SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Construction and Testing of an Upper Floridan Aquifer Monitor Well L-63N CANAL ASR SITE Okeechobee, Florida

Technical Publication WS-27

by
Clayton B. McMillan
Robert T. Verrastro, P.G.

December 2008

sfwmd.gov

Executive Summary

This report summarizes the construction of the Upper Floridan aquifer monitor well at the Taylor Creek aquifer storage and recovery (ASR) well site, in Okeechobee, Florida.

The ASR system, along with a dual-zone monitor well, was constructed in 1988 and tested by the South Florida Water Management District (SFWMD or District) during the early 1990s. The dual-zone monitor well is approximately 600 feet northeast of the ASR well.

To support the reactivation of an ASR system at this site, a single-zone monitor well (OKF-106) was constructed within 150 feet of the ASR well, as required by ASR system permit requirements to monitor water quality and water levels in the Upper Floridan aquifer. During times of surplus water, the ASR system is intended to convey stormwater from Taylor Creek (L-63N Canal) as recharge water to the ASR well for storage in the Floridan aquifer. The water recovered from recharge of the ASR well will be discharged back into Taylor Creek. The monitor well will collect water quality and water level data in the Upper Floridan aquifer, located up section of the Taylor Creek ASR well's storage zone.

Based on hydrogeologic testing at the borehole, and lithologic and geophysical logging, the top of the targeted monitor interval was identified at 718 feet below land surface. The well was constructed of 10.75-inch (outer diameter) polyvinyl chloride to 718 below land surface, with an open-hole monitor zone interval from 718 to 800 feet bls. Hydraulic testing indicated modest productivity in this interval. Transmissivity was estimated at 5,845 square feet per day from a calculated specific capacity of 6.27 gallons per minute per foot.

Water collected from the open hole of the well contains a chloride and total dissolved solids concentration of 670 milligrams per liter (mg/L) and 1,500 mg/L, respectively. As of November 15, 2008, the peizometric surface at the completed wellhead exhibited a pressure of 1.5 pounds per square inch, which equals a water level of 8.465 feet above land surface. The wellhead was constructed using 316 stainless steel. Telemetry equipment was installed on the wellhead, providing continuous recording of water-level data. All water-level and water quality data are stored in the District's environmental database, DBHydro.

Applied Drilling Engineering drilling the 17-inch pilot hole

Table of Contents

List of Tables

List of Figures

List of Appendices

Note: Appendices available on CD; Appendix I video survey available on DVD

1
Introduction

This report summarizes the drilling, construction, and testing of the single-zone monitor well, OKF-106, at Taylor Creek's L63N Canal aquifer storage and recovery (ASR) site in Okeechobee County (**Figure 1**). To support the reactivation of the ASR system at this site, OKF-106 was completed in the Upper Floridan aquifer between 718 and 800 feet below land surface (bls) to monitor water quality and water levels per ASR construction permit requirements. The well is located in the northeast quadrant of Section 24, Township 37 South, Range 35 East, and the geographic coordinates are 27° 14' 16" N latitude and 080° 47' 08" W longitude North American Datum of 1983 (NAD 1983). The land surface elevation of 32.82 feet National Geodetic Vertical Datum of 1929 (NGVD, 1929) was determined from a survey.

The ASR system is intended to convey stormwater during times of surplus water from Taylor Creek and recharge it into the ASR well for storage in the Floridan aquifer. The water recovered from recharge of the ASR well will be discharged back into Taylor Creek (**Figure 2**). The monitor well will collect water quality and water level data in the Upper Floridan aquifer, located up section of the Taylor Creek ASR well's storage zone. **Figure 3** shows the geologic setting of the Taylor Creek site.

Construction of OKF-106 was authorized by the Florida Department of Environmental Protection (FDEP) through a Class V Group and Underground Injection Control ASR System construction permit (number 0198641-009-UC) (**Appendix A**). Per this permit, weekly informational summary reports were submitted to the FDEP during construction and testing. **Appendix B** presents these weekly summary reports.

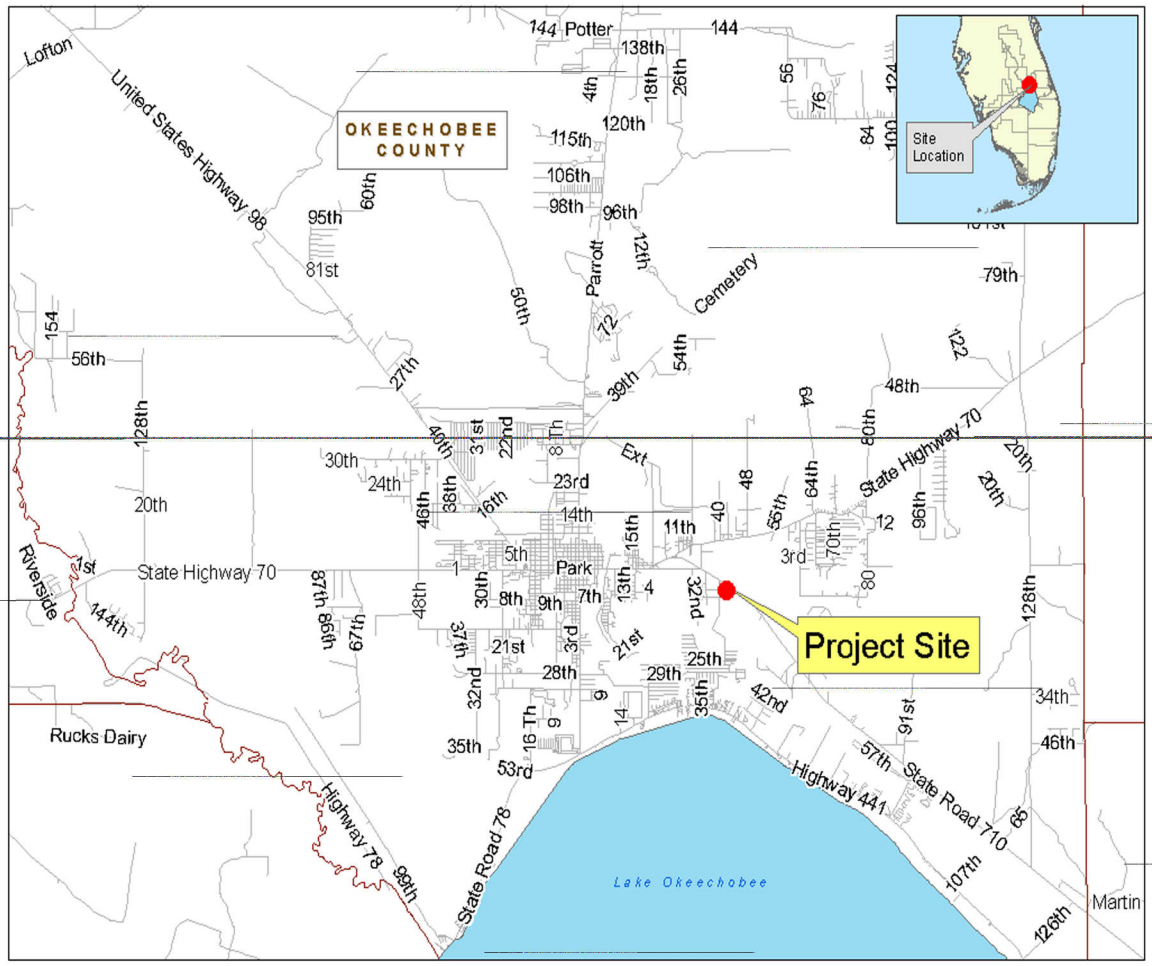


Figure 1. General location map.

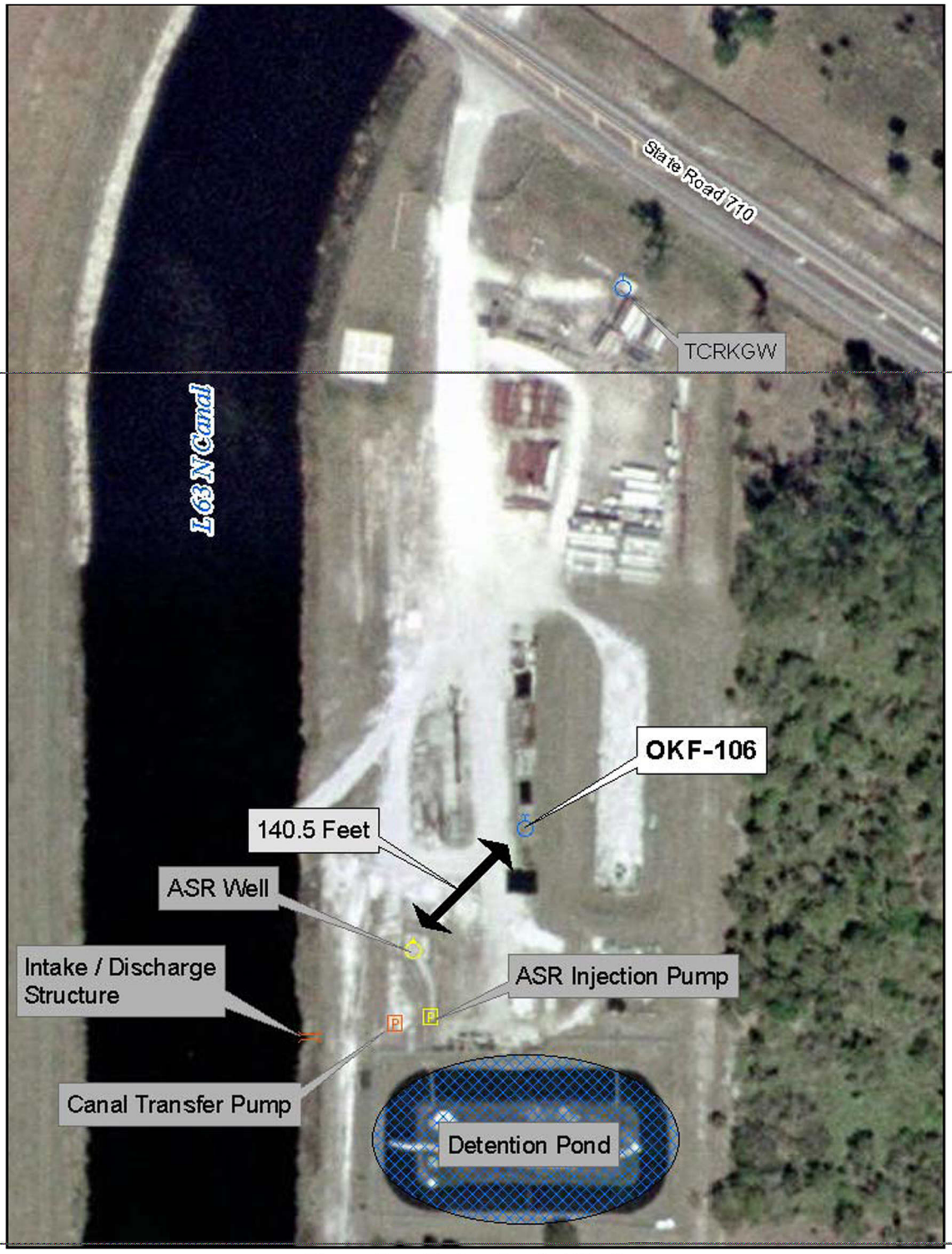


Figure 2. Taylor Creek ASR site.

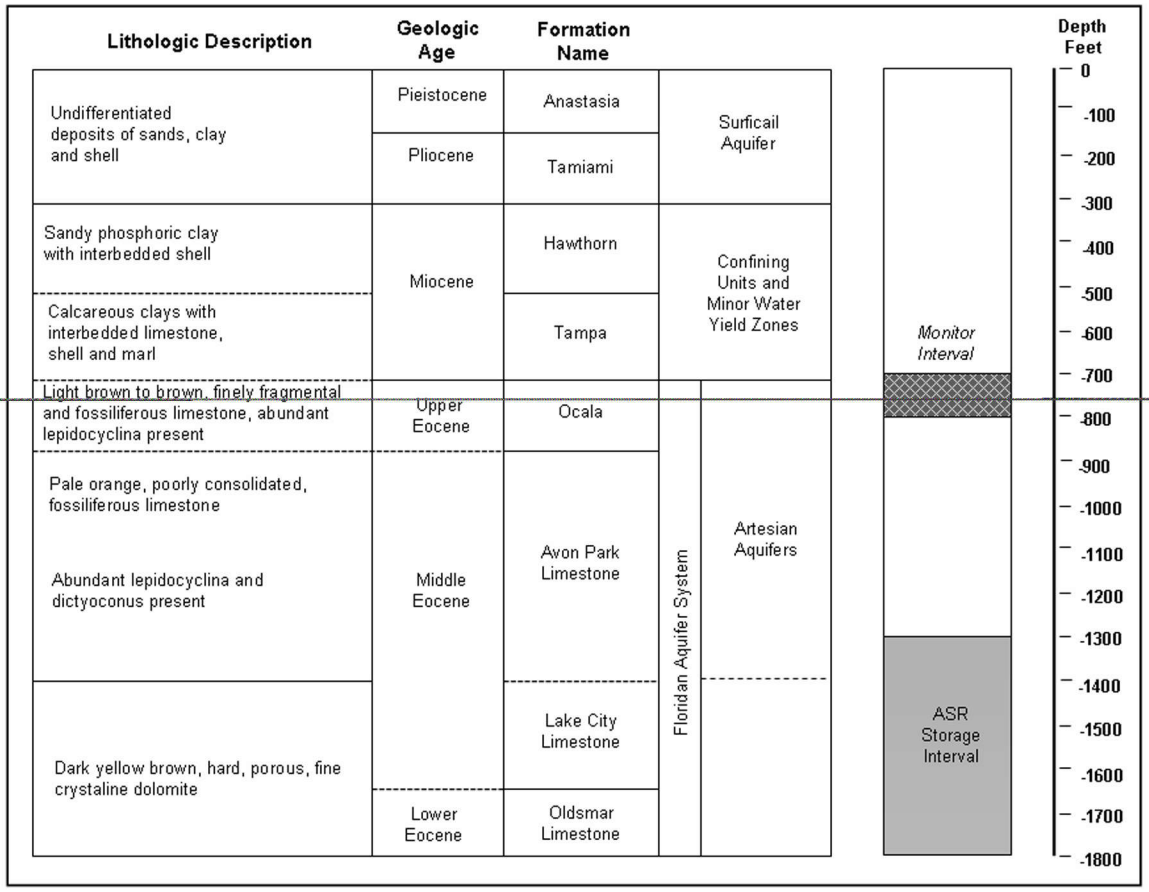


Figure 3. Geologic setting of the Taylor Creek ASR site.

The Tampa-based contractor, Applied Drilling Engineering (ADE), was responsible for drilling, well construction, and testing services at the project site, while Boyle Engineering Company (Boyle) of Palm City, Florida provided consultation services.

2 Well Construction

The OKF-106 monitor well was completed in the Upper Eocene-aged Ocala Formation, part of the Upper Floridan aquifer. During construction, the SFWMD prepared and sent weekly summary reports to the FDEP and Technical Advisory Committee (TAC) (**Appendix B**). Daily drilling reports were prepared by the contractor and submitted with the weekly summary reports.

2.1 WELL CONSTRUCTION DETAILS

Applied Drilling Engineering (ADE) began construction on June 30, 2008. Limited site preparation was needed, as the drill site was an existing construction site. Support timbers were substituted for a drilling pad. Mud rotary and reverse-air techniques were used during drilling operations. Formation samples (well cuttings) were collected at 10-foot intervals and lithologic descriptions were conducted on the cuttings (**Appendix C**). A schematic of the completed well is shown in **Figure 4**.

2.1.1 Pit Casing Installation

On July 1, 2008, closed-circulation mud rotary drilling was used to advance a nominal 8-inch diameter pilot hole from land surface to 82 feet bls. ADE reamed (over-drilled) the 8-inch diameter pilot hole using a nominal 23-inch diameter reamer bit to a depth of 84 feet bls. Then ADE installed the 18-inch steel pit casing from land surface to 82 feet bls and pressure grouted it back to land surface using 108 cubic feet (ft^3) of ASTM Type II neat cement. The casing summary is presented in **Appendix D**. **Appendix E** provides the manufacturer's mill certificates for the 18-inch diameter steel pit casing.

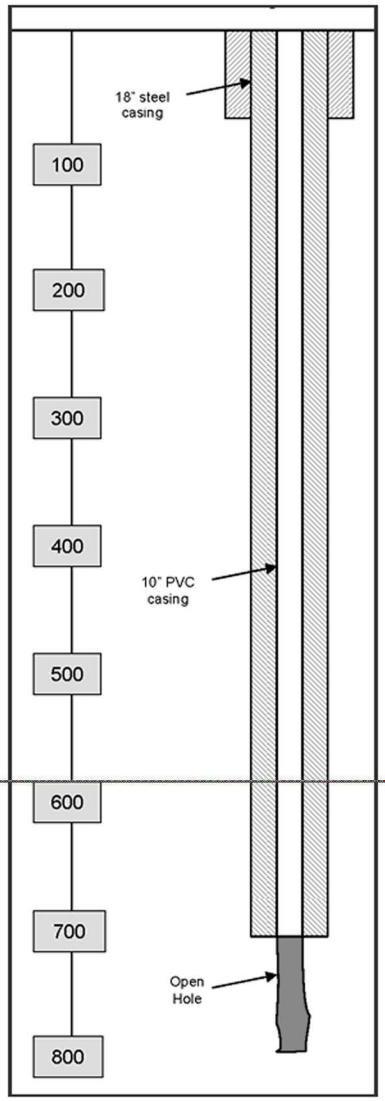


Figure 4. Completed well schematic.

2.1.2 Final Casing Installation

On July 7, 2008, ADE employed the mud rotary method to drill a nominal 17-inch pilot hole from 82 to 720 feet bls. Geophysical logs (gamma, caliper, and dual induction) were conducted on the pilot hole on July 25, 2008 after reaching 720 feet bls. The FDEP approved seating the casing at 717 feet bls based on the formation samples (well cuttings) and geophysical logs. On July 28, 2008, ADE installed the 10-inch Certa-lok™ polyvinyl chloride (PVC) casing to 717 feet bls and pressure grouted the annular space. ADE then cemented the remaining annular space around the 10-inch PVC casing to land surface in three stages by the tremie method using ASTM Type II cement mixed with 4 percent bentonite. **Table 1** shows a summary of the cementing stages. **Appendix D** provides a casing summary. The CertainTeed casing specifications are shown in **Appendix F**.

Table 1. Cement summary.

Stage No.	Pumped Volume (cubic feet)	Slurry Type	Hard Tagged (ft bls)
1	216	4% bentonite-cement	463
2	209	4% bentonite-cement	128
3	108	4% bentonite-cement	0

2.1.3 Open-Hole Construction

On August 7, 2008, ADE switched to the reverse-air method to advance the nominal 8-inch diameter borehole from 717 to 730 feet bls. Based on the competency of formation samples at the interval of 730 to 740 feet bls, ADE obtained one 4-inch, full diameter core with 80 percent recovery. A representative core section was prepared for analysis by Core Laboratories, Inc. in Midland, Texas. Section 3.3: Petrographic Analysis provides the analysis and the core description is presented in **Appendix G**. **Appendix H** provides the corresponding report from Core Laboratories, Inc., which is also described in Section 3.3. After retrieving the core, ADE advanced the 8-inch diameter borehole to a total depth 802 feet bls. Samples of formation water were collected from the discharge stream at 10-foot intervals during the reverse-air drilling and field-tested for pH, temperature, conductivity, and total dissolved solids concentration (**Table 2**).

Table 2. Water quality data.

Depth (ft bls)	Temperature (°C)	pH (SU)	Specific Conductance (µS/cm)	Total Dissolved Solids (mg/L)
730	28.6	7.63	2,590	1,290
740	30.1	7.69	2,680	1,340
760	28.7	8.15	2,700	1,350
770	27.1	7.62	2,710	1,360
780	27.1	8.07	2,720	1,360
800	27.0	8.16	2,700	1,360

Legend:
°C - degrees Celsius
SU - standard units
µS/cm - microSiemens per centimeter
mg/L - milligrams per liter

2.2 WELLHEAD AND PAD COMPLETION

On August 20, 2008, ADE constructed the wellhead and well pad (**Figure 5**) as specified in the statement of work for this contract. All PVC parts are schedule 80 and the steel parts are 316 stainless steel. A 10 x 10 x 6-inch diameter PVC tee was connected to the 10-inch PVC production casing by a flange held in place with stainless steel bolts. From the upper end of the PVC tee, a 10-inch diameter blind flange plate, with a 3-inch diameter threaded connection was installed; complete with neoprene gaskets and stainless steel bolts. A 3-inch stainless steel ball valve was installed onto a 3-inch diameter steel pipe extending above the blind flange. A ½-inch diameter smooth nose sample port was built onto the 3-inch diameter steel pipe, along with a 4-inch steel, 50 pounds per square inch, fluid-filled pressure gauge, via a 3-inch diameter steel tee. Along the horizontal part of the 10-inch PVC tee, a 6-inch butterfly valve was installed on the 6-inch PVC pipe with an impeller McCrometer flowmeter. The PVC pipe was coupled with two 6-inch diameter 45-degree bends and buried to discharge at the detention pond to the south.

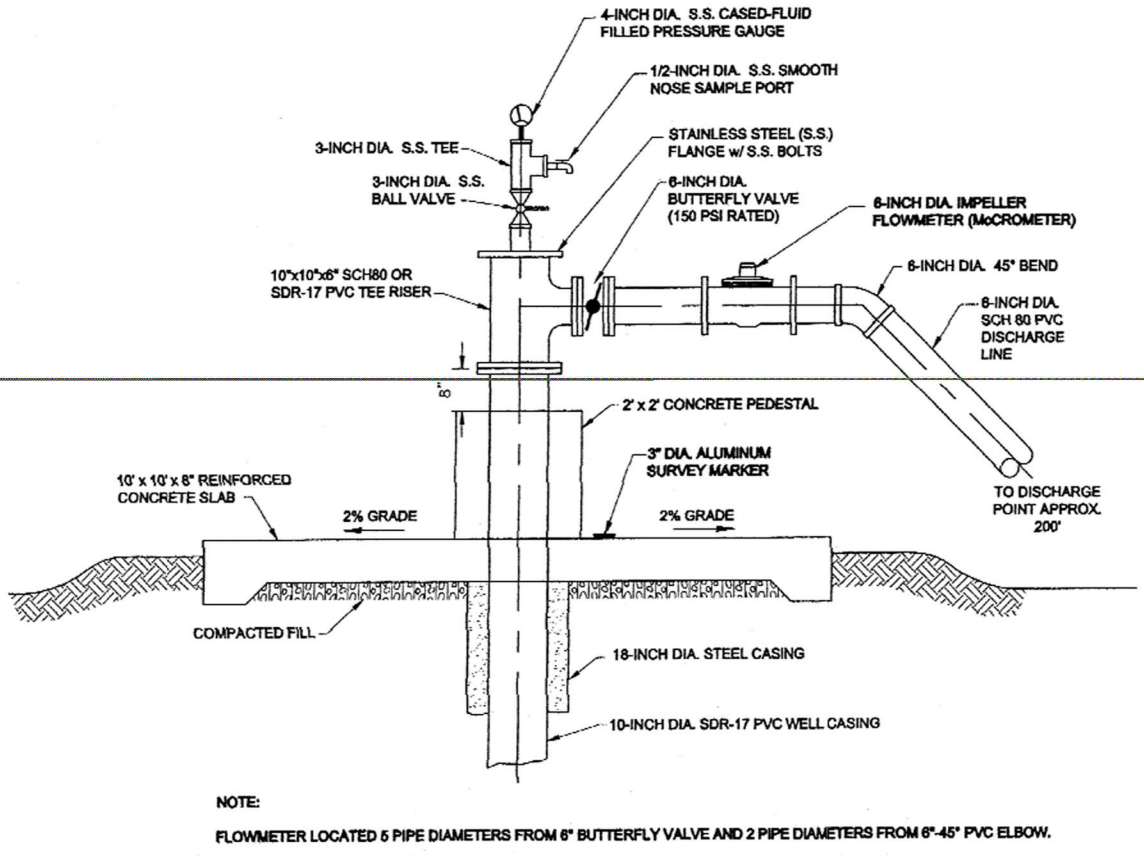


Figure 5. Wellhead and well pad schematic.

ADE poured the 10-foot by 10-foot by 8-inch reinforced finished well pad and installed an aluminum survey marker on the southwest corner of the pedestal with 4-inch steel posts and rails around the well pad. **Figure 6** shows the finished wellhead and well pad.

Figure 6. Wellhead and well pad.

2.3 AQUIFER PUMP TEST

On August 26, 2008, ADE ran a step drawdown test in OKF-106. The test consisted of three steps, run for 60 minutes, and its purpose was to determine the maximum sustainable discharge rate for a single-well aquifer performance test (APT). ADE began pumping the well at 173 gallons per minute (gpm) for the first step. This step resulted in a drawdown of 24 feet in OKF-106. The second step was conducted at a pumping rate of 307 gpm with a drawdown of 44 feet. The final step occurred at 400 gpm with a 60.5 foot drawdown in the well. This step test provided data to calculate the specific capacity and determine the optimal pumping rate for the 8-hour APT, which was approximately 400 gpm. On August 27, 2008, the 8-hour APT began at a discharge rate of 414 gpm. Section 3.4: Aquifer Pumping Tests presents the corresponding drawdown and recovery illustrations and analyses.

2.4 FINAL GEOPHYSICAL LOGGING AND VIDEO SURVEY

On September 2, 2008, Advanced Borehole Services (ABS) of Dade City, Florida conducted a down-hole video survey and discovered an obstruction in the borehole at 723 feet bls, preventing the survey from being completed. ADE mobilized a drill rig to the site and drilled out the obstruction. ABS completed the video survey and conducted geophysical logs (gamma, caliper, dual induction, and resistivity) on September 8, 2008. **Appendix I** provides the geophysical log results (see CD) and video survey (see DVD).

3 Hydrogeology

3.1 GEOLOGY

The description of the geology at the project site is based on the analyses of drill cuttings, geophysical logs (**Appendix I**), and hydrologic tests conducted during the construction of OKF-106. The lithologic log of the cuttings is provided in **Appendix C**. The borehole was terminated in the Ocala Formation at 802 feet bls. **Figure 7** summarizes the general stratigraphic description of the monitor well construction. **Appendix J** provides more information about the lithology and its geophysical correlation.

The geologic formations penetrated during construction range in age from Pleistocene to Upper Eocene. They consist of undifferentiated Quaternary deposits, the Hawthorn Group (the Hawthorn Formation and the Tampa Formation), and the Ocala Formation.

Lithologic Description	Geologic Age	Formation	Hydrogeologic Units	Depth (ft)
Undifferentiated deposits of sands, clay, and shell	Pleistocene	Anastasia	Surficial Aquifer	100
	Pliocene	Tamiami		200
Sandy phosphatic clay with interbedded shell	Miocene	Hawthorn	Confining Units and Minor Water Producing Zones	300 400
Calcareous clays with interbedded limestone, shell, and marl		Tampa		500 600 700
Light brown to brown, fossiliferous limestone, abundance of *lepidocyclina*	Upper Eocene	Ocala	Upper Floridan Aquifer (artesian)	800

Figure 7. General stratigraphy of the monitor well construction.

Undifferentiated sediments of Pliocene to Pleistocene age are found from land surface to 240 feet bls at the site. These surficial deposits mainly consist of unconsolidated quartz sand (fine- to medium-grained), shell fragments, silts, and clays with trace amounts of phosphatic sediments. The cuttings then increase in clay content from less than 30 percent beginning at 180 feet bls through 240 feet bls, where clays account for about 75 percent of sample lithology.

The Hawthorn Formation (Hawthorn Group) of Miocene age is found on-site from 250 feet bls and consists primarily of clays. A thick bed of moderately-cohesive clay extends to 340 feet bls. Beds of quartz sand, shell fragments, and carbonate sands are found at the 340 to 500 feet bls interval. Grains of phosphate-rich sediment are found in percentages from 5 to 15 percent of sample composition. Underlying the Hawthorn Formation, also of Miocene age, the Tampa Formation, consists of indurated limestone, shell fragments, and trace amounts of phosphate, with clays being the primary constituent. The depth range of the formation is 500 to 700 feet bls. A thick layer of moderately- to well-cohesive clays is found at the 500 to 600 feet bls interval. This layer provides good confinement for the Upper Floridan aquifer, which occurs in the calcareous Ocala Formation underlying the Hawthorn Group.

The Ocala Formation of Upper Eocene age starts at 700 feet bls. It consists of poorly indurated calcarenitic limestone with abundant shells and shell fragments. The abundance of the indicative *Lepidocyclina sp.* fossils increases with depth, as well as increased friability. The monitor interval, extending from 718 to 820 feet bls, occurs within the carbonate rocks of the Ocala Formation.

3.2 AQUIFER DESIGNATIONS

The penetrated strata are grouped into three principal systems: the surficial aquifer system (SAS), the intermediate confining unit, and the Floridan aquifer system (FAS). The aquifers and confining unit identified at the site are illustrated in **Figure 3** and **Figure 7**. The SAS includes the water table aquifer. The intermediate confining unit includes the formations within the Hawthorn Group. The upper section of the FAS, also known as the Upper Floridan aquifer, includes the carbonate strata of the Ocala Formation at this site. The Upper Floridan aquifer is the hydraulic unit identified as the monitor interval for this well.

3.3 PETROGRAPHIC ANALYSIS

One 10-foot core sample was collected from this borehole. The core was obtained within the Ocala Formation, from a depth of 730 to 740 feet bls. The sample was packaged and shipped to Core Laboratories, Inc. in Midland, Texas for petrographic analysis. Based on the core analysis report provided by Core Laboratories, Inc., the Ocala Formation sample is divided into two

classifications: bioclastic grainstone and packstone. **Figure 8** shows the different areas of the core sample. The lithologic description received from the laboratory is for the upper grainstone area only. Porosity is estimated at about 30 to 35 percent with moldic, intraparticle, and interparticle pore-types. Generally, the texture is grainstone. Calcite composes 100 percent of the minerals with trace amount (<0.5%) of quartz. Bioclasts include foraminifera (*Lepidocydina sp.* **Figure 8** inset), bivalves, gastropods, and bryozoans.

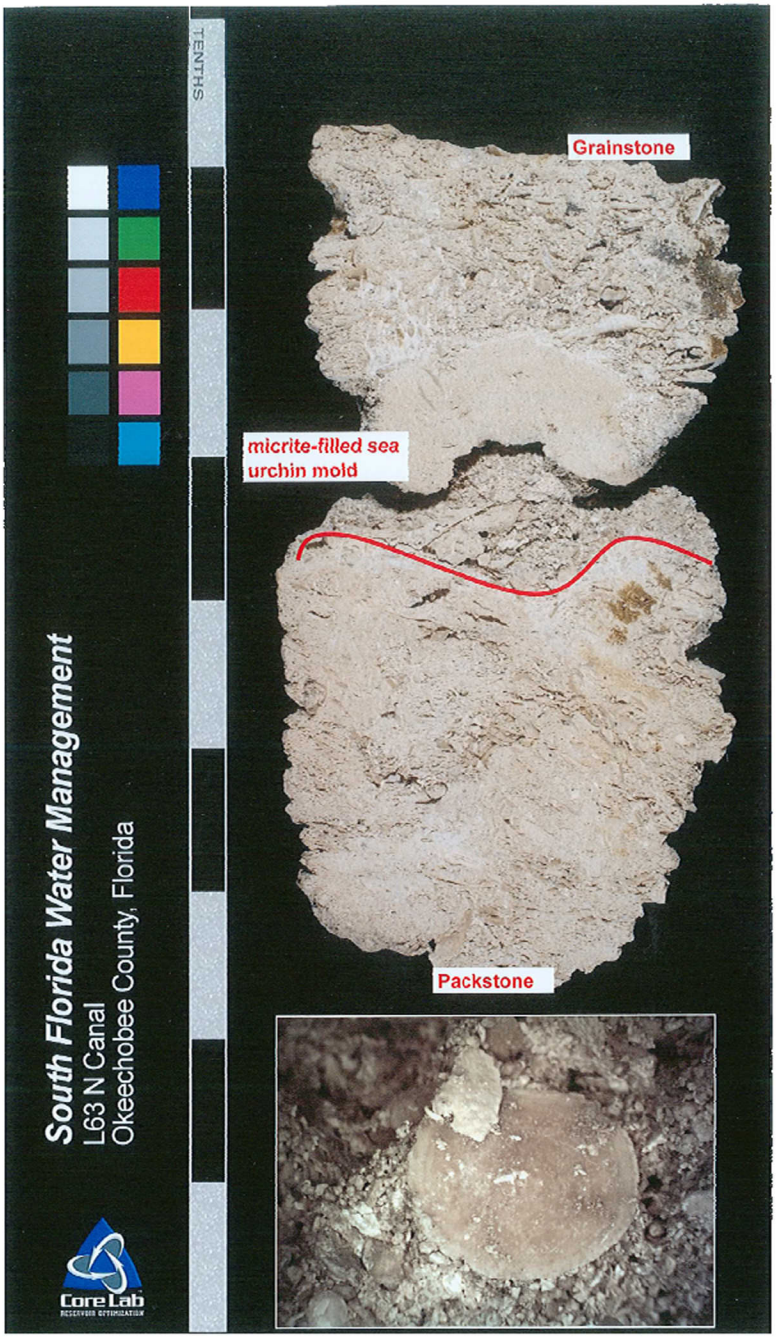


Figure 8. Core sample from Core Laboratories. The core description is from the upper grainstone area. Note the inset photo of orbitoid foraminifera (*Lepidocyclina sp.*).

3.4 AQUIFER PUMPING TESTS

On August 26, 2008, ADE ran a step drawdown test in OKF-106. The test consisted of three steps and its purpose was to determine the maximum sustainable discharge rate for a single-well APT. ADE began pumping the well at 173 gpm for the first step, which resulted in a drawdown of 24 feet. The pumping rate for the second step was 307 gpm with a drawdown of 44 feet. The final step was pumped at 400 gpm with a 60.5-foot drawdown. **Figure 9** plots the results to the step drawdown test. The specific capacity was calculated for each step, and the corresponding range of calculated specific capacity is 6.6 to 7.2 gallons per minute per foot (gpm/ft) (shown in **Figure 10**).

Based on the specific capacity test, a pumping rate of approximately 400 gpm was determined for the 8-hour constant-rate APT.

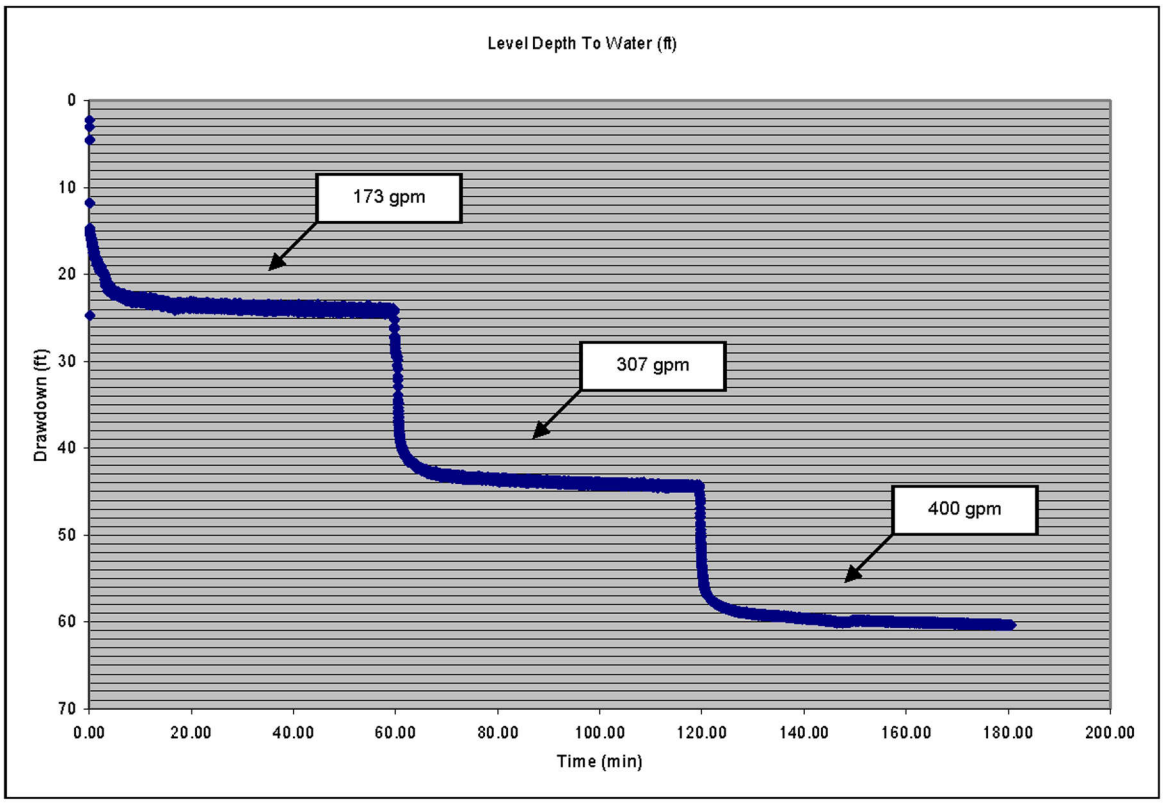


Figure 9. Step drawdown test.

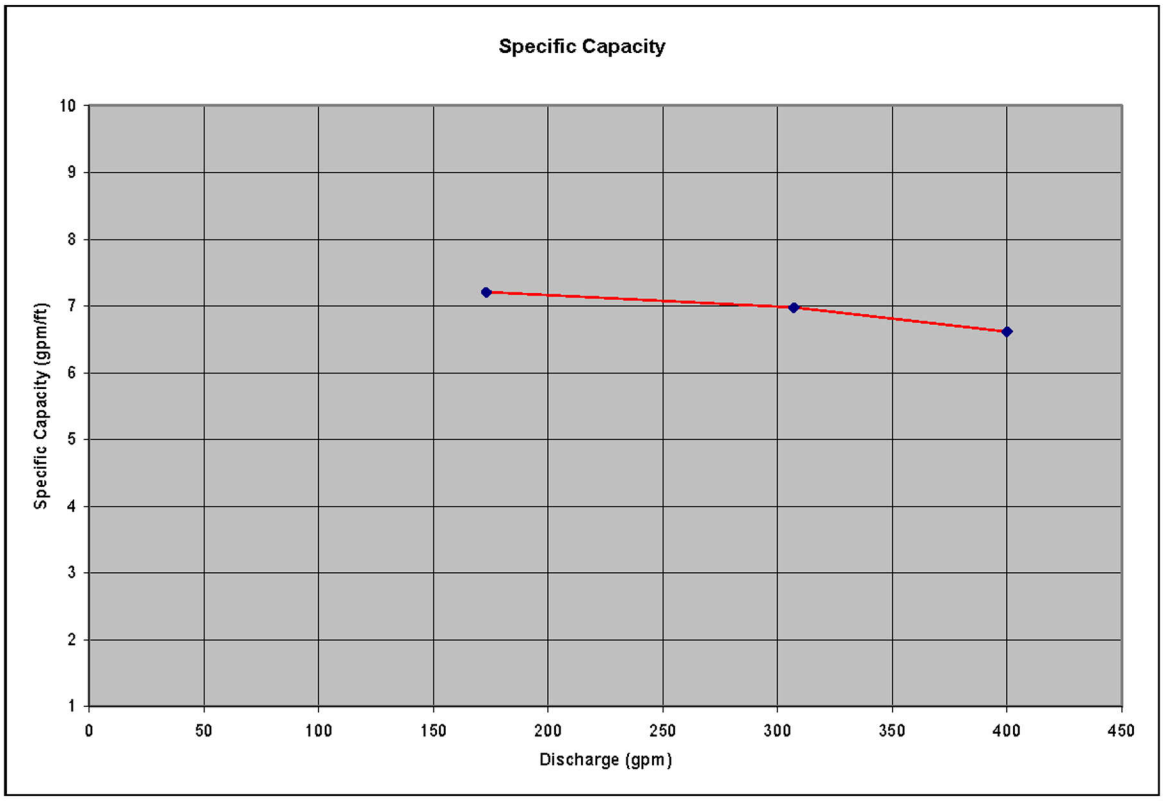


Figure 10. Specific capacity.

On August 27, 2008, the 8-hour APT was conducted with a pumping rate of 414 gpm. **Figures 11** and **12** present drawdown and recovery plots of the 8-hour APT. Transmissivity of the Upper Floridan aquifer is calculated to be 43,718 gallons per day per foot (gpd/ft) (5,845 ft^2/day), using the straight-line method, which is similar to the calculation using the Cooper-Jacob nonequilibrium equation:

$$T = \frac{264\,Q}{\Delta s}$$

Where:

- T = coefficient of transmissivity, in gpd/ft.
- Q = pumping rate, in gallons per day (gpd).
- Δs = slope of the "time versus drawdown" plot between one log cycle, in ft.

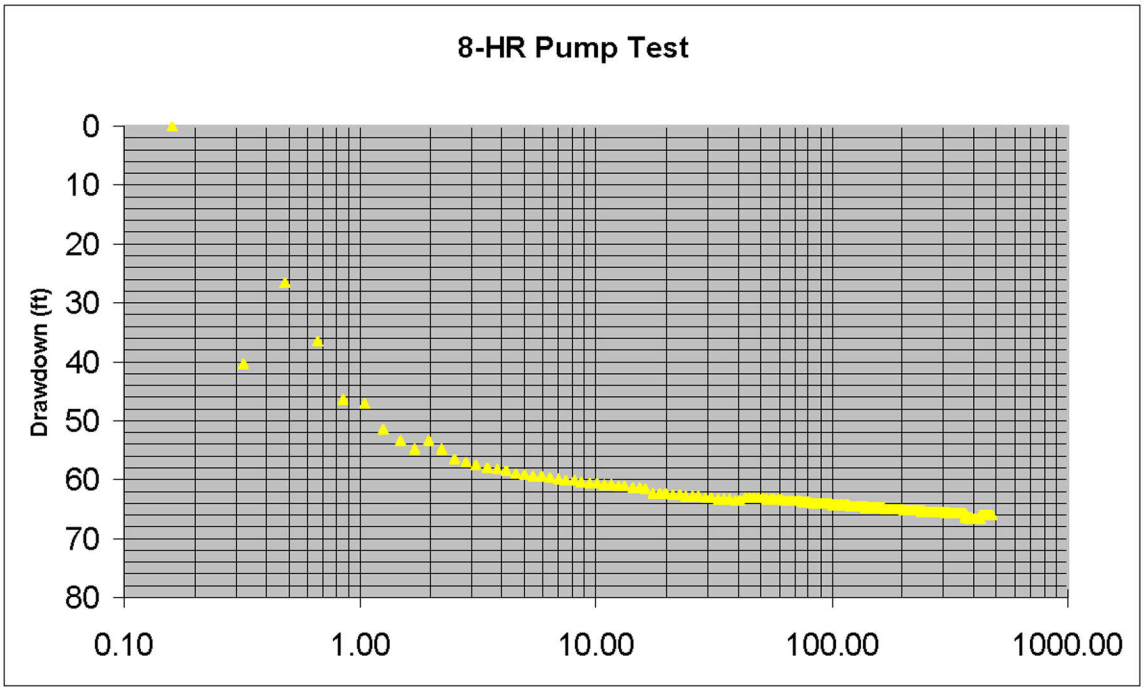


Figure 11. Drawdown versus Time.

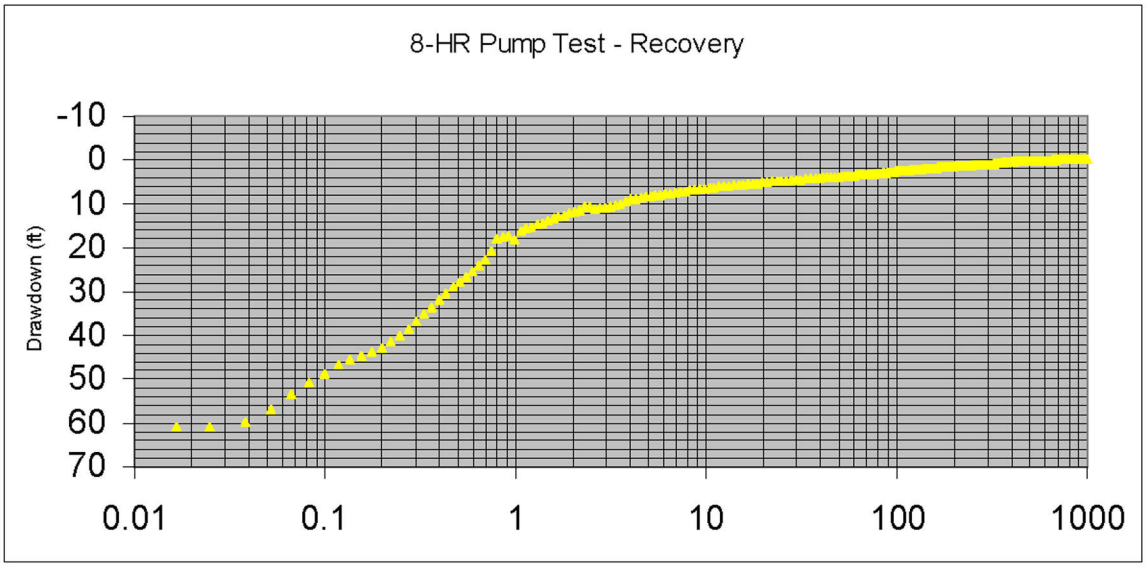


Figure 12. Drawdown versus Time - Recovery.

Appendix K provides electronic files of the aquifer pump tests.

4

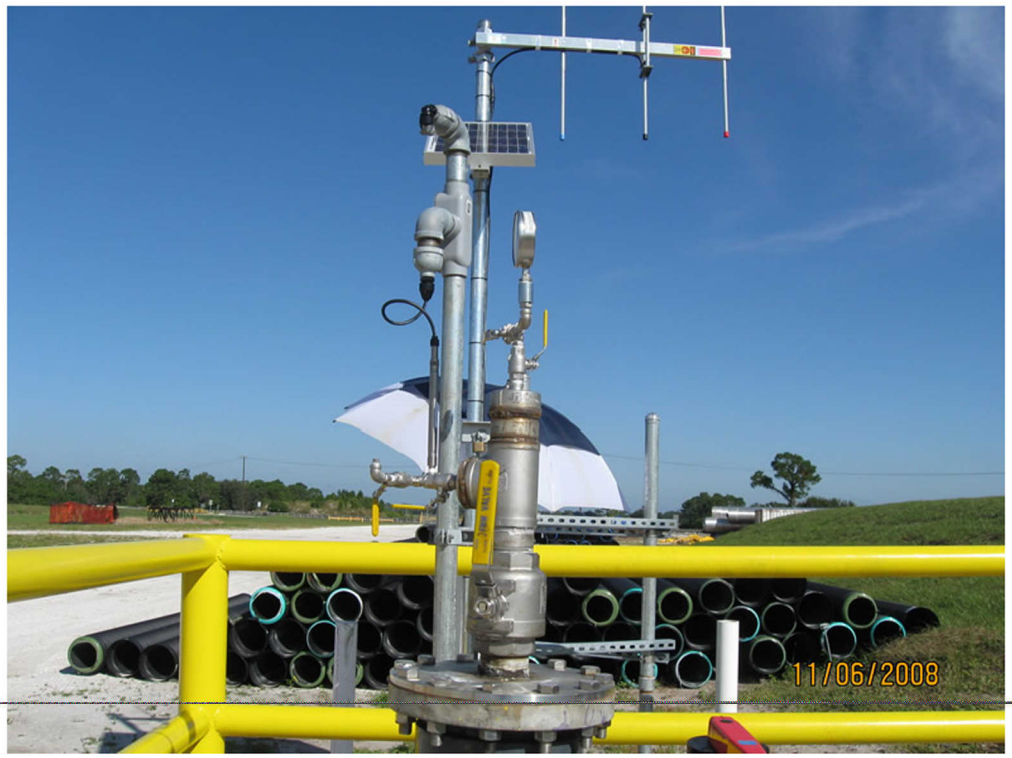
Water Quality

Upon completion of the pumping portion of the constant-rate pump test, a water sample was collected and analyzed for primary and secondary drinking water parameters, as required by the well construction permit. **Appendix L** contains the laboratory data sheets and quality validation reports. **Table 3** presents a summary of the laboratory results.

Table 3. Summary of water analysis from Well OKF-106 at the L63N Canal ASR site (sample data: August 27, 2008).

Constituent	Concentration	Units
Total Dissolved Solids	1,500	mg/L
Sodium	430	mg/L
Chloride	670	mg/L
Magnesium	56	mg/L
Sulfate	250	mg/L
Alkalinity	100	mg/L
Gross Alpha	3.1 +/- 2.2	pCi/L
Specific Conductance	2,700	µmhos/cm
pH	7.52	SU
Color	2.0	CU
Odor	180	TON
Total Coliform	BDL	CFU/100 mL
Arsenic	2.6	µg/L
Iron	0.025	mg/L
Pesticides (all parameters)	BDL	µg/L
Volatile Organic Constituents (all parameters)	BDL	µg/L
Semi-volatile Organic Constituents (all parameters)	BDL	µg/L
Halogenated Organic Constituents (all parameters)	BDL	µg/L

Legend:
mg/L - milligrams per liter
pCi/L - picocuries per liter
µhmos/cm - micromohs per centimeter
SU - standard units
CU - color units
TON - threshold odor number
CFU/100 mL - colony-forming units per 100 milliliters
µg/L - micrograms per liter



Completed wellhead with telemetry equipment installed

5

References

CH2M Hill. 1989. *Construction and Testing of the Aquifer Storage Recovery (ASR) Demonstration Project for Lake Okeechobee, Florida (Volumes I and II).* CH2M Hill, Gainesville, FL.

