30 secs @ 65 psi	10 from bottom of joint	
16	40.17	39.10	600.14	282.91	0046	0101	30 secs @ 45 psi		
17	40.10	39.03	639.17	243.88	0103	0115	30 secs @ 60 psi	15 feet from top of joint	
18	40.10	39.03	678.20	204.85	0118	0130	30 secs @ 65 psi		
19	40.10	39.03	717.23	165.82	0134	0153	30 secs @ 60 psi		
20	40.17	39.10	756.33	126.72	0156	0210	30 secs @ 65 psi	10 feet from bottom of joint	
21	40.10	39.03	795.36	87.69	0214	0233	30 secs @ 65 psi		
22	40.23	39.16	834.52	48.53	0235	0252	30 secs @ 45 psi	Middle of joint	
23	40.17	39.10	873.62	9.43	0255	0314	30 secs @ 60 psi		
24	10.50	9.43	883.05	0.00	0319	0512			Delay in landing casing was due to steps necessary to lower the casing below the rig floor, not due to casing defects.

Cementing Log

FKAA ASR PROJECT

ASR WELL
1st STAGE OF CEMENTING LOG
24-INCH FRP CASING
August 17, 2006

Time	Density (lbs/gal)	Pumping Rate (BBLs/min)	Total Pumped (YDS^3)	Wellhead Pressure (psi)	Comments
1501					1st cement truck arrives w/7 yds^3 of neat cement
1507	16.4				Density of cement in 1st truck is measured. Cement is heavy, thick, and hot. Decision made by T. Howard of JAC to add 15 gallons of H2O to the cement mix
1518	16.2				Density of cement in 1st truck is measured after water was added. Cement is still dense, thick, and hot. T. Howard directs additional water to be added to mix. 2nd cement truck arrives w/7 yds^3 of neat cement.
1525					Installation of tremie pipe completed to a depth of 848 feet bls.
1530					Start pumping fresh H2O to establish circulation.
1532					Circulation established. Stop pumping H2O. Reject the cement mix from the 1st truck as cement is very hot and too thick to pump even after an additional 11 gallons of H2O was added.
1539	15.4				Density of cement in 2nd truck is measured. Start pumping neat cement.
1543					Cement mix from 2nd truck is inspected and found to have multiple dry clumps of cement mix and no aggregate.
1555			5.5	0	2nd cement truck is empty and cement pumping is stopped. Agree with T. Howard that due to the poor cement mix and the rejection of the cement clumps due to screen over cement hopper, a total of 1.5 yds^3 is reduced from the pumped amount.

FKAA ASR PROJECT

ASR WELL
1st STAGE OF CEMENTING LOG
24-INCH FRP CASING
August 17, 2006

Time	Density (lbs/gal)	Pumping Rate (BBLs/min)	Total Pumped (YDS^3)	Wellhead Pressure (psi)	Comments
1620					Start pumping fresh H2O to ensure that the tremie string remains unplugged by curing cement.
1626					3rd cement truck arrives with 7 yds^3 of neat cement
1634	15.8				Density of cement in 3rd truck is measured. Resume pumping neat cement.
1639				0	The cement mix is similar to the mix in the 2nd truck. Informed T. Howard that if mix does not improve it will be rejected.
1643				0	Mix quality improves and no clumps of dry cement mix are noted
1650			12.5	0	3rd truck empty. Stop pumping cement.
1711					4th cement truck arrives with 7 yds^3 of neat cement. Unable to pump H2O.
1723					Cement stage is stopped due to inability to pump through tremie string. 4th cement truck not pumped.

FKAA ASR PROJECT

ASR WELL
2nd STAGE OF CEMENTING LOG
24-INCH FRP CASING
August 18, 2006

Time	Density (lbs/gal)	Pumping Rate (BBLs/min)	Total Pumped (YDS^3)	Comments
1425				1st and 2nd cement trucks arrive at the site w/7yds^3 of neat cement each. Still installing tremie lines.
1545	14.8			Start pumping neat cement from 2nd truck. 1st truck rejected due to hot cement. Two additional trucks w/7yds^3 of neat cement each have arrived.
1550				Stop pumping as hose develops leak. Circulation is established, but weak
1605				Resume pumping from 2nd truck after replacing hose.
1615			5	Pumping is stopped as cement has become dense and hot. Start pulling 2 joints from each tremie line.
1645	15			Start pumping neat cement from 4th truck. Rinker recalled 3rd truck due to hot cement.
1650				Pumping is stopped as cement pump will not pump. After observing truck dump load, it is determined that no additional cement was pumped.

FKAA ASR PROJECT

ASR WELL
3rd STAGE OF CEMENTING LOG
24-INCH FRP CASING
August 21, 2006

Time	Density (lbs/gal)	Pumping Rate (BBLs/min)	Total Pumped (YDS^3)	Comments
1337				1st truck arrives w/7 yds^3 of neat
1345	14.7			Start pumping from 1st truck. Circulation is good.
1358			7	1st truck empty. Stop pumping and start pulling tremie joints.
1410				2nd truck arrives w/7 yds^3 of neat
1414	14.9			Start pumping from 2nd truck after pulling one joint each from the two tremie lines. Circulation is good.
1426			14	2nd truck empty. Stop pumping and start pulling tremie joints.
1440				A total of 2 joints from each tremie line is pulled for a grand total of 3 joints from each line.
1444				3rd truck arrives w/7yds^3 of neat
1445	14.6			Start pumping from 3rd truck. Circulation is good.
1448				Rain begins. Pumping continues
1459			21	3rd truck empty. Stop pumping and start pulling tremie joints.
1515				A total of 2 joints from each tremie line is pulled for a grand total of 5 joints from each line. Rain stops.
1541				4th truck arrives w/7 yds^3 of neat
1545	14.1			Start pumping from 4th truck. Circulation is good.
1547				5th truck arrives w/7 yds^3 of neat
1559			28	4th truck empty. Rain resumes.
1602	14.8			Start pumping from 5th truck. Circulation is good.
1615			35	5th truck empty. Stop pumping and start preparing to chase.
1617				Start pumping fresh H2O as chase. Rain stops.
1620				Stop chase and start pulling tremie joints.
1652				A total of 5 joints from each tremie line is pulled for a grand total of 10 joints from each line. Start pumping 2nd chase.
1655				Stop chase.

FKAA ASR PROJECT

ASR WELL
4th STAGE OF CEMENTING LOG
24-INCH FRP CASING
August 22, 2006

Time	Density (lbs/gal)	Pumping Rate (BBLs/min)	Total Pumped (YDS^3)	Comments
1259				1st truck arrives w/7 yds^3 of neat
1302	14.9			Start pumping from 1st truck. Only one tremie string (2.375-inch) is in place. Circulation is good.
1313				2nd truck arrives w/7 yds^3 of neat
1314			7	1st truck empty. Stop pumping and start pulling tremie joints.
1320	15.1			Start pumping from 2nd truck after pulling one joint of tremie pipe. Circulation is good.
1330			14	2nd truck empty. Stop pumping and start pulling tremie joints.
1337				A total of 2 additional tremie joints pulled for a grand total of 3 joints.
1349				Pump approximately 100 gallons of fresh water to clean out hoses and tremie pipe while waiting on arrival of 3rd truck.
1424				3rd truck arrives w/7yds^3 of neat
1431				Start pumping from 3rd truck. Circulation is good. Tremie string is being raised and lowered during pumping to ensure that pipe does not get stuck.
1434				Returns start to thicken
1439				Clump of mud are noted in the returns.
1442			19*	Stop pumping due to the tremie string not being able to be lowered. Truck not empty. Start pulling tremie joints.
1453				A total of 2 additional tremie joints pulled for a grand total of 5 joints. Start pumping water to clear hoses and tremie pipe.
1455				Stop pumping and start removing all the remaining joints from the annulus.

* Amount estimated and agreed upon by Tom Howard of JAC and Mark Schilling of CH2M HILL

APPENDIX G

Pressure Test Data and Calibration Certificate

CASING PRESSURE TEST CH2MHILL

Final Pressure Test of 24-inch FRP Casing
FKAA J. Robert Dean Water Treatment Plant
ASR-1
October 18, 2006

Pressure Reading (PSI)	Time	Elapsed Time (minutes)	Overall Change in Pressure (PSI)	Comments
100.0	0902	0	0	Start test
100.0	0907	5	0	
99.5	0912	10	0.5	
99.5	0917	15	-	
99.25	0922	20	0.75	
99.0	0927	25	1.00	
99.0	0932	30	-	
99.0	0937	35	-	
98.5	0942	40	1.50	
98.5	0947	45	-	
98.5	0952	50	-	
98.5	0957	55	-	
98.5	1002	60	1.50	Bled off 16 gallons to reach 0 psi

5 GALS = 61.0 psi
5 GALS = 30.5 psi
5 GALS = 3.5 psi
1 GAL = 0 psi

Witnessed by:

Mark Schilling/CH2M HILL

Jerry Thomas/Jaffer

Len Fishkin/FDEP

Certificate of Calibration

KELC-9536

Kimball Electronic Laboratory, Inc.

