February 2008

Ft. Pierce Utilities Authority

Floridan Aquifer Production Well Project (FA-7 and FA-9)

Prepared by

BOYLE

FORT PIERCE UTLILITIES AUTHORITY
FLORIDAN AQUIFER PRODUCTION WELL PROJECT
(FA-7 & FA-9)

Prepared for

Fort Pierce Utilities Authority
Fort Pierce, Florida

February 2008

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Project No. 06-0039

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Executive Summary

The Fort Pierce Utilities Authority received funding through the Alternative Water Supply (AWS) Grant Program sponsored by the South Florida Water Management District (SFWMD) to help offset costs to construct two (2) new Floridan aquifer water supply wells and to deepen three existing Floridan aquifer production wells. The water produced by these efforts will supply additional brackish water to the FPUA operated Reverse Osmosis facility. This additional water will provide their customers with a stable water supply and will help to meet long-term demands for potable water within established regulatory requirements.

A notice to proceed was issued to All Webb's Enterprise (AWE) on April 9, 2007 to construct production wells FA-7 and FA-9 and to deepen three previously constructed wells identified as FB-2, FB-3, and FB-4. Construction and testing services provided by AWE began on May, 14, 2007 and were completed in accordance with the contract documents on September 30, 2007. Brackish water supply wells FA-7 and FA-9 were completed with a production interval from 580 to 1,200 and 618 to 1,252 feet below land surface (bls), respectively. Once production wells FA-7 and FA-9 were drilled to their respective total depths, the open hole section were acidized in an effort to increase their production capacity. Based on minor changes in the original well design and acidizing the production interval, the well capacity for both wells exceed the original design capacity of 1.3 million gallons per day by approximately 80 percent. The second component of this project increased the open-hole section of existing production wells FB-2, FB-3 and FB-4 from 500 to 880 feet bls to 500 to 1,250 feet bls. The entire production interval was then acidified. Deepening the production intervals from 880 feet to a depth of 1,250 feet followed by well acidization produced an eight to ten fold increase in the well's production capacity with little change in water quality. At this time the SFWMD Alternative Grants do not fund well acidization procedures however future funding should be considered based on an average two-fold increase in production capacity after well acidization procedures are completed.

Future consideration should be given to acidizing existing production wells FA-5, FA-8, FA-10 and FA-11 to improve operating efficiencies without effecting water quality. A long-

term aquifer performance test should be conducted to determine field scale hydraulic parameters to help determine the regional impacts of well field usage. Water quality and water levels should be monitored on a regular basis to understand trends resulting in long-term operation of the well field. A well field and raw water transmission system optimization study should be conducted to determine the most efficient pumping schemes and to determine the efficiency of the raw water transmission system to handle current and future demands.

SECTION 1

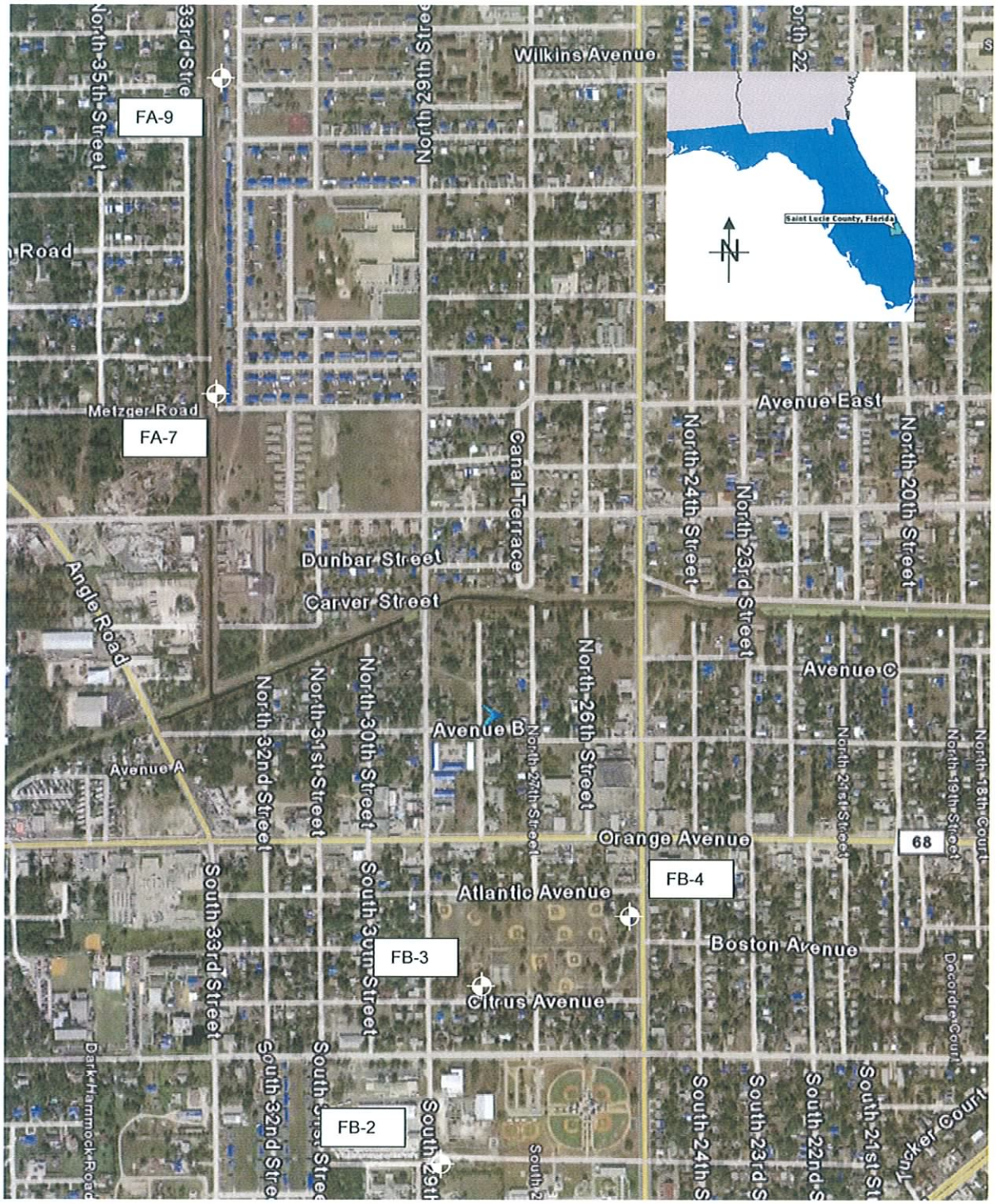
Introduction

The intent of this report is to summarize the construction activities and testing of five (5) Floridan aquifer production wells that supply water to the Fort Pierce Utilities Authority (FPUA) water treatment plant (WTP). This project entailed the construction of wells FA-7 and FA-9 and the deepening of previously constructed wells identified as FB-2, FB-3, and FB-4. Construction and testing of the wells were performed in accordance with South Florida Water Management District (SFWMD) construction permits, the guidelines established as part of the alternative water supply funding program, and "The Contract Documents and Technical Specifications for The Fort Pierce Utilities Authority Floridan Aquifer Production Well Project". Copies of the SFWMD construction permits and the well completion reports can be found in Appendix A. A site location map with well locations is presented as Figure 1.

Section 2 of this report describes the drilling techniques utilized (mud rotary and reverse air), the three stages of construction for wells FA-7 and FA-9 (surface casing, inner casing, and open hole), procedures for deepening previously constructed wells FB-2, FB-3, and FB-4, and any complications encountered during well construction activities.

Section 3 of this report describes the regional and site geology and the hydrogeology that were encountered during this project. This information is important in determining the setting depths for the steel surface casing; the PVC production casing and the extent of the production interval (open-hole section).

Section 4 of this report explains testing operations and results that were conducted and determined as part of this project. The qualitative and quantitative information acquired during this testing is crucial in determining well efficiency, well characteristics, and water quality. Hydrogeologic testing during the construction or deepening of the Floridan aquifer production wells include: formation sampling, water quality analysis, geophysical logging, and variable-rate pumping tests.



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Drawn By: SME
Date: 10/23/2007

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project

Site Location Map

Figure
1

Section 5 of this report summarizes activities conducted as part of this project and provides recommendations for proper future testing, operation and maintenance of the well field and to conduct computer modeling of the groundwater and raw water transmission systems to determine inefficiencies within the brackish water supply system.

SECTION 2

Construction Phase

This section describes the construction, drilling, and testing details associated with the construction of Floridan aquifer production wells FA-7 and FA-9 and the deepening and well stimulation of previously constructed Floridan aquifer production wells FB-2, FB-3 and FB-4. The South Florida Water Management District (SFWMD) well construction permits and drilling contractor well completion reports are included in Appendix A.

2.1 Production Well FA-7

2.1.1 General

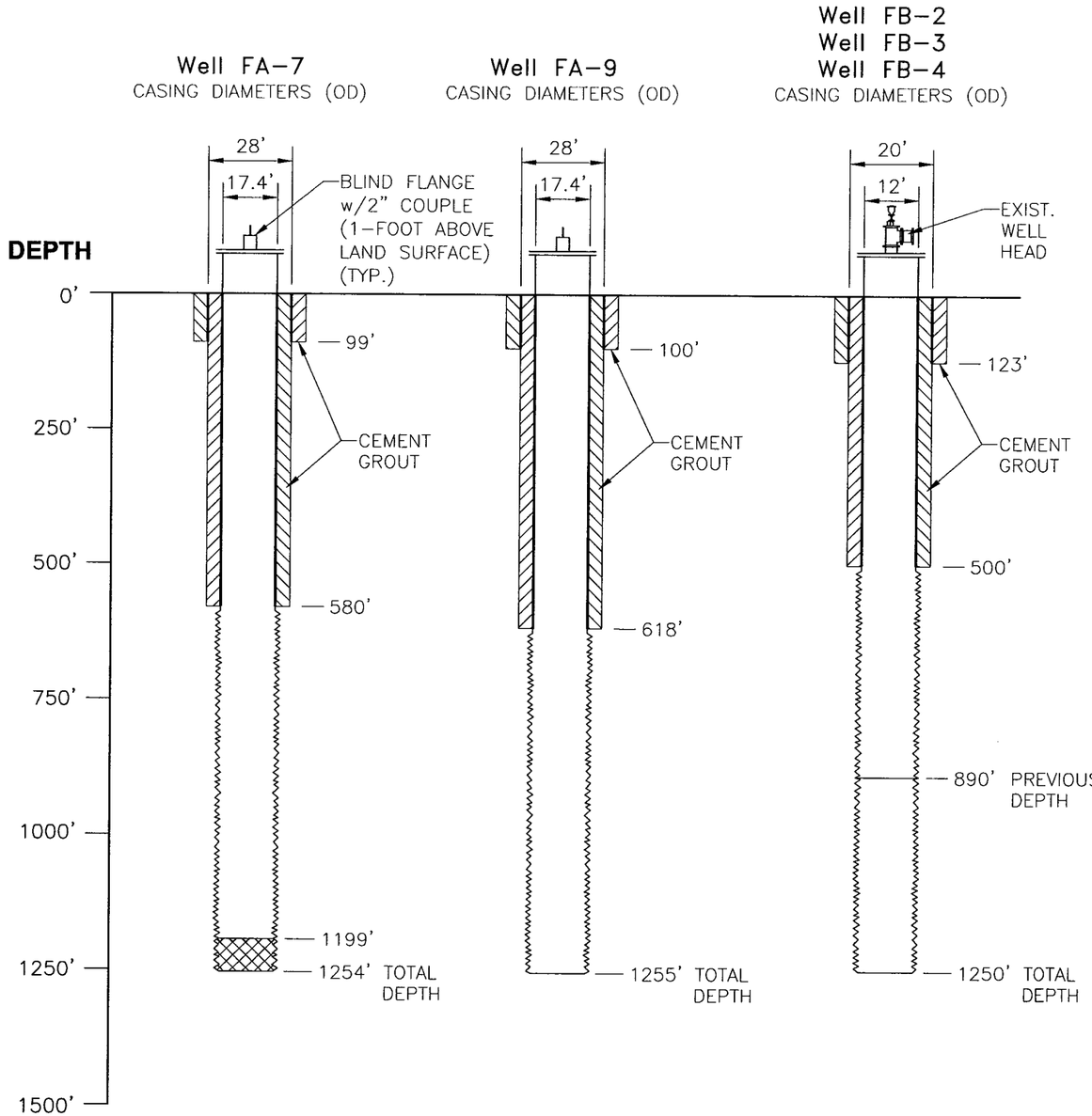
All Webbs Enterprises, Inc. (AWE) began construction of Well FA-7 on May 17, 2007 and ended on August 17, 2007, with the installation of the temporary wellhead. The first 100 feet of the borehole was drilled using a bucket-type auger rig. The remaining portion of the borehole was advanced using a Failing 2500 rotary drill rig. Mud rotary drilling techniques were used to drill through the surficial aquifer and the clay and silt intervals that make up the Hawthorn Group (intermediate confining unit). The mud rotary technique circulates drilling fluids (mud) in the borehole during drilling operations. The drilling fluid, with a higher viscosity than water, helps to lift the cuttings to the surface and also provides a mud cake along the sidewall of the borehole which aids in preventing collapse of poorly consolidated sediments. Product information sheets for drilling fluids (all NSF approved) used during mud-rotary drilling activities can be found in Appendix D. Subsequent reverse-air drilling techniques were utilized to accomplish further advancement of the borehole to a depth of 1,254 feet bls. Reverse-air drilling, which creates a suction lift through the drill string, allows representative water quality samples to be collected and creates low pressure in the borehole thus developing the well as the borehole is advanced. A tabulated summary of construction and testing activities is presented in Appendix B.

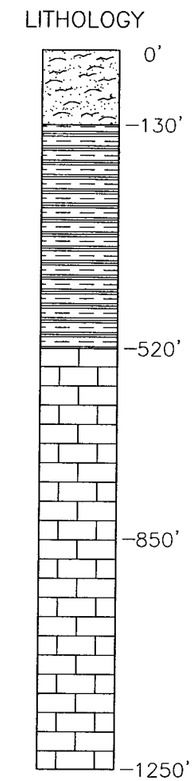
Lithologic samples were collected at 10 foot intervals during the advancement of the borehole. Lithologic descriptions of the samples collected are presented in Appendix C and discussed in greater detail in Section 4.1 of this report. Water samples were collected at 30 foot intervals during reverse-air drilling and field tested for temperature, pH, specific conductance, and total dissolved solids (TDS) concentrations. This water sampling program was designed to detect undesirable increases in salinity (TDS) which commonly occurs within the Floridan aquifer with increasing depth. Water quality results are discussed in Section 4.2 of this report. Geophysical logs conducted during the construction of production well FA-7 included: caliper, natural gamma ray, dual-induction, compensated sonic, temperature, fluid resistivity, and fluid velocity. The temperature, fluid resistivity, and flow meter logs were conducted under both static (shut in) and dynamic (flowing) conditions to help identify productive intervals within the borehole. Along with the geophysical logs, borehole video surveys were also conducted to visually conform the depths of productive and nonproductive intervals and to visually inspect the well casing for leaks or damage. The geophysical logs and video surveys can be found in Appendix F and are discussed in Section 4.3 of this report.

Production well FA-7 consists of an outer steel casing, an inner Polyvinyl Chloride (PVC) casing, and an open-hole section. Casing setting depth and the open hole interval was selected after careful evaluation and/or interpretation of the lithologic samples collected, geophysical logs, and pertinent information obtained from reports detailing Floridan aquifer wells previously installed in the area (FB-2 [1992], FB-3 & FB-4 [1996], FA-6 & FA-8 [2000]). The 28-inch diameter, carbon steel outer casing was emplaced at the surface of the borehole to prevent formation collapse during ensuing drilling operations and the installation of the inner casing. The inner casing was set to a depth within competent material, sealing off the clay confining strata of the Hawthorn Group, without blocking any significant production zones within the Floridan aquifer. A well completion diagram of production well FA-7 is provided in Figure 2-1.

2.1.2 Surface Casing

Construction of production well FA-7 commenced with the drilling of a borehole to a depth of 100 feet bls using a 34-inch auger bit. Drill cuttings were stockpiled next to the well and





SERIES		GEOLOGIC UNIT	HYDROGEOLOGIC UNIT	
HOLOCENE		PAMLICO SAND	SURFICIAL AQUIFER SYSTEM	0'
PLEISTOCENE		ANASTASIA FORMATION		
PLIOCENE		TAMIAMI FORMATION		
MIOCENE AND LATE OLIGOCENE		HAWTHORN GROUP	INTERMEDIATE CONFINING UNIT	130'
EARLY OLIGOCENE				520'
EOCENE	LATE	OCALA LIMESTONE	FLORIDAN AQUIFER SYSTEM: UPPER FLORIDAN AQUIFER	
	MIDDLE	AVON PARK FORMATION		850'
	EARLY		MIDDLE CONFINING UNIT	1100'
				1250'

LEGEND

- SAND AND SHELL
- CLAY
- FOSSILIFEROUS LIMESTONE
- BACKFILL

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FORT PIERCE UTILITIES AUTHORITY

WELL CONSTRUCTION DETAILS

BEC PROJECT NO. 32063.00

FIGURE 2-1

DWG: P:\06-0039\REPORT\Final\32063-FIG-2-1.dwg Layout Name: FIGURE - Plotted by: Debbie Pullam Date: 2/13/2008 - 10:58 AM
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periodically back-bladed along the dirt road next to the well location. Caliper and natural gamma geophysical logs were then conducted on May 20, 2007 to 100 feet bls.

On May 20, 2007, steel surface casing (ASTM A53, Grade B), 28-inch outer diameter (OD) was then placed in the borehole to a depth of 99 feet bls with 1-2 feet of casing remaining above ground surface. A mill certificate for the steel casing can be found in Appendix D. The casing joints were arc-welded together as each section was lowered into the borehole. Centralizers were welded to the outside of the steel casing to ensure an annulus space between the casing and the sidewall of the borehole. A set of three centralizers were attached, approximately 120 degrees apart, around the exterior wall of the casing at 5, 20, 35, and 84 feet from the bottom of the casing.

Upon placement of the steel casing to the desired depth, a tremie pipe was inserted inside the 28-inch diameter steel casing. The annulus space between the outside of the well casing and the sidewall of the borehole was then cemented to surface in one stage using ASTM Type II neat cement via the pressure grouting method. The Contractor cementing program can be found in Appendix D. Table 2.1 provides a summary of the casing depths and quantities of cement used during casing installation.

2.1.3 PVC Inner Casing

After installation of the surface casing, mud rotary drilling techniques were used to drill a pilot hole to a depth of 754 feet bls using a nominal 12 ¼-inch diameter tri-cone bit. The following geophysical logs were then conducted within the pilot hole: caliper, natural gamma, dual induction with spontaneous potential, temperature, and sonic. The pilot hole was then reamed to a depth of 600 feet bls using a nominal 28-inch diameter tri-cone bit prior to installing the 17.4 inch (OD) PVC casing to a depth of 598 feet bls.

The PVC inner casing was installed on June 17, 2007. The inner casing consisted of 20 foot lengths of Certainteed™ 17.4-inch (OD) Certa-Lok SDR 17 PVC well casing, with an inner diameter of 15.25 inches. Engineering specifications for the PVC casing are provided in Appendix D. Thirty sections, for a total of 600 feet, were installed with 1-2 feet of casing remaining above ground surface. The individual 20-foot sections of PVC well casing were connected, as they were lowered into the borehole, by the insertion of a plastic spline through the couplings and manufacture grooves located on the end of each pipe section.

The spline acts to hold the pipe in the coupling locking it in place. Centralizers were attached to the outside of the Certa-Lok PVC casing to ensure an annulus space exists between the casing and the sidewall of the borehole, and to help keep the casing straight within the borehole. A set of four stainless steel centralizers were attached, approximately 90 degrees apart, around the exterior wall of the casing at 5, 39, 59, 98, 185, 285, 385, 485, and 565 feet from the bottom of the casing. A cement header was attached at the surface to the last pipe section to conduct pressure grouting cementing operations.

Upon placement of the PVC casing to the desired depth, a tremie pipe was inserted inside the Cert-Lok PVC well casing to approximately 564 feet bls. The annulus space between the outside of the well casing and the sidewall of the borehole was then pressure grouted from the bottom of the casing back to a depth of 414 feet. The remaining portion of the annulus was cemented back to land surface in two stages (lifts) via the tremie method. The Contractor calculated the cement volumes to be used in each stage of cementing to avoid exceeding the casing collapse strength and minimize the heat of hydration that could deform or collapse the PVC well casing. Each cement lift was performed at least 15 hours apart to allow ample curing time of the ASTM Type II neat cement. A product information sheet for the ASTM type II cement can be found in Appendix D. The first cement lift was performed immediately following the placement of the PVC casing within the nominal 28-inch diameter borehole. The next day, cement level in the annulus was hard tagged at 414 feet bls using 1½ inch diameter collarless steel tremie pipe. The second lift of cement placed in the annular space was done via the tremie method. Prior to starting the third lift, the cement level in the annulus was hard tagged at 311 feet bls and the tremie pipe was placed at 310 feet bls. A cement slurry consisting of 6% bentonite was used during the final cement lift. Table 2.1 provides a summary of the casing depths and quantities of cement used during casing installation.

TABLE 2.1
Ft. Pierce Utilities Authority
Floridan Aquifer Well Casing Depths and Cement Quantity Summary for FA-7

	28-inch diameter Steel	Quantity of Cement Used (Barrels)	17.4-inch diameter Certa-Lok PVC	Quantity of Cement Used (Barrels)	Quantity Used (Barrels)
Well Name	Depth Installed (feet bls)	ASTM Type II Neat Cement	Depth Installed (feet bls)	ASTM Type II Neat Cement	6% Bentonite Cement
FA-7	99		578		
1st Lift		45		80	
2nd Lift				52.6	
3rd Lift					110

2.1.4 Open Borehole

Following the installation of the PVC production casing, the drilling method changed from mud rotary to reverse-air circulation techniques using a 14 ¾ inch diameter tri-cone bit to further advance the borehole to a depth of 1,254 feet bls. Drill cuttings produced by reverse-air drilling were collected and described. Groundwater produced during reverse-air drilling operations gravity flowed into the 33rd Street Canal after passing through a settling tank to remove suspended solids.

On June 26, 2007 small pieces of PVC were observed in the reverse-air drill cuttings and it was determined that a video survey was needed to assess this occurrence. The video survey revealed that a portion of the Certa-Lok PVC casing had broken off at the bottom of the casing string. Drilling operations over the next several weeks slowed greatly because pieces of PVC casing would clog the drill string as they were brought to surface. Larger diameter drill pipe and discharge lines were then used to help alleviate some of these drilling difficulties.

After drilling production well FA-7 to the desired depth of 1,254 feet bls, the following set of geophysical logs were conducted: 4-arm caliper, natural gamma ray, dual induction, temperature, fluid resistivity, and flow meter. The temperature, fluid resistivity, and flow meter logs were conducted under both static (shut in) and dynamic (flowing) conditions. A borehole video survey was also conducted under dynamic conditions. The video survey revealed that the bottom 20 foot section of PVC casing had collapsed during cementing or

became un-joined during subsequent reverse-air drilling operations. A portion of this PVC casing, approximately 5-6 feet in length, was observed from about 594 feet to 600 feet bls. Therefore, the bottom of the Cert-Lok PVC casing was now located at a depth of 578 feet bls instead of the original setting depth of 598 feet bls.

Once the production interval (578 to 1,254 feet) was completed it was acidized in an effort to increase its production capacity. On August 15 and 16, 2007 a total of 9,600 gallons of 28% HCL acid with corrosion inhibitor was pumped into production well FA-7. This acidization procedure was performed to further open the pathways within the carbonate aquifer to help increase the overall production of the well. The Contractor's acidization program is provided in Appendix D.

The well was developed via over pumping method. Sand content during well development was measured using a Rossum Sand Tester. The well was developed at an average pumping rate of about 2,300 gallons per minute (gpm) for approximately 24 hours. Well development ceased upon reaching a desired sand content of less than .4 ml of sand (particulate) accumulation (measured in the Rossum Sand Tester) within a one-hour time period. The well was allowed to recover to static conditions whereby consistent water level readings were maintained for more than one-hour. Once water level stabilized, a variable-rate specific capacity test was conducted to determine well yield. Specific capacity results are discussed in Section 4.4 of this report. On September 7, 2007 a plumb and alignment test was conducted on well FA-7. The plumb and alignment test was performed to verify the final well casing was straight and plumb thereby ensuring a submersible pump could be properly installed to the desired setting depth.

Another video survey was conducted after the variable-rate pumping test and plumb and alignment test were complete. The video survey revealed a piece of cement obstructing the open-hole section of the well at approximately 745 feet bls. It was determined that remedial actions were necessary to clear any existing obstructions and remove any pieces of cement or PVC that could pose future problems. After thoroughly swabbing and surging the well, via a wire line operated tool, another video survey was conducted. No obstructions were observed that would hinder the water flow from the well. However, several small pieces of cement and PVC casing were observed along the sidewall of the well, at various depths, that could pose future problems if they become displaced from the position observed at the

time of the video survey. The Contractor agreed to conducted additional remedial work using various techniques to clear any potential obstructions from within the production interval. The larger pieces of cement and PVC well casing that could not be removed were pushed to the bottom of the wellbore. After the remedial work was completed a bore hole video survey was conducted. The video survey showed that the accumulated material (piece of PVC, cement grout and rock material) backfilled the wellbore to a depth of 1,220 feet (30 feet of fill material). The Contractor then installed a 20 foot cement cap to permanently seal the backfill material in place to avoid future problems. These efforts however reduced the production interval by 50 feet but fortunately the bottom 75 to 100 feet of the wellbore produced very little water based on the lithologic and geophysical log data. The overall production capacity of this well was not significantly impacted by the above mentioned remedial actions.

2.2 Production Well FA-9

2.2.1 General

All Webbs Enterprises, Inc. (AWE) began construction of Well FA-9 on July 17, 2007 and ended on September 15, 2007 with the installation of a temporary wellhead. The drilling techniques and construction were similar to that of well FA-7 with the main differences being in the casing setting depths, geophysical logging, and drilled depth of the pilot hole. A tabulated summary of construction and testing activities is presented in Appendix B. Lithologic samples were collected at 10 foot intervals during the advancement of the borehole. Lithologic descriptions of the samples collected are presented in Appendix C and discussed in Section 4.1 of this report. Water samples were collected at 30 foot intervals during reverse-air drilling and field tested for temperature, pH, specific conductance, and total dissolved solids (TDS) concentrations. Water quality results are discussed in Section 4.2 of this report. Geophysical logs and video surveys, conducted at production well FA-9, can be found in Appendix F and are discussed in Section 4.3 of this report. Production well FA-9 consists of an outer steel casing, an inner PVC casing, and an open-hole section. A well completion diagram of production well FA-9 is provided in Figure 2-1.