Scott, T.M. 1992. *A Geologic Overview of Florida.* Open-file Report No. 50:78. *Florida Geological Survey.*

Driscoll, F.G. (ed.). 1986. Groundwater and Wells (Second edition). Johnson Division, St. Paul, MN, 1089.

sfwmd.gov

South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406
561-686-8800 • FL WATS 1-800-432-2045
www.sfwmd.gov

MAILING ADDRESS: P.O. Box 24680
West Palm Beach, FL 33416-4680

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Construction and Testing of an Upper Floridan Aquifer Monitor Well L-63N CANAL ASR SITE Okeechobee, Florida

Technical Publication WS-27
APPENDICES

by
Clayton B. McMillan
Robert T. Verrastro, P.G.

December 2008

sfwmd.gov

A

FDEP Well Construction Permit

Department of Environmental Protection

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

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

NOTICE OF PERMIT

June 9, 2008

Mr. Chip Merriam
Deputy Executive Director
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406

OKEECHOBEE COUNTY
UIC – L-63N Canal ASR Facility
FILE: 0198641-009-UC

Dear Mr. Merriam:

Enclosed is Permit Number 0198641-009-UC, to construct a single zone monitoring well (UFA-MW1) at the L-63N Canal ASR Facility, located a few miles southeast of the City of Okeechobee, near the intersection of State Road 710 and the L-63N Canal in Okeechobee 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 Mark A. Silverman, P.G., or Joseph R. May, P.G., of this office at (561) 681-6778 or (561) 681-6691, respectively.

Executed in West Palm Beach, Florida.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

6-6-08

Jack Long
District Director
Southeast District

JL/LAB/JRM/mas

Copies furnished to:

Robert Verrastro, SFWMD	Donnie McClaugherty, FDEP/TLH	Nancy Marsh, USEPA/ATL
Paul Linton, SFWMD	George Heuler, FDEP/TLH	Bart Bibler, FDOH/TLH
Scott Burns, SFWMD	Chad Kennedy, FDEP/WPB	Robert Renken, USGS/FTL
Steve Anderson, SFWMD/WPB	Jonathan Arthur, FGS/TLH	Ron Reese, USGS/FTL

CERTIFICATE OF SERVICE

This is to certify that this NOTICE OF PERMIT and all copies were mailed before the close of business on 6/9/08 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

6/09/08
Date

Department of
Environmental Protection

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

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

PERMITTEE:
Mr. Chip Merriam
Deputy Executive Director
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406

PERMIT/CERTIFICATION NUMBER: 0198641-009-UC
DATE OF ISSUANCE: June 9, 2008
EXPIRATION DATE: June 8, 2013
COUNTY: Okeechobee
POSITION: 26° 14' 20" N / 80° 14' 09" W
PROJECT: Construction and Testing Permit for a Single Zone Monitor Well at the L-63N Canal ASR Facility

PROJECT: Construction permit for a single zone monitoring well, UFA-MW1.

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:

TO CONSTRUCT AND TEST: One single zone monitoring well (UFA-MW1) at the L-63N Canal ASR Facility. This well shall be constructed to accommodate anticipated Class V, Group 7 aquifer storage and recovery (ASR) well monitoring at the L-63N Canal ASR Facility. The facility, which had been permitted, constructed and operated (cycle tested) by the SFWMD during the early 1990's, includes a 24-inch diameter ASR well and a dual-zone monitoring well. The ASR well was completed with an open hole extending from 1,268 to 1,700 feet below land surface (bls). The dual zone monitoring well was completed with an upper zone extending from 990 to 1,075 feet bls, and a lower zone extending from 1,275 to 1,700 feet bls.

Monitoring well UFA-MW1 is being constructed because current UIC permitting criteria requires a monitoring well within 150 feet of the ASR well, to monitor for upward fluid movement, for a Water Quality Criteria Exemption (WQCE). The new monitoring well will be constructed of 10-inch diameter final PVC casing. It is anticipated that this casing will be cemented to a depth of approximately 700 feet bls, and that an open hole will extend to approximately 750 feet bls, to monitor the uppermost portion of the Floridan aquifer overlying the ASR storage zone. The actual setting depth of the final casing and the monitor interval will be determined based on field conditions only after approval from the Department.

IN ACCORDANCE WITH: Application to construct and test a single zone monitoring well received March 21, 2008 deemed complete as of June 4, 2008.

LOCATED AT: The L-63N Canal ASR Facility, which is a few miles southeast of the City of Okeechobee, near the intersection of State Road 710 and the L-63N Canal in Okeechobee County, Florida..

TO SERVE: The Governor's Lake Okeechobee and Estuary Recovery (LOER) Plan.

SUBJECT TO: General Conditions 1-24 and Specific Conditions 1-8.

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.

GENERAL CONDITIONS:

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 applicable 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.

GENERAL CONDITIONS:

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 which 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.

    All 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)

SPECIFIC CONDITIONS:

1. General Requirements

   a. 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.

   b. This permit is for the SFWMD to construct and test a single zone monitoring well, referred to herein as C-7A-MW1, at the L-63N Canal ASR facility. This permit does not authorize the construction or operational testing of any other well or wells associated with the L-63N Canal ASR System project.

   c. 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.

   d. The permittee shall be subject to all requirements and regulations of Okeechobee County and the South Florida Water Management District (SFWMD) regarding the construction and testing of this single zone monitoring well.

   e. If historical or archaeological artifacts, such as Indian canoes, are discovered at any time within the project site, the permittee shall notify the FDEP Southeast District 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 the single zone monitoring well.

   b. A Department approved blow-out prevention device shall be installed on the well prior to penetration of the Floridan aquifer.

   c. The measurement points for drilling and logging operations shall be surveyed and referenced to the North American Vertical Datum of 1988 (NAVD 88) prior to the onset of drilling activities for the single zone monitoring 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 the necessary approval(s) 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, unless otherwise authorized.

   e. The Department shall be notified within 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 single zone monitoring well shall be contained and properly disposed.

SPECIFIC CONDITIONS:

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

1) Spud date for the well

2) 10-inch diameter PVC casing seat in monitoring well

3) Monitoring zone interval determination

i. The drilling and geophysical logging program, during the drilling of the single zone monitoring well, shall at a minimum include:

1) Install an 18-inch O.D. steel surface casing from approximately 0-60 feet bpl.

2) Drill a nominal 17-inch diameter hole using the mud rotary method from the landing of the pit casing to approximately 710 feet bpl. Perform the following logging techniques subsequent to drilling:

- Natural gamma ray
- Dual induction
- Caliper

3) Install and cement in place 10-inch diameter (10.75-inch O.D., 9.31-inch I.D.) PVC casing (to approximately 700 feet bls). The casing will have neat cement with up to 6% bentonite filled annulus. Run temperature log after each lift.

4) Drill a nominal 9-inch diameter pilot hole using a standard reverse air rotary drilling method from approximately 700 feet bpl to approximately 775 feet bpl. Collect one core within this interval for geotechnical and petrographic analysis, collect water samples at each drill rod connection (approximately every 20 to 30 feet), develop the open hole interval, perform a short-term (approximately 15 minute duration) specific capacity test, collect water samples from the open hole section, and perform the following logging techniques in the open hole section:

- Natural gamma ray
- Dual induction
- Caliper
- Borehole video survey
- Temperature/differential temperature
- Fluid resistivity
- Flowmeter
- Temperature/differential temperature (dynamic conditions)
- Fluid resistivity (dynamic conditions)
- Flowmeter (dynamic conditions)

5) Conduct an 8 to 10-hour drawdown and recovery test at an anticipated rate of 200 to 300 gallons per minute (gpm). Collect water samples at the beginning, middle and end of the drawdown portion of the test.

6) Water samples (entailed above) will be analyzed as follows:

a) Samples collected at each drill rod connection below 700 feet bls (approximately every 20 to 30 feet) – chloride, sulfate, total dissolved solids (TDS), specific conductance, temperature and pH;

b) Water samples collected from the open hole section prior to the 8 to 10-hour drawdown and recovery test – all parameters listed in Item a) above, plus calcium, sodium, magnesium, potassium, total alkalinity, total and noncarbonated hardness, iron, silica and strontium;

SPECIFIC CONDITIONS:

c) Water samples collected at the beginning, middle and end of the drawdown test - all parameters listed in Item b) above, plus the primary and secondary drinking water quality standards and minimum criteria listed in Attachment A.

j. Testing:

1) Injection is prohibited as this is a single zone monitoring well.

k. UIC–TAC meetings are scheduled on the 2nd and 4th Tuesday of each month subject to a five working day prior notice and timely receipt of critical data by all TAC members. Emergency meetings may be arranged when justified to avoid undue construction delays.

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

m. No fluids shall be injected with the exception of fluids used while drilling operations are under way.

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, pursuant to Chapter 492, F.S., shall provide monitoring of the drilling and testing operation. The permittee shall notify the Department immediately of any change of the Engineer of Record or Geologist of Record.

c. In accordance with Section 492, Florida Statutes, all documents prepared for the geological/hydrogeological evaluation of the single zone monitoring 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 testing, geophysical logging and cementing operations.

SPECIFIC CONDITIONS:

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
- Department of Environmental Protection, Tallahassee
- South Florida Water Management District (SFWMD), West Palm Beach
- United States Geological Survey (USGS)-Fort Lauderdale office, Final Report only

b The permittee shall provide copies of all correspondence relative to this permit to each member of the UIC-TAC. 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 UIC-TAC member who submits to the permittee a written request to be omitted as a recipient of specific correspondence.

c. Throughout the construction period allowed by this permit, daily progress reports shall be submitted to the Department 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 in 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: 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;

7) Well development records;

SPECIFIC CONDITIONS:

8) Water quality analyses;

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, including the date, depth and amount of material used.

d. 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.

e. 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.

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

g. Within 30 days of well completion of UFA-MW1, the permittee or the authorized representative shall submit to the Department the following information:

1) Certification of Monitor Well Completion, DEP Form 62-528.900(10);

h. Upon completion of construction of the well, a complete set of as-built engineering drawings (Florida registered P.E. signed and sealed) for Monitoring Well UFA-MW1 shall be submitted to the Department's SED office in West Palm Beach and Tallahassee UIC Program.

i. After completion of construction and testing of the well, the following requirements shall apply:

1) A final engineering report shall be submitted to the Department and TAC. 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. This report shall also be signed and sealed by a Florida licensed professional engineer and professional geologist.

SPECIFIC CONDITIONS:

2) The permittee shall contact the UIC Section of the Department of Environmental Protection in Tallahassee to arrange for the transfer, at the permittee's expense, 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 water samples collected during packer testing and final background water sampling;

d) Any geophysical logs run during well construction; and

e) A copy of the final report described in S.C. 4.i.1) above.

3) The permittee shall submit the following to the Department and TAC:

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

b) 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

c) All other applicable permits.

j. The Department shall conduct an inspection of the facility to determine if the conditions of this permit have been met. FPL shall contact the Underground Injection Control Section of the Department, SED, to arrange for the site inspection. The inspection will determine if all equipment necessary for UFA-MW1 is in compliance with the permit and Department rules. During the inspection, reporting requirements shall be reviewed.

k. A minimum of three well volumes of fluid shall be evacuated prior to sampling for water quality parameters. A State-certified laboratory shall analyze all samples. Sufficient purging shall have occurred when either of the following have occurred:

1) pH, specific conductance 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

2) upon purging the fifth well volume

Alternative sampling methodology may be proposed for Departmental review and approval prior to actual sampling.

l. All well system data submittals shall be clearly identified on each page with: facility name, I.D. Number, permit number, date of sampling/recording, and type of data.

5. Surface Equipment

a. The integrity of the monitoring zone sampling systems shall be maintained at all times. Sampling lines shall be clearly and unambiguously identified by monitoring zone at the point at which samples are drawn. All reasonable and prudent precautions shall be taken to ensure that samples are properly identified by monitoring zone and that samples obtained are representative of those zones. Sampling lines and equipment shall be kept free of contamination with independent discharges and no interconnections with any other lines.

SPECIFIC CONDITIONS:

b. The surface equipment for the injection 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 monitoring well surface equipment and piping shall be kept free of corrosion at all times.

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

6. Plugging and Abandonment and Alternate Use Plans

a. Permittees who are unable to operate the 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, or

3) Implement the plugging and abandonment plan.

7. 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 shall contain the following certification:

"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."

SPECIFIC CONDITIONS:

8. 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 this permit. In accordance with Rule 62-4.070(4), F.A.C., a permit cannot be extended beyond the maximum 5-year statutory limit.

Issued this 6 day of June, 2008

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Jack Long
District Director
Southeast District

JL/LAB/JRM/mas

PRIMARY DRINKING WATER STANDARDS

PARAMETER

Alachlor (Polychlorinated Biphenyl or PCB)
Aldicarb
Aldicarb sulfoxide
Aldicarb sulfone (Sulfone aldoxycarb)
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)
Bromate
Cadmium
Carbofuran
Carbon Tetrachloride (Tetrachloromethane)
Chlordane
Chlorine
Chlorine Dioxide
Chlorite
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

Glyphosate (Roundup)
Gross Alpha
Haloacetic Acids (HAA5)
Heptachlor
Heptachlor Epoxide
Hexachlorobenzene (HCB)
gamma-Hexachlorocyclohexane (Lindane)
Hexachlorocyclopentadiene
Lead

PRIMARY DRINKING WATER STANDARDS, CONT'D

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
Strontium-90
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, Total
Vinyl Chloride (Chloroethylene)
Xylenes (total)

SECONDARY DRINKING WATER STANDARDS

PARAMETER

Aluminum
Chloride
Color
Copper
Ethylbenzene
Fluoride
Foaming Agents (MBAS)
Iron
Manganese
Odor
pH
Silver
Sulfate
Toluene
Total Dissolved Solids (TDS)
Xylenes
Zinc

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
Naphthalene
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

B

Weekly Construction Summary Reports

BOYLE

Engineering Excellence Since 1942

2090 Palm Beach Lakes Blvd., Suite 600
West Palm Beach, FL 33409
TEL: (561)684-3375
FAX: (561)689-8531
www.boyleengineering.com

Employee Owned

July 8, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.1 – June 26, 2008 through July 4, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the first full week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The first full week of construction and related activities for OKF-106 (UFA-MW1) are summarized below;

- Completed Mobilization of drill rig and support equipment.
- Confirmed lateral distance of UFA Monitor Well (OKF-106) from the ASR well to be 140.5 feet (center to center) prior to the start of drilling activities.
- Drilled a nominal 8-inch diameter pilot hole from land surface to 82 feet below land surface (bls) via mud rotary method.
- Reamed the 8-inch diameter pilot hole to 23-inches in diameter using a 12 ¼ x 23 inch diameter drilling assembly from land surface to 85 feet bls via mud rotary method.
- Circulated the nominal 23-inch diameter for approximately 2 hours to condition it before installing the 18-inch diameter steel surface casing.
- Installed 84.2 feet of 18-inch diameter steel surface casing set to a depth of 82.2 feet bls.
- Cemented the 18-inch diameter in place using 3.5 cubic yards of ASTM Type II neat cement.
- Installed rotating head on 18-inch diameter steel surface casing to control potential artesian flow conditions while advancing the borehole through the intermediate confining unit and into the Floridan Aquifer.
- Drilled out cement plug at the base of the 18-inch diameter steel casing.
- No Work on Friday July 4th.

Work scheduled for next week:

Begin to drill a nominal the 17-inch diameter borehole from 82 feet bls and continue to advance the borehole to an anticipated depth of 550 feet bls.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett 7/8/08

Michael W. Bennett, P.G.
Senior Hydrogeologist

Enclosures: Engineer's Daily Field Reports
Contractor's Daily Reports

Distribution to Interested Parties – Weekly Summary Report No. 1

Distribution: Mark Silverman FDEP/WPB
Joseph May, FDEP/WPB
George Heuler, FDEP/TLH
Ron Reese, USGS/FTL
Jonathan Arthur, FGS/TLH
Nancy March, USEPA/ATL
Bart Bibler, FDOH/TLH
Bob Verrastro, SFWMD/WPB

File

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63N Canal ASR Pilot Project	Client: SFWMD	Date: 7/1/08	Day of Week: Tuesday	Contractor: Applied Drilling Engineering (ADE)
Well Name: UFA MW-1	FDEP Permit #: 0198641-009-UC	Starting Depth: 0'	Ending Depth: 82'	Bit Size: $7^{7}/_{8}$"	Weather: Sunny and Warm

PRIMARY ACTIVITY: Pilot Hole for Pit Casing
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
1200	Shamus English on site. ADE on site and preparing to start drilling pilot hole at time of arrival..
1210	Distance from injection well to monitoring well is 140.5 ft. Verified Heat #'s and Lot #'s for four section of 18" diameter steel pipe to be used for pit casing.
1235	Commenced drilling pilot hole from surface with $7\ ^{7}/_{8}$" bit.
1308	Kelly down at 22 ft bls, circulating on bottom.
1316	ADE attaching 6" collar
1324	Drilling resumed at 22 ft bls
1343	Kelly down at 42 ft bls, circulating on bottom
1350	ADE attaching drill pipe #1
1402	Drilling resumed at 42 ft bls
1428	Kelly down at 62 ft bls, circulating on bottom
1440	Drilling resumed at 62 ft bls
1505	Kelly down at 82 ft bls
1530	Shamus English off site. ADE to weld header on 18" steel casing and misc. fabrication before securing site.

Recorded By: Shamus English Date: 7/1/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3383
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number:	Project Name:	Client:	Date:	Day of Week:	Contractor:
17191.00	L63A	SFWMD	7/2/08	Tuesday	Applied Drilling Engineering (ADE)
Well Name:	**FDEP Permit #:**	**Starting Depth:**	**Ending Depth:**	**Bit Size:**	**Weather:**
UFA MW-1	0198641-009-UC	0'	85'	23"	Sunny and Warm

PRIMARY ACTIVITY: Pilot Hole for Pit Casing
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0830	Shamus English on site. ADE on site and drilling at time of arrival. Depth at about 55 ft bls. Kelly down will be 65 ft bls. Bit size = 23".
0847	Kelly down at 65 ft bls, circulating on bottom.
0855	ADE mixing mud
0928	Drilling resumed at 65 ft bls
1001	Kelly down at 85 ft bls, circulating on bottom
1020	ADE tripping out of hole.
1050	ADE setting up to perform casing installation. Heat number GO17564
1055	Welding centralizers on bottom 90° apart. Roy Rowland (ADE) is welder.
1110	Welding casing section 1 and 2 together. ADE performing 1 pass across connection. Tallied length of casing is 84.2 ft.
1124	ADE finish welding sections 1 and 2
1134	Lowering casing
1144	Welding sections 2 and 3
1201	Finish welding section 2 and 3
1211	Lowering casing
1220	Welding sections 3 and 4
1235	Lowering casing, slight trouble lowering casing to bottom
1242	Casing set
1247	Lowering tremie tubing (2" TNC w/ API coupling)
1300	Finished lowering tremie tubing to 73 ft bls. ADE circulating fluids while waiting on cement truck
1315	SE off site
1340	SE on site
1420	ADE preparing for cementing operations, continued to circulate fluids
1515	ADE discontinued circulation, still waiting on ready mix truck
1600	Ready mix truck on site with 4 yds^3 of neat cement. Cement truck to pour cement into 150 gal tub then pressure grouted down hole through tremmie pipe. Mud weight at 15.6 lbs/gal

1604	Pre-flush 150 gallons of water
1605	Commence pumping cement.
1610	Cementing halted. Thinning cement with approx. 150 gallons of water.
1614	Resume pumping cement, new weight is 14.7 lbs/gallon
1625	Cement at surface. Pumping displacement water
1627	Ready mix truck emptying remaining cement on ground. Approx. .5 yds^3 of left over cement so, Approx. 3.5 yds^3 of cement used on pit casing. 18 psi pressure at well head
1640	Ready mix truck off site. ADE adding Thinz-It® mud thinner
1700	Shamus English off site.

Recorded By: Shamus English Date: 7/3/08

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 6-30-07	Project: taylor creek
Well Number:	Job Number :

Well Depth - Start of Shift : ________ Water Level - Start of Shift: ________

End of Shift : ________ End of Shift: ________

Activities	From	To
Trailer Job — Rigged up		
on [illegible]		
Rig Down 16:30		
Rig Up 5:30		
Hrs 2.0		

Formations from:	From	To

Safety Meeting ? Yes ___ No X

Daily Topic

Accident on Site ? Yes ___ No X

Describe:

Weather Conditions: Clear / Rainy

Drilling Mud Properties	In	Out
Mud Weight (ppg)		
Mud Viscosity		

Driller: [illegible]

Helpers: Jeff, Roy

Eng.Rep: none

Drilling Assembly ________

Available WOB ______ lbs

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: ____

Date: 7-1-08	Project: taylor creek
Well Number:	Job Number:

Well Depth - Start of Shift: ____ Water Level - Start of Shift: ____

End of Shift: ____ End of Shift: ____

Activities	From	To
Finished Rigging up - Drilled		
7-7/8 pilot hole to 825		
tripped out - made up		
23" bit set up to Ream		
Rig Oil		
D.V. 7:00		
4:30		
4.09 9.5		

Formations from:	From	To

Safety Meeting ? Yes ___ No X

Daily Topic

Accident on Site ? Yes ___ No X

Describe:

Weather Conditions: clear / raining

Drilling Mud Properties	In	Out
Mud Weight (ppg)		
Mud Viscosity		

Driller: JS

Helpers: Ray, Jeff

Eng.Rep.: 3 Lamas

Drilling Assembly 7 7/8

Available WOB ____ lbs

COMPANY CONFIDENTIAL

Applied
DRILLING
Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-2-08	Project: taylor creek
Well Number:	Job Number:

Well Depth - Start of Shift: ______ Water Level - Start of Shift: ______
End of Shift: ______ End of Shift: ______

Activities	From	To
Drilled 23" Hole from 0-85'		
lot clean up - tripped out		
Run 82' of 18" Steel casing (B15)		
Pumped 3½ yards of cement.		
cleaned up.		
Rig Dr-1 6:00		
Pick up 5:30		
4.05 11.5		

Formations from:	From	To
Grey Sand - Shell	0	45
Hard lime	45	48
shell - Green	48	85
Clay		

Safety Meeting ? Yes ___ No X	Weather Conditions: clear / Rainy
Daily Topic	
Accident on Site ? Yes ___ No X	Drilling Mud Properties — In / Out
Describe:	Mud Weight (ppg)
	Mud Viscosity
Driller: JG	Drilling Assembly 12¼ x 23"
Helpers: Roy, Tate	
Eng.Rep: Shanes	Available WOB ______ lbs

COMPANY CONFIDENTIAL

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-3-08	Project: taylor creek
Well Number:	Job Number:

Well Depth - Start of Shift: ______ Water Level - Start of Shift: ______

End of Shift: ______ End of Shift: ______

Activities	From	To
Pulled tubing out of Hardee		
Built Ramp - Dug out pit		
Reset up Rig on Second Site		
Rig Onl 7.00		
Personal		
1.05		

Formations from:	From	To

Safety Meeting ? Yes ___ No x

Daily Topic

Accident on Site ? Yes ___ No x

Describe:

Driller: Jis

Helpers: Ray, Jeff

Eng.Rep.: None

Weather Conditions: clear

Drilling Mud Properties	In	Out
Mud Weight (ppg)		
Mud Viscosity		

Drilling Assembly

Available WOB ______ lbs

BOYLE

Engineering Excellence Since 1942

2090 Palm Beach Lakes Blvd., Suite 600
West Palm Beach, FL 33409
TEL: (561)684-3375
FAX: (561)689-8531
www.boyleengineering.com

Employee Owned

July 14, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.2 – July 7, 2008 through July 13, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the second week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The construction and related activities that transpired during the second week related to OKF-106 (UFA-MW1) are summarized below;

- Began drilling a nominal 17-inch diameter borehole via the mud rotary method at a depth of 82 feet below land surface (bls).
- Continued to advance the nominal 17-inch diameter borehole via the mud rotary method from 82 to 502 feet bls.
- Ended mud rotary drilling operations for the week at a depth of 502 feet bls.
- No drilling or testing activities were conducted on Saturday July 12th or Sunday July 13th.

Work scheduled for the next report period:

The Contractor will continue to advance the nominal the 17-inch diameter borehole via the mud rotary method from 502 feet bls to an anticipated depth of 710 feet bls. This will be approximately 10 feet into the carbonate section of the Floridan aquifer. The nominal 17-inch borehole will then be geophysically logged from 0 to 710 feet bls. A casing seat justification for the 10-inch diameter PVC casing will be submitted to the Department for approval. Depending on the timeliness of completing the 17-inch diameter borehole to 710 feet bls; the Contractor may upon approval by the SFWMD begin installing the 10-inch diameter Certa-lok PVC well casing into the uppermost section of the Floridan aquifer. Once the 10-inch diameter casing is installed, it will be carefully cemented back to surface with temperature logs conducted to verify the elevation of the cement within the annulus.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett

7-14-08

Michael W. Bennett, P.G.
Senior Hydrogeologist

Enclosures: Engineer's Daily Field Reports
Contractor's Daily Reports
Lithologic Descriptions
Deviation Survey Data

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(772) 286-3883
FAX (772) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/7/08	Day of Week: Monday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 85'	Ending Depth: 116.5'	Bit Size: 17"	Weather: Sunny and Warm

PRIMARY ACTIVITY: Drill Nominal 17-inch Borehole
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
1330	Shamus English on site. Site locked at time of arrival. Talked to Joe Schmidt via telephone and he informed me that they had to pick up more drill pipe and should arrive in about an hour. Shamus English off site
1430	Shamus English on site. ADE has not arrived yet. PVC Casing and Couplings on site. PVC is 20' lengths (38 sections = 780'), 9½" ID and 10½" OD, "Certainteed 10" SDR 17 Class 250 Certa-Lok Well Casing IC-1 PVC ASTM F480 NSF-wc B 05-01-08 A W1 [and B 04-30-08 A W1] Made in USA 654015". Discharge T on well head has been fabricated.
1440	ADE on site with a total of 15 sections of 20' 3½" diameter drill pipe. ADE still has to drill out plug from pit casing cement job before advancing borehole further.
1520	ADE adding drill pipe #1 to collars and setting up drilling fluid pump assembly.
1558	Hard tagged top of plug at 77 ft bls. Pit casing set at 83 ft bls and borehole was drilled to 85 ft bls, so should be about a 6-8 ft plug
1605	ADE mixing mud
1630	ADE hooking up hydraulics for pick up pump
1651	Drilling commenced at 77 ft bls
1703	Depth at 85 ft bls
1714	Kelly down at 96.5 ft bls, circulating on bottom.
1734	ADE attaching drill pipe #2 to drill string
1739	Drilling resumed at 96.5 ft bls
1751	Kelly down at 116.5 ft bls, circulating on bottom.
1810	ADE to run deviation survey in the morning
1825	Shamus English off site

Recorded By: Shamus English Date: 7/8/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(772) 286-3883
FAX (772) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/8/08	Day of Week: Tuesday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 116.5'	Ending Depth: 236.5'	Bit Size: 17"	Weather: Sunny and Warm

PRIMARY ACTIVITY: Drill Nominal 17-inch Borehole
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0800	Shamus English on site. ADE on site at time of arrival and repairing leak in hydraulic line.
0840	ADE spooling wire line cable around drum on rig for deviation surveys.
0905	Finished spooling cable, setting up for deviation survey. Rubber stabilizers for deviation survey are designed for 4½" drill pipe and ADE is using 3½" drill pipe, ADB will not attach tool stabilizers for deviation surveys.
0915	ADE tripping pipe out of hole to 76 ft bls to run deviation survey, will lower tool to bottom and raise 16 ft. Bit assembly is within pit casing.
0921	Timer set at 10 mins, lowering tool down hole.
0935	Raising tool to surface
0940	Deviation survey measured at 0.1°.
0943	Adding 2 more sections of drill pipe and taking another deviation survey at 120 ft bls (survey actually taken at 116.5 ft bls).
0946	Lowering tool down hole.
1005	Deviation survey measured at 0.2°.
1025	Drilling commenced at 116.5 ft bls
1037	Kelly down at 136.5 ft bls, circulating on bottom
1040	Mud weight at 9.0 lbs/gal going in, 9.5 lbs/gal going out of system. Viscosity measured in Marsh funnel at 57 secs for approx. 1 Liter (measuring cup not used so actual value is believed to be lower).
1122	Drilling resumed at 136.5 ft bls.
1133	Kelly down at 156.5 ft bls, circulating on bottom
1145	ADE removing cuttings from settling tank to cuttings holding tank.
1210	ADE attaching drill pipe #4 (20 ft)
1213	Drilling resumed at 156.5 ft bls
1233	Kelly down at 176.5 ft bls, circulating on bottom. Received last weeks contractor drilling logs from ADE.
1300	ADE attaching drill pipe #6 to drill string and setting up for deviation survey.
1305	Lowering deviation tool down hole
1323	Deviation survey measured at 0.2 (approx. 180 ft bls).
1330	ADE taking lunch. Shamus English off site.

1545	Shamus English on site. Kelly down at 216.5 ft bls at time of arrival and circulating on bottom.
1617	Drilling resumed at 216.5 ft bls
1643	Depth at 225 ft bls
1710	Kelly down at 236.5 ft bls, circulating on bottom.
1728	ADE attaching drill pipe #9 to drill string and setting up for deviation survey
1733	Lowering tool down hole.
1758	Deviation survey measured at 0.8°. Variation from last survey (176.5 ft bls) is 0.6°, notified Michael Bennett via telephone. Per Michael Bennett, variation is too high between survey measurements and another survey will need to be conducted tomorrow morning at 176.6 ft bls for verification. Advised Joe Schmidt (ADE) of this situation and agreed to run another survey in the morning.
1810	Shamus English off site.

Recorded By: Shamus English Date: 7/8/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(772) 286-3883
FAX (772) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/9/08	Day of Week: Wednesday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 236.5'	Ending Depth: 336.5'	Bit Size: 17"	Weather: Sunny and Warm

PRIMARY ACTIVITY: Drill Nominal 17-Inch Borehole
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0730	Shamus English on site. ADE on site at time of arrival and leveling ground along road to grade. ADE mixing mud and setting up for today's drilling activities. Second deviation survey at 236.5 will be conducted shortly.
0810	ADE tripping pipe down hole.
0830	ADE connecting Kelly and rotating bit as they trip down hole from 176 to 236.6 ft bls to straighten hole for second deviation survey.
0920	Paul (ADE) on site. Notified Paul of the problem with drilling fluids on the ground. Paul explained that they will build a berm on the ground around the tanks or dig a lined trench to hold fluids.
0940	ADE still slowly tripping down hole rotating bit and circulating as they go down.
0955	ADE lowering deviation tool down hole.
1015	Second deviation survey at 240 ft bls (236.5 actual) measured at 0.4°.
1023	Drilling commenced at 236.5 ft bls.
1040	Mud weight at 8.8 lbs/gal. Viscosity – took 39 seconds to fill 1 Liter.
1056	Kelly down at 256.5 ft bls, circulating on bottom.
1107	Attaching drill pipe #10 to drill string
1215	Kelly down at 276.5 ft bls, circulating on bottom
1249	Attaching drill pipe #11 to drill string
1253	Drilling resumed at 276.5 ft bls
1304	Kelly down at 296.5 ft bls, circulating on bottom
1320	ADE fabricating flange cover for well head to prevent flow if well were to come alive.
1336	ADE attaching drill pipe #12 to drill string and preparing to run deviation survey
1405	Deviation survey measured at 0.5°.
1408	Drilling resumed at 296.5 ft bls
1420	Kelly down at 316.5 ft bls, circulating on bottom. Mud weight at 8.7 lbs/gal going in and 9.7 lbs/gal coming out. Viscosity at 41 seconds to fill 1 liter.
1437	Attaching drill pipe #13 to drill string

1440	Drilling resumed at 316.5 ft bls
1455	Kelly down at 336.5 ft bls, circulating on bottom
1505	Per Joe S. (ADE), air compressor for bladder pump is not working, drilling activities will be halted for the day at 336.5 ft bls
1520	Shamus English off site. ADE to trip out of hole and attach flange on well head that will prevent flow if well were to come alive.

Recorded By: Shamus English Date: 7/9/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(772) 288-3883
FAX (772) 288-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/10/08	Day of Week: Thursday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 336.5'	Ending Depth: 476.5'	Bit Size: 17"	Weather: Sunny and Warm

PRIMARY ACTIVITY: Drill Nominal 17-inch Borehole
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0800	Shamus English on site. ADE on site at time of arrival. Waiting on rental company to deliver compresser for bladder pump before drilling. 40 sections of drill pipe delivered to site last night.
0830	ADE mixing mud and performing rig and site maintenance.
0845	Compresser on site. ADE tripping pipe to bottom.
0935	Drilling commenced at 336.5 ft bls.
1030	Mud weight at 8.9 lbs/gal going in and 9.3 lbs/gal coming out. Viscosity measured at 40 seconds for 1 liter.
1040	Kelly down at 356.5, circulating on bottom
1108	ADE attaching drill pipe # 15 and setting up for deviation survey
1125	Deviation survey measured at 0.3° at 360 ft bls (356.5 ft actual).
1128	Drilling resumed at 356.5 ft bls
1148	Waste Management on site to remove filled cuttings tank and replace with empty tank.
1154	Kelly down at 376.5, circulating on bottom.
1240	Drilling resumed at 376.5 ft bls
1322	Kelly down at 396.5 ft bls, circulating on bottom
1353	ADE mixing mud
1417	Attaching drill pipe #17 to drill string
1422	Drilling resumed at 396.5 ft bls
1435	Mud weight at 9.1 lbs/gal going in and 9.2 lbs/gal coming out.
1439	Kelly down at 426.5 ft bls, circulating on bottom
1502	Attaching drill pipe #18 to drill string and setting up for deviation survey
1537	Deviation survey measured at 0.2° at 420 ft bls (416.5 ft actual).
1540	Drilling resumed at 416.5 ft bls
1553	Kelly down at 436.5 ft bls, circulating on bottom
1613	Attaching drill pipe #19 to drill string
1616	Drilling resumed at 436.5 ft bls
1633	Kelly down at 456.5 ft bls, circulating on bottom

1658	Attaching drill pipe #21 to drill string
1704	Drilling resumed at 456.5 ft bls
1727	Kelly down at 476.5 ft bls, circulating on bottom
1745	Attaching drill pipe #22 to drill string and setting up for deviation survey
1808	Deviation survey measured at 0.5° at 480 ft bls (476.5 ft actual).
1810	Shamus English off site. ADE to trip pipe up to casing before securing site.

Recorded By: Shamus English Date: 7/10/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(772) 286-3883
FAX (772) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/11/08	Day of Week: Friday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 476.5'	Ending Depth: 502'	Bit Size: 17"	Weather: Sunny and Warm

PRIMARY ACTIVITY: Drill Nominal 17-inch Borehole
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0730	Shamus English on site. ADE on site and setting up for drilling activities at time of arrival
0820	Drilling commenced at 476.5 ft bls. Dense clay, drilling slow.
0950	Kelly down at 496.5 ft bls, circulating on bottom
1002	Attaching drill pipe #22 to drill string.
1005	Drilling resumed at 496.5 ft bls. Dense clay, drilling slow.
1055	Drilling halted for the day at 502 ft bls. ADE tripping pipe up into casing
1130	SFWMD on site
1230	Shamus English off site.

Recorded By: Shamus English Date: 7/11/08

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: _____

Date: 7-7-09	Project: SFWD
Well Number: OSF-106	Job Number :

Well Depth - Start of Shift : 81 Water Level - Start of Shift: _____

End of Shift : 116 End of Shift: _____

Activities	From	To
traveled to site - picked up 3rd joint Drill pipe		
Finished R.U. up tugged cement inside at 17' out side at Land surface		
Drilled out cement - Drilled 17' hole down to 116' with mud		
tripped up.		
R.D. Drill 11:00		
P.U. 6:30		
4.05 1.5		

Formations from:	From	To
Ocean clay	82-	90
Sand + shell	90	116

Safety Meeting ? Yes ___ No X

Daily Topic

Accident on Site ? Yes ___ No X

Describe:

Weather Conditions: Clear

Drilling Mud Properties	In	Out
Mud Weight (ppg)		
Mud Viscosity		

Driller: JS

Helpers: Jeff

Eng.Rep.: Shawn

Drilling Assembly 12¼ x 17 x 17

Available WOB _____ lbs

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-8-08	Project: taylor creek
Well Number: OKF-106	Job Number:

Well Depth - Start of Shift: 116 Water Level - Start of Shift:
End of Shift: 236 End of Shift:

Activities	From	To
Drilled 17" Hole from 116 to		
236 with mud - let clean up.		
Ran surv Shots at 60' - 120' 180 - 240'		
Rig Data		
P.U - [illegible] Start 7:00		
End 6:30		
Hrs 11.5		

Formations from:	From	To
Gray Sand - Shell	116	190
Green sandy clay	190	236

Safety Meeting ? Yes ___ No X
Daily Topic: ______

Accident on Site ? Yes ___ No X
Describe: ______

Weather Conditions: Clear

Drilling Mud Properties	In	Out
Mud Weight (ppg)	9.2	
Mud Viscosity	56	

Driller: J.S.
Helpers: Ray, Taft
Eng.Rep.: [illegible]

Drilling Assembly 12 1/4 x 17 x 17

Available WOB ______ lbs

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-9-08	Project: taylor Creek
Well Number: OFK-106	Job Number :

Well Depth - Start of Shift : 236 Water Level - Start of Shift:
End of Shift : 336 End of Shift:

Activities	From	To
Drilled [illegible] Hole from 236 to		
330' [illegible] mud		
Ran surv Shots 240' 300'		
ReReamed from 180' to 240		
Rig D[illegible] Start 7:00		
Rig [illegible] End 6:30		
[illegible] tot - 11.5		

Formations from:	From	To
Green clay	236	336

Safety Meeting ? Yes ___ No X
Daily Topic:

Accident on Site ? Yes X No ___
Describe: General Safety

Driller: TG
Helpers: Ray, Jeff
Eng.Rep.: Thomas

Weather Conditions: clear

Drilling Mud Properties	In	Out
Mud Weight (ppg)	8.7	9.7
Mud Viscosity	41	

Drilling Assembly 12¼ X 17 X 17

Available WOB ______ lbs

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/1/2008	0	10	**Quartz Sand** - Unconsolidated, dark yellowish brown (10YR 4/2) - fine to medium grained; moderately sorted; 20% porosity
7/1/2008	10	20	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	20	30	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	30	40	**Shell Fragments (50%)** - Unconsolidated shell fragments and pieces; Quartz Sand (40%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	40	50	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	50	60	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	60	70	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, dark yellowish brown (10YR 4/2); Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	70	80	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10-15%) - approx. 1-2 mm , sub-rounded to sub-angular
7/1/2008	80	90	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular
7/7/2008	90	100	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	100	110	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - fine grained to approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	110	120	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	120	130	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/8/2008	130	140	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	140	150	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	150	160	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	160	170	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	170	180	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Clay (30%) pale olive (10Y 6/2) moderately to poorly cohesive; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	180	190	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	190	200	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	200	210	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	210	220	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	220	230	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5-10%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/9/2008	230	240	Clay (65%) - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	240	250	Clay (70%) - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	250	260	Clay (90%) - dusky yellow green (5GY 5/2), very to moderately cohesive; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	260	270	Clay (85%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	270	280	Clay (85%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	280	290	Clay (80%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	290	300	Clay (80%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	300	310	Clay (80%) - grayish olive green (5GY 3/2), moderately cohesive, Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	310	320	Clay (85%) - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	320	330	Clay (85%) - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	330	340	Clay (85%) - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	340	350	Clay (70%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	350	360	Clay (45%) - dusky yellow green (5GY 5/2), poor to moderate cohesion; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/10/2008	360	370	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; **Shell Fragments (30%)** - Unconsolidated shell fragments and pieces; **Quartz Sand (25%)**- Unconsolidated, mostly translucent,coarse to fine grained; **Phosphate (10%)** - fine grained to 1 mm, sub-rounded to sub-angular
7/10/2008	370	380	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; **Shell Fragments (30%)** - Unconsolidated shell fragments and pieces; **Quartz Sand (25%)**- Unconsolidated, mostly translucent,coarse to fine grained; **Phosphate (10%)** - fine grained to 1-2 mm, sub-rounded to sub-angular
7/10/2008	380	390	**Shell Fragments (45%)** - Unconsolidated shell fragments and pieces; **Quartz Sand (30%)**- Unconsolidated, mostly translucent,coarse to fine grained; ; **Phosphate (15%)** fine grained to 1-2 mm, sub-rounded to sub-angular; **Silty Clay (10%)** - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	390	400	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; **Quartz Sand (30%)**- Unconsolidated, mostly translucent,coarse to fine grained; ; **Phosphate (15%)** fine grained to 1-2 mm, sub-rounded to sub-angular; **Silty Clay (15%)** - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	400	410	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; **Shell Fragments (35%)** - Unconsolidated shell fragments and pieces; **Quartz Sand (15%)**- Unconsolidated, mostly translucent, medium to fine grained; **Phosphate (10%)** - medium to fine grained
7/10/2008	410	420	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; **Shell Fragments (30%)** - Unconsolidated shell fragments and pieces; **Quartz Sand (15%)**- Unconsolidated, mostly translucent, medium to fine grained; **Phosphate (10%)** - medium to fine grained; **Silty Clay (5%)** - dusky yellow green (5GY 5/2), very poor to no cohesion
7/10/2008	420	430	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; **Shell Fragments (35%)** - Unconsolidated shell fragments and pieces; **Quartz Sand (15%)**- Unconsolidated, mostly translucent, medium to fine grained; **Phosphate (5%)** - medium to fine grained
7/10/2008	430	440	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; **Shell Fragments (35%)** - Unconsolidated shell fragments and pieces; **Quartz Sand (15%)**- Unconsolidated, mostly translucent, medium to fine grained; **Phosphate (5%)** - medium to fine grained
7/10/2008	440	450	**Silty Clay (40%)** - pale olive (10Y 6/2), poor cohesion; **Shell Fragments (30%)** - Unconsolidated shell fragments and pieces; **Carbonate Sand (20%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; **Quartz Sand (5%)**- Unconsolidated, mostly translucent,medium to fine grained; **Phosphate (5%)** - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/10/2008	450	460	Silty Clay (45%) - pale olive (10Y 6/2), poor cohesion; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	460	470	Silty Clay (55%) - pale olive (10Y 6/2), poor cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	470	480	Silty Clay (55%) - pale olive (10Y 6/2), poor to moderate cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained

BOYLE

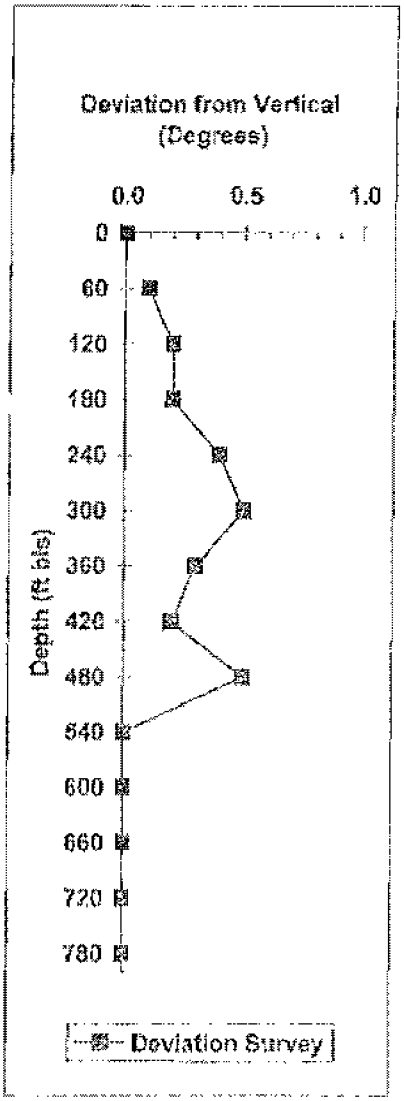
Engineering Excellence Since 1942

Deviation Survey

South Florida Water Management District
L63N - Okeechobee County

Well Number	OKF-106
Permit Number	0198641-009-UC
Job Number	17191.00

Deviation Survey		
Date	Depth (feet)	Deviation (degrees)
7/8/2008	60	0.1
7/8/2008	120	0.2
7/8/2008	180	0.2
7/9/2008	240	0.4
7/9/2008	300	0.5
7/10/2008	360	0.3
7/10/2008	420	0.2
7/10/2008	480	0.5
	540	
	600	
	660	
	720	
	780	



Boyle Engineering
2090 Palm Beach Lakes Boulevard, Suite 600, West Palm Beach, Fl 33409
T 561.684.3375 F 561.689.6531 www.boyle.aecom.com

July 21, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.3 – July 14, 2008 through July 20, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the third week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The construction and related activities that transpired during the third week related to OKF-106 (UFA-MW1) are summarized below;

- Continued to advance the nominal 17-inch diameter borehole via the mud rotary method from 502 to 597 feet bls.
- Ended mud rotary drilling operations for the week at a depth of 597 feet bls.
- No drilling or testing activities were conducted on Saturday July 19th or Sunday July 20th.

On Friday, July 17, 2008 the deviation of the borehole from center was measured at 1.7°. In an attempt to bring the borehole back to center the Contractor pulled out the nominal 17-inch diameter bit assembly and will begin to drill the remaining portion of the borehole using a nominal 12-inch diameter bit.

Work scheduled for the next report period:

The Contractor will begin advancing a nominal 12-inch diameter borehole from 597 feet bls to an anticipated depth of 710 feet bls in an attempt to bring the borehole back to center. When completed, the borehole will be geophysically logged from land surface to a depth of 710 feet. Based on the lithologic and geophysical logs, a casing seat justification for the 10-inch diameter PVC casing will be submitted to the Department for approval. In the interim, the Contractor will begin to ream the 12-inch diameter borehole to a nominal 17-inch diameter from 597 feet bls to approximately 710 feet bls via the mud rotary method. The setting depth of 710 feet will be approximately 10 feet into the carbonate section of the Floridan aquifer. Depending on the timeliness of completing the 17-inch diameter borehole to 710 feet bls; the Contractor may begin installing the 10-inch diameter Certa-lok PVC well casing. Once the 10-inch diameter casing is installed, it will be carefully cemented back to surface with the elevation of the cement within the annulus verified by physical hard tags using a collarless tremie pipe and temperature logs.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett, P.G.
Senior Hydrogeologist

Enclosures: Engineer's Daily Field Reports
Contractor's Daily Reports
Lithologic Descriptions
Deviation Survey Data

Distribution to Interested Parties – Weekly Summary Report No. 3

Distribution: Mark Silverman FDEP/WPB
Joseph May, FDEP/WPB
George Heuler, FDEP/TLH
Bob Verrastro, SFWMD/WPB
File

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number:	Project Name:	Client:	Date:	Day of Week:	Contractor:
17191.00	L63N	SFWMD	7/14/08	Monday	Applied Drilling Engineering (ADE)
Well Name:	**FDEP Permit #:**	**Starting Depth:**	**Ending Depth:**	**Bit Size:**	**Weather:**
OKF-106	0198641-009-UC	502'	516.5'	17"	Sunny and Warm

PRIMARY ACTIVITY: 17" Borehole Drilling
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
1215	Shamus English on site. ADE on site and setting up for drilling activities at time of arrival
1255	Drilling commenced for the day at 502 ft bls. Drilling through dense clay, rate of penetration is very slow
1400	Depth at about 504 ft bls
1420	Rain Storm over head, ADE continue drilling without person operating brake handle.
1440	Storm passed, light drizzle.
1500	Depth at about 505 ft bls.
1520	ADE attaching couplings to ends of PVC casing, SE numbering each section of PVC casing.
1600	Depth at about 507 ft bls. Rate of penetration picking up. PVC section labeled #6 has 1 foot cut off at the end for mule shoe (#6 is 19 ft long).
1700	Depth at about 512 ft bls.
1800	Shamus English off site. Depth at about 515 ft bls, Kelly down will be 516.5 ft bls. ADE to drill to Kelly down and trip pipe up into casing before securing site.

Recorded By: Shamus English Date: 7/17/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63AN	Client: SFWMD	Date: 7/15/08	Day of Week: Tuesday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 516.5'	Ending Depth: 536.5'	Bit Size: 17"	Weather: Sunny and Warm

PRIMARY ACTIVITY: 17" Borehole Drilling
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0845	Shamus English on site. ADE on site and drilling at time of arrival. Depth at about 525 ft bls. Clayton McMillan (SFWMD) on site at time of arrival.
0920	Mud weight at 9.1 lbs/gal.
0928	Kelly down at 536.5 ft bls, circulating on bottom.
0943	Attaching drill pipe #24 to drill string, and setting up to run deviation survey.
1015	Deviation survey measured at 1.2°, too high. ADE running deviation survey again.
1040	Second deviation survey at 540 ft bls measured 1.0°, advised ADE to raise drill string about 50 ft and ream borehole as they advance back down to 536.5 ft bls., before running a 3rd deviation survey.
1145	Lowering tool down hole for 3rd deviation survey.
1215	Third deviation survey measured 1.0°, notified Michael Bennett. Per Michael Bennett, advise ADE to raise drill string to 400 ft bls and slowly advance back down to 536.5 ft bls., while rotating bit and circulating, before running a 4th deviation survey
1435	Waste Management on site to pick up roll off tank full of cuttings and spent fluids.
1445	While lifting roll-off tank onto truck, spent drilling fluids in tank discharged onto ground inundating area around the tank.
1515	Per Joe S. (ADE), drilling activities halted for the day so they can build a lined and bermed containment area around the roll-off tanks.
1545	Shamus English off site.