Precision Measurement Equipment Specialists

Purchase Order # N/A

Calibration Performed By:

KIMBALL ELECTRONIC LABORATORY, INC
8081 W 21 LANE
HIALEAH, FL. 33016

For: JAF016

JAFFER CORP.
2801 NW 6TH AVENUE

MIAMI FL 33127

Equipment Information KELI I.D.: JAF-01006

Description: ASHCROFT 200 PSI PRESSURE TEST GAUGE

Manufacturer:	ASHCROFT
Model Number:	200 PSI
Part Number:	N/A
Range:	0-200 PSI
Serial Number:	A00449
Customer I.D.:	N/A
Cust. Barcode:	N/A
Cust. Location:	N/A
Specifications:	+/- 0.25% FULL SCALE

Cal Date:	01-Sep-06
Cal. Due Date:	01-Sep-07
Cal. Interval:	12 MONTHS
Received:	IN TOLERANCE
Calibration Result:	PASS
Temp / RH:	74F / 50%
Performed By:	BRUCE CABOT
Procedure:	SYN54

This is to certify that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure at the points tested (unless otherwise noted). It has been calibrated using measurement standards traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. This calibration is in accordance with MIL STD 45662A and ANSI/NCSL Z540-1-1994. TURS when applicable are greater than or equal to 4:1; with expanded uncertainty used to calculate the Test Uncertainty Ratio, with a coverage factor of K=2 at a confidence level of approximately 95%, unless otherwise noted. Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired.

Calibration Notes

PERFORMED ROUTINE CALIBRATION/CERTIFICATION

Standards Used To Calibrate Equipment

Company	I.D.	Description	Last Cal.	Cal. Due Date
KIM001	391	EATON UPS 3000BAA PRESSURE INDICATOR	05-Jul-05	31-Jul-07

Signatures:

Certified by: BRUCE CABOT — Bruce M Cabot — 01-Sep-06 11:06:53 AM

Approved By: Ricardo Alt

Kimball Electronic Laboratory, Inc. - 8081 W. 21st Lane - Hialeah, FL. 33016
Tel: 305-822-5792 - Toll Free: 800-393-1094 - Fax: 305-362-3125 - Web: www.kelilabs.com

APPENDIX H

Lithologic Descriptions

Lithologic Log for Well FKAA-FC-ASR-1

Logger: G. Bulman/CH2M HILL
Reference point: Land Surface

From (ft)	To (ft)	Description
0	10	LIMESTONE, very pale orange (10YR 8/2), moderately consolidated, fine-grained, with occasional reddish-orange oxidation surfaces, tubular calcareous fossil molds and shell fragments.
10	20	Same as above.
20	30	As above, with color shift to very light gray (N8) and some reddish-orange oxidation staining.
30	40	LIMESTONE, bimodal color: white (N9) and medium light gray (N7), moderately well consolidated, fine-grained, micritic.
40	50	LIMESTONE, white (N9) to very light gray (N8) to yellowish gray (5Y 8/1), moderately well consolidated, fine-grained matrix supporting medium grained quartz grains.
50	60	SHELL FRAGMENTS, light brownish gray (5YR 6/1) to yellowish gray (5Y 8/1), unconsolidated, coarse, lagoonal facies bivalve mollusks, and LIMESTONE, very light gray (N8) to yellowish gray (5Y 8/1), crystalline.
60	70	Same as above.
70	80	As above, but finer-grained unconsolidated SHELL HASH with less LIMESTONE.
80	90	Same as above.
90	100	Same as above.
100	110	Same as above.
110	120	CLAY and SILT (50%), dark greenish gray (5GY 4/1), weak plasticity, and SHELL FRAGMENTS (50%), as above.
120	130	CLAY and SILT (60%), greenish gray (5GY 6/1), weak plasticity, and SHELL FRAGMENTS and LIMESTONE (40%).
130	140	LIMESTONE (biomicrite, 60%), yellowish gray (5Y 8/1), poorly consolidated, and SHELL FRAGMENTS (35%), light gray (N7) to light brownish gray (5YR 6/1), unconsolidated, and PHOSPHORITE GRAINS (<5%).
140	150	CLAY and SILT (50%), greenish gray (5GY 6/1), weak plasticity, and SHELL FRAGMENTS (50%), as above.
150	160	Same as above.
160	170	Same as above.
170	180	SHELL FRAGMENTS, yellowish gray (5Y 8/1) to light brownish gray (5YR 6/1), LIMESTONE, light gray (N7), moderately consolidated and SILT, greenish gray (5GY 6/1).
180	190	LIMESTONE (packstone), medium light gray (N6), containing fine-grained quartz and phophorite, poorly consolidated, with SHELL FRAGMENTS, yellowish gray (5Y 8/1) to light brownish gray (5YR 6/1).
190	200	Same as above.

From (ft)	To (ft)	Description
200	210	LIMESTONE (packstone), same as above, with a greater proportion of SHELL FRAGMENTS.
210	220	Same as above.
220	230	Same as above.
230	240	Same as above.
240	250	Same as above.
250	260	Same as above.
260	270	Same as above, with some white (N9), well-consolidated, crystalline LIMESTONE.
270	280	Same as above.
280	290	Same as above, with some CARBONATE MUD, light gray (N7).
290	300	Same as above, with an increasing proportion of CARBONATE MUD (~30%), light gray (N7).
300	310	Same as above.
310	320	Same as above.
320	330	CARBONATE MUD and CLAY (60%), light olive gray (5Y 6/1), SHELL FRAGMENTS (30%), light brownish gray (5YR 6/1) and LIMESTONE (<10%).
330	340	Same as above.
340	350	Same as above.
350	360	Same as above.
360	370	CLAY and CARBONATE MUD (80%), dark greenish gray (5GY 4/1) to olive black (5Y 2/1), with fine SAND or SILT, SHELL FRAGMENTS and LIMESTONE (20%)
370	380	Same as above.
380	390	CLAY and SILT, as above, with an increase in SHELL FRAGMENTS (50%).
390	400	CLAY and SILT, as above, with only 30-40% SHELL FRAGMENTS.
400	410	CLAY and SILT (50%), medium gray (N5) to greenish gray (5GY 6/1), SHELL FRAGMENTS (30%), yellowish gray (5Y 8/1), and LIMESTONE (packstone, 20%), medium gray (N5).
410	420	Same as above, slightly higer proportion of silt.
420	430	CLAY and SILT (60%), dark greenish gray (5GY 4/1) to olive black (5Y 2/1), LIMESTONE(packstone, 30%), medium gray (N5), with little SHELL FRAGMENTS and well preserved sharks teeth.
430	440	CLAY, olive black (5Y 2/1), silty, stiff, with little SHELL FRAGMENTS and LIMESTONE.
440	450	SILT, dark greenish gray (5GY 4/1), CLAY, olive black (5Y 2/1), LIMESTONE (packstone), olive gray (5Y 4/1), SHELL FRAGMENTS, yellowish gray (5Y 8/1).
450	460	Same as above.
460	470	Same as above.
470	480	Same as above.

From (ft)	To (ft)	Description
480	490	LIMESTONE (packstone/biomicrite, 50%), yellowish gray (5Y 8/1), poorly consolidated; SHELL FRAGMENTS (40%), white (N9) to yellowish gray (5Y 8/1), and SILT/CLAY (10%), light olive gray (5Y 5/2).
490	500	Same as above, with even less silt/clay.
500	510	LIMESTONE (packstone/biomicrite), yellowish gray (5Y 8/1), poorly consolidated, and some SHELL FRAGMENTS, white (N9) to yellowish gray (5Y 8/1).
510	520	Same as above.
520	530	Same as above.
530	540	LIMESTONE (packstone), medium light gray (N6) to light olive gray (5Y 6/1), poorly consolidated, with some very fine phosphorite grains, and LIMESTONE (biomicrite), white (N9) to yellowish gray (5Y 8/1), moderately well consolidated, with SHELL FRAGMENTS.
540	550	Same as above.
550	560	Same as above.
560	570	Same as above.
570	580	As above, with a higher proportion of moderately well consolidated white LIMESTONE (micrite).
580	590	Same as above.
590	600	Same as above.
600	610	LIMESTONE (biomicrite), yellowish gray (5Y 8/1), poorly consolidated with some coarser SHELL fragments.
610	620	Same as above.
620	630	LIMESTONE (packstone/biomicrite), yellowish gray (5Y 8/1), poorly consolidated, containing fewer shell fragments.
630	640	Same as above.
640	650	Same as above.
650	660	Same as above.
660	670	Same as above.
670	680	Same as above.
680	690	LIMESTONE (packstone/biomicrite), yellowish gray (5Y 8/1), moderately consolidated with some SHELL FRAGMENTS.
690	700	Same as above.
700	710	LIMESTONE (pakcstone/biomicrite), yellowish gray (5Y 8/1), moderately consolidated with some SHELL FRAGMENTS.
710	720	As above, but poorly consolidated.
720	730	Same as above.
730	740	Same as above.