2.2.2 Surface Casing

Construction of production well FA-9 commenced with the drilling of a borehole to a depth of 100 feet bls using a 34inch auger bit. On July 19, 2007, ASTM A53, Grade B, 28 inch outer diameter (OD) carbon steel surface casing was placed in the borehole to a depth of 100 feet bls with 1-2 feet of casing remaining above ground surface. The annulus space between the outside of the well casing and the sidewall of the borehole was then pressure cemented from bottom to land surface in one stage using ASTM Type II neat cement, see Table 2.2 below.

2.2.3 PVC Inner Casing

After installation of the steel surface casing, mud rotary drilling techniques were used to advance the borehole to a depth of 620 feet bls using a 28-inch diameter tricone bit. Upon completion of drilling the 28-inch diameter borehole, a 4-arm caliper and natural gamma ray geophysical logs were conducted to correlate the depths with other wells in the area and to calculate cement volume during subsequent cementing operations. On July 26, 2007, Certainteed™ 17.4 inch outer diameter (OD) Certa-Lok SDR 17 PVC well casing was installed into the borehole. Thirty-one sections (20 feet in length), for a total of 620 feet, were installed with 1-2 feet of casing remaining above ground surface. The annulus space between the outside of the well casing and the sidewall of the borehole was pressure cemented from bottom 580 feet. The remaining part of the annulus was cemented to land surface via the tremie method in two stages (lifts) using ASTM Type II neat cement. Table 2.2 provides a summary of the casing depths and quantities of cement used during casing installation.

TABLE 2.2
Ft. Pierce Utilities Authority
Floridan Aquifer Well Casing Depth and Cement Quantity Summary for FA-9

	28-inch diameter Steel	Quantity of Cement Used (Barrels)	17.4-inch diameter PVC	Quantity Cement Used (Barrels)
Well Name	Depth Installed (feet bls)	ASTM Type II Neat Cement	Depth Installed (feet bls)	ASTM Type II Neat Cement
FA-9	100		618	
1st Lift		20		46
2nd Lift				105
3rd Lift				49

2.2.4 Open Borehole

After installing the PVC casing to a depth of 618 feet bls, the drilling method was changed from mud rotary to reverse-air circulation techniques to further advance the borehole to a depth of 1,255 feet bls using a 14.25-inch diameter tri-cone bit. On August 8 & 9, 2007 the following geophysical logs were performed within the open hole section of well FA-9: 4-arm caliper, natural gamma ray, dual induction, temperature, fluid resistivity, and flow meter. The temperature, fluid resistivity, and flow meter logs were conducted under static (shut-in) and dynamic (flowing) conditions. Along with the geophysical logs, a video survey was also conducted under dynamic conditions. Geophysical logs and video surveys, conducted at production well FA-9 helped to identify and quantify the flow characteristics of the anticipated production interval. These data can be found in Appendix F and are discussed in Section 4.3 of this report.

On August 22 and 23, 2007 a total of 8,500 gallons of 28% HCL acid with a corrosion inhibitor was pumped into production well FA-9. The well was then developed by the over-pumping method using a submersible turbine pump. Sand content during well development was measured using a Rossum Sand Tester. The well was developed at an average pumping rate of about 2,300 gallons per minute (gpm) for approximately 24 hours. Well development stopped when the sand content of the produced water was less than .4 ml of accumulation (measured by the Rossum Sand Tester) over a one hour time period. The well was allowed to recover to static conditions where consistent water level readings are maintained for more than one hour. Once water level stabilized, a variable-rate specific capacity test was conducted to determine well yield. Specific capacity results are discussed in Section 4.4 of this report. On September 7, 2007 a plumb and alignment test was successfully conducted at well FA-9. A final video survey was conducted after the variable-rate pumping test and plumb and alignment test were complete.

2.3 Deepening of Production Well FB-2

All Webbs Enterprises, Inc. (AWE) began deepening Production Well FB-2 on August 14, 2007 and ended on August 17, 2007 with the completion of drilling activities. Reverse-air drilling techniques were used to deepen the open-hole section of Well FB-2 from 888 feet to

1,249 feet bls using an 11-inch diameter tri-cone bit. A tabulated summary of construction and testing activities for FB-2 is presented in Appendix B.

Lithologic samples were collected at 10 foot intervals during the advancement of the borehole. Lithologic descriptions of the samples collected are presented in Appendix C and discussed in Section 4.1 of this report. Water samples were collected at 30 foot intervals during reverse-air drilling and field tested for temperature, pH, specific conductance, and total dissolved solids (TDS). Water quality results are discussed in Section 4.2 of this report.

The following geophysical logs were performed on well FB-2 after drilling to the desired depth: 4-arm caliper, natural gamma ray, dual induction, temperature, fluid resistivity, and flow meter. The temperature, fluid resistivity, and flow meter logs were conducted under static (shut in) and dynamic (flowing) conditions. Along with the geophysical logs, a video survey was also conducted under dynamic conditions. The geophysical logs and video surveys are provided in Appendix F and are discussed in Section 4.3 of this report. As part of the well stimulation program a total of 4,830 gallons of 28% hydrochloric acid was pumped into the wellbore. The produced groundwater and spent acid was neutralized using soda ash to bring the pH to 6 standard unit or greater prior to discharge to the storm water system. The well development and variable-rate pumping test were performed on FB-2 similar to that of FA-7 and FA-9. The results from the specific capacity test are discussed in Section 4.4 of this report.

2.4 Deepening of Production Well FB-3

All Webbs Enterprises, Inc. (AWE) began deepening Well FB-3 on June 27, 2007 and ended on July 2, 2007 with the completion of drilling activities. Reverse-air drilling techniques were used to deepen the open-hole section of Well FB-3 from 887 feet to 1,250 feet bls using an 11-inch diameter tri-cone bit. A tabulated summary of construction and testing activities for FB-3 is presented in Appendix B.

Lithologic samples were collected at 10-foot intervals during the advancement of the borehole. Lithologic descriptions of the samples collected are presented in Appendix C and discussed in Section 4.1 of this report. Water samples were collected at 30 foot intervals

during reverse-air drilling and field tested for temperature, pH, specific conductance, and total dissolved solids (TDS). Water quality results are discussed in Section 4.2 of this report.

The following geophysical logs were performed on well FB-3 after drilling to the desired depth: 4-arm caliper, natural gamma ray, dual induction, temperature, fluid resistivity, and flow meter. The temperature, fluid resistivity, and flow meter logs were conducted under static (shut in) and dynamic (flowing) conditions. Along with the geophysical logs, a video survey was also conducted under dynamic conditions. The geophysical logs and video surveys are provided in Appendix F and are discussed in Section 4.3 of this report. For acidization, a total of 5,000 gallons of 28% Hydrochloric acid solution was used and the process and was conducted in 2 stages using 2,500 gallons during each stage. The well development and variable-rate pumping test were performed on FB-3 similar to that of FA-7. Specific capacity results from the pumping activity are discussed in Section 4.4 of this report.

2.5 Deepening of Production Well FB-4

All Webbs Enterprises, Inc. (AWE) began deepening Well FB-3 on May 21, 2007 and ended on May 24, 2007 with the completion of drilling activities. Reverse-air drilling techniques were used to deepen the open-hole section of FB-4 from 880 feet to 1,250 feet bls using a nominal 10-inch diameter tri-cone bit. A tabulated summary of construction and testing activities for FB-4 is presented in Appendix B.

Lithologic samples were collected at 10 foot intervals during the advancement of the borehole. Lithologic descriptions of the samples collected are presented in Appendix C and discussed in Section 4.1 of this report. Water samples were collected at 30 foot intervals during reverse-air drilling and field tested for temperature, pH, specific conductance, and total dissolved solids (TDS). Water quality results are discussed in Section 4.2 of this report.

The following geophysical logs were performed on well FB-4 after drilling to the desired depth: 4-arm caliper, natural gamma ray, dual induction, sonic, temperature, fluid resistivity, and flow meter. The temperature, fluid resistivity, and flow meter logs were conducted under static (shut in) and dynamic (flowing) conditions. Along with the geophysical logs, a video survey was also conducted under dynamic conditions. The

geophysical logs and video survey can be found in Appendix F and are discussed in Section 4.3 of this report. Well stimulation operations were conducted by pumping 2,400 gallons of 28% Hydrochloric acid with corrosion inhibitor in two stages for a total of 4,800 gallons. The well development and variable-rate pumping test were performed on FB-4 similar to that of FA-7 and FA-9. The results of the specific capacity tests are discussed in Section 4.4 of this report.

SECTION 3

Geologic and Hydrogeologic Framework

3.1 Regional Geology and Hydrogeology

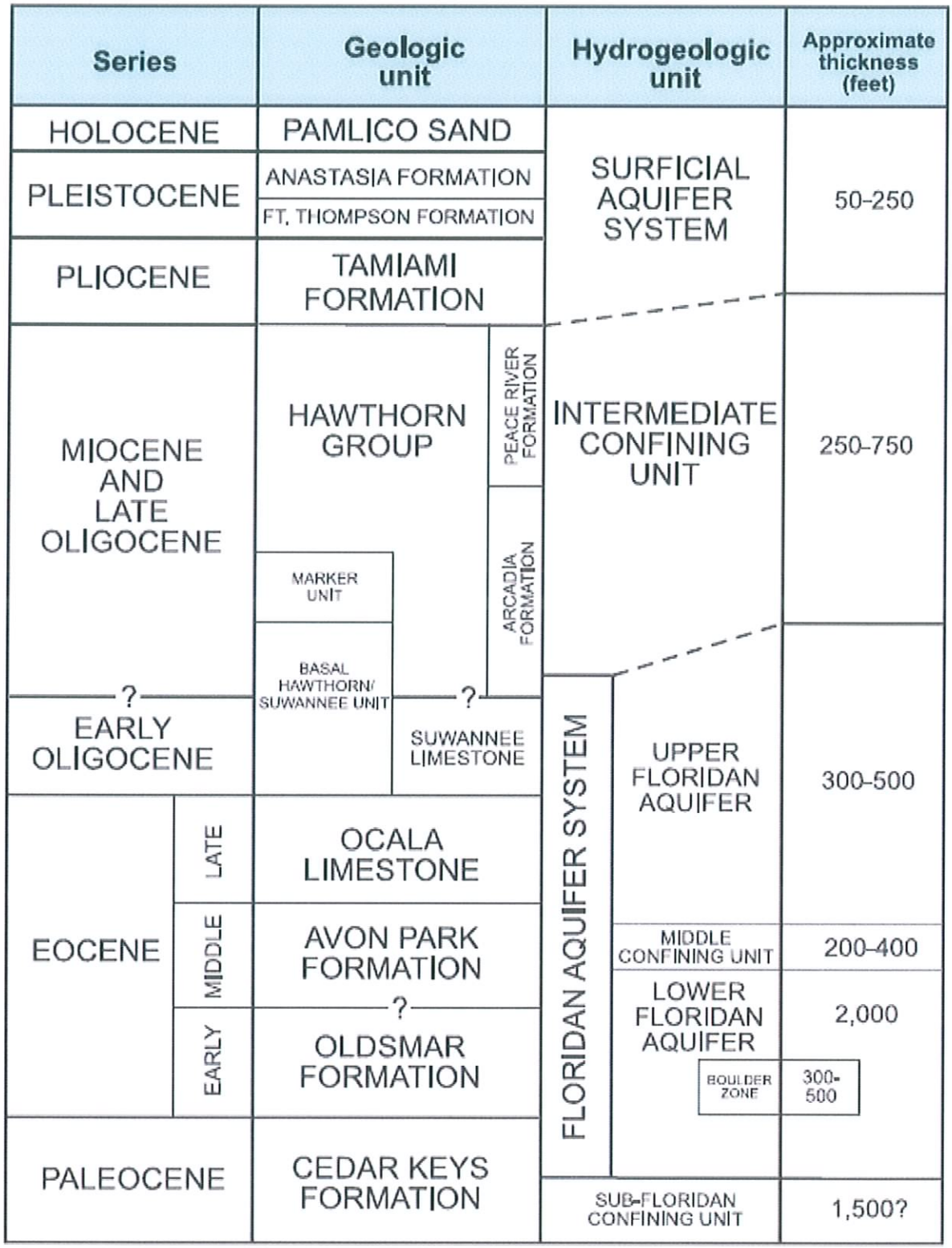
The regional geology of southeastern Florida consists primarily of inter-layered sands, clay, and limestone formations that were deposited primarily in a shallow sea environment. The upper 100 to 200 feet consists of inter-layered sand, sandy limestone, limestone, and coquina. Beneath that is the Hawthorn Group, which consists of approximately 400 feet of varying lithologies and components which includes shell beds, quartz sand, silt and calcareous clay with abundant phosphate grains. Underlying the Hawthorn Group is several thousand feet of carbonates (limestone and dolomite) compromising the Ocala Limestone, Avon Park, Oldsmar and Cedar Keys Formations.

The regional hydrogeology consists of the Surficial and Floridan Aquifer Systems. The Surficial Aquifer is highly transmissive and used extensively for private and municipal water supply. The Floridan and Surficial aquifer systems are separated by an intermediate confining unit (The Hawthorn Group) which contains sediments of lower permeability. The Floridan aquifer system has two major water-bearing zones, the Upper and Lower Floridan aquifers, which are separated by a less permeable middle confining unit. Both the Upper and Lower Floridan aquifers are highly productive; however, the Upper Floridan contains a significantly higher quality of water than the Lower Floridan. The base of the Floridan aquifer system is marked by impermeable, massive anhydrite beds of the Cedar Keys Formation. Figure 3-1 provides a generalized geologic and hydrogeologic interpretation of the region.

3.2 Site Geology and Hydrogeology

A site specific stratigraphic profile was derived from the correlation of formation samples and geophysical logs. The major stratigraphic and corresponding hydrogeological units encountered at the site are presented in Figure 2-1. Strata encountered during construction or deepening of the various Floridan aquifer production wells ranged in age from Eocene to

Figure 3-1
Generalized geology and hydrogeology in Martin and St. Lucie Counties
(Reese, R.S., 2004. USGS Water-Resources Investigation Report 03-4242)



Holocene Age deposits. The stratigraphic units and their respective ages are as follows: the Avon Park Formation and Ocala Group of Eocene Age; the Hawthorn Group of late Oligocene and Miocene Ages; the Tamiami Formation of Pliocene Age; the Anastasia Formation of Pleistocene Age; and Pamlico Sand of Holocene Age. The Surficial Aquifer, intermediate confining unit, and the Upper Floridan Aquifer were encountered during well construction activities.

3.2.1 Avon Park Formation

The Avon Park Formation of middle to late Eocene Age occurs from a depth of about 850 to at least 1,250 feet bls at the site. The Avon Park Formation consists primarily of micritic to fossiliferous limestone, dolomitic limestone, and hard crystalline dolomite. The top of the Avon Park Formation is marked in some places by light-brown colored, finely crystalline dolomite inter-bedded with limestone. A thick interval containing mostly dolomite, but commonly inter-bedded with limestone, is present in the middle to lower part of the formation. Index fossils which are characteristic of the Avon Park Formation are cone-shaped foraminifera *Dictyoconus sp.* (Duncan and Others, 1994). The upper portion of the Avon Park Formation was encountered during this project (850 feet bls) and forms several producing horizons within the upper Floridan aquifer.

3.2.2 Ocala Limestone

The Ocala Limestone of late Eocene Age and was encountered between 520 and 850 feet bls. The Ocala Group consists primarily of yellowish gray/tan, chalky to fossiliferous limestone. Interbedded throughout the Ocala Limestone are minor layers of chert and minor clay units. The limestone is characterized by abundant foraminifera, such as *Operculinoides sp.*, *Camerina sp.*, and *Lepidocyclina sp.* (Peacock, 1983). The presence of these foraminifera aids to distinguish the Ocala Limestone from the underlying Avon Park Formation. The Ocala Limestone is also part of the upper Floridan aquifer and is under artesian pressure and is frequently used for raw water supply in this area but is generally less productive than the Avon Park Formation

3.2.3 Hawthorn Group

The Hawthorn Group of the Oligocene-Miocene Age occurs from a depth of about 130 to 520 feet bls. The Hawthorn Group consists of the Peace River and Arcadia Formations and constitutes the primary confining interval (Intermediate Confining Unit) that separates the Surficial aquifer and the Floridan aquifer systems. The top of the confining unit is commonly equivalent to the top of the Hawthorn Group but can extend into the overlying Tamiami Formation. The Hawthorn Group sediments consist primarily of olive gray and dark greenish gray, slightly sandy, phosphatic calcerous clay, inter-bedded with thin layers of quartz sand and silt. The lower portion of the Arcadia Formation is generally composed of micritic limestone and marl or clay. The Hawthorn Group is identified on the geophysical logs by high gamma ray activity and low apparent formation resistivity. The high gamma ray activity within the Hawthorn Group is a result of high clay and phosphate content with the low apparent resistivity attributed to poorly to unconsolidated nature of the sediments.

3.2.4 Anastasia Formation

The Anastasia Formation of the Pleistocene Age occurs from a depth of about 60 to 130 feet bls at the site. The Anastasia Formation consists of gray/tan semi-consolidated sand/sandstone and silt and carbonate sand with shells and shell fragments.

3.2.5 Pamlico Sand

The Pamlico Sand of the Pleistocene Age occurs in the upper 60 feet bls at the site. This undifferentiated sediment consists of fine to medium-grained, moderately sorted, unconsolidated quarts sand and shell debris. The Pamlico Sand and Anastasia Formation compromise the surficial aquifer system St. Lucie County. The surficial aquifer was effectively isolated by the installed 28-inch diameter steel surface casing during the well construction process of Wells FA-7 and FA-9 before drilling deeper into the brackish artesian Floridan aquifer.

SECTION 4

Hydrogeologic Testing

Hydrogeologic testing during the construction and deepening of the Floridan aquifer production wells include: formation and water quality sampling, geophysical logging, and variable-rate pumping tests. Results of the hydrogeologic testing were used to determine the physical characteristics of the strata intercepted by the borehole, which in turn, were used to determine the appropriate casing setting depths and production intervals of the well.

4.1 Formation Sampling

Formation cutting samples from FB-2, FB-3, FB-4, FA-7, and FA-9 were collected at 10-foot intervals during drilling activities. Each cutting sample was described in detail to develop a lithologic log. The samples were described for rock type, color, consolidation (induration), porosity, and fossil content. These data were useful for determining the geologic formations and hydrogeologic units penetrated by the well bore. Formation descriptions of strata and hydrogeologic units encountered during drilling operations are discussed in Section 3 of this report. Detailed lithologic descriptions of samples collected from FB-2, FB-3, FB-4, FA-7, and FA-9 are provided in Attachment C. Upon completion of drilling activities, a set of samples from well FA-7 was provided to the South Florida Water Management District (SFWMD).

4.2 Water Quality

The water quality of the Floridan aquifer generally degrades with increased depth. Therefore, it is necessary to periodically monitor water quality during the advancement of the borehole. Water samples were collected at the reverse air discharge pipe at 30 foot intervals (length of the drill rods). Reverse air drilling was used after the 17.4 inch diameter PVC casing was installed as part of FA-7 and FA-9 and for all drilling activities while deepening wells FB-2, FB-3 and FB-4. Drilling was stopped for 5 to 10 minutes at the end of each 30-foot section to allow the reverse-air returns to clear, after which time a water sample was retrieved. Water samples collected underwent field analysis for temperature, pH, conductivity and total dissolved solids (TDS) concentrations.

Water quality results for Floridan aquifer wells FB-2, FB-3, FB-4, FA-7 and FA-9 are summarized in Tables 4.1 through 4.5. Graphs depicting the data for each parameter can be found as Figures 4-1 through 4-4.

Table 4.1
Well FB-2 - Reverse Air Return - Water Quality Data

Depth (ft bls)	Temperature (°C)	pH (s.u.)	Specific Conductance (µS/cm)	Total Dissolved Solids (mg/L)	Comments
908	24.55	8.16	2,341	1,520	
939	25.01	7.91	1,515	985	
971	25.07	8.03	1,566	1,017	
1,000	25.08	8.10	1,693	1,100	Well Killed
1,031	25.10	8.00	1,697	1,103	Well Killed
1,061	24.96	8.07	1,689	1,098	Well Killed
1,092	24.73	8.06	1,647	1,071	Well Killed
1,122	24.99	8.14	1,645	1,069	Well Killed
1,153	25.22	8.05	1,597	1,038	Well Killed
1,184	25.21	7.98	1,642	1,067	Well Killed
1,215	25.08	8.02	1,591	1,033	Well Killed
1,246	25.03	8.08	1,628	1,058	Well Killed
1,250	24.84	8.14	1,423	925	Well Killed

Depth (ft bls) - Feet below land surface
°C - degrees Celsius
S.U. - Standard Units
µS/cm - micro-siemens per centimeter
mg/L - milligrams per liter

Table 4.2
Well FB-3 - Reverse Air Return - Water Quality Data

Depth (ft. bls)	Temperature (°C)	pH (s.u.)	Specific Conductance (µS/cm)	Total Dissolved Solids (mg/L)	Comments
910	25.1	8.2	2,069	1,345	
941	25.2	8.1	1,748	1,135	
974	24.9	8.2	1,631	1,060	
1,004	25.0	8.2	1,805	1,173	
1,035	24.5	8.2	1,715	1,115	
1,066	24.9	8.2	1,718	1,117	
1,097	25.2	8.2	1,675	1,089	
1,127	25.3	8.2	1,658	1,077	
1,158	25.1	8.3	1,601	1,039	
1,188	25.5	8.2	1,588	1,032	
1,219		8.1	1,559	1,013	Temp. not recorded at time sample was collected
1,250	25.3	8.2	1,508	981	

Table 4.3
Well FB-4 - Reverse Air Return - Water Quality Data

Depth (ft. bls)	Temperature (°C)	pH (s.u.)	Specific Conductance (µS/cm)	Comments
907	25.1	6.80	1,582	
937	25.2	7.60	1,626	
967	25.2	7.20	1,133	
1,000	25.3	7.60	1,090	
1,030	25.0	7.60	1,106	
1,060	24.9	7.60	1,141	
1,092	25.2	7.60	1,140	
1,122	25.2	7.60	1,116	
1,153	25.2	7.60	1,011	
1,184	24.9	7.70	1,060	
1,215	25.0	8.50	1,016	
1,245	25.0	9.10	1,006	
1,250	25.3	8.00	978	

During drilling operations at FA-7 and FA-9, the aquifer could not supply sufficient water for reverse-air circulation until a depth of approximately 800 feet bls. Additional water was introduced from the FPUA raw water main to aid reverse-air circulation while drilling from approximately 600 to 800 feet bls. Therefore, water samples collected and the water quality results provided prior to reaching a depth 800 feet bls are not completely representative of the produced formation water.

Table 4.4
Well FB-7 - Reverse Air Return - Water Quality Data

Depth (ft bls)	Temperature (°C)	pH (S.U.)	Specific Conductance (µS/cm)	Total Dissolved Solids (mg/L)	Comments
795	25.23	8.20	1,397	906	
825	24.98	8.14	1,455	944	
857	25.40	8.20	1,471	956	
888	25.17	8.04	1,549	1,005	
921	25.01	8.07	1,537	998	
952	25.14	8.66	1,557	1,011	
983	25.08	8.25	1,617	1,055	
1,015		8.13	1,610	1,050	Temp. not recorded at time sample was collected
1,046	25.11	8.20	1,597	1,038	
1,076	25.18	8.12	1,619	1,052	
1,108	25.18	8.03	1,669	1,086	
1,139	25.16	8.11	1,642	1,067	
1,170	25.21	8.12	1,619	1,052	
1,201	25.18	8.16	1,432	931	
1,232	25.20	8.05	1,554	1,009	
1,250	25.22	8.12	1,550	1,006	

Table 4.5
Well FA-9 - Reverse Air Return - Water Quality Data

Depth (ft bls)	Temperature (°C)	pH	Specific Conductance (µS/cm)	Total Dissolved Solids (mg/L)	Comments
671	25.23	8.28	1,360	884	
702	24.86	8.27	1,381	898	
733	25.22	8.07	1,375	893	
764	25.33	8.17	1,392	903	
795	25.32	7.97	1,415	920	
826	25.19	7.94	1,402	911	
858	25.20	7.94	1,384	900	
889	25.27	7.91	1,381	897	
921	No Data	No Data	No Data	No Data	Sample not retrieved
952	25.22	7.99	1,542	1,002	
983	25.24	7.97	1,508	981	
1,014	25.38	8.35	1,488	966	
1,044	25.41	7.99	1,470	958	
1,075	25.26	8.06	1,476	959	
1,105	25.31	7.90	1,546	1,006	
1,135	25.32	7.97	1,572	1,027	
1,166	25.35	7.92	1,567	1,017	
1,197	25.35	8.02	1,529	993	
1,229	25.36	7.99	1,535	997	
1,250	25.42	7.95	1,522	990	

The water quality results (Figures 4-1 through 4-4) indicated that temperature and pH did not vary significantly with depth. Conductivity and Total Dissolved Solids (TDS) concentration showed a general increasing trend with depth. The water quality testing instrument used to test the parameters of well FB-4 was not the same as the instrument used to test the other wells. At well FB-4, a Hanna water quality meter model HI 9835 (Conductivity and Temperature) and Hanna water quality meter model HI 98127 (pH) was used; and an YSI hand held display 650 MDS with 600XL multi-parameter water quality probe was used at the remaining well sites.