Recorded By: Shamus English Date: 7/17/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 288-3925

DAILY REPORT OF CONSTRUCTION

Project Number:	Project Name:	Client:	Date:	Day of Week:	Contractor:
17191.00	L63N	SFWMD	7/16/08	Wednesday	Applied Drilling Engineering (ADE)
Well Name:	**FDEP Permit #:**	**Starting Depth:**	**Ending Depth:**	**Bit Size:**	**Weather:**
OKF-106	0198641-009-UC	536.5'	563'	17"	Sunny and Warm

PRIMARY ACTIVITY: 17" Borehole Drilling
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0800	Shamus English on site. ADE on site at time of arrival. Circulating on bottom at 536.5 ft bls before taking 4th deviation survey. ADE built a lined and bermed containment area around roll-off tanks west of rig.
0835	Deviation survey #4 at 540 ft bls measured at 1.1° which is still out of compliance with specs. Per Michael Bennett, advise ADE to make a decision as to how they are to remedy this problem.
0845	Per Joe S. (ADE), they are going to continue drilling and take another deviation survey at 600 ft bls, notified Michael Bennett.
0855	Per Michael Bennett, he spoke with Paul P. (ADE) and it was agreed to take deviation surveys every 20 ft until borehole is back to center.
0920	Drilling commenced at 536.5 ft bls. Clayton M. (SFWMD) on site.
1045	Paul P. (ADE) on site.
1110	Paul P. (ADE) off site. Rain storm over head.
1130	Storm passed, slight drizzle.
1215	Kelly down at 556.5 ft bls, circulating on bottom.
1226	Attaching drill pipe #25 to drill string and setting up for deviation survey.
1305	Deviation survey measured at 0.9°, borehole appears to be pulling back to center.
1315	Drilling resumed at 556.5 ft bls, Drilling with very low weight on bit in dense clay, very slow rate of penetration.
1415	Depth at about 558 ft bls.
1500	Depth at about 559 ft bls.
1600	Depth at about 560 ft bls.
1700	Depth at about 562 ft bls.
1800	Depth at about 563 ft bls.
1815	Drilling halted for the day at 563 ft bls
1830	Shamus English off site.

Recorded By: Shamus English Date: 7/17/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number:	Project Name:	Client:	Date:	Day of Week:	Contractor:
17191.00	L63N	SFWMD	7/16/08	Thursday	Applied Drilling Engineering (ADE)
Well Name:	**FDEP Permit #:**	**Starting Depth:**	**Ending Depth:**	**Bit Size:**	**Weather:**
OKF-106	0198641-009-UC	563'	596.5'	17"	Sunny and Warm

PRIMARY ACTIVITY: 17" Borehole Drilling
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0800	Shamus English on site. ADE on site and mixing mud for today's drilling activities at time of arrival. Paul P. (ADE) on site.
0815	Drilling commenced for the day.
0830	Depth at about 565 ft bls.
0900	Depth at about 71 ft bls, rate of penetration has increased.
0920	Kelly down at 576.5 ft bls, circulating on bottom.
0935	Attaching drill pipe #26 to drill string and running deviation survey.
1000	Deviation survey measured at 1.4°. ADE is going to rotate drill string 180° and run another deviation survey to see if possibly the collars are slightly bent causing false drift indicator readings.
1030	Second deviation survey at 576.6 ft bls measured 1.5°. ADE is going to drill down another 20 ft with high rpm's and very low weight on bit before running another deviation survey.
1040	Drilling resumed at 576.5 ft bls.
1245	Kelly down at 596.5 ft bls, circulating on bottom.
1300	Attaching drill pipe #27 to drill string and running deviation survey.
1335	Deviation survey at 596.5 ft bls measured 1.7°. ADE is going to run another survey with plastic stabilizers on tool.
1345	Shamus English off site.
1515	Shamus English on site. Second deviation survey at 596.5 ft bls measured 1.7°. ADE is going to trip pipe out of hole and replace 17" bit with a smaller diameter bit, probably 12", in an attempt to bring borehole back to center.
1530	Shamus English off site.

Recorded By: Shamus English Date: 7/17/08

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-14-08	Project: Taylor Creek
Well Number: OKF-101	Job Number:

Well Depth - Start of Shift: 502 Water Level - Start of Shift: ______
End of Shift: 516 End of Shift: ______

Activities	From	To
Tripped in - ReReamed back to		
Bottom. Drilled 17" hole from		
502 - 516 with mud.		
Rig Drill 10:00		
Rig Serv 6:30		
4.05 8.5		

Formations from:	From	To
Stiff Green clay	502	516

Safety Meeting ? Yes ___ No X	Weather Conditions: clear
Daily Topic ______	
Accident on Site ? Yes ___ No X	Drilling Mud Properties — In / Out
	Mud Weight (ppg): In 9.1 / Out
Describe: ______	Mud Viscosity: In 48 / Out
Driller: JS	Drilling Assembly 12 x 17 x 17
Helpers: Roy, Jeff	
Eng.Rep.: S Lamos	Available WOB ______ lbs

Applied
DRILLING
Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-15-08	Project: taylor creek
Well Number: CKF-106	Job Number :

Well Depth - Start of Shift : 516 Water Level - Start of Shift:
End of Shift : 536 End of Shift:

Activities	From	To
Drilled 17" hole with mud from		
516-536 - Ran sure shot, Ran sure shot		
pulled up to 480 - Re Reamed from 480		
to 540 - Ran sure shot - tripped up		
to 400 - Re Drilled very slowly		
from 400-500 - Shut Down - cleaned		
up mess from Dumpster Truck - laid Down		
plastic - Re Ran Mag bailer		
Rig Drill 9:00		
R.V. Surf 5:30		
1.05 10.00		

Formations from:	From	To
Green clay	516	536

Safety Meeting ? Yes ___ No X
Daily Topic ______

Accident on Site ? Yes X No ___
Describe: safty Hand books

Driller: J.S.
Helpers: Roy, Jake
Eng.Rep.: Shannes

Weather Conditions: Clear

Drilling Mud Properties	In	Out
Mud Weight (ppg)	9.1	9.1
Mud Viscosity	44	

Drilling Assembly 12 X 17 X 17

Available WOB ______ lbs

Applied
DRILLING
Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-16-08	Project: Taylor creek
Well Number: OFR-106	Job Number:

Well Depth - Start of Shift: 536   Water Level - Start of Shift:
End of Shift: 564   End of Shift:

Activities	From	To
ReReamed Down to 540 - Ran surv		
Shot 0.0 - Drill to 560 - Ran surv Shot		
0.9 - Drilled to 564 with 17"		
bit on mud		
Rig [illegible] 7.00		
RV-501 6.30		
4.05 11.5		

Formations from:	From	To

Safety Meeting ? Yes ___ No X
Daily Topic ______

Accident on Site ? Yes ___ No X
Describe: ______

Weather Conditions: Raining

Drilling Mud Properties	In	Out
Mud Weight (ppg)	9.1	9.1
Mud Viscosity	45	45

Driller: J.S
Helpers: Roy, Tate
Eng.Rep.: Shawn, Clayton

Drilling Assembly: 12 X 17 X 17
Available WOB: ______ lbs

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 8-17-08	Project: Taylor creek
Well Number: OFK -106	Job Number :

Well Depth - Start of Shift : 564 Water Level - Start of Shift:
End of Shift : 596 End of Shift:

Activities	From	To
Drilled from 564 to 576 - Run		
sur Shot - Drilled from 576 to		
596 - Ran sur. Shot off 1.7 tripped		
Drill pipe out - Rained out at		
5:00		
Ar - 1 7:00		
Lv - 5:00		
4.05 Hrs		

Formations from:	From	To
Green clay	564	576

Safety Meeting ? Yes ___ No X
Daily Topic ______

Accident on Site ? Yes ___ No X
Describe: ______

Weather Conditions: Rainey

Drilling Mud Properties	In	Out
Mud Weight (ppg)	9.1	9.1
Mud Viscosity	45	45

Driller: J.S
Helpers: Roy, Jeff
Eng.Rep.: Shamus

Drilling Assembly 12 X 17 X 17

Available WOB ______ lbs

Applied **DRILLING** Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-18-07	Project: taylor creek
Well Number: OKK-104	Job Number:

Well Depth - Start of Shift: ______ Water Level - Start of Shift: ______
End of Shift: ______ End of Shift: ______

Activities	From	To
Finished tripping out - Broke		
Down Bits - Re set up Bits		
in new configuration & tripped in		
sealed in well for weekend		
Rig - Oil 7:00		
P.U. [illegible] 1:00		
4.05 6.00		

Formations from:	From	To

Safety Meeting ? Yes ___ No X

Daily Topic ______

Accident on Site ? Yes ___ No X

Describe: ______

Weather Conditions: clear

Drilling Mud Properties	In	Out
Mud Weight (ppg)		
Mud Viscosity		

Driller: J.G

Helpers: Roy Jeff

Eng.Rep.: none

Drilling Assembly ______

Available WOB ______ lbs

COMPANY CONFIDENTIAL

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/1/2008	0	10	**Quartz Sand** - Unconsolidated, dark yellowish brown (10YR 4/2) - fine to medium grained; moderately sorted; 20% porosity
7/1/2008	10	20	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	20	30	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	30	40	**Shell Fragments (50%)** - Unconsolidated shell fragments and pieces; Quartz Sand (40%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	40	50	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	50	60	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	60	70	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, dark yellowish brown (10YR 4/2); Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	70	80	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10-15%) - approx. 1-2 mm , sub-rounded to sub-angular
7/1/2008	80	90	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular
7/7/2008	90	100	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	100	110	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - fine grained to approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	110	120	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	120	130	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/8/2008	130	140	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	140	150	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	150	160	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	160	170	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	170	180	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Clay (30%) pale olive (10Y 6/2) moderately to poorly cohesive; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	180	190	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	190	200	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	200	210	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	210	220	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	220	230	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5-10%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/9/2008	230	240	Clay (65%) - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	240	250	Clay (70%) - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	250	260	Clay (90%) - dusky yellow green (5GY 5/2), very to moderately cohesive; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	260	270	Clay (85%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	270	280	Clay (85%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	280	290	Clay (80%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	290	300	Clay (80%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	300	310	Clay (80%) - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	310	320	Clay (85%) - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	320	330	Clay (85%) - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	330	340	Clay (85%) - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	340	350	Clay (70%) - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	350	360	Clay (45%) - dusky yellow green (5GY 5/2), poor to moderate cohesion; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/10/2008	360	370	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1 mm, sub-rounded to sub-angular
7/10/2008	370	380	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1-2 mm, sub-rounded to sub-angular
7/10/2008	380	390	**Shell Fragments (45%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) - fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (10%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	390	400	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) - fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (15%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	400	410	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained
7/10/2008	410	420	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained; Silty Clay (5%) - dusky yellow green (5GY 5/2), very poor to no cohesion
7/10/2008	420	430	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained
7/10/2008	430	440	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained
7/10/2008	440	450	**Silty Clay (40%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/10/2008	450	460	**Silty Clay (45%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	460	470	**Silty Clay (55%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	470	480	**Silty Clay (55%)** - pale olive (10Y 6/2), poor to moderate cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
	480	490	**Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
	490	500	**Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
	500	510	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
	510	520	**Clay (70%)** - grayish green (10GY 5/2), well to moderate cohesion; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (10%) - medium to fine grained
	520	530	**Clay (75%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - medium to fine grained
	530	540	**Clay (70%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

	540	550	Clay (75%) - pale olive (10Y 6/2), well to moderate cohesion; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - medium to fine grained
	550	560	Clay (75%) - pale olive (10Y 6/2), well to moderate cohesion; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - medium to fine grained
	560	570	Clay (75%) - pale olive (10Y 6/2), well to moderate cohesion; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - medium to fine grained
	570	580	Clay (70%) - pale olive (10Y 6/2), well to moderate cohesion; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - medium to fine grained
	580	590	Clay (70%) - pale olive (10Y 6/2), well to moderate cohesion; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - medium to fine grained
	590	600	Clay (70%) - pale olive (10Y 6/2), well to moderate cohesion; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - medium to fine grained

BOYLE

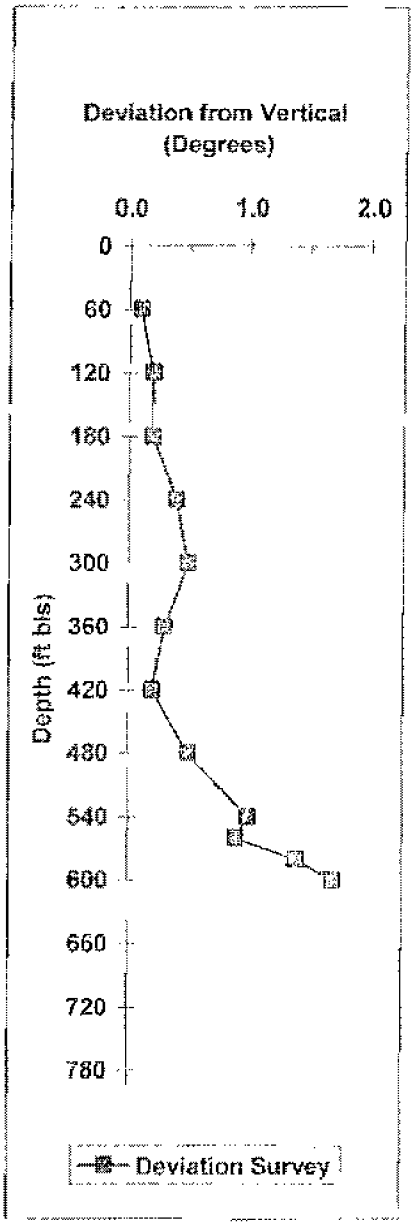
Engineering Excellence Since 1942

Deviation Survey

South Florida Water Management District
L63N - Okeechobee County

Well Number	OKF-106
Permit Number	0198641-009-UC
Job Number	17191.00

Deviation Survey		
Date	Depth (feet)	Deviation (degrees)
7/8/2008	60	0.1
7/8/2008	120	0.2
7/8/2008	180	0.2
7/9/2008	240	0.4
7/9/2008	300	0.5
7/10/2008	360	0.3
7/10/2008	420	0.2
7/10/2008	480	0.5
7/15/2008	540	1.0
7/16/2008	560	0.9
7/17/2008	580	1.4
7/17/2008	600	1.7
	660	
	720	
	780	



Boyle Engineering
2090 Palm Beach Lakes Boulevard, Suite 600, West Palm Beach, FL 33409
T 561.684.3375 F 561.689.8631 www.boyle.aecom.com

July 28, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.4 – July 21, 2008 through July 27, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the fourth week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The construction and related activities that transpired during the fourth week related to OKF-106 (UFA-MW1) are summarized below;

- Continued to advance the nominal 17-inch diameter borehole via the mud rotary method from to 597 to 720 feet bls.
- Ended mud rotary drilling operations for the week at a depth of 720 feet bls.
- Completed geophysical logging in the nominal 17-inch diameter borehole from land surface to 720 feet bls.
- No drilling or testing activities were conducted on Saturday July 26th or Sunday July 27th.

On Friday, July 25, 2008 geophysical logs were completed on the nominal 17-inch diameter borehole. Based on the lithologic and geophysical logs, a casing seat justification for the 10-inch diameter PVC casing was submitted electronically to the Department on Sunday July 27th for approval.

Work scheduled for the next report period:

Once the casing setting depth recommendation is approved by the Department, the Contractor will begin to ream the bottom 30 feet of the nominal 12-inch diameter borehole to a depth of 720 feet bls via the mud rotary method. The proposed setting depth of 718 feet bls for the nominal 10-inch diameter Certa-lok PVC casing will be approximately 18 feet into the carbonate section of the Floridan aquifer. On Tuesday, July 29th, the Contractor will circulate the completed nominal 17-inch diameter for 2-hours before installing the 10-inch diameter Certa-lok PVC well casing to 718 feet bls. Once the 10-inch diameter casing is installed, it will be carefully cemented back to surface with the elevation of the cement within the annulus verified by physical hard tags using a collarless tremie pipe and temperature logs.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett, P.G.
Senior Hydrogeologist

Enclosures: Engineer's Daily Field Reports
Lithologic Descriptions
Deviation Survey Data

Distribution to Interested Parties – Weekly Summary Report No. 4

Distribution: Mark Silverman FDEP/WPB
Joseph May, FDEP/WPB
George Heuler, FDEP/TLH
Bob Verrastro, SFWMD/WPB
File

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number:	Project Name:	Client:	Date:	Day of Week:	Contractor:
17191.00	L63A	SFWMD	7/23/08	Wednesday	Applied Drilling Engineering (ADE)
Well Name:	**FDEP Permit #:**	**Starting Depth:**	**Ending Depth:**	**Bit Size:**	**Weather:**
OKF-106	0198641-009-UC	649'	720'	12"/17"	Sunny and Warm

PRIMARY ACTIVITY: 17" Borehole Drilling
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0730	Shamus English on site. ADE on site and drilling at time of arrival. Drilling commenced at 649 ft bls just prior to my arrival.
0815	Depth at 660 ft bls. Rate of Penetration has increased greatly since yesterday.
0935	Kelly down at 669 ft bls, circulating on bottom.
0950	Lowering deviation tool down hole. Water is leaking from ASR well at about 3 gpm.
1015	Deviation survey at 669 ft bls measured 1.3°.
1025	Drilling resumed 669 ft bls.
1215	Drilling halted at 685 ft bls. drilling fluid is spent, ADE is transferring spent fluids into another tank.
1305	ADE mixing new batch of mud.
1330	Drilling resumed at 685 ft bls.
1420	Kelly down at 689 ft bls, circulating on bottom
1435	Lowering deviation tool down hole.
1500	Deviation survey at 689 ft bls measured 1.0°.
1505	Drilling resumed at 689 ft bls.
1520	Depth at 693 ft bls. rig beginning to chatter, appears drilling through limestone.
1645	Kelly down at 709 ft bls. Difficult to determine lithology on bottom. Because of drill bit configuration cuttings retrieved at surface are from 2 separate depths that are 30 ft apart; mush more clay is mixed in with cuttings than is from pilot bit. Limestone that is coming up has been pulverized by 17" reamer bit. Notified Michael Bennett, he is to talk with Paul (ADE) and get back to me.
1700	Per Michael Bennett, ADE is to drill another 11 ft to 720 and run another deviation survey.
1725	Depth at 720 ft bls. Significantly more limestone in cuttings and also larger pieces.
1745	Lowering deviation tool down hole.
1820	Deviation survey at 610 ft bls measured 1.4°.
1830	Shamus English off site.

Recorded By: Shamus English Date: 7/24/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/25/08	Day of Week: Friday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: N/A	Ending Depth: N/A'	Bit Size: N/A	Weather: Sunny and Warm

PRIMARY ACTIVITY: Geophysical Logging
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0700	Shamus English on site. ADE and logging company on site at time of arrival. Setting up for logging activities.
0715	Lowering gamma tool down hole.
0725	Gamma tool on bottom. Recording on the way up. Bottom of tool tagged at 712 ft bls. Gamma sensor is 6 ft from bottom of tool so first reading is taken at 706 ft bls. Gamma log did not pick up clean limestone on bottom. Per Joe S. (ADE) they performed a wiper run yesterday and circulated on bottom from 0930 to 1100.
0755	Gamma tool at surface. He is going to run another gamma log to see if we can pick up the clean limestone on the bottom.
0803	Lowering second gamma tool down hole. Tool also has 16/64 resistively capability.
0810	Tool on bottom. Recording on the way up at 40 ft/min. sensor on this tool is about 1 foot from bottom. Gamma log picked up a little bit of the clean limestone on bottom this time.
0828	Gamma tool at surface.
0838	Lowering 4-arm caliper tool down hole.
0853	Raising 4-arm caliper tool recording on the way up. Mud is so thick on the bottom that arms did not open fully until started raising tool.
0915	Tool at surface.
0930	Lowering dual induction tool down hole.
0938	Tool on bottom, raising to surface while recording. Cannot view log while recording.
1000	DI tool at surface. Waiting to receive field copies.
1215	Received 3 field copies of logs. Shamus English off site.

Recorded By: Shamus English

Date: 7/28/08

Applied **DRILLING** Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-21-08	Project: Taylor creek
Well Number: OFR-106	Job Number:

Well Depth - Start of Shift: 596 Water Level - Start of Shift: ______
End of Shift: 635 End of Shift: ______

Activities	From	To
Tripped in to 589 - mixed new		
mud - circulated hole - Ran sweep		
Drilled to 629 - Ran sweep short		
Drilled to 635'		
Rig Dril [illegible]		
[illegible] 10'0 [illegible]		
638		
105 8.5		

Formations from:	From	To
Green Clay	596	635

Safety Meeting ? Yes ___ No X
Daily Topic ______

Accident on Site ? Yes ___ No X
Describe: ______

Driller: JS
Helpers: Ray, Jeff
Eng.Rep.: [illegible]

Weather Conditions: Clear

Drilling Mud Properties	In	Out
Mud Weight (ppg)	9.2	9.2
Mud Viscosity	43	43

Drilling Assembly: 13 x 17

Available WOB ______ lbs

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: _____

Date: 7-22-08	Project: Taylor creek
Well Number: OFK-106	Job Number:

Well Depth - Start of Shift: 635 Water Level - Start of Shift: _____

End of Shift: 649 End of Shift: _____

Activities	From	To
Drilled from 635 - 649 w/ 12 1/4		
12 x 17 bits very slow - very		
sticky clay - Ran steel shoot at 649		
Tripped up.		
Rig Rel 7:00		
Rig up 5:00		
1.0 10.00		

Formations from:	From	To
very stiff green	635	649
clay		
Shale 630		

Safety Meeting ? Yes ___ No X		Weather Conditions:	clear / Rainy
Daily Topic			
		Drilling Mud Properties	In / Out
Accident on Site ? Yes ___ No X		Mud Weight (ppg)	9.2 / 9.2
Describe:		Mud Viscosity	48 /
Driller:	JS	Drilling Assembly	12 x 17
Helpers:	Ray, Jeff		
Eng.Rep.:	Abrams	Available WOB	___ lbs

Applied
DRILLING
Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-23-08	Project: taylor creek
Well Number: OFK-206	Job Number:

Well Depth - Start of Shift: 649 | Water Level - Start of Shift: ______
End of Shift: 720 | End of Shift: ______

Activities	From	To
Drilled 12" Hole from 649		
to 720 - with mud (Fill		
ASR well Look?)		
Ran sur shots at 649 - 689 - 720		
Rig On 1 7:00		
Rig Sert 7:00		
7:05 - 12:00		

Formations from:	From	To
Green clay	649	690
tan limestone	690	720

Safety Meeting ? Yes ___ No X	Weather Conditions: clear/Rainy
Daily Topic ______	

Drilling Mud Properties	In	Out
Mud Weight (ppg)	9.3	9.3
Mud Viscosity	48	48

Accident on Site ? Yes ___ No x
Describe: ______

Driller: JL	Drilling Assembly 12 X 17
Helpers: Ray, Dale, Grégor	
Eng.Rep.: Shuwke	Available WOB ______ lbs

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-24-09	Project: Taylor Creek
Well Number: OFK-106	Job Number :

Well Depth - Start of Shift : ______ Water Level - Start of Shift: ______

End of Shift : ______ End of Shift: ______

Activities	From	To
Remixed mud - circulated hole		
for 1.5 hours - tripped out tools		
capped off well - waited for		
loggers		
3:30 - loggers not showing till		
7:00 AM Fri - logged off		
Rig Out 7:00		
Rig Set 3:36		
1.05 · 8:00		

Formations from:	From	To

Safety Meeting ? Yes ___ No X

Daily Topic ______

Accident on Site ? Yes ___ No X

Describe: ______

Driller: JG

Helpers: Roy, Cougar, Todd

Eng.Rep.: Grant

Weather Conditions: Clear

Drilling Mud Properties	In	Out
Mud Weight (ppg)		
Mud Viscosity		

Drilling Assembly 12 X 17

Available WOB ______ lbs

Applied DRILLING Engineering, Inc.

Daily Drilling Report

Report No: ______

Date: 7-25-08	Project: taylor creek
Well Number: OPA-106	Job Number:

Well Depth - Start of Shift: ______ Water Level - Start of Shift: ______
End of Shift: ______ End of Shift: ______

Activities	From	To
logged well - Art Benson		
cleaned up - secured site		
sealed in well for weekend		
Rig - Ord 7.00		
PU - Gury		
1.05		

Formations from:	From	To

Safety Meeting ? Yes ___ No ___
Daily Topic ______

Accident on Site ? Yes ___ No ___
Describe: ______

Weather Conditions: Clear

Drilling Mud Properties	In	Out
Mud Weight (ppg)		
Mud Viscosity		

Driller: JS
Helpers: Roy, Jeff, Gregory
Eng.Rep.: S. Adams

Drilling Assembly ______

Available WOB ______ lbs

COMPANY CONFIDENTIAL

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/21/08	Day of Week: Monday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 597'	Ending Depth: 632'	Bit Size: 12"/17"	Weather: Sunny and Warm

PRIMARY ACTIVITY: 17" Borehole Drilling
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
1435	Shamus English on site. ADE on site and drilling at time of arrival. Depth at 609 ft bls. Next Kelly down will be 629 ft bls. Observed ASR well on site was leaking water from top of well head. ADE has reconfigured drill bit assembly with a 12" diameter bit and a 17" diameter chaser/reamer bit located 30 ft up from 12" penetration bit. This new drill bit assembly will cause cuttings retrieved at surface to be representative of two different depths located 30 ft apart, lithologic descriptions below 630 ft bls will not be completely representative of depth of borehole advancement.
1550	Kelly down at 629 ft bls, circulating on bottom.
1615	Lowering deviation tool down hole.
1640	Deviation survey at 629 ft bls measured 1.0°.
1645	Drilling resumed at 629 ft bls.
1745	Depth at about 631 ft bls.
1815	Drilling halted for the day at 632 ft bls
1830	Shamus English off site.

Recorded By: Shamus English Date: 7/23/08

BOYLE
Engineering Excellence Since 1942

3560 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/22/08	Day of Week: Tuesday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 632'	Ending Depth: 649'	Bit Size: 12"/17"	Weather: Sunny and Warm

PRIMARY ACTIVITY: 17" Borehole Drilling
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0800	Shamus English on site. ADE on site and drilling at time of arrival. Depth at 632 ft bls.
0900	Depth at 634 ft bls
1000	Depth at 636 ft bls
1100	Depth at 637 ft bls
1200	Depth at 639 ft bls
1300	Depth at 640 ft bls
1400	Depth at 642 ft bls
1500	Depth at 644 ft bls
1555	Kelly down at 649 ft bls., circulating on bottom. Rate of penetration increased at 649 ft bls.
1608	Lowering deviation tool down hole.
1635	Deviation survey measured at 1.0°.
1645	Lightning in the area, Joe S. (ADE) to decide whether or not to continue drilling.
1655	Drilling halted for the day. ADB to trip pipe up into casing before securing site. Per Joe S. (ADE), they will get an early start tomorrow in an attempt to TD by the end of the day.
1700	Shamus English off site.

Recorded By: Shamus English Date: 7/23/08

BOYLE

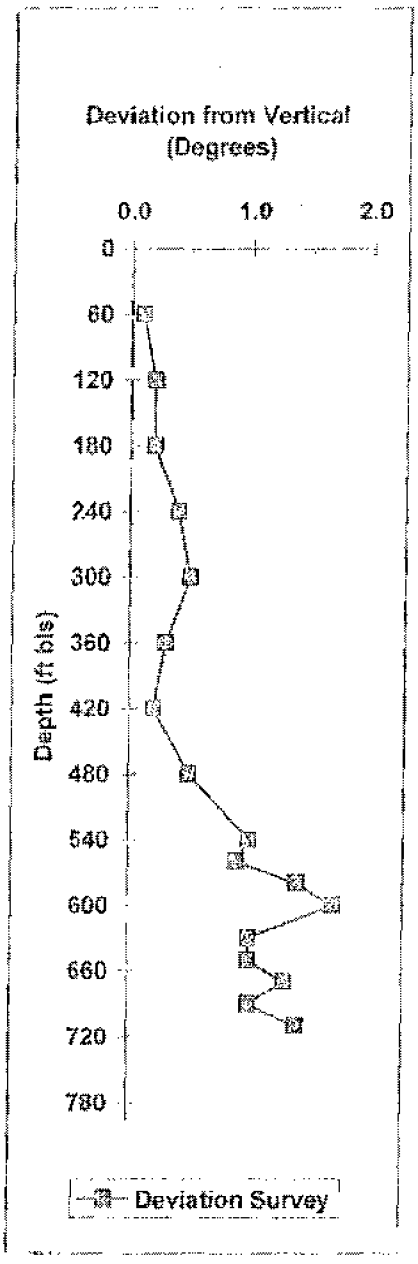
Engineering Excellence Since 1942

Deviation Survey

South Florida Water Management District
L63N - Okeechobee County

Well Number	**OKF-106**
Permit Number	**0198641-009-UC**
Job Number	**17191.00**

Deviation Survey		
Date	Depth (feet)	Deviation (degrees)
7/8/2008	60	0.1
7/8/2008	120	0.2
7/8/2008	180	0.2
7/9/2008	240	0.4
7/9/2008	300	0.5
7/10/2008	360	0.3
7/10/2008	420	0.2
7/10/2008	480	0.5
7/15/2008	540	1.0
7/16/2008	560	0.9
7/17/2008	580	1.4
7/17/2008	600	1.7
7/21/2008	630	1.0
7/22/2008	650	1.0
7/23/2008	670	1.3
7/23/2008	690	1.0
7/23/2008	710	1.4



BOYLE

Engineering Excellence Since 1942

12" DRILL PIPE TALLY w/ 17" CHASER/REAMER BIT

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME	**OKF-106**
PERMIT NUMBER	**0198641-009-UC**
JOB NUMBER	**17191.00**

ITEM	PIPE #	LENGTH (ft)	STRING LENGTH (ft)	KELLY DOWN (ft bls)	DATE
Drill Bit - 12¼"	B1	1.00	1.00		
Collar #1	C1	14.34	15.34		
Collar #2	C2	14.00	29.34		
Drill Bit #2 - 17"	B2	3.83	33.17		
Collar #3	C3	13.4	46.59		
Sub	S1	2.6	49.17		
Collar #4	C4	20.0	69.17		
Drill Pipe	1	20.0	89.17		
Drill Pipe	2	20.0	109.17		
Drill Pipe	3	20.0	129.17		
Drill Pipe	4	20.0	149.17		
Drill Pipe	5	20.0	169.17		
Drill Pipe	6	20.0	189.17		
Drill Pipe	7	20.0	209.17		
Drill Pipe	8	20.0	229.17		
Drill Pipe	9	20.0	249.17		
Drill Pipe	10	20.0	269.17		
Drill Pipe	11	20.0	289.17		
Drill Pipe	12	20.0	309.17		
Drill Pipe	13	20.0	329.17		
Drill Pipe	14	20.0	349.17		
Drill Pipe	15	20.0	369.17		
Drill Pipe	16	20.0	389.17		
Drill Pipe	17	20.0	409.17		
Drill Pipe	18	20.0	429.17		
Drill Pipe	19	20.0	449.17		
Drill Pipe	20	20.0	469.17		
Drill Pipe	21	20.0	489.17		
Drill Pipe	22	20.0	509.17		
Drill Pipe	23	20.0	529.17		
Drill Pipe	24	20.0	549.17		
Drill Pipe	25	20.0	569.17		
Drill Pipe	26	20.0	589.17	609.2	07/21/08
Drill Pipe	27	20.0	609.17	629.2	07/21/08
Drill Pipe	28	20.0	629.17	649.2	07/22/08
Drill Pipe	29	20.0	649.17	669.2	07/23/08
Drill Pipe	30	20.0	669.17	689.2	07/23/08
Drill Pipe	31	20.0	689.17	709.2	07/23/08
Drill Pipe	32	20.0	709.17	729.2	07/23/08

BOYLE

Engineering Excellence Since 1942

17" DRILL PIPE TALLY

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME	**OKF-106**
PERMIT NUMBER	**0198641-009-UC**
JOB NUMBER	**17191.00**

ITEM	PIPE #	LENGTH (ft)	STRING LENGTH (ft)	KELLY DOWN (ft bls)	DATE
Drill Bit - 17"	B1	2.42	2.42		
Collar #1 (8")	C1	14.00	16.42		
Bit #2 (17")	B2	3.17	19.59		
Collar #2 (8") w/sub	C2	16.92	36.51		
Collar #3 (8")	C3	20.0	56.51		
Drill Pipe	1	20.0	76.51	96.5	07/07/08
Drill Pipe	2	20.0	96.51	116.5	07/07/08
Drill Pipe	3	20.0	116.51	136.5	07/08/08
Drill Pipe	4	20.0	136.51	156.5	07/08/08
Drill Pipe	5	20.0	156.51	176.5	07/08/08
Drill Pipe	6	20.0	176.51	196.5	07/08/08
Drill Pipe	7	20.0	196.51	216.5	07/08/08
Drill Pipe	8	20.0	216.51	236.5	07/08/08
Drill Pipe	9	20.0	236.51	256.5	07/08/08
Drill Pipe	10	20.0	256.51	276.5	07/09/08
Drill Pipe	11	20.0	276.51	296.5	07/09/08
Drill Pipe	12	20.0	296.51	316.5	07/09/08
Drill Pipe	13	20.0	316.51	336.5	07/09/08
Drill Pipe	14	20.0	336.51	356.5	07/10/08
Drill Pipe	15	20.0	356.51	376.5	07/10/08
Drill Pipe	16	20.0	376.51	396.5	07/10/08
Drill Pipe	17	20.0	396.51	416.5	07/10/08
Drill Pipe	18	20.0	416.51	436.5	07/10/08
Drill Pipe	19	20.0	436.51	456.5	07/10/08
Drill Pipe	20	20.0	456.51	476.5	07/10/08
Drill Pipe	21	20.0	476.51	496.5	07/11/08
Drill Pipe	22	20.0	496.51	516.5	07/14/08
Drill Pipe	23	20.0	516.51	536.5	07/15/08
Drill Pipe	24	20.0	536.51	556.5	07/16/08
Drill Pipe	25	20.0	556.51	576.5	07/16/08
Drill Pipe	26	20.0	576.51	596.5	07/17/08
Changed drill bit assembly, see 12" pipe tally					

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/1/2008	0	10	**Quartz Sand** - Unconsolidated, dark yellowish brown (10YR 4/2) - fine to medium grained; moderately sorted; 20% porosity
7/1/2008	10	20	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	20	30	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	30	40	**Shell Fragments (50%)** - Unconsolidated shell fragments and pieces; Quartz Sand (40%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	40	50	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	50	60	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	60	70	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, dark yellowish brown (10YR 4/2); Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	70	80	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10-15%) - approx. 1-2 mm , sub-rounded to sub-angular
7/1/2008	80	90	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular
7/7/2008	90	100	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	100	110	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - fine grained to approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	110	120	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	120	130	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/8/2008	130	140	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	140	150	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	150	160	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	160	170	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	170	180	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Clay (30%) pale olive (10Y 6/2) moderately to poorly cohesive; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	180	190	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	190	200	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	200	210	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	210	220	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	220	230	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5-10%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/9/2008	230	240	**Clay (65%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	240	250	**Clay (70%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	250	260	**Clay (90%)** - dusky yellow green (5GY 5/2), very to moderately cohesive; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	260	270	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	270	280	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	280	290	**Clay (80%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	300	310	**Clay (80%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	310	320	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	320	330	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	330	340	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	340	350	**Clay (70%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	350	360	**Clay (45%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/10/2008	360	370	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1 mm, sub-rounded to sub-angular
7/10/2008	370	380	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1-2 mm, sub-rounded to sub-angular
7/10/2008	380	390	**Shell Fragments (45%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (10%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	390	400	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (15%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	400	410	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained
7/10/2008	410	420	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained; Silty Clay (5%) - dusky yellow green (5GY 5/2), very poor to no cohesion
7/10/2008	420	430	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained
7/10/2008	430	440	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained
7/10/2008	440	450	**Sandy Clay (40%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/10/2008	450	460	**Sandy Clay (45%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (25%) - Unconsolidated shell fragments and pieces, Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	460	470	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	470	480	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor to moderate cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	480	490	**Sandy Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	490	500	**Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/14/2008	500	510	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/14/2008	510	520	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/15/2008	520	530	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/15/2008	530	540	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	540	550	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	550	560	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	560	570	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	570	580	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	580	590	**Clay (75%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/17/2008	590	600	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	600	610	**Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	610	620	**Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/21/2008	620	630	Clay (70%) - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	630	640	*Clay (70%) - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	640	650	*Clay (70%) - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/23/2008	650	660	*Clay (60%) - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (10%) - medium to fine grained
7/23/2008	660	670	*Clay (60%) - pale olive (10Y 6/2), well to moderate cohesion; Limestone (35%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	670	680	*Clay (70%) - pale olive (10Y 6/2), well to moderate cohesion; Limestone (25%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	680	690	*Limestone (55%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (30%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (15%) - fine grained to3mm
7/23/2008	690	700	*Limestone (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm
7/23/2008	700	710	*Limestone (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm
7/23/2008	710	720	*Limestone - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky.
	720	730	
	730	740	
	740	750	
	750	760	

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

	760	770	
	770	780	
	780	790	

*Due to drill bit configuration, lithologic sample collected may not be completely representative of noted depth interval.

ft. bls = feet below land surface

Boyle Engineering
2000 Palm Beach Lakes Boulevard, Suite 600, West Palm Beach, FL 33409
T 561.684.3375 F 561.689.8631 www.boyle.aecom.com

August 4, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.5 – July 28, 2008 through August 3, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the fifth week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The construction and related activities that transpired during the fifth week related to OKF-106 (UFA-MW1) are summarized below:

- Reamed the bottom 30 feet of the nominal 12-inch diameter borehole to a depth of 720 feet bls via the mud rotary method.
- Installed the 10-inch diameter Certa-lok PVC well casing to 717 feet bls.
- Cemented the 10-inch diameter Certa-lok PVC well casing to surface in three stages.
- Set up for reverse air drilling
- No drilling or testing activities were conducted on Saturday August 2nd or Sunday August 3rd.

Work scheduled for the next report period:

The Contractor will continue to set up for reverse air drilling. This will include trenching and piping a formation water discharge line from the well head to the on site retention pond. The Contractor will then drill out the cement plug located at the bottom of the 10-inch diameter Certa-lok PVC well casing to 720 ft bls via reverse air drilling. Close attention to the drill cuttings will then be taken, as the nominal 8-inch borehole is further advanced, to select a competent rock interval to obtain the full diameter core which is currently proposed at 730 to 740 ft bls. Once the full diameter core is retrieved, the nominal 8-inch borehole will be advanced to the total well depth of approximately 770 ft bls. To achieve the desired artesian flow of 150 to 200 gpm, borehole advancement to a maximum depth of 800 ft bls may be required.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett, P.G.
Senior Hydrogeologist

Enclosures: Engineer's Daily Field Reports
Lithologic Descriptions
Deviation Survey Data
Casing Run Summary

Distribution to Interested Parties – Weekly Summary Report No. 5

Distribution: Mark Silverman FDEP/WPB
Joseph May, FDEP/WPB
George Heuler, FDEP/TLH
Bob Verrastro, SFWMD/WPB
File

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/29/08	Day of Week: Tuesday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: N/A	Ending Depth: N/A'	Bit Size: N/A	Weather: Sunny and Warm

PRIMARY ACTIVITY: Set PVC Casing and First Lift of Cementing
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0915	Shamus English on site. ADE onsite and tripping drill pipe out of hole at time of arrival. Circulated on bottom for one hour last night and one hour this morning.
0949	Lowering first section of PVC down hole. See casing summary report for details of PVC casing run.
0951	Slip plate slightly too small. ADE to enlarge slip plate slightly.
1001	Slip plate corrected, casing run resumed.
1057	Activities temporarily halted for minor rig maintenance.
1109	Casing run continued.
1203	Attaching header flange. ADE used the one foot section they cut off bottom PVC section and glued flange on it so the header flange could be attached to casing the same way each casing section is connected.
1245	Casing set with approximately three feet of stick up so casing seating depth is approximately 617 feet bls. Shamus English off site
1345	Shamus English on site. ADE tripping down hole with two inch high pressure cement tubing for first cement lift.
1415	ADE mixing approximately 425 gallons (2yds^3) of bentonite slurry to mix with neat cement (4-6% by weight not volume).
1507	Cement tubing set at 693 feet bls. Begin circulating drilling fluids.
1515	Cemex ready-mix cement truck on site with 8 yds^3 neat cement.
1520	Pumping Bentonite slurry mix directly into barrel of cement truck to mix with neat cement.
1525	Filling 500 gallon tank with water to be used during flush. Transferring drilling fluids from circulation tank intl another roll-off tank to allow for displaced fluids during cementing operations.
1536	Pre-flush with 200 gallons of water and begin pumping cement.
1540	Cement density at 12.5 lbs/gal.
1543	Pressure at well head is 8 psi.
1546	Cement density at 13.8 lbs/gal
1548	Pressure at well is 29 psi
1544	Finished pumping cement, density at 14.0 lbs/gal. 180 gallons of water used as displacement.
1547	Finished displacement, closing valve on well head, pressure at 52 psi.
1605	ADE cleaning up. ADE to come back to site in approx. four hours to release pressure and circulate on top of plug.

1615	Shamus English off site.

Recorded By: Shamus English Date: 7/31/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 7/30/08	Day of Week: Wednesday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: N/A	Ending Depth: N/A'	Bit Size: N/A	Weather: Sunny and Warm

PRIMARY ACTIVITY: Second Lift of Cementing
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
1245	Shamus English on site. ADE on site at time of arrival and setting for cementing activities. Hard tagged at 463 ft bls from first lift.
1300	Cemex ready-mix cement truck on site with 8yds^3 of neat cement.
1310	Pumping bentonite mix into barrel of cement truck.
1319	Commenced pumping second lift. Tremmie tubing set at 442 ft bls. Cement density is 13.5 lbs/gal.
1327	Cement density is 13.2 lbs/gal.
1333	Cement pumping temporarily halted to remove four sections of tubing. Cement tubing now set at 358 ft bls.
1350	Cement density is 13.3 lbs/gal.
1402	Cement density is 13.1 lbs/gal.
1410	Finished pumping second lift. Approx. ¼ yd^3 of cement that came out of ready-mix truck already hardened and filtered before being pumped down hole was discarded. ADE cleaning up and pulling tremmie pipe out of hole.
1415	Chase land surface on site to take away some of the spent drilling fluids.
1445	Shamus English off site.

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3983
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number:	Project Name:	Client:	Date:	Day of Week:	Contractor:
17191.00	L63A	SFWMD	7/31/08	Thursday	Applied Drilling Engineering (ADE)
Well Name:	**FDEP Permit #:**	**Starting Depth:**	**Ending Depth:**	**Bit Size:**	**Weather:**
OKF-106	0198641-009-UC	N/A	N/A'	N/A	Sunny and Warm

PRIMARY ACTIVITY: Third Lift of Cementing
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
1230	Shamus English on site. ADE on site at time of arrival. ADE has begun digging trench and laying pipe for discharge to retention pond during reverse air drilling. Hard tagged at 128 ft bls from second lift. 1¼-inch tremmie tubing set at 126 ft bls.
1245	Cemex ready-mix cement truck on site with 8yds^3 of neat cement.
1250	Pumping approx. 425 gallons of bentonite mix into barrel of cement truck
1301	Commenced pumping third lift
1305	Cement density is 12.0 lbs/gal.
1310	Cement density is 12.5 lbs/gal.
1314	Cement density is 13.1 lbs/gal.
1316	Cement returns at surface, pumping halted.
1320	Per driver of cement truck there is approx 4yds^3 of cement still in barrel of truck. ADE flushing hoses and cleaning up.
1327	ADE pulling tremmie pipe out of hole.
1331	Cemex cement truck off site, emptied 4yds^3 of neat cement on ground just north of rig.
1340	Confirmed 6 sections of 1¼-inch tremmie tubing removed from hole.
1345	Shamus English off site.

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/1/2008	0	10	**Quartz Sand** - Unconsolidated, dark yellowish brown (10YR 4/2) - fine to medium grained; moderately sorted; 20% porosity
7/1/2008	10	20	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	20	30	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	30	40	**Shell Fragments (50%)** - Unconsolidated shell fragments and pieces; Quartz Sand (40%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	40	50	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	50	60	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	60	70	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, dark yellowish brown (10YR 4/2); Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	70	80	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10-15%) - approx. 1-2 mm , sub-rounded to sub-angular
7/1/2008	80	90	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular
7/7/2008	90	100	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	100	110	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - fine grained to approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	110	120	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	120	130	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/8/2008	130	140	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	140	150	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	150	160	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	160	170	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	170	180	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Clay (30%) pale olive (10Y 6/2) moderately to poorly cohesive; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	180	190	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	190	200	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	200	210	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	210	220	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	220	230	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5-10%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/9/2008	230	240	**Clay (65%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	240	250	**Clay (70%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	250	260	**Clay (90%)** - dusky yellow green (5GY 5/2), very to moderately cohesive; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	260	270	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	270	280	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	280	290	**Clay (80%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	290	300	**Clay (80%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	300	310	**Clay (80%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	310	320	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	320	330	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	330	340	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	340	350	**Clay (70%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/10/2008	350	360	**Clay (45%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/10/2008	360	370	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1 mm, sub-rounded to sub-angular
7/10/2008	370	380	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1-2 mm, sub-rounded to sub-angular
7/10/2008	380	390	**Shell Fragments (45%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (10%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	390	400	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (15%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	400	410	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained
7/10/2008	410	420	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained; Silty Clay (5%) - dusky yellow green (5GY 5/2), very poor to no cohesion
7/10/2008	420	430	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained
7/10/2008	430	440	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/10/2008	440	450	**Sandy Clay (40%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	450	460	**Sandy Clay (45%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	460	470	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	470	480	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor to moderate cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	480	490	**Sandy Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	490	500	**Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/14/2008	500	510	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/14/2008	510	520	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/15/2008	520	530	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/15/2008	530	540	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	540	550	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	550	560	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	560	570	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	570	580	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	580	590	**Clay (75%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/17/2008	590	600	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/21/2008	600	610	**Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	610	620	**Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	620	630	**Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	630	640	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	640	650	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/23/2008	650	660	***Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (10%) - medium to fine grained
7/23/2008	660	670	***Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (35%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	670	680	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (25%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	680	690	***Limestone** (55%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (30%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (15%) - fine grained to3mm
7/23/2008	690	700	***Limestone** (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/23/2008	700	710	*Limestone (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky, Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm
7/23/2008	710	720	*Limestone - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky.
	720	730	
	730	740	
	740	750	
	750	760	
	760	770	
	770	780	
	780	790	

*Due to drill bit configuration, lithologic sample collected may not be completely representative of noted depth interval.

ft. bls = feet below land surface

BOYLE

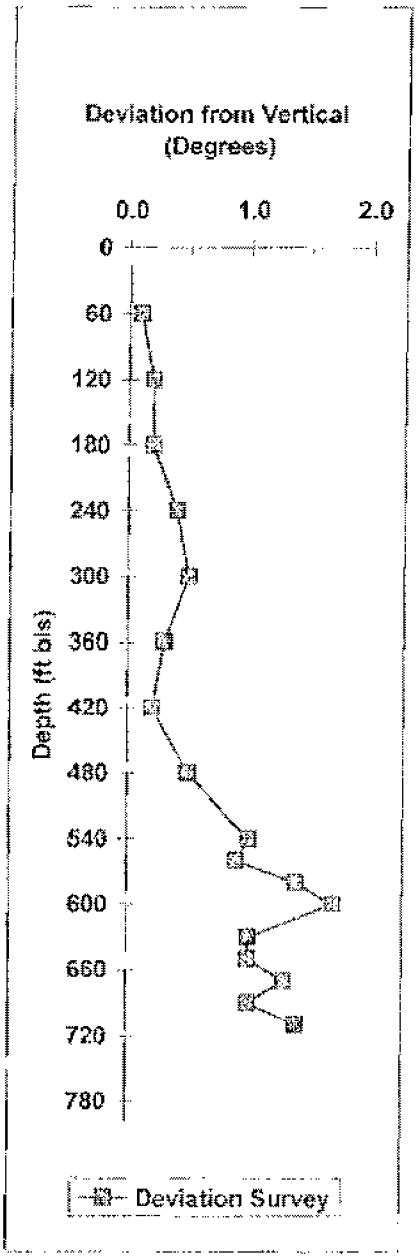
Engineering Excellence Since 1942

Deviation Survey

South Florida Water Management District
L63N - Okeechobee County

Well Number	OKF-106
Permit Number	0198641-009-UC
Job Number	17191.00

Deviation Survey		
Date	Depth (feet)	Deviation (degrees)
7/6/2008	60	0.1
7/8/2008	120	0.2
7/8/2008	180	0.2
7/9/2008	240	0.4
7/9/2008	300	0.5
7/10/2008	360	0.3
7/10/2008	420	0.2
7/10/2008	480	0.5
7/15/2008	540	1.0
7/16/2008	560	0.9
7/17/2008	580	1.4
7/17/2008	600	1.7
7/21/2008	630	1.0
7/22/2008	650	1.0
7/23/2008	670	1.3
7/23/2008	690	1.0
7/23/2008	710	1.4



BOYLE
Engineering Excellence Since 1942

Casing Summary

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0196641-009-UC
JOB NUMBER 17191.00

18-inch Diameter Steel Outer Casing

Date Installed	Time Installed	Joint #	Heat #	Length of Joint*	Cumulative Length
7/2/2008		1	GO17564	21.10	21.10
7/2/2008		2	GO17564	21.00	42.10
7/2/2008		3	GO17564	21.00	63.10
7/2/2008		4	GO17564	21.10	84.20

10-inch Diameter PVC Inner Casing

Date Installed	Time Installed	Joint #	Batch #	Length of Joint*	Cumulative Length
7/29/2008	949	1>	** 654015	19.00	19.00
7/29/2008	1005	2>	** 654015	20.00	39.00
7/29/2008	1009	3	** 654015	20.00	59.00
7/29/2008	1012	4	** 654015	20.00	79.00
7/29/2008	1015	5>	** 654015	20.00	99.00
7/29/2008	1018	6	** 654015	20.00	119.00
7/29/2008	1020	7	** 654015	20.00	139.00
7/29/2008	1022	8	** 654015	20.00	159.00
7/29/2008	1025	9	** 654015	20.00	179.00
7/29/2008	1028	10	** 654015	20.00	199.00
7/29/2008	1032	11>	** 654015	20.00	219.00
7/29/2008	1036	12	** 654015	20.00	239.00
7/29/2008	1038	13	** 654015	20.00	259.00
7/29/2008	1041	14	** 654015	20.00	279.00
7/29/2008	1044	15	** 654015	20.00	299.00
7/29/2008	1047	16	** 654015	20.00	319.00
7/29/2008	1049	17>	** 654015	20.00	339.00
7/29/2008	1054	18	** 654015	20.00	359.00
7/29/2008	1056	19	** 654015	20.00	379.00
7/29/2008	1109	20	** 654015	20.00	399.00
7/29/2008	1111	21	** 654015	20.00	419.00
7/29/2008	1114	22>	** 654015	20.00	439.00
7/29/2008	1118	23	** 654015	20.00	459.00
7/29/2008	1120	24	** 654015	20.00	479.00
7/29/2008	1123	25	** 654015	20.00	499.00
7/29/2008	1127	26	** 654015	20.00	519.00
7/29/2008	1130	27>	** 654015	20.00	539.00
7/29/2008	1134	28	** 654015	20.00	559.00
7/29/2008	1137	29	** 654015	20.00	579.00
7/29/2008	1139	30	** 654015	20.00	599.00
7/29/2008	1142	31	** 654015	20.00	619.00
7/29/2008	1146	32>	** 654015	20.00	639.00
7/29/2008	1149	33	** 654015	20.00	659.00
7/29/2008	1152	34	** 654015	20.00	679.00
7/29/2008	1154	35	** 654015	20.00	699.00
7/29/2008	1200	36>	** 654015	20.00	719.00
7/29/2008	1203	Header Flange	** 654015	1.00	720.00

Subtract 3 feet from cumulative length for stick up

PVC Casing set to 717 feet bls

* - All lengths measured in feet.
** - Certainteed 10" SDR17 Class 250 Cert-lok Well Casing IC-1 PVC ASTM F480 Batch #654015
> = Centralizer

Boyle Engineering
2090 Palm Beach Lakes Boulevard, Suite 600, West Palm Beach, FL 33409
T 561.684.3375 F 561.689.8631 www.boyle.aecom.com

August 11, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.6 – August 3, 2008 through August 10, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the sixth week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The construction and related activities that transpired during the sixth week related to OKF-106 (UFA-MW1) are summarized below;

- Continued to set up for reverse air drilling
- Drilled out the cement plug located at the bottom of the 10-inch diameter Certa-lok PVC well casing to 720 ft bls via reverse air drilling
- Advanced the nominal 8-inch borehole from 720 ft bls to the proposed depth of 730 ft bls in preparation for coring activities.
- No drilling or testing activities were conducted on Friday August 8th, Saturday August 9th or Sunday August 10th.