From (ft)	To (ft)	Description
740	750	LIMESTONE (packstone/biomicrite), yellowish gray (5Y 8/1), moderately to poorly consolidated with some fine-grained PHOSPHORITE grains.
750	760	Same as above.
760	770	Same as above.
770	780	LIMESTONE (packstone/biomicrite), yellowish gray (5Y 8/1), moderately to poorly consolidated, containing increasing component of fine PHOSPHORITE grains; some coarser SHELL FRAGMENTS.
780	785	Same as above.
785	790	Same as above.
790	795	Same as above.
795	800	Same as above.
800	805	LIMESTONE (packstone/biomicrite), yellowish gray (5Y 8/1), moderately to poorly consolidated, containing some fine PHOSPHORITE grains; some coarse SHELL FRAGMENTS.
805	810	Same as above.
810	815	Same as above.
815	820	Same as above.
820	825	Same as above.
825	830	Same as above.
830	835	Same as above.
835	840	Same as above.
840	845	LIMESTONE (packstone/biomicrite, 50%), yellowish gray (5Y 8/1), moderately to poorly consolidated, and CLAY and SILT(45%), yellowish gray (5Y 8/1), low plasticity, with some coarser PHOSPHORITE GRAINS and SHELL FRAGMENTS (5%).
845	850	Same as above.
850	855	LIMESTONE (packstone/biomicritic), yellowish gray (5Y 8/1), moderately to poorly consolidated, containing some fine PHOSPHORITE GRAINS, with some coarse crystalline SHELL FRAGMENTS.
855	860	Same as above.
860	865	Same as above.
865	870	Same as above.
870	875	Same as above.
875	880	Same as above.
880	885	Same as above.
885	890	Same as above.

From (ft)	To (ft)	Description
890	895	Same as above, slightly lighter color.
895	900	Same as above.
900	905	LIMESTONE (biomicrite), yellowish gray (5Y 7/2), moderately to poorly consolidated.
905	910	LIMESTONE (biomicrite), white (N9) to yellowish gray (5Y 8/1), moderately consolidated, with some fine PHOSPHORITE grains and some coarse SHELL FRAGMENTS.
910	915	Same as above.
915	920	Same as above.
920	925	LIMESTONE (grainstone), yellowish gray (5Y 8/1), medium grained, well sorted, moderately to poorly consolidated.
925	930	LIMESTONE (biomicrite), white (N9) to yellowish gray (5Y 8/1), moderately consolidated, with some coarse SHELL FRAGMENTS.
930	935	Same as above.
935	940	Same as above.
940	945	Same as above.
945	950	LIMESTONE (floatstone/grainstone), yellowish gray (5Y 8/1) to light olive gray (5Y 6/1), medium grained, well sorted, moderately consolidated, with some coarse SHELL FRAGMENTS.
950	955	Same as above.
955	960	Same as above.
960	965	Same as above.
965	970	LIMESTONE (packstone), yellowish gray (5Y 8/1), and LIMESTONE (floatstone), white (N9) to yellowish gray (5Y 8/1), containing abundant SHELL FRAGMENTS.
970	975	Same as above.
975	980	Same as above.
980	985	LIMESTONE (floatstone), white (N9) to medium gray (N5) and yellowish gray (5Y 8/1), well consolidated, containing abundant SHELL FRAGMENTS.
985	990	Same as above.
990	995	Same as above.
995	1000	CARBONATE MUD, yellowish gray (5Y 8/1) to light olive gray (5Y 6/1), contains some CLAY, low plasticity; fine SAND and some coarse SHELL FRAGMENTS.
1000	1005	LIMESTONE (grainstone), yellowish gray (5Y 7/2), moderately to poorly consolidated, with some coarse SHELL FRAGMENTS.
1005	1010	Same as above.
1010	1015	LIMESTONE (floatstone), white (N9)/very light gray (N8) to yellowish gray (5Y 8/1), moderately to well consolidated, containing coarse SHELL FRAGMENTS.
1015	1020	Same as above.

From (ft)	To (ft)	Description
1020	1025	Same as above.
1025	1030	Same as above.
1030	1035	Same as above.
1035	1040	CARBONATE MUD, yellowish gray (5Y 8/1), contains fine SAND and some coarse SHELL FRAGMENTS.
1040	1045	CLAY, light olive gray (5Y 6/1), calcareous, moderate plasticity.
1045	1050	CLAY, yellowish gray (5Y 7/2), calcareous, low to moderate plasticity, with some LIMESTONE fragments and some SAND.
1050	1055	CLAY, grayish olive (10Y 4/2), moderate to high plasticity, with some fine SAND.
1055	1060	CLAY, light greenish gray (5GY 8/1), low plasticity; and LIMESTONE (packstone), yellowish gray (5Y 8/1), moderately to poorly consolidated, with some fine PHOSPHORITE grains and some coarse SHELL FRAGMENTS.
1060	1065	LIMESTONE (biomicrite), very light gray (N8) to yellowish gray (5Y 8/1), moderately consolidated, contains coarse SHELL FRAGMENTS and some fine PHOSPHORITE grains.
1065	1070	Same as above.
1070	1075	Same as above.
1075	1080	LIMESTONE (biomicrite), yellowish gray (5Y 8/1), moderately to poorly consolidated, and CLAY, yellowish gray (5Y 8/1), low plasticity, with some fine PHOSPHORITE grains and some coarse SHELL FRAGMENTS.
1080	1085	LIMESTONE (biomicrite), yellowish gray (5Y 8/1), moderately to poorly consolidated, with coarse SHELL FRAGMENTS and some fine PHOSPHORITE grains.
1085	1090	LIMESTONE (biomicrite), yellowish gray (5Y 8/1), moderately to poorly consolidated, with coarse SHELL FRAGMENTS and CLAY, yellowish gray (5Y 7/2), calcareous, low plasticity, with some fine PHOSPHORITE grains.
1090	1095	CLAY, yellowish gray (5Y 7/2), calcareous, low to moderate plasticity, and some LIMESTONE (biomicrite), yellowish gray (5Y 7/2), moderately to poorly consolidated, and with some fine PHOSPHORITE grains and some coarse SHELL FRAGMENTS.
1095	1100	LIMESTONE (biomicrite), yellowish gray (5Y 7/2), moderately to poorly consolidated, and with some fine PHOSPHORITE grains and some coarse SHELL FRAGMENTS, and CLAY, yellowish gray (5Y 7/2), low to moderate plasticity.
1100	1105	CARBONATE MUD and CLAY, yellowish gray (5Y 7/2), moderate plasticity; and some LIMESTONE (biomicrite) yellowish gray (5Y 7/2), moderately to poorly consolidated, with some fine PHOSPHORITE grains and some coarse SHELL FRAGMENTS.
1105	1110	Same as above.
1110	1115	LIMESTONE (biomicrite) yellowish gray (5Y 7/2), moderately to poorly consolidated, and CARBONATE MUD and CLAY, yellowish gray (5Y 7/2), moderate plasticity, with some fine PHOSPHORITE grains and some coarse SHELL FRAGMENTS.
1115	1120	CARBONATE MUD and CLAY, yellowish gray (5Y 7/2), moderate plasticity; and some LIMESTONE (biomicrite) yellowish gray (5Y 7/2), moderately to poorly consolidated, with some

From (ft)	To (ft)	Description
		fine PHOSPHORITE grains and some coarse SHELL FRAGMENTS.
1120	1125	Same as above.
1125	1130	LIMESTONE (grainstone) yellowish gray (5Y 7/2), fine grained, moderately to poorly consolidated, and CARBONATE MUD, yellowish gray (5Y 7/2), with some fine PHOSPHORITE grains and some coarse SHELL FRAGMENTS.
1130	1135	LIMESTONE (sparse biomicrite), light olive to yellowish gray (5Y 7/1), well consolidated.
1135	1140	LIMESTONE (grainstone), yellowish gray (5Y 8/1), moderately well consolidated.
1140	1145	LIMESTONE (biomicrite), yellowish gray (5Y 8/1), well consolidated, fossiliferous, with some recrystallized calcite and abundant fine PHOSPHORITE grains.
1145	1150	As above, with the addition of well consolidated, white (N9), fossiliferous LIMESTONE.
1150	1155	As above, but without abundant PHOSPHORITE grains.
1155	1160	LIMESTONE (biomicrite), pale yellowish brown (10 YR 6/2), fine grained, poorly to moderately consolidated.
1160	1165	Same as above.
1165	1170	LIMESTONE (biomicrite), yellowish gray (5Y 8/1), medium grained, well consolidated, fossiliferous, with some PHOSPHORITE grains.
1170	1175	LIMESTONE (biomicrite), pale yellowish brown (10 YR 6/2) and yellowish gray (5Y 8/1), medium grained, well consolidated, fossiliferous, with some PHOSPHORITE grains.
1175	1180	LIMESTONE (biomicrite), pale yellowish brown (10 YR 6/2) to yellowish gray (5Y 8/1), medium grained, poorly to moderately consolidated, arenaceous, with some PHOSPHORITE grains.
1180	1185	LIMESTONE (grainstone), yellowish gray (5Y 8/1), fine grained, arenaceous, poorly to moderately consolidated.
1185	1190	As above with some bioclasts.
1190	1195	As above.
1195	1200	As above.
1200	1205	LIMESTONE (biomicrite/grainstone), yellowish gray (5Y 8/1), fine grained, fossiliferous, well consolidated; contains brachiopods and mollusks.
1205	1210	Same as above.
1210	1215	Same as above.
1215	1220	Same as above.
1220	1225	Same as above.
1225	1230	As above, but with increasing matrix grain size (grainstone), less well consolidated, with some PHOSPHORITE grains.
1230	1235	As above, LIMESTONE (grainstone), well consolidated, fine grained.
1235	1240	As above, with abundant large fossil casts.