Figure 4-1
Reverse Air Return – Formation Water Temperature Data

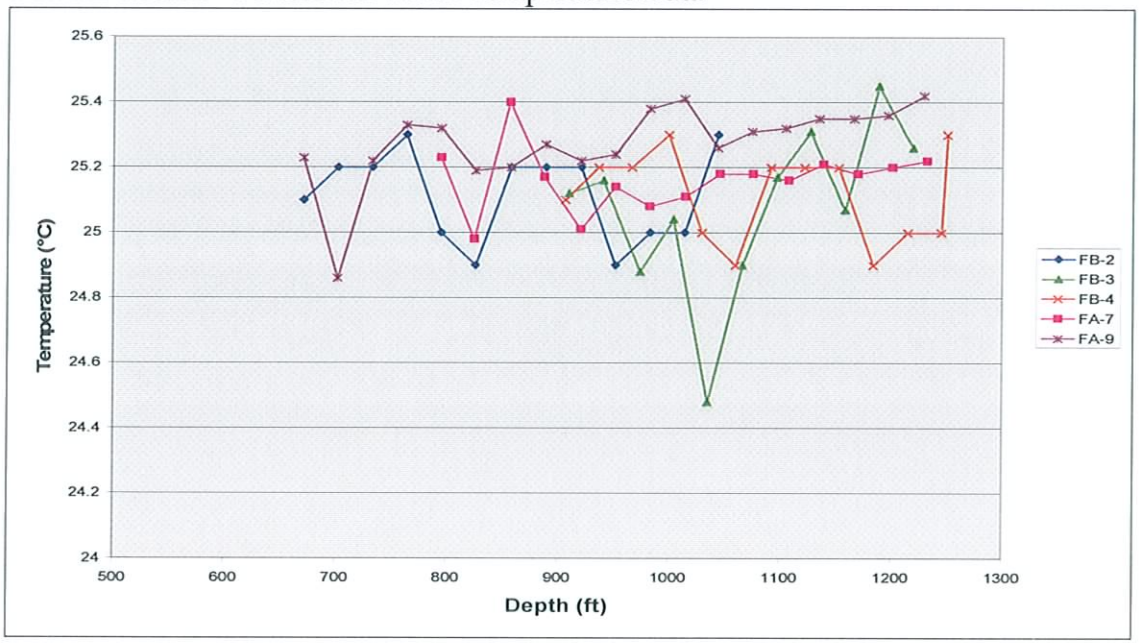


Figure 4-2
Reverse Air Return – Formation Water pH Data

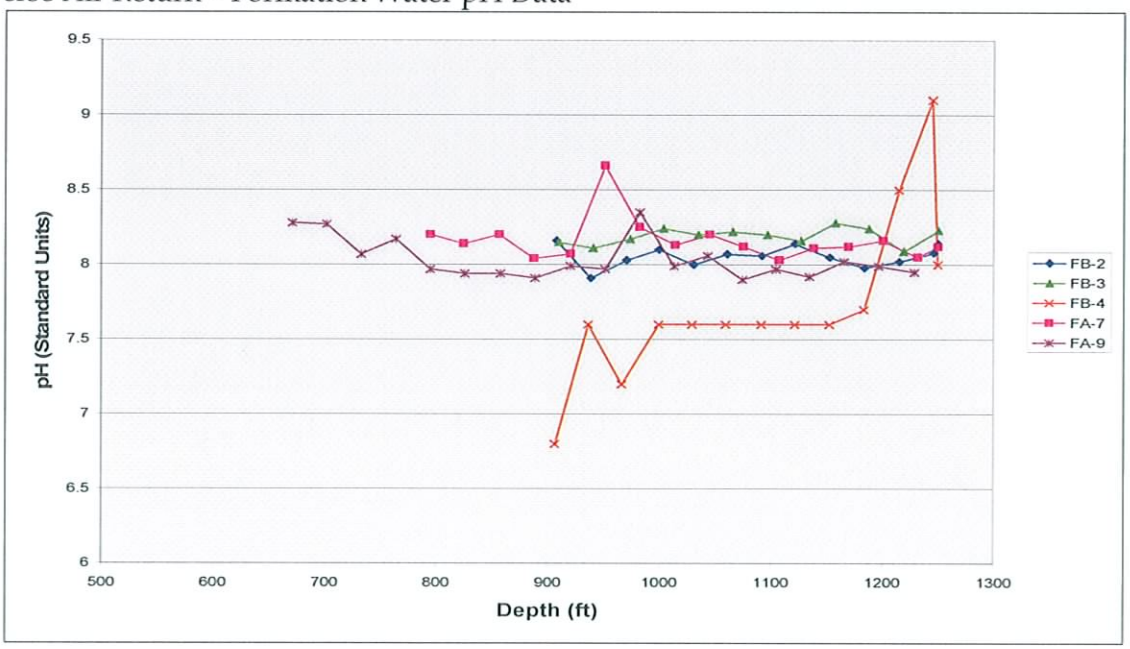


Figure 4-3
Reverse Air Return – Formation Water Specific Conductance Data

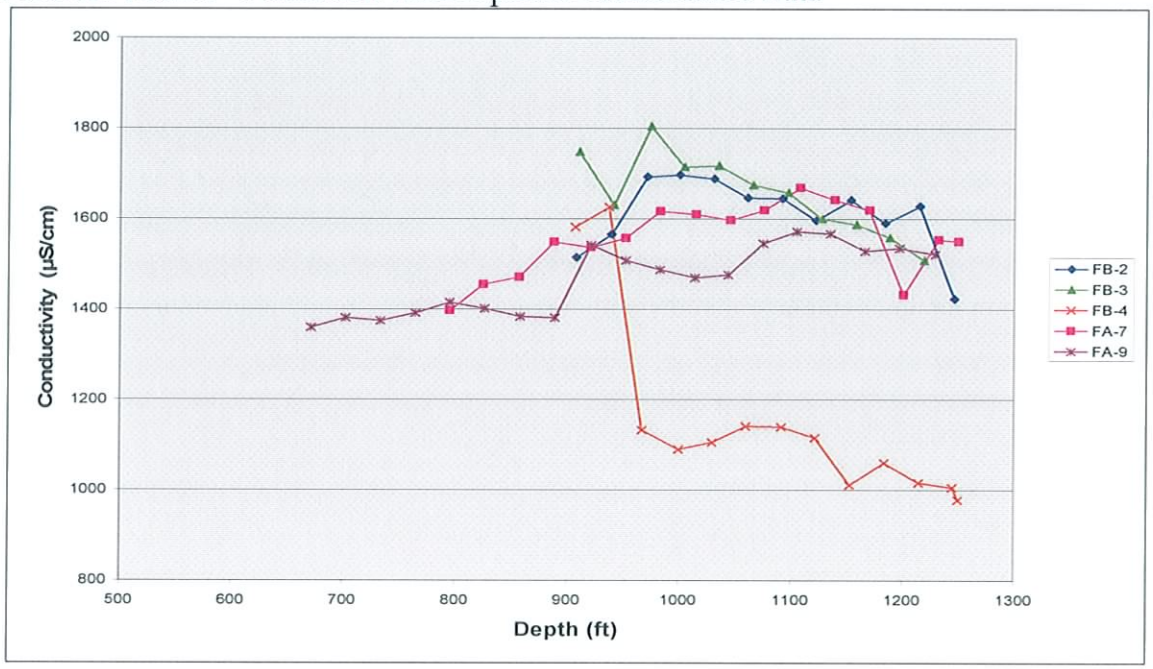
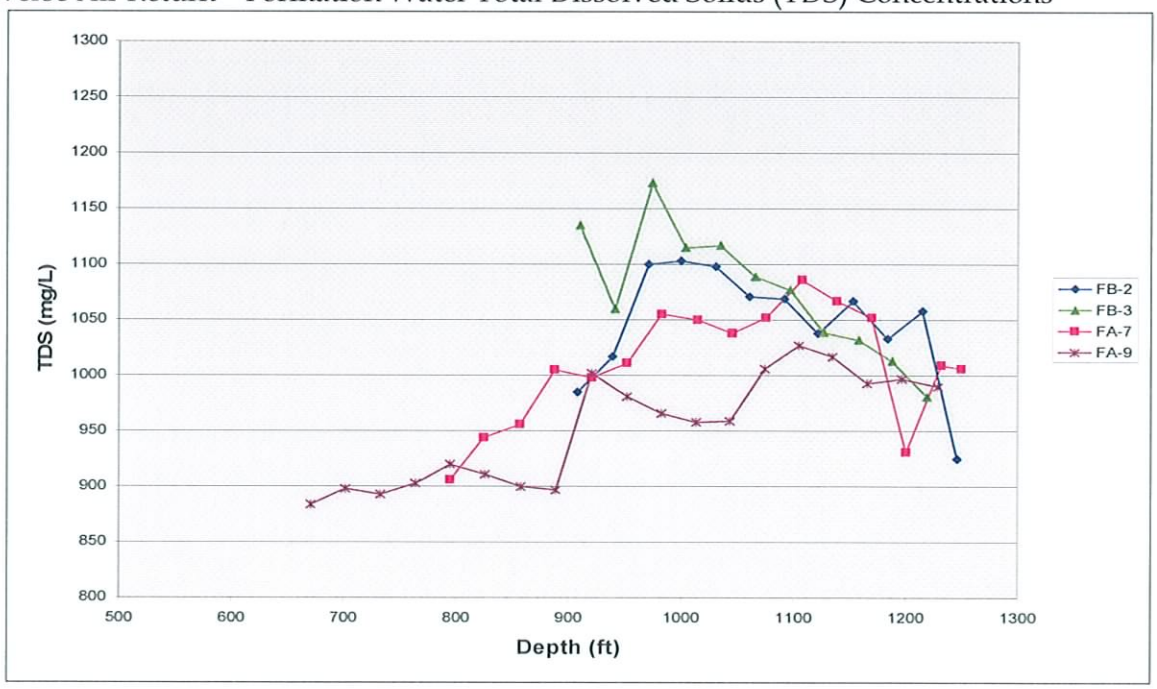


Figure 4-4
Reverse Air Return – Formation Water Total Dissolved Solids (TDS) Concentrations



4.3 Geophysical Logging & Video Surveys

4.3.1 General

Geophysical logs were conducted in the open borehole after each stage of drilling and before casing installation. Borehole geophysical logging provides a continuous record of the physical properties of the subsurface formations and their contained fluids penetrated during borehole advancement. Geophysical logs were performed on the borehole intervals to correlate formation samples taken during drilling, to identify formation boundaries, and to obtain specific data pertaining to the underground formations and water producing horizons. The geophysical logs also provide data for determining optimum casing setting depths for the wells. Copies of each of the geophysical logs performed are provided in Attachment F along with a table summarizing all of the geophysical logs performed during the construction or deepening of the water supply wells. The following geophysical logging surveys were conducted during this project.

4.3.2 Natural Gamma Log

Natural gamma logging measures the natural gamma ray emissions from certain very low level radioactive elements that occur in small and varying amounts in different lithologies. Certain strata, such as clay minerals, dolomite, and phosphate can be identified by its higher gamma ray emissions.

4.3.3 Caliper Log

The caliper log is a record of the borehole or casing diameter versus depth. Caliper logs locate borehole enlargements (subsurface cavities), provide the data needed to calculate cement required when setting casing, and are necessary for quantitative interpretation of flow meter logs to determine changes in fluid velocity as a function of borehole diameter.

4.3.4 Dual Induction Log

The dual induction log is a record of the apparent resistivity of the subsurface formations and formation fluids plotted against depth. Dual induction logging induces a magnetic field which creates an electrical current that passes through the rock formation and surrounding fluids. The relative ease of the flow of the electrical current gives an indication of water quality

and/or formation porosity. Higher resistivity values suggest harder strata, which is a function of lower porosity, or better water quality (lower total dissolved solids content).

4.3.5 Temperature Log

The temperature log is a record of water temperature within the borehole versus depth. Temperature logs may be used to locate zones of water entry into the borehole. This can be accomplished by identifying changes in the thermal gradient within the wellbore. Significant differences between the static temperature log values versus the dynamic temperature log values can also be useful in determining water producing horizons.

4.3.6 Fluid Resistivity Log

The fluid resistivity log is used to identify zones of water entry into the borehole. Similar to the temperature log, production zones frequently possess different water quality, primarily in total dissolved solids concentration, which causes changes in the fluids electrical resistance and subsequently detected by the fluid resistivity log. Significant changes in the static and dynamic fluid resistivity log values versus depth can also be useful in determining water bearing zones and to seal off poor water quality intervals.

4.3.7 Flowmeter – Fluid Velocity Log

Flow meter or fluid velocity logs measure upward vertical flow of water in the wellbore. Flows at various depths are measured by means of a propeller flow meter that is lowered into the well at a known, constant rate. Fluid velocity logs are used to determine areas of high water production or flow zones but also varies as a function of the borehole diameter. Therefore a caliper log must be conducted to properly evaluate a flow meter log.

4.3.8 Video Survey

Video Surveys are simply digital recordings of the well as a camera is slowly lowered down the borehole. Video Surveys are used to inspect the casings joints of the well to make sure the well casing was not damaged during drilling activities, visually confirm formation changes, determine the extent of well development based on particulate matter as a function of visibility (particulate matter refracts the light from the camera) within the fluid column and visually confirm specific flow zones that were identified by the other geophysical logs.

4.4 Interpretation of Geophysical Logging & Video Surveys

4.4.1 Interpretation of Formation Evaluation Logs

The Avon Park Formation, encountered during this project occurs at a depth from approximately 850 feet to 1250 feet bls. The Avon Park Formation is generally characterized by increased resistivity values and natural gamma ray emissions, and by a decrease in the borehole diameter than the overlying Ocala Limestone, primarily due to the dolomite content that is characteristic of this formation. Corresponding fluctuations in gamma ray emissions and dual induction values in the Avon Park Formation represent alternating sections of softer limestone and harder dolomite units. The transition from the underlying Avon Park Formation to the Ocala Limestone that occurs at approximately 850 feet bls is denoted by a marked decrease in gamma-ray emission and resistivity values and a substantial increase in borehole diameter compared to the Avon Park Formation. Overlying the Ocala Limestone is the Hawthorn Group. It was encountered during this project from approximately 130 feet bls to 520feet bls, denoted by high natural gamma-ray activity with irregular spikes representing areas of high phosphate content. This increase in natural gamma activity within the Hawthorn Group indicates lithologic changes from sand/shell and limestone units to silt to clay strata containing intermixed phosphate grains. A general trend of increasing resistivity values with depth illustrates the strata is progressively harder or better consolidated with lower porosity. The dual induction log also did not indicate significant water quality changes (increase salinity) with depth. Geophysical logging results are generally consistent with the formation samples collected at each of the individual well sites.

Because the production-type logs; the flow meter, temperature, and fluid resistivity logs tend to have highly varying results between wells even in close proximity, the interpretation will be discussed separately for each of the well site.

4.4.2 Interpretation of Production Logs – Well FB-2

The fluid velocity log conducted at FB-2 displays very little upward flow below 1,182 feet bls. Initial upward flow was noted by a slight increase in dynamic fluid velocity values and a corresponding deviation in the static temperature values at about 1,182 feet bls. Fluid velocity values remains fairly constant until about 1,077 feet bls where another increase in flow meter readings is observed with corresponding dips in the fluid resistivity and static temperature values. A significant increase in fluid velocity is displayed at about 990 feet bls. At this depth

the temperature and fluid resistivity values decrease significantly with the dynamic fluid resistivity values decreasing at a depth of 980 feet bls. Fluid velocity readings above 990 feet are influenced greatly by this flow zone such that changes in flow meter values above it are simply a function of borehole diameter.

4.4.3 Interpretation of Production Logs – Well FB-3

The fluid velocity logs conducted at FB-3 display very little flow below 1,172 feet bls. Initial upward flow can be noted with a slight increase in flow meter readings at about 1,172 feet bls and remains fairly constant until about 1,080 feet where another increase is observed. Fluid resistivity values remain fairly constant from the base of the well bore to a depth of 1,120 feet bls. The fluid resistivity values display a steadily decreasing trend from 1,120 to 1,000 feet bls and then stay fairly constant to 500 feet bls. A significant increase in fluid velocity readings reading at about 1,006 feet bls and corresponds to flow zone observed in the borehole video survey. In addition a slight dip in the dynamic temperature log value can be observed at 1,010 feet bls that corresponds with the increased dynamic flow values at that same depth. Fluid velocity readings above this depth are influenced greatly by this flow zone such that changes in flow meter values above it are simply a function of borehole diameter. Water temperatures remain fairly constant throughout the entire logged interval varying from about 77.8°F at the bottom of the borehole (1,250 feet bls) to about 77.3°F under artesian flow conditions.

4.4.4 Interpretation of Production Logs – Well FB-4

The fluid velocity logs conducted at FB-4 display very little flow below 1,176 feet bls. Initial upward flow can be noted with a slight increase in the flowmeter log at about 1,172 feet bls that remains fairly constant until a depth of 1,044 feet where another increase is observed. A significant increase in fluid velocity with a corresponding decrease in the dynamic fluid resistivity values are displayed at about 998 feet bls. Fluid resistivity values remain fairly constant above 998 feet bls with the fluid velocity readings influenced greatly by this flow zone such that changes in flow values above it are simply a function of borehole diameter. Water temperatures remain fairly constant throughout the logged interval similar to well FB-3 varying from about 77.8°F at the bottom of the borehole (1,250 feet bls) to about 77.3°F at the bottom of casing (500 feet bls). It should be noted that the broad temperature range used for the log (70°F to 80°F) is such that subtle changes in temperature values are not easily discernible.

4.4.5 Interpretation of Production Logs – Well FA-7

The fluid velocity logs conducted at FA-7 display very little water production below 1,195 feet bls. At about 1,195 feet bls there is an initial upward flow noted by a slight increase and a corresponding increase in fluid resistivity that steadily increases until a depth of 1,015feet where another increase in fluid resistivity is observed. Water flow in the borehole remains fairly constant from 1,195 feet to 886 feet but another increase is observed at 885 feet. Fluid velocity values above this depth remain fairly constant with apparent changes that correspond directly with variations in borehole diameter.

4.4.6 Interpretation of Production Logs – Well FA-9

The fluid velocity logs conducted at FA-9 display very little water production from 1,250 feet 1,138 feet bls. However, water production is noted at a depth of 1,106 feet by an increase in flowmeter readings that steadily increases until about 977 feet where a significant flow zone is observed. Water flow steadily increases from 977 feet to 850 feet bls. Fluid velocity values above this depth remain fairly constant with apparent changes that affected by changes in borehole diameter. The borehole video survey confirms the presence of the productive intervals within the well bore as identified by the production-type geophysical logs.

4.5 Variable-Rate Pump Tests

4.5.1 General

A variable-rate pumping test was conducted to evaluate the production capacity of the open-hole interval of each well. Specific capacity tests were conducted after well acidization and thorough well development. The tests consisted of pumping the well at 4 to 5 separate rates; each for a period of one hour. Water levels were measured and recorded using a submersible Insitu Mini-Troll pressure transducer. For quality assurance purposes, water level readings were also recorded manually every 5 minutes, via a manometer tube attached to the well head, while water levels remained above the top of the well flange. Pumping rates during testing operations were measured using a calibrated 12-inch diameter totalizing McCrometer, in-line flow meter.

Summaries of specific capacity results for the variable-rate pumping tests are presented in Table 4.6 and Table 4.7. For comparative purposes, Table 4.6 depicts specific capacity results for wells FB-2, FB-3 and FB-4 prior to being deepened and acidized. Table 4.7 shows specific

capacity results for wells FA-7 and FA-9 along with those for wells FA-6, FA-8 and FA-10, which are in close proximity (1,000 feet) to the two newly constructed wells.

Table 4.6
Variable-Rate Pumping Test Data and Calculated Specific Capacity Results

Results from variable-rate pump test previously conducted at same well prior to deepening and well acidization

Well FB-2

9/20/1991

Pumping Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/foot of drawdown)
740	27.3	27.1
940	37.1	25.4
1,170	46.5	25.1

Results from recently conducted variable-rate pump tests conducted at same well after deepening and well acidization

Well FB-2

9/6/2007

Pumping Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/foot of drawdown)
550	2.1	258.3
1,083	4.5	239.2
1,600	10.5	152.6
2,033	14.4	141.0
2,350	18.3	128.5

Well FB-3

11/16/1995

Pumping Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/foot of drawdown)
421	10.0	42.0
596	16.5	36.0
892	27.0	33.0

Well FB-3

7/19/2007

Pumping Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/foot of drawdown)
583	1.8	319.5
1,058	4.5	235.7
1,600	8.8	182.7
2,050	13.6	150.4

Well FB-4

11/19/1995

Pumping Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/foot of drawdown)
444	15.3	29.0
680	25.3	27.0
1,007	42.3	24.0

Well FB-4

8/5/2007

Pumping Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/foot of drawdown)
650	2.3	289.3
1,050	4.4	236.6
1,516	8.3	183.2
2,100	14.5	145.2

4.5.2 Specific Capacity Results – Well FB-2

Comparing the specific capacity data results from the test conducted at FB-2 at the time the well was constructed (9/20/1991) to the recently conducted test, completed after deepening and acidizing the well (9/6/2007), shows a significant increase in it production capacity which was the primary objective of this project. In 1991 three steps were run during the test: 740 gpm, 940 gpm and 1,170 gpm yielding specific capacity values of 27.1 gpm/ft, 25.4 gpm/ft and 25.1 gpm/ft respectively. Using a trend line for the data results from the test recently conducted (see Figure 4-5), we can compare the results for equivalent pumping rates. At a pumping rate of 740 gpm, the specific capacity increased from 27.1 to 250 gpm/ft of drawdown. The specific capacity increased from 25.4 to 232 gpm/ft of drawdown at a pump rate to 940 gpm. During the third stage with a pump rate of 1,170 gpm, the specific capacity increased from 25.1 to 214 gpm/ft of drawdown. This is a 9-fold increase in specific capacity, clearly demonstrating the benefits of increasing the depth of the borehole to 1,250 feet which intersected additional flow zone and conducting an aggressive well acidization program.

4.5.3 Specific Capacity Results – Well FB-3

Comparing the specific capacity test data results from the previously conducted test at FB-3 (11/16/1995) to the one recently conducted (7/19/2007) also showed a substantial increase in well capacity. In 1995 three steps were run during the test: 421 gpm, 596 gpm and 892 gpm yielding specific capacity values of 42 gpm/ft, 36 gpm/ft and 33 gpm/ft respectively. Again, a trend line was developed from the specific capacity results of the recently conducted test (see Figure 4-6), the specific capacity results were then compared for the same pumping rates from the previous test. At a pump rate of 421 gpm, the specific capacity increased from 42 to 325 gpm/ft. The specific capacity determined at a pump rate of 596 gpm increased from 36 to 306 gpm/ft and at a rate of 892 gpm, the specific capacity increased from 33 gpm/ft to 272 gpm/ft. As a result of deepening the open hole section of well FB-3 by 370 feet and conducting an aggressive well acidization program, the specific capacity for this well increased by a multiple of 8.5.

4.5.4 Specific Capacity Results – Well FB-4

The test recently conducted (8/5/2007) shows an increase in well productivity as compared to pump test data results from the test previously conducted at FB-4 (11/19/1995). This comparison shows the extent in which the production capacity increased as result of this

project. In 1995 three steps were run during the test: 444 gpm, 680 gpm and 1,007 gpm yielding specific capacity values of 29 gpm/ft, 27 gpm/ft and 24 gpm/ft respectively. Using a trend line developed from the recent specific capacity tests (see Figure 4-7), we can compare the results to previous pump rates. An increase in specific capacity from 29 to 300 gpm/ft was inferred at a pump rate of 444 gpm. At a pump rate of 680 gpm the specific capacity increased from 27 to 274 gpm/ft. At the highest pumping rate of 1,007 gpm the specific capacity increased from 24 to 244 gpm/ft. This is a 10-fold increase in specific capacity, clearly demonstrating the benefits of deepening the borehole to 1,250 feet and acidizing the open-hole section.

Table 4.7
Variable-Rate Pumping Test Data - Calculated Specific Capacity Results

Results from variable-rate pump tests previously conducted at wells in close proximity

Well FA-6 — **Well Acidized** — **6/25/2001**

Pumping Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/foot of drawdown)
1,500	6.8	221.9
2,000	11.0	182.7
2,700	16.6	163.0

Located 1,000 feet south of well FA-7

Well FA-7 — **Well Acidized** — **9/6/2007**

Pumping Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/foot of drawdown)
600	1.9	320.9
1,000	4.1	244.6
1,500	7.2	208.0
2,000	10.2	195.4

Well FA-8 — **Well Not Acidized** — **9/26/2000**

Pumping Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/foot of drawdown)
1,900	19.5	97.5
2,400	26.7	90.1
2,900	35.5	81.7

Located 1,000 feet south of well FA-9

Well FA-9 — **Well Acidized** — **7/19/2007**

Pumping Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/foot of drawdown)
550	2.8	198.5
1,067	4.9	216.7
1,583	7.4	214.0
2,050	10.7	191.2
2,635	14.5	182.1

4.5.5 Specific Capacity Results – Well FA-7 & FA-9

The specific capacity results for production wells FA-7 and FA-9 are similar to the test results of well FA-6, which had been acidized prior to conducting the pump test (see Table 4-7). Production well FA-8 was not acidized before conducting the variable-rate pump test and yielded specific capacity values that were about 50% of those from FA-7 and FA-9.

As illustrated in Figure 4-9, the specific capacity results for well FA-9 display an irregular or non-linear pattern. A possible explanation for these sporadic results could be that the discharge line had two 90° turns within a relatively short distance from the well head causing excessive back pressure which was observed at the time of the test via spraying water at the connection from the discharge pipe to the well head. Also there was some pumping from FA-10 that occurred during testing operations that affect water level readings and contributed to the irregular test results.

As shown by the specific capacity test results, well acidization procedures greatly increase individual well production that will minimize the overall drawdown within the well field thus increasing it overall efficiency. As a result of the high production capacity of wells FA-7 and FA-9, larger submersible pumps and motors that can achieve 1500 to 1600 gpm rate will be installed to increase the long-term raw water supply to the RO treatment facilities.