Work scheduled for the next report period:

Obtain the full diameter core from 730 to 740 ft bls with at least 50% recovery. Once the full diameter core is retrieved, the nominal 8-inch borehole will be advanced to the total well depth of approximately 770 ft bls. To achieve the desired artesian flow of 150 to 200 gpm, borehole advancement to a maximum depth of 800 ft bls may be required. Upon reaching the total depth, the well be will be conditioned and geophysical logging will be performed.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett, P.G.
Senior Hydrogeologist

Enclosures: Engineer's Daily Field Reports
Lithologic Descriptions
Casing Run Summary

Distribution to Interested Parties – Weekly Summary Report No. 6

Distribution: Mark Silverman FDEP/WPB
Joseph May, FDEP/WPB
George Heuler, FDEP/TLH
Bob Verrastro, SFWMD/WPB
File

BOYLE
Engineering Excellence Since 1942

3650 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63A	Client: SFWMD	Date: 8/7/08	Day of Week: Thursday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 720'	Ending Depth: 730'	Bit Size: 8"	Weather: Sunny and Warm

PRIMARY ACTIVITY: Advance Borehole to 730 ft bls
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0900	Shamus English on site. ADE on site and developing debris from rat hole at bottom of PVC Casing. Kelly down at 721.5 ft bls.
1000	Developing debris from rat hole at bottom of PVC casing.
1055	ADE performing rig repair, welding bracket on Kelly hose
1130	Begin drilling and advancing borehole
1150	Depth at 730 ft bls. Limestone appears to be hard enough to core at this interval. Notified Michael Bennett. Agreed to core interval depth fro 730 – 740 ft bls.
1300	Shamus English off site.

Recorded By: Shamus English

Date: 8/8/08

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/1/2008	0	10	**Quartz Sand** - Unconsolidated, dark yellowish brown (10YR 4/2) - fine to medium grained; moderately sorted; 20% porosity
7/1/2008	10	20	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	20	30	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	30	40	**Shell Fragments (50%)** - Unconsolidated shell fragments and pieces; Quartz Sand (40%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	40	50	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	50	60	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	60	70	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, dark yellowish brown (10YR 4/2); Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	70	80	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10-15%) - approx. 1-2 mm , sub-rounded to sub-angular
7/1/2008	80	90	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular
7/7/2008	90	100	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	100	110	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - fine grained to approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	110	120	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	120	130	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/8/2008	130	140	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	140	150	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	150	160	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	160	170	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	170	180	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Clay (30%) pale olive (10Y 6/2) moderately to poorly cohesive; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	180	190	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	190	200	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	200	210	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	210	220	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	220	230	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5-10%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/9/2008	230	240	**Clay (65%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	240	250	**Clay (70%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	250	260	**Clay (90%)** - dusky yellow green (5GY 5/2), very to moderately cohesive; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	260	270	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	270	280	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	280	290	**Clay (80%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	290	300	**Clay (80%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	300	310	**Clay (80%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	310	320	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	320	330	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	330	340	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	340	350	**Clay (70%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	350	360	**Clay (45%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/10/2008	360	370	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1 mm, sub-rounded to sub-angular
7/10/2008	370	380	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1-2 mm, sub-rounded to sub-angular
7/10/2008	380	390	**Shell Fragments (45%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (10%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	390	400	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (15%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	400	410	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained
7/10/2008	410	420	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained; Silty Clay (5%) - dusky yellow green (5GY 5/2), very poor to no cohesion
7/10/2008	420	430	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained
7/10/2008	430	440	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained
7/10/2008	440	450	**Sandy Clay (40%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/10/2008	450	460	**Sandy Clay (45%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	460	470	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	470	480	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor to moderate cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	480	490	**Sandy Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	490	500	**Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/14/2008	500	510	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/14/2008	510	520	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/15/2008	520	530	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/15/2008	530	540	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	540	550	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	550	560	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	560	570	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	570	580	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	580	590	**Clay (75%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/17/2008	590	600	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	600	610	**Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	610	620	**Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

7/21/2008	620	630	**Clay** (70%) - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	630	640	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	640	650	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/23/2008	650	660	***Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (10%) - medium to fine grained
7/23/2008	660	670	***Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (35%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	670	680	*Clay (70%) - pale olive (10Y 6/2), well to moderate cohesion; Limestone (25%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	680	690	***Limestone** (55%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (30%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (15%) - fine grained to3mm
7/23/2008	690	700	***Limestone** (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm
7/23/2008	700	710	***Limestone** (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm
7/23/2008	710	720	***Limestone** - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky.
8/7/2008	720	730	**Limestone** - Very pale orange (10 YR 8/2), calcarenite, moderately indurated, low intergranular macroporosity, lepidocyclina sp. present, turritella and other fossill shells evedint
	730	740	
	740	750	

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

	750	760	
	760	770	
	770	780	
	780	790	

*Due to drill bit configuration, lithologic sample collected may not be completely representative of noted depth interval.

ft. bls = feet below land surface

BOYLE
Engineering Excellence Since 1942

Casing Summary

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0196841-009-UC
JOB NUMBER 17191.60

18-inch Diameter Steel Outer Casing

Date Installed	Time Installed	Joint #	Heat #	Length of Joint*	Cumulative Length
7/2/2008		1	GO17564	21.10	21.10
7/2/2008		2	GO17584	21.00	42.10
7/2/2008		3	GO17564	21.00	63.10
7/2/2008		4	GO17564	21.10	84.20

10-inch Diameter PVC Inner Casing

Date Installed	Time Installed	Joint #	Batch #	Length of Joint*	Cumulative Length
7/29/2008	949	1>	** 654015	19.00	19.00
7/29/2008	1006	2>	** 654015	20.00	39.00
7/29/2008	1009	3	** 654015	20.00	59.00
7/29/2008	1012	4	** 654015	20.00	79.00
7/29/2008	1015	5>	** 654015	20.00	99.00
7/29/2008	1018	6	** 654015	20.00	119.00
7/29/2008	1020	7	** 654015	20.00	139.00
7/29/2008	1023	8	** 654015	20.00	159.00
7/29/2008	1025	9	** 654015	20.00	179.00
7/29/2008	1028	10	** 654015	20.00	199.00
7/29/2008	1032	11>	** 654015	20.00	219.00
7/29/2008	1036	12	** 654015	20.00	239.00
7/29/2008	1038	13	** 654015	20.00	259.00
7/29/2008	1041	14	** 654015	20.00	279.00
7/29/2008	1044	15	** 654015	20.00	299.00
7/29/2008	1047	16	** 654015	20.00	319.00
7/29/2008	1049	17>	** 654015	20.00	339.00
7/29/2008	1054	18	** 654015	20.00	359.00
7/29/2008	1058	19	** 654015	20.00	379.00
7/29/2008	1109	20	** 654015	20.00	399.00
7/29/2008	1111	21	** 654015	20.00	419.00
7/29/2008	1114	22>	** 654015	20.00	439.00
7/29/2008	1118	23	** 654015	20.00	459.00
7/29/2008	1120	24	** 654015	20.00	479.00
7/29/2008	1123	25	** 654015	20.00	499.00
7/29/2008	1127	26	** 654015	20.00	519.00
7/29/2008	1130	27>	** 654015	20.00	539.00
7/29/2008	1134	28	** 654015	20.00	559.00
7/29/2008	1137	29	** 654015	20.00	579.00
7/29/2008	1139	30	** 654015	20.00	599.00
7/29/2008	1142	31	** 654015	20.00	619.00
7/29/2008	1146	32>	** 654015	20.00	639.00
7/29/2008	1149	33	** 654015	20.00	659.00
7/29/2008	1152	34	** 654015	20.00	679.00
7/29/2008	1154	35	** 654015	20.00	699.00
7/29/2008	1200	36>	** 654015	20.00	719.00
7/29/2008	1205	Header Flange	** 654015	1.00	720.00

Subtract 3 feet from cumulative length for stick up

PVC Casing set to 717 feet bls

* - All lengths measured in feet.
** - Centerlock 10" SDR17 Class 250 Certi-lok Well Casing IC-1 PVC ASTM F480 Batch #654015
> # Centralizer

Boyle Engineering
2000 Palm Beach Lakes Boulevard, Suite 600, West Palm Beach, FL 33409
T 561.684.3375 F 561.689.8531 www.boyle-aecom.com

August 19, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.7 – August 11, 2008 through August 17, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the seventh week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The construction and related activities that transpired during the seventh week related to OKF-106 (UFA-MW1) are summarized below;

- Obtained the full diameter core from 730 to 740 ft bls with 80% recovery
- Advanced a nominal 8-inch borehole to the total well depth of 800 ft bls.
- Cleaned up site for demobilization.
- No drilling or testing activities were conducted on Saturday August 16th or Sunday August 17th.

Work scheduled for the next report period:

Due to tropical storm event, activities may be postponed until later in the week. The Contractors will continue to clean up site and restore to conditions prior to drilling activities, begin to construct the well head, and conduct pump test with flow rates to be determined.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett, P.G.
Senior Hydrogeologist

Enclosures:
Engineer's Daily Field Reports
Lithologic Descriptions
Core Description
Core Pipe Tally
8", 12", and 17" Pipe Tally's
Water Quality with Depth
Deviation Survey Data

Distribution to Interested Parties – Weekly Summary Report No. 7

Distribution: Mark Silvermau FDEP/WPB
Joseph May, FDEP/WPB
George Heuler, FDEP/TLH
Bob Verrastro, SFWMD/WPB
File

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number:	Project Name:	Client:	Date:	Day of Week:	Contractor:
17191.00	L63N	SFWMD	8/12/08	Tuesday	Applied Drilling Engineering (ADE)
Well Name:	**FDEP Permit #:**	**Starting Depth:**	**Ending Depth:**	**Bit Size:**	**Weather:**
OKF-106	0198641-009-UC	N/A	N/A	N/A	Sunny and Warm

PRIMARY ACTIVITY: Core Interval 730-740 ft bls
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
1400	Shamus English on site. ADE on site and setting up for coring at time of arrival. Core barrel is on bottom, Christianson saw bit. 6" barrel cuts 4" core.
1424	Commenced coring at 730 ft bls.
1435	At 740 ft bls, finished coring. ADE disconnecting Kelly from drill pipe.
1444	ADE tripping pipe to surface.
1605	Core barrel at surface, retrieval of core temporarily halted due to rain event.
1619	Retrieval of core resumed.
1655	Recovered 80% of core interval, mostly rubble with two sections that are 7.5 inches.
1730	Shamus English off site. Marked depths on core box. Due to heavy rain, core will be described tomorrow.

Recorded By: Shamus English

Date: 8/15/08

BOYLE
Engineering Excellence Since 1942

3550 S.W. Corporate Parkway
Palm City, Florida 34990
(561) 286-3883
FAX (561) 286-3925

DAILY REPORT OF CONSTRUCTION

Project Number: 17191.00	Project Name: L63N	Client: SFWMD	Date: 8/13/08	Day of Week: Wednesday	Contractor: Applied Drilling Engineering (ADE)
Well Name: OKF-106	FDEP Permit #: 0198641-009-UC	Starting Depth: 730'	Ending Depth: 800'	Bit Size: 8"	Weather: Sunny and Warm

PRIMARY ACTIVITY: Advance Borehole to 800 ft bls
RESIDENT OBSERVER/GEOLOGIST: Shamus English
DRILLER: Joe Schmidt

Time	Activity
0915	Shamus English on site. ADE on site and drilling at time of arrival. Depth at about 755 ft bls. Artesian flow rate at 740 ft bls was 80 gpm. WQ at 740 ft bls. pH - 7.69 S.U., Temp – 30.1 °C, Cond. – 2,680 µS, TDS – 1,340 ppm.
0922	Kelly down at 760 ft bls, circulating on bottom. WQ at 760 ft bls. pH – 8.15 S.U., Temp – 28.7°C, Cond. – 2,700 µS, TDS – 1,350 ppm. Artesian flow at 760 ft bls – 92 gpm
1006	Drilling resumed at 760 ft bls, will stop at 770 ft bls to check flow rate.
1017	Drilling halted at 770 ft bls to get flow rate.
1030	WQ at 770 ft bls. pH – 7.62 S.U., Temp – 27.1°C, Cond. – 2,710 µS, TDS – 1,360 ppm. Artesian flow at 760 ft bls – 92 gpm
1035	Drilling resumed at 770 ft bls
1047	Kelly down at 780 ft bls, circulating on bottom.
1100	WQ at 780 ft bls. pH – 8.07 S.U., Temp – 27.1°C, Cond. – 2,720 µS, TDS – 1,360 ppm. Artesian flow at 780 ft bls – 95 gpm
1105	Drilling resumed at 780 ft bls.
1135	Kelly down at 800 ft bls.
1150	WQ at 800 ft bls. pH – 8.16 S.U., Temp – 27.0°C, Cond. – 2,700 µS, TDS – 1,360 ppm. Artesian flow at 800 ft bls – 100 gpm
1215	Shamus English off site. After lunch ADE will circulate on bottom for approx. two hours before tripping out of hole.

Recorded By: Shamus English Date: 8/15/08

BOYLE

Engineering Excellence Since 1942

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/1/2008	0	10	**Quartz Sand** - Unconsolidated, dark yellowish brown (10YR 4/2) - fine to medium grained; moderately sorted; 20% porosity
7/1/2008	10	20	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	20	30	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	30	40	**Shell Fragments (50%)** - Unconsolidated shell fragments and pieces; Quartz Sand (40%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	40	50	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	50	60	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	60	70	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, dark yellowish brown (10YR 4/2); Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	70	80	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10-15%) - approx. 1-2 mm , sub-rounded to sub-angular
7/1/2008	80	90	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular
7/7/2008	90	100	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	100	110	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - fine grained to approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	110	120	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	120	130	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular

Date	Depth (ft. bls) From	To	Observer's Description
7/8/2008	130	140	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	140	150	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	150	160	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	160	170	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	170	180	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Clay (30%) pale olive (10Y 6/2) moderately to poorly cohesive; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	180	190	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	190	200	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	200	210	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	210	220	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	220	230	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5-10%) - fine grained
7/9/2008	230	240	**Clay (65%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	240	250	**Clay (70%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	250	260	**Clay (90%)** - dusky yellow green (5GY 5/2), very to moderately cohesive; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	260	270	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	270	280	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained

Date	Depth (ft. bls) From	To	Observer's Description
7/9/2008	280	290	**Clay (80%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	290	300	**Clay (80%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	300	310	**Clay (80%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	310	320	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	320	330	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	330	340	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	340	350	**Clay (70%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	350	360	**Clay (45%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/10/2008	360	370	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1 mm, sub-rounded to sub-angular
7/10/2008	370	380	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1-2 mm, sub-rounded to sub-angular
7/10/2008	380	390	**Shell Fragments (45%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (10%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	390	400	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (15%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	400	410	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained
7/10/2008	410	420	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained; Silty Clay (5%) - dusky yellow green (5GY 5/2), very poor to no cohesion
7/10/2008	420	430	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained, Phosphate (5%) - medium to fine grained
7/10/2008	430	440	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained

Date	Depth (ft. bls) From	To	Observer's Description
7/10/2008	440	450	**Sandy Clay (40%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	450	460	**Sandy Clay (45%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	460	470	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	470	480	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor to moderate cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	480	490	**Sandy Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	490	500	**Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/14/2008	500	510	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/14/2008	510	520	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/15/2008	520	530	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/15/2008	530	540	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	540	550	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	550	560	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained

Date	Depth (ft. bls) From	To	Observer's Description
7/17/2008	560	570	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	570	580	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	580	590	**Clay (75%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/17/2008	590	600	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	600	610	**Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	610	620	**Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	620	630	**Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	630	640	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	640	650	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/23/2008	650	660	***Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (10%) - medium to fine grained
7/23/2008	660	670	***Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (35%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	670	680	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (25%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	680	690	***Limestone** (55%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (30%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (15%) - fine grained to3mm
7/23/2008	690	700	***Limestone** (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm
7/23/2008	700	710	***Limestone** (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm

Date	Depth (ft. bls) From	To	Observer's Description
7/23/2008	710	720	*__Limestone__ - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky.
8/7/2008	720	730	**Limestone** - Very pale orange (10 YR 8/2), moderately indurated, calcarenitic, low intergranular macroporosity, *lepidocyclina sp* . present, turritella and other shells pieces and fragments evident
8/13/2008	730	740	**Limestone** - Very pale orange (10 YR 8/2) to light gray (N8), moderately to poorly indurated, calcarenitic, moderate macroporosity (mostly moldic and intergranular), *lepidocyclina sp* . present, abundent shell pieces and fragments
8/13/2008	740	750	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.
8/13/2008	750	760	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.
8/13/2008	760	770	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.
8/13/2008	770	780	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.
8/13/2008	780	790	**Limestone** - Very pale orange (10 YR 8/2), moderately to poorly indurated, calcarenitic, moderately friable, abundant *lepidocyclina sp* . present.
8/13/2008	790	800	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.

*Due to drill bit configuration, lithologic sample collected may not be completely representative of noted depth interval.

ft. bls = feet below land surface

BOYLE

Engineering Excellence Since 1942

CORE DESCRIPTION

South Florida Water Management District
L63N-Okeechobee County

DATE	8-12-08
WELL NUMBER	OKF-106
PERMIT NUMBER	0198641-009-UC
JOB NUMBER	17191.00
CORE NUMBER	1
DIAMETER	4 inch
CORED INTERVAL	730 – 740 ft
LENGTH OF SAMPLE	8 ft
PERCENT RECOVERED	80%

DEPTH (ft bls)	INTERVAL (ft)	DESCRIPTION
730 – 732.75	0 - 2.75	Limestone: very pale orange 10 YR 8/2, biomicrite; moderately indurated, calcarenitic, slightly friable, vuggy, good macroporosity (mostly moldic and intergranular), *lepidocyclina sp.* present, abundant shell pieces and fragments.
732.75 – 737.5	2.75 – 7.5	Limestone: very pale orange 10 YR 8/2 to light gray N8, biomicrite; moderately to poorly indurated, calcarenitic, moderately friable, vuggy, good to moderate macroporosity (mostly moldic and intergranular), *lepidocyclina sp.* present, abundant shell pieces and fragments.
737.5 – 8.0	7.5 – 8.0	Limestone: very pale orange 10 YR 8/2, biomicrite; moderately to poorly indurated, calcarenitic, moderately friable, slightly vuggy, moderate to poor macroporosity (mostly intergranular), *lepidocyclina sp.* present, shell pieces and fragments evident.

BOYLE

Engineering Excellence Since 1942

CORE PIPE TALLY

South Florida Water Management District
L63N Site - Okeechobee County

DATE:	8/12/2008
WELL NAME:	OKF-106
PERMIT NUMBER:	0198641-009-UC
JOB NUMBER:	17191.000000
OPERATION:	4-INCH CORE
CORE INTERVAL:	730 - 740 FT BLS
BIT TYPE:	CHRISTIANSON SAW BIT

ITEM	PIPE #	LENGTH	STRING LENGTH	KELLY DOWN	DATE
Core bit assembly		13.25			
Drill Pipe	1	20.00	33.25		
Drill Pipe	2	20.00	53.25		
Drill Pipe	3	20.00	73.25		
Drill Pipe	4	20.00	93.25		
Drill Pipe	5	20.00	113.25		
Drill Pipe	6	20.00	133.25		
Drill Pipe	7	20.00	153.25		
Drill Pipe	8	20.00	173.25		
Drill Pipe	9	20.00	193.25		
Drill Pipe	10	20.00	213.25		
Drill Pipe	11	20.00	233.25		
Drill Pipe	12	20.00	253.25		
Drill Pipe	13	20.00	273.25		
Drill Pipe	14	20.00	293.25		
Drill Pipe	15	20.00	313.25		
Drill Pipe	16	20.00	333.25		
Drill Pipe	17	20.00	353.25		
Drill Pipe	18	20.00	373.25		
Drill Pipe	19	20.00	393.25		
Drill Pipe	20	20.00	413.25		
Drill Pipe	21	20.00	433.25		
Drill Pipe	22	20.00	453.25		
Drill Pipe	23	20.00	473.25		
Drill Pipe	24	20.00	493.25		
Drill Pipe	25	20.00	513.25		
Drill Pipe	26	20.00	533.25		
Drill Pipe	27	20.00	553.25		
Drill Pipe	28	20.00	573.25		
Drill Pipe	29	20.00	593.25		
Drill Pipe	30	20.00	613.25		
Drill Pipe	31	20.00	633.25		

ITEM	PIPE #	LENGTH	STRING LENGTH	KELLY DOWN	DATE
Drill Pipe	32	20.00	653.25		
Drill Pipe	33	20.00	673.25		
Drill Pipe	34	20.00	693.25		
Drill Pipe	35	20.00	713.25		
Drill Pipe	36	20.00	733.25	753	

BOYLE
Engineering Excellence Since 1942

17" DRILL PIPE TALLY

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME	**OKF-106**
PERMIT NUMBER	**0198641-009-UC**
JOB NUMBER	**17191.00**

ITEM	PIPE #	LENGTH (ft)	STRING LENGTH (ft)	KELLY DOWN (ft bls)	DATE
Drill Bit - 17"	B1	2.42	2.42		
Collar #1 (6")	C1	14.00	16.42		
Bit #2 (17")	B2	3.17	19.59		
Collar #2 (8") w/sub	C2	16.92	36.51		
Collar #3 (6")	C3	20.0	56.51		
Drill Pipe	1	20.0	76.51	96.5	07/07/08
Drill Pipe	2	20.0	96.51	116.5	07/07/08
Drill Pipe	3	20.0	116.51	136.5	07/08/08
Drill Pipe	4	20.0	136.51	156.5	07/08/08
Drill Pipe	5	20.0	156.51	176.5	07/08/08
Drill Pipe	6	20.0	176.51	196.5	07/08/08
Drill Pipe	7	20.0	196.51	216.5	07/08/08
Drill Pipe	8	20.0	216.51	236.5	07/08/08
Drill Pipe	9	20.0	236.51	256.5	07/08/08
Drill Pipe	10	20.0	256.51	276.5	07/09/08
Drill Pipe	11	20.0	276.51	296.5	07/09/08
Drill Pipe	12	20.0	296.51	316.5	07/09/08
Drill Pipe	13	20.0	316.51	336.5	07/09/08
Drill Pipe	14	20.0	336.51	356.5	07/10/08
Drill Pipe	15	20.0	356.51	376.5	07/10/08
Drill Pipe	16	20.0	376.51	396.5	07/10/08
Drill Pipe	17	20.0	396.51	416.5	07/10/08
Drill Pipe	18	20.0	416.51	436.5	07/10/08
Drill Pipe	19	20.0	436.51	456.5	07/10/08
Drill Pipe	20	20.0	456.51	476.5	07/10/08
Drill Pipe	21	20.0	476.51	496.5	07/11/08
Drill Pipe	22	20.0	496.51	516.5	07/14/08
Drill Pipe	23	20.0	516.51	536.5	07/15/08
Drill Pipe	24	20.0	536.51	556.5	07/16/08
Drill Pipe	25	20.0	556.51	576.5	07/16/08
Drill Pipe	26	20.0	576.51	596.5	07/17/08
Changed drill bit assembly, see 12" pipe tally					

BOYLE
Engineering Excellence Since 1942

12" DRILL PIPE TALLY w/ 17" CHASER/REAMER BIT

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME	OKF-106
PERMIT NUMBER	0198641-009-UC
JOB NUMBER	17191.00

ITEM	PIPE #	LENGTH (ft)	STRING LENGTH (ft)	KELLY DOWN (ft bls)	DATE
Drill Bit - 12¼"	B1	1.00	1.00		
Collar #1	C1	14.34	15.34		
Collar #2	C2	14.00	29.34		
Drill Bit #2 - 17"	B2	3.83	33.17		
Collar #3	C3	13.4	46.59		
Sub	S1	2.6	49.17		
Collar #4	C4	20.0	69.17		
Drill Pipe	1	20.0	89.17		
Drill Pipe	2	20.0	109.17		
Drill Pipe	3	20.0	129.17		
Drill Pipe	4	20.0	149.17		
Drill Pipe	5	20.0	169.17		
Drill Pipe	6	20.0	189.17		
Drill Pipe	7	20.0	209.17		
Drill Pipe	10	20.0	269.17		
Drill Pipe	11	20.0	289.17		
Drill Pipe	12	20.0	309.17		
Drill Pipe	13	20.0	329.17		
Drill Pipe	14	20.0	349.17		
Drill Pipe	15	20.0	369.17		
Drill Pipe	16	20.0	389.17		
Drill Pipe	17	20.0	409.17		
Drill Pipe	18	20.0	429.17		
Drill Pipe	19	20.0	449.17		
Drill Pipe	20	20.0	469.17		
Drill Pipe	21	20.0	489.17		
Drill Pipe	22	20.0	509.17		
Drill Pipe	23	20.0	529.17		
Drill Pipe	24	20.0	549.17		
Drill Pipe	25	20.0	569.17		
Drill Pipe	26	20.0	589.17	609.2	07/21/08
Drill Pipe	27	20.0	609.17	629.2	07/21/08
Drill Pipe	28	20.0	629.17	649.2	07/22/08
Drill Pipe	29	20.0	649.17	669.2	07/23/08
Drill Pipe	30	20.0	669.17	689.2	07/23/08
Drill Pipe	31	20.0	689.17	709.2	07/23/08
Drill Pipe	32	20.0	709.17	729.2	07/23/08
Used 8" drill bit to TD, see 8" pipe tally					

BOYLE

Engineering Excellence Since 1942

8" DRILL PIPE TALLY

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME	OKF-105
PERMIT NUMBER	0198641-009-UC
JOB NUMBER	17191.00

ITEM	PIPE #	LENGTH (ft)	STRING LENGTH (ft)	KELLY DOWN (ft bls)	DATE
8" Drill Bit w/Sub	B1	2.00	2.00		
6" Collar	C1	20.0	22.00		
Drill Pipe	1	20.0	42.00		
Drill Pipe	2	20.0	62.00		
Drill Pipe	3	20.0	82.00		
Drill Pipe	4	20.0	102.00		
Drill Pipe	5	20.0	122.00		
Drill Pipe	6	20.0	142.00		
Drill Pipe	7	20.0	162.00		
Drill Pipe	8	20.0	182.00		
Drill Pipe	9	20.0	202.00		
Drill Pipe	10	20.0	222.00		
Drill Pipe	11	20.0	242.00		
Drill Pipe	12	20.0	262.00		
Drill Pipe	13	20.0	282.00		
Drill Pipe	14	20.0	302.00		
Drill Pipe	15	20.0	322.00		
Drill Pipe	16	20.0	342.00		
Drill Pipe	17	20.0	362.00		
Drill Pipe	18	20.0	382.00		
Drill Pipe	19	20.0	402.00		
Drill Pipe	20	20.0	422.00		
Drill Pipe	21	20.0	442.00		
Drill Pipe	22	20.0	462.00		
Drill Pipe	23	20.0	482.00		
Drill Pipe	24	20.0	502.00		
Drill Pipe	25	20.0	522.00		
Drill Pipe	26	20.0	542.00		
Drill Pipe	27	20.0	562.00		
Drill Pipe	28	20.0	582.00		
Drill Pipe	29	20.0	602.00		
Drill Pipe	30	20.0	622.00		
Drill Pipe	31	20.0	642.00		
Drill Pipe	32	20.0	662.00		
Drill Pipe	33	20.0	682.00		
Drill Pipe	34	20.0	702.00		
Drill Pipe	35	20.0	722.00	742.0	08/13/08
Drill Pipe	36	20.0	742.00	762.0	08/13/08
Drill Pipe	37	20.0	762.00	782.0	08/13/08
Drill Pipe	38	20.0	782.00	802.0	08/13/08

BOYLE

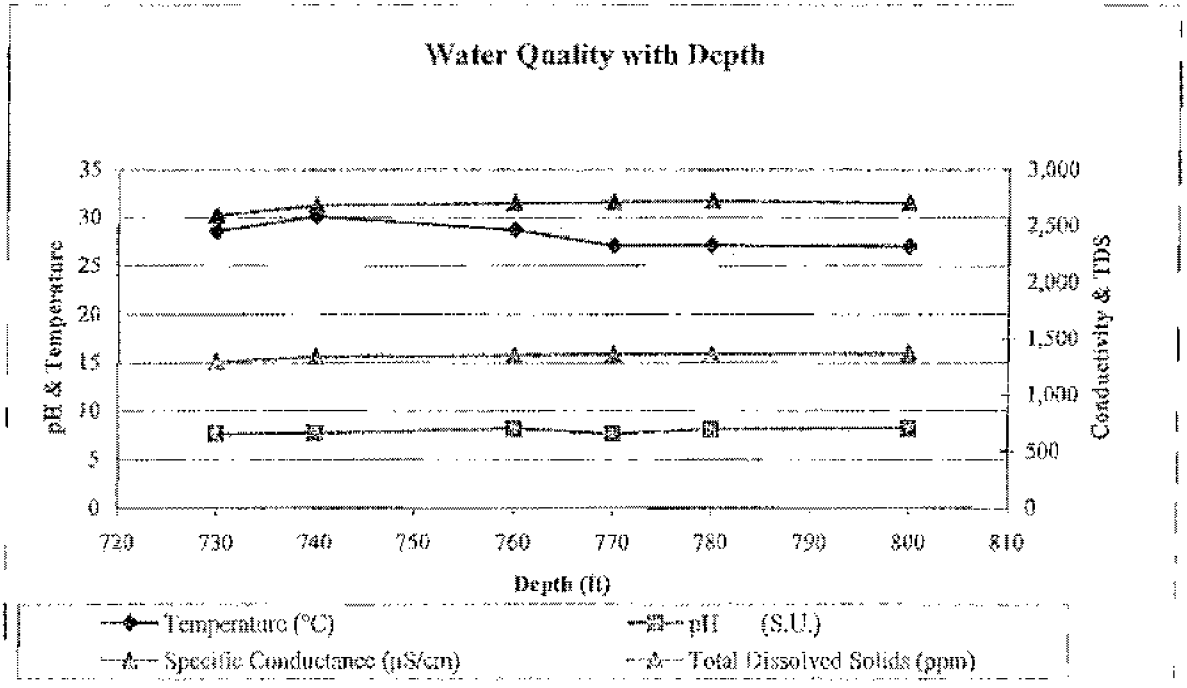
Engineering Excellence Since 1942

Water Quality with Depth

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-106
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Depth (ft bls)	Temperature (°C)	pH (S.U.)	Specific Conductance (µS/cm)	Total Dissolved Solids (ppm)	Comments
730	28.6	7.63	2,590	1,290	
740	30.1	7.69	2,680	1,340	
760	28.7	8.15	2,700	1,350	
770	27.1	7.62	2,710	1,360	
780	27.1	8.07	2,720	1,360	
800	27.0	8.16	2,700	1,360	



BOYLE

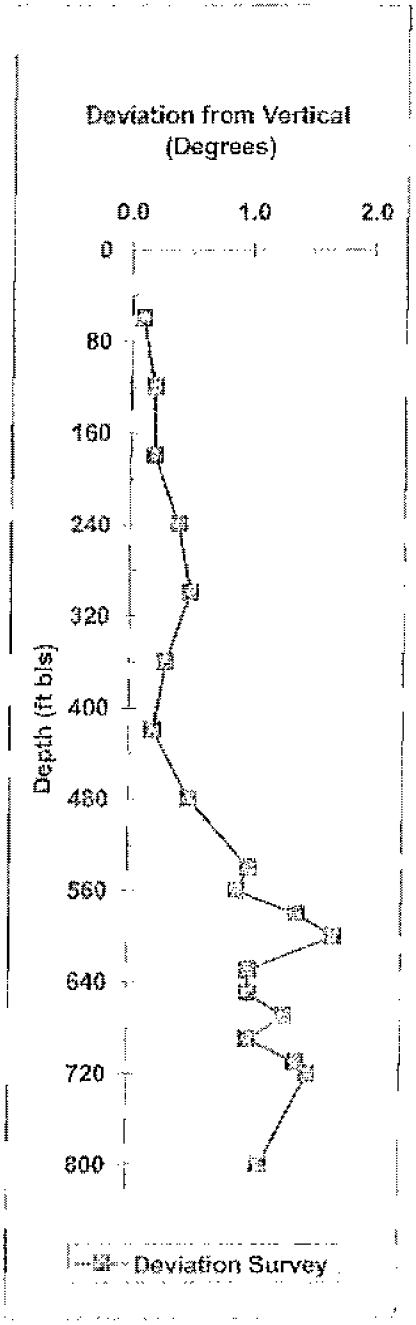
Engineering Excellence Since 1942

Deviation Survey

South Florida Water Management District
L63N - Okeechobee County

Well Number	OKF-106
Permit Number	0198641-009-UC
Job Number	17191.00

Deviation Survey		
Date	Depth (feet)	Deviation (degrees)
7/8/2008	60	0.1
7/8/2008	120	0.2
7/8/2008	180	0.2
7/9/2008	240	0.4
7/9/2008	300	0.5
7/10/2008	360	0.3
7/10/2008	420	0.2
7/10/2008	480	0.5
7/15/2008	540	1.0
7/16/2008	560	0.9
7/17/2008	580	1.4
7/17/2008	600	1.7
7/21/2008	630	1.0
7/22/2008	650	1.0
7/23/2008	670	1.3
7/23/2008	690	1.0
7/23/2008	710	1.4
7/28/2008	720	1.5
8/13/2008	800	1.1



Boyle Engineering
2000 Palm Beach Lakes Boulevard, Suite 800, West Palm Beach, FL 33409
T 561.684.3375 F 561.689.8531 www.boyle.aecom.com

August 25, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.8 – August 18, 2008 through August 24, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the eighth week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The construction and related activities that transpired during the eighth week related to OKF-106 (UFA-MW1) are summarized below;

- Completed well head, well pad, & surface facilities and met substantial completion component of the contract with the SFWMD on Thursday, August 21, 2008.
- Continued demobilization and site restoration.
- No drilling or testing activities were conducted on Monday August 18th, Tuesday August 19th, Saturday August 23rd or Sunday August 24th.

Work scheduled for the next report period:

The Contractors will develop the well while monitoring the sand content via a Rosem Sand Tester. Upon reaching the desired sand content of less than 5 mg/L after a hour period, the Contractor will set up for and conduct step test (4 steps) and an 8-hour drawdown test. Water quality samples will be collected for major cation and anion analysis along with primary and secondary drinking water criteria analysis. The Contractor will also continue to perform demobilization and site restoration.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett, P.G.
Senior Hydrogeologist
Boyle/AECOM

Distribution to Interested Parties – Weekly Summary Report No. 8

Distribution: Mark Silverman FDEP/WPB
Joseph May, FDEP/WPB
George Houler, FDEP/TLH
Bob Verrastro, SFWMD/WPB
File

Boyle Engineering
2090 Palm Beach Lakes Boulevard, Suite 300, West Palm Beach, FL 33409
T 561.684.3375 F 561.689.6531 www.boyle.aecom.com

September 11, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.9 – August 25, 2008 through August 31, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the ninth week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The construction and related activities that transpired during the ninth week related to OKF-106 (UFA-MW1) are summarized below;

- Completed well development.
- Conducted step test at 173 gpm, 307 gpm, and 400 gpm.
- Conducted 8-Hour drawdown test at 414 gpm.
- Collected water samples for major cation/anion and primary/secondary drinking water standard laboratory analysis
- No drilling or testing activities were conducted Saturday August 30th or Sunday August 31st.

Work scheduled for the next report period:

The Contractor will arrange for a geophysical logging company to perform a video survey and geophysical logging as specified in the technical plans and specifications. The Contractor will also continue to perform demobilization and site restoration.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett

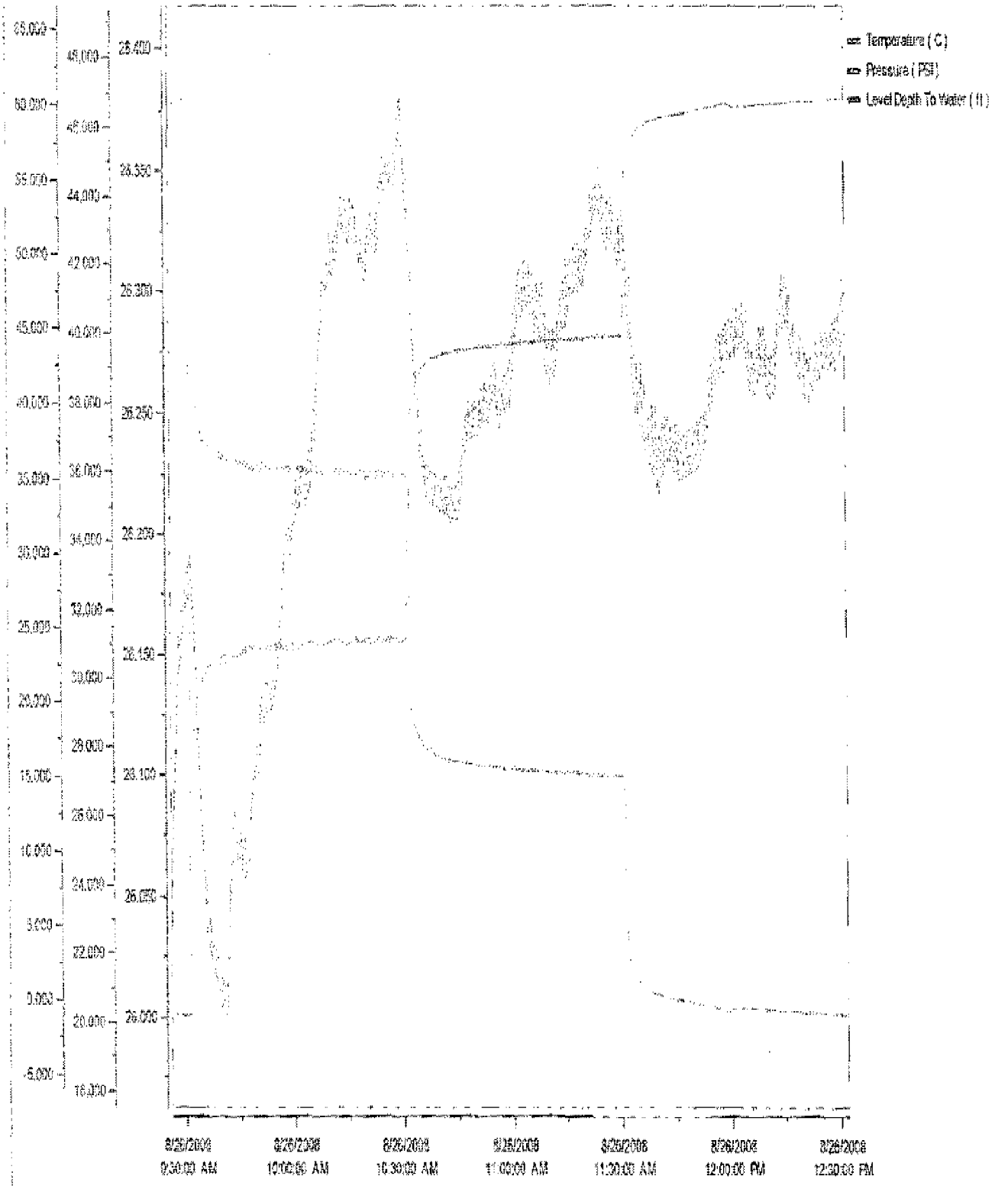
Michael W. Bennett, P.G.
Senior Hydrogeologist
Boyle [illegible]

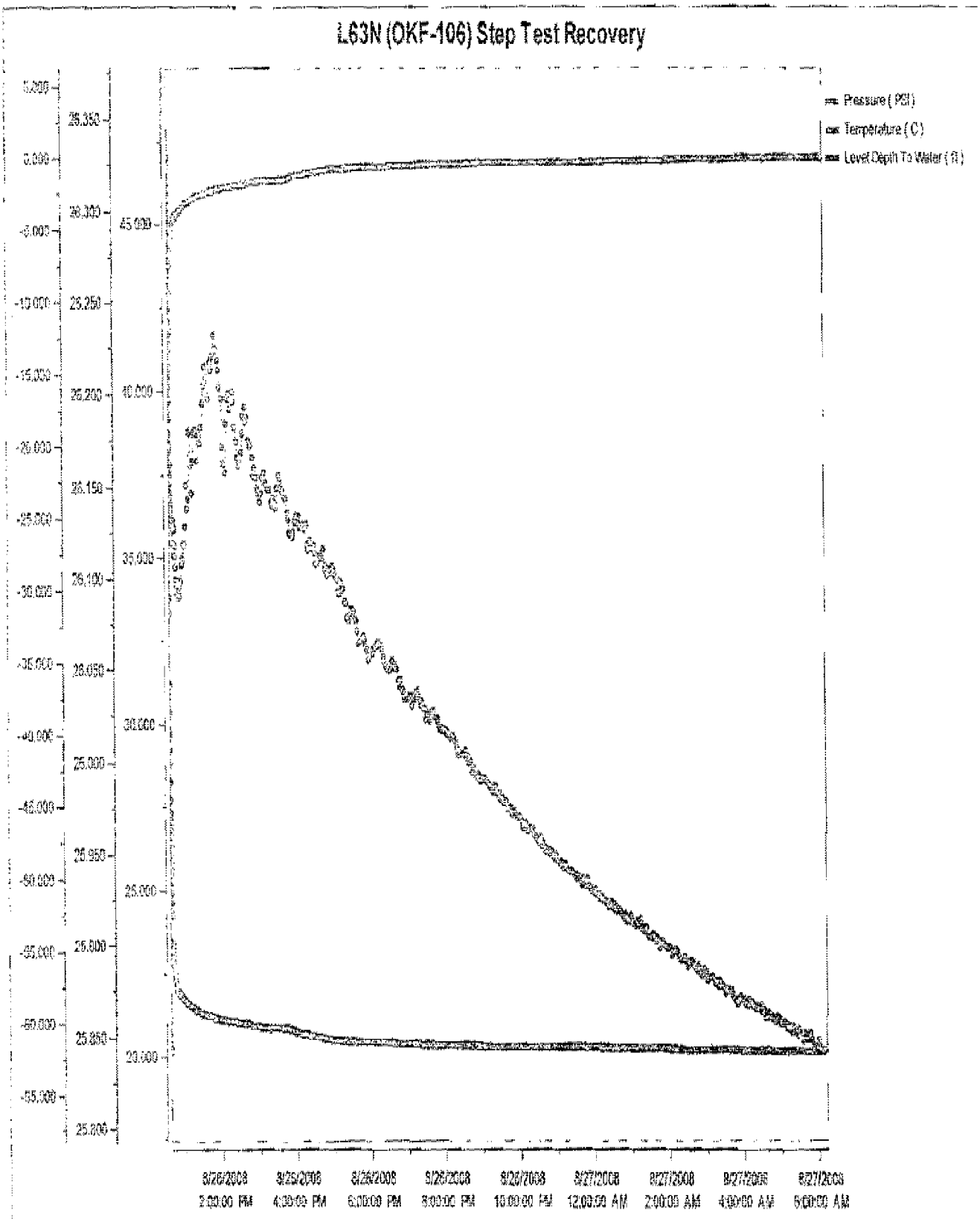
Enclosures: 8-Hour Drawdown and Step Test Graphs

Distribution to Interested Parties – Weekly Summary Report No. 9

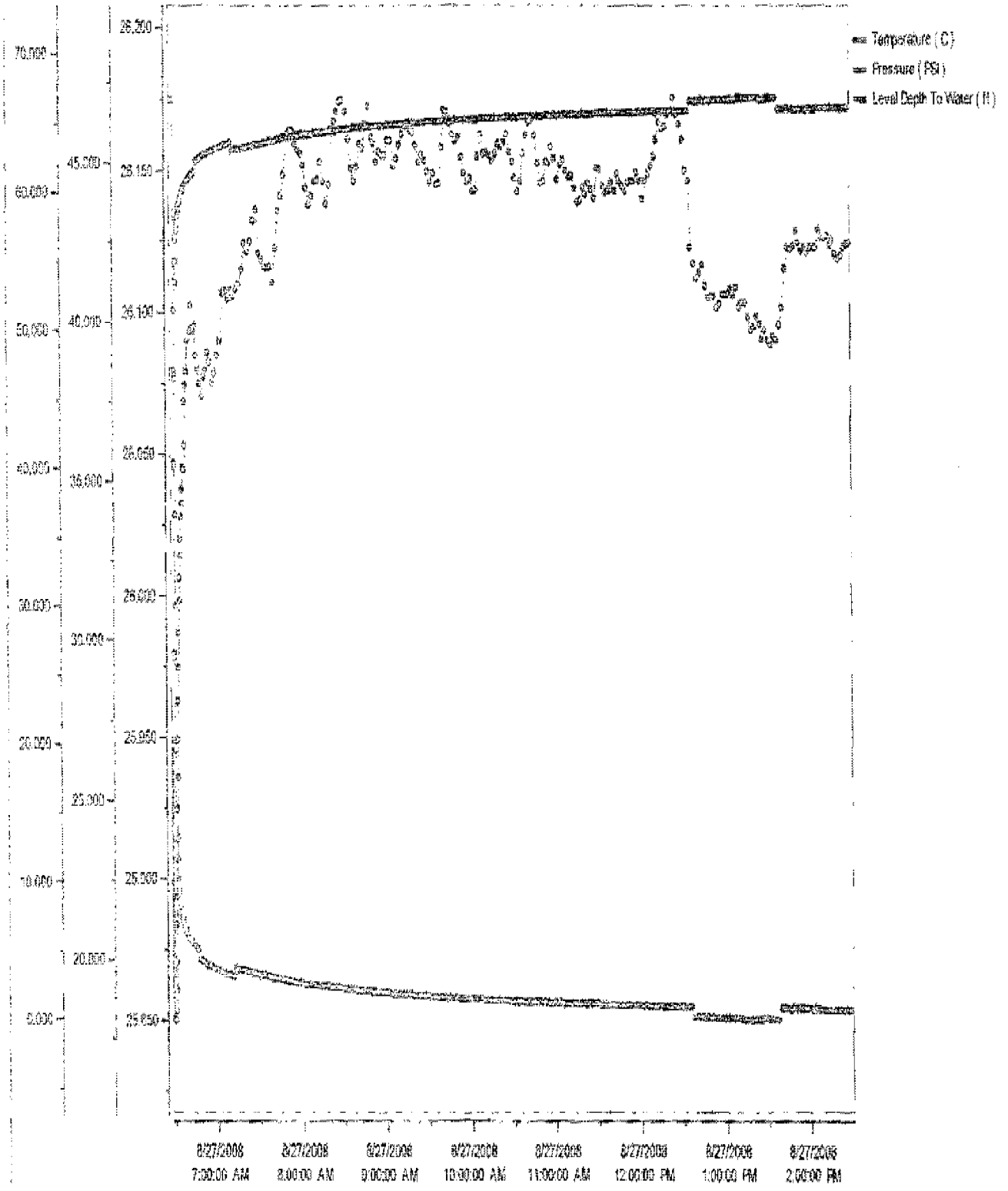
Distribution: Mark Silverman FDEP/WPB
Joseph May, FDEP/WPB
George Heuler, FDEP/TLH
Bob Verrastro, SFWMD/WPB
File

L63N (OKF-106) Step 1@173gpm, Step 2@307 gpm, Step 3@400gpm

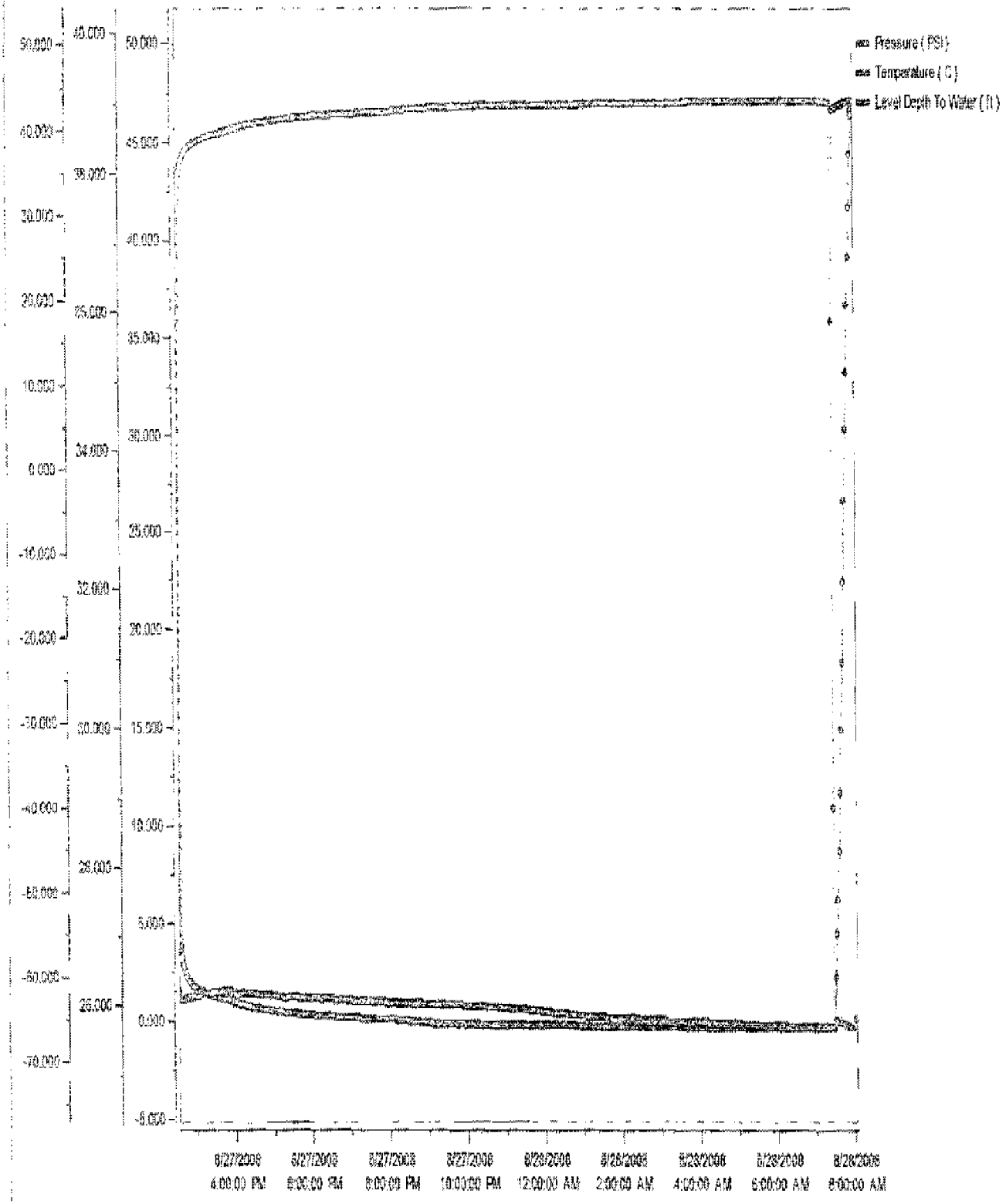



L63N (OKF-106) Step Test Recovery
Pressure (PSI)
Temperature (C)
Level Depth To Water (ft)
8/26/2008 2:00:00 PM
8/26/2008 4:00:00 PM
8/26/2008 6:00:00 PM
8/26/2008 8:00:00 PM
8/26/2008 10:00:00 PM
8/27/2008 12:00:00 AM
8/27/2008 2:00:00 AM
8/27/2008 4:00:00 AM
8/27/2008 6:00:00 AM

L63N (OKF-106) 8-Hour Drawdown Test @ 414gpm



L63N (OKF-106) 8-Hour Drawdown Recovery



Boyle Engineering
2000 Palm Beach Lakes Boulevard, Suite 600, West Palm Beach, FL 33409
T 561.684.3375 F 561.689.8631 www.boyle.aecom.com

September 11, 2008

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.10 – September 1, 2008 through September 7, 2008
South Florida Water Management District, Upper Floridan Aquifer Monitor Well
OKF-106 (UFA-MW1)
FDEP UIC Well Construction Permit Number 0198641-009-UC

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the tenth week of construction on the upper Floridan aquifer monitor well identified as OKF-106 (UFA-MW1) and those activities anticipated for the next report period.