From (ft)	To (ft)	Description
1240	1245	Same as above.
1245	1250	Same as above.
1250	1255	Same as above.
1255	1260	Same as above.
1260	1265	LIMESTONE (packed biomicrite), yellowish gray (5Y 8/1), medium grained, fossiliferous, well consolidated.
1265	1270	LIMESTONE (biomicrite/grainstone), yellowish gray (5Y 8/1) and medium gray (N5), fine grained, very well consolidated.
1270	1275	Same as above.
1275	1280	LIMESTONE (biomicrite), yellowish gray (5Y 8/1) to light gray (N7), fossiliferous, very well consolidated; contains abundant mollusks and brachiopods.
1280	1285	LIMESTONE (biomicrite), yellowish gray (5Y 8/1), medium grained, moderately consolidated and LIMESTONE (biomicrite), medium gray (N7), fossiliferous, well consolidated.
1285	1290	Same as above.
1290	1295	LIMESTONE (biomicrite), yellowish gray (5Y 8/1), fine grained, well consolidated, fossiliferous.
1295	1300	Same as above.

APPENDIX I

Packer Test Water Quality Data

KSA Environmental Laboratory Inc.

February 07, 2007

Jaffer Associates Corp.

Attn: ~~Bill McCluskey~~

2801 NW 6th Aveune

Miami, FL 33127

RE: FKAA

KSA Workorder: Q000272

Dear ~~Bill McCluskey,~~

Enclosed is a copy of your laboratory report for test samples received by our laboratory on 01/11/07 13:30.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

This data has been produced in accordance with NELAC standards. This report shall not be reproduced except in full, without the written approval of the Laboratory.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Emerson Perez

Project Manager

Enclosure(s)

CASE NARRATIVE

KSA Work Order #: Q000272
Project Name: FKAA

I. Sample Receiving Notes

All samples listed on the Chain of Custody identified with KSA Work Order # Q000272 were received with containers intact, correctly preserved, and at the proper temperature for the requested analyses.

II. Analytical Data Notes

The analyses were performed in accordance with KSA Environmental Laboratory SOP's and industry-standard methodologies in compliance with FDEP/NELAC criteria. There were no notable problems encountered in the analytical process.

Stable Isotopes analysis was subcontracted to MGG RSMAS University of Miami. 4600 Rickenbacker Causeway. Miami, FL 33149. Analytical results are included as appendix A.

III. Quality Control Notes

EPA 6010: The MS/MSD RPD for batch 7010256 exceeded laboratory guidelines for Magnesium and Selenium; however, the LCS percent recoveries were within control limits. Sample FKAA ASR-DT#1 was used to prepare the matrix spikes, the associated data is flagged with the FDEP "J" qualifier.

EPA 6010: The MS and MSD for batch 7010256 recovered out of control limits for Calcium and Sodium. The LCS was within control limits. The MSD recovered high for Potassium; however, the MS was within acceptable criteria. Sample FKAA ASR-DT#1 was used to prepare the matrix spikes and the parent sample is flagged with the FDEP "J" qualifier.

SAMPLE SUMMARY

	Client ID	Matrix	Sampled	Received
Q000272-01	FKAA ASR-DT #1	Groundwater	01/11/07 11:30	01/11/07 13:30

ANALYTICAL REPORT

Sample ID:	FKAA ASR-DT #1	Project:	FKAA
Lab #:	Q000272-01	Work Order #:	Q000272
Sampled:	01/11/07 11:30	Matrix:	Groundwater

Metals

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Arsenic, Total	0.0043 mg/L	U	1	0.0043	0.010	6010	01/12/07 17:50	01/15/07 12:14	7010256
Barium, Total	0.012 mg/L	I	1	0.0014	0.050	6010	01/12/07 17:50	01/15/07 12:14	7010256
Cadmium, Total	0.0013 mg/L	U	1	0.0013	0.0050	6010	01/12/07 17:50	01/15/07 12:14	7010256
Calcium, Total	68 mg/L	J	1	0.083	1.0	6010	01/12/07 17:50	01/15/07 12:14	7010256
Chromium, Total	0.0012 mg/L	U	1	0.0012	0.0050	6010	01/12/07 17:50	01/15/07 12:14	7010256
Iron, Total	1.4 mg/L	V	1	0.0020	0.050	6010	01/12/07 17:50	01/15/07 12:14	7010256
Lead, Total	0.0044 mg/L	U	1	0.0044	0.015	6010	01/12/07 17:50	01/15/07 12:14	7010256
Magnesium, Total	80 mg/L	J, V	1	0.013	0.50	6010	01/12/07 17:50	01/15/07 12:14	7010256
Mercury, Total	0.00012 mg/L	I, V	1	0.000060	0.00020	7470	01/12/07 17:48	01/15/07 16:14	7010255
Potassium, Total	74 mg/L	J	1	0.079	1.0	6010	01/12/07 17:50	01/15/07 12:14	7010256
Selenium, Total	0.0037 mg/L	J, U	1	0.0037	0.010	6010	01/12/07 17:50	01/15/07 12:14	7010256
Silver, Total	0.00057 mg/L	U	1	0.00057	0.0050	6010	01/12/07 17:50	01/15/07 12:14	7010256
Sodium, Total	800 mg/L	J	20	5.0	20	6010	01/12/07 17:50	01/15/07 12:14	7010256

Wet Chemistry

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Bicarbonate Alkalinity	210 mg/L		1	5.0	5.0	310.1	01/12/07 14:00	01/12/07 15:53	7010300
Carbonate Alkalinity	5.0 mg/L	U	1	5.0	5.0	310.1	01/12/07 14:00	01/12/07 14:00	7010300
Chloride	1100 mg/L		200	39	80	300.0	01/14/07 14:50	01/14/07 14:50	7010344
Conductivity	3870 umhos/cm		1	0.00	0.00	120.1	01/12/07 11:00	01/12/07 11:00	7010282
pH	7.71 s.u.		1	0.00	0.00	150.1	01/11/07 16:30	01/11/07 16:30	7010252
Solids, Total Dissolved	2800 mg/L		1	8.9	10	160.1	01/15/07 16:45	01/15/07 16:45	7010384
Sulfate	990 mg/L		200	28	200	300.0	01/14/07 14:50	01/14/07 14:50	7010344

QUALITY CONTROL FOR :Q000272

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Metals - Quality Control									
Blank (7010255-BLK1)						Prepared: 12-Jan-07 Analyzed: 15-Jan-07			
Mercury, Total	0.00013	I	0.000060	0.00020	mg/L				
Metals - Quality Control									
LCS (7010255-BS1)						Prepared: 12-Jan-07 Analyzed: 15-Jan-07			
Mercury, Total						111	85-115		
Metals - Quality Control									
Matrix Spike (7010255-MS1)				**Source: Q000272-01**		Prepared: 12-Jan-07 Analyzed: 15-Jan-07			
Mercury, Total						122	75-125		
Metals - Quality Control									
Matrix Spike Dup (7010255-MSD1)				**Source: Q000272-01**		Prepared: 12-Jan-07 Analyzed: 15-Jan-07			
Mercury, Total						123	75-125	0.816	20
Metals - Quality Control									
Blank (7010256-BLK1)						Prepared: 12-Jan-07 Analyzed: 15-Jan-07			
Arsenic, Total	0.0043	U	0.0043	0.010	mg/L				
Barium, Total	0.0014	U	0.0014	0.050	mg/L				
Cadmium, Total	0.0013	U	0.0013	0.0050	mg/L				
Calcium, Total	0.083	U	0.083	1.0	mg/L				
Chromium, Total	0.0012	U	0.0012	0.0050	mg/L				
Iron, Total	0.0080	I	0.0020	0.050	mg/L				
Lead, Total	0.0044	U	0.0044	0.015	mg/L				
Magnesium, Total	0.043	I	0.013	0.50	mg/L				
Potassium, Total	0.079	U	0.079	1.0	mg/L				
Selenium, Total	0.0037	U	0.0037	0.010	mg/L				
Silver, Total	0.00059	I	0.00057	0.0050	mg/L				
Sodium, Total	0.25	U	0.25	1.0	mg/L				
Metals - Quality Control									
LCS (7010256-BS1)						Prepared: 12-Jan-07 Analyzed: 15-Jan-07			
Arsenic, Total						105	80-120		
Barium, Total						102	80-120		
Cadmium, Total						103	80-120		
Calcium, Total						109	80-120		
Chromium, Total						107	80-120		
Iron, Total						104	80-120		
Lead, Total						104	80-120		
Magnesium, Total						103	80-120		
Potassium, Total						81.8	80-120		
Selenium, Total						103	80-120		
Silver, Total						102	80-120		
Sodium, Total						87.0	80-120		