Figure 4-5
FB-2 Variable-Rate Pumping Test Data - Specific Capacity Data with Trend Line

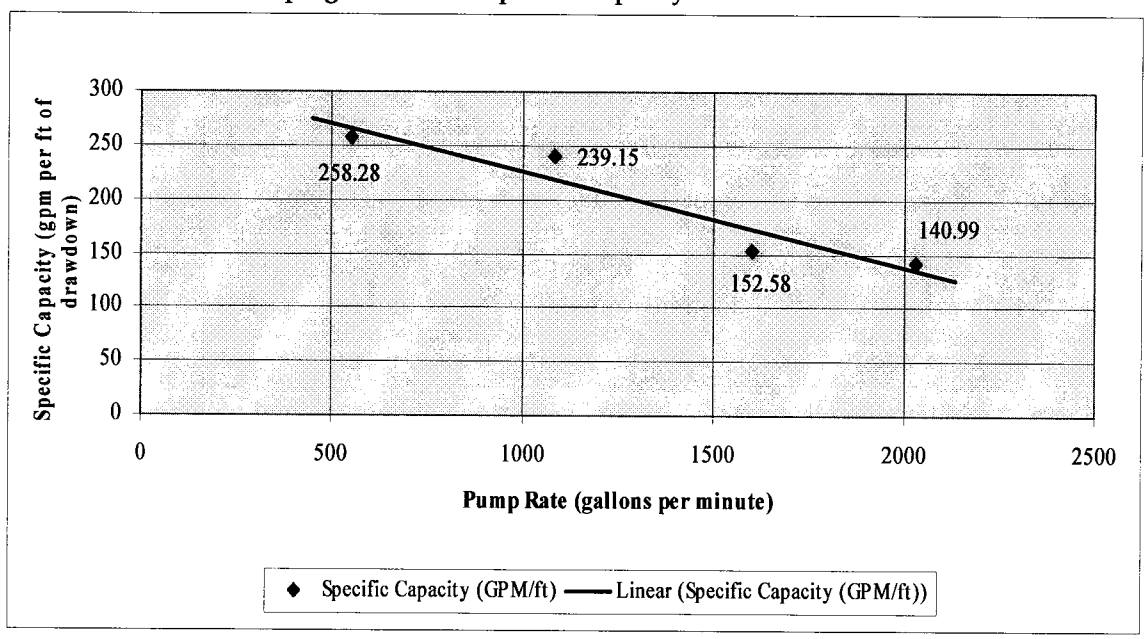


Figure 4-6
FB-3 Variable-Rate Pumping Test Data - Specific Capacity Data with Trend Line

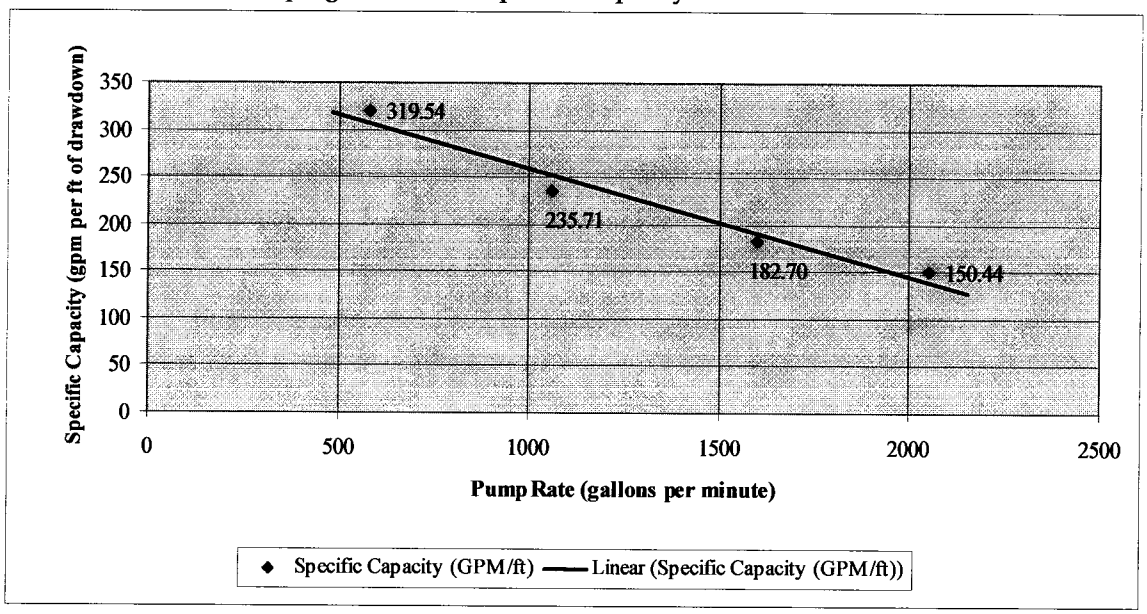


Figure 4-7
FB-4 Variable-Rate Pumping Test Data - Specific Capacity Data with Trend Line

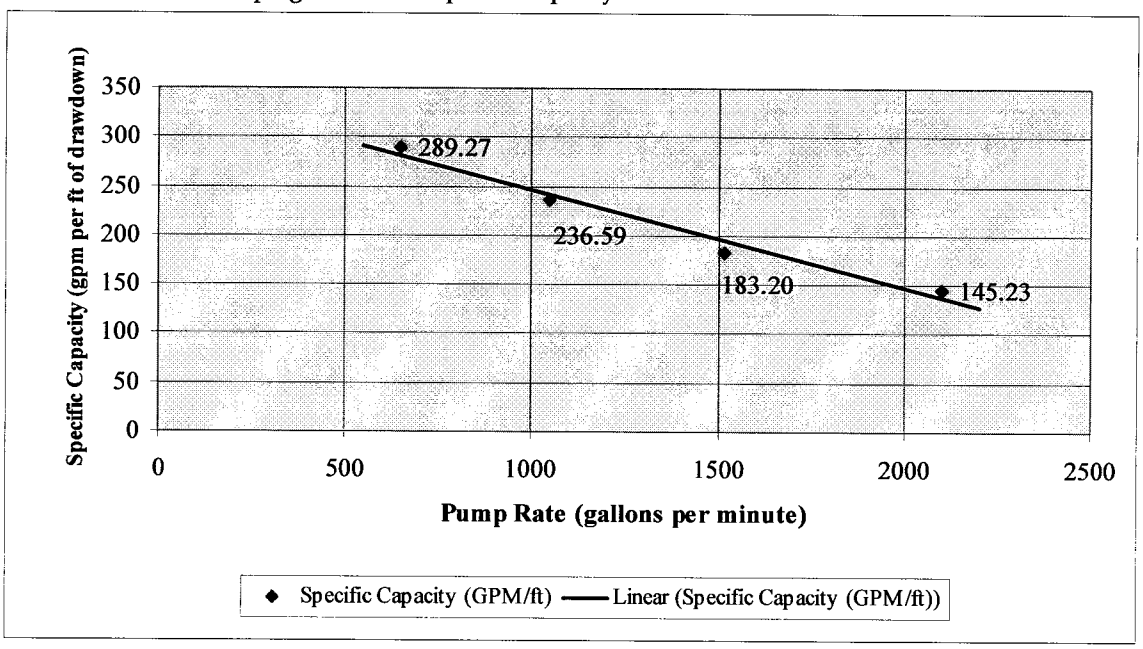


Figure 4-8
FA-7 Variable-Rate Pumping Test Data - Specific Capacity Data with Trend Line

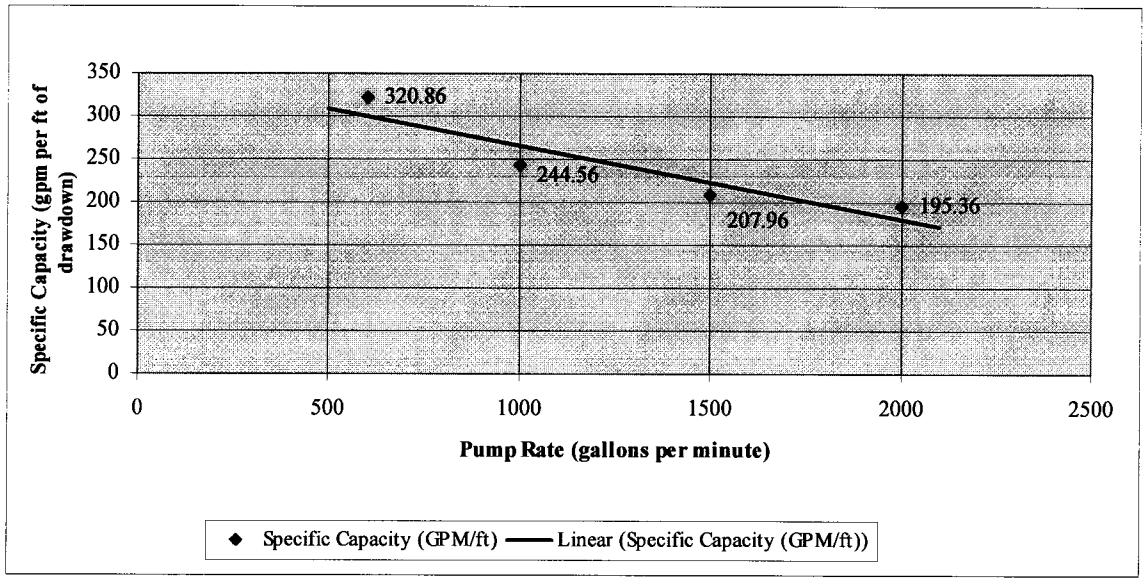
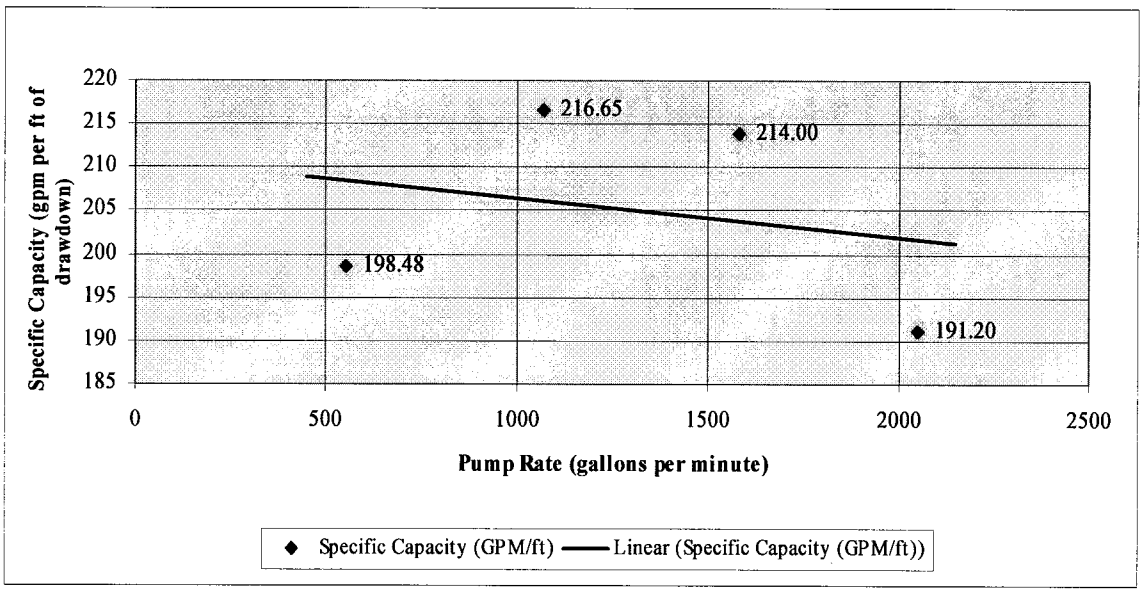


Figure 4-9
FA-9 Variable-Rate Pumping Test Data - Specific Capacity Data with Trend Line



SECTION 5

Conclusions and Recommendations

5.1 FA-7 and FA-9

Floridan aquifer wells FA-7 and FA-9 were successfully completed to a depth of approximately 1,250 feet below land surface (bls) using similar techniques of construction. The casings included a 28-inch diameter steel outer casing set to a depth of 100 feet bls, and a 17.4 inch inner Cert-Lok PVC casing set to a depth of 578 feet bls for FA-7 and 618 feet bls for FA-9. Well cuttings, geophysical testing and video surveys revealed the same general lithologic characteristics for both wells with formation interfaces at depths only slightly apart. Variable-rate pumping tests revealed that overall production of these wells is similar to, or better, than other wells, of similar construction, located in close proximity to FA-7 and FA-9 (i.e., FA-6, FA-8 and FA-10). These wells should provide ample raw water supply without lowering water levels below land surface during production.

5.2 FB-2, FB-3 and FB-4

Floridan aquifer production wells FB-2, FB-3, and FB-4 were successfully deepened from 890 feet bls to approximately 1,250 feet bls using similar drilling methods. Well cuttings, geophysical logging and video surveys revealed the same general lithologic characteristics for the wells with formation interfaces at similar depths. Comparing the variable-rate pumping tests conducted at the time these wells were constructed, in 1991 and 1995, to the tests recently completed, after deepening and acidizing the wells, illustrates the benefits of increasing the length of the production interval and chemical stimulation. Overall production increased by as much as 10-times as compared to the original production data. These wells should provide ample raw water supply without lowering the well pressure head below land surface.

5.3 Recommendations

The following items should be given consideration as for proper future planning and maintenance and for maximizing the efficiency of the well field with regards to pumping rates and times.

- Conduct well stimulation (acidization) procedures on the remaining Floridan aquifer production wells currently supplying raw water to the Fort Pierce Utilities Authority to increase their production capacity.

- Determine the regional impacts of usage of the wellfield by conducting a long-term aquifer performance test. This information can be used in future Consumptive Use Permit (CUP) modifications or renewals.

- Water quality and potentiometic head (water levels) from the individual wells should be monitored regularly to identify trends in water quality or quantity to understand their impacts on the long-term operation of the well field.

- Be proactive and implement a well field maintenance program to insure peak well performance and productivity.

- Conduct a well field optimization study to determine the most efficient pumping schemes (rates and duration and times of operation) for each well to assist in reducing well field impacts and minimize energy cost.

- Conduct a modeling study of the pumping system, well appurtenance and transmission lines to determine restrictions and the overall efficiency of the raw water transmission system. This information would be beneficial in identifying short-term and long-term capital improvements.

APPENDIX A

Construction Permits

Well Completion Reports

APPENDIX A-1

Well Construction Permit FB-2

#105.00

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

☐ Southwest
☐ Northwest
☐ St. Johns River
☒ South Florida
☐ Suwannee River

CHECK BOX FOR APPROPRIATE DISTRICT. ADDRESS ON BACK OF PERMIT FORM.

THIS FORM MUST BE FILLED OUT COMPLETELY.

The water well contractor is responsible for completing this form and forwarding the permit to the appropriate delegated county where applicable.

Permit No. [redacted]937
Permit Unique I.D. _____
Permit Stipulations Required (See attached) _____
ERP/SFWMD well ☐
SFWMD Application No. _____

1. Fort Pierce Utilities Authority — 206 S 6th Street — Fort Pierce — 34948 — (772) 466-1600
   Owner, Legal Name of Entity if Corporation — Address — City — Zip — Telephone Number
2. FLORIDA AVENUE
   Well Location — Address, Road Name or Number, City
3. All Webb's Enterprises, Inc. — 2040 — 561-746-2079
   Well Drilling Contractor — License No. — Telephone No.
   309 Commerce Way
   Address
   Jupiter — FL — 34958
   City — State — Zip
4. ____ 1/4 of ____ 1/4 of Section ____ (Indicate Well on Chart)
5. Township 35 Range 40
6. St Lucie | _____ | _____ | _____ | _____
   County — Subdivision Name — Lot — Block — Unit

NW NE SW SE

Fold at this line in order that address is visible through envelope window

7. Number of proposed wells 3 Check the use of well: (See back of permit for additional choices) _____ Domestic Monitor (type) _____
   _____ Irrigation (type) (See Back) Public Water Supply (type) PWS-C (See Back) List Other _____
   Distance from septic system _____ ft. Description of facility _____ Estimated start of construction date _____
8. Application for: _____ New Construction ✓ Repair/Modify _____ Abandonment _____ OPEN HOLE (Reason for Abandonment)
   IN EXISTING WELL
9. Estimated: Well Depth 1250' Casing Depth _____ Screen Interval from _____ to _____
   Casing Material: Blk-Steel / Gal / PVC Casing Diameter _____ Seal Material _____

Date Stamp

10. If applicable: Proposed Grouting Interval From _____ to _____ Seal Material _____
    From _____ to _____ Seal Material _____
    From _____ to _____ Seal Material _____
11. Telescope Casing ____ or Liner ____ (check one) Diameter _____
    Blk-Steel / Galvanized / PVC Other (specify): _____
12. Method of Construction: ✓ Rotary ____ Cable Tool ____ Combination
    ____ Auger ____ Other (specify:) _____
13. Indicate total No. of wells on site ____. List number of unused wells on site ____.
14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ___No ___Yes
    (If yes, complete the following) CUP/WUP No. _____
    District well I.D. No. FD 2
    Latitude _____ Longitude _____
    Data obtained from GPS ____ or map ____ or survey ____ (map datum NAD 27____ NAD 83____)

Draw a map of well location and indicate well site with an "X". Identify known roads and landmarks; provide distances between well and landmarks.

North

APPROVED
SEE ATTACHED
MAY 15 2007
SHEET 3
St. Lucie County Health Department
ENVIRONMENTAL HEALTH DIVISION

West East

South

15. I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after drilling or the permit expiration, whichever occurs first.

Signature of Contractor — 2040 License No.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to permanent of the WMD or a representative access to the well site.

Owner's or Agent's Signature — 4/12/07 Date

Approval Granted By: _____ Issue Date: 5/14/07 Hydrologist Approval _____

Owner Number: _____ Fee Received $ _____ Receipt No.: _____ Check No.: _____

THIS PERMIT NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD. IT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL DRILLING OPERATIONS. *This permit is valid for 90 days from date of issue.*

WHITE: ORIGINAL FILE
YELLOW: DRILLING CONTRACTOR
PINK: OWNER

SFWMD FORM #06-3-1 REV. 12/95

APPENDIX A-2

Well Construction Permit FB-3

#105.00

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

☐ Southwest
☐ Northwest
☐ St. Johns River
☒ South Florida
☐ Suwannee River

CHECK BOX FOR APPROPRIATE DISTRICT. ADDRESS ON BACK OF PERMIT FORM.

THIS FORM MUST BE FILLED OUT COMPLETELY.

The water well contractor is responsible for completing this form and forwarding the permit to the appropriate delegated county where applicable.

Permit No.
Florida Unique I.D.
Permit Stipulations Required (See attached)
SD-824 well ☐
SFWMD Application No.

1. Fort Pierce Utilities Authority — 206 S 6th Street — Fort Pierce — 34948 — (772) 466-16
   Owner, Legal Name of Entity if Corporation — Address — City — Zip — Telephone Number
2. CITRUS AVENUE BETWEEN 27th + 29th
   Well Location — Address, Road Name or Number, City
3. All Webb's Enterprises, Inc. — 2040 — 561-746-2079
   Well Drilling Contractor — License No. — Telephone No.
   309 Commerce Way
   Address
   Jupiter — FL — 34958
   City — State — Zip
4. ____ (unshaded) 1/4 of ____ (shaded) 1/4 of Section ____ (Indicate Well on Chart)
5. Township ____ Range ____
6. St Lucie — County — Subdivision Name — Lot — Block — Unit

NW NE SW SE

Fold at this line in order that address in window envelope is visible

7. Number of proposed wells 3 — Check the use of well: (See back of permit for additional choices) ____ Domestic — Monitor (type) ____
   ____ Irrigation (type) (See Back) — Public Water Supply (type) PWS-C (See Back) — List Other ____
   Distance from septic system ____ ft. — Description of facility ____ — Estimated start of construction date ASAP
8. Application for: ____ New Construction — ✓ Repair/Modify — ____ Abandonment ____ (Reason for Abandonment)
9. Estimated: Well Depth 1250' — Casing Depth ____ — Screen Interval from ____ to ____
   Casing Material: Blk-Steel / Gal / PVC — Casing Diameter ____ — Seal Material ____
10. If applicable: Proposed Grouting Interval From ____ to ____ Seal Material ____
    From ____ to ____ Seal Material ____
    From ____ to ____ Seal Material ____
11. Telescope Casing ____ or Liner ____ (check one) Diameter ____
    Blk-Steel / Galvanized / PVC — Other (specify): ____
12. Method of Construction: ✓ Rotary ____ Cable Tool ____ Combination
    ____ Auger ____ Other (specify:) ____
13. Indicate total No. of wells on site ____. List number of unused wells on site ____.
14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ___No ___Yes
    (If yes, complete the following) CUP/WUP No. ____
    District well I.D. No. FB-3
    Latitude ____ Longitude ____
    Data obtained from GPS ___ or map ___ or survey ___ (map datum NAD 27___ NAD 83___)

Date Stamp

Draw a map of well location and indicate well site with an "X". Identify known roads and landmarks; provide distances between well and landmarks.

North

APPROVED
SEE ATTACHED
MAY 15 2007
SHEET 3
St. Lucie County Health Department
ENVIRONMENTAL HEALTH DIVISION

West — East

South

15. I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after drilling or the permit expiration, whichever occurs first.

2040
Signature of Contractor — License No.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to personnel of the WMD or a representative access to the well site.

4/12/07
Owner's or Agent's Signature — Date

Approval Granted by: ____ Issue Date: 5/14/07 Hydrologist Approval ____

Owner Number: ____ Fee Received $ ____ Receipt No.: ____ Check No.: ____

THIS PERMIT NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD. IT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL DRILLING OPERATIONS. *This permit is valid for 90 days from date of issue.*

WHITE: ORIGINAL FILE
YELLOW: DRILLING CONTRACTOR
PINK: OWNER

SFWMD FORM #60-3-1 REV. 12/93

APPENDIX A-3

Well Construction Permit FB-4

#105.00

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

Permit No. 56-17794
Florida Unique I.D.
Permit Stipulations Required (See attached)
82-524 well ☐
SWIM Application No.

☐ Southwest
☐ Northwest
☐ St. Johns River
☒ South Florida
☐ Suwannee River

CHECK BOX FOR APPROPRIATE DISTRICT. ADDRESS ON BACK OF PERMIT FORM.

THIS FORM MUST BE FILLED OUT COMPLETELY.
The water well contractor is responsible for completing this form and forwarding the permit to the appropriate delegated county where applicable.

1. Fort Pierce Utilities Authority — 206 S 6th Street — Fort Pierce — 34948 — (772) 466-1600
Owner, Legal Name of Entity if Corporation — Address — City — Zip — Telephone Number

2. S 25th AND BOSTON, FT PIERCE
Well Location — Address, Road Name or Number, City

3. All Webb's Enterprises, Inc. — 2040
Well Drilling Contractor — License No.
309 Commerce Way — Telephone No.
Address
Jupiter — FL — 34958
City — State — Zip

4. ____ 1/4 of ____ 1/4 of Section 5
(Indicate Well on Chart)
NW NE SW SE

5. Township 35 Range 40

6. St Lucie | Subdivision Name | Lot | Block | Unit
County

7. Number of proposed wells 3 Check the use of well: (See back of permit for additional choices) ____ Domestic Monitor (type) ____
____ Irrigation (type) (See Back) Public Water Supply (type) PWS-C (See Back) List Other ____
Distance from septic system ____ ft. Description of facility ____ Estimated start of construction date APPROVED

8. Application for: ____ New Construction ✓ Repair/Modify ____ Abandonment MODIFY TO DEEPEN OPEN HOLE (Reason for Abandonment)

9. Estimated: Well Depth 1250' Casing Depth ____ Screen Interval from ____ to ____
Casing Material: Blk-Steel / Gal / PVC Casing Diameter ____ Seal Material ____

Date Stamp
APR 30
ST. LUCIE COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION

10. If applicable: Proposed Grouting Interval From ____ to ____ Seal Material ____
From ____ to ____ Seal Material ____
From ____ to ____ Seal Material ____

11. Telescope Casing ____ or Liner ____ (check one) Diameter ____
Blk-Steel / Galvanized / PVC Other (specify): ____

12. Method of Construction: ✓ Rotary ____ Cable Tool ____ Combination
____ Auger ____ Other (specify:) ____

13. Indicate total No. of wells on site ____. List number of unused wells on site ____.

14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ___No X Yes
(If yes, complete the following) CUP/WUP No. ____
District well I.D. No. FB-4
Latitude ____ Longitude ____
Data obtained from GPS ____ or map ____ or survey ____ (map datum NAD 27 ____ NAD 83 ____)

Draw a map of well location and indicate well site with an "X". Identify known roads and landmarks; provide distances between well and landmarks.

North

SEE ATTACHED

West East

South

15. I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit, or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after drilling or the permit expiration, whichever occurs first.

Signature of Contractor — 2040 License No.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to personnel of the WMD or a representative access to the well site.

Owner's or Agent's Signature — Date 4/12/07

DO NOT WRITE BELOW THIS LINE — FOR OFFICIAL USE ONLY

Approval Granted By: J. Hanson — Issue Date: 4/20/07 — Hydrologist Approval ____ Initials

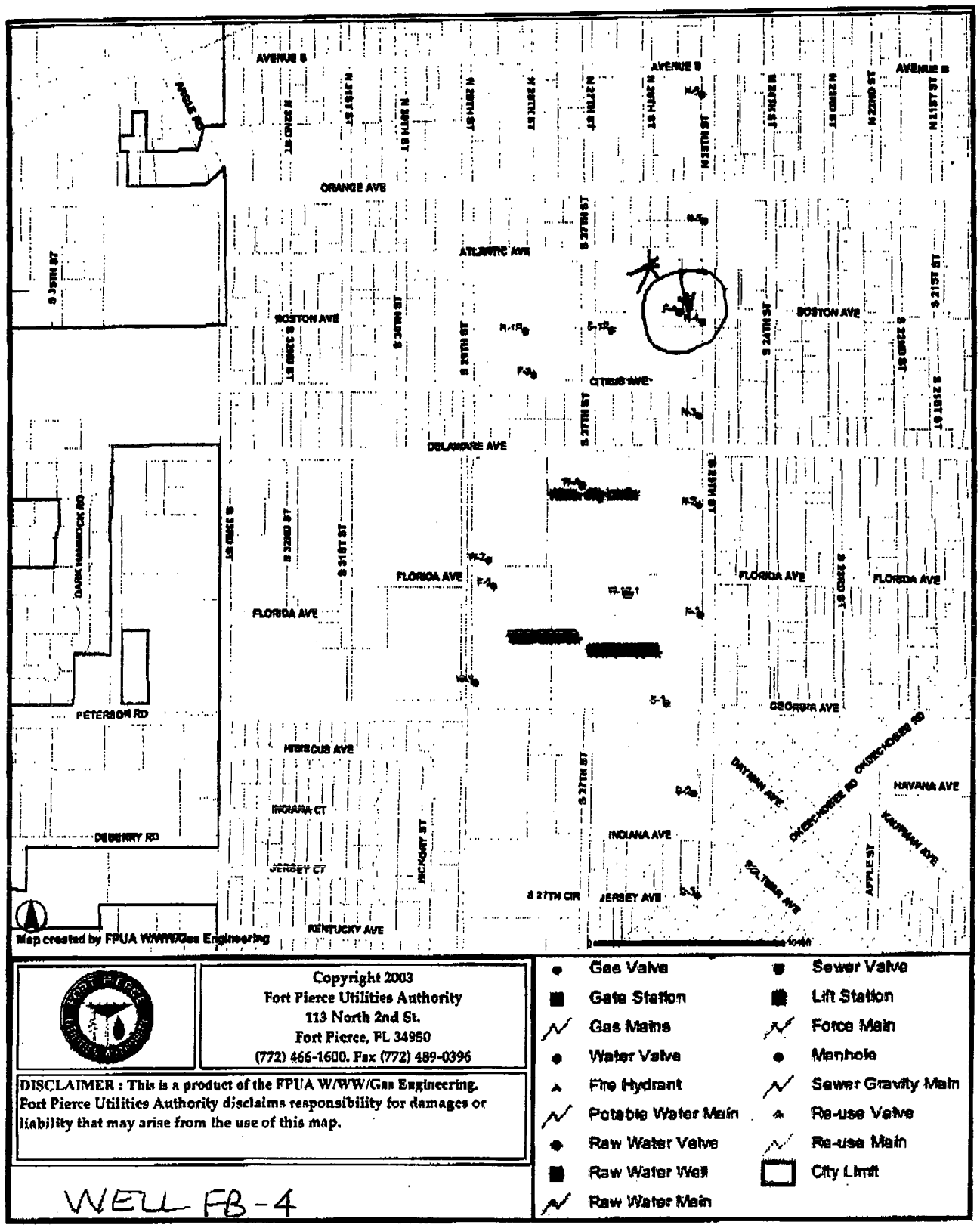
Owner Number: ____ Fee Received: $ ____ Receipt No.: ____ Check No.: ____

THIS PERMIT NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD. IT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL DRILLING OPERATIONS. ***This permit is valid for 90 days from date of issue.***

WHITE: ORIGINAL FILE
YELLOW: DRILLING CONTRACTOR
PINK: OWNER

SRWMD FORM 408-3-1 REV. 12/95

FPUA GIS Map Output Page



DISCLAIMER : This is a product of the FPUA W/WW/Gas Engineering. Fort Pierce Utilities Authority disclaims responsibility for damages or liability that may arise from the use of this map.