The construction and related activities that transpired during the tenth week related to OKF-106 (UFA-MW1) are summarized below;

- Conducted geophysical logging. However, an obstruction was observed just below the bottom of the casing and the video tool could not travel to bottom of borehole.
- Mobilized drill rig to site and drilled out obstruction in borehole observed during geophysical logging activities.
- No drilling or testing activities were conducted Saturday September 6th or Sunday September 7th.

Work scheduled for the next report period:

The Contractor will arrange for a geophysical logging company to finish the video survey and geophysical logging as specified in the technical plans and specifications. The Contractor will also continue to perform demobilization and site restoration.

If you have any questions or concerns based on the information provided above, please contact the undersigned at 561-684-3375.

Sincerely:

Michael W. Bennett 9/11/08

Michael W. Bennett, P.G.
Senior Hydrogeologist
Boyle AECOM

Enclosures: Laboratory analytical data for major cation/anion

Distribution to Interested Parties – Weekly Summary Report No. 10

Distribution: Mark Silverman FDEP/WPB
Joseph May, FDEP/WPB
George Healer, FDEP/TLH
Bob Verrastro, SFWMD/WPB
File

HBEL, Inc.
5600 U.S. 1 North, Fort Pierce, FL 34946
Phone: (772) 465-8584 Fax: (772) 467-1524

Date issued: September 9, 2008

To: Shamus English
Boyle Engineering
3550 SW Corporate Parkway
Palm City, FL 34990

Client: Boyle Engineering
Workorder ID: L63N Cation/Anion **[2031953]**
Received: 8/27/08 16:30

Dear Shamus English;

Analytical results presented in this report have been reviewed for compliance with the HBEL, Inc. Quality Systems Manual and have been determined to meet applicable Method guidelines and Standards referenced in the July 2003 National Environmental Laboratory Accreditation Program (NELAP) Quality Manual unless otherwise noted. The Analytical Results within these report pages reflect the values obtained from tests performed on Samples As Received by the laboratory unless indicated differently.

FDOH Safe Drinking Water Act, Clean Water Act and RCRA Certification #'s:
E96080, E83509

Questions regarding this report should be directed to the Report Signatory at (772) 465-8584 referencing the HBEL Workorder ID [Number].

Respectfully submitted,

Eric Charest
HBEL, Inc. Laboratory Manager

HBEL, Inc.

5600 U.S. 1 North, Fort Pierce, FL 34946
Phone: (772) 465-8584 Fax: (772) 467-2584

Quality Control Summary

Client: Boyle Engineering
Workorder ID: L63N Cation/Anion [2031953]
Received: 8/27/08 16:30

MB=Method Blank LCS=Laboratory Control Sample LCSD=Laboratory Control Sample Duplicate MS=Matrix Spike MSD=Matrix Spike Duplicate DUP=Sample Duplicate

Method Narratives (If Applicable)

HBEL Sample Number	Sample ID	Analytical Method	Description

Quality Control Summary

Method	HBEL Batch	Analyte	Analytical Issue

HBEL Inc.
5600 U.S. 1 North, Fort Pierce, FL 34946
Phone: (772) 465-8584 Fax: (772) 467-4584

CERTIFICATE OF ANALYSIS

[2031953]

Client: Boyle Engineering *Workorder ID:* L63N Cation/Anion

Parameter	Qualifier	Result[1]	Units	Reporting Limit	Method	Laboratory Batch	Prep Date/Time	Analyzed Date/Time	Analyst	Lab ID
Laboratory ID: **2031953001** *Sample ID:* **OKF-106 Major Cation/Anion #1**							*Sampled:* 08/27/08 11:30 *Matrix:* Water	*Received:* 08/27/08 16:30 Results reported on Wet Weight Basis		
Total Dissolved Solids		1500	mg/L	32	EPA 160.1	WCGE29882		08/31/08 16:00	SP	E96080
Calcium		55	mg/L	0.10	EPA 200.7	META9029	09/5/08 8:29	09/8/08 23:54	DM	E96080
Magnesium		56	mg/L	0.050	EPA 200.7	META9029	09/5/08 8:29	09/8/08 23:54	DM	E96080
Potassium		16	mg/L	0.20	EPA 200.7	META9029	09/5/08 8:29	09/8/08 23:54	DM	E96080
Sodium		430	mg/L	0.50	EPA 200.7	META9029	09/5/08 8:29	09/8/08 23:54	DM	E96080
Strontium		23	mg/L	0.0010	EPA 200.7	META9029	09/5/08 8:29	09/8/08 23:54	DM	E96080
Bromide		2.3	mg/L	0.027	EPA 300.0	IC7784		08/28/08 23:08	JL	E96080
Chloride		670	mg/L	5.0	EPA 300.0	IC7785		08/29/08 14:30	JL	E96080
Fluoride		0.77	mg/L	0.022	EPA 300.0	IC7783		08/28/08 17:56	JL	E96080
Sulfate		250	mg/L	1.4	EPA 300.0	IC7785		08/29/08 14:30	JL	E96080
Silica (as SiO2)		16	mg/L	1.0	EPA 370.1	WCGE29895		09/3/08 12:40	SP	E96080
Alkalinity		100	mg/L CaCO3	2.2	SM2320 B	WCGE29878		08/30/08 15:52	GS	E96080
Alkalinity, Carbonate		0.80 U	mg/L CaCO3	0.80	SM2320 B	CALC5563		09/3/08 9:35	DH	E96080
Alkalinity, Phenolphthalein		0.8 U	mg/L CaCO3	0.8	SM2320 B	WCGE29878		08/30/08 15:52	GS	E96080
Laboratory ID: **2031953002** *Sample ID:* **OKF-105 Major Cation/Anion #2**							*Sampled:* 08/27/08 15:30 *Matrix:* Water	*Received:* 08/27/08 16:30 Results reported on Wet Weight Basis		
Total Dissolved Solids		1500	mg/L	32	EPA 160.1	WCGE29882		08/31/08 16:00	SP	E96080
Calcium		56	mg/L	0.10	EPA 200.7	META9029	09/5/08 8:29	09/9/08 0:00	DM	E96080
Magnesium		57	mg/L	0.050	EPA 200.7	META9029	09/5/08 8:29	09/9/08 0:00	DM	E96080
Potassium		16	mg/L	0.20	EPA 200.7	META9029	09/5/08 8:29	09/9/08 0:00	DM	E96080
Sodium		430	mg/L	0.50	EPA 200.7	META9029	09/5/08 8:29	09/9/08 0:00	DM	E96080
Strontium		23	mg/L	0.0010	EPA 200.7	META9029	09/5/08 8:29	09/9/08 0:00	DM	E96080
Bromide		2.3	mg/L	0.027	EPA 300.0	IC7784		08/28/08 23:43	JL	E96080
Chloride		670	mg/L	5.0	EPA 300.0	IC7785		08/29/08 14:40	JL	E96080
Fluoride		0.76	mg/L	0.022	EPA 300.0	IC7783		08/28/08 18:16	JL	E96080
Sulfate		250	mg/L	1.4	EPA 300.0	IC7785		08/29/08 14:40	JL	E96080
Silica (as SiO2)		16	mg/L	1.0	EPA 370.1	WCGE29895		09/3/08 12:40	SP	E96080
Alkalinity		110	mg/L CaCO3	2.2	SM2320 B	WCGE29878		08/30/08 15:52	GS	E96080
Alkalinity, Carbonate		0.80 U	mg/L CaCO3	0.80	SM2320 B	CALC5563		09/3/08 9:35	DH	E96080
Alkalinity, Phenolphthalein		0.8 U	mg/L CaCO3	0.8	SM2320 B	WCGE29878		08/30/08 15:52	GS	E96080

[1]Result Qualifiers: U = Not Detected I = Analyte detected between the Laboratory Method Detection Limit and Laboratory Reporting Limit
Applicable Florida Department of Environmental Protection Qualifiers defined below. Statement of Estimated Uncertainty available upon request.

HARBOR BRANCH
ENVIRONMENTAL LABORATORIES, INC.
5600 US 1 North, Fort Pierce, FL 34946
Phone (772) 465-2400, Ext. 285 Fax: (772) 467-8824

Chain-of-Custody and Agreement to Perform Services

USE BALL POINT PEN
PRESS HARD
COMPLETELY FILL OUT ALL NON GREYED AREAS
PRINT LEGIBLY

Laboratory not responsible for omitted information

___FDOH # E96080 5600 U.S. 1 North Fort Pierce, FL 34946
___FDOH # E85370 307 Coolidge Avenue Lehigh Acres, FL 33936
___FDOH # E83509 4185 St. Johns Pkwy. Suite 1300 Sanford, FL 32771
___FDOH # E84418 16331 Cortez Blvd. Brooksville, FL 34601

nelac

Company: Boyle Engineering Corp.
Address: 2090 Palm Bch Lakes Blvd #600
West Palm Beach, FL Zip: 33409
Phone: 772-631-3832 Fax: 561-689-8531
Client Contact: Shamus English
Project Name: L63W
Sampled By: Shamus English

Method(s) of Shipment: ______
e-mail: ______

Standard Laboratory Turn Around Time
Or
Rush in ___ Business Days
Requires Laboratory Approval

For Lab Use Only
Temperature Checked: (Y) N — Custody Seals Intact: Y N NA — pH Checked: Y N
LAB # 2031953

PRESERVATIVE

ANALYSES REQUESTED

Preservation Key
H=Hydrochloric Acid; P=Phosphoric Acid; N=Nitric Acid; ST=Sodium Thiosulfate; S=Sulfuric Acid; SH=Sodium Hydroxide; U=Unpreserved

LAB ID	COLLECTION DATE	COLLECTION TIME	Sample Type*	MATRIX**	# Containers	SAMPLE DESCRIPTION As Will Appear On Report	See Attached Bottle Custody Form			pH (S.U.)	Cond (umS)	Temp (C)		COMMENTS
001	8/27/08	1130				OKF-106 Major cation/anion #1				6.6	2,330	26.2		
2	8/27/08	1530				OKF-106 Major cation/anion #2								

* Sample Type: G=Grab C=Composite
** Matrix: S=Solid SL=Sludge DW=Drinking Water GW=Ground Water SW=Surface Water WW=Wastewater M=Marine

Report Page 4 of 4

RELINQUISHED BY [signature]	RELINQUISHED BY	RELINQUISHED BY
DATE/TIME 8/27/08 1525	DATE/TIME	DATE/TIME
RECEIVED BY [signature]	RECEIVED BY	RECEIVED FOR HBEL CUSTODY BY [signature]
DATE/TIME 8-27-08 1525	DATE/TIME	DATE/TIME 8-27-08 16:30

Distribution: WHITE with REPORT; YELLOW for FILE; PINK to CLIENT; GOLD for SAMPLER

CHAIN PAGE 1 of 1

HBEL Sample: 2031953001 OKF-106#1

Anion/Cation Balance

Referenced in The NALCO WATER HANDBOOK (second edition)

Cations (from HBEL report)		Calcium Carbonate Equivalent Multiplier	
Alkalinity	100 mg/L as CaCO3	1.00	100
Silica	16 mg/L as SiO2	0.83	13.28
Chloride	670 mg/L	1.41	944.7
Sulfate	250 mg/L	1.04	260

Anions (from HBEL Report)		Calcium Carbonate Equivalent Multiplier	
Sodium	430 mg/L	2.18	937.4
Potassium	16 mg/L	1.28	20.48
Magnesium	56 mg/L	4.1	229.6
Calcium	55 mg/L	2.5	137.5
Iron	0 mg/L	1.79	0

*Assuming iron is in solution as Fe+2 (Ferrous)

Anion Total	1317.98	Cation Total	1324.98

Percent Difference: 0.374561

HBEL Sample: 2031963002 OKF-106#2

Anion/Cation Balance

Referenced in The NALCO WATER HANDOOK (second edition)

Cations (from HBEL report)		Calcium Carbonate Equivalent Multiplier	
Alkalinity	110 mg/L as CaCO3	1.00	110
Silica	16 mg/L as SiO2	0.83	13.28
Chloride	670 mg/L	1.41	944.7
Sulfate	250 mg/L	1.04	260

Anions (from HBEL Report)		Calcium Carbonate Equivalent Multiplier	
Sodium	430 mg/L	2.18	937.4
Potassium	16 mg/L	1.28	20.48
Magnesium	57 mg/L	4.1	233.7
Calcium	56 mg/L	2.5	140
Iron	0 mg/L	1.79	0

*Assuming Iron is in solution as Fe+2 (Ferrous)

Anion Total 1327.98 Cation Total 1331.58

Percent Difference: 0.191429

C

Lithologic Log of Well Samples

Lithologic Descriptions

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME OKF-105
PERMIT NUMBER 0198641-009-UC
JOB NUMBER 17191.00

Date	Depth (ft. bls) From	To	Observer's Description
7/1/2008	0	10	**Quartz Sand** - Unconsolidated, dark yellowish brown (10YR 4/2) - fine to medium grained; moderately sorted; 20% porosity
7/1/2008	10	20	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	20	30	**Quartz Sand** - Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; moderately sorted; 20% porosity
7/1/2008	30	40	**Shell Fragments (50%)** - Unconsolidated shell fragments and pieces; Quartz Sand (40%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	40	50	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	50	60	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, grayish orange (10YR 7/4)- fine to medium grained; Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	60	70	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, dark yellowish brown (10YR 4/2); Phosphate (5-10%) - approx. 1 mm , sub-rounded to sub-angular
7/1/2008	70	80	**Shell Fragments (65%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10-15%) - approx. 1-2 mm , sub-rounded to sub-angular
7/1/2008	80	90	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular
7/7/2008	90	100	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	100	110	**Shell Fragments (70%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (5%) - fine grained to approx. 1-2 mm , sub-rounded to sub-angular; Cement pieces evident in sample
7/7/2008	110	120	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	120	130	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular

Date	Depth (ft. bls) From	To	Observer's Description
7/8/2008	130	140	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (5%) - fine grained to approx. 1 mm , sub-rounded to sub-angular
7/8/2008	140	150	**Shell Fragments (60%)** - Unconsolidated shell fragments and pieces; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	150	160	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	160	170	**Shell Fragments (55%)** - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, light gray (7)- fine to medium grained; Silt (10%); Phosphate (10%) - fine grained
7/8/2008	170	180	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Clay (30%) pale olive (10Y 6/2), moderately to poorly cohesive; Quartz Sand (20%)- Unconsolidated, light gray (7)- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	180	190	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	190	200	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	200	210	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	210	220	**Clay (50%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (10%) - fine grained
7/9/2008	220	230	**Clay (55%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5-10%) - fine grained
7/9/2008	230	240	**Clay (65%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	240	250	**Clay (70%)** - pale olive (10Y 6/2), moderately to poorly cohesive; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, greenish gray 5G 6/1- fine to medium grained; Phosphate (5%) - fine grained
7/9/2008	250	260	**Clay (90%)** - dusky yellow green (5GY 5/2), very to moderately cohesive; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	260	270	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	270	280	**Clay (85%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (10-15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained

Date	Depth (ft. bls) From	To	Observer's Description
7/9/2008	280	290	**Clay (80%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	290	300	**Clay (80%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	300	310	**Clay (80%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (15%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	310	320	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	320	330	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/9/2008	330	340	**Clay (85%)** - grayish olive green (5GY 3/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	340	350	**Clay (70%)** - dusky yellow green (5GY 5/2), moderately cohesive; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - fine grained
7/10/2008	350	360	**Clay (45%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/10/2008	360	370	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1 mm, sub-rounded to sub-angular
7/10/2008	370	380	**Clay (40%)** - dusky yellow green (5GY 5/2), poor to moderate cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (25%)- Unconsolidated, mostly translucent,coarse to fine grained; Phosphate (10%) - fine grained to 1-2 mm, sub-rounded to sub-angular
7/10/2008	380	390	**Shell Fragments (45%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) - fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (10%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	390	400	**Shell Fragments (40%)** - Unconsolidated shell fragments and pieces; Quartz Sand (30%)- Unconsolidated, mostly translucent,coarse to fine grained; ; Phosphate (15%) - fine grained to 1-2 mm, sub-rounded to sub-angular; Silty Clay (15%) - dusky yellow green (5GY 5/2), very poor cohesion
7/10/2008	400	410	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained
7/10/2008	410	420	**Carbonate Sand (40%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (10%) - medium to fine grained; Silty Clay (5%) - dusky yellow green (5GY 5/2), very poor to no cohesion
7/10/2008	420	430	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained
7/10/2008	430	440	**Carbonate Sand (45%)** - Unconsolidated, grayish orange pink (5YR 7/2), medium grain size; Shell Fragments (35%) - Unconsolidated shell fragments and pieces; Quartz Sand (15%)- Unconsolidated, mostly translucent, medium to fine grained; Phosphate (5%) - medium to fine grained

Date	Depth (ft. bls) From	To	Observer's Description
7/10/2008	440	450	**Sandy Clay (40%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (30%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	450	460	**Sandy Clay (45%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (25%) - Unconsolidated shell fragments and pieces; Carbonate Sand (20%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	460	470	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/10/2008	470	480	**Sandy Clay (55%)** - pale olive (10Y 6/2), poor to moderate cohesion; Shell Fragments (20%) - Unconsolidated shell fragments and pieces; Carbonate Sand (15%) - Unconsolidated, grayish orange pink (5YR 7/2), medium to fine grain size; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	480	490	**Sandy Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Shell Fragments (10%) - Unconsolidated shell fragments and pieces; Quartz Sand (10%)- unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/11/2008	490	500	**Clay (75%)** - grayish green (10GY 5/2), moderately cohesive; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/14/2008	500	510	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Quartz Sand (5%)- Unconsolidated, mostly translucent,medium to fine grained; Phosphate (5%) - fine grained
7/14/2008	510	520	**Clay (75%)** - grayish green (10GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/15/2008	520	530	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/15/2008	530	540	**Clay (80%)** - dusky yellow green (5GY 5/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	540	550	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/16/2008	550	560	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained

Date	Depth (ft. bls) From	To	Observer's Description
7/17/2008	560	570	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	570	580	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/17/2008	580	590	**Clay (75%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (10%) - medium to fine grained
7/17/2008	590	600	**Clay (80%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (10%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	600	610	**Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	610	620	**Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/21/2008	620	630	**Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	630	640	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/22/2008	640	650	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (20%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Shell Fragments (5%) - Unconsolidated shell fragments and pieces; Phosphate (5%) - medium to fine grained
7/23/2008	650	660	***Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (30%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (10%) - medium to fine grained
7/23/2008	660	670	***Clay (60%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (35%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	670	680	***Clay (70%)** - pale olive (10Y 6/2), well to moderate cohesion; Limestone (25%) - white (N9) to very pale orange (10 YR 8/2), moderately to poorly indurated; Phosphate (5%) - medium to fine grained
7/23/2008	680	690	***Limestone** (55%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (30%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (15%) - fine grained to3mm
7/23/2008	690	700	***Limestone** (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm
7/23/2008	700	710	***Limestone** (70%) - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky; Clay (20%) - yellowish gray (5Y 7/2), well to moderate cohesion; Phosphate (10%) - fine grained to3mm

Date	Depth (ft. bls) From	To	Observer's Description
7/23/2008	710	720	*__Limestone__ - white (N9) to very pale orange (10 YR 8/2), poorly indurated, chalky.
8/7/2008	720	730	**Limestone** - Very pale orange (10 YR 8/2), moderately indurated, calcarenitic, low intergranular macroporosity, *lepidocyclina sp* . present, turritella and other shells pieces and fragments evident
8/13/2008	730	740	**Limestone** - Very pale orange (10 YR 8/2) to light gray (N8), moderately to poorly indurated, calcarenitic, moderate macroporosity (mostly moldic and intergranular), *lepidocyclina sp* . present, abundant shell pieces and fragments
8/13/2008	740	750	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.
8/13/2008	750	760	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.
8/13/2008	760	770	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.
8/13/2008	770	780	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.
8/13/2008	780	790	**Limestone** - Very pale orange (10 YR 8/2), moderately to poorly indurated, calcarenitic, moderately friable, abundant *lepidocyclina sp* . present.
8/13/2008	790	800	**Limestone** - Very pale orange (10 YR 8/2), poorly indurated, calcarenitic, highly friable, abundant *lepidocyclina sp* . present.

*Due to drill bit configuration, lithologic sample collected may not be completely representative of noted depth interval.

ft. bls = feet below land surface

D

Casing Summary

BOYLE

Engineering Excellence Since 1942

Casing Summary

South Florida Water Management District
L63N Site - Okeechobee County

WELL NAME	CKF-168
PERMIT NUMBER	0196641-005-DC
JOB NUMBER	17191.00

18-inch Diameter Steel Outer Casing

Date Installed	Time Installed	Joint #	Heat #	Length of Joint*	Cumulative Length
7/2/2008		1	GO17564	21.10	21.10
7/2/2008		2	GO17564	21.00	42.10
7/2/2008		3	GO17564	21.00	63.10
7/2/2008		4	GO17564	21.10	84.20

10-inch Diameter PVC Inner Casing

Date Installed	Time Installed	Joint #	Batch #	Length of Joint*	Cumulative Length
7/29/2008	949	1>	** 654015	19.00	19.00
7/29/2008	1005	2>	** 654015	20.00	39.00
7/29/2008	1009	3	** 654015	20.00	59.00
7/29/2008	1012	4	** 654015	20.00	79.00
7/29/2008	1015	5>	** 654015	20.00	99.00
7/29/2008	1018	6	** 654015	20.00	119.00
7/29/2008	1020	7	** 654015	20.00	139.00
7/29/2008	1022	8	** 654015	20.00	159.00
7/29/2008	1025	9	** 654015	20.00	179.00
7/29/2008	1028	10	** 654015	20.00	199.00
7/29/2008	1032	11>	** 654015	20.00	219.00
7/29/2008	1036	12	** 654015	20.00	239.00
7/29/2008	1038	13	** 654015	20.00	259.00
7/29/2008	1041	14	** 654015	20.00	279.00
7/29/2008	1044	15	** 654015	20.00	299.00
7/29/2008	1047	16	** 654015	20.00	319.00
7/29/2008	1049	17>	** 654015	20.00	339.00
7/29/2008	1054	18	** 654015	20.00	359.00
7/29/2008	1056	19	** 654015	20.00	379.00
7/29/2008	1100	20	** 654015	20.00	399.00
7/29/2008	1111	21	** 654015	20.00	419.00
7/29/2008	1114	22>	** 654015	20.00	439.00
7/29/2008	1118	23	** 654015	20.00	459.00
7/29/2008	1120	24	** 654015	20.00	479.00
7/29/2008	1123	25	** 654015	20.00	499.00
7/29/2008	1127	26	** 654015	20.00	519.00
7/29/2008	1130	27>	** 654015	20.00	539.00
7/29/2008	1134	28	** 654015	20.00	559.00
7/29/2008	1137	29	** 654015	20.00	579.00
7/29/2008	1139	30	** 654015	20.00	599.00
7/29/2008	1142	31	** 654015	20.00	619.00
7/29/2008	1145	32>	** 654015	20.00	639.00
7/29/2008	1149	33	** 654015	20.00	659.00
7/29/2008	1152	34	** 654015	20.00	679.00
7/29/2008	1154	35	** 654015	20.00	699.00
7/29/2008	1200	36>	** 654015	20.00	719.00
7/29/2008	1203	Header Flange	** 654015	1.00	720.00

Subtract 3 feet from cumulative length for stick up

PVC Casing set to 717 feet bls

* - All lengths measured in feet.

** - Certainteed 10" SDR17 Class 250 Centlok Well Casing IC-1 PVC ASTM F480 Batch #654015

> = Centralizer

E

18-Inch Steel Casing Mill Certificate

증명서 번호 CERTIFICATE NO.	7800268	페이지 PAGE	1 of 1
발행일자 DATE OF ISSUE	2007 08-07		
계약번호 CONTRACT(P/O) NO.	200009025	고객사 CUSTOMER	현대종합상사
품명 COMMODITY	E.R.W. STEEL PIPE		
제품규격 SPECIFICATION	API 5L X42/API 5LB PSL1/ASTM A53B/ASME SA53B		

검 사 증 명 서(A)

MILL INSPECTION CERTIFICATE

HYUNDAI HYSCO
현대하이스코주식회사
HYUNDAI HYSCO

본사·공장 (ULSAN PLANT) 울산광역시 북구 염포동 265번지 683-040
#265 YUMPO-DONG, BUK-KU, ULSAN, KOREA
TEL:82-52-280-014, FAX:82-52-287-8916

서울사무소 (SEOUL OFFICE) 서울시 강남구 역삼동 837-36번지 랜드마크타워 135-080
LANDMARK TOWER 837-36, YEOKSAM-DONG, GANGNAM-KU, SEOUL, KOREA
TEL:82-2-2112-8114, FAX:82-2-775-7095

관말 TYPE OF PIPE END		치수 DIMENSION 외경 x 두께 x 길이 (OUTDIA x THICK x LENGTH)	수량 QUANTITY	중량 WEIGHT	수압시험 HYDROSTATIC TEST PSI	※5	제강번호 HEAT NO.	인장시험 TENSILE TEST (Gage Length : 2 INCH)	항복강도 YIELD STRENGTH	인장강도 TENSILE STRENGTH ※7 B	인장강도 TENSILE STRENGTH ※7 W	연신율 EL	화학성분(%) CHEMICAL COMPOSITION	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb			Al	CEQ ※9	경도 HARDNESS	충격시험 IMPACT TEST (℃) 흡수에너지 ABSORBED ENERGY	연성파면율 SHEAR AREA	도막시험 COATING TEST 아연부착량 WEIGHT OF ZINC COAT	균일성 DIP TEST	비고 REMARK
※1	※2	※3 ※4	(PCS)	(KG)				※6	Mpa/PSI			%	※8	x100			x1000		x100									x1000		HV	JOULE	%	g/㎡	TIMES	※15
EB BE	NB	12-3/4" X .375" X 21.000'	2	949	2,100	G	5R28649		323	472	494	34		18	2	31	14	4	2	2	1	1	TR	TR	TR										
									[illegible]	68,700	71,100																								
EB BE	NB	18" X .250" X 42.000'	12	10,9[illegible]	990	G	G017564		318	498	523	36		16	18	97	14	8	2	2	1	1	TR	TR	TR										
									[illegible]	72,400	[illegible]																								
		TOTAL →	14	11,8[illegible]																															

※10 HEAT TREATMENT	※11 VISUAL & DIMENSION TEST	※12 FLATTENING, BEND, GUIDED BEND TEST	※13 R-FLATTENING TEST	※14 FLARING TEST	※15 NONDESTRUCTIVE TEST (U.T)	※16 R.M.T	※17 CRUSH TEST	※18 DRIFT TEST	※19 FLANGE TEST
GOOD	GOOD	GOOD			GOOD	GOOD			

NOTE 1 ※1 Type of pipe End 관말

EB:ERW Black End	RB:SAW Black	TC:Thread Coupling
EA:ERW Annealing	RG:SAW Galvanizing	RG:Roll Grooving
EG:ERW Galvanizing	RS:SAW Spiral	VG:Victaulic Grooving
EC:ERW Black Thread	PE:Plain End	PC:Plain End Coupled
ED:ERW Galvanizing Thread	BE:Bevel End	PB:Plain End Bevel End
EN:ERW Galvanizing Scaffolding	TE:Thread End	SD:Ball End

※2 NB:Nominal Bore 호칭경, OD:Outside Diameter ※3 Unit 단위(Mm, Inch) ※4 Unit 단위(M:Meter, F:Feet, I:Inch)

※5 G:GOOD ※6 L:Longitudinal 압연방향, T:Transverse 횡방향 ※7 B:Base Metal 모재부, W:Weld Part 용접부

※8 H:Heat(Ladle) Analysis 래들분석, P:Product Analysis 제품분석, WP:Weld Product Analysis 용접부 제품분석 ※9 CEQ=C+Mn/6+(Ni+Cu)/15+(Cr+Mo+V)/5 탄소당량

※10:Heat Treatment 열처리 ※11 Visual & Dimension Test 외관 및 치수검사 ※12 Flattening/Bend/Guided Bend Test 편평/벤드/굽힘시험

※13:Reverse Flattening Test 역편평시험 ※14 Flaring Test 확관시험 ※15 Nondestructive Test 비파괴검사

※16:Residual Magnetism Test 잔류자장시험 ※17:Crush Test 압궤시험 ※18:Drift Test 관확시험 ※19:Flange Test 플랜지시험

NOTE 2 : SPEC YEAR = API 2004/ASTM 2006/ASME 2004
NACE MR0175

본 제품은 관련 규격의 합격되었음을 보증합니다.
WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN ACCEPTED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER
※본 검사증명서에 명기된 규격용도외 사용시 안전상 문제가 발생할 수 있으며, 검사증명서 위,변조시 사문서 위조로 형사처벌 받을 수 있습니다.

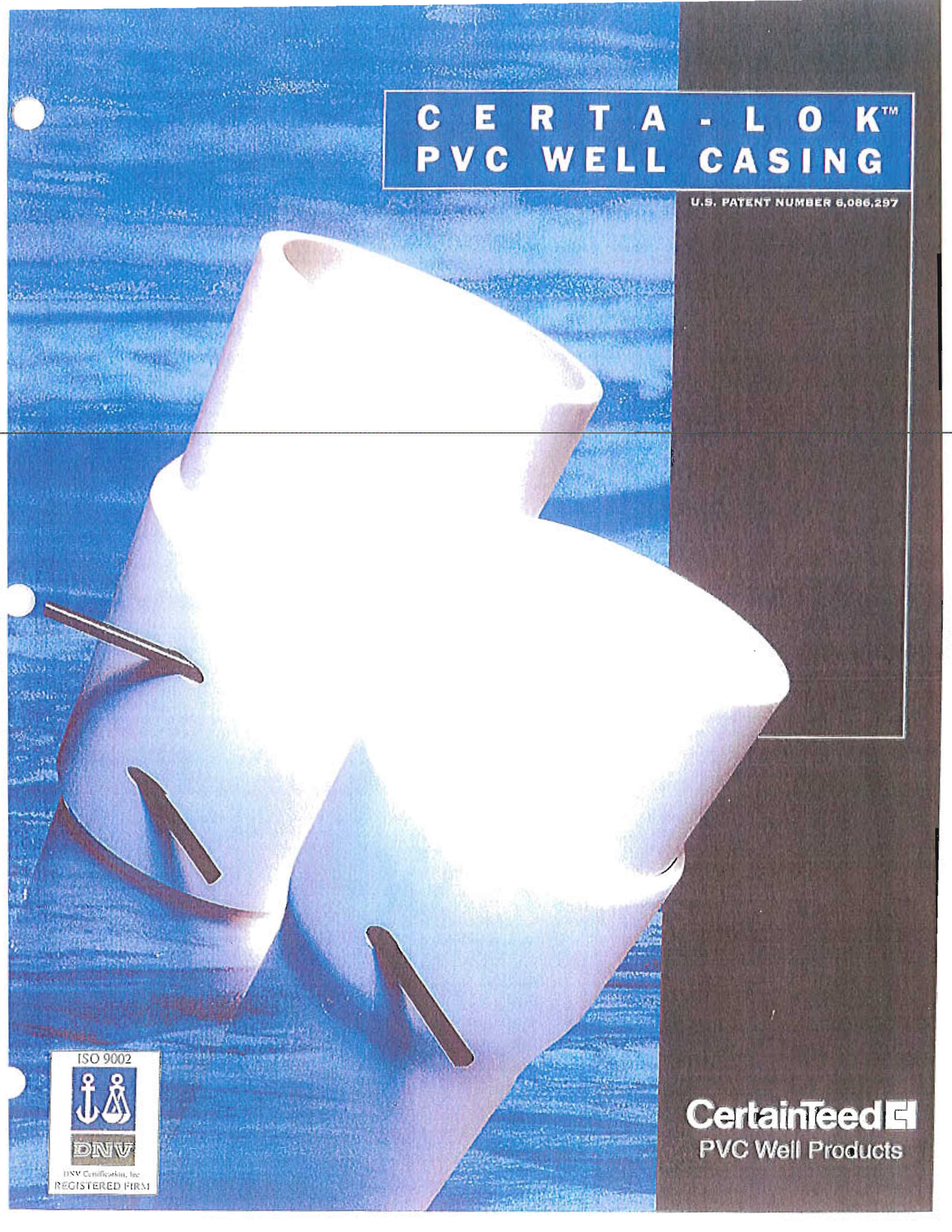
SURVEYOR	INSPECTION MANAGER
	H. J. KIM

F

CertainTeed PVC Casing Specifications

CERTA-LOK™ PVC WELL CASING

U.S. PATENT NUMBER 6,086,297



ISO 9002

DNV

DNV Certification, Inc.
REGISTERED FIRM

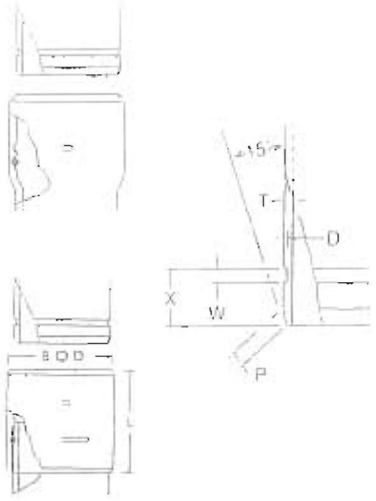
CertainTeed

PVC Well Products

DIMENSIONS, WEIGHTS & PERFORMANCE DATA

O.D. SIZE	X	W	D MIN.	D MAX.	P	BELL DEPTH
INTEGRAL BELL JOINT						
4.500"	1.313	.375	.125	.130	.25	3.00
4.950"	1.313	.375	.125	.130	.25	3.00
5.563"	1.313	.375	.125	.130	.25	3.00
6.625"	1.313	.375	.125	.130	.25	3.00
6.900"	1.313	.375	.125	.130	.25	3.00
8.625"	3.163	.500	.135	.140	.66	5.00

O.D. SIZE	X	W	D MIN.	D MAX.	P	L	COUPLING O.D.
COUPLED JOINT							
10.750"	3.500	.500	.205	.215	.66	12.00	12.438
12.750"	3.500	.500	.205	.215	.66	12.00	14.000
14.000"	3.500	.500	.205	.215	.66	12.00	15.300
16.000"	3.500	.500	.205	.215	.66	12.00	17.400
17.400"	3.500	.500	.205	.215	.66	12.00	18.701



NOMINAL SIZE DESIGNATION	O.D. SIZE	CLASS	T MIN. WALL	I.D. MIN.	I.D. MAX.	BELL O.D.	R.H.C.P. (PSI)	MAX. TENSILE PULL (LBS.)	MAX. INTERNAL PRESSURE (PSI)	APPROX. WEIGHT LBS./FT.	PART NO.
INTEGRAL BELL JOINT											
4"	4.500"	SCH40	.237	3.968	4.026	5.06	158	4,900	100	2.06	65300
4½"	4.950"	SCH40	.248	4.379	4.454	5.55	134	4,700	135	2.37	65302
		SDR17	.291	4.288	4.368	5.56	224	6,300	145	2.75	65301
5"	5.563"	SDR21*	.265	4.941	5.033	6.20	115	6,300	115	2.86	65303
		SDR17	.327	4.810	4.909	6.25	224	8,500	180	3.49	65304
6"	6.625"	SCH40	.280	5.961	6.065	7.33	79	8,500	120	3.63	65307
		SDR21	.316	5.885	5.993	7.30	115	8,800	145	4.06	65305
		SDR17	.390	5.728	5.845	7.45	224	10,000	220	4.95	65306
6.9" O.D.	6.900"	SDR21	.329	6.128	6.242	7.61	115	7,400	130	4.47	65320
		SDR17	.406	5.964	6.088	7.71	224	9,400	190	5.22	65308
8"	8.625"	SDR17	.508	7.458	7.609	9.75	224	17,000	185	8.38	65309
COUPLED JOINT (INCLUDES CASING AND COUPLING)											
10"	10.750"	SDR17	.632	9.310	9.486		224	26,000	300	13.27	65405
12"	12.750"	SDR17	.750	11.040	11.250		224	30,800	150	18.89	65705
14"	14.000"	SDR17	.823	12.105	12.354		224	36,440	150	22.55	65715
16"	16.000"	SDR26	.616	14.544	14.768		59	35,200	150	20.48	65285
		SDR21	.762	14.235	14.476		115	35,200	150	24.59	65485
		SDR17	.941	13.855	14.118		224	35,200	150	31.66	65475
17.4" O.D	17.400"	SDR17	1.024	15.079	15.352		224	37,000	125	34.43	65725

* Equivalent to SCH40

R.H.C.P. = Resistance to Hydraulic Collapse Pressure (predicted failure point at room temperature – no safety factor included). See brochure on the Selection of PVC Well Casing Based on Hydraulic Collapse Considerations, Literature Code 40-37-02, for additional details.

Notes: Dimensions in all tables are in inches. All dimensions and weights are subject to manufacturing tolerances. Standard laying length = 20'. Short-term pressure ratings shown apply to well casing installation only. Max. tensile pull values include a minimum 1.5:1 safety factor.

PACKAGING & WEIGHTS

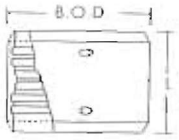
O.D. SIZE	CLASS	FEET PER FAST-PAK	FAST-PAKS PER T/L	FEET PER T/L	LBS. PER T/L
4.500"	SCH40	580	28	16240	33454
4.950"	SCH40	520	24	12480	29578
	SDR17	520	24	12480	34320
5.563"	SDR21/SCH40	460	24	11040	31574
	SDR17	460	24	11040	38530
6.625"	SCH40	400	20	8000	29040
	SDR21	400	20	8000	32560
	SDR17	400	20	8000	39680
6.900"	SDR21	340	20	6800	29512
	SDR17	340	20	6800	35972
8.625"	SDR17	280	16	4480	39245
10.750"	SDR17	80	32	2560	33971
12.750"	SDR17	80	28	2240	42314
14.000"	SDR17	120	12	1440	32472
16.000"	SDR26	120	12	1440	29491
	SDR21	120	12	1440	35410
	SDR17	120	12	1440	45590
17.400"	SDR17	60/40	10/10	1000	34430

COUPLING

INCLUDES GASKETS AND SPLINES

O.D. SIZE	PART NUMBER	L	B.O.D.
4.500"	70703	6.00	4.950
4.950"	70704	6.00	5.563
5.563"	70705	6.00	6.180
6.625"	70706	6.00	7.600
6.900"	70727	6.00	7.840
6.900" x 6.625"	70728	6.00	7.840
8.625"	70708	10.00	9.854
10.750"	70712	12.00	12.438
12.750"	70709	12.00	14.000
14.000"	70710	12.00	15.300
16.000"	70711	12.00	17.400
17.400"	70719	12.00	18.700

Reducing

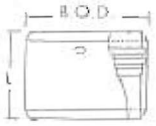


COUPLING

CERTA-LOK BELL BY SOLVENT WELD BELL
INCLUDES GASKET AND SPLINE

O.D. SIZE	SOLVENT O.D. SIZE	PART NUMBER	L	B.O.D.
4.500"	4.500"	71703	6.00	4.950
4.950"	4.950"	71704	6.00	5.563
5.563"	5.563"	71705	6.13	6.180
6.625"	6.625"	71706	6.63	7.600
6.900"	6.900"	71713	6.63	7.840
6.900"	6.625"	71714	6.63	7.840
8.625"	8.625"	71707	10.00	9.854
10.750"	10.750"	71710	12.00	12.438
12.750"	12.750"	71711	12.00	14.000

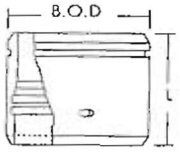
Reducing



REDUCER BUSHING

CERTA-LOK SPIGOT BY CERTA-LOK BELL
INCLUDES GASKET AND SPLINE

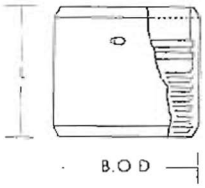
O.D. SIZE	PART NUMBER	L	B.O.D.
8.625" x 6.625"	71225	8.25	8.625
8.625" x 6.900"	71220	8.25	8.625
10.750" x 8.625"	71227	10.00	10.750
12.750" x 10.750"	71229	12.00	12.750
14.000" x 12.750"	71230	12.00	14.000
16.000" x 14.000"	71232	12.00	16.000
17.400" x 16.000"	71231	12.00	17.400



THREAD ADAPTER

CERTA-LOK FEMALE X FIPT
INCLUDES GASKET AND SPLINE

O.D. SIZE	FEMALE THREAD SIZE	PART NUMBER	L	B.O.D.
4.500"	4"	81077	7.00	5.470
4.950"	4"	81078	6.00	5.563
5.563"	5"	81079	6.13	6.180
6.625"	6"	81080	6.63	7.600
6.900"	6"	81086	6.63	7.840
8.625"	8"	81082	10.00	9.854
10.750"	10"	81084	12.00	12.438
12.750"	12"	81085	12.00	14.000



SPLINE

O-RING (GASKET)

O.D. SIZE	SPLINE PART NUMBER	SPLINE LENGTH	SPLINE SIZE	O-RING PART NUMBER	O-RING C/S	O-RING COLOR
4.500"	86479	18.4	.250 [1]	86123	.210	Brown
4.950"	86479	18.4	.250 [1]	86128	.210	Brown
5.563"	86479	18.4	.250 [1]	86124	.210	Brown
6.625"	86463	24	.250 [1]	86125	.210	Brown
6.900"	86463	24	.250 [1]	86179	.210	Brown
8.625"	86464	32	.313 [2]	86271	.375	Blue
10.750"	86465	39	.375 [2]	86196	.375	Green
12.750"	86466	46	.375 [2]	86178	.375	Green
14.000"	86490	48	.375 [2]	86171	.375	Green
16.000"	86491	53	.375 [2]	86172	.375	Green
17.400"	86492	60	.375 [2]	86173	.407	Green

[1] Round Spline. Extruded
[2] Square Spline. Extruded
[3] Round Spline. Injection molded

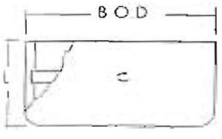
C/S = Ring Cross-Section Diameter

Material: 45 - 69° NBR
8.625" & up Poly Isoprene

CASING & SCREEN CAP

CERTA-LOK BELL
INCLUDES SPLINE

O.D. SIZE	PART NUMBER	L	B.O.D.
4.500"	81061	4.00	4.950
4.950"	81062	4.00	5.563
5.563"	81063	4.25	6.180
6.625"	81064	4.25	7.600
6.900"	81060	4.25	7.600
8.625"	81066	4.50	9.854
10.750"	81068	5.00	11.600
12.750"	81069	5.00	14.000
14.000"	81070	5.00	15.300
16.000"	81071	5.25	17.400
17.400"	81072	5.50	18.700



G

Core Description

BOYLE

CORE DESCRIPTION

South Florida Water Management District
L63N-Okeechobee County

DATE	8-12-08
WELL NUMBER	OKF-106
PERMIT NUMBER	0198641-009-UC
JOB NUMBER	17191.00
CORE NUMBER	1
CORED INTERVAL	730 – 740 ft
LENGTH OF SAMPLE	8 ft
PERCENT RECOVERED	80%

DEPTH (ft bls)	INTERVAL (ft)	DESCRIPTION
730 – 732.75	0 - 2.75	Limestone: very pale orange 10 YR 8/2, biomicrite; moderately indurated, calcarenitic, slightly friable, vuggy, good macroporosity (mostly moldic and intergranular), *lepidocyclina sp.* present, abundant shell pieces and fragments.
732.75 – 737.5	2.75 – 7.5	Limestone: very pale orange 10 YR 8/2 to light gray N8, biomicrite; moderately to poorly indurated, calcarenitic, moderately friable, vuggy, good to moderate macroporosity (mostly moldic and intergranular), *lepidocyclina sp.* present, abundant shell pieces and fragments.
737.5 – 8.0	7.5 – 8.0	Limestone: very pale orange 10 YR 8/2, biomicrite; moderately to poorly indurated, calcarenitic, moderately friable, slightly vuggy, moderate to poor macroporosity (mostly intergranular), *lepidocyclina sp.* present, shell pieces and fragments evident.