QUALITY CONTROL FOR :Q000272

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Metals - Quality Control									
Matrix Spike (7010256-MS1)		**Source: Q000272-01**				Prepared: 12-Jan-07 Analyzed: 15-Jan-07			
Arsenic, Total						109	75-125		
Barium, Total						91.8	75-125		
Cadmium, Total						99.3	75-125		
Calcium, Total						NR	75-125		
Chromium, Total						102	75-125		
Iron, Total						93.0	75-125		
Lead, Total						101	75-125		
Magnesium, Total						NR	75-125		
Potassium, Total						127	75-125		
Selenium, Total						104	75-125		
Silver, Total						98.8	75-125		
Sodium, Total						NR	75-125		
Metals - Quality Control									
Matrix Spike Dup (7010256-MSD1)		**Source: Q000272-01**				Prepared: 12-Jan-07 Analyzed: 15-Jan-07			
Arsenic, Total						108	75-125	0.922	20
Barium, Total						91.2	75-125	0.656	20
Cadmium, Total						98.8	75-125	0.505	20
Calcium, Total						50.0	75-125	NR	20
Chromium, Total						101	75-125	0.985	20
Iron, Total						96.0	75-125	3.17	20
Lead, Total						100	75-125	0.995	20
Magnesium, Total						110	75-125	200	20
Potassium, Total						148	75-125	15.3	20
Selenium, Total						289	75-125	94.1	20
Silver, Total						98.5	75-125	0.304	20
Sodium, Total						NR	75-125	10.1	20
Wet Chemistry - Quality Control									
LCS (7010252-BS1)						Prepared & Analyzed: 11-Jan-07			
pH						100	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7010252-BSD1)						Prepared & Analyzed: 11-Jan-07			
pH						100	90-110	0.00	20
Wet Chemistry - Quality Control									
Duplicate (7010252-DUP1)		**Source: Q000249-01**				Prepared & Analyzed: 11-Jan-07			
pH	7.27			0.00	s.u.			0.275	20
Wet Chemistry - Quality Control									
LCS (7010282-BS1)						Prepared & Analyzed: 12-Jan-07			
Conductivity						100	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7010282-BSD1)						Prepared & Analyzed: 12-Jan-07			
Conductivity						100	90-110	0.00	20
Wet Chemistry - Quality Control									
Blank (7010300-BLK1)						Prepared & Analyzed: 12-Jan-07			
Bicarbonate Alkalinity	5.0	U	5.0	5.0	mg/L				
Carbonate Alkalinity	5.0	U	5.0	5.0	mg/L				

Florida Certifications: E86349

QUALITY CONTROL FOR :Q000272

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Wet Chemistry - Quality Control									
LCS (7010300-BS1)						Prepared & Analyzed: 12-Jan-07			
Bicarbonate Alkalinity						100	80-120		
Carbonate Alkalinity						100	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7010300-BSD1)						Prepared & Analyzed: 12-Jan-07			
Bicarbonate Alkalinity						100	80-120	0.00	20
Carbonate Alkalinity						100	80-120	0.00	20
Wet Chemistry - Quality Control									
Duplicate (7010300-DUP1)				**Source: Q000231-03**		Prepared & Analyzed: 12-Jan-07			
Bicarbonate Alkalinity	90.0		5.0	5.0	mg/L			2.25	20
Carbonate Alkalinity	5.0	U	5.0	5.0	mg/L				20
Wet Chemistry - Quality Control									
Blank (7010344-BLK1)						Prepared & Analyzed: 14-Jan-07			
Chloride	0.20	U	0.20	0.40	mg/L				
Sulfate	0.14	U	0.14	1.0	mg/L				
Wet Chemistry - Quality Control									
LCS (7010344-BS1)						Prepared & Analyzed: 14-Jan-07			
Chloride						102	90-110		
Sulfate						99.4	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7010344-BSD1)						Prepared & Analyzed: 14-Jan-07			
Chloride						102	90-110	0.00	20
Sulfate						99.0	90-110	0.403	20
Wet Chemistry - Quality Control									
Blank (7010384-BLK1)						Prepared & Analyzed: 15-Jan-07			
Solids, Total Dissolved	8.9	U	8.9	10	mg/L				
Wet Chemistry - Quality Control									
LCS (7010384-BS1)						Prepared & Analyzed: 15-Jan-07			
Solids, Total Dissolved						100	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7010384-BSD1)						Prepared & Analyzed: 15-Jan-07			
Solids, Total Dissolved						103	80-120	2.96	30
Wet Chemistry - Quality Control									
Duplicate (7010384-DUP1)				**Source: Q000346-19**		Prepared & Analyzed: 15-Jan-07			
Solids, Total Dissolved	936		8.9	10	mg/L			6.61	20

NOTES AND DEFINITIONS

V	Indicates the analyte was detected in both the sample and the associated method blank. The value in the method blank is not subtracted from the associated samples.
U	Indicates the compound was analyzed for but not detected.
J	Estimated value. See accompanying case narrative for a complete description.
I	The reported value is between the laboratory method detection limit and the reporting limit.
#	Quality control recovered outside acceptance criteria.
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
DF	Dilution Factor
%REC	Percent Recovery
RPD	Relative Percent Difference

CHAIN OF CUSTODY RECORD

KSA Environmental Laboratory, Inc.
10200 USA Today Way - Miramar, Florida 33025
Phone (954)431-4550 Fax (954)431-1959

Nº 2314

NELAC / FDOH # : E86349

Work Order #: RD00292 COC# _____ Page 1 of 1

Client Name: LOFFER
Client Address: 2801 NW 6th Ave
Miami FL 33127
Project Contact: Gary Bialek
Project Number/Name: FKAA
Sampled By (print):
Sampler's Signature:

Phone: _____ Fax: _____
Site Location: _____

Line #	SAMPLE ID	Collected DATE	Collected TIME	MATRIX	# BOTTLES	Bicarbonate	Carbonate	Cl, SO4, TDS	Resp. metabolite	Mg Ca No. K	DW Conductivity	Stable Isotopes
1	FKAA ASR-DT #1	1-4-07	11:20	GW	6	X	X	X	X	X	X	X
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												

Analysis Required

Matrix Code:	Preservation code
A - Air	1 - Ice
GW - Groundwater	2 - HCl
S - Soil / Sediment	3 - H2SO4
WW - Wastewater	4 - HNO3
DW - Drinking Water	5 - NaOH
SW - Surface Water	6 - ZnAcetate
SL - Sludge	0 - Other
O - Other	

Sample Remarks	Lab No.

◄ Enter Preservation code

Special Instructions & Comments

Temp. 5.5°C

Relinquished by	Company	Date/Time	Received by	Company	Date/Time
Michael Quintanilla	LOFFER	1-8-07 1330	M Shaw	KSA	1/8/07 1330
Relinquished by	Company	Date/Time	Received by	Company	Date/Time
Relinquished by	Company	Date/Time	Received by	Company	Date/Time

KSA Environmental Laboratory, Inc.

April 13, 2007

Jaffer Associates Corp.
Attn: Bill McCluskey
2801 NW 6th Aveune
Miami, FL 33127

RE: FKAA
KSA Workorder: Q000861

Dear Bill McCluskey,

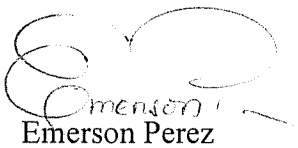
Enclosed is a copy of your laboratory report for test samples received by our laboratory on 02/05/07 15:04.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

This data has been produced in accordance with NELAC standards. This report shall not be reproduced except in full, without the written approval of the Laboratory.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,



Emerson Perez
Project Manager

Enclosure(s)

Florida Certifications: E86349 & E86616 (Microbiology)
10200 USA Today Way • Miramar, Florida 33025
Phone: (954) 431-4550 • Fax: (954) 431-1959

CASE NARRATIVE

KSA Work Order #: Q000861
Project Name: FKAA

I. Sample Receiving Notes

All samples listed on the Chain of Custody identified with KSA Work Order # Q000861 were received with containers intact, correctly preserved, and at the proper temperature for the requested analyses.

II. Analytical Data Notes

The analyses were performed in accordance with KSA Environmental Laboratory SOP's and industry-standard methodologies in compliance with FDEP/NELAC criteria. There were no notable problems encountered in the analytical process.

Stable Isotopes analysis was subcontracted to MGG RSMAS University of Miami. 4600 Rickenbacker Causeway. Miami, FL 33149. Analytical results are included as appendix A.

III. Quality Control Notes

EPA 7470: The MS and MSD for batch 7020138 recovered low for Mercury; however, the LCS was within acceptable criteria. Sample FKAA ASR-PT#2 was used to prepare the matrix spikes and may be biased low for this analyte. The parent sample is flagged with the FDEP "J" qualifier.