WELL FB-4

- Gas Valve
- Gate Station
- Gas Mains
- Water Valve
- Fire Hydrant
- Potable Water Main
- Raw Water Valve
- Raw Water Well
- Raw Water Main
- Sewer Valve
- Lift Station
- Force Main
- Manhole
- Sewer Gravity Main
- Re-use Valve
- Re-use Main
- City Limit

APPENDIX A-4

Well Construction Permit FA-7

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

☐ Southwest
☐ Northwest
☐ St. Johns River
☒ South Florida
☐ Suwannee River

CHECK BOX FOR APPROPRIATE DISTRICT. ADDRESS ON BACK OF PERMIT FORM.

THIS FORM MUST BE FILLED OUT COMPLETELY.

The water well contractor is responsible for completing this form and forwarding the permit to the appropriate delegated county where applicable.

Permit No. 56-17929
Florida Unique I.D. _____
Permit Stipulations Required (See attached) _____
62-524 well ☐
CUP/ Application No. _____

1. Fort Pierce Utilities Authority — 206 S 6th Street — Fort Pierce — 34948 — (772) 466-1600
   Owner, Legal Name of Entity if Corporation — Address — City — Zip — Telephone Number
2. 33rd STREET CANAL CLOSE TO AVENUE K, FT PIERCE
   Well Location — Address, Road Name or Number, City
3. All Webb's Enterprises, Inc. — 2040 — 561-746-2079
   Well Drilling Contractor — License No. — Telephone No.
   309 Commerce Way
   Address
   Jupiter — FL — 34958
   City — State — Zip
4. _____ 1/4 of _____ 1/4 of Section 5 (Indicate Well on Chart)
5. Township 35 Range 40
6. St Lucie — _____ — _____ — _____ — _____
   County — Subdivision Name — Lot — Block — Unit

NW NE SW SE

Fold at this line in order that address is visible through envelope window

7. Number of proposed wells 41 Check the use of well: (See back of permit for additional choices) _____ Domestic Monitor (type) _____
   _____ Irrigation (type) (See Back) ✓ Public Water Supply (type) PWS-C (See Back) List Other _____
   Distance from septic system _____ ft. Description of facility _____ Estimated start of construction date MAY 3
8. Application for: X New Construction _____ Repair/Modify _____ Abandonment _____ (Reason for Abandonment)
9. Estimated: Well Depth 1250' Casing Depth 600' Screen Interval from ____ to ____
   Casing Material: Blk-Steel / Gal (PVC) Casing Diameter 17.4" Seal Material _____
10. If applicable: Proposed Grouting Interval
    From 600 to 500 Seal Material NEAT CEMENT
    From 500 to 15 Seal Material CEMENT + 12% BENTONITE
    From _____ to _____ Seal Material _____
11. Telescope Casing ____ or Liner ____ (check one) Diameter ____
    Blk-Steel / Galvanized / PVC Other (specify): _____
12. Method of Construction: ✓ Rotary ____ Cable Tool ____ Combination
    ____ Auger ____ Other (specify:) _____
13. Indicate total No. of wells on site ____. List number of unused wells on site ____.
14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ☐ No ☒ Yes
    (If yes, complete the following) CUP/WUP No. 56-00085W
    District well I.D. No. FA-1 NEW PERMIT EXPECTED IN MAY
    Latitude _____ Longitude _____
    Data obtained from GPS ____ or map ____ or survey ____ (map datum NAD 27 ____ NAD 83 ____)

Date Stamp

Draw a map of well location and indicate well site with an "X". Identify known roads and landmarks; provide distances between well and landmarks.

North / West / East / South

SEE ATTACHED SHEET 3

15. I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after drilling or the permit expiration, whichever occurs first.

Signature of Contractor — License No.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to personnel of the WMD or a representative access to the well site.

Owner's or Agent's Signature — Date: 4/12/07

DO NOT WRITE BELOW THIS LINE. FOR OFFICIAL USE ONLY

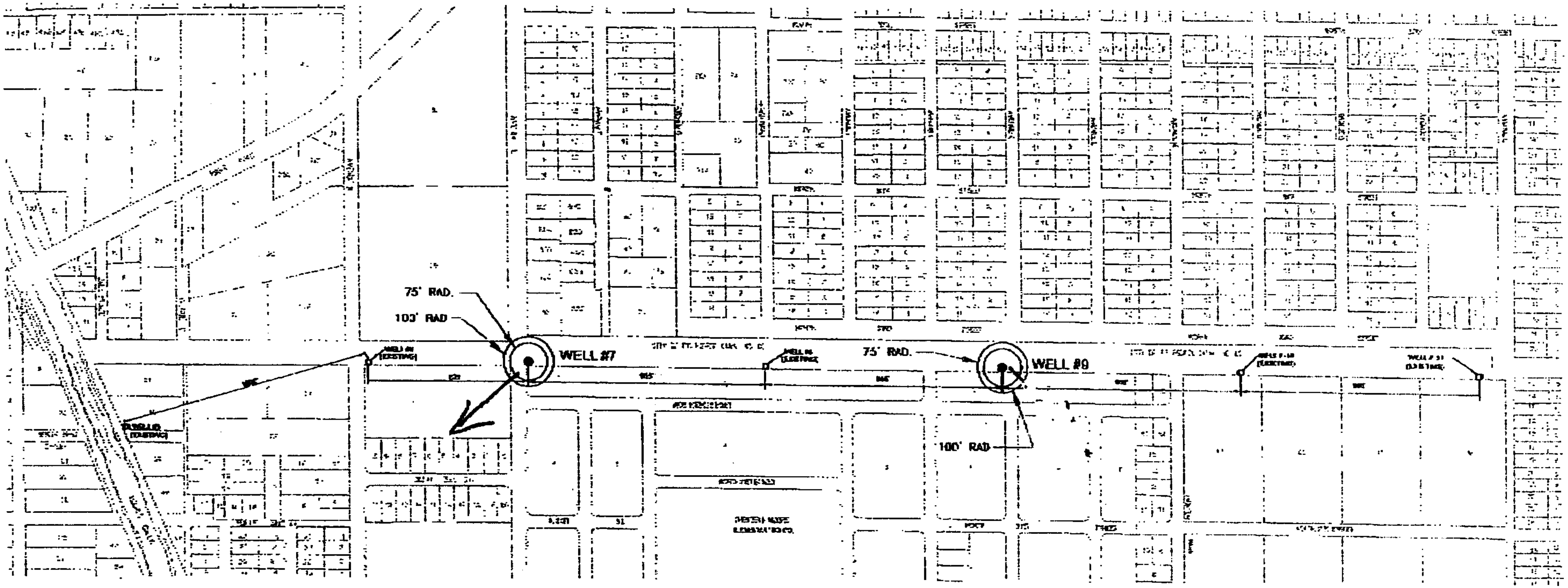
Approval Granted By: _____ Issue Date: 5/14/07 Hydrologist Approval _____ Initials

Owner Number: _____ Fee Received: $ _____ Receipt No.: _____ Check No.: _____

THIS PERMIT NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD. IT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL DRILLING OPERATIONS. *This permit is valid for 90 days from date of issue.*

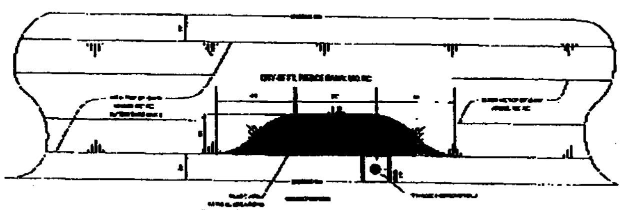
WHITE: ORIGINAL FILE
YELLOW: DRILLING CONTRACTOR
PINK: OWNER

SFWMD FORM #66-3.1 REV. 12/95



PRODUCTION WELL LOCATION PLAN

1"=200'



TYPICAL BERM AREA AT WELL LOCATIONS

NTS

THE PROPOSED LOCATIONS OF WELLS #7 AND #9 MEET THE 75 FT AND 100 FT SETBACK REQUIREMENTS LISTED BY TABLE 1, PART A, OF CHAPTER 62-532.

BASE DRAWING INFORMATION OBTAINED FROM FT. PIERCE UTILITIES AUTHORITY PLANS DATED MARCH, 2006

VERIFY SCALE

CONSULTING CIVIL ENGINEERS, SURVEYORS & MAPPERS
"Partners For Results, Value By Design"

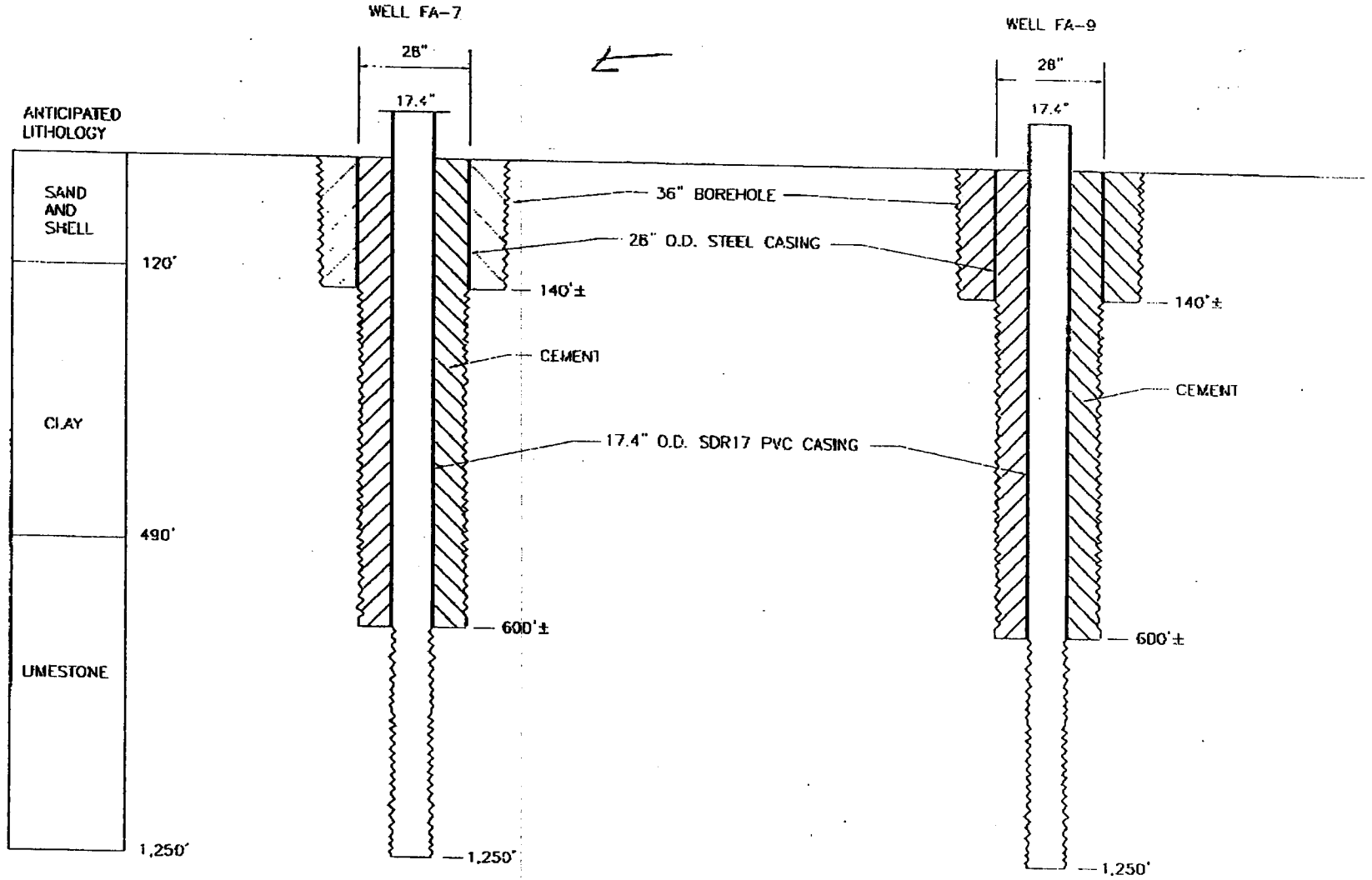
PRODUCTION WELL LOCATION MAP

FT. PIERCE UTILITIES AUTHORITY

FLORIDAN AQUIFER SUPPLY WELLS PROJECT

06-0039

SHEET 3



VERIFY SCALE
BAR IS 1 INCH TO ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ADJUST ALL SCALES ACCORDINGLY

CONSULTING CIVIL ENGINEERS SURVEYORS & MAPPERS
"Partners For Results, Value By Design"

WELLS SUBSURFACE DIAGRAM

FT. PIERCE UTILITIES AUTHORITY
FLORIDIAN AQUIFER SUPPLY WELLS PROJECT

08-0039
SHEET 6

APPENDIX A-5

Well Construction Permit FA-9

$385.00

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

- ☐ Southwest
- ☐ Northwest
- ☐ St. Johns River
- ☒ South Florida
- ☐ Suwannee River

CHECK BOX FOR APPROPRIATE DISTRICT. ADDRESS ON BACK OF PERMIT FORM.

THIS FORM MUST BE FILLED OUT COMPLETELY.

The water well contractor is responsible for completing this form and forwarding the permit to the appropriate delegated county where applicable.

Permit No. 591745
Florida Unique I.D.
Permit Stipulations Required (See attached)
82-524 well ☐
SWF Application No.

1. Fort Pierce Utilities Authority — 206 S 6th Street Fort Pierce 34948 — (772) 466-1600
   Owner, Legal Name of Entity if Corporation — Address — City — Zip — Telephone Number
2. 25th STREET CANAL CLOSE TO AVENUE K, FT PIERCE — 561-746-2079
   Well Location — Address, Road Name or Number, City
3. All Webb's Enterprises, Inc. — 2040 — Telephone No.
   Well Drilling Contractor — License No.
   309 Commerce Way
   Address
   Jupiter — FL — 34958
   City — State — Zip
4. ____ 1/4 of ____ 1/4 of Section 5 (Indicate Well on Chart)
5. Township 35 Range 40
6. St Lucie — Subdivision Name — Lot — Block — Unit
   County

NW NE SW SE

7. Number of proposed wells 2 — Check the use of well: (See back of permit for additional choices) ____ Domestic — Monitor (type) ____
   ____ Irrigation (type) (See Back) — Public Water Supply (type) PWS-C (See Back) — List Other ____
   Distance from septic system ____ ft. — Description of facility ____ — Estimated start of construction date 4/30/07

APPROVED

Date Stamp
APR 30 2007
ST. LUCIE COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION

8. Application for: X New Construction — Repair/Modify — Abandonment ____ (Reason for Abandonment)
9. Estimated: Well Depth 1250' — Casing Depth 600' — Screen Interval from ____ to ____
   Casing Material: Blk-Steel / Gal (PVC) — Casing Diameter 17.44" — Seal Material ____
10. If applicable: Proposed Grouting Interval
    From 600 to 500 Seal Material NEAT CEMENT
    From 500 to LS Seal Material CEMENT + 10% BENTONITE
    From ____ to ____ Seal Material ____
11. Telescope Casing ____ or Liner ____ (check one) Diameter ____
    Blk-Steel / Galvanized / PVC — Other (specify): ____
12. Method of Construction: V Rotary — ____ Cable Tool — ____ Combination
    ____ Auger — ____ Other (specify:) ____
13. Indicate total No. of wells on site ____. List number of unused wells on site ____.
14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ___ No X Yes
    (If yes, complete the following) CUP/WUP No. 56-00085W
    District well I.D. No. F-9 — NEW permit EXPECTED IN MAY
    Latitude ____ Longitude ____
    Data obtained from GPS ____ or map ____ or survey ____ (map datum NAD 27 ____ NAD 83 ____)

Draw a map of well location and indicate well site with an "X". Identify known roads and landmarks; provide distances between well and landmarks.

North

SEE ATTACHED SHEET 3

West — East

South

15. I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or artificial recharge permit, if required, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after drilling or the permit expiration, whichever occurs first.

Signature of Contractor — License No.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to personnel of the WMD or a representative access to the well site.

David A. Mann — 4/12/07
Owner's or Agent's Signature — Date

DO NOT WRITE BELOW THIS LINE — FOR OFFICIAL USE ONLY

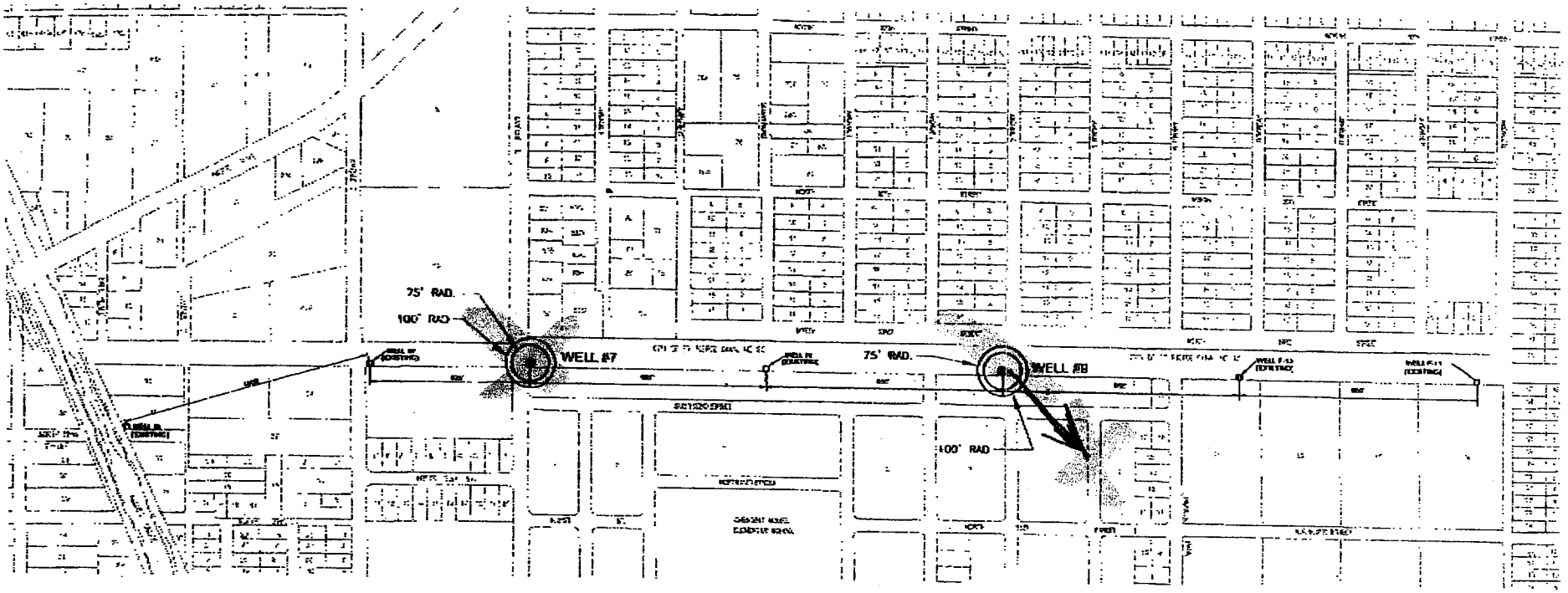
Approval Granted By: K Hanson — Issue Date: 4/30/07 — Hydrologist Approval ____ (Initials)

Owner Number: ____ Fee Received: $ ____ Receipt No.: ____ Check No.: ____

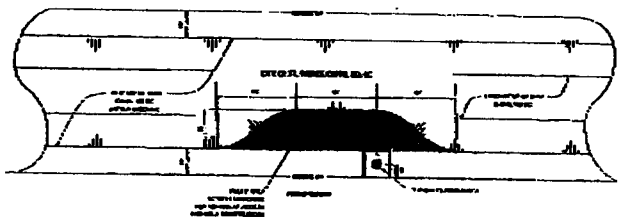
THIS PERMIT NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD. IT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL DRILLING OPERATIONS. *This permit is valid for 90 days from date of issue.*

WHITE: ORIGINAL FILE
YELLOW: DRILLING CONTRACTOR
PINK: OWNER

SRWMD FORM 40B-3-1 REV. 12/95



PRODUCTION WELL LOCATION PLAN



TYPICAL BERM AREA AT WELL LOCATIONS

APPROVED
S1-17475
APR 30 2007
ST. LUCIE COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION

THE PROPOSED LOCATIONS OF WELLS #7 AND #8 MEET THE 75 FT AND 100 FT SETBACK REQUIREMENTS LISTED IN TABLE 1, PART A, OF CHAPTER 62-532.

BASE DRAWING INFORMATION OBTAINED FROM FT. PIERCE UTILITIES AUTHORITY PLANS DATED MARCH, 2006

DATE	BY	REVISIONS

VERIFY SCALE
BAR IS EQUAL TO ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ADJUST ALL SCALED DIMENSIONS ACCORDINGLY

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"Value By Design"
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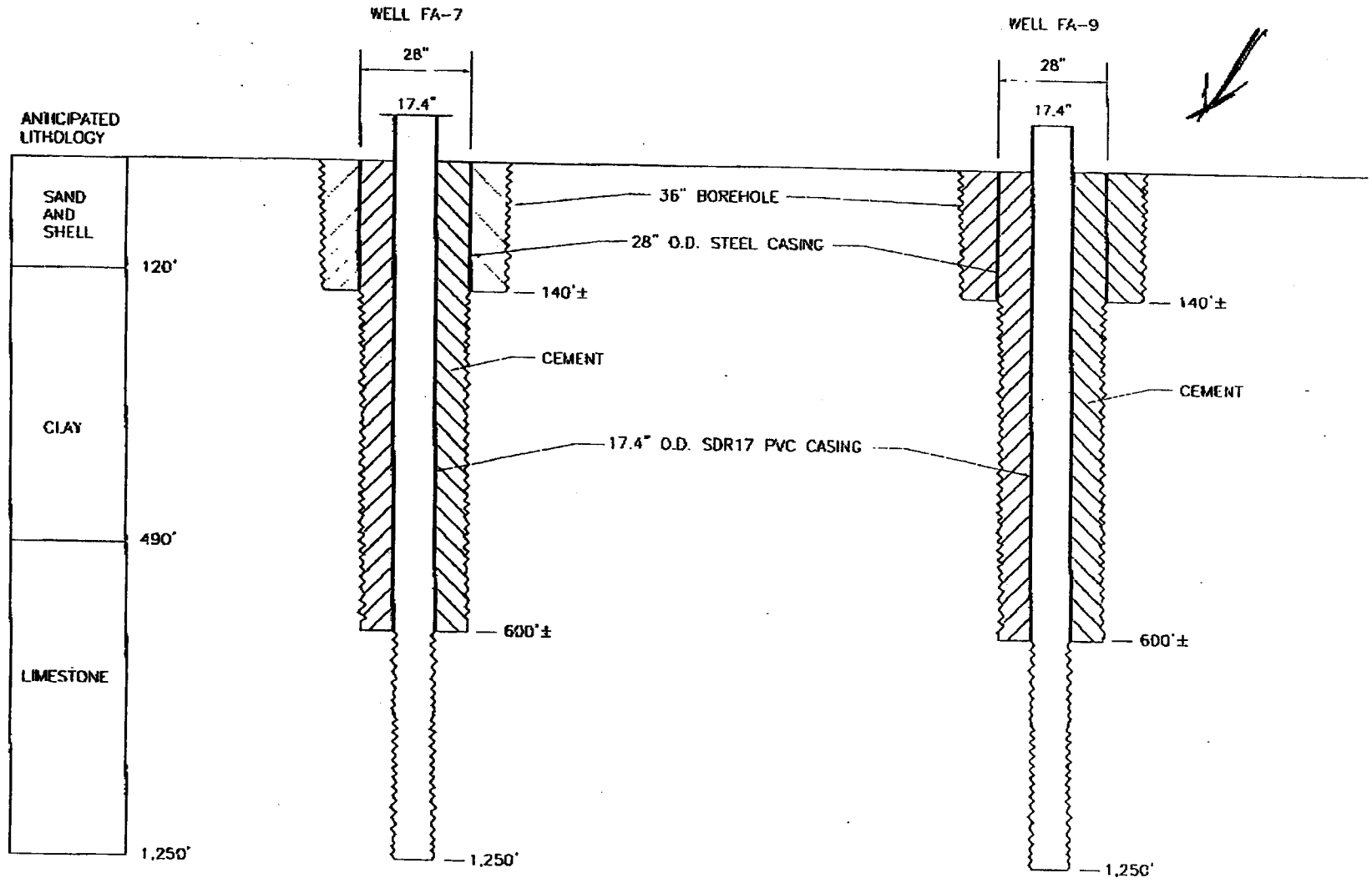
(772) 398-3883 Fax: (772) 398-3925
FBPE & FBPE License No.: 515

PRODUCTION WELL LOCATION MAP

FT. PIERCE UTILITIES AUTHORITY
FLORIDAN AQUIFER SUPPLY WELLS PROJECT

06-0039
SHEET 3



VERIFY SCALE

WELLS SUBSURFACE DIAGRAM

FT. PIERCE UTILITIES AUTHORITY
FLORIDIAN AQUIFER SUPPLY WELLS PROJECT

06-0039
SHEET 6

APPENDIX A-6

Well Completion Report FA-7

APPENDIX A-7

Well Completion Report FA-9

APPENDIX B

Summary of Well Construction Activity

Daily Construction Reports

APPENDIX B-1

Summary of Well Construction Activity

Summary of Drilling, Testing and Geophysical Logging for the Ft. Pierce Utilities Authority Floridan Aquifer Wellfield

WELL FB-7

Date	Milestone
05-17-07	Begin drilling a nominal 36-inch borehole from surface.
05-19-07	Finish drilling nominal 36-inch borehole to 100-feet bls .
05-20-07	Caliper and natural gamma geophysical logs were performed from 0 to 100- feet bls, Install 28-inch steel surface casing to a depth of 99-feet bls and cement in place.
06-02-07	Begin drilling a nominal 12.25-inch pilot hole from 100-feet bls
06-07-07	Finish drilling a nominal 12.25-inch pilot hole to 754-feet bls
06-08-07	Perform geophysical logging from 100 to 754-feet bls, including: caliper, natural gamma, dual induction with SPR, and temperature.
06-11-07	Begin reaming pilot hole with a nominal 27-inch bit
06-17-07	Finish reaming pilot hole with a nominal 27-inch bit to a depth of 600-feet bls. Perform caliper log from 100-600-feet bls. Install 17.4-inch SDR 17 ASTM F480 PVC inner casing to 600-feet bls and start cementing in place.
06-18-07	Perform second stage (lift) of cementing
06-19-07	Finish cementing 17.4" PVC casing in place
06-23-07	Begin drilling a nominal 15" borehole from 600-feet bls
07-12-07	Finish drilling a nominal 15" borehole from 600 to 1250-feet bls
07-14-07	Perform geophysical logging from 600 to 1250-feet bls, including: caliper, natural gamma, dual induction, fluid resistivity, temperature, dual induction, and flow logs. Perform video survey from surface to bottom inspecting joints
08-14-07	Acidize well – stage 1 – 4800 gallons
08-15-07	Acidize well – stage 2 – 4800 gallons
08-20-07	Begin well development
08-22-07	Conduct variable-rate pumping test. Continue well development.
08-24-07	Finish well development
09-07-07	Perform plumb and alignment test
09-10-07	Perform video survey from surface to bottom
09-14-07	Swab well to clear obstructions
09-17-07	Swab well to clear obstructions
09-19-07	Swab well to clear obstructions
09-20-07	Perform video survey from surface to bottom

WELL FB-4 (Deepening of Previously Constructed Well)

Date	Milestone
05-21-07	Begin drilling a nominal 10-inch borehole from 890-feet bls at previously constructed Well FB-4.
05-24-07	Finished drilling a nominal 10-inch borehole from 890 to 1250-feet bls
05-31-07	Perform geophysical logging from 500 to 1250-feet bls, including: caliper, natural gamma, dual induction, fluid resistivity, temperature, dual induction, and sonic logs.
06-13-07	Perform video survey from surface to bottom inspecting joints
07-25-07	Acidize well – stage 1 – 2400 gallons
07-26-07	Acidize well – stage 2 – 2400 gallons
08-02-07	Begin well development

08-05-07	Conduct variable-rate pumping test. Finish well development.