H

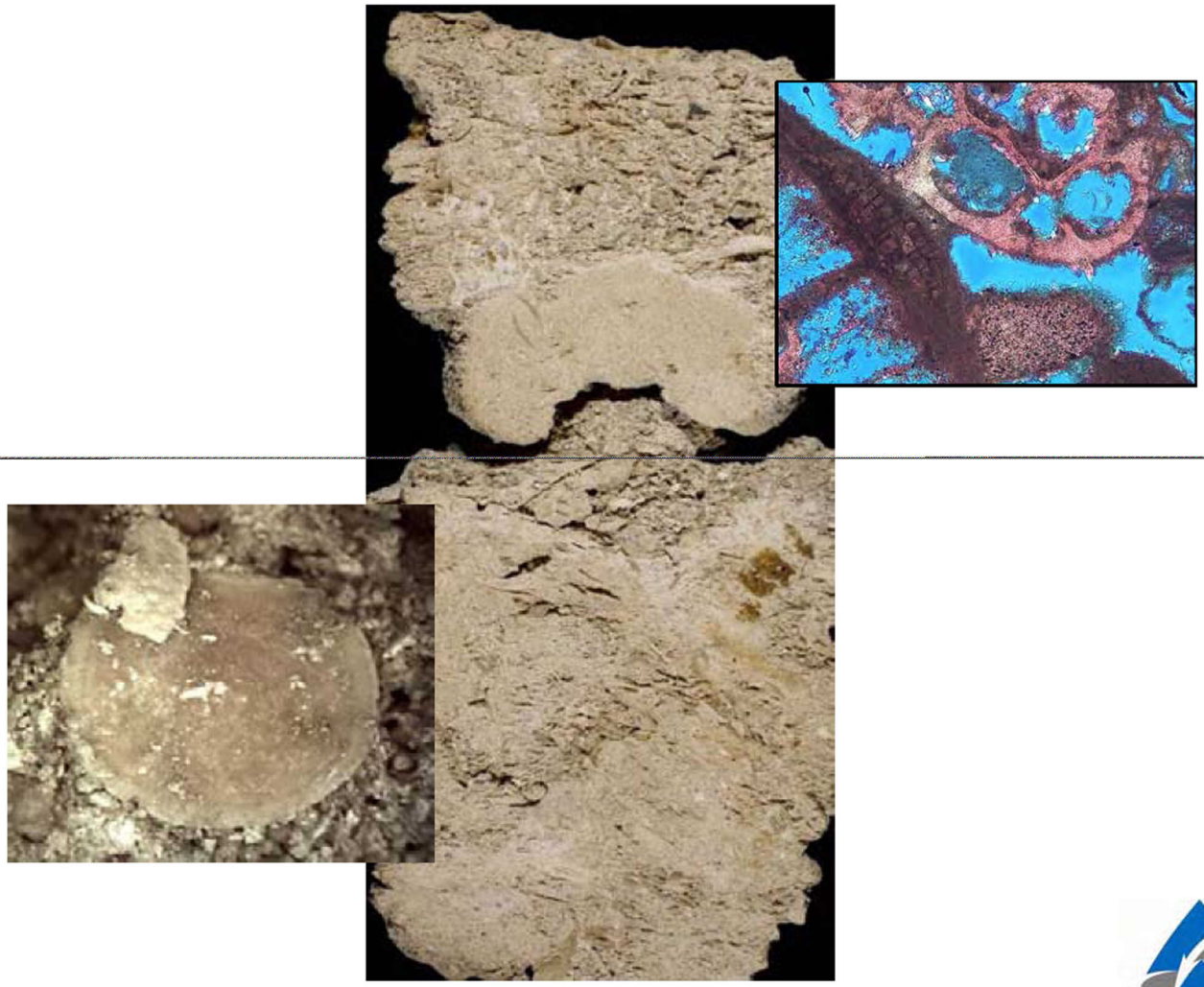
Report of Core Sample Analysis

Core Description and Petrographic Analysis of a Conventional Core from:

South Florida Water Management District

L63N Core

Okeechobee Co., Florida



Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
Reservoir Geology
Houston Advanced Technology Center
6316 Windfern Road
Houston, Texas 77040
713-328-2170

November 21, 2008
HOU #080879

South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

Attention: Mr. Clayton McMillan

Subject:

Core Description and Petrography (Thin Section Description and X-Ray Diffraction) of Conventional Core from:

South Florida Water Management District

L63N Canal Core
Okeechobee Co., Florida

Objectives:

1) Provide a macroscopic description of the core.

2) Describe the petrographic characteristics (fabric, texture, composition, types and distribution of porosity) of the rock.

Introduction

An approximately 7-inch long piece of conventional core was submitted to Core Laboratories - Reservoir Geology for description and petrographic analysis (thin section description and x-ray diffraction). The client indicated the core was from the Middle Eocene, Ocala Formation. The core section was slabbed, photographed and described. A single thin section (1.5" X 3", blue epoxy impregnated, dual carbonate stain) was made from near the top part of the core and a sample was taken adjacent to the thin section sample for XRD analysis.

Core Description

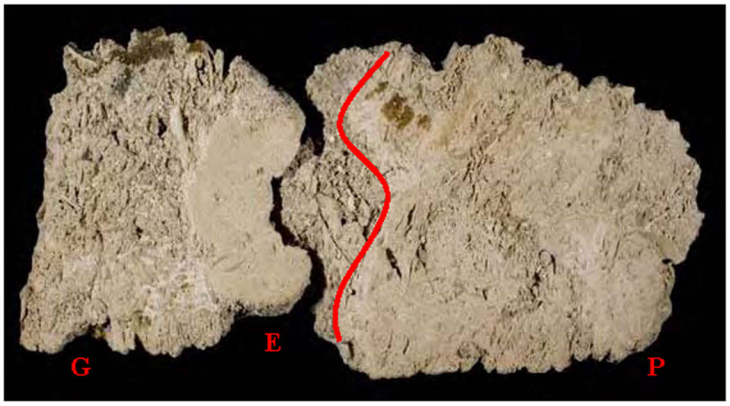


Figure 1. Core Photo

The rock is predominantly friable, light beige to tan, highly porous limestone. The figure shown above (also enlarged in Plate 1) illustrates the general character of the core. Left of the red line (indicated by 'G') the rock is predominantly a grainstone. Right of the red line (indicated by 'P') the rock is primarily a packstone. The large feature indicated by 'E' is interpreted to be a matrix-filled mold of an echinoid (sea urchin). The macropores seen at this scale are predominantly interparticle and moldic (shapes of most of the moldic pores indicate they are likely pores created by the dissolution of mollusk (bivalve) and other shell fragments. Large orbitoid foraminifers (*Lepidocyclina* sp. - e.g. Figure 2) are most abundant and are typically about 10 millimeters in diameter. Other macrofossils (gastropods, bivalves - e.g. Figure 3, bryozoans) are much less common.

Figure 2. *Lepidocyclina* sp.
(diameter of test is 7 millimeters)

Figure 3. Bivalve
(long dimension of shell is 7 millimeters)

Petrography

Samples chosen for thin section and XRD analysis were taken from near the top of the core section (left side of Figure 1, grainstone portion of the rock). XRD data (Table 1) indicates the rock is 100% calcite. Petrographic data indicates this part of the

Table 1.

Sample Information		Whole Rock Mineralogy (Weight %)								Relative Clay Abundance (Normalized to 100%)				
Sample #	Depth	Quartz	K-Feldspar	Plagioclase	Calcite	Dolomite	Siderite	Pyrite	Total Clay	Smectite	Illite / Smectite	Illite & Mica	Kaolinite	Chlorite
1	Unknown	Tr	0	0	100	0	0	0	0	0	0	0	0	0

Tr=Trace (<0.5%)

rock is a bioclastic grainstone (Plate 2, Photo A). The allochems are intraclasts and various types of bioclasts. The larger bioclasts seen in the thin sections include pieces of gastropods, mollusk shell fragments (typically bored, e.g. Plate 2, Photo B), and orbitoid foraminifera tests (e.g. Plate 1, Photo A). The smaller grains include pieces of mollusk shells, echinoid spines, bryozoans, coralline algae, codiacean algae, and several kinds of foraminifera (biserial, miliolids, orbitoid fragments). Non-skeletal clasts are predominantly intraclasts (e.g. Plate 2, Photo A). The typical size of the smaller grains (bioclasts and non-skeletal) is about 0.209 millimeter (fine sand size on Wentworth scale). Almost all of the grains have a micrite rim and a subsequent coating

of isopachous/fringing cement (e.g. Plate 3, Photo A). The isopachous/fringing cement coats the exterior surface of the grains and also chambers and voids in bioclasts such as miliolid foraminifer tests (e.g. Plate 3, Photo C). Small amounts of sparry calcite cement occur throughout the thin section. It typically occurs as an interparticle cement, often attached to larger bioclasts (e.g. Plate 2, Photos B and C). The sparry calcite cement also occurs as cement filling chambers in some of the foraminifer tests (e.g. Plate 3, Photo C).

Visually estimated porosity of the thin section is about 30-35%. Pore-types include moldic, intraparticle, and interparticle. The moldic pores are typically the largest pores and appear to be the result of the dissolution of mollusk shell fragments (Plate 2, Photo A). Moldic pores also result from the near-complete dissolution of grains, where only a micrite rim or isopachous cement remains to indicate the previous existence of a grain. Intrapartice porosity includes un-cemented chambers in foraminifer tests, pores in other bioclasts, and partially dissolved intraclasts (e.g. Plate 3, Photo A). Interparticle pores (e.g. Plate 3, Photo B) are the most abundant pore-type in this rock and account for about 2/3 of the total porosity.

Reference List

Scholle, P.A., Ulmer-Scholle, D.S., 2003, ***A Color Guide to the Petrography of Carbonate Rocks: Grains, textures, porosity, diagenesis***; American Association of Petroleum Geologists Memoir 77, 474p.

Thank you for this opportunity to be of service. If you have any questions, or if we can be of further assistance, please feel free to give us a call. One copy of this report was delivered to Mr. Clayton McMillan (South Florida Water Management District, West Palm Beach, Florida). The remainder of the core and the thin section were returned to returned to the client, along with the final report.

Barry E. Wawak
Senior Geologist
Reservoir Geology
Core Laboratories

Plate 1

South Florida Water Management District

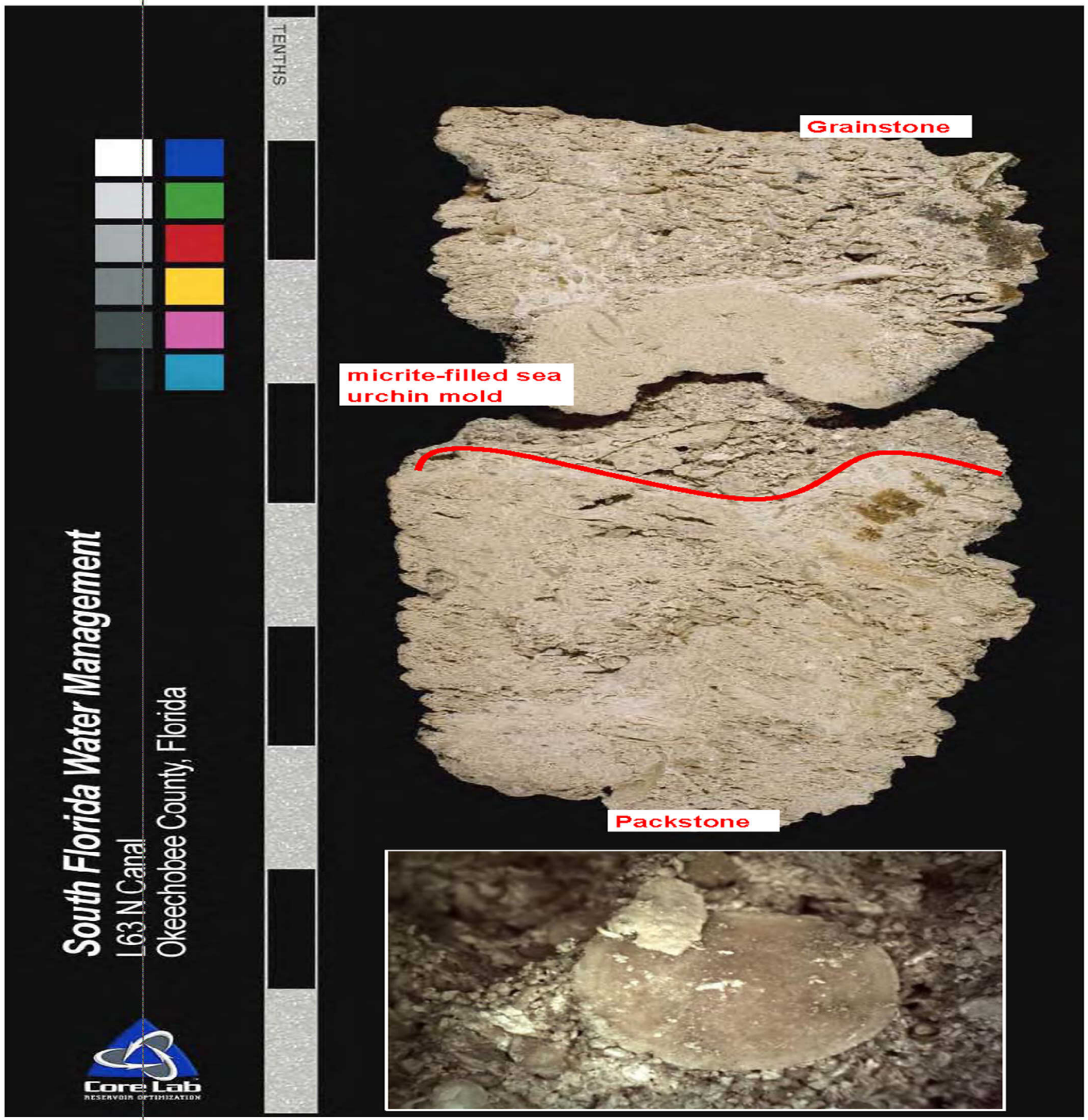
L63N Core
Okeechobee Co., Florida

XRD Data
Bulk Mineralogy (wt. %)

Quartz - Trace
Calcite - 100%

Core Photo

Approximately 7-inches of conventional core was available for description. The core has a light tan to beige color and is friable. The upper half of the core (above the red line) has a grainstone texture. This part of the core consists of macrofossils, broken pieces of fossil shells and clasts, with very little matrix. Macrofossils include large orbitoid foraminifera (*Lepidocyclina* sp.), gastropods, and bryozoans. A photo of a *Lepidocyclina* sp. test is shown in the inset photo. The diameter of the foraminifer test is 7 millimeters. A large clast-like feature near the base of the grainstone-interval appears to be an echinoid (sea urchin) mold that is filled with micrite. Moldic pores and interparticle pores are the dominant pore types in this part of the core. The lower half of the core (below the red line) has a packstone texture which reflects elevated amounts of micrite in this part of the core. This is indicated by a marked reduction of open macro-pores. The identifiable macrofossil content of this part of the core is similar to the upper part. Moldic pores are more abundant than interparticle pores in this part of the core.



South Florida Water Management District
L63N Canal Core
Okeechobee Co., Florida

Plate 2

South Florida Water Management District

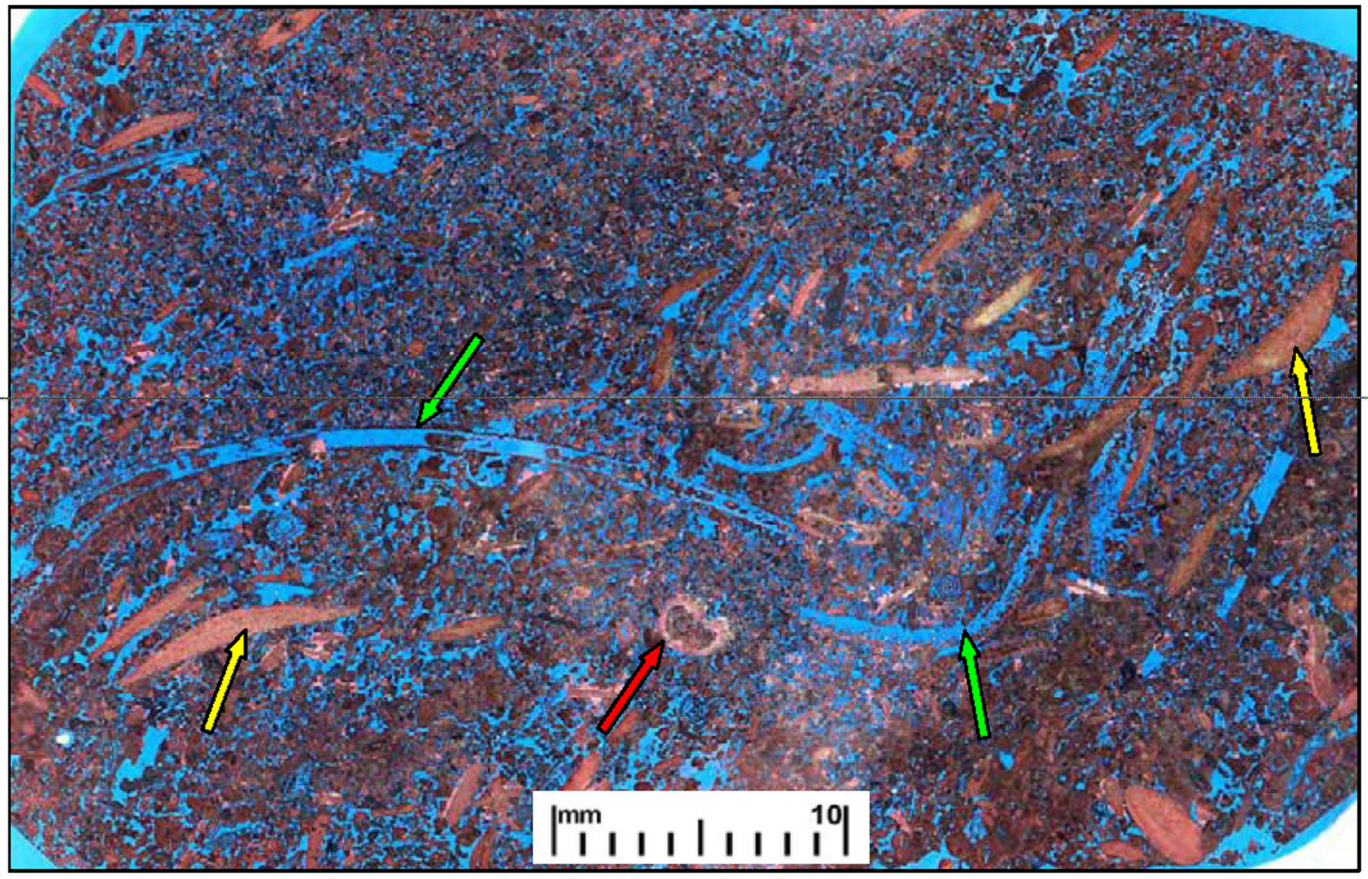
L63N Core
Okeechobee Co., Florida

XRD Data
Bulk Mineralogy (wt. %)

Quartz - Trace
Calcite - 100%

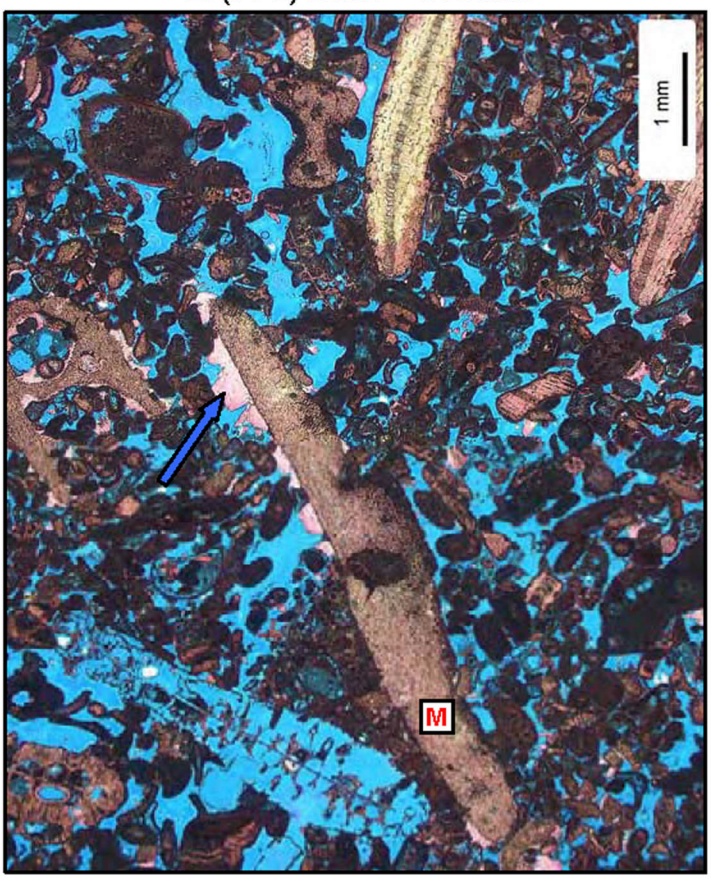
Thin Section Scan and Photomicrographs

The thin section was made from the grainstone part of the core. The thin sections also contains scattered, small areas of microcrystalline micrite matrix (not indicated in photomicrographs). Photo A is a scan of the thin section that shows the texture of the rock and the distribution of the larger skeletal grains. Note occurrence of large orbitoid foraminifer tests (yellow arrows) and a gastropod cross section (red arrow). Note also the occurrence of moldic pores that appear to be the result of dissolution of bivalve shell fragments (green arrows). The higher magnification photos show the details of the predominant allochems, most of which have micrite coats and isopachous rim cement. The average size of these smaller grains is about 0.209 millimeters (fine sand size - Wentworth scale). The variety of grains include intraclasts, rare ooids/coated grains and numerous bioclasts. Identifiable bioclasts include fragments of coralline algae, codiacean algae (lower left corner, Photo B), echinoderm spines, mollusk shell fragments (often bored, e.g. M, Photo B), bryozoan fragments, and several different kinds of foraminifer (biserial, miliolids, as well as fragments of the much larger orbitoids). Sparry calcite cement is relatively rare, but is typically seen attached to some of the larger mollusk shell fragments (blue arrows, Photos B and C). Photo B is a good example of an area of the thin sections where the macroporosity consists predominantly of interparticle pores.

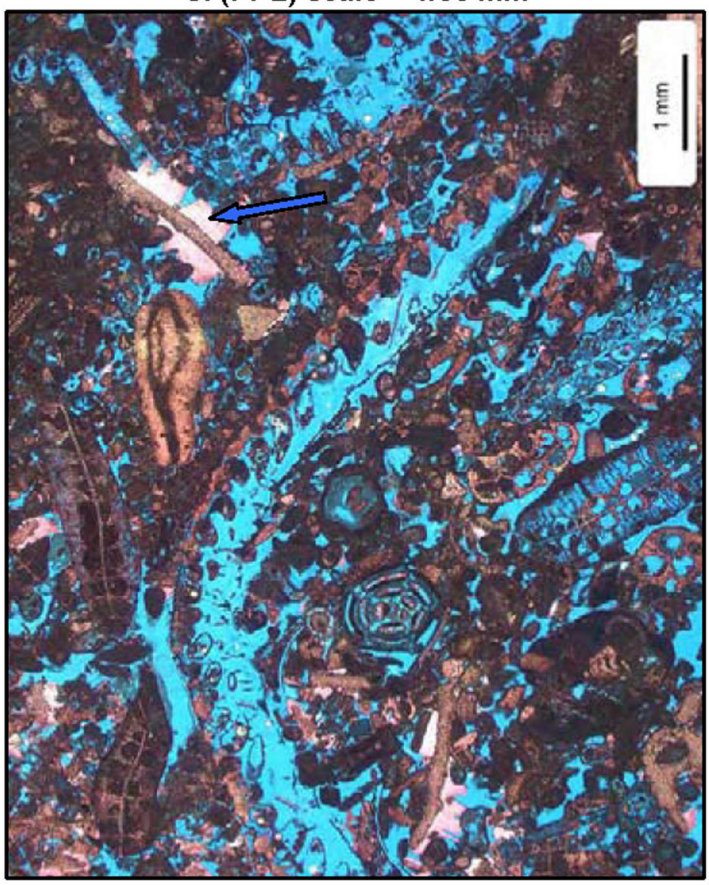


A. (PPL) Thin Section scan

B. (PPL) scale = 1.00 mm



C. (PPL) scale = 1.00 mm



South Florida Water Management District
L63N Canal Core, Okeechobee Co., Florida

Plate 3

South Florida Water Management District

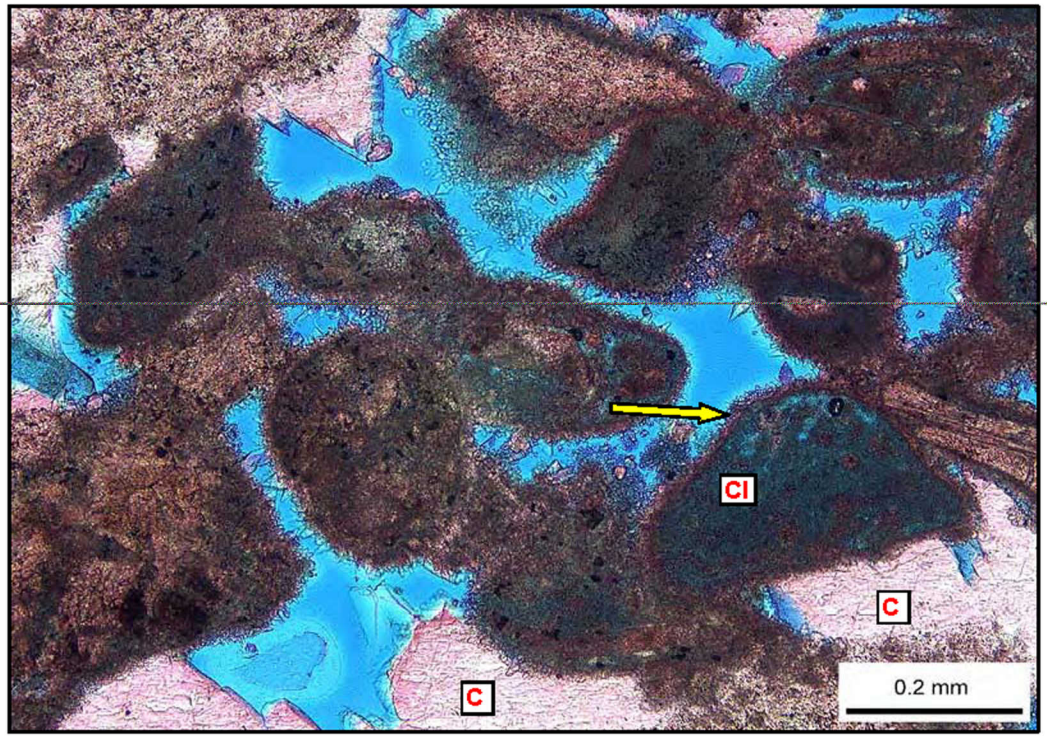
L63N Core
Okeechobee Co., Florida

XRD Data
Bulk Mineralogy (wt. %)

Quartz - Trace
Calcite - 100%

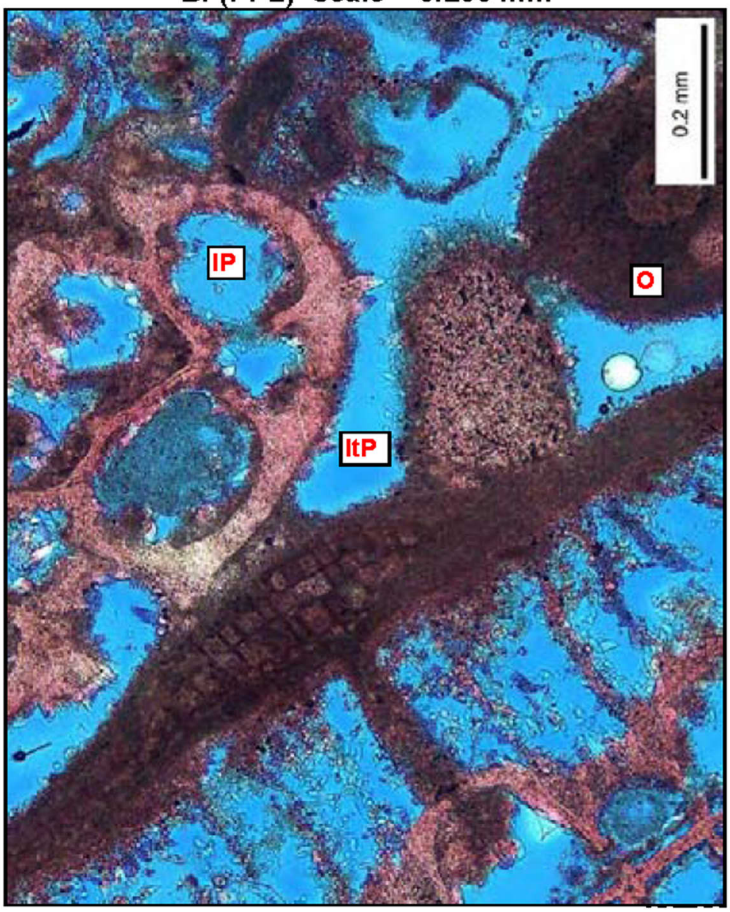
Thin Section Photomicrographs

These are higher magnification photomicrographs showing some of the small-scale petrographic features of the rock. Sparry calcite cement is rare in the thin section. It occurs as scattered interparticle cement ('C', Photo A) and occasionally fill voids in some of the larger bioclasts (lower right, Photo C, where the calcite cement fills chambers in a miliolid foraminifer test). Ooids/coated grains ('O', Photo B) are rare in the thin section. Most of the micrite clasts show varying degrees of dissolution that create intraparticle pore space ('CI', Photo A). Almost all of the grains have 1) a micrite rim, probably caused by algal boring, and 2) and isopachous rim cement coating the micrite rim (e.g. yellow arrow, Photo A). Photo B shows the two predominant types of macropores; 1) intraparticle pores (IP - Photo B, un-cemented chambers in a foraminifer test), and 2) interparticle pores (ItP - Photo B), occurring between the allochems/bioclasts.

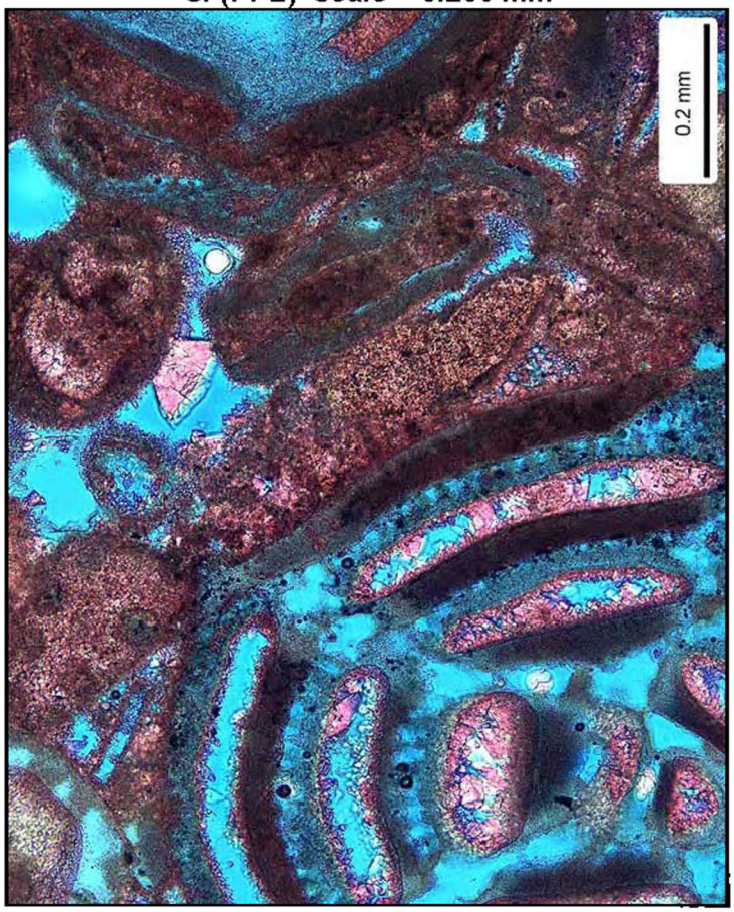


A. (PPL) scale = 0.200 mm

B. (PPL) scale = 0.200 mm



C. (PPL) scale = 0.200 mm



South Florida Water Management District
L63N Canal Core
Okeechobee Co., Florida

I

Geophysical Logs and Video Survey

Note: Video Survey available on DVD.

ABS

Advanced Borehole Services

X-Y CALIPER GRAY

OKF-106

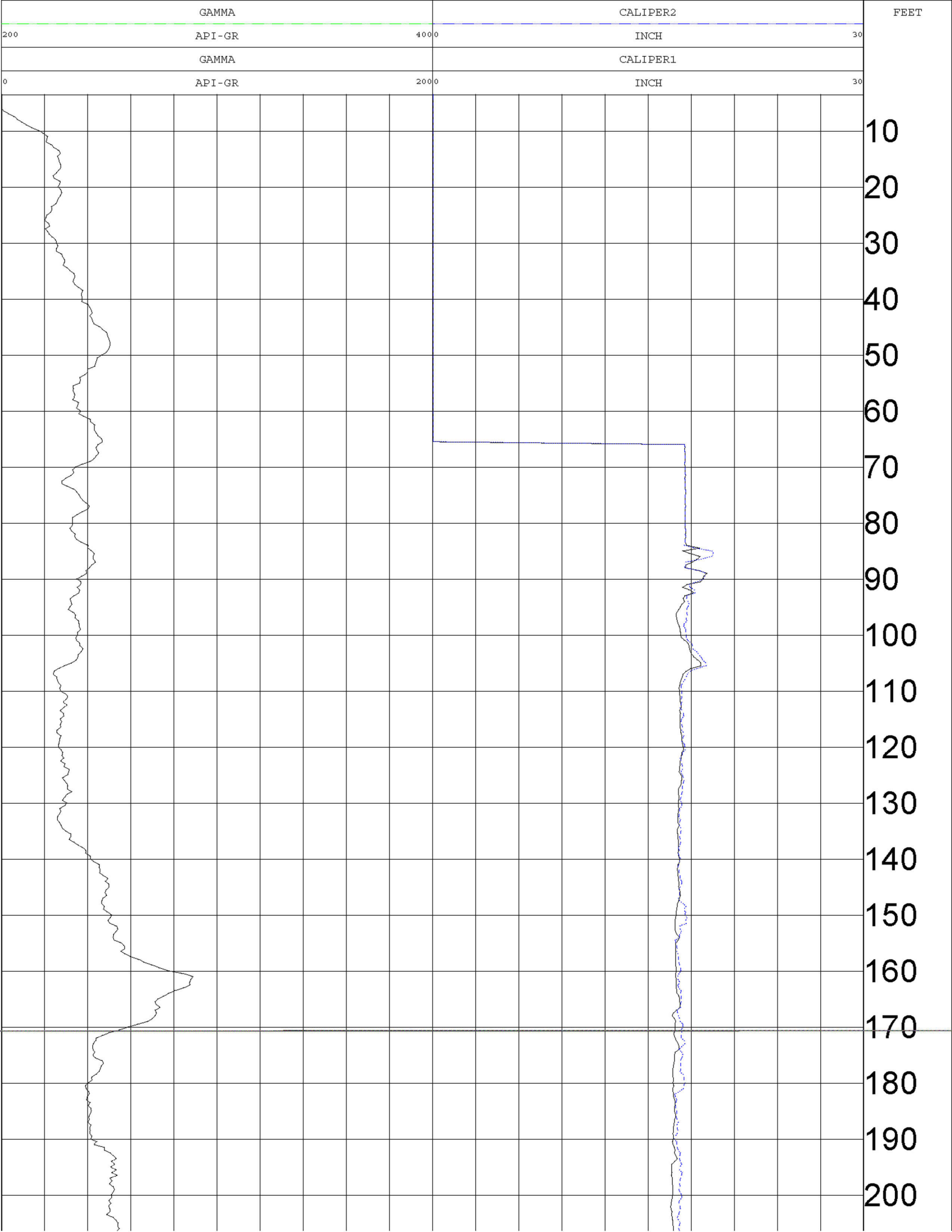
COMPANY	:	APPLIED DRILLING	OTHER SERVICES: DIL
WELL	:	OKF-106	
FIELD	:		
COUNTY	:	OKEECHOBEE	
STATE	:	FLORIDA	

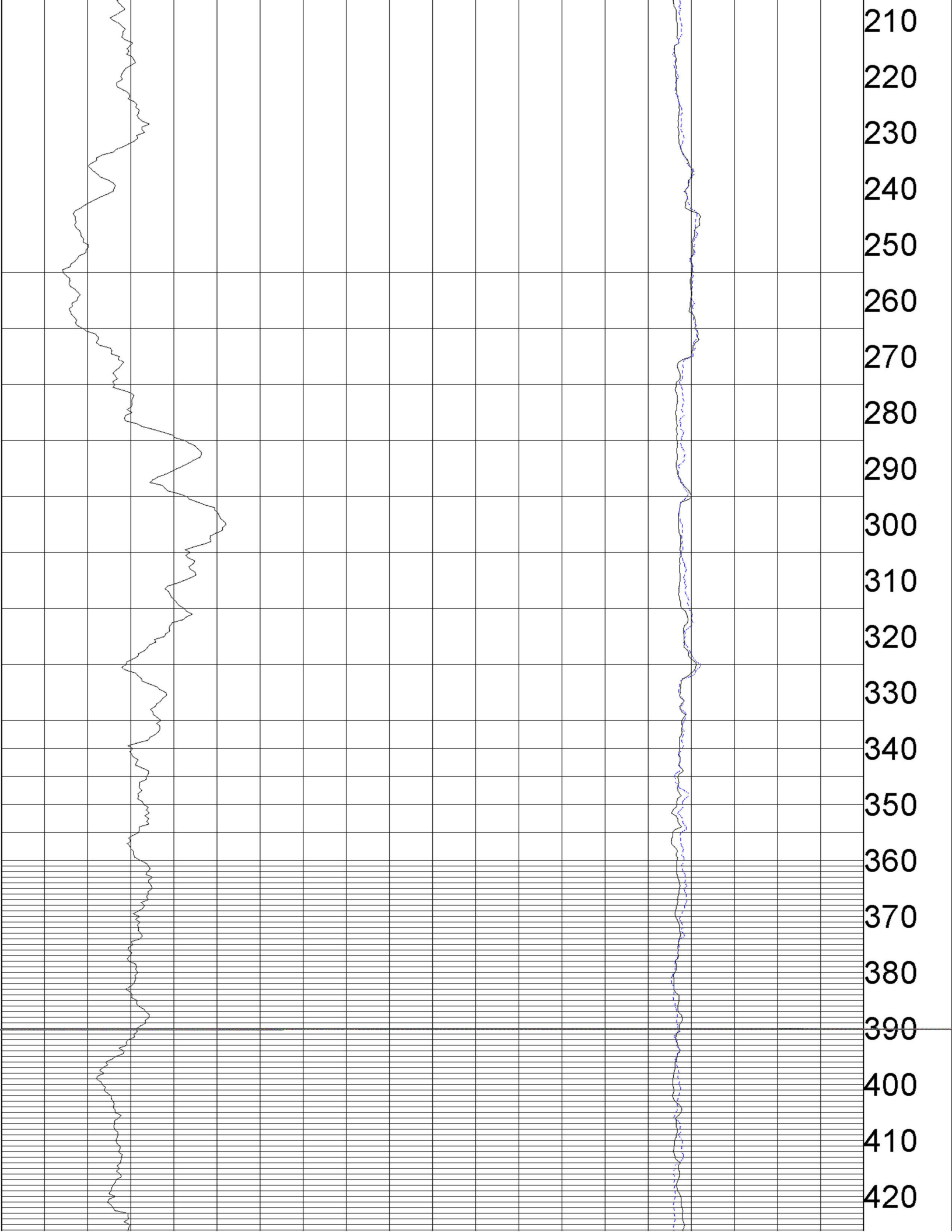
LOCATION	:		
SECTION	:		
TOWNSHIP	:		
RANGE	:		
API NO.	:		
UNIQUE WELL ID.	:		

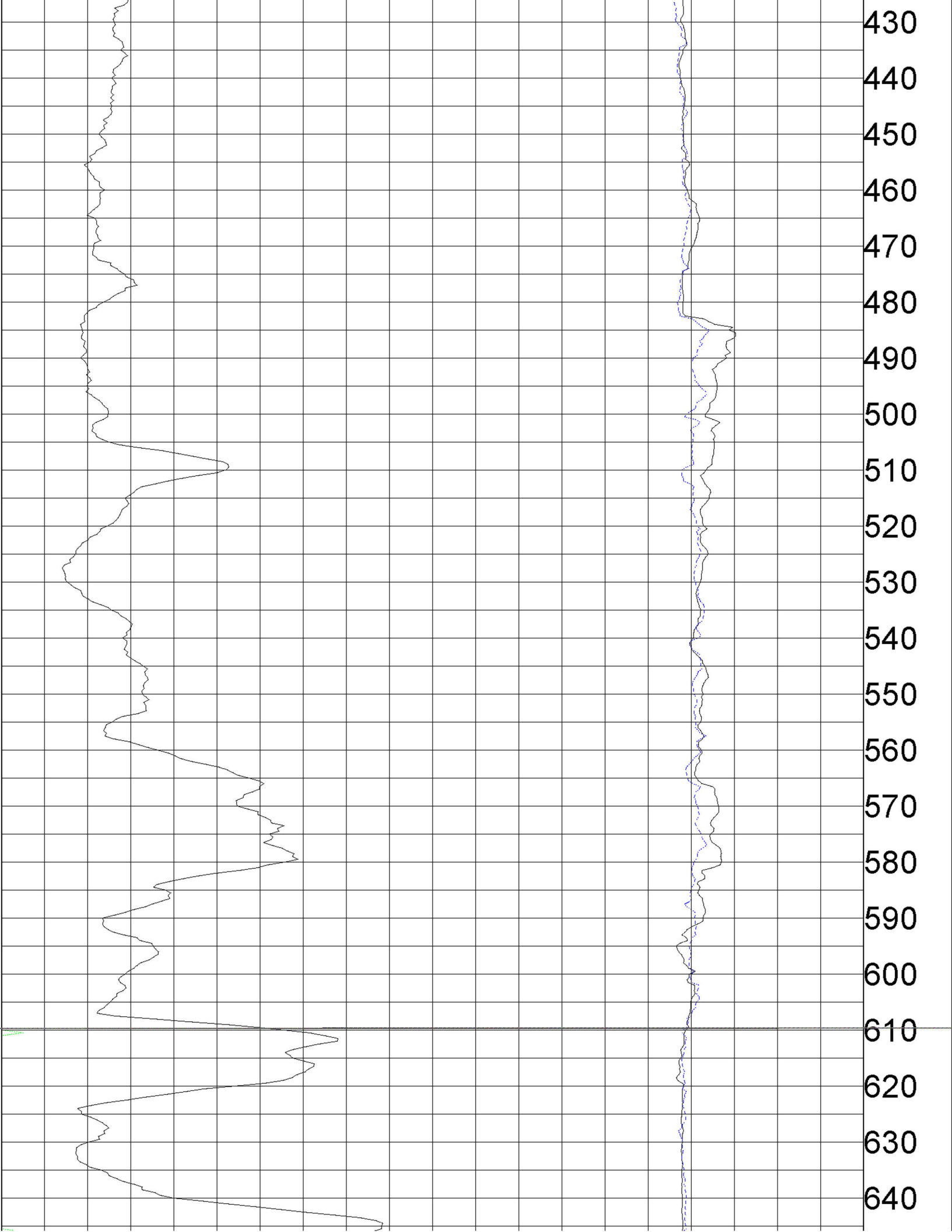
PERMANENT DATUM	:	MSL	ELEVATION KB :
LOG MEASURED FROM:		GS	ELEVATION DF :
DRL MEASURED FROM :		GS	ELEVATION GL:

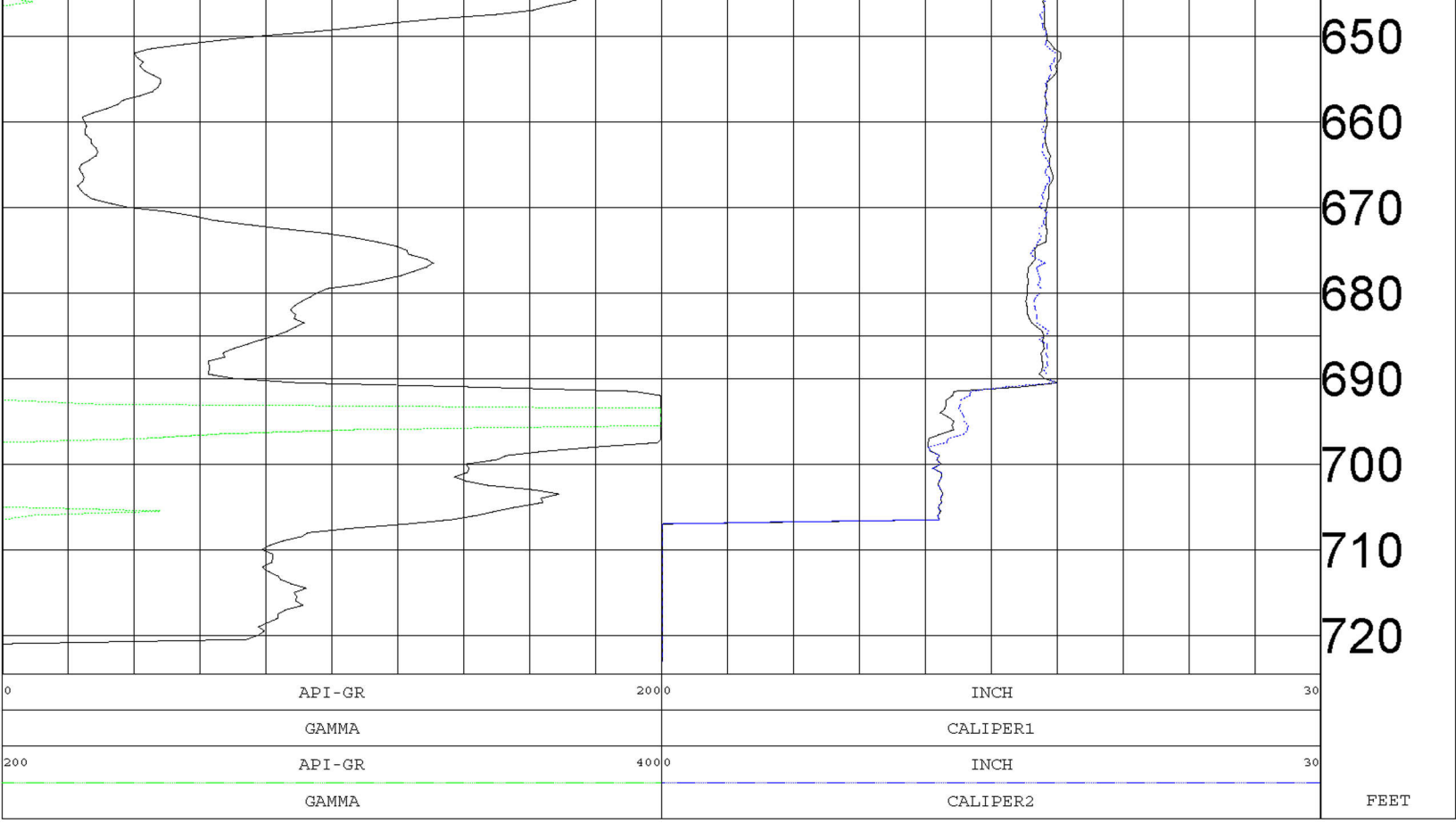
DATE	:	07.25.08
DEPTH DRILLER	:	720
BIT SIZE	:	17
LOG TOP	:	3.50
LOG BOTTOM	:	724.00
CASING OD	:	
CASING BOTTOM	:	83
CASING TYPE	:	STEEL
BOREHOLE FLUID	:	MUD
RM TEMPERATURE	:	
MUD RES	:	
MUD WEIGHT	:	
WITNESSED BY	:	