SAMPLE SUMMARY

	Client ID	Matrix	Sampled	Received
Q000861-01	FKAA ASR-PT#2	Groundwater	02/03/07 19:10	02/05/07 15:04

ANALYTICAL REPORT

Sample ID:	FKAA ASR-PT#2	Project:	FKAA
Lab #:	Q000861-01	Work Order #:	Q000861
Sampled:	02/03/07 19:10	Matrix:	Groundwater

Metals

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Arsenic, Total	0.0043 mg/L	U	1	0.0043	0.010	6010	02/06/07 13:11	02/06/07 21:32	7020139
Barium, Total	0.0054 mg/L	I	1	0.0014	0.050	6010	02/06/07 13:11	02/06/07 21:32	7020139
Cadmium, Total	0.0013 mg/L	U	1	0.0013	0.0050	6010	02/06/07 13:11	02/06/07 21:32	7020139
Chromium, Total	0.0012 mg/L	U	1	0.0012	0.0050	6010	02/06/07 13:11	02/06/07 21:32	7020139
Iron, Total	0.064 mg/L	V	1	0.0020	0.050	6010	02/06/07 13:11	02/06/07 21:32	7020139
Lead, Total	0.0044 mg/L	U	1	0.0044	0.015	6010	02/06/07 13:11	02/06/07 21:32	7020139
Magnesium, Total	60 mg/L		1	0.013	0.50	6010	02/06/07 13:11	02/06/07 21:32	7020139
Mercury, Total	0.000060 mg/L	J, U	1	0.000060	0.00020	7470	02/06/07 13:06	02/07/07 17:06	7020138
Potassium, Total	63 mg/L		1	0.079	1.0	6010	02/06/07 13:11	02/06/07 21:32	7020139
Selenium, Total	0.0037 mg/L	U	1	0.0037	0.010	6010	02/06/07 13:11	02/06/07 21:32	7020139
Silver, Total	0.00057 mg/L	U	1	0.00057	0.0050	6010	02/06/07 13:11	02/06/07 21:32	7020139
Sodium, Total	670 mg/L		10	2.5	10	6010	02/06/07 13:11	02/06/07 21:32	7020139

Wet Chemistry

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Bicarbonate Alkalinity	320 mg/L		1	5.0	5.0	310.1	02/06/07 15:00	02/06/07 16:55	7020148
Carbonate Alkalinity	5.0 mg/L	U	1	5.0	5.0	310.1	02/06/07 15:00	02/06/07 15:00	7020148
Chloride	560 mg/L		20	3.9	8.0	300.0	02/07/07 17:45	02/07/07 17:45	7020199
Conductivity	2620 umhos/cm		1	0.00	0.00	120.1	02/13/07 17:04	02/13/07 17:05	7020339
pH	7.60 s.u.		1	0.00	0.00	150.1	02/06/07 16:00	02/06/07 16:00	7020147
Solids, Total Dissolved	2400 mg/L		1	8.9	10	160.1	02/06/07 16:45	02/06/07 16:45	7020169
Sulfate	880 mg/L		20	2.8	20	300.0	02/07/07 17:45	02/07/07 17:45	7020199

QUALITY CONTROL FOR :Q000861

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Metals - Quality Control									
Blank (7020138-BLK1)						Prepared: 06-Feb-07 Analyzed: 07-Feb-07			
Mercury, Total	0.000060	U	0.000060	0.00020	mg/L				
Metals - Quality Control									
LCS (7020138-BS1)						Prepared: 06-Feb-07 Analyzed: 07-Feb-07			
Mercury, Total						88.1	85-115		
Metals - Quality Control									
Matrix Spike (7020138-MS1)				**Source: Q000861-01**		Prepared: 06-Feb-07 Analyzed: 07-Feb-07			
Mercury, Total						6.00	75-125		
Metals - Quality Control									
Matrix Spike Dup (7020138-MSD1)				**Source: Q000861-01**		Prepared: 06-Feb-07 Analyzed: 07-Feb-07			
Mercury, Total						5.60	75-125	6.90	20
Metals - Quality Control									
Blank (7020139-BLK1)						Prepared & Analyzed: 06-Feb-07			
Arsenic, Total	0.0043	U	0.0043	0.010	mg/L				
Barium, Total	0.0014	U	0.0014	0.050	mg/L				
Cadmium, Total	0.0013	U	0.0013	0.0050	mg/L				
Chromium, Total	0.0012	U	0.0012	0.0050	mg/L				
Iron, Total	0.0024	I	0.0020	0.050	mg/L				
Lead, Total	0.0044	U	0.0044	0.015	mg/L				
Magnesium, Total	0.013	U	0.013	0.50	mg/L				
Potassium, Total	0.079	U	0.079	1.0	mg/L				
Selenium, Total	0.0037	U	0.0037	0.010	mg/L				
Silver, Total	0.00057	U	0.00057	0.0050	mg/L				
Sodium, Total	0.25	U	0.25	1.0	mg/L				
Metals - Quality Control									
LCS (7020139-BS1)						Prepared & Analyzed: 06-Feb-07			
Arsenic, Total						103	80-120		
Barium, Total						100	80-120		
Cadmium, Total						103	80-120		
Chromium, Total						104	80-120		
Iron, Total						100	80-120		
Lead, Total						102	80-120		
Magnesium, Total						103	80-120		
Potassium, Total						82.2	80-120		
Selenium, Total						101	80-120		
Silver, Total						101	80-120		
Sodium, Total						86.3	80-120		

QUALITY CONTROL FOR :Q000861

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Metals - Quality Control									
Matrix Spike (7020139-MS1)				**Source: Q000866-01**		Prepared & Analyzed: 06-Feb-07			
Arsenic, Total						101	75-125		
Barium, Total						98.0	75-125		
Cadmium, Total						102	75-125		
Chromium, Total						103	75-125		
Iron, Total						99.0	75-125		
Lead, Total						101	75-125		
Magnesium, Total						103	75-125		
Potassium, Total						91.0	75-125		
Selenium, Total						101	75-125		
Silver, Total						100	75-125		
Sodium, Total						0.00	75-125		
Metals - Quality Control									
Matrix Spike Dup (7020139-MSD1)				**Source: Q000866-01**		Prepared & Analyzed: 06-Feb-07			
Arsenic, Total						101	75-125	0.00	20
Barium, Total						97.0	75-125	1.03	20
Cadmium, Total						99.8	75-125	2.18	20
Chromium, Total						101	75-125	1.96	20
Iron, Total						95.0	75-125	4.12	20
Lead, Total						98.9	75-125	2.10	20
Magnesium, Total						79.0	75-125	26.4	20
Potassium, Total						85.0	75-125	6.82	20
Selenium, Total						98.5	75-125	2.51	20
Silver, Total						98.3	75-125	1.71	20
Sodium, Total						NR	75-125		20
Wet Chemistry - Quality Control									
LCS (7020147-BS1)						Prepared & Analyzed: 06-Feb-07			
pH						100	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7020147-BSD1)						Prepared & Analyzed: 06-Feb-07			
pH						101	90-110	0.163	20
Wet Chemistry - Quality Control									
Duplicate (7020147-DUP1)				**Source: Q000870-02**		Prepared & Analyzed: 06-Feb-07			
pH	7.17			0.00	s.u.			0.140	20
Wet Chemistry - Quality Control									
Blank (7020148-BLK1)						Prepared & Analyzed: 06-Feb-07			
Bicarbonate Alkalinity	5.0	U	5.0	5.0	mg/L				
Carbonate Alkalinity	5.0	U	5.0	5.0	mg/L				
Wet Chemistry - Quality Control									
LCS (7020148-BS1)						Prepared & Analyzed: 06-Feb-07			
Bicarbonate Alkalinity						100	80-120		
Carbonate Alkalinity						100	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7020148-BSD1)						Prepared & Analyzed: 06-Feb-07			
Bicarbonate Alkalinity						100	80-120	0.00	20
Carbonate Alkalinity						100	80-120	0.00	20

QUALITY CONTROL FOR :Q000861

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Wet Chemistry - Quality Control									
Duplicate (7020148-DUP1)				**Source: Q000757-01**		Prepared & Analyzed: 06-Feb-07			
Bicarbonate Alkalinity	196		5.0	5.0	mg/L			2.02	20
Carbonate Alkalinity	5.0	U	5.0	5.0	mg/L				20
Wet Chemistry - Quality Control									
Blank (7020169-BLK1)						Prepared & Analyzed: 06-Feb-07			
Solids, Total Dissolved	8.9	U	8.9	10	mg/L				
Wet Chemistry - Quality Control									
LCS (7020169-BS1)						Prepared & Analyzed: 06-Feb-07			
Solids, Total Dissolved						103	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7020169-BSD1)						Prepared & Analyzed: 06-Feb-07			
Solids, Total Dissolved						99.6	80-120	3.36	30
Wet Chemistry - Quality Control									
Duplicate (7020169-DUP1)				**Source: Q000867-02**		Prepared & Analyzed: 06-Feb-07			
Solids, Total Dissolved	1160		8.9	10	mg/L			5.31	20
Wet Chemistry - Quality Control									
Blank (7020199-BLK1)						Prepared & Analyzed: 07-Feb-07			
Chloride	0.20	U	0.20	0.40	mg/L				
Sulfate	0.14	U	0.14	1.0	mg/L				
Wet Chemistry - Quality Control									
LCS (7020199-BS2)						Prepared & Analyzed: 07-Feb-07			
Chloride						97.9	90-110		
Sulfate						97.3	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7020199-BSD1)						Prepared & Analyzed: 07-Feb-07			
Chloride						97.1	90-110		20
Sulfate						96.7	90-110		20
Wet Chemistry - Quality Control									
Matrix Spike (7020199-MS1)				**Source: Q000879-01**		Prepared & Analyzed: 07-Feb-07			
Chloride						70.0	90-110		
Sulfate						72.5	90-110		
Wet Chemistry - Quality Control									
Matrix Spike Dup (7020199-MSD1)				**Source: Q000879-01**		Prepared & Analyzed: 07-Feb-07			
Chloride						70.0	90-110	0.00	20
Sulfate						74.0	90-110	2.05	20
Wet Chemistry - Quality Control									
LCS (7020339-BS1)						Prepared & Analyzed: 13-Feb-07			
Conductivity						98.3	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7020339-BSD1)						Prepared & Analyzed: 13-Feb-07			
Conductivity						98.2	90-110	0.102	20

NOTES AND DEFINITIONS

RPD	Relative Percent Difference
%REC	Percent Recovery
DF	Dilution Factor
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
V	Indicates the analyte was detected in both the sample and the associated method blank. The value in the method blank is not subtracted from the associated samples.
U	Indicates the compound was analyzed for but not detected.
J	Estimated value. See accompanying case narrative for a complete description.
I	The reported value is between the laboratory method detection limit and the reporting limit.
#	Quality control recovered outside acceptance criteria.