WELL FB-3 (Deepening of Previously Constructed Well)

Date	Milestone
06-27-07	Begin drilling a nominal 11-inch borehole from 890-feet bls at previously constructed Well FB-3.
07-02-07	Finished drilling a nominal 11-inch borehole from 890 to 1250-feet bls
07-03-07	Perform geophysical logging from 500 to 1250-feet bls, including: caliper, natural gamma, dual induction, fluid resistivity, temperature, dual induction, and flow logs. Perform video survey from surface to bottom inspecting joints
07-10-07	Acidize well – stage 1 – 2500 gallons
07-11-07	Acidize well – stage 2 – 2500 gallons
07-18-07	Begin well development
07-19-07	Conduct variable-rate pumping test. Finish well development

WELL FA-9

Date	Milestone
07-17-07	Begin drilling a nominal 36-inch borehole from surface.
07-19-07	Finish drilling nominal 36-inch borehole to 100-feet bls. Install 28-inch steel surface casing to a depth of 99-feet bls and cement in place.
07-23-07	Begin drilling a nominal 28-inch pilot hole from 100-feet bls
07-26-07	Finished drilling a nominal 27-inch pilot hole from 100 to 620-feet bls, Conduct caliper and natural gamma geophysical logs. Install 17.4-inch SDR 17 ASTM F480 PVC inner casing to 618-feet bls.
07-27-07	Start cementing PVC inner casing in place
07-28-07	Perform second stage (lift) of cementing
07-29-07	Finish cementing 17.4" PVC casing in place
08-01-07	Begin drilling a nominal 15-inch borehole from 620-feet bls
08-07-07	Finish drilling a nominal 15-inch borehole to 1255 feet bls
08-08-07	Perform geophysical logging from 600 to 1250-feet bls, including: caliper, natural gamma, dual induction, fluid resistivity, temperature, and dual induction logs. Perform video survey from surface to bottom inspecting joints
08-09-07	Perform flow meter geophysical log
08-22-07	Acidize well – stage 1 – 4000 gallons
08-23-07	Acidize well – stage 2 – 4500 gallons
08-25-07	Begin well development
08-28-07	Conduct variable-rate pumping test. Continue well development.
08-29-07	Finish well development
09-07-07	Perform plumb and alignment test
09-10-07	Perform video survey from surface to bottom

WELL FB-2 (Deepening of Previously Constructed Well)

Date	Milestone
08-14-07	Begin drilling a nominal 11-inch borehole from 890-feet bls at previously constructed Well FB-2.
08-17-07	Finished drilling a nominal 11-inch borehole from 890 to 1247-feet bls
08-20-07	Perform geophysical logging from 500 to 1250-feet bls, including: natural gamma, fluid resistivity, temperature, and dual induction logs. Perform video survey from surface to bottom inspecting joints
08-24-07	Perform geophysical logging from 500 to 1250-feet bls, including: caliper, dual induction and flow logs
08-29-07	Acidize well – acid pumped in one stage – 4850 gallons
09-01-07	Well development started
09-06-07	Conduct variable-rate pumping test. Continue well development.
09-07-07	Finish well development

APPENDIX B-2

Daily Construction Reports

LBFH, INC.
CONSULTING ENGINEERS, SURVEYORS & MAPPERS

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

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Fort Pierce, Florida 34950
(561) 461-2450
FAX (561) 465-1225

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West Palm Beach, Florida 34990
(561) 684-3375
FAX (561) 689-8531

☐ 421 N.W. 3rd Street
Okeechobee, Florida 34972
(863) 763-8999
FAX (863) 763-6692

DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 5/17/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-4	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK:

1405 - Cody Heathcock arrives @ 14:05
Talked with Driller (Kelvin) said finishing up getting rig ready to drill. May be ready to go in the hole by the end of the day. However, in all likelihood drilling will not continue until Friday May 18, 2007, afternoon. Kelvin stated already installed check valve in line going to drainage sewer. Drainage pipe seems to be duct tapped together in one section, but Kelvin says duct tape is covering gash but gash is not all the way through pipe.
1435 - Talk with Mike Bennett over the phone, says stay at site until he arrives
1445 - Mike Bennett arrives on site
1457 - Drillers start pulling drainage pipe into correct position in order to cover drainage catch basin
1503 - Drainage hole covered around drainage pipe, so as to make safe for people walking around pipe.
1600 - Kelvin states no drilling will begin today, Cody Heathcock leaves the site

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Okeechobee, Florida 34972
(863) 763-8999
FAX (863) 763-6692

DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 05/17/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 0'	Ending Depth: 40'	Bit Size: 36"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK:

0930 – Shamus English on site
1000 – Drill crew arrived on site, Tony and Mike (All Webbs Enterprises)
1000 – Setup auger rig with 36" bucket bit
130 – Mixed mud in approx. 5,000 gal. aluminum tank. Mud consists of Poly-Bore™ borehole stabilizing dry polymer. This is first time drill crew has used this product.
1215 – Lunch
1300 – Drilling commenced
1315 – 0'-5'
1330 – 5'-10'
1415 – 10'-15'
1430 – Sidewalls of borehole collapsing, drillers to experiment with adding more Poly-Bore to increase viscosity of mud
1600 – 15'-20'
1630 – 20'-25'
1700 – 25'-30'
1745 – 30'-35'
1815 – 35'-40'
1830 – cable on drill rig broke
1845 – Shamus English off site. Michael Bennett and drill crew still onsite at the time Shamus English left site.

Recorded By: Shamus English

Date: 5/17/07

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Okeechobee, Florida 34972
(863) 763-8999
FAX (863) 763-6692

DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 05/18/07	Day of Week: Friday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 40'	Ending Depth: 55'	Bit Size: 36"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK:

0915 – Shamus English on site. Drill crew on site at time of arrival (TOA), Tony and Mike (All Webbs Enterprises). Borehole at 41' at TOA. Drill rig appears to have been repaired from previous days malfunction
015 – 40'-45'
1200 – Lunch
1300 – Drilling resumed @ approx. 47'
1400 – Bracket inside bucket auger bit broke and drilling halted at approx. 50'
1530 – Welder arrived on site to repair auger bit
1730 – Drilling resumed at approx. 50'
1800 – Shamus English off site. Michael Bennett and drill crew still onsite at the time Shamus English left site.

Recorded By: Shamus English

Date: 5/18/07

LBFH, INC.
CONSULTING ENGINEERS, SURVEYORS & MAPPERS

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Okeechobee, Florida 34972
(863) 763-8999
FAX (863) 763-6692

DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 05/19/07	Day of Week: Friday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 40'	Ending Depth: 55'	Bit Size: 36"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK:

0915 – Shamus English on site. Drill crew on site at time of arrival (TOA), Tony and Mike (All Webbs Enterprises). Borehole at 41' at TOA. Drill rig appears to have been repaired from previous days malfunction
1015 – 40'-45'
1200 – Lunch
1300 – Drilling resumed @ approx. 47'
1400 – Bracket inside bucket auger bit broke and drilling halted at approx. 50'
1530 – Welder arrived on site to repair auger bit
1730 – Drilling resumed at approx. 50'
1800 – Shamus English off site. Michael Bennett and drill crew still onsite at the time Shamus English left site.

Recorded By: Shamus English

Date: 5/19/07

LBFH, INC.
CONSULTING ENGINEERS, SURVEYORS & MAPPERS

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FAX (561) 689-8531

☐ 421 N.W. 3rd Street
Okeechobee, Florida 34972
(863) 763-8999
FAX (863) 763-6692

DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 05/19/07	Day of Week: Saturday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 55'	Ending Depth: 100'	Bit Size: 36"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Drill 36" Borehole from 0-100' bls

1245– Michael Bennett on site. Contractors continue to drill a 36" borehole to 100' bls
1513 – Confirmed depth at 80' with sinker bar and rope
1735 - Confirmed depth at 98' with sinker bar and rope
825 – Secured borehole with steel plate

1835 –Michael Bennett off site.

Recorded By: Shamus English

Date: 5/19/07

LBFH, INC.
CONSULTING ENGINEERS, SURVEYORS & MAPPERS

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 05/20/07	Day of Week: Sunday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Geophysical Logs and Set Casing 0-100'

0905 – Michael Bennett on site. Completed 4-arm caliper log by AWE
0915 – Began to run in the 36" borehole with natural gamma log
0925 – Completed natural gamma log
0935 – Re-enter the 36" borehole to total depth; very little material in bucket
.055 – Received field prints of caliper and natural gamma log
1130 – Began to weld section (1) to section (2), 28" diameter steel casing, centralizers install @ 5' and 20' above bottom of casing
1152 – Completed weld sections (1) and (2)
1207 – Began to weld section (2) to section (3), 28" diameter steel casing, centralizers install @ 35 above bottom of casing
1230 - Completed weld sections (2) and (3)
1233 – Install centralizer at 84' above bottom of casing. 66" stick up of 28" pipe. Lifted 3" off bottom for cementing.
1245 – Check plumbness of 28" pipe – straight in both directions
1315 - Installing 2" tremie pipe through cement header. The bottom of the tremie pipe will be 16.87' above base of 28" diameter casing
1340 – Completed installing tremie pipe and secured cement header to 28" casing
1345 – Waiting on delivery of cement equipment
1445 – Cement equipment on site
1630 – Begin to pump 10 barrels water to evacuate and displace air within casing
1640 – Begin to pump cement 15.1 lbs/gal, ranged from 14.7-15.2 lbs/gal
1722 – Cement pumped to surface, total of 45 barrels, pressure at well head 20 psi
1745 – Pump water to flush after cementing, total of 9.1 barrels

1800 – Michael Bennett off site.

Recorded By: Michael Bennett

Date: 5/20/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 5/21/07	Day of Week: Monday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-4	FDEP Permit #:	Starting Depth: 880'	Ending Depth: 935'	Bit Size: 10"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK:

1130 – Shamus English on site. Dave Sr. & Calvin (AWE.) on site at time of arrival.
1145 – Dave Sr. explained that the pump was malfunctioning and he had to go to Stuart to get a part.
1345 – National Rent-a-Fence arrived on site to erect temporary chain link fence around site.
1345 – Water sample collected @ 880' Hanna meter HI 9835 (cond=1546µS, temp=26.4°C)
Hanna meter HI 98127 (temp=26.4°C, pH=7.9)
1345 – Drilling commenced 880'-890'
1430 – 890' 900'
1500 – Water sample collected at 905' Hanna meter HI 9835 (cond=1582µS, temp=25.1°C)
Hanna meter HI 98127 (temp=25.7°C, pH=6.8)
1600 - Chain link fence installed
1615 – 905'-910'
1700 – 910'-920'
1755 – 920'-930'
1815 – Drilling halted, air hose plugged-off
1845 – Drilling resumed after replacing check valve
1915 - Water sample collected at 935' Hanna meter HI 9835 (cond=1626µS, temp=25.2°C)
Hanna meter HI 98127 (temp=25.6°C, pH=7.6)

1930 – Shamus English off site.

Recorded By: Shamus English

Date: 5/21/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 5/22/07	Day of Week: Tuesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-4	FDEP Permit #:	Starting Depth: 935'	Ending Depth: 1037'	Bit Size: 10"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK:

0800 – Shamus English on site. Calvin and Mick (AWE.) on site at time of arrival.
0805 – Lithologic sample collected at 935'
0845 – Lithologic sample collected at 945'
0920 – Lithologic sample collected at 955'
0945 - Lithologic sample collected at 965'
0950 – Drilling halted, air hose plugged-off
1025 – Drilling resumed
1035 – Kelly down drilling halted
Water sample collected at 967' Hanna meter HI 9835 (cond=1,133µS, temp=25.2°C)
Hanna meter HI 98127 (temp=26.4°C, pH=7.2)
1130 – Drilling resumed at 968'
1152 - Lithologic sample collected at 975'
1228 – at 980'
1308 - Lithologic sample collected at 985'
1341 – at 990'
1405 - Lithologic sample collected at 995'
1421 - Kelly down drilling halted at 1,000'
1429 - Water sample collected at 1,000' Hanna meter HI 9835 (cond=1,090µS, temp=25.3°C)
Hanna meter HI 98127 (temp=25.1°C, pH=7.6)
1505 - Drilling resumed at 1,000'. Approx. 2 mins from time drilling started to the time material discharged from goose neck into settling tank.
1600 – drill bit dropped from 1,004' to 1,005.5' instantly (possible void), discharge water changed from light brown to dark grey
1605 - Lithologic sample collected at 1,005.5'
1614 – at 1,010'
1628 - Lithologic sample collected at 1,015'
1649 – Lithologic sample collected at 1,020'
1710 - Lithologic sample collected at 1,025'
1723 - Kelly down drilling halted at 1,030'

1730 - Water sample collected at 1000' Hanna meter HI 9835 (cond=1,106µS, temp=25.0°C)
Hanna meter HI 98127 (temp=25.2°C, pH=7.6)

1758 – Drilling resumed

1833 - Lithology sample collected at 1,035'

1848 – Drilling stopped for day day

1855 – Shamus English off site.

Recorded By: Shamus English

Date: 5/22/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 5/23/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-4	FDEP Permit #:	Starting Depth: 1037'	Ending Depth: 1184'	Bit Size: 10"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK:

0830 – Shamus English on site. Calvin and Mick (AWE.) on site and drilling at time of arrival.
0832 – Lithologic sample collected at 1045'
0908 – at 1050'
0925 – Lithologic sample collected at 1,055'
0937 - Kelly down drilling halted at 1,060'
0947 – Water sample collected at 1,060' Hanna meter HI 9835 (cond=1,141µS, temp=24.9°C)
Hanna meter HI 98127 (temp=24.8°C, pH=7.6)
1018 – Drilling resumed at 1,060'
1047 - Lithologic sample collected at 1,065'
1118 – Lithologic sample collected at 1,070'
1129 - Lithologic sample collected at 1,075'
1142 – Lithologic sample collected at 1,080'
1156 - Lithologic sample collected at 1,085'
1207 – Lithologic sample collected at 1,090'
1214 - Kelly down drilling halted at 1,092'
1222 - Water sample collected at 1,092' Hanna meter HI 9835 (cond=1,140µS, temp=25.2°C)
Hanna meter HI 98127 (temp=25.5°C, pH=7.6)
1252 - Drilling resumed at 1,092'
1302 – Lithologic sample collected at 1,095'
1326 - Lithologic sample collected at 1,105'
1344 – Lithologic sample collected at 1,110'
1358 - Lithologic sample collected at 1,115'
1409 – Lithologic sample collected at 1,120'
1413 - Kelly down drilling halted at 1,122'
1420 - Water sample collected at 1,122' Hanna meter HI 9835 (cond=1116µS, temp=25.2°C)
Hanna meter HI 98127 (temp=25.6°C, pH=7.6)
1506 – Drilling resumed
1516 - Lithologic sample collected at 1,125'
1530 – Lithologic sample collected at 1,130'
1545 - Lithologic sample collected at 1,135'

1552 – Lithologic sample collected at 1,140'
1604 - Lithologic sample collected at 1,145'
1631 – Lithologic sample collected at 1,150'
1642 - Kelly down drilling halted at 1,153'
1650 - Water sample collected at 1,153' Hanna meter HI 9835 (cond=1,011µS, temp=25.2°C)
Hanna meter HI 98127 (temp=25.5°C, pH=7.6)
1727 – Drilling resumed at 1,153'
1747 - Lithologic sample collected at 1,155'
1756 – Lithologic sample collected at 1,160'
1805 - Lithologic sample collected at 1,165'
1843 – Lithologic sample collected at 1,170'
1554 - Lithologic sample collected at 1,175'
1927 – Lithologic sample collected at 1,130'
1950 - Lithologic sample collected at 1,183', will mix this sample with sample to be collected at 1,188' tomorrow 5/24/07
1955 - Kelly down drilling halted at 1,184'
2003 - Water sample collected at 1,184' Hanna meter HI 9835 (cond=1,060µS, temp=24.9°C)
Hanna meter HI 98127 (temp=25.1°C, pH=7.7)

2005 – Shamus English off site.

Recorded By: Shamus English

Date: 5/23/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 5/24/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-4	FDEP Permit #:	Starting Depth: 1184'	Ending Depth: 1250'	Bit Size: 10"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK:

0830 – Shamus English on site. Calvin and Mick (AWE.) were on site and drilling at time of arrival. Mick said drilling began at 0820hr
0840 – sample collected at 1,188', mixed with sample collected at 1,183' from previous day.
0848 – Lithologic sample collected at 1,190'
0856 – Lithologic sample collected at 1,195'
0903 – Lithologic sample collected at 1,200'
0909 – Lithologic sample collected at 1,205'
0915 – Lithologic sample collected at 1,210'
0921 – Lithologic sample collected at 1,215'
0921 - Kelly down drilling halted at 1,215'
0931 – Water sample collected at 1,215' Hanna meter HI 9835 (cond=1,016µS, temp=25.0°C)
Hanna meter HI 98127 (temp=25.0°C, pH=8.5)
0945 – pH from last water sample seemed high. Checked pH of drinking water pH=8.4 after 4 mins
pH=8.3 after 8 mins
** There appears to be a problem with pH meter

1016 – Drilling resumed at 1,215'
1024 – Lithologic sample collected at 1,220'
1031 – Lithologic sample collected at 1,225'
1041 – Lithologic sample collected at 1,230'
1054 – Lithologic sample collected at 1,235'
1128 – Lithologic sample collected at 1,240'
1134 – Lithologic sample collected sample collected at 1,243', will mix with sample to be collected at 1248' for composite sample
1138 - Kelly down drilling halted at 1,245'
1155 - Water sample collected at 1,245' Hanna meter HI 9835 (cond=1,006µS, temp=25.0°C)
Hanna meter HI 98127 (temp=25.2°C, pH=9.1)
** There appears to be a problem with pH meter

1222 - Drilling resumed at 1,245'

1231 – Sample collected at 1,248', mixed with sample collected at 1,243' for composite
1236 - Drilling stopped at depth of 1,250'
1249 - Water sample collected at 1,250' Hanna meter HI 9835 (cond=978µS, temp=25.3°C)
Hanna meter HI 98127 (temp=25.4°C, pH=8.0)
1257 – Checked pH of drinking water pH=8.0
** There appears to be a problem with pH meter

1300 – AWE purged water from well via reverse-air method
1528 - Tripped pipe up into casing to perform wiper run

1630 – Shamus English off site.

Recorded By: Shamus English

Date: 5/24/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 5/28/07	Day of Week: Monday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-4	FDEP Permit #:	Starting Depth: NA	Ending Depth: NA	Bit Size: NA	Weather: NA

ACTIVITY:

DESCRIPTION OF WORK:

0915 – Michael Bennett on site to conduct geophysical logging. Logging using tool 9041C, S/N 280
- •Natural Gamma, Res (FC), Sp. Temp., Res (16N), Res (64), Res., Del. Temp., Lateral, Sp. Cond.
- •Running up hole @ 30 ft/min

0950 – Finish running static logs, these logs were run up hole at 30 ft/min
0952 – Opened valve to bring well alive (flowing conditions)
0958 – Begin running tool down hole at 82 ft/min
1013 – E-tool at bottom of open hole; measured at 1,235' bls, Sp. Conductance = 1,085µS/cm, Temp =77.7°F, Logging up hole at 31 ft/min
1041 – Logged to 400' bls - pulling tool back into casing
1048 – E-tool out FB-4 completed w/ this logging probe
1100 – Impeller flow meter log installed into stand pipe (Dynamic Conditions), Type 9710A, S/N 211, Sample interval 0.10', 0 cps reading at 730' to 740' bls
**Note: need a way to determine (present) line speed or tension on final print
1145 – Flow meter stopped due to zero readings; possibly due to obstruction. Started to log at 993' bls, stopped logging due to zero reading.
1150 – Pulling impeller flow meter back to surface.
1200 – Impeller flow meter back to surface and checked while it was pulled from the standpipe, it was knocked against it possibly dislodging any material stuck in the impellers. The flow meter was brought to the truck and the impeller spun freely and reading showed it accordingly, but Dominic did not want to put this flow meter back down borehole. A second flow meter is available but it too was providing incorrect readings.
1210 – Working on a second impeller flow meter logging tool. Domenic determined that it too was inoperable.
1310 – Run back into the well with Century 9710A tool
1315 – Logging started at 400' bls. Bottom of sensor at displayed depth +4.4 feet at 30ft/min
1324 – Impeller flow meter produced readings of zero at 582' bls.
1338 – Started to run induction tool into well, measured length = 7' of tool and stand pipe 24' above land surface, top of tool was used to depth calibrate at +17' above; logging was conducted under static conditions
1403 – Induction tool at bottom at 1,250' bls, started to log: this will be considered the repeat section.

1417 – Ran induction tool to bottom to start to run main section
1500 – Completed Induction Logging run
1509 – Started to calibrate x-y caliper log
1510 – Calibrated using 15 $^{1}/_{4}$" PVC ring: maximum extension of 14.25", calibrations in 9 $^{3}/_{8}$" Black Poly Pipe 9.4-9.7; calibrations in 15 $^{1}/_{4}$" PVC pipe reading 16.4"
1520 – Tripped x-y caliper tool into borehole at 170 ft/min
1535 – Bottom of borehole measured at 1250.3' bls
1537 – Logging xy-caliper up hole at 30ft/min
1605 – Logged interval 400' to 1250' bls
1610 – Start to run repeat section from 605' to 400' bls
1630 – Completed repeat section and came out of well w/ tool
1650 – Installed top and bottom centralizers and set maximum diameter of centralizers to 10" onto compensated sonic tool
1655 – Pull sonic tool from stand pipe to adjust centralizer width, Reduced centralizers to 8" and reinstalled into stand pipe
1705 – Ran sonic tool back into stand pipe with success
1900 – Tripping the sonic tool out of the borehole at 75ft/min
1920 – Sonic log back to surface
1940 – Tripping borehole video log in well
1945 – Began borehole video survey under static conditions; casing base at 502'
2005 – Pulled camera back to into 12" casing and opened the valve at the wellhead to clear the water of particulate material.
Flow at 564.5', 608', 639', 672', 718', 835', 843', 871', 916', 921', 945', 957', 963', 973', 987', 996', 1064'.
Little flow at 720'-749', 776'-828', 845'-869', 884'-896', 901'- , 1010'-1023', 1160'
2040 – Reached total depth of 1,251, bls w/ borehole video camera
2041 – Started to trip out of the borehole w/ borehole video camera
2100 – Borehole video survey out of borehole

2130 – Michael Bennett off site FB-4.

Recorded By: Michael Bennett

Date: 5/28/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 5/31/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-4	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size: NA	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Geophysical Logging

1100 – Shamus English on site to conduct geophysical logging. Flow meter log for static conditions recorded prior to my arrival. Impeller at bottom of borehole upon my arrival (1243.82' +5.58').
1116 – Started to raise Flow meter impeller tool up hole from bottom (1,249.40), not recording.
1122 – Stopped at 397'
1124 – Start recording flow meter log down hole from 397' to bottom at 30 ft/min (Dynamic Conditions)
1127 - @ 500'
1131 - @ 600'
1134 - @ 700'
1152 – Reached bottom (147.82) recording stopped

**Next, record flow meter log with Impeller stationary at 100' intervals, as per Michael Bennett
1157 – Raised Impeller to approx. 1225' and started recording (Dynamic Conditions) with Impeller stationary at 1,225' for 3-4 mins.
1202 – Raised Impeller to 1,125' without recording.
1205 - Impeller at 1,125', started recording (Dynamic Conditions) with Impeller stationary at 1,125' for 3-4 mins.
1208 – Raised Impeller to 1,025' without recording.
1211 - Impeller at 1,025', started recording (Dynamic Conditions) with Impeller stationary at 1025' for 3-4 mins.
1214 – Raised Impeller to 925' without recording.
1216 - Impeller at 925', started recording (Dynamic Conditions) with Impeller stationary at 925' for 3-4 mins.
1219 – Raised Impeller to 825' without recording.
1220 - Impeller at 825', started recording (Dynamic Conditions) with Impeller stationary at 825' for 3-4 mins.
1223 – Raised Impeller to 725' without recording.
1226 - Impeller at 725', started recording (Dynamic Conditions) with Impeller stationary at 725' for 3-4 mins.
1229 – Raised Impeller to 625' without recording.