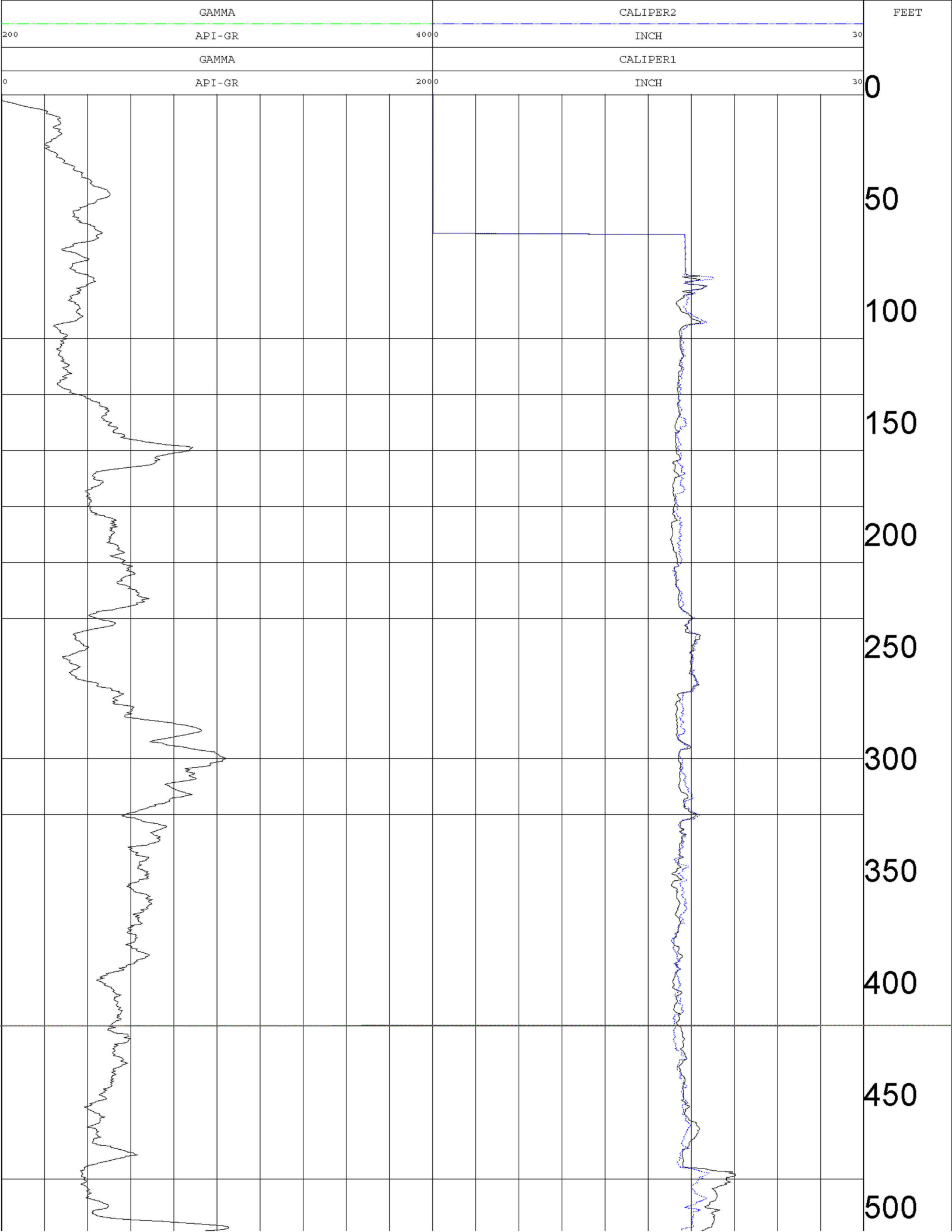
RECORDED BY	:	AFB
REMARKS 1	:	
REMARKS 2	:	

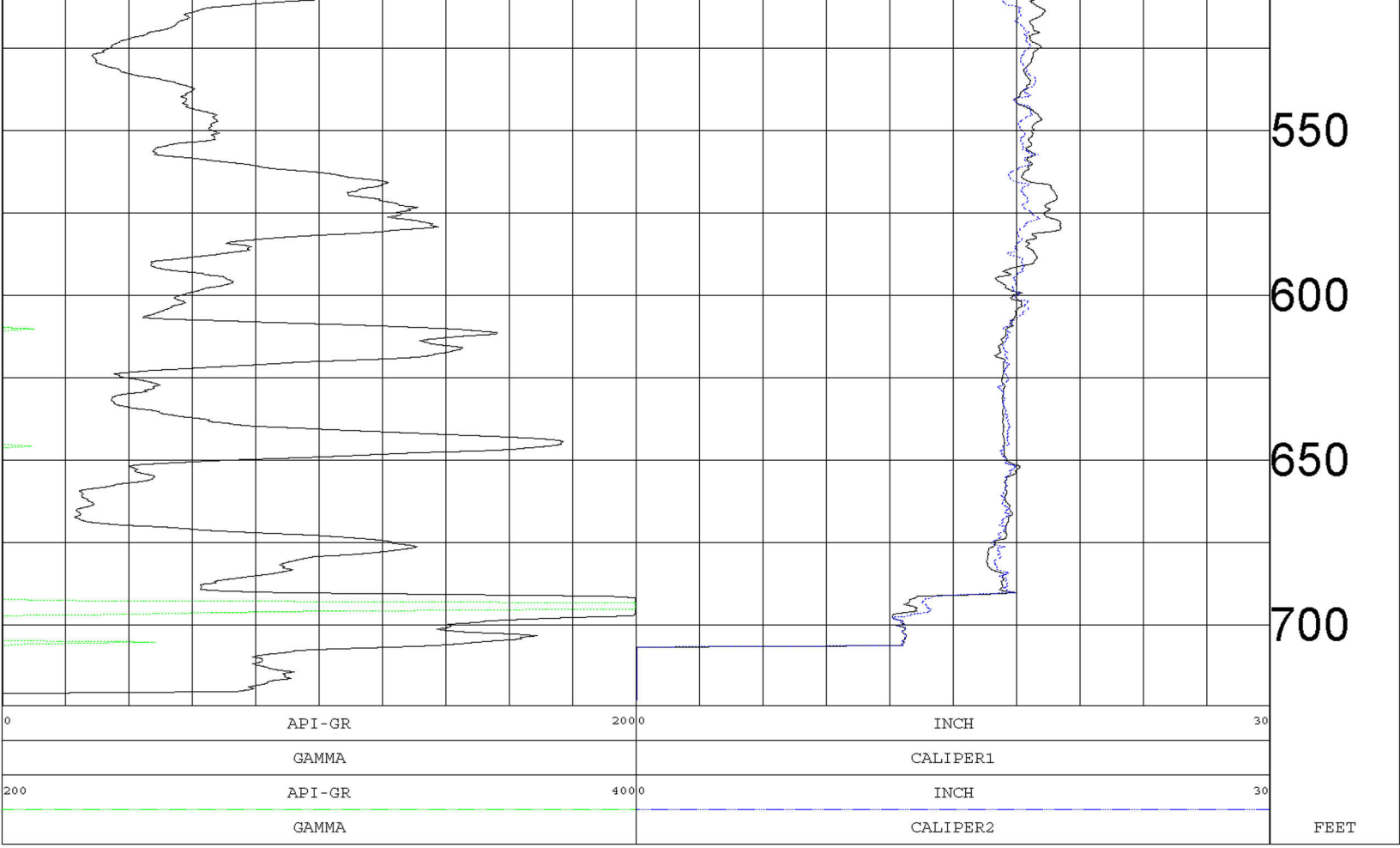

GAMMA
200
API-GR
400
GAMMA
0
API-GR
200
CALIPER2
0
INCH
30
CALIPER1
0
INCH
30
FEET
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200

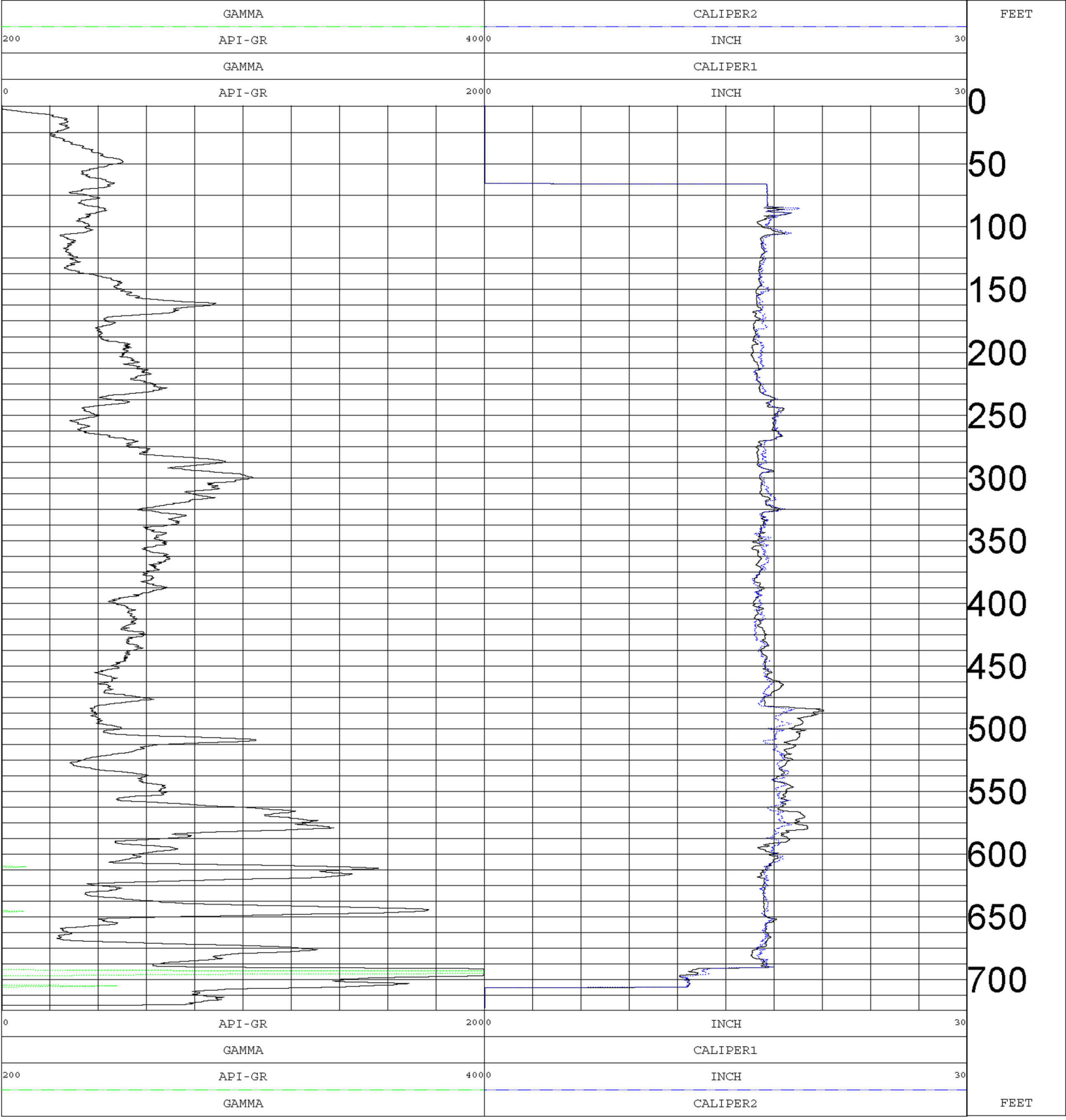

210
220
230
240
250
260
270
280
290
300
310
320
330
340
350
360
370
380
390
400
410
420


430
440
450
460
470
480
490
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640


650
660
670
680
690
700
710
720
0
API-GR
200
0
INCH
30
GAMMA
CALIPER1
200
API-GR
400
0
INCH
30
GAMMA
CALIPER2
FEET


GAMMA
200
API-GR
400
GAMMA
0
API-GR
200
CALIPER2
0
INCH
30
CALIPER1
0
INCH
30
FEET
0
50
100
150
200
250
300
350
400
450
500


550
600
650
700
0
API-GR
200
GAMMA
0
INCH
30
CALIPER1
200
API-GR
400
GAMMA
0
INCH
30
CALIPER2
FEET


GAMMA
200
API-GR
400
0
API-GR
200
0
API-GR
200
GAMMA
200
API-GR
400
GAMMA
CALIPER2
0
INCH
30
CALIPER1
0
INCH
30
0
INCH
30
CALIPER1
0
INCH
30
CALIPER2
FEET
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
FEET

ABS

Advanced Borehole Services

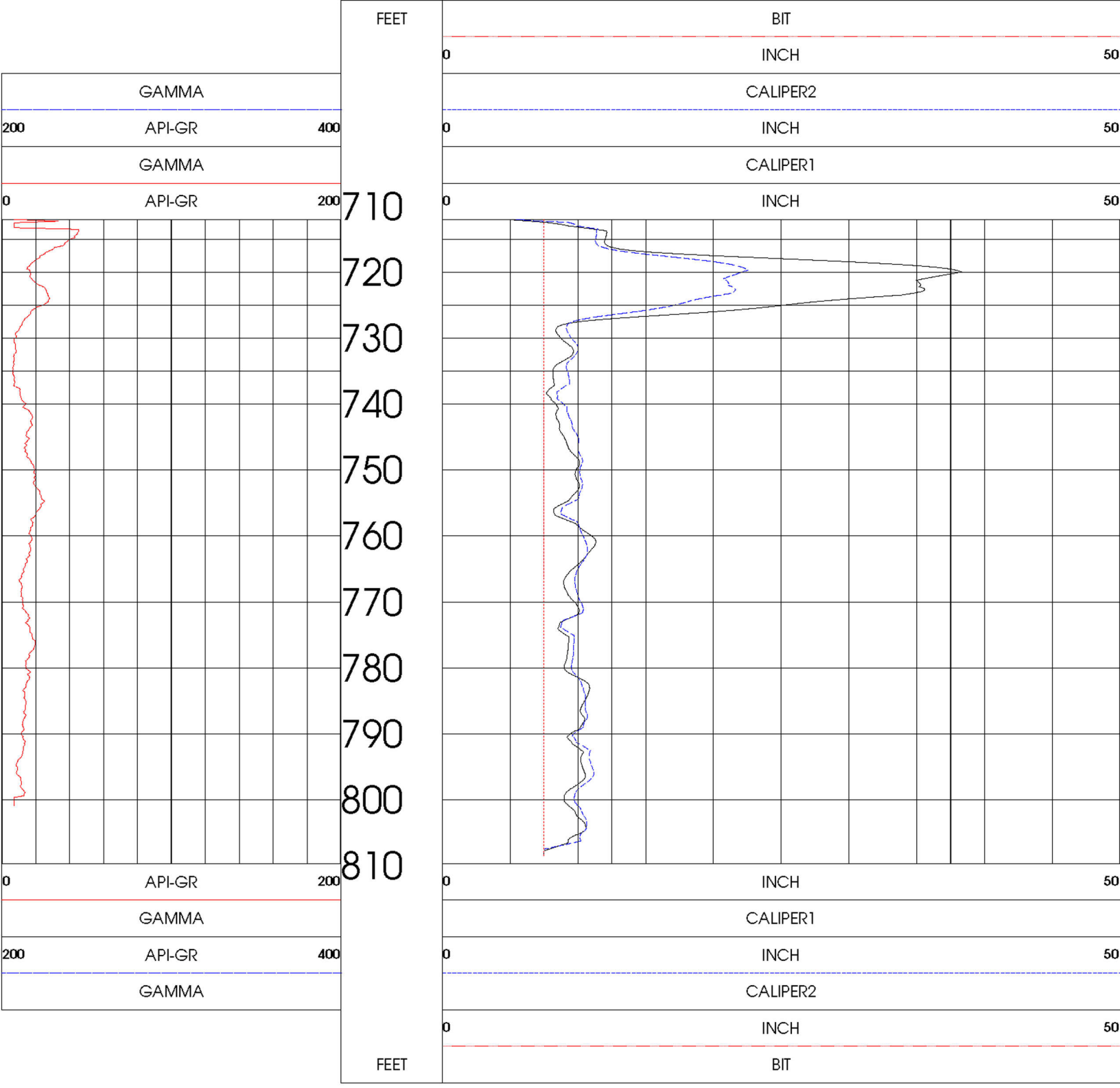
X-Y CALIPER GRAY COMPLETION SUITE OKF-106

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: VIDEO COMPLE
WELL	: OKF-106	
FIELD	: L63 NORTH CANAL	
COUNTY	: OKEECHOBEE	
STATE	:	

LOCATION	: L63 NORTH CANAL	
SECTION	:	
TOWNSHIP	:	
RANGE	:	
API NO.	:	
UNIQUE WELL ID.	:	

PERMANENT DATUM	: MSL	ELEVATION KB :
LOG MEASURED FROM:	PAD	ELEVATION DF :
DRL MEASURED FROM :	GS	ELEVATION GL:

DATE	: 09.08.08	
DEPTH DRILLER	: 804	
BIT SIZE	: 7.8	
LOG TOP	: 701.22	
LOG BOTTOM	: 808.87	
CASING OD	:	
CASING BOTTOM	: 717	
CASING TYPE	: CERTAL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	:	
MUD RES	:	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	:	


FEET
BIT
0
INCH
50
GAMMA
CALIPER2
200
API-GR
400
0
INCH
50
GAMMA
CALIPER1
0
API-GR
200
0
INCH
50
710
720
730
740
750
760
770
780
790
800
810
0
API-GR
200
0
INCH
50
GAMMA
CALIPER1
200
API-GR
400
0
INCH
50
GAMMA
CALIPER2
0
INCH
50
FEET
BIT

ABS
Advanced Borehole Services

DUAL INDUCTION-GAMMA RAY

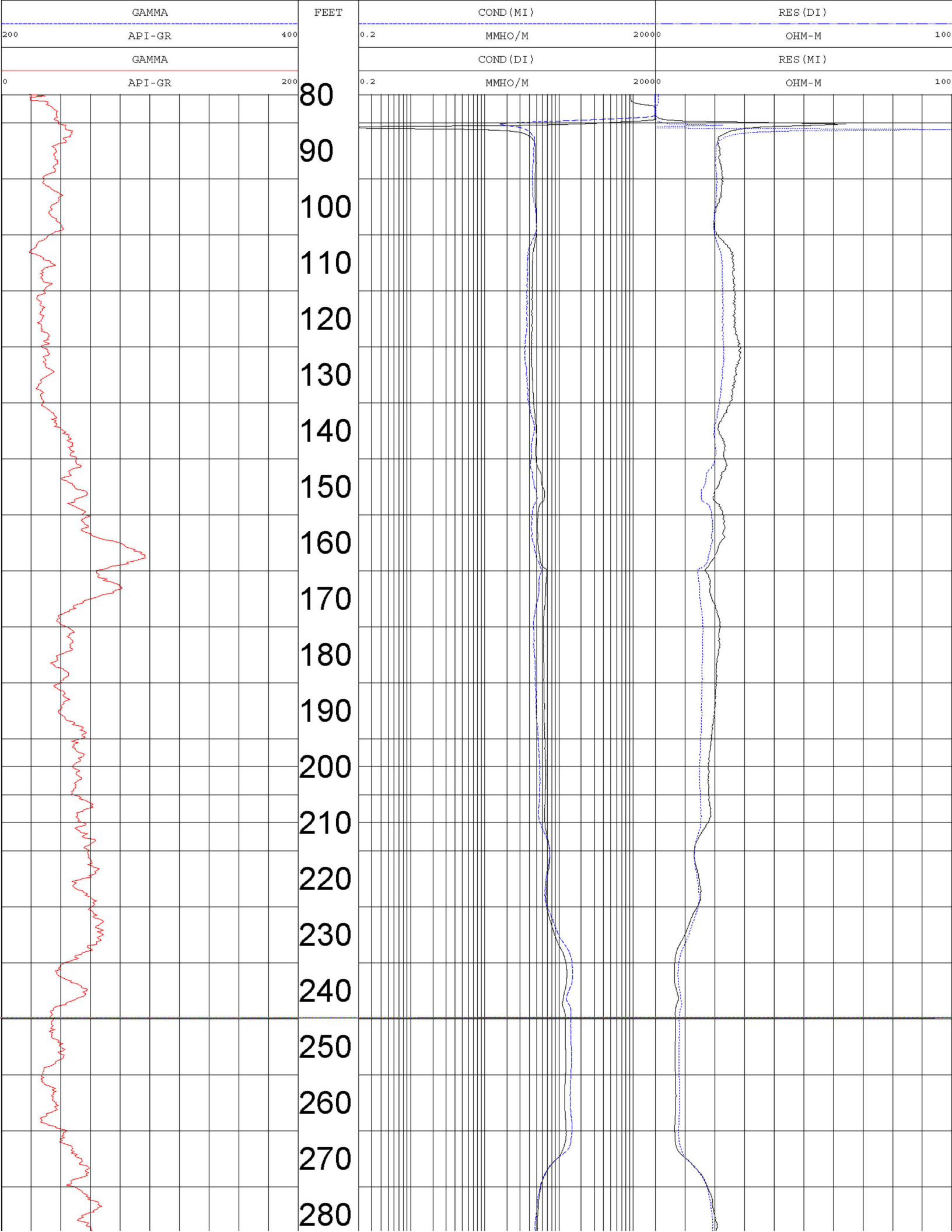
OKF106

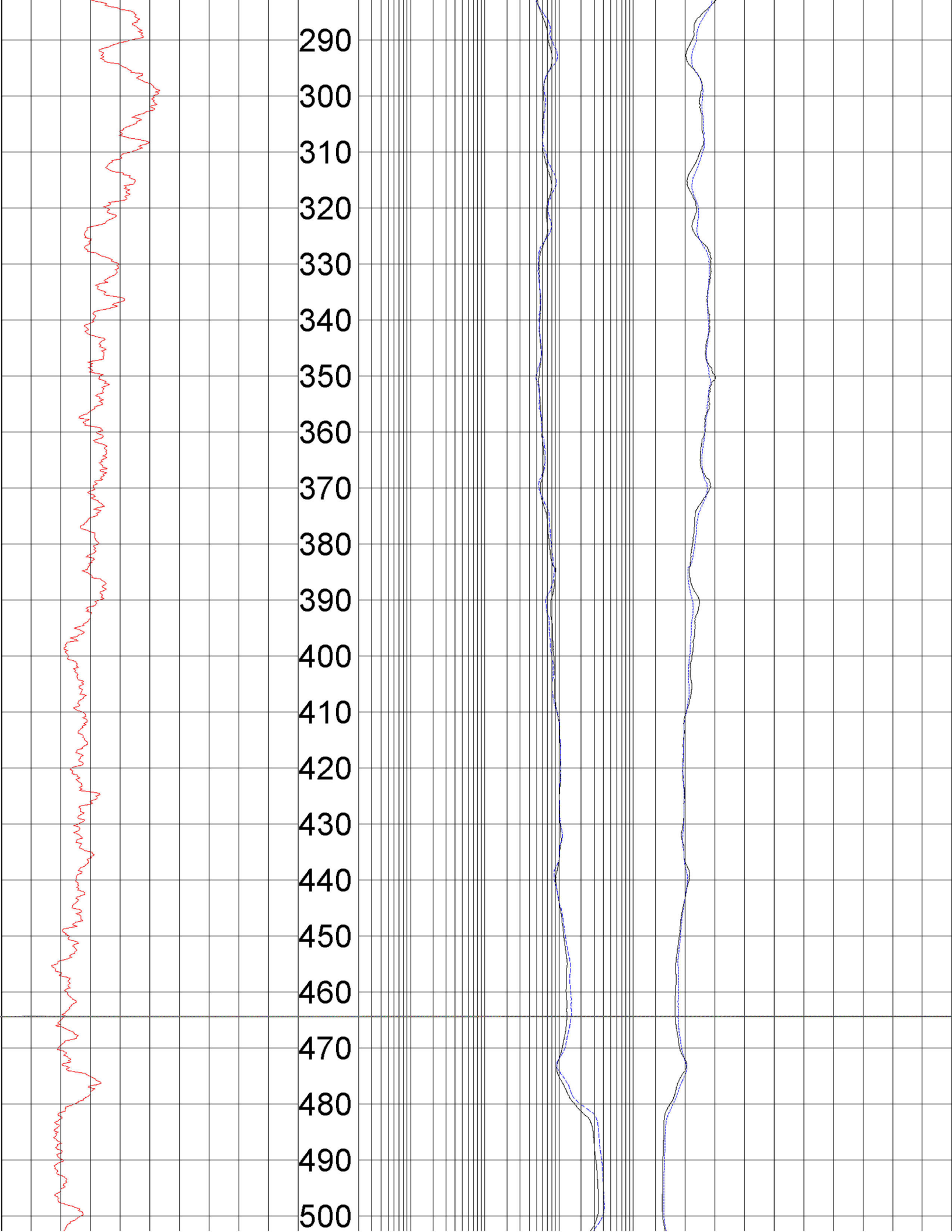
COMPANY	: APPLIED DRILLING	OTHER SERVICES: XY
WELL	: OKF106	
FIELD	:	
COUNTY	: OKEECHOBEE	
STATE	: FLORIDA	

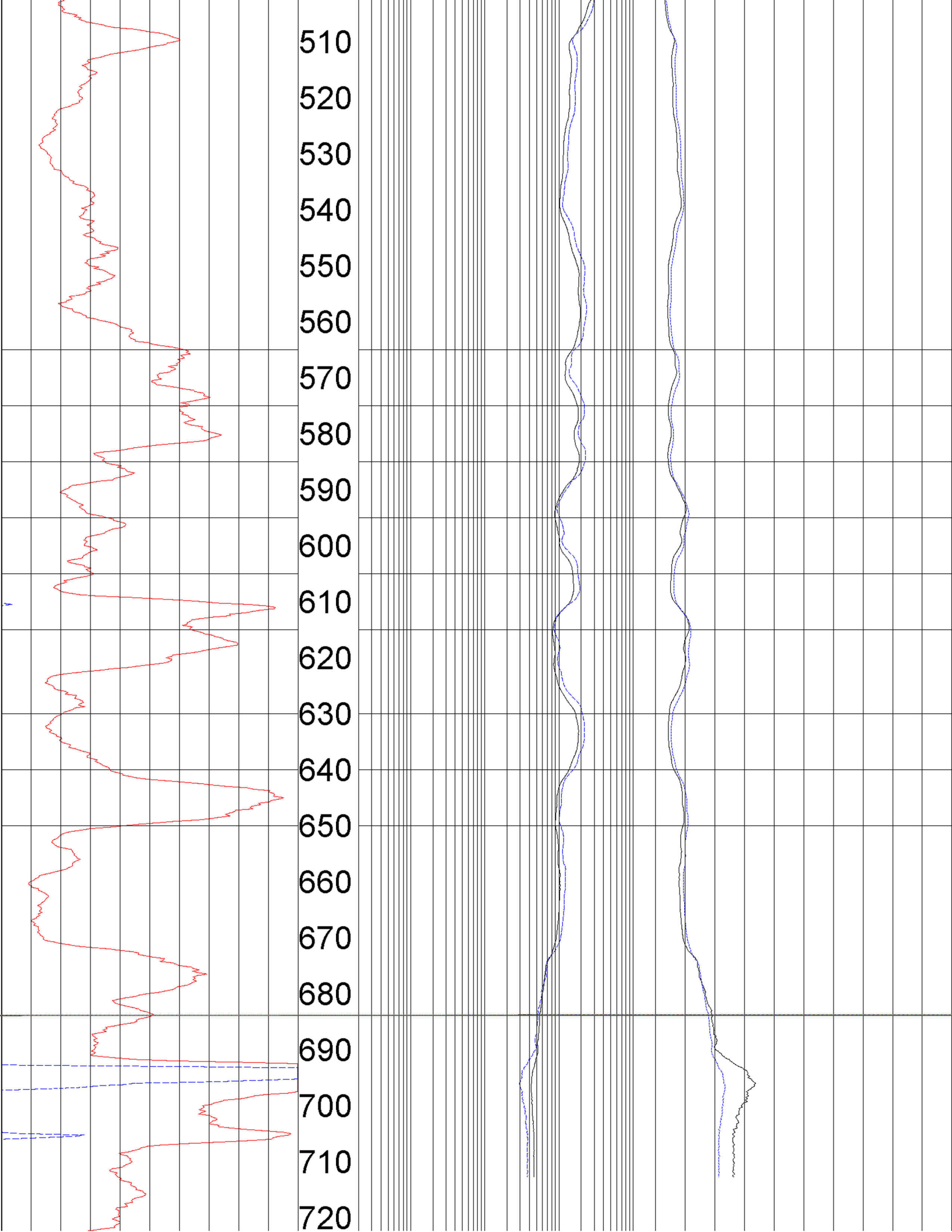
LOCATION	:	
SECTION	:	
TOWNSHIP	:	
RANGE	:	
API NO.	:	
UNIQUE WELL ID.	:	

PERMANENT DATUM	: MSL	ELEVATION KB :
LOG MEASURED FROM:	GS	ELEVATION DF :
DRL MEASURED FROM :	GS	ELEVATION GL:

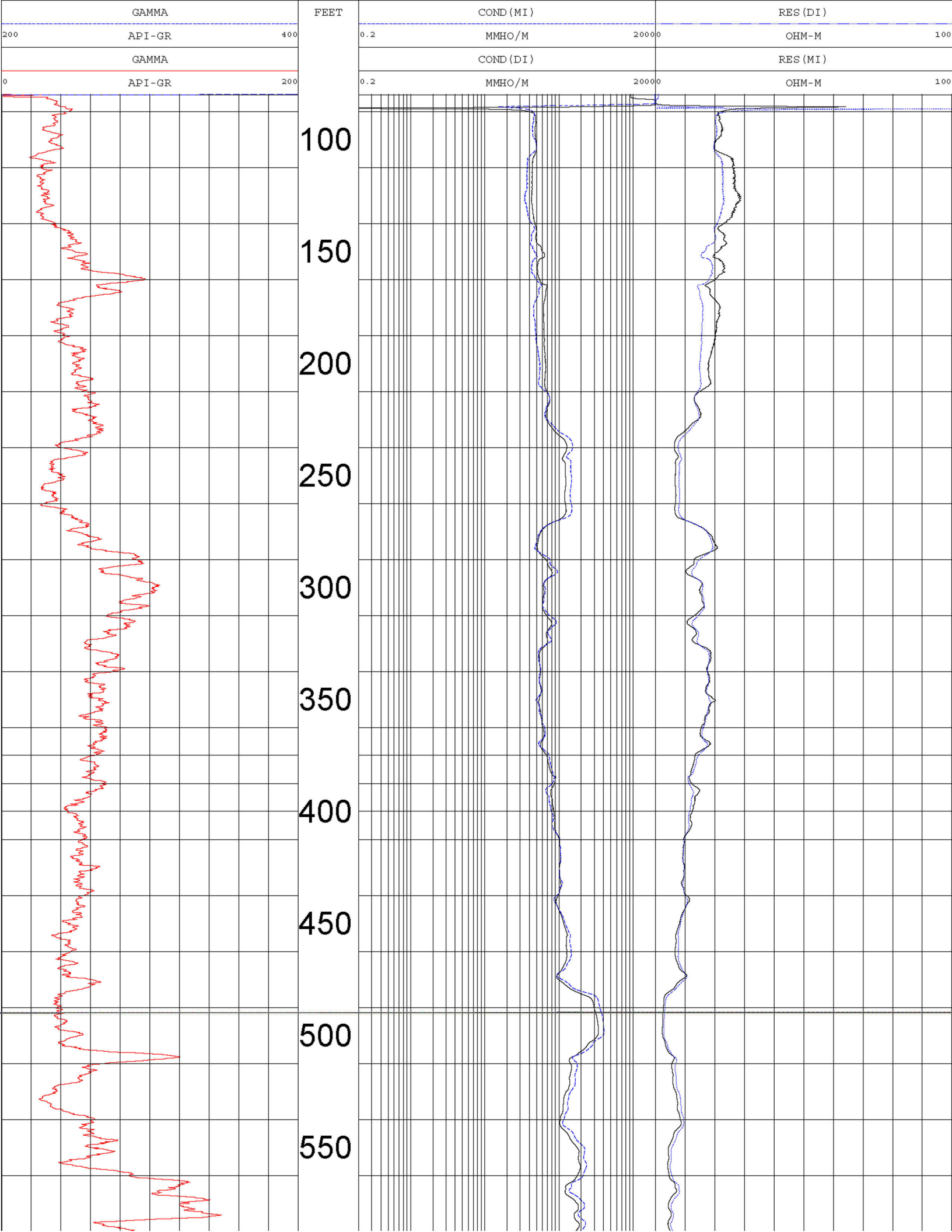
DATE	: 7.25.08	
DEPTH DRILLER	: 720	
BIT SIZE	: 17	
LOG TOP	: 3.50	
LOG BOTTOM	: 724.25	
CASING OD	:	
CASING BOTTOM	: 83	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: MUD	
RM TEMPERATURE	:	
MUD RES	:	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	:	

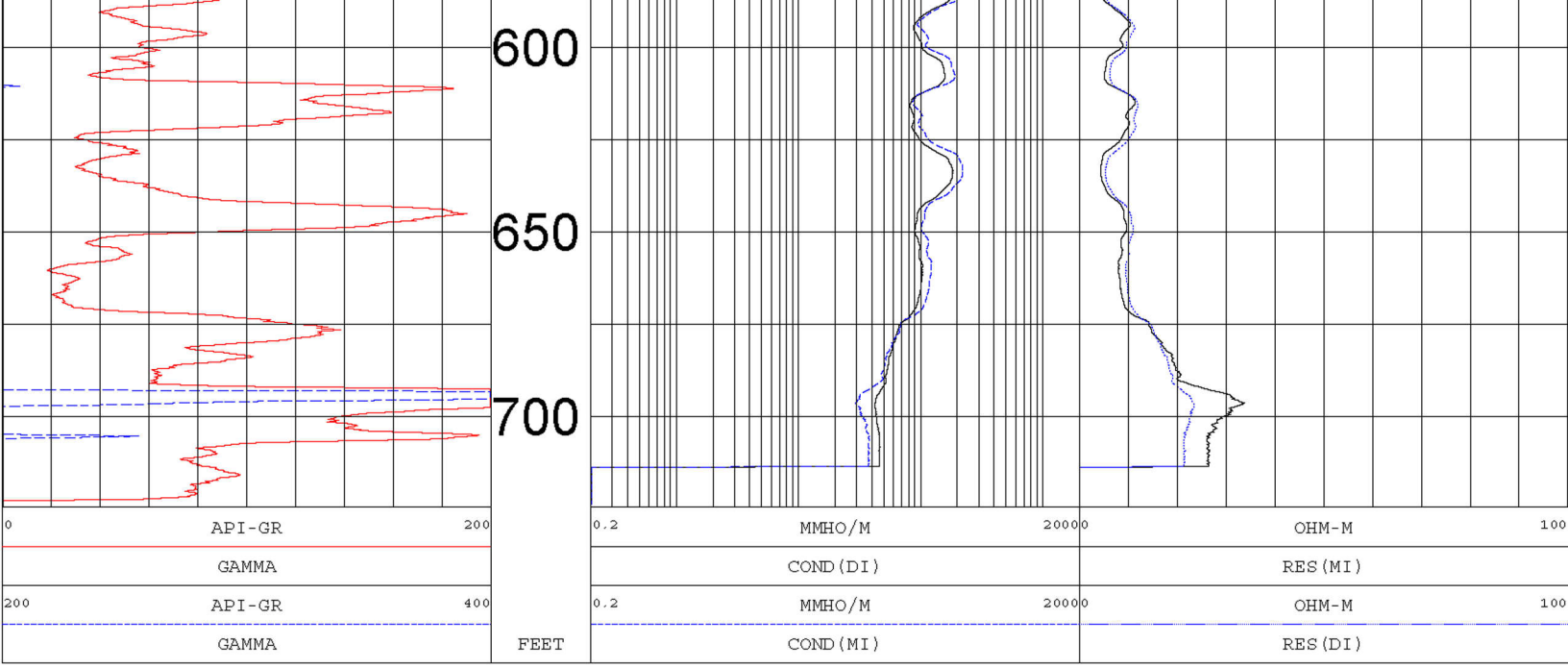

GAMMA
200
API-GR
400
GAMMA
0
API-GR
200
FEET
COND(MI)
0.2
MMHO/M
2000
COND(DI)
0.2
MMHO/M
2000
RES(DI)
0
OHM-M
100
RES(MI)
0
OHM-M
100
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280

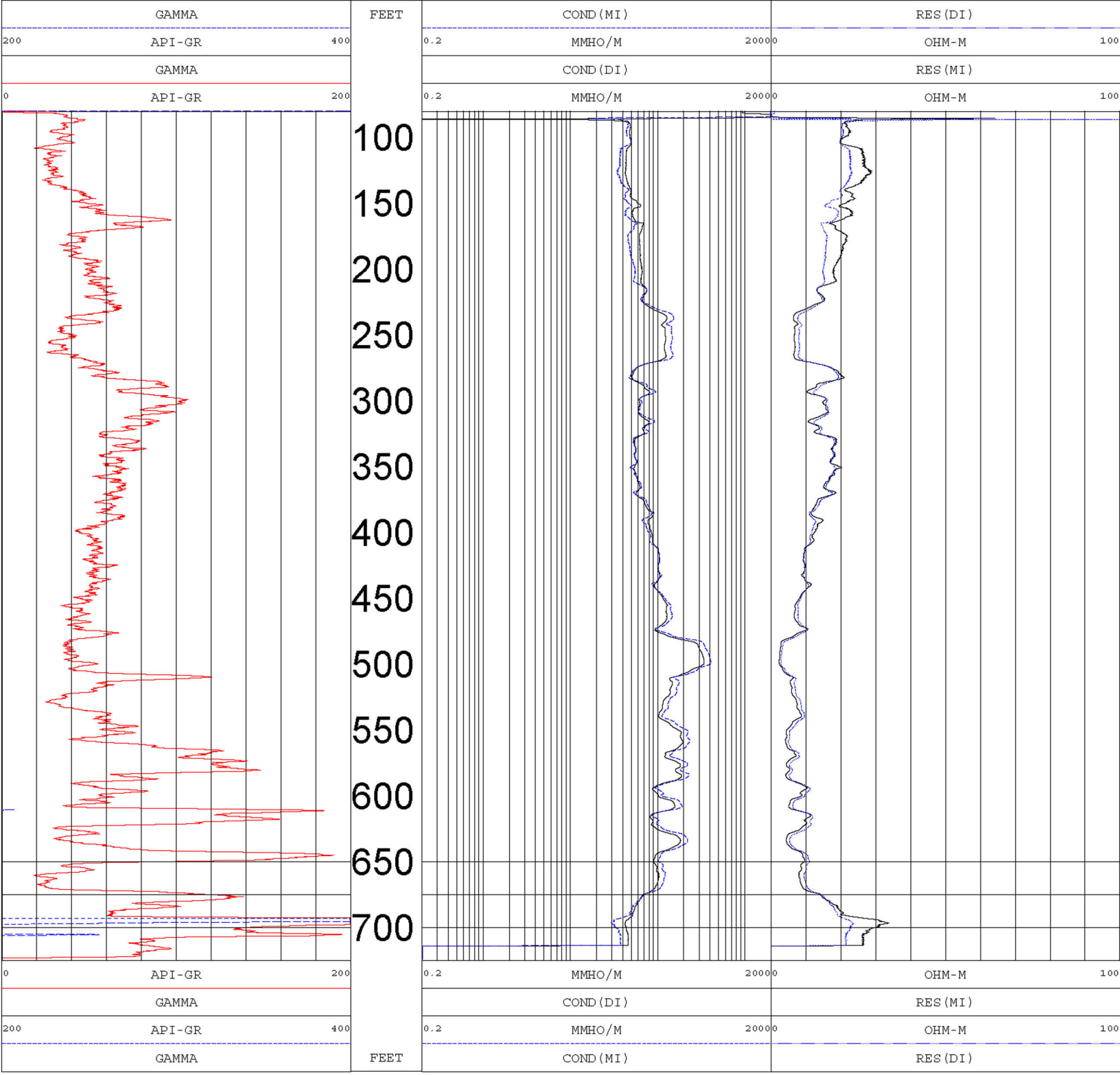

290
300
310
320
330
340
350
360
370
380
390
400
410
420
430
440
450
460
470
480
490
500


510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
710
720

0	API-GR	200		0.2	MMHO/M	20000	0	OHM-M	100
	GAMMA				COND(DI)			RES(MI)	
200	API-GR	400		0.2	MMHO/M	20000	0	OHM-M	100
	GAMMA		FEET		COND(MI)			RES(DI)	


GAMMA
200
API-GR
400
GAMMA
0
API-GR
200
FEET
COND(MI)
0.2
MMHO/M
2000
COND(DI)
0.2
MMHO/M
2000
RES(DI)
0
OHM-M
100
RES(MI)
0
OHM-M
100
100
150
200
250
300
350
400
450
500
550


600
650
700
0
API-GR
200
GAMMA
200
API-GR
400
GAMMA
FEET
0.2
MMHO/M
2000
COND(DI)
0.2
MMHO/M
2000
COND(MI)
0
OHM-M
100
RES(MI)
0
OHM-M
100
RES(DI)


GAMMA
200
API-GR
400
GAMMA
0
API-GR
200
FEET
COND(MI)
0.2
MMHO/M
2000
COND(DI)
0.2
MMHO/M
2000
RES(DI)
0
OHM-M
100
RES(MI)
0
OHM-M
100
100
150
200
250
300
350
400
450
500
550
600
650
700
0
API-GR
200
GAMMA
200
API-GR
400
GAMMA
FEET
COND(DI)
0.2
MMHO/M
2000
RES(MI)
0
OHM-M
100
COND(MI)
0.2
MMHO/M
2000
RES(DI)
0
OHM-M
100

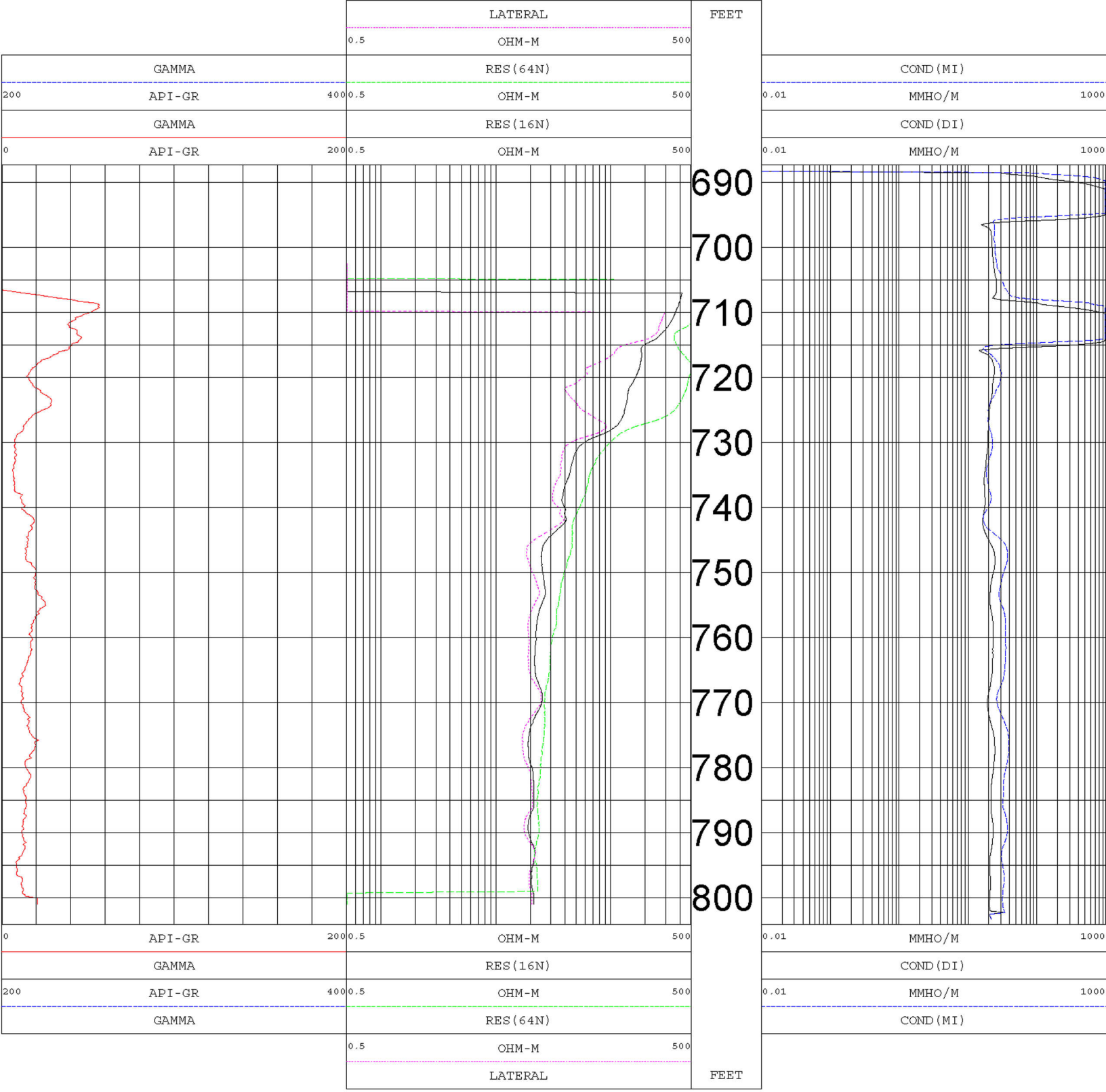
ABS
Advanced Borehole Services

DUAL INDUCTION-16/64 LSN

OKF-106

COMPANY	:	APPLIED ENGINEERING DRILLING	OTHER SERVICES: COMPL
WELL	:	OKF-106	
FIELD	:	OKEECHOBEE	
COUNTY	:	OKECHOBEE	
STATE	:	FLORIDA	

LOCATION	:			
SECTION	:	NA		
TOWNSHIP	:	NA		
RANGE	:	NA		
API NO.	:			
UNIQUE WELL ID.	:			
PERMANENT DATUM	:	MSL	ELEVATION KB :	NA
LOG MEASURED FROM:		PAD	ELEVATION DF :	NA
DRL MEASURED FROM :		GS	ELEVATION GL:	NA
DATE	:	09/03/08		
DEPTH DRILLER	:	802		
BIT SIZE	:	7.8		
LOG TOP	:	687.30		
LOG BOTTOM	:	803.80		
CASING OD	:			
CASING BOTTOM	:	717		
CASING TYPE	:	CERTA-L		
BOREHOLE FLUID	:	FOR		
RM TEMPERATURE	:	0		
MUD RES	:	0		
MUD WEIGHT	:			
WITNESSED BY	:	M BEN		
RECORDED BY	:	AFB		
REMARKS 1	:	SHUTIN 16HR		
REMARKS 2	:			


LATERAL
FEET
0.5
OHM-M
500
GAMMA
RES(64N)
COND(MI)
200
API-GR
400
0.5
OHM-M
500
0.01
MMHO/M
1000
GAMMA
RES(16N)
COND(DI)
0
API-GR
200
0.5
OHM-M
500
0.01
MMHO/M
1000
690
700
710
720
730
740
750
760
770
780
790
800
0
API-GR
200
0.5
OHM-M
500
0.01
MMHO/M
1000
GAMMA
RES(16N)
COND(DI)
200
API-GR
400
0.5
OHM-M
500
0.01
MMHO/M
1000
GAMMA
RES(64N)
COND(MI)
0.5
OHM-M
500
LATERAL
FEET

TOOL CALIBRATION OKF-106 09/03/08 09:16
TOOL 8044A TM VERSION 0
SERIAL NUMBER 768

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Sep29,05	23:16:32	GAMMA	Default	[CPS]	Default	[CPS]
	Sep29,05	20:16:32	GAMMA	Default	[CPS]	Default	[CPS]
2	Aug27,08	15:15:39	RES(FL)	2.900	[OHM-M]	11352.00	[CPS]
	Aug27,08	15:15:39	RES(FL)	54.600	[OHM-M]	40245.00	[CPS]
3	Sep29,05	20:25:53	SP	0.000	[MV]	59802.00	[CPS]
	Sep29,05	20:25:53	SP	376.000	[MV]	91209.00	[CPS]
4	Jul16,08	15:04:27	RES(16N)	0.000	[OHM-M]	4160.00	[CPS]
	Jul16,08	15:04:27	RES(16N)	1998.000	[OHM-M]	103127.00	[CPS]
5	Jul16,08	15:14:22	RES(64N)	0.000	[OHM-M]	4200.00	[CPS]
	Jul16,08	15:14:22	RES(64N)	1990.000	[OHM-M]	102076.00	[CPS]
6	Aug25,08	22:49:21	TEMP	88.700	[DEG F]	59023.00	[CPS]
	Aug25,08	22:49:21	TEMP	121.000	[DEG F]	40240.00	[CPS]
7	Sep29,05	20:26:24	RES	0.000	[OHM]	10075.00	[CPS]
	Sep29,05	20:26:24	RES	988.000	[OHM]	59049.00	[CPS]

ABS
Advanced Borehole Services

COMBINATION LOG
STATIC WATER QUALITY
OKF-106

COMPANY	:	APPLIED ENGINEERING DRILLING	OTHER SERVICES: COMPL
WELL	:	OKF-106	
FIELD	:	OKEECHOBEE	
COUNTY	:	OKECHOBEE	
STATE	:	FLORIDA	

LOCATION	:			
SECTION	:	NA		
TOWNSHIP	:	NA		
RANGE	:	NA		
API NO.	:			
UNIQUE WELL ID.	:			

PERMANENT DATUM	:	MSL	ELEVATION KB :	NA
LOG MEASURED FROM:		PAD	ELEVATION DF :	NA
DRL MEASURED FROM :		GS	ELEVATION GL:	NA

DATE	:	09/03/08
DEPTH DRILLER	:	802
BIT SIZE	:	7.8
LOG TOP	:	702.50
LOG BOTTOM	:	801.50
CASING OD	:	
CASING BOTTOM	:	717
CASING TYPE	:	CERTA-L
BOREHOLE FLUID	:	FOR
RM TEMPERATURE	:	0
MUD RES	:	0
MUD WEIGHT	:	
WITNESSED BY	:	M BEN
RECORDED BY	:	AFB
REMARKS 1	:	SHUTIN 16HR
REMARKS 2	:	

		FEET		RES			SP COND	
		<-VOLUME	0.2	OHM	20000	0	US/CM	3000
	SP			LATERAL			RES(FL)	
300	MV	500	SPEED->	0.2	OHM-M	20000	OHM-M	5
	GAMMA			RES(64N)			DEL TEMP	
100	API-GR	200		0.2	OHM-M	2000	-0.5 DEG F	0.5
	GAMMA			RES(16N)			TEMP	
0	API-GR	100	700	0.2	OHM-M	2000	70 DEG F	90
			710					
			720					
			730					
			740					
			750					
			760					
			770					
			780					
			790					
			800					
0	API-GR	100		0.2	OHM-M	2000	70 DEG F	90
	GAMMA			RES(16N)			TEMP	
100	API-GR	200		0.2	OHM-M	2000	-0.5 DEG F	0.5
	GAMMA		SPEED->	RES(64N)			DEL TEMP	
300	MV	500		0.2	OHM-M	20000	0 OHM-M	5
	SP			LATERAL			RES(FL)	
		<-VOLUME		0.2	OHM	20000	0 US/CM	3000
		FEET		RES			SP COND	