CHAIN OF CUSTODY RECORD

KSA Environmental Laboratory, Inc.
10200 USA Today Way - Miramar, Florida 33025
Phone (954)431-4550 Fax (954)431-1559

No 3773

NELAC / FDOH # E86349

Work Order # G [illegible] COC# [illegible]

Page ____ of

Client Name: JAFFER ASSOCIATES — Phone: — Fax:

Client Address: — Site Location: FKAA J. ROBERT DEAN WTP - FLORIDA CITY

Project Contact:

Project Number/Name: FKAA ASR-1

Sampled By (print): ~~Mark Spencer~~ Tom Howard

Sampler's Signature:

Lab #	SAMPLE ID	Collected DATE	Collected TIME	MATRIX	# BOTTLES	Sulfate	Alkalinity Bic. & Carb.	Cl / Cond / RORA	Mg / Fe (K) / Na	pH / TDS	Soluble Inorganics	Sample Remarks	Lab No
1	FKAA ASR-PT* 2	~~1/30/07~~ 2/3/07	1910	GW	4	✓	✓	✓	✓	✓	✓	SEE MARIANNE WAGNER FOR COMPLETE ANALYSIS LIST	
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													

Analysis Required

Matrix Code:	Preservation code
A - Air	1 - Ice
GW - Groundwater	2 - HCl
S - Soil / Sediment	3 - H2SO4
WW - Wastewater	4 - HNO3
DW - Drinking Water	5 - NaOH
SW - Surface Water	6 - ZnAcetate
SL - Sludge	0 - Other
O - Other	

◄ Enter Preservation code

Special Instructions & Comments: 3°C

Relinquished by	Company	Date/Time	Received by	Company	Date/Time
[signature]		2/4/07	[signature]	KSA	2/4/07 0900
Relinquished by	Company	Date/Time	Received by	Company	Date/Time
Relinquished by	Company	Date/Time	Received by	Company	Date/Time

APPENDIX A

University of Miami, Division of Marine Biology
1301 West Copans Rd., Bldg. D, Suite 8
Pompano Beach, FL 33064

Q00861-01H

Deuterium	-13.74+/-0.07	delta d/ml

Q000861-01G

Oxygen 18	-2.37+/-0.16	delta o/ml

KSA Environmental Laboratory, Inc.

April 13, 2007

Jaffer Associates Corp.
Attn: Bill McCluskey
2801 NW 6th Aveune
Miami, FL 33127

RE: FKAA
KSA Workorder: Q000957

Dear Bill McCluskey,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on 02/08/07 10:13.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

This data has been produced in accordance with NELAC standards. This report shall not be reproduced except in full, without the written approval of the Laboratory.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Emerson Perez
Project Manager

Enclosure(s)

Florida Certifications: E86349 & E86616 (Microbiology)
10200 USA Today Way • Miramar, Florida 33025
Phone: (954) 431-4550 • Fax: (954) 431-1959

CASE NARRATIVE

KSA Work Order #: Q000957
Project Name: FKAA

I. Sample Receiving Notes

All samples listed on the Chain of Custody identified with KSA Work Order # Q000957 were received with containers intact, correctly preserved, and at the proper temperature for the requested analyses.

II. Analytical Data Notes

The analyses were performed in accordance with KSA Environmental Laboratory SOP's and industry-standard methodologies in compliance with FDEP/NELAC criteria. There were no notable problems encountered in the analytical process.

Stable Isotopes analysis was subcontracted to MGG RSMAS University of Miami. 4600 Rickenbacker Causeway. Miami, FL 33149. Analytical results are included as appendix A.

III. Quality Control Notes

EPA 7470: The MS and MSD for batch 7020225 recovered low for Mercury; however, the LCS was within acceptable criteria. Sample PT#3 was used to prepare the matrix spikes and may be biased low for this analyte. The parent sample is flagged with the FDEP "J" qualifier.

EPA 6010: The MS and MSD for batch 7020224 exhibited results below control limits for Sodium and Magnesium. The sample result is more than four times the spike added. The LCS is within acceptable criteria.

SAMPLE SUMMARY

	Client ID	Matrix	Sampled	Received
Q000957-01	PT#3	Groundwater	02/07/07 17:10	02/08/07 10:13

ANALYTICAL REPORT

Sample ID:	PT#3	Project:	FKAA
Lab #:	Q000957-01	Work Order #:	Q000957
Sampled:	02/07/07 17:10	Matrix:	Groundwater

Metals

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Arsenic, Total	0.0043 mg/L	U	1	0.0043	0.010	6010	02/08/07 20:06	02/09/07 15:18	7020224
Barium, Total	0.0040 mg/L	I	1	0.0014	0.050	6010	02/08/07 20:06	02/09/07 15:18	7020224
Cadmium, Total	0.0013 mg/L	U	1	0.0013	0.0050	6010	02/08/07 20:06	02/09/07 15:18	7020224
Chromium, Total	0.0012 mg/L	U	1	0.0012	0.0050	6010	02/08/07 20:06	02/09/07 15:18	7020224
Iron, Total	0.027 mg/L	I	1	0.0020	0.050	6010	02/08/07 20:06	02/09/07 15:18	7020224
Lead, Total	0.0044 mg/L	U	1	0.0044	0.015	6010	02/08/07 20:06	02/09/07 15:18	7020224
Magnesium, Total	52 mg/L		1	0.013	0.50	6010	02/08/07 20:06	02/09/07 15:18	7020224
Mercury, Total	0.000060 mg/L	U, J	1	0.000060	0.00020	7470	02/08/07 20:14	02/12/07 11:15	7020225
Potassium, Total	47 mg/L		1	0.079	1.0	6010	02/12/07 19:43	02/13/07 16:17	7020307
Selenium, Total	0.0037 mg/L	U	1	0.0037	0.010	6010	02/08/07 20:06	02/09/07 15:18	7020224
Silver, Total	0.00057 mg/L	U	1	0.00057	0.0050	6010	02/08/07 20:06	02/09/07 15:18	7020224
Sodium, Total	470 mg/L		10	2.5	10	6010	02/08/07 20:06	02/09/07 15:18	7020224

Wet Chemistry

Parameter	Analytical Results	Q	DF	MDL	PQL	Analysis Method	Prep Date/Time	Analysis Date/Time	Analytical Batch
Bicarbonate Alkalinity	350 mg/L		1	5.0	5.0	310.1	02/12/07 14:00	02/12/07 15:48	7020294
Carbonate Alkalinity	5.0 mg/L	U	1	5.0	5.0	310.1	02/12/07 14:00	02/12/07 14:00	7020294
Chloride	180 mg/L		10	2.0	4.0	300.0	02/10/07 14:00	02/10/07 14:00	7020285
Conductivity	3530 umhos/cm		1	0.00	0.00	120.1	02/13/07 17:04	02/13/07 17:05	7020339
pH	7.61 s.u.		1	0.00	0.00	150.1	02/09/07 16:45	02/09/07 16:45	7020257
Solids, Total Dissolved	1700 mg/L		1	8.9	10	160.1	02/12/07 16:55	02/12/07 16:55	7020315
Sulfate	370 mg/L		10	1.4	10	300.0	02/10/07 14:00	02/10/07 14:00	7020285

QUALITY CONTROL FOR :Q000957

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit

Metals - Quality Control

Blank (7020224-BLK1) Prepared: 08-Feb-07 Analyzed: 09-Feb-07

Arsenic, Total	0.0043	U	0.0043	0.010	mg/L				
Barium, Total	0.0014	U	0.0014	0.050	mg/L				
Cadmium, Total	0.0013	U	0.0013	0.0050	mg/L				
Chromium, Total	0.0012	U	0.0012	0.0050	mg/L				
Iron, Total	0.0020	U	0.0020	0.050	mg/L				
Lead, Total	0.0044	U	0.0044	0.015	mg/L				
Magnesium, Total	0.013	U	0.013	0.50	mg/L				
Potassium, Total	0.079	U	0.079	1.0	mg/L				
Selenium, Total	0.0037	U	0.0037	0.010	mg/L				
Silver, Total	0.00057	U	0.00057	0.0050	mg/L				
Sodium, Total	0.25	U	0.25	1.0	mg/L				