1232 - Impeller at 625', started recording (Dynamic Conditions) with Impeller stationary at 625' for 3-4 mins.
1236 – Raised Impeller to 525' without recording.
1238 - Impeller at 525', started recording (Dynamic Conditions) with Impeller stationary at 525' for 3-4 mins.
1241 – Flow meter logging finished. Raised impeller to top of borehole
1247 – Removing flow meter from stand pipe.

** Next to perform Sonic Porosity Logging
1255 – Assembling Sonic Tool
1317 – Lowering Sonic Tool inside top of stand pipe'
1320 – Closed valve (Static Conditions)
1323 – From 1323 to 1502 Logging operator (Dominic) ran sonic tool down hole and then back up hole adjusting controls frequently along the runs. This apparently was a practice run to get system adjusted properly.
1503 – Began recording Sonic Porosity Log down hole from 421' to bottom (Static Conditions) at 30 ft/min
1531 – Reached bottom of borehole (1,248') and began recording Sonic Porosity Log up hole from 1,248' to 383' at 30 ft/min
1559 – Stopped recording Sonic Porosity at 383'. Sonic Porosity logging finished. Raised Tool to top of borehole.
1603 – Removing Sonic Tool from top of stand pipe.
1630 – Lowering a different flow meter into top of stand pipe. Dominic explained that this flow meter is a rental they are considering buying and he wants to test it out to see how well it works.
1635 – Left FB-4 site, going to check on FA-7 site to see how setup is coming along and when drilling should begin. Will return to FB-4 site.
1700 – Returned to FB-4 site. Waiting to get field prints of geophysical logs conducted today.

1755 – Shamus English off site.

Recorded By: Shamus English

Date: 5/31/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/1/07	Day of Week: Friday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK:

1230 – Shamus English on site. Drill crew finishing lunch at time of arrival (TOA).
1300 – Jason (All Webs, Ent.) explained that they still had to add collars
1530 – Noticed drillers were using a 12 ¼" bit. Specs call for an 8" pilot hole bit. Informed Michael Bennett of this via telephone. After Michael Bennett spoke with Dave Webb Jr. for a few moments, I was informed that we would be using a 12 ¼" pilot hole bit.
1535 – Lowering 12 ¼" bit and collars down borehole. Was told that it was approx. 90' of 9" O.D. collar was used, Found out later that approx. 76' (two 30' sections and one 16' section) of 9" O.D. collar was used.

1800 – Shamus English off site. Drillers still have to get through concrete plug at bottom of borehole. Drillers will begin working on Saturday 6/2/07 at about 0700.

Recorded By: Shamus English

Date: 6/1/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/2/07	Day of Week: Saturday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 90'	Ending Depth: 200'	Bit Size: 12 ¼"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Begin drilling pilot hole from 100' to 700'

0830 – Shamus English on site. Drillers had problems with pump yesterday (6/1/07) and were unable to drill through concrete plug.
0919 – Adding bentonite to mud to raise viscosity from 33 to 40. Informed drillers that I want mud weught at 9 lbs/gal. Mud is HYG-200 Hi Yield Wyoming Bentonite,
)956 – Drilling commenced at 90' bls (top of concrete plug). 4 ½" drill pipe.
1002 – Drilling halted at about 91'. Generator malfunction.
1045 – Dave Webb Jr. arrives onsite. Explains that the will have to get another generator and would take about 2 hours.
1230 – Dave Webb Jr. back on site with generator
1315 – Drilling resumed at 91' bls.
1335 – Reached bottom of plug at 97' (concrete plug from 90' to 97')
1351 - at 105', 100'- 110' sample collected
1416 – Kelly down, drilling halted at 112.79' to add drill pipe.

*** As per Dave Webb Jr., Deviation Survey Tool not available today but that it would be ready before next days drilling event. Informed later by Michael Bennett that a Deviation Survey would not be performed on this borehole.
1519 – Drilling resumed at 113'
1526 - at 115', 110'- 120' sample collected
1533 – at 120'
1538 - 125', 120'- 130' sample collected
1547 – at 130'
1552 - Kelly down, drilling halted at 134.69' to add drill pipe.
1626 – Drilling resumed at 135'
1630 – at 136', 130'-140' sample collected
1636 – at 140'
1641 – at 145' 140'-150' sample collected
1648 - Kelly down, drilling halted at 155.30' to add drill pipe.
1712 – Drilling resumed at 155'
1713 – at 155', 150'-160' sample collected

1719 – at 160'
1726 – at 165', 160'-170' sample collected
1736 – at 175', 170'-180' sample collected
1741 - Kelly down, drilling halted at 178.48' to add drill pipe.
1823 – drilling resumed at 179'
1829 – at 185', 180'-190' sample collected
1835 – at 190'
1853 – at 195', 190'-200' sample collected
1903 - Kelly down, drilling halted at 199.72' to add drill pipe.

1915 – Shamus English off site. Drillers will begin working on Sunday 6/3/07 at about 0730.

Recorded By: Shamus English

Date: 6/2/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/3/07	Day of Week: Sunday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 200'	Ending Depth: 300'	Bit Size: 12 ¼"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Continue drilling pilot hole from 100' to 700'

0815 – Shamus English on site. Drilling commenced prior to my arrival. Depth at 217' bls at T.O.A.
200'-210' sample collected by drillers prior to my arrival on site.
0817 – 210'-220' sample collected at approx 217' bls.
0826 – Kelly down, drilling halted at 222' to add drill pipe.
0853 – Drilling resumed at 222' bls.
0902 – at 225', 220'-230' sample collected
0918 – at 235', 230'-240' sample collected
0939 - Kelly down, drilling halted at 244' to add drill pipe.
*Pump malfunction, drilling temporarily delayed
1102 – Drilling resumed at 244'
1105 - at 245', 240'- 250' sample collected
1122 – at 255', 250'- 260' sample collected
1139 - at 265', 260'- 270' sample collected
1143 - Kelly down, drilling halted at 266' to add drill pipe.
1151 - Lunch
1259 – Drilling resumed at 266'
1311 – Viscosity of mud is 36, mud weight is 9 lbs/gal, pH is 10.2
1315 – at 275', 270'-280' sample collected
1330 – at 285' 280'-290' sample collected
1335 - Kelly down, drilling halted at 286' to add drill pipe.
1357 – Drilling resumed at 286'
1420 – at 295', 290'-300' sample collected
1429 – Pump overheated at 299', drilling halted for day, kelly down will be at 310'.

1455 – Shamus English off site.

Recorded By: Shamus English

Date: 6/3/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/4/07	Day of Week: Monday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 300'	Ending Depth: 414'	Bit Size: 12 ¼"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Continue drilling pilot hole from 100' to 700'

0859 – Shamus English on site. Drilling commenced just a few minutes prior to my arrival. Depth at 301' bls at T.O.A.
0912 - at 305', 300'-310' sample collected
0924 – viscosity of mud at 38, mud weight is at 8.9 lbs/gal
0934 – Kelly down, drilling halted at 310' to add drill pipe.
0959 – Drilling resumed at 310' bls.
1018 – at 315', 310'-320' sample collected
1032 – at 325', 320'-330' sample collected
1044 - Kelly down, drilling halted at 332' to add drill pipe.
1106 – Drilling resumed at 332'
1112 - at 335', 330'- 340' sample collected
1122 – at 340'
1131 - at 345', 340'- 350' sample collected
1142 – at 350'
1150 - Kelly down, drilling halted at 354' to add drill pipe.
1213 – Drilling resumed at 354'
1216 – at 356', 350'-360' sample collected
1224 – at 360'
1234 – at 365' 360'-370' sample collected
1246 – at 370'
1255 - at 375' 370'-380' sample collected
1258 - Kelly down, drilling halted at 376' to add drill pipe.
** Not sure what time drilling resumed, went to get some lunch
1340 – at 385', 380'-390' sample collected
1351 – at 390'
1407 – at 395' 390'-400' sample collected
1432 - Drilling halted at 396' to add drill pipe. Still about 1.5 feet till Kelly down. Paul is going to add drill pipe before kelly down in hopes that it will clean up drill bit in the process.
1506 – Drilling resumed at 396'
1547 – at 400'

1635 – at 405', 400'-410' sample collected
1717 – at 410'
1747 – at 415', 410'-420' sample collected
1749 – Drilling halted for day at 414', Kelly down will be at about 420'

1805 – Shamus English off site.

Recorded By: Shamus English

Date: 6/4/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/05/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 415'	Ending Depth: 465'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling FA-7

0745 - Cody Heathcock (LBFH) arrives onsite
Talked with the Driller (Jason) and current depth of 415' and drilling begins
Al demonstrates to Cody Heathcock how to take samples
0815 - Sample taken at ~417'
Al takes sample and shows it to Cody Heathcock, seems to be Clay
0835 - Jason reports @ 420', leaves drilling rig and Mark and Al watch in his place
0840 - Jason returns to drilling rig
0850 - Drilling is stopped and drilling pipe is pulled out
0855 - Attaching new section of drilling pipe
0905 - Attaching drilling rig to new section of pipe
0915 - Drilling Commences
1015 - Cody Heathcock takes sample @ 425', seems to be Clay
1055 - Cody Heathcock takes sample @ 430', seems to be Clay
1200 - Cody Heathcock takes sample @ 435', seems to be Clay with some sandy substance consisting of shells.
1225 - Talked with Jason states at end of this drill depth will be approximately 444'
1230 - Cody Heathcock takes sample @ 440'
12:40 - Drilling rig starts shaking Jason says hit some rock
1250 - Drilling rig stops and current depth is 443.39'
1307 - Jason and Al work on exhaust for Generator
1309 - Drilling pipe pulled out of hole and getting ready to add a new section of pipe
1324 - tripping new pipe in hole
1328 - Hooking rig up to pipe
1331 - Drilling continues
1345 - Mike Bennett arrives on site
1345 - Drilling stops to perform maintenance on pump that seems to be malfunctioning
1410 - Drilling commences, pump is fixed
1415 - Mike Bennett leaves site
1425 - Cody Heathcock takes sample @ 445'
1555 - Cody Heathcock takes sample @ 450'

1645 - Dave Webb arrives on site
1655 - Cody Heathcock takes sample @ 455'
1700 - Dave Webb leaves site
1720 - Cody Heathcock talked to Jason and he stated that Dave Webb instructed him that it was okay to put more weight on the bit to speed up drilling
1730 - Cody Heathcock takes a sample @ 460'
1815 - Cody Heathcock takes sample @ 465'
1817 - Drilling stops @ 465'
Letting well circulate drilling is done for the day
1845 - Cody Heathcock collects samples and leaves site, Jason says drilling will commence @ 07:00 the next morning.

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/6/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 465'	Ending Depth: 620'	Bit Size: 12 ¼"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Continue drilling pilot hole from 100' to 700'

0800 – Shamus English on site. Drilling not started yet at time of arrival. Depth at 465' bls.
0810 – Drilling commenced at 465'
0847 – at 470'
0951 - at 475', 470'-480' sample collected
1041 – at 480', drilling rate increased greatly at 480', discharge from shaker changed color from dark gray to light brown
1053 – at 485', 480'-490' sample collected
1057 – Kelly down, drilling halted at 487' to add drill pipe.
1128 – Drilling resumed at 310' bls.
1133 – at 490'
1144 – at 495', 490'-500' sample collected
1154 – at 500'
1206 – at 505', 500'-510' sample collected
1216 - Kelly down, drilling halted at 508' to add drill pipe.
1246 – Drilling resumed at 508'
1251 – at 510'
1302 – mud weight at 9 lbs/gal
1303 – at 515', 510'-520' sample collected
1316 – at 520'
1332 - at 525', 520'- 530' sample collected
1347 – at 530'
1352 - Kelly down, drilling halted at 532' to add drill pipe.
1429 – Drilling resumed at 532'
1439 – at 535', 530'-540' sample collected
1502 – at 540'
1521 – at 545' 540'-550' sample collected
1543 – at 550'
1558 - Kelly down, drilling halted at 553' to add drill pipe.
1620 – Drilling resumed at 553', switched drill rig operators from Jason to Dana
1624 - at 555', 550'-560' sample collected

1630 - at 565', 560'-570' sample collected
1633 - Kelly down, drilling halted at 577' to add drill pipe.
1633 – 570'-580' sample collected at 577' after Kelly down.
1647 – Shaker arced , drillers repairing
1753 – Drilling resumed at 577', Jason is drill rig operator again.
1758 – at 580'
1802 – at 585', 580'-590' sample collected
1806 – at 590'
1811 – at 595' 590'-600' sample collected
1815 - Kelly down, drilling halted at 599' to add drill pipe. Only one more drill pipe section will be run before drilling halted for day at approx. 620'. Drillers to collect 600'-610' and 610'-620' samples in my absence.

1825 – Shamus English off site.

Recorded By: Shamus English

Date: 6/6/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/7/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 620'	Ending Depth: 753'	Bit Size: 12 ¼"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Continue drilling pilot hole from 100' to 700'

0805 – Shamus English on site. Depth at 625' at time of arrival.
0806 – at 625', 620'-630' sample collected
0823 - at 635', 630'-640' sample collected
0836 – at 640'
0841 – Kelly down, drilling halted at 643' to add drill pipe.
0907 – Drilling resumed at 643' bls.
0914 – at 645', 640'-650' sample collected
0923 – at 655', 650'-660' sample collected
0930 – at 660'
1003 – at 665', 660'-670' sample collected
1006 - Kelly down, drilling halted at 665.82' to add drill pipe.
1037 – Drilling resumed at 666'
1101 – at 670'
1110 – at 675', 670'-680' sample collected
1118 - at 685', 680'- 690' sample collected
1121 - Kelly down, drilling halted at 687.83' to add drill pipe.
1159 – Drilling resumed at 688'
1204 – at 690'
1209 – at 695', 690'-700' sample collected
1216 – at 705', 700'-710' sample collected
1219 - Kelly down, drilling halted at 709'
*** Add another pipe section and keep drilling as per Michael Bennett
1251 – Drilling resumed at 709',
1257 - at 715', 710'-720' sample collected
1305 – at 720'
1313 - at 725', 720'-730' sample collected
1321 - Kelly down, drilling halted at 731'.
*** Add another pipe section and keep drilling as per Michael Bennett
1348 – Drilling resumed at 731'.
1353 – at 735', 730'-740' sample collected

1401 – at 745', 740'-750' sample collected

1408 - Kelly down, drilling halted at 753.64' to add drill pipe. Only one more drill pipe section will be run before drilling halted for day at approx. 620'. Drillers to collect 600'-610' and 610'-620' samples in my absence.

1415 – Stop drilling pilot hole as per Michael Bennett

1500 – Shamus English off site.

Recorded By: Shamus English

Date: 6/7/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/8/07	Day of Week: Friday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size: 12 ¼"	Weather: Cloudy and Overcast

ACTIVITY:

DESCRIPTION OF WORK: Conduct Geophysical Logging

0900 – Shamus English on site. Dominic onsite at time of arrival. E-tool logging started at about 0805, prior to my arrival. At 0840 E-tool had reached bottom and logging commenced recording up hole trip only @ 30 ft/min (static conditions).
0914 – E-tool coming out of borehole, finished with E-tool logging
*** pressure head of water about 20 feet bls (flowing conditions not applicable)

0929 – Lowering Dual Induction tool into borehole
0934 – Tool at 90' bls where borehole reduces from 36" diameter to 12 ¼" diameter, having trouble getting tool into 12 1/4" hole
0945 – Start trip down hole at 42 - 71 ft/min, stopped briefly at 213' and 263'
1008 – Dual Induction Tool at bottom of borehole: measured at 754.8
1012 – Started recorded dual induction tool log from 754.8 to 588' (Repeat Pass) at 30 ft/min
1017 – Stopped recording at 588', lowered tool to bottom to record (Main Pass) from bottom up hole
1023 – Started recording dual induction tool log from 754.7' to 98' (Main Pass) at 30 ft/min. Deep and Medium values in mid 20's Ohm-meters when logging started'
1032 – Tool at 500', deep value=20.9 Ohm-meters, medium value=15.3 Ohm-meters
1040 - Tool at 250', deep value=11.7 Ohm-meters, medium value=10.9 Ohm-meters
1045 – Induction tool at bottom of steel casing (98'), turned tool off and stopped recording
1047 – Induction tool at top of borehole, finished with this dual induction tool logging event

1116 – Lowering caliper tool into borehole
1129 – Caliper tool at bottom: measured 756.6
1137 – Started caliper logging from bottom (754.3) up hole (Repeat Pass) at 30 ft/min
1144 – Stopped logging (Repeat Pass) at 584.8' and began running tool down hole
1152 – Started caliper logging from bottom (755') up hole (Main Pass) to top.
1218 – lifting caliper tool from borehole
1236 – lowering Sonic Tool into borehole
1306 – Sonic tool reached bottom, measured 758.7

1307 – Started Sonic tool logging (Main Pass) from bottom (758.7) up hole. From 750'-285' raised at 18 ft/min. From 285' to top raised at 25-30 ft/min.

1344 – Stopped recording at 77' and brought Sonic tool to top. Finished Sonic Porosity logging

1500 – Shamus English off site.

Recorded By: Shamus English

Date: 6/8/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 6/13/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-4	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size: NA	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Video Survey

1040 – Start Video Survey

Casing Joint	Casing Joint
97.1-OK	117.0-OK
137-OK	157-OK
177-OK	197-OK
217-OK	237-OK
257-OK	277-OK
297-OK	317-OK
337-OK	357-OK
377-OK	397-OK
417-OK	437-OK
457-OK	477-OK
495-OK	503-Base of Casing

1150 – Finished Video Survey

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/13/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 250'	Ending Depth: 310'	Bit Size: 28"	Weather: Warm & Cloudy

ACTIVITY:

DESCRIPTION OF WORK: Reaming Pilot Hole From 100' to 600'

1130 – Shamus English on site. Depth at approximately 275' below land surface (bls) at T.O.A. Using a 28" bit with approximately 40,000 lbs of Collar.
1302 – Kelly down, drilling halted at 275' bls
1334 – Drilling resumed at 275' bls
1423 – Drilling halted
1334 – Drilling resumed
1500 – Started mixing EZ-MUD polymer to mud
1547 – Kelly down, drilling halted at approx. 298' bls
1638 – Drilling resumed

1800 – Shamus English off site. Depth at about 310' bls

Recorded By: Shamus English

Date: 6/13/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/14/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 390'	Ending Depth: 405'	Bit Size: 28"	Weather: Warm & Cloudy

ACTIVITY:

DESCRIPTION OF WORK: Reaming Pilot Hole From 100' to 600'

1000 – Shamus English on site. Depth at approximately 390' below land surface (bls) at T.O.A. Drill crew explained that they worked until about 2400 hours the previous night. Drilling in clay, very slow progress

1100 – Depth at approx. 400'

1115 – Jason Mittler (FPUA) arrived onsite. Wants to know when to deenergize electric lines at FA-9 and reenergize electric lines at FA-7. He explained that both areas cannot be deenergized at the same time. His cellular phone # is (772) 519-0073

1150 – Drilling halted at about 405' bls

1208 – Drilling resumed

1220 – Drilling halted, Representative for EZ-MUD product arrived on site. He did not have MSDS sheet with him, however, he did provide some product data sheets. EZ-MUD appears to be NSF certified.

1255 – Cliff Berry, Inc. (CBI) vacuum truck arrived on site to pump out settling pit.

1325 – Tony (All Webbs) arrived on site to pump out mud tank, then remix new batch of mud.

1730 – Shamus English off site. Depth at about 405' bls. Drill crew still mixing mud.

Recorded By: Shamus English

Date: 6/14/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/15/07	Day of Week: Friday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 440'	Ending Depth: 455'	Bit Size: 28"	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Reaming Pilot Hole From 100' to 600'

1000 – Shamus English on site. Depth at approximately 440' below land surface (bls) at T.O.A. Drill crew explained that they worked until about 0300 hours this morning. Drilling in clay, very slow progress
1038 – TeleVac South, Inc arrived onsite with a vacuum truck to pump out settling pit.
1100 – Drill crew added laundry detergent and dishwashing soap to mud. Supposed to help clay from caking up on drill bit.
1145 – Drilling halted. Changing out screens on shaker tray.
1235 – Drilling resumed at about 448'
1511 – Kelly down, drilling halted at about 455'
1038 – TeleVac South, Inc arrived onsite with a vacuum truck to pump out settling pit.
1100
1115 – Jason Mittler (FPUA) arrived onsite. Wants to know when to deenergize electric lines at FA-9 and reenergize electric lines at FA-7. He explained that both areas cannot be deenergized at the same time. His cellular phone # is (772) 519-0073
1150 – Drilling halted at about 405' bls
1208 – Drilling resumed
1220 – Drilling halted, Representative for EZ-MUD product arrived on site. He did not have MSDS sheet with him, however, he did provide some product data sheets. EZ-MUD appears to be NSF certified.
1255 – Cliff Berry, Inc. (CBI) vacuum truck arrived on site to pump out settling pit.
1325 – Tony (All Webbs) arrived on site to pump out mud tank, then mix new batch of mud.

1730 – Shamus English off site. Depth at about 455' bls. Drill crew still mixing mud.

Recorded By: Shamus English

Date: 6/14/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/17/07	Day of Week: Sunday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Perform Geophysical Logging, Set Casing From 0' to 600' bls, Pour 1st Stage of Cement

1400 – Shamus English on site. Drill crew removing Collars from drill bit at T.O.A.
*** Casing-Certainteed 17.4" Cert-Lok Well Casing IC-1 PVC SDR 17 Class 250 ASTM F480 SE B 03/10/07 Batch #657214
*** 30 x 20' lengths of casing have coupling attached at one end. I numbered them from 1-30
1430 – Collars and Drill Bit removed from borehole. Geophysical logging truck arrived on site.
1451 – Lowering Caliper tool down borehole at about 84 ft/min
1501 – Tool at bottom of borehole; measured 606' bls
1504 – Begin recording up borehole @ 30 ft/min
1519 – Stopped recording at 80.6' bls. X-caliper measuring 42" between 250'-400' bls while Y-caliper measured 30"
1522 – Sending Caliper tool down hole to perform a Repeat Pass from 250'-400' bls
1528 – Begin recording caliper log from 400' to 250' bls (repeat pass)
1530 – Michael Bennett (LBFH) arrived on site.
1532 – Stopped recording caliper log at 241' bls. Log still shows large variability between 250' and 400' bls. Raising Caliper tool to surface.
1536 – Caliper tool at surface
1544 – Lowering caliper tool back down hole to perform another log, too much variability.
1548 – Touch down at bottom of borehole; measured 607.5' bls
1551 – Begin recording caliper log up hole from bottom. Y-caliper is now showing large diameter void between 250' to 400' bls
1608 – Caliper tool at surface.
1703 – Lowering first section of casing into borehole; Attaching centralizer 5' from bottom of casing; See table below for details of casing set.
2015 – Work halted for food break
2035 – Work resumed
2100 – Finished setting casing to 600'

Time	Casing #	Cumulative Length	Centralizers	Spline Set
1703	13	0'-20'	5'	X
1715	12	20'-40'	39'	X
1720	6	40'-60'	59'	X
1727	3	60'-80'		X
1732	8	80'-100'	98'	X
1739	4	100'-120'		X
1844	5	120'-140'		X
1850	1	140'-160'		X
1854	2	160'-180'		X
1858	10	180'-200'	185'	X
1906	11	200'-220'		X
1911	7	220'-240'		X
1915	30	240'-260'		X
1920	9	260'-280'		X
1924	27	280'-300'	285'	X
1934	28	300'-320'		X
1939	24	320'-340'		X
1943	25	340'-360'		X
1947	26	360'-380'		X
1950	22	380'-400'	385'	X
1959	29	400'-420'		X
2003	23	420'-440'		X
2006	20	440'-460'		X
2009	21	460'-480'		X
2013	19	480'-500'	485'	X
2035	18	500'-520'		X
2041	16	520'-540'		X
2045	17	540'-560'		X
2049	14	560'-580'	565'	X
2056	15	580'-600'		X

2324 – lower trimie pipe down hole. Trip down to approx. 564' bls

6/18/07

0100 – Began pumping cement down trimmy pipe.

***Cement density measures 15.04 lbs/gal. checked weight with mud balance 15 lbs/gal. Density varied while pumping between 14.7 and 15.3 lbs/gal

***Rate varied while pumping between 3.8 and 4.3 barrels per minute

0141 – Ran out of cement, pumping halted; Total of 80 barrels pumped down hole; Final pressure inside casing was 48 psi.

0202 – Shamus English off site.

Recorded By: Shamus English

Date: 6/17/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/18/07	Day of Week: Monday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Pour 2nd Stage of Cement

1400 – Shamus English on site. Contractors setting up for reverse air drilling. Jason (All Webbs, Ent.) explained that Tony took bulk unit rig to fill with cement and should be back shortly. Trimmy pipe set down backside of borehole annulus to a depth of 406' bls. Stage 1 cementing event fill annulus from 600' to 414' bls.

** Contractors could only get about 50 barrels of cement and will have to finish job tomorrow with stage 3.

1702 – Pumping 20 barrels of pre-flush (water only). Pressure in casing at 40 psi.

1711 – Pre-flush completed (20.36 barrels). Begin pumping cement. Weight between 14.2-15 lbs/gal. Rate is 1.7 bpm. A kink in dry cement feed hose caused weight to drop to 14 lbs/gal.

1725 – Stopped pumping to let weight build back up.
1726 – pumping resumed; Weight at 15.10 lbs/gal; Rate at 2.8 bpm
1729 – Rate at 3.6 bpm
1730 – Raised trimmy pipe about 10'; Rate at 4 bpm, Weight at 14.5 lbs/gal. Total of 40 barrels pumped
1734 – Rate at 3.2 bpm, weight at 14.31 lbs/gal. Total of 47 barrels pumped.
1735 – Pumping finished; Total is 52.6 barrels. Final pressure inside casing is 30 psi.
1738 – flush out trimmy pipe. Pumped 1 barrel, raised trimmy pipe 7' and pumped 5 more barrels.
1741 – finished stage 2, contractors disconnecting hoses

1745 – Shamus English off site.

Recorded By: Shamus English

Date: 6/18/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/19/07	Day of Week: Tuesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Pour 3rd and final Stage of Cement

1130 – Shamus English on site. Trimmy pipe set down backside of borehole annulus to a depth of 310' bls. Stage 1 cementing event fill annulus from 414' to 311' bls. Cement will contain 6% bentonite.

** Observed bit that will be used for reverse air drilling (14 ¾" tricone bit).

1224 – Begin pumping pre-flush
1229 – Pre-flush halted at 18.63 barrels. Pony motor for hydraulics (on cement mixing unit) cut out.
1239 – Everything shut down until Pony motor is repaired
1331 – Equipment running again, was just a fuse.
1335 – Pre-flush resumed
1337 – Pre-flush finished. Total of 26 barrels.
1346 – Begin pumping cement into borehole annulus
1359 – Pumping halted
1424 – Raised trimmy pipe and removed one section of pipe

*** Dave Webb Sr. informed me that I could not stand on cement mixing rig where control display is located unless LBFH provided him with a letter explaining that he is not responsible.
1440 – Pumping cement resumed Weight at 12.37 lbs/gal; Rate at 2.7 gpm; Total is 46 barrels. These values were read to me by contractor.
1456 – Pressure inside casing at 20 psi.
1458 – Pumping halted due to clog in line.
1519 – Pumping resumed
1531 – Cement at surface. Discharge color changed from light gray to dark gray. 110 total barrels pumped. Final pressure inside casing at 10 psi. Weight varied between 13.4-14 lbs/gal; Rate varied between 3-4 bpm. These values were given to me by contractor after cement had reached surface.

1545 – Shamus English off site.

Recorded By: Shamus English

Date: 6/19/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/26/07	Day of Week: Tuesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-3 from 890' to 1,250' bls

1350 – Shamus English on site. Dana Webb and Marcel tripping down borehole at T.O.A. Bit size 11" per Michael Bennett

*** At approx. 500' bls reached an obstruction in borehole and could not proceed further without reaming borehole. Called Michael Bennett to get details on previous well construction. Was informed by Michael Bennett that the caliper log from initial well construction described the bore hole as having no openings less than 12" in diameter. Advised contractors to ream this section of the borehole very slowly as it would not take much to get past this section. Easily got past this obstruction with minimal effort.

1800 – Tagged down at 887' below platform level (bpl). Platform level approx. 5' above land surface.

1817 – Water sample collected at 887' bpl. Using Hanna instruments HI 9835 and HI 98127, pH=10.0, temp.=26.2°C, conductivity = 1439µS.

1945 – Drill pipe keeps getting clogged. Driller (Dana Webb) keeps lifting Kelly and dropping then applying brake (Juking) to dislodge clog.

2000 – Shamus English off site.

Recorded By: Shamus English

Date: 6/26/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/26/07	Day of Week: Tuesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Reverse air drilling to 1,250' bls

1015 – Shamus English on site. Was informed that PVC was coming up with the cuttings. Depth at about 705' bls. Will perform video survey and caliper log to see why PVC is coming up.
1100 – Lowering video survey tool down borehole..
1107 – Video tool at 100' bls, Can't see anything
1123 – Stopped at 570' bls. Letting camera cool down.
1129 – The camera is rotated 360', the PVC is cracked from 596' to 599' bls.
1205 – Raising video survey tool
1220 – Connecting caliper tool
1250 – Lowering caliper tool down borehole at about 80 ft/min.
1303 – T.D. at 693.7' bls. Raising caliper tool up borehole recording caliper log.

Depth	X-cal (in)	Y-cal (in)
690	39	33
680	32	27
670	25	22
660	25	25
650	26	26
640	25	24
630	24	22
620	22	21
610	21	20
600	17	23
Casing	16.1	15.4

1325 – Shamus English off site.

Recorded By: Shamus English

Date: 6/26/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/27/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth: 890'	Ending Depth: 974'	Bit Size: 11"	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-3 from 890' to 1,250' bls

0800 – Shamus English on site. Dana Webb and Marcel onsite at T.O.A. Depth at about 890' bpl. Rig operator is Dana Webb.
1000 – Drill pipe keeps getting clogged. Driller (Dana Webb) keeps lifting Kelly and dropping then applying brake (Juking) to dislodge clog. Depth at about 891' bpl.
1150 – Kelly down, drilling halted at 910' bpl.
1201 - Water sample collected at 910' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.15, Temp.= 25.12°C, Conductivity = 2069µS, TDS = 1.345 g/L.
1331 – Drilling resumed at 910' bpl.
1534 – Kelly down, drilling halted at 941' bpl.
1545 - Water sample collected at 941' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.11, Temp= 25.16°C, Conductivity = 1748µS, TDS = 1.135 g/L.
1630 – Drilling resumed at 941' bpl.
1705 – Depth at 945' bpl
1737 – Depth at 950' bpl
1756 – Depth at 955' bpl
1808 – Depth at 960' bpl
1822 – Depth at 965' bpl
1853 – Depth at 970' bpl
1910 – Kelly down, drilling halted at 974' bpl.
1920 - Water sample collected at 974' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.17, temp.= 24.88°C, conductivity = 1631µS, TDS = 1.060 g/L.

1930 – Shamus English off site.

Recorded By: Shamus English

Date: 6/27/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/28/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth: 974'	Ending Depth: 1028'	Bit Size: 11"	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-3 from 890' to 1,250' bls

0930 – Shamus English on site. Dana Webb and Marcel onsite at T.O.A. Depth at 989' bpl. Rig operator has changed from Dana Webb to Marcel
1021 – Depth at 995' bpl
1139 – Depth at 1000' bpl
1153 – Kelly down, drilling halted at 1004' bpl.
1205 - Water sample collected at 1004' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.24, temp.= 25.04°C, conductivity = 1805µS, TDS = 1.173 g/L.
1245 – Drilling resumed at 1004' bpl.
1254 – Depth at 1005' bpl
1339 – Depth at 1010' bpl
1513 – Depth at 1015' bpl
1525 – Line clogged, drilling halted
1615 – Line unclogged, drilling resumed
1625 - Depth at 1020' bpl
1710 – Depth at 1025' bpl
1725 – Line clogged, drilling halted
1830 – Line unclogged, drilling resumed
1940 – Drilling halted for the day at 1028' bpl, Kelly down will be 1035' bpl

1945 – Shamus English off site.

Recorded By: Shamus English

Date: 6/28/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/29/07	Day of Week: Friday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth: 1028'	Ending Depth: 1090'	Bit Size: 11"	Weather: Warm & Cloudy

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-3 from 890' to 1,250' bls

0800 – Shamus English on site. Dana Webb and Marcel onsite at T.O.A. Depth at 1030' bpl. Rig operator is Marcel
0903 – Kelly down, drilling halted at 1035' bpl.
0914 - Water sample collected at 1035' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.2, temp.= 24.48°C, conductivity = 1715µS, TDS = 1.115 g/L.
1000 – Drilling resumed at 1035' bpl.
1027 – Depth at 1050' bpl
1130 – Depth at 1060' bpl
1255 – Kelly down, drilling halted at 1065' bpl.
1310 - Water sample collected at 1065' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.22, temp.= 24.90°C, conductivity = 1718µS, TDS = 1.117 g/L.
1315 – Temporarily left site, Michael Bennett on site
1327 - Drilling resumed at 1065' bpl. Per Michael Bennett
1534 - Depth at 1075' bpl
1634 - Depth at 1080' bpl
1647 - Depth at 1085' bpl
1807 - Depth at 1090' bpl
1835 – Line clogged, drilling halted
1915 – Removing Kelly from drill pipe, contractors are making changes to rig, discharge line to go directly from swivel at top of Kelly to settling tank with 5" hose.

1930 – Shamus English off site.

Recorded By: Shamus English

Date: 6/29/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 06/30/07	Day of Week: Saturday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth: 1090'	Ending Depth: 1135'	Bit Size: 11"	Weather: Warm & Cloudy

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-3 from 890' to 1,250' bls

0815 – Shamus English on site. Dana Webb and Marcel onsite at T.O.A. Depth at 1092' bpl. Rig operator is Marcel
0907 – Depth at 1095' bpl
0947 – Kelly down, drilling halted at 1097' bpl.
0955 - Water sample collected at 1097' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.2, Temp.= 25.17°C, Conductivity = 1675µS, TDS = 1.089 g/L.
1010 – Temporarily left site
1136 – Depth at 1105' bpl
1203 – Depth at 1110' bpl
1217 – Depth at 1115' bpl
1237 – Depth at 1120' bpl
1247 – Kelly down, drilling halted at 1127' bpl.
1254 - Water sample collected at 1065' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.16, Temp = 25.31°C, Cnductivity = 1658µS, TDS = 1.077 g/L.
1255 – Contractors switching out discharge hose on rig at FB-3 with discharge hose on rig at FA-7. Dave Webb Sr. informed me that this should take about 20 minutes (actually took 2.75 hours).
1543 – Adding next drill pipe.
1610 - Drilling resumed at 1127' bpl
1623 - Depth at 1130' bpl
1747 - Depth at 1135' bpl
1800 – Temporarily left site
1835 – Returned to site, Contractors had left the site for the day

1835 – Shamus English off site.

Recorded By: Shamus English

Date: 6/30/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/01/07	Day of Week: Sunday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth: 1135'	Ending Depth: 1200'	Bit Size: 11"	Weather: Warm & Cloudy

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-3 from 890' to 1,250' bls

0804 – Shamus English on site. Dana Webb, Paul and Marcel onsite at T.O.A. Depth at 1147' bpl. Rig operator is Marcel
0819 – Depth at 1150' bpl
0835 – Kelly down, drilling halted at 1158' bpl.
0843 - Water sample collected at 1158' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.28, temp.= 25.07°C, conductivity = 1601µS, TDS = 1.039 g/L.
0910 – Drilling resumed at 1158' bpl.
0952 – Depth at 1165' bpl
1016 – Depth at 1170' bpl
1046 – Depth at 1175' bpl
1111 – Depth at 1180' bpl
1116 – Depth at 1185' bpl
1120 – Kelly down, drilling halted at 1188' bpl.
1129 - Water sample collected at 1188' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.24, temp.= 25.45°C, conductivity = 1588µS, TDS = 1.032 g/L.
1155 – In the process of joining Kelly to next pipe joint the air line dropped to bottom of borehole. Contractors will have to trip up borehole until they get to air line at about 360' bls.
1532 – Drilling resumed at 1188' bpl.
1555 - Depth at 1190' bpl
1650 - Depth at 1195' bpl
1730 – Depth at 1200' bpl, drilling halted. Contractors knocking well down (adding salt)

1800 – Shamus English off site.

Recorded By: Shamus English

Date: 7/01/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/02/07	Day of Week: Monday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth: 1200'	Ending Depth: 1250'	Bit Size: 11"	Weather: Warm & Cloudy

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-3 from 890' to 1,250' bls

0804 – Shamus English on site. Dana Webb and Marcel onsite at T.O.A. Depth at 1250' bpl.
*** Water sample collected by contractor at 1219' bpl (approx. 1945 on 7/1/07) Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.09, conductivity = 1559µS, TDS = 1.013 g/L.. Temperature not measured at the time sample was collected.
0835 - Water sample collected at 1250' bpl. Using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.09, Temp.= 25.07°C, Conductivity = 1601µS, TDS = 1.039 g/L.

0900 – Shamus English off site.

Recorded By: Shamus English

Date: 7/02/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/7/07	Day of Week: Saturday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 785'	Ending Depth: 840'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling FA-7

1100 – Shamus English on site. Depth at 785' bpl. Kelly down will be at 795' bpl. PVC evident in sample collected at 785'
1124 – Depth at 790'
1154 – Kelly down, drilling halted at 795'
1205 – Water Sample collected @ 795' bpl
Temp-25.23°C pH-8.20 cond.-1397µS/cm TDS-0.906 g/l
1239 – Drilling resumed at 795' bpl
1257 – Depth at 800'
1310 – Depth at 805'
1323 – Depth at 810'
1335 – Depth at 815'
1352 – Depth at 820'
1435 - Kelly down, drilling halted at 825'
1444 – Water Sample collected @ 825' bpl
Temp-24.98°C pH-8.14 cond.-1455µS/cm TDS-0.944 g/l
1509 – Drilling resumed at 825'
1543 – Backhoe pierced a hole in settling tank. Water flooding site. Drilling halted at about 830'
1830 – Drilling halted for the day at about 840'

1830 – Shamus English off site.

Recorded By: Shamus English

Date: 7/7/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/8/07	Day of Week: Sunday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 857'	Ending Depth: 921'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling FA-7

0825 – Shamus English on site. Kelly down at time of arrival (857').
0830 – Water Sample collected @ 857' bpl
Temp-25.40°C pH-8.20 cond.-1471µS/cm TDS-0.956 g/l
0958 – Drilling resumed at 857' bpl
1151 – Depth at 880'
1333 – Depth at 885'
1408 - Kelly down, drilling halted at 888'
1415 – Water Sample collected @ 888' bpl
Temp-24.98°C pH-8.14 cond.-1455µS/cm TDS-0.944 g/l
1457 – Drilling resumed at 888'
1506 – Depth at 890'
1523 – Depth at 895'
1554 – Depth at 900'
1615 – Depth at 905'
1628 – Depth at 910'
1640 – Depth at 915'
1711 – Kelly down, drilling halted at 921'
1718 – Water Sample collected @ 921' bpl
Temp-25.01°C pH-8.07 cond.-1537µS/cm TDS-0.998 g/l
1745 – Contractor's dropped air line down borehole. Will have to trip up about 350' to retrieve line

1750 – Shamus English off site.

Recorded By: Shamus English

Date: 7/8/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/9/07	Day of Week: Monday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 921'	Ending Depth: 983'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling FA-7

0852 – Shamus English on site. Contractor's tripping back down hole after retrieving air line.
0935 – Drilling resumed at 921'
1002 – Depth at 925'
1055 – Depth at 930'
1127 – Drilling halted for lunch
1142 – Drilling resumed at 933'
1157 – PVC coming up with cuttings
1214 – Depth at 935'
1228 – Depth at 940'
1250 – Depth at 945'
1306 – Depth at 950'
1313 – Kelly down, drilling halted at 952'
1320 – Water Sample collected @ 952' bpl
Temp-25.24°C pH-8.66 cond.-1557µS/cm TDS-1.011 g/l
1328 – After turning compressor on, so much pressure came through the line it caused the goose neck to detach from settling tank. Will have to be welded before drilling can continue.
1453 – Drilling resumed at 952' bpl. PVC coming up with cuttings.
1542 – Depth at 955'
1551 – Depth at 960'
1558 – Depth at 965'
1611 – Depth at 970'
1814 – Kelly down, drilling halted at 983'
1821 – Water Sample collected @ 983' bpl
Temp-25.08°C pH-8.25 cond.-1617µS/cm TDS-1.055 g/l

1750 – Shamus English off site.

Recorded By: Shamus English

Date: 7/9/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/10/07	Day of Week: Tuesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 983'	Ending Depth: 1156'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling FA-7

1030 – Shamus English on site. Depth at 1038'
1035 – Depth at 925'
1040 – Water sample collected by contractor's this morning at 0840 (**1015' bpl**)
pH-8.13 cond.-1610µS/cm TDS-1.050 g/l
1059 – Kelly down, drilling halted at 1046'
1104 – Water Sample collected @ 1046' bpl
Temp-26.24°C (waited too long to take reading) pH-8.26 cond.-1602µS/cm TDS-1.041 g/l
1104 – Water Sample collected @ 1046' bpl
Temp-25.11°C pH-8.20 cond.-1597µS/cm TDS-1.038 g/l
1125 – Drilling resumed at 1046' bpl.
1127 – Drilling halted for lunch
1146 – Drilling resumed at 1046' bpl.
1204 – Depth at 1050'
1222 – Depth at 1055'
1240 – Depth at 1060'
1249 – Depth at 1065'
1258 – Depth at 1070'
1324 – Kelly down, drilling halted at 1076'
1333 – Water Sample collected @ 1076' bpl
Temp-25.18°C pH-8.12 cond.-1619µS/cm TDS-1.052 g/l
1353 – Drilling resumed at 1076'
1411 – Depth at 1080'
1427 – Depth at 1085'
1451 – Depth at 1100'
1514 – Kelly down, drilling halted at 1108'
1523 – Water Sample collected @ 1108' bpl
Temp-25.18°C pH-8.03 cond.-1669µS/cm TDS-1.086 g/l
1539 – Drilling resumed at 1108'

1544 – Depth at 1110'
1551 – Drilling halted, air line lost pressure
1616 – Drilling resumed
1626 – Depth at 1115'
1636 – Depth at 1120'
1655 – Depth at 1125'
1700 – Drilling halted, operator taking break
1717 – Drilling resumed
1731 – Depth at 1130'
1745 – Depth at 1135
1748 – Kelly down, drilling halted at 1139'
1755 – Water Sample collected @ 1139' bpl
Temp-25.16°C pH-8.11 cond.-1642µS/cm TDS-1.067 g/l
1820 – Drilling resumed at 1139'
1847 – Depth at 1145'
1854 – Depth at 1150'
1925 – Depth at 1155'
1935 – Drilling haltedfor the day at 1156'

1750 – Shamus English off site.

Recorded By: Shamus English

Date: 7/10/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/11/07	Day of Week: Tuesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Warm & Cloudy

ACTIVITY:

DESCRIPTION OF WORK: Acidize Well FB-3 (Stage 2)

1555 – Michael Bennett on site
1605 – Pressurized system with water to determine potential leaks or loose connections.
1613 – Started to pump 32% HCL acid.
618 – 1,000 gallons of acid pumped. Pressure at well head 0 psi
1625 – 2,000 gallons of acid pumped. Pressure at well head 15 psi
1630 – Pressure at well head 25 psi
1632 – Stopped pumping acid. Pumped a total of 2,500 gallons of acid.
1635 – Started pumping water backside (500 gallons)
1637 – Finished pumping chase water (500 gallons)
1650 – Pressure at well head 35 psi
1700 – Pressure at well head 37 psi
1705 – Pressure at well head 40 psi
1715 – Pressure at well head 40.5 psi
1722 – Pressure at well head 41 psi
1730 – Pressure at well head 41 psi

1730 – Michael Bennett off site.

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/11/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 1156'	Ending Depth: 1170'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling FA-7

0900 – Shamus English on site. Depth at 1162'
0935 – Depth at 1165'
1032 – Kelly down, drilling halted at 1170'. Loud noise came from rig.
140 – Water Sample collected @ 1170' bpl
Temp-25.21°C pH-8.12 cond.-1619µS/cm TDS-1.052 g/l
*** Drive shaft on drill rig broke. Tony (All Webbs) taking it to machine shop to be repaired; says it should be fixed later this afternoon
1145 – Tony returned to site and explained that drive shaft would not be repaired until late today or tomorrow.
1200 – Shamus English off site

1755 – Michael Bennett on site. Adding next section of drill pipe. Depth at 1170' bls
1810 – Drilling resumed at 1170' bls
1905 – Drilling halted for the day at 1173' bls
1910 – Michael Bennett off site.

Recorded By: Shamus English

Date: 7/11/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/12/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth: 1170'	Ending Depth: 1250'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling FA-7

0900 – Shamus English on site. Depth at 1195'
1000 – Kelly down, drilling halted at 1201'.
1008 – Water Sample collected @ 1201' bpl
Temp-25.18°C pH-8.16 cond.-1432µS/cm TDS - 0.931 g/l
1029 – Drilling resumed at 1201'
1103 – Depth at 1210'
1236 – Depth at 1220'
1305 – Depth at 1225'
1420 – Kelly down, drilling halted at 1232'.
1428 – Water Sample collected @ 1232' bpl
Temp-25.20°C pH-8.05 cond.-1554µS/cm TDS – 1.009 g/l
1504 – Drilling resumed at 1232'
1515 – Depth at 1235'
1545 – Depth at 1240'
1626 – Depth at 1250' finished drilling FA-7 well
1638 – Water Sample collected @ 1232' bpl
Temp-25.22°C pH-8.12 cond.-1550µS/cm TDS – 1.006 g/l

1700 – Shamus English off site.

Recorded By: Shamus English

Date: 7/12/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/14/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Geophysical Logging FA-7

Temp/Fluid Res. Log (static & dynamic)

0830 – Shamus English on site. E-tool had been lowered down borehole prior to my arrival. E-tool at bottom of borehole (reading 1265' bpl). Preparing to raise tool up hole recording repeat pass (static conditions) at 30 ft/min.
0849 – Tool at 1100', sending tool back down to bottom for main pass (static conditions).
0854 – Tool at bottom, Preparing to raise tool up hole for main pass (static conditions) at 30 ft/min
0918 – Tool at 500' bpl, recording main pass (static) finished. Preparing to send tool back down hole to log under dynamic conditions
0933 – Tool at bottom, preparing to raise tool up hole recording repeat pass (dynamic conditions) at 30 ft/min
0939 – Tool at 1100', sending tool back down to bottom for main pass (dynamic conditions).
0943 – Tool at bottom, Preparing to raise tool up hole for main pass (dynamic conditions) at 30 ft/min
1008 – Stopped recording. Temp/Fluid Res. Log complete. Raising tool to surface.
1013 – As tool reached top of stand pipe, a tangle was observed in cable. This caused depth reading to show higher reading than it actually is, so bottom of hole is less than 1265' bpl

Gamma/Flow Log (static & dynamic)

1029 – Lowering gamma/flow tool down borehole
1034 – Tool at 150' bpl. Lowering tool down hole recording main pass (dynamic conditions) at 30 ft/min
1113 – Tool at bottom, reading 1243' + 5.5' (tool) = 1249'bpl. Preparing to raise tool up borehole.
1117 – Tool at 1100'. Preparing to lower tool down hole recording repeat pass (dynamic conditions)
1120 – Tool at bottom. Preparing to raise tool up borehole and perform logs under static conditions
1129 – Tool at 500' bpl. Preparing to send tool down hole recording main pass (static conditions)
1156 – Tool at bottom. Preparing to raise tool up hole for repeat pass
1159 – Tool at 1100' bpl. Preparing to send tool to bottom recording repeat pass (static conditions)
1204 – Tool at bottom. Raising tool to surface. Gamma/Flow Log complete.

Caliper Log

1233 – Lowering caliper tool down borehole
1300 – Tool at bottom, reading 1254' bpl. Preparing to raise tool up borehole recording main pass at 30 ft/min

1350 – Tool at 10' bpl. Main pass complete. Preparing to send tool down hole to perform repeat pass
1411 – Tool at 850'. Preparing to raise tool up hole recording repeat pass.
1419 – Tool at 700', repeat pass complete, recording stopped. Caliper log complete. Preparing to raise tool to surface.

Dual Induction Log

1442 – Lowering Dual Induction tool down borehole.
1455 – 1521 Tool keeps getting caught on a ledge at about 600' (We will see why when conducting video survey)
1531 – Tool at bottom. Preparing to raise tool up borehole recording repeat pass at 30 ft/min
1537 – Tool at 1100' Preparing to lower tool to bottom to perform main pass
1541 – Tool at bottom. Preparing to raise tool up borehole recording main pass at 30 ft/min
1615 – Tool at surface. Dual Induction Log complete

Video Survey

1659 – Lowering Video survey tool down borehole
*** Casing ended at 576' bpl, appears that one length of casing is missing
*** Small piece of casing observed from 595'-600'
1729 – Tool at bottom. Preparing to raise tool up borehole recording
1810 – Video Survey tool at surface.
1930 – Received Field logs and DVD of video survey from Dominick (All Webbs)

1930 – Shamus English off site.

Recorded By: Shamus English

Date: 7/14/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/17/07	Day of Week: Tuesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 0'	Ending Depth: 41'	Bit Size: 36"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: WELL DRILLING FA-9 (0'-100' w/ 36" augur bit)

0830 – Shamus English on site. Drilling to commence shortly.
0845 – Testing drill rig 0'-1' bls
0855 – Leveling up kelly
0900 – Drilling Commenced
0905 – Drilling halted; cable on rig is twisting. Swivel is not spinning; contractors will have to lay the mast down and extend the kelly so they can grease swivel.
1007 – Drilling resumed
1330 – Depth at 15' bls
1410 – Depth at 20' bls
1447 – Depth at 25' bls
1605 – Depth at 30' bls
1747 – Depth at 35' bls
1906 – Depth at 40' bls
1930 – Drilling halted for the day at about 41' bls

1940 – Shamus English off site.

Recorded By: Shamus English

Date: 7/17/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/18/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: WELL DEVELOPMENT FB-3

1300 – Shamus English on site. Well development to commence shortly
1401 – Well development Commenced @ 1750 gpm
1404 – Pumping at a rate of 2000 gpm. Rossum sand tester attached to well head.
1414 – Started sand test
1415 – Rossum sand tester (RST) at .8 ml after 1 min
1420 – Pumping at a rate of 2100 gpm
1442 – Started sand test
1519 – Rossum sand tester (RST) at 3 ml after 37 mins. Pumping at a rate of 2150 gpm
1542 – Rossum sand tester (RST) at 4 ml after 1 hour. Pumping at a rate of 2150 gpm

1600 – Shamus English off site.

Recorded By: Shamus English

Date: 7/18/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/18/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 41'	Ending Depth: 87'	Bit Size: 36"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: WELL DRILLING FA-7 (0'-100' w/ 36" augur bit)

0800 – Shamus English on site. Drilling to commence shortly. Contractors performing rig maintenance at T.O.A.
0835 – Drilling Commenced @ 41' bls
0930 – Shamus English off site to go to FB-3 site (Well development to start at FB-3 today)
1045 – Back on site FA-9, contractors had a problem after I left and are at about 44' bls
1103 – Depth at 45' bls
1112 – Depth at 50' bls
1130 – Depth at 55' bls, drilling halted for lunch
1154 – Drilling resumed
1217 – Depth at 60' bls
1250 – Shamus English off site to go to FB-3 site, will be traveling back and forth between FA-9 and FB-3. Contractors to collect samples in my absence
1645 – Depth at 70' bls
1730 – Depth at 75' bls
1915 – Depth at 85' bls
1945 – Drilling halted for the day at about 87' bls

2000 – Shamus English off site.

Recorded By: Shamus English

Date: 7/18/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/19/07	Day of Week: Thusrday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-3	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: WELL DEVELOPMENT FB-3

0838 – Shamus English on site. Pump started just minutes prior to my arrival. Developed well last night until 1945. Vial on Rossum sand tester had been cleaned out and reattached at 0800
0845 – Rossum sand tester (RST) at 1.4 ml after 45 mins. Pumping at a rate of 2350 gpm
0900 – Rossum sand tester (RST) at 1.5 ml after 1 hour. Pumping at a rate of 2400 gpm. Pocket PC reads a depth of 27.977'.
0915 – Rossum sand tester (RST) at 1.6 ml after 1 hour 15 mins. Pumping at a rate of