TOOL CALIBRATION OKF-106 09/03/08 09:16
TOOL 8044A TM VERSION 0
SERIAL NUMBER 768

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Sep29,05	23:16:32	GAMMA	Default	(CPS)	Default	(CPS)
	Sep29,05	20:16:32	GAMMA	Default	(CPS)	Default	(CPS)
2	Aug27,08	15:15:39	RES(FL)	2.900	(OHM-M)	11352.00	(CPS)
	Aug27,08	15:15:39	RES(FL)	54.600	(OHM-M)	40245.00	(CPS)
3	Sep29,05	20:25:53	SP	0.000	(MV)	59802.00	(CPS)
	Sep29,05	20:25:53	SP	376.000	(MV)	91209.00	(CPS)
4	Jul16,08	15:04:27	RES(16N)	0.000	(OHM-M)	4160.00	(CPS)
	Jul16,08	15:04:27	RES(16N)	1998.000	(OHM-M)	103127.00	(CPS)
5	Jul16,08	15:14:22	RES(64N)	0.000	(OHM-M)	4200.00	(CPS)
	Jul16,08	15:14:22	RES(64N)	1990.000	(OHM-M)	102076.00	(CPS)
6	Aug25,08	22:49:21	TEMP	88.700	(DEG F)	59023.00	(CPS)
	Aug25,08	22:49:21	TEMP	121.000	(DEG F)	40240.00	(CPS)
7	Sep29,05	20:26:24	RES	0.000	(OHM)	10075.00	(CPS)
	Sep29,05	20:26:24	RES	988.000	(OHM)	59049.00	(CPS)

ABS
Advanced Borehole Services

FLOW STATIONS

OKF-106

COMPANY	: APPLIED ENGINEERING DRILLING	OTHER SERVICES: COMPL
WELL	: OKF-106	
FIELD	: OKEECHOBEE	
COUNTY	: OKECHOBEE	
STATE	: FLORIDA	

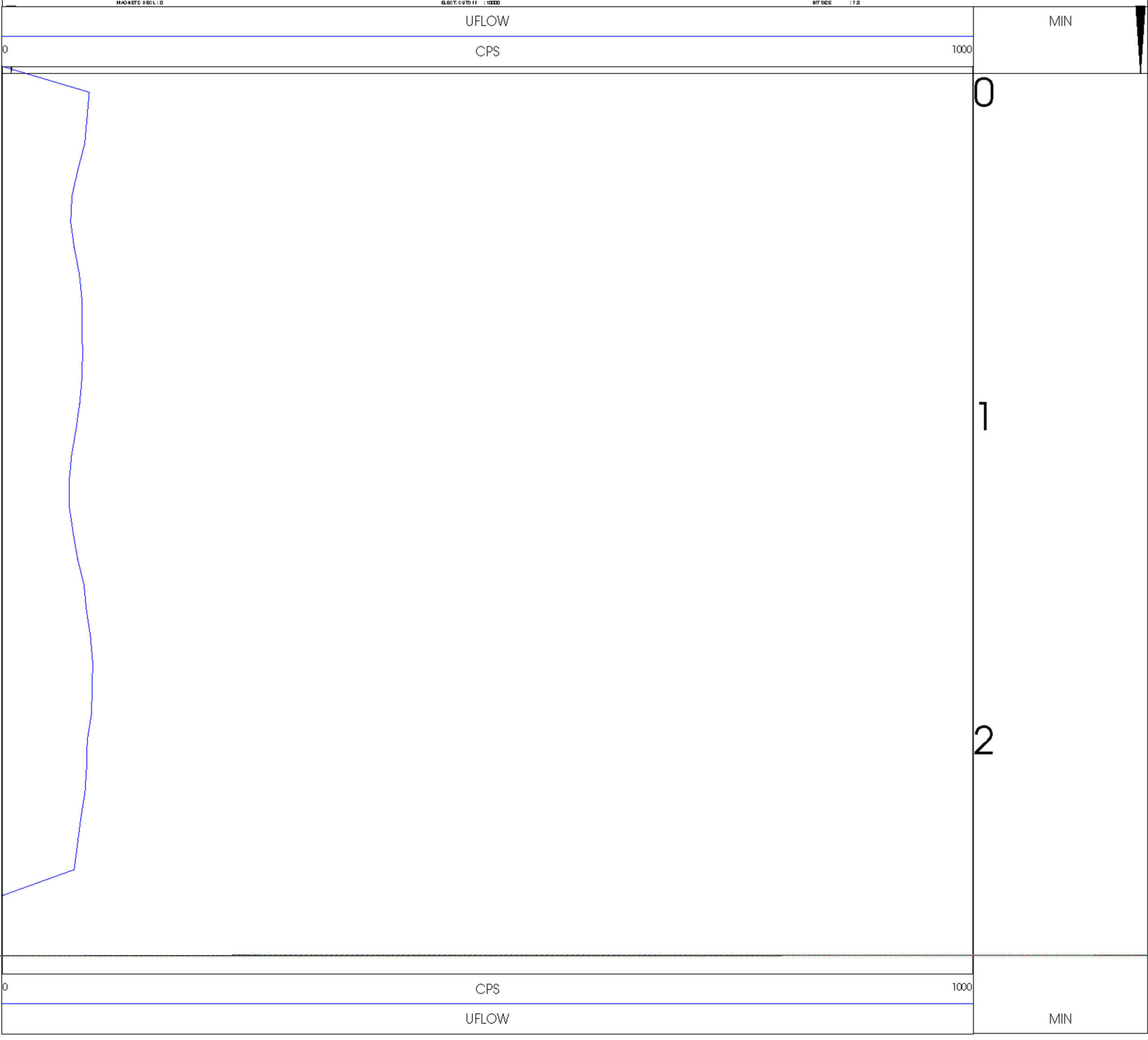
LOCATION	:		
SECTION	: NA		
TOWNSHIP	: NA		
RANGE	: NA		
API NO.	:		
UNIQUE WELL ID.	:		
PERMANENT DATUM	: MSL	ELEVATION KB :	NA
LOG MEASURED FROM:	PAD	ELEVATION DF :	NA
DRL MEASURED FROM :	GS	ELEVATION GL:	NA

DATE	: 09/03/08
DEPTH DRILLER	: 802
BIT SIZE	: 7.8
LOG TOP	: -0.08
LOG BOTTOM	: 2.64
CASING OD	:
CASING BOTTOM	: 730
CASING TYPE	: CLOCK
BOREHOLE FLUID	: FOR
RM TEMPERATURE	: 0
MUD RES	: 0
MUD WEIGHT	:
WITNESSED BY	:
RECORDED BY	: AFB
REMARKS 1	: FLOW @ 150GPM
REMARKS 2	:

LOG PARAMETERS

MATRIX DENSITY : 2.71 NEUTRON MATRIX: Dolomite MATRIX DELTA T : 140

MAGNETIC DECL : 0 ELECT. CUTOFF : 10000 BIT SIZE : 7.8



LOG PARAMETERS

MATRIX DENSITY : 2.71 NEUTRON MATRIX: Dolomite MATRIX DELTA T : 140

MAGNETIC DECL : 0 ELECT. CUTOFF : 10000 BIT SIZE : 7.8

UFLOW MIN

0 CPS 1000

0

1

2

0 CPS 1000

UFLOW MIN

LOG PARAMETERS

MATRIX DENSITY : 2.71 NEUTRON MATRIX: Dolomite MATRIX DELTA T : 140

MAGNETIC DECL : 0 ELECT. CUTOFF : 10000 BIT SIZE : 7.8

UFLOW		MIN
0	CPS 1000	
		0
		1
		2
0	CPS 1000	
UFLOW		MIN

LOG PARAMETERS

MATRIX DENSITY : 2.71 NEUTRON MATRIX: Dolomite MATRIX DELTA T : 140

MAGNETIC DECL : 0 ELECT. CUTOFF : 10000 BIT SIZE : 7.8

UFLOW		MIN
0	CPS 1000	
		0
		1
		2
0	CPS 1000	
UFLOW		MIN

ABS
Advanced Borehole Services

FLOWING WATER QUALITY

OKF-106

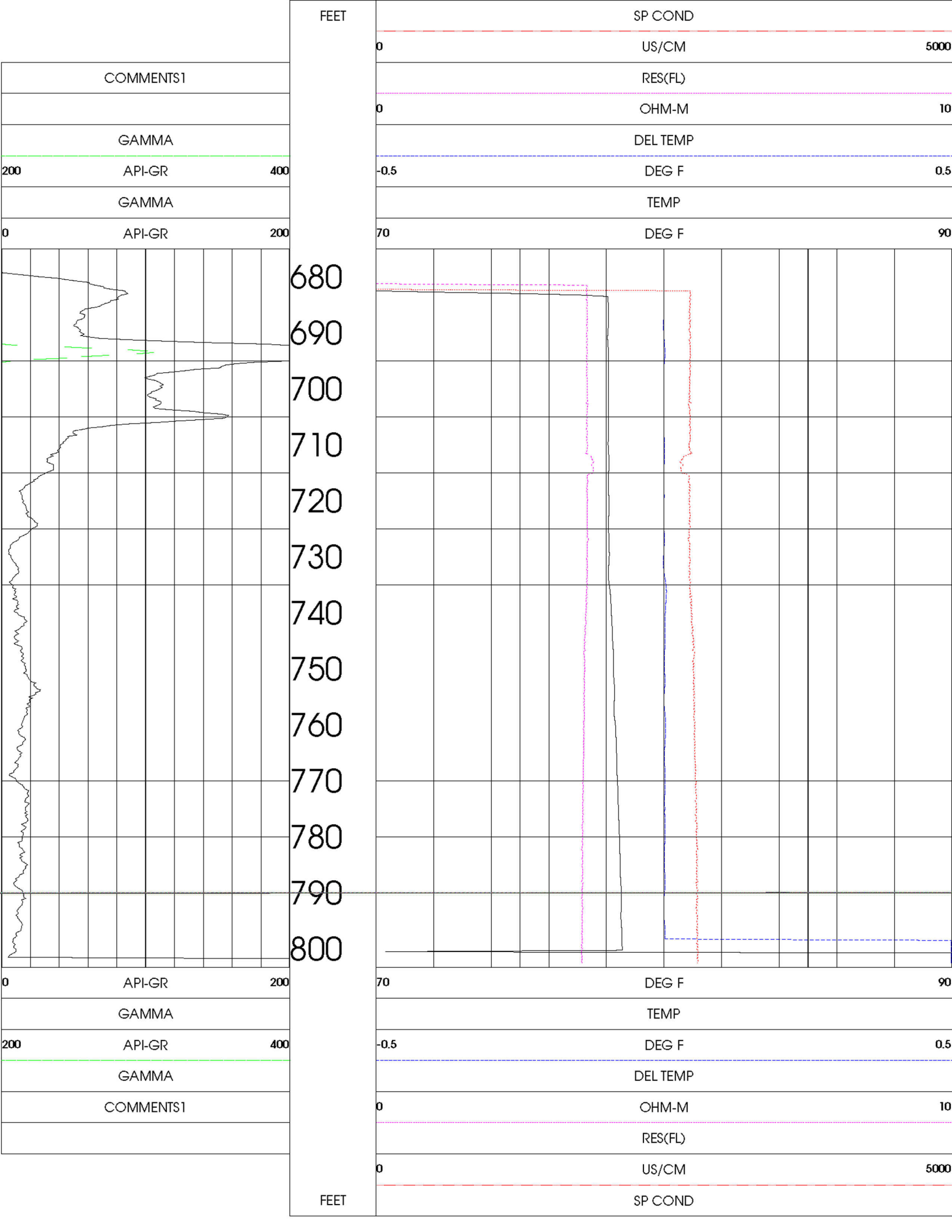
COMPANY	: APPLIED ENGINEERING DRILLING	OTHER SERVICES: COMPL
WELL	: OKF-106	
FIELD	: OKEECHOBEE	
COUNTY	: OKECHOBEE	
STATE	: FLORIDA	

LOCATION	:		
SECTION	: NA		
TOWNSHIP	: NA		
RANGE	: NA		
API NO.	:		
UNIQUE WELL ID.	:		

PERMANENT DATUM	: MSL	ELEVATION KB :	NA
LOG MEASURED FROM:	PAD	ELEVATION DF :	NA
DRL MEASURED FROM :	GS	ELEVATION GL:	NA

DATE	: 09/03/08
DEPTH DRILLER	: 802
BIT SIZE	: 7.8
LOG TOP	: 675.00
LOG BOTTOM	: 803.00
CASING OD	:
CASING BOTTOM	: 730
CASING TYPE	: CLOCK

BOREHOLE FLUID	: FOR
RM TEMPERATURE	: 0
MUD RES	: 0
MUD WEIGHT	:
WITNESSED BY	:
RECORDED BY	: AFB
REMARKS 1	: FLOWING
REMARKS 2	:


FEET
SP COND
0
US/CM
5000
COMMENTS1
RES(FL)
0
OHM-M
10
GAMMA
DEL TEMP
200
API-GR
400
-0.5
DEG F
0.5
GAMMA
TEMP
0
API-GR
200
70
DEG F
90
680
690
700
710
720
730
740
750
760
770
780
790
800
0
API-GR
200
70
DEG F
90
GAMMA
TEMP
200
API-GR
400
-0.5
DEG F
0.5
GAMMA
DEL TEMP
COMMENTS1
0
OHM-M
10
RES(FL)
0
US/CM
5000
FEET
SP COND

TOOL CALIBRATION OKF-106 09/03/08 09:39
TOOL 8044A TM VERSION 0
SERIAL NUMBER 768

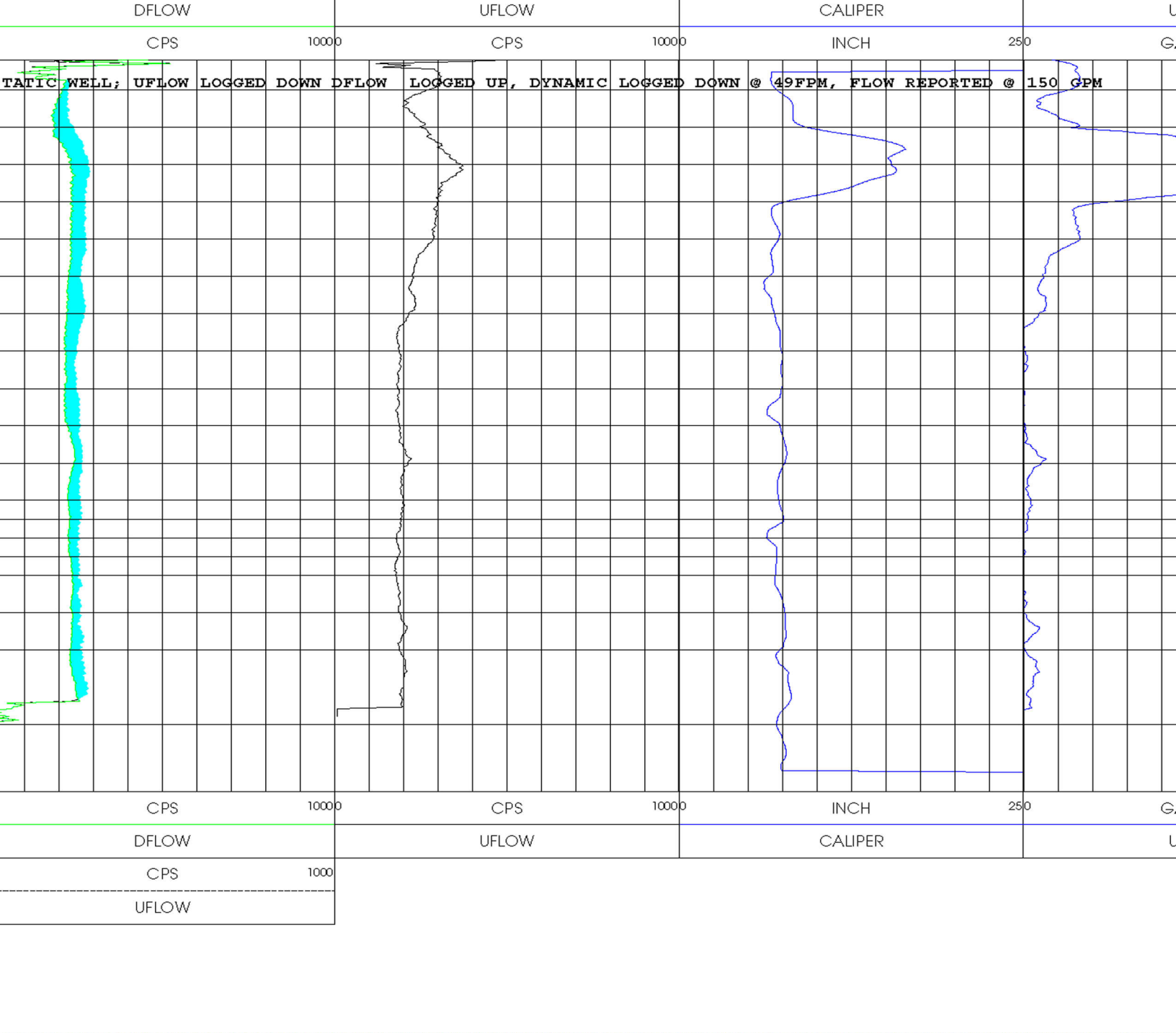
	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Sep29,05	23:16:32	GAMMA	Default	(CPS)	Default	(CPS)
	Sep29,05	20:16:32	GAMMA	Default	(CPS)	Default	(CPS)
2	Aug27,08	15:15:39	RES(FL)	2.900	(OHM-M)	11352.00	(CPS)
	Aug27,08	15:15:39	RES(FL)	54.600	(OHM-M)	40245.00	(CPS)
3	Sep29,05	20:25:53	SP	0.000	(MV)	59802.00	(CPS)
	Sep29,05	20:25:53	SP	376.000	(MV)	91209.00	(CPS)
4	Jul16,08	15:04:27	RES(16N)	0.000	(OHM-M)	4160.00	(CPS)
	Jul16,08	15:04:27	RES(16N)	1998.000	(OHM-M)	103127.00	(CPS)
5	Jul16,08	15:14:22	RES(64N)	0.000	(OHM-M)	4200.00	(CPS)
	Jul16,08	15:14:22	RES(64N)	1990.000	(OHM-M)	102076.00	(CPS)
6	Aug25,08	22:49:21	TEMP	88.700	(DEG F)	59023.00	(CPS)
	Aug25,08	22:49:21	TEMP	121.000	(DEG F)	40240.00	(CPS)
7	Sep29,05	20:26:24	RES	0.000	(OHM)	10075.00	(CPS)
	Sep29,05	20:26:24	RES	988.000	(OHM)	59049.00	(CPS)

ABS
Advanced Borehole Services

PRODUCTION-STATIC-FLOWING

OKF-106

COMPANY	: APPLIED ENGINEERING DRILLING		OTHER SERVICES: COMPL
WELL	: OKF-106		
FIELD	: OKEECHOBEE		
COUNTY	: OKECHOBEE		
STATE	: FLORIDA		
LOCATION	:		
SECTION	: NA		
TOWNSHIP	: NA		
RANGE	: NA		
API NO.	:		
UNIQUE WELL ID.	:		
PERMANENT DATUM	: MSL	ELEVATION KB :	NA
LOG MEASURED FROM:	PAD	ELEVATION DF :	NA
DRL MEASURED FROM	: GS	ELEVATION GL :	NA
DATE	: 09/03/08		
DEPTH DRILLER	: 802		
BIT SIZE	: 7.8		
LOG TOP	: 679.25		
LOG BOTTOM	: 808.87		
CASING OD	:		
CASING BOTTOM	: 730		
CASING TYPE	: CLOCK		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		

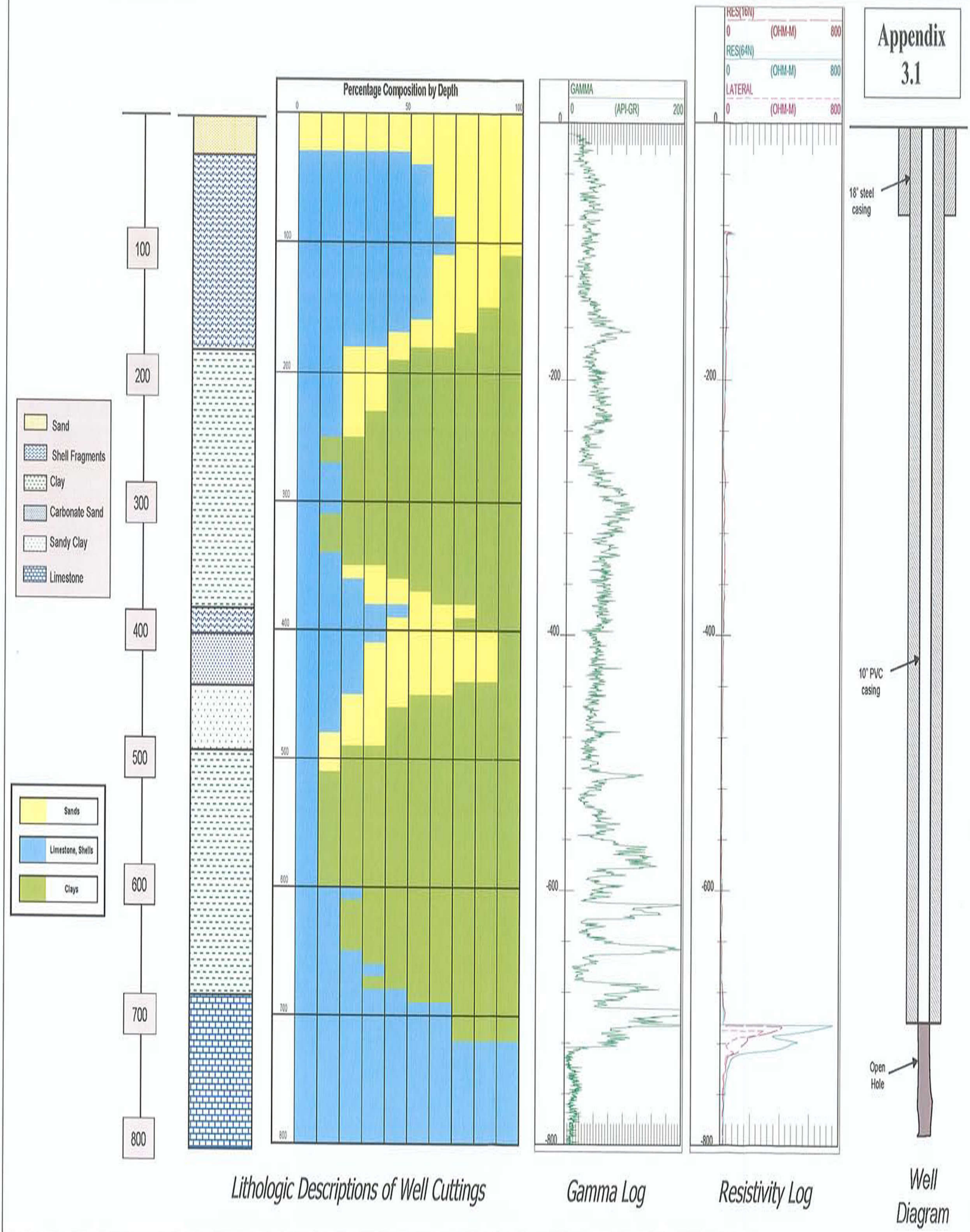

DFLOW
CPS
10000
UFLOW
CPS
10000
CALIPER
INCH
250
TATIC WELL; UFLOW LOGGED DOWN DFLOW LOGGED UP, DYNAMIC LOGGED DOWN @ 49FPM, FLOW REPORTED @ 150 GPM
CPS
10000
CPS
10000
INCH
250
DFLOW
UFLOW
CALIPER
CPS
1000
UFLOW

SERIAL NUMBER 227

DATE	TIME	SENSOR	STANDARD	
Apr26,06	20:22:05	DFLOW	30.000	(FT/MIN)
Apr26,06	17:22:05	DFLOW	123.000	(FT/MIN)
Oct11,06	14:15:38	UFLOW	10.000	(FT/MIN)
Oct11,06	14:15:38	UFLOW	40.000	(FT/MIN)

J
Lithology and Geophysical Correlations

Appendix 3.1



Lithologic Descriptions of Well Cuttings

Gamma Log

Resistivity Log

Well Diagram

K

Aquifer Pump Test Data

STEP TEST

Report Date:	9/15/2008 15:50	
Report User Name:	Owner	
Report Computer Name:	OWNER-PC	
Log File Properties		
File Name	Step Test 2008-08-27 07-17-27.wsl	
Create Date	8/27/2008 7:14	
Device Properties		
Device	Level TROLL® 700	
Site	L63N (OKF-106)	
Device Name		
Serial Number	134613	
Firmware Version	2.07	
Log Configuration	Log Name	Step Test 2
	Created By	SEnglish
	Computer Name	USPCT1LT011
	Application	WinSitu.exe
	Application Version	5.6.1.8
	Create Date	8/26/2008 10:22
	Notes Size(bytes)	4096
	Type	Step Linear
	Overwrite when full	Disabled
	Scheduled Start Time	Manual Start
	Scheduled Stop	No Stop Time
Steps	1	
Step: 1	Duration	Days: 0 Hours: 05 Mins: 00 Secs: 00
	Interval	Days: 0 Hours: 00 Mins: 00 Secs: 01
Level Reference Settings At Log Creation		
	Level Measurement Mode	Level Depth To Water
	Specific Gravity	0.999
	Level Reference Mode:	Set new reference
	Level Reference Value:	0 (ft)
	Level Reference Head Pressure	46.3352 (PSI)
	Head Pressure	46.353 (PSI)
	Temperature	25.9195 (C)
	Depth of Probe	107.028 (ft)

Log Notes:

Date and Time	Note
8/26/2008 10:26	Manual Start Command
8/26/2008 13:31	Manual Stop Command

Log Data:	
Record Count	11149
Sensor: Pres 100G SN#: 134613	

Date and Time	Elaspsed Time (Seconds)	Temperature (C)	Pressure (PSI)	Level Depth To Water (ft)
8/26/2008 10:26	0.000	26.014	46.680	-0.797
8/26/2008 10:26	1.053	26.021	46.704	-0.853
8/26/2008 10:26	2.001	26.026	46.687	-0.812
8/26/2008 10:26	3.001	26.026	46.689	-0.816
8/26/2008 10:26	4.001	26.026	46.691	-0.821
8/26/2008 10:26	5.001	26.029	46.689	-0.817
8/26/2008 10:26	6.001	26.033	46.683	-0.803
8/26/2008 10:26	7.001	26.046	46.688	-0.816
8/26/2008 10:26	8.001	26.037	46.695	-0.832
8/26/2008 10:26	9.001	26.041	46.696	-0.834
8/26/2008 10:26	10.001	26.054	46.685	-0.807
8/26/2008 10:26	11.001	26.047	46.697	-0.835
8/26/2008 10:26	12.001	26.046	46.701	-0.844
8/26/2008 10:26	13.001	26.044	46.700	-0.843
8/26/2008 10:26	14.001	26.047	46.698	-0.837
8/26/2008 10:26	15.001	26.057	46.688	-0.815
8/26/2008 10:26	16.001	26.050	46.697	-0.835
8/26/2008 10:26	17.001	26.052	46.697	-0.834
8/26/2008 10:26	18.001	26.050	46.696	-0.832
8/26/2008 10:26	19.001	26.052	46.709	-0.864
8/26/2008 10:26	20.001	26.065	46.710	-0.866
8/26/2008 10:26	21.001	26.057	46.701	-0.844
8/26/2008 10:26	22.001	26.058	46.697	-0.834
8/26/2008 10:26	23.001	26.053	46.701	-0.844
8/26/2008 10:26	24.001	26.059	46.704	-0.853
8/26/2008 10:26	25.001	26.068	46.704	-0.852
8/26/2008 10:26	26.001	26.064	46.695	-0.830
8/26/2008 10:26	27.001	26.060	46.700	-0.843
8/26/2008 10:26	28.001	26.063	46.705	-0.855
8/26/2008 10:26	29.001	26.062	46.704	-0.853
8/26/2008 10:26	30.001	26.072	46.699	-0.841
8/26/2008 10:26	31.001	26.067	46.701	-0.845
8/26/2008 10:26	32.001	26.068	46.705	-0.854
8/26/2008 10:26	33.001	26.066	46.712	-0.869
8/26/2008 10:26	34.001	26.068	46.709	-0.862
8/26/2008 10:26	35.001	26.080	46.698	-0.838
8/26/2008 10:26	36.001	26.075	46.708	-0.862
8/26/2008 10:26	37.001	26.070	46.712	-0.871
8/26/2008 10:26	38.001	26.073	46.708	-0.862
8/26/2008 10:26	39.001	26.073	46.706	-0.857
8/26/2008 10:26	40.001	26.087	46.705	-0.855
8/26/2008 10:26	41.001	26.080	46.709	-0.864
8/26/2008 10:26	42.001	26.077	46.713	-0.872
8/26/2008 10:26	43.001	26.079	46.712	-0.869
8/26/2008 10:26	44.001	26.075	46.714	-0.874
8/26/2008 10:26	45.001	26.088	46.705	-0.854
8/26/2008 10:26	46.001	26.083	46.707	-0.858
8/26/2008 10:26	47.001	26.080	46.712	-0.869
8/26/2008 10:26	48.001	26.079	46.713	-0.873

Date and Time	Elaspsed Time (Seconds)	Temperature (C)	Pressure (PSI)	Level Depth To Water (ft)
8/26/2008 10:26	49.001	26.081	46.718	-0.883
8/26/2008 10:26	50.001	26.092	46.719	-0.886
8/26/2008 10:26	51.001	26.088	46.714	-0.874
8/26/2008 10:26	52.001	26.086	46.713	-0.871
8/26/2008 10:26	53.001	26.086	46.719	-0.886
8/26/2008 10:26	54.001	26.083	46.720	-0.888
8/26/2008 10:26	55.001	26.094	46.712	-0.869
8/26/2008 10:26	56.001	26.091	46.714	-0.876
8/26/2008 10:26	57.001	26.089	46.711	-0.868
8/26/2008 10:27	58.001	26.087	46.713	-0.871
8/26/2008 10:27	59.001	26.089	46.725	-0.901
8/26/2008 10:27	60.076	26.102	46.713	-0.872
8/26/2008 10:27	61.001	26.097	46.710	-0.867
8/26/2008 10:27	62.001	26.094	46.722	-0.892
8/26/2008 10:27	63.001	26.093	46.721	-0.891
8/26/2008 10:27	64.001	26.092	46.721	-0.890
8/26/2008 10:27	65.001	26.104	46.712	-0.870
8/26/2008 10:27	66.001	26.100	46.720	-0.889
8/26/2008 10:27	67.001	26.098	46.723	-0.895
8/26/2008 10:27	68.001	26.095	46.724	-0.897
8/26/2008 10:27	69.001	26.095	46.719	-0.887
8/26/2008 10:27	70.001	26.108	46.726	-0.903
8/26/2008 10:27	71.001	26.100	46.725	-0.899
8/26/2008 10:27	72.001	26.103	46.721	-0.890
8/26/2008 10:27	73.001	26.101	46.725	-0.901
8/26/2008 10:27	74.001	26.099	46.725	-0.900
8/26/2008 10:27	75.001	26.110	46.727	-0.905
8/26/2008 10:27	76.001	26.107	46.724	-0.898
8/26/2008 10:27	77.001	26.103	46.724	-0.898
8/26/2008 10:27	78.001	26.103	46.728	-0.908
8/26/2008 10:27	79.001	26.103	46.729	-0.908
8/26/2008 10:27	80.001	26.120	46.733	-0.919
8/26/2008 10:27	81.001	26.109	46.725	-0.901
8/26/2008 10:27	82.001	26.110	46.728	-0.907
8/26/2008 10:27	83.001	26.108	46.727	-0.905
8/26/2008 10:27	84.001	26.107	46.730	-0.913
8/26/2008 10:27	85.001	26.119	46.732	-0.917
8/26/2008 10:27	86.001	26.111	46.730	-0.911
8/26/2008 10:27	87.001	26.112	46.730	-0.911
8/26/2008 10:27	88.001	26.109	46.725	-0.900
8/26/2008 10:27	89.001	26.110	46.736	-0.926
8/26/2008 10:27	90.001	26.123	46.733	-0.919
8/26/2008 10:27	91.001	26.117	46.727	-0.906
8/26/2008 10:27	92.001	26.113	46.732	-0.916
8/26/2008 10:27	93.001	26.114	46.733	-0.918
8/26/2008 10:27	94.001	26.114	46.737	-0.927
8/26/2008 10:27	95.001	26.126	46.737	-0.927
8/26/2008 10:27	96.001	26.119	46.733	-0.919
8/26/2008 10:27	97.001	26.118	46.739	-0.933

Date and Time	Elaspsed Time (Seconds)	Temperature (C)	Pressure (PSI)	Level Depth To Water (ft)
8/26/2008 10:27	98.001	26.117	46.735	-0.924
8/26/2008 10:27	99.001	26.117	46.738	-0.931
8/26/2008 10:27	100.001	26.128	46.738	-0.930
8/26/2008 10:27	101.001	26.122	46.737	-0.927
8/26/2008 10:27	102.001	26.121	46.733	-0.919
8/26/2008 10:27	103.001	26.118	46.738	-0.929
8/26/2008 10:27	104.001	26.117	46.736	-0.925
8/26/2008 10:27	105.001	26.129	46.743	-0.941
8/26/2008 10:27	106.001	26.128	46.733	-0.918
8/26/2008 10:27	107.001	26.122	46.740	-0.934
8/26/2008 10:27	108.001	26.122	46.736	-0.925
8/26/2008 10:27	109.001	26.123	46.742	-0.939
8/26/2008 10:27	110.001	26.135	46.744	-0.943
8/26/2008 10:27	111.001	26.126	46.735	-0.924
8/26/2008 10:27	112.001	26.126	46.732	-0.916
8/26/2008 10:27	113.001	26.127	46.737	-0.928
8/26/2008 10:27	114.001	26.124	46.742	-0.940
8/26/2008 10:27	115.001	26.138	46.745	-0.945
8/26/2008 10:27	116.001	26.131	46.737	-0.927
8/26/2008 10:27	117.001	26.129	46.742	-0.940
8/26/2008 10:28	118.001	26.128	46.739	-0.932
8/26/2008 10:28	119.001	26.129	46.738	-0.931
8/26/2008 10:28	120.075	26.139	46.736	-0.926
8/26/2008 10:28	121.001	26.135	46.748	-0.954
8/26/2008 10:28	122.001	26.130	46.739	-0.932
8/26/2008 10:28	123.001	26.129	46.747	-0.950
8/26/2008 10:28	124.001	26.131	46.747	-0.951
8/26/2008 10:28	125.001	26.142	46.737	-0.928
8/26/2008 10:28	126.001	26.136	46.752	-0.962
8/26/2008 10:28	127.001	26.137	46.746	-0.949
8/26/2008 10:28	128.001	26.135	46.748	-0.954
8/26/2008 10:28	129.001	26.133	46.748	-0.952
8/26/2008 10:28	130.001	26.144	46.737	-0.927
8/26/2008 10:28	131.001	26.142	46.740	-0.934
8/26/2008 10:28	132.001	26.140	46.748	-0.952
8/26/2008 10:28	133.001	26.138	46.745	-0.947
8/26/2008 10:28	134.001	26.137	46.747	-0.950
8/26/2008 10:28	135.001	26.149	46.754	-0.968
8/26/2008 10:28	136.001	26.139	46.744	-0.945
8/26/2008 10:28	137.001	26.138	46.752	-0.962
8/26/2008 10:28	138.001	26.139	46.753	-0.965
8/26/2008 10:28	139.001	26.140	46.749	-0.956
8/26/2008 10:28	140.001	26.150	46.751	-0.961
8/26/2008 10:28	141.001	26.147	46.744	-0.945
8/26/2008 10:28	142.001	26.140	46.751	-0.960
8/26/2008 10:28	143.001	26.139	46.746	-0.948
8/26/2008 10:28	144.001	26.140	46.747	-0.952
8/26/2008 10:28	145.001	26.153	46.754	-0.967
8/26/2008 10:28	146.001	26.146	46.749	-0.955

Date and Time	Elaspsed Time (Seconds)	Temperature (C)	Pressure (PSI)	Level Depth To Water (ft)
8/26/2008 10:28	147.001	26.146	46.753	-0.964
8/26/2008 10:28	148.001	26.144	46.755	-0.969
8/26/2008 10:28	149.001	26.143	46.757	-0.974
8/26/2008 10:28	150.001	26.158	46.759	-0.978
8/26/2008 10:28	151.001	26.146	46.750	-0.959
8/26/2008 10:28	152.001	26.146	46.753	-0.966
8/26/2008 10:28	153.001	26.145	46.756	-0.972
8/26/2008 10:28	154.001	26.144	46.758	-0.976
8/26/2008 10:28	155.001	26.154	46.761	-0.984
8/26/2008 10:28	156.001	26.148	46.749	-0.956
8/26/2008 10:28	157.001	26.148	46.757	-0.973
8/26/2008 10:28	158.001	26.147	46.764	-0.990
8/26/2008 10:28	159.001	26.147	46.754	-0.966
8/26/2008 10:28	160.001	26.155	46.761	-0.983
8/26/2008 10:28	161.001	26.147	46.753	-0.965
8/26/2008 10:28	162.001	26.148	46.756	-0.972
8/26/2008 10:28	163.001	26.149	46.754	-0.968
8/26/2008 10:28	164.001	26.148	46.756	-0.971
8/26/2008 10:28	165.001	26.158	46.753	-0.964
8/26/2008 10:28	166.001	26.152	46.759	-0.978
8/26/2008 10:28	167.001	26.150	46.757	-0.974
8/26/2008 10:28	168.001	26.149	46.762	-0.985
8/26/2008 10:28	169.001	26.149	46.752	-0.963
8/26/2008 10:28	170.001	26.160	46.753	-0.964
8/26/2008 10:28	171.001	26.154	46.747	-0.951
8/26/2008 10:28	172.001	26.153	46.757	-0.974
8/26/2008 10:28	173.001	26.154	46.764	-0.989
8/26/2008 10:28	174.001	26.151	46.760	-0.982
8/26/2008 10:28	175.001	26.161	46.767	-0.997
8/26/2008 10:28	176.001	26.154	46.761	-0.983
8/26/2008 10:28	177.001	26.155	46.763	-0.989
8/26/2008 10:29	178.001	26.154	46.758	-0.977
8/26/2008 10:29	179.001	26.152	46.758	-0.977
8/26/2008 10:29	180.073	26.163	46.752	-0.962
8/26/2008 10:29	181.001	26.157	46.772	-1.009
8/26/2008 10:29	182.001	26.153	46.759	-0.978
8/26/2008 10:29	183.001	26.153	46.766	-0.995
8/26/2008 10:29	184.001	26.153	46.766	-0.995
8/26/2008 10:29	185.001	26.168	46.760	-0.982
8/26/2008 10:29	186.001	26.159	46.763	-0.987
8/26/2008 10:29	187.001	26.159	46.761	-0.983
8/26/2008 10:29	188.001	26.157	46.767	-0.998
8/26/2008 10:29	189.001	26.156	46.764	-0.990
8/26/2008 10:29	190.001	26.169	46.759	-0.979
8/26/2008 10:29	191.001	26.161	46.768	-1.000
8/26/2008 10:29	192.001	26.157	46.765	-0.993
8/26/2008 10:29	193.001	26.158	46.766	-0.994
8/26/2008 10:29	194.001	26.156	46.769	-1.001
8/26/2008 10:29	195.001	26.168	46.759	-0.979

Date and Time	Elaspsed Time (Seconds)	Temperature (C)	Pressure (PSI)	Level Depth To Water (ft)
8/26/2008 10:29	196.001	26.163	46.768	-0.998
8/26/2008 10:29	197.001	26.163	46.763	-0.988
8/26/2008 10:29	198.001	26.158	46.768	-0.999
8/26/2008 10:29	199.001	26.158	46.774	-1.014
8/26/2008 10:29	200.001	26.170	46.763	-0.987
8/26/2008 10:29	201.001	26.163	46.765	-0.993
8/26/2008 10:29	202.001	26.160	46.769	-1.002
8/26/2008 10:29	203.001	26.163	46.769	-1.003
8/26/2008 10:29	204.001	26.159	46.766	-0.995
8/26/2008 10:29	205.001	26.169	46.771	-1.007
8/26/2008 10:29	206.001	26.165	46.772	-1.009
8/26/2008 10:29	207.001	26.161	46.769	-1.001
8/26/2008 10:29	208.001	26.160	46.770	-1.004
8/26/2008 10:29	209.001	26.159	46.774	-1.013
8/26/2008 10:29	210.001	26.176	46.779	-1.025
8/26/2008 10:29	211.001	26.167	46.764	-0.989
8/26/2008 10:29	212.001	26.162	46.772	-1.009
8/26/2008 10:29	213.001	26.164	46.778	-1.022
8/26/2008 10:29	214.001	26.162	46.771	-1.006
8/26/2008 10:29	215.001	26.175	46.772	-1.008
8/26/2008 10:29	216.001	26.167	46.768	-0.999
8/26/2008 10:29	217.001	26.163	46.772	-1.008
8/26/2008 10:29	218.001	26.164	46.771	-1.007
8/26/2008 10:29	219.001	26.165	46.774	-1.014
8/26/2008 10:29	220.001	26.175	46.783	-1.035
8/26/2008 10:29	221.001	26.171	46.769	-1.002
8/26/2008 10:29	222.001	26.167	46.770	-1.005
8/26/2008 10:29	223.001	26.164	46.771	-1.007
8/26/2008 10:29	224.001	26.166	46.778	-1.023
8/26/2008 10:29	225.001	26.174	46.783	-1.033
8/26/2008 10:29	226.001	26.169	46.775	-1.017
8/26/2008 10:29	227.001	26.168	46.776	-1.017
8/26/2008 10:29	228.001	26.167	46.773	-1.011
8/26/2008 10:29	229.001	26.166	46.777	-1.021
8/26/2008 10:29	230.001	26.177	46.783	-1.034
8/26/2008 10:29	231.001	26.169	46.773	-1.010
8/26/2008 10:29	232.001	26.168	46.776	-1.017
8/26/2008 10:29	233.001	26.163	46.774	-1.013
8/26/2008 10:29	234.001	26.166	46.775	-1.017
8/26/2008 10:29	235.001	26.176	46.767	-0.997
8/26/2008 10:29	236.001	26.172	46.772	-1.008
8/26/2008 10:29	237.001	26.170	46.775	-1.017
8/26/2008 10:30	238.001	26.167	46.778	-1.022
8/26/2008 10:30	239.001	26.167	46.780	-1.027
8/26/2008 10:30	240.072	26.178	46.768	-1.000
8/26/2008 10:30	241.001	26.170	46.777	-1.019
8/26/2008 10:30	242.001	26.172	46.769	-1.001
8/26/2008 10:30	243.001	26.169	46.776	-1.018
8/26/2008 10:30	244.001	26.166	46.779	-1.024

Date and Time	Elaspsed Time (Seconds)	Temperature (C)	Pressure (PSI)	Level Depth To Water (ft)
8/26/2008 10:30	245.001	26.180	46.772	-1.009
8/26/2008 10:30	246.001	26.171	46.776	-1.019
8/26/2008 10:30	247.001	26.171	46.782	-1.032
8/26/2008 10:30	248.001	26.169	46.781	-1.028
8/26/2008 10:30	249.001	26.170	46.781	-1.028
8/26/2008 10:30	250.001	26.179	46.773	-1.012
8/26/2008 10:30	251.001	26.174	46.783	-1.035
8/26/2008 10:30	252.001	26.170	46.785	-1.038
8/26/2008 10:30	253.001	26.172	46.780	-1.027
8/26/2008 10:30	254.001	26.170	46.785	-1.039
8/26/2008 10:30	255.001	26.179	46.779	-1.024
8/26/2008 10:30	256.001	26.172	46.776	-1.017
8/26/2008 10:30	257.001	26.175	46.780	-1.027
8/26/2008 10:30	258.001	26.170	46.786	-1.041
8/26/2008 10:30	259.001	26.170	46.791	-1.052
8/26/2008 10:30	260.001	26.184	46.776	-1.018
8/26/2008 10:30	261.001	26.173	46.786	-1.040
8/26/2008 10:30	262.001	26.171	46.786	-1.041
8/26/2008 10:30	263.001	26.173	46.787	-1.043
8/26/2008 10:30	264.001	26.171	46.780	-1.027
8/26/2008 10:30	265.001	26.185	46.788	-1.045
8/26/2008 10:30	266.001	26.177	46.781	-1.030
8/26/2008 10:30	267.001	26.175	46.788	-1.045
8/26/2008 10:30	268.001	26.172	46.788	-1.046
8/26/2008 10:30	269.001	26.175	46.787	-1.044
8/26/2008 10:30	270.001	26.182	46.775	-1.016
8/26/2008 10:30	271.001	26.178	46.784	-1.036
8/26/2008 10:30	272.001	26.175	46.790	-1.049
8/26/2008 10:30	273.001	26.173	46.787	-1.044
8/26/2008 10:30	274.001	26.172	46.789	-1.047
8/26/2008 10:30	275.001	26.186	46.776	-1.017
8/26/2008 10:30	276.001	26.176	46.784	-1.037
8/26/2008 10:30	277.001	26.175	46.786	-1.040
8/26/2008 10:30	278.001	26.174	46.784	-1.037
8/26/2008 10:30	279.001	26.177	46.790	-1.050
8/26/2008 10:30	280.001	26.184	46.791	-1.052
8/26/2008 10:30	281.001	26.177	46.783	-1.034
8/26/2008 10:30	282.001	26.175	46.783	-1.033
8/26/2008 10:30	283.001	26.176	46.789	-1.049
8/26/2008 10:30	284.001	26.174	46.792	-1.056
8/26/2008 10:30	285.001	26.186	46.772	-1.008
8/26/2008 10:30	286.001	26.180	46.787	-1.042
8/26/2008 10:30	287.001	26.173	46.792	-1.056
8/26/2008 10:30	288.001	26.176	46.790	-1.051
8/26/2008 10:30	289.001	26.173	46.789	-1.048
8/26/2008 10:30	290.001	26.187	46.781	-1.029
8/26/2008 10:30	291.001	26.177	46.788	-1.046
8/26/2008 10:30	292.001	26.177	46.788	-1.046
8/26/2008 10:30	293.001	26.176	46.785	-1.039

Date and Time	Elaspsed Time (Seconds)	Temperature (C)	Pressure (PSI)	Level Depth To Water (ft)
8/26/2008 10:30	294.001	26.173	46.792	-1.055
8/26/2008 10:30	295.001	26.186	46.789	-1.049
8/26/2008 10:30	296.001	26.181	46.789	-1.047
8/26/2008 10:30	297.001	26.178	46.794	-1.060
8/26/2008 10:31	298.001	26.178	46.791	-1.052
8/26/2008 10:31	299.001	26.179	46.794	-1.060
8/26/2008 10:31	300.071	26.184	46.795	-1.062
8/26/2008 10:31	301.001	26.178	46.791	-1.053
8/26/2008 10:31	302.001	26.181	46.791	-1.052
8/26/2008 10:31	303.001	26.177	46.799	-1.071
8/26/2008 10:31	304.001	26.177	46.799	-1.070
8/26/2008 10:31	305.001	26.185	46.784	-1.037
8/26/2008 10:31	306.001	26.182	46.790	-1.049
8/26/2008 10:31	307.001	26.180	46.790	-1.050
8/26/2008 10:31	308.001	26.179	46.791	-1.052
8/26/2008 10:31	309.001	26.177	46.791	-1.053
8/26/2008 10:31	310.001	26.187	46.785	-1.038
8/26/2008 10:31	311.001	26.182	46.783	-1.035
8/26/2008 10:31	312.001	26.177	46.791	-1.053
8/26/2008 10:31	313.001	26.177	46.799	-1.071
8/26/2008 10:31	314.001	26.177	46.778	-1.023
8/26/2008 10:31	315.001	26.189	46.636	-0.694
8/26/2008 10:31	316.001	26.181	46.709	-0.862
8/26/2008 10:31	317.001	26.180	45.046	2.977
8/26/2008 10:31	318.001	26.179	45.365	2.240
8/26/2008 10:31	319.001	26.178	44.380	4.514
8/26/2008 10:31	320.001	26.186	35.623	24.733
8/26/2008 10:31	321.001	26.185	41.237	11.771
8/26/2008 10:31	322.001	26.180	39.811	15.064
8/26/2008 10:31	323.001	26.180	39.959	14.721
8/26/2008 10:31	324.001	26.177	39.890	14.881
8/26/2008 10:31	325.001	26.189	39.873	14.921
8/26/2008 10:31	326.001	26.183	39.796	15.099
8/26/2008 10:31	327.001	26.180	39.757	15.189
8/26/2008 10:31	328.001	26.179	39.650	15.436
8/26/2008 10:31	329.001	26.180	39.635	15.470
8/26/2008 10:31	330.001	26.191	39.578	15.603
8/26/2008 10:31	331.001	26.179	39.627	15.488
8/26/2008 10:31	332.001	26.179	39.397	16.020
8/26/2008 10:31	333.001	26.179	39.534	15.703
8/26/2008 10:31	334.001	26.180	39.455	15.886
8/26/2008 10:31	335.001	26.188	39.475	15.839
8/26/2008 10:31	336.001	26.180	39.546	15.675
8/26/2008 10:31	337.001	26.178	39.589	15.576
8/26/2008 10:31	338.001	26.177	39.451	15.896
8/26/2008 10:31	339.001	26.176	39.362	16.101
8/26/2008 10:31	340.001	26.189	39.347	16.136
8/26/2008 10:31	341.001	26.180	39.320	16.198
8/26/2008 10:31	342.001	26.180	39.298	16.248