Metals - Quality Control

LCS (7020224-BS1) Prepared: 08-Feb-07 Analyzed: 09-Feb-07

Arsenic, Total						97.9	80-120		
Barium, Total						95.5	80-120		
Cadmium, Total						99.7	80-120		
Chromium, Total						104	80-120		
Iron, Total						96.0	80-120		
Lead, Total						101	80-120		
Magnesium, Total						102	80-120		
Selenium, Total						97.9	80-120		
Silver, Total						98.3	80-120		
Sodium, Total						80.1	80-120		

Metals - Quality Control

Matrix Spike (7020224-MS1) **Source: Q000957-01** Prepared: 08-Feb-07 Analyzed: 09-Feb-07

Arsenic, Total						109	75-125		
Barium, Total						97.7	75-125		
Cadmium, Total						105	75-125		
Chromium, Total						107	75-125		
Iron, Total						101	75-125		
Lead, Total						105	75-125		
Magnesium, Total						NR	75-125		
Potassium, Total						108	75-125		
Selenium, Total						108	75-125		
Silver, Total						104	75-125		
Sodium, Total						NR	75-125		

Metals - Quality Control

Blank (7020225-BLK1) Prepared: 08-Feb-07 Analyzed: 12-Feb-07

Mercury, Total	0.000060	U	0.000060	0.00020	mg/L				

Metals - Quality Control

LCS (7020225-BS1) Prepared: 08-Feb-07 Analyzed: 12-Feb-07

Mercury, Total						88.1	85-115		

Metals - Quality Control

Matrix Spike (7020225-MS1) **Source: Q000957-01** Prepared: 08-Feb-07 Analyzed: 12-Feb-07

Mercury, Total						43.0	75-125		

QUALITY CONTROL FOR :Q000957

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Metals - Quality Control									
Matrix Spike Dup (7020225-MSD1)				**Source: Q000957-01**		Prepared: 08-Feb-07 Analyzed: 12-Feb-07			
Mercury, Total						43.0	75-125	0.00	20
Metals - Quality Control									
Blank (7020307-BLK1)						Prepared: 12-Feb-07 Analyzed: 13-Feb-07			
Potassium, Total	0.079	U	0.079	1.0	mg/L				
Metals - Quality Control									
LCS (7020307-BS1)						Prepared: 12-Feb-07 Analyzed: 13-Feb-07			
Potassium, Total						87.9	80-120		
Metals - Quality Control									
Matrix Spike (7020307-MS1)				**Source: Q000994-01**		Prepared: 12-Feb-07 Analyzed: 13-Feb-07			
Potassium, Total						104	75-125		
Metals - Quality Control									
Matrix Spike Dup (7020307-MSD1)				**Source: Q000994-01**		Prepared: 12-Feb-07 Analyzed: 13-Feb-07			
Potassium, Total						96.0	75-125	8.00	20
Wet Chemistry - Quality Control									
LCS (7020257-BS1)						Prepared & Analyzed: 09-Feb-07			
pH						100	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7020257-BSD1)						Prepared & Analyzed: 09-Feb-07			
pH						100	90-110	0.163	20
Wet Chemistry - Quality Control									
Duplicate (7020257-DUP1)				**Source: Q000977-03**		Prepared & Analyzed: 09-Feb-07			
pH	7.23			0.00	s.u.			0.138	20
Wet Chemistry - Quality Control									
Blank (7020285-BLK1)						Prepared & Analyzed: 10-Feb-07			
Chloride	0.20	U	0.20	0.40	mg/L				
Sulfate	0.14	U	0.14	1.0	mg/L				
Wet Chemistry - Quality Control									
LCS (7020285-BS1)						Prepared & Analyzed: 10-Feb-07			
Chloride						99.2	90-110		
Sulfate						97.9	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7020285-BSD1)						Prepared & Analyzed: 10-Feb-07			
Chloride						101	90-110	1.80	20
Sulfate						99.2	90-110	1.32	20
Wet Chemistry - Quality Control									
Matrix Spike (7020285-MS1)				**Source: Q000986-01**		Prepared & Analyzed: 10-Feb-07			
Chloride						92.0	90-110		
Sulfate						82.0	90-110		

QUALITY CONTROL FOR :Q000957

Analyte	Result		MDL	PQL	Units	%REC	%REC Limits	RPD	RPD Limit
Wet Chemistry - Quality Control									
Matrix Spike Dup (7020285-MSD1)				**Source: Q000986-01**		Prepared & Analyzed: 10-Feb-07			
Chloride						91.0	90-110	1.09	20
Sulfate						78.0	90-110	5.00	20
Wet Chemistry - Quality Control									
Blank (7020294-BLK1)						Prepared & Analyzed: 12-Feb-07			
Bicarbonate Alkalinity	5.0	U	5.0	5.0	mg/L				
Carbonate Alkalinity	5.0	U	5.0	5.0	mg/L				
Wet Chemistry - Quality Control									
LCS (7020294-BS1)						Prepared & Analyzed: 12-Feb-07			
Bicarbonate Alkalinity						100	80-120		
Carbonate Alkalinity						100	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7020294-BSD1)						Prepared & Analyzed: 12-Feb-07			
Bicarbonate Alkalinity						100	80-120	0.00	20
Carbonate Alkalinity						100	80-120	0.00	20
Wet Chemistry - Quality Control									
Duplicate (7020294-DUP1)				**Source: Q000934-03**		Prepared & Analyzed: 12-Feb-07			
Bicarbonate Alkalinity	116		5.0	5.0	mg/L			3.39	20
Carbonate Alkalinity	5.0	U	5.0	5.0	mg/L				20
Wet Chemistry - Quality Control									
Blank (7020315-BLK1)						Prepared & Analyzed: 12-Feb-07			
Solids, Total Dissolved	8.9	U	8.9	10	mg/L				
Wet Chemistry - Quality Control									
LCS (7020315-BS1)						Prepared & Analyzed: 12-Feb-07			
Solids, Total Dissolved						98.8	80-120		
Wet Chemistry - Quality Control									
LCS Dup (7020315-BSD1)						Prepared & Analyzed: 12-Feb-07			
Solids, Total Dissolved						103	80-120	4.16	30
Wet Chemistry - Quality Control									
LCS (7020339-BS1)						Prepared & Analyzed: 13-Feb-07			
Conductivity						98.3	90-110		
Wet Chemistry - Quality Control									
LCS Dup (7020339-BSD1)						Prepared & Analyzed: 13-Feb-07			
Conductivity						98.2	90-110	0.102	20

NOTES AND DEFINITIONS

RPD	Relative Percent Difference
%REC	Percent Recovery
DF	Dilution Factor
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
U	Indicates the compound was analyzed for but not detected.
J	Estimated value. See accompanying case narrative for a complete description.
I	The reported value is between the laboratory method detection limit and the reporting limit.
#	Quality control recovered outside acceptance criteria.

CHAIN OF CUSTODY RECORD

KSA Environmental Laboratory, Inc.
10200 USA Today Way - Miramar, Florida 33025
Phone (954)431-4550 Fax (954)431-1959

№ 4173

NELAC / FDOH # E86349

Work Order #: 2001957 FL COC#

Page ____ of ____

Client Name: JAFFER ASSOCIATES — Phone — Fax

Client Address — Site Location: FKAA ASR-1 / J ROBERT DEAN WTP

Project Contact: Tom Haines

Project Number/Name: FKAA ASR-1

Sampled By (print): Tom Haines

Sampler's Signature

LIMS #	SAMPLE ID	Collected DATE	Collected TIME	MATRIX	# BOTTLES	Sulfate	Alkalinity Pic & Carb	Cl / Cond / RCRA	Mg / Fe / K / Na	pH / TDS	Metals Trace (specify)
1	PT#3	2-1-07	1710	GW	7						
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											

Analysis Required

Matrix Code:	Preservation code
A - Air	1 - Ice
GW - Groundwater	2 - HCl
S - Soil / Sediment	3 - H2SO4
WW - Wastewater	4 - HNO3
DW - Drinking Water	5 - NaOH
SW - Surface Water	6 - ZnAcetate
SL - Sludge	0 - Other
O - Other	

Sample Remarks	Lab No.
See Matrix Worksheet For Full Analysis	

← Enter Preservation code

Special Instructions & Comments:

Temp 3° FL

Relinquished By	Company	Date/Time	Received By	Company	Date/Time
	JAFFER	2-2-07 1011		KSA	2/2/07 1047
Relinquished By	Company	Date/Time	Received By	Company	Date/Time

APPENDIX A

University of Miami, Division of Marine Biology
1301 West Copans Rd., Bldg. D, Suite 8
Pompano Beach, FL 33064

Q00957-01H		
Deuterium	-13.82+/-0.12	delta d/ml
Q000957-01G		
Oxygen 18	-2.4+/-0.1	delta o/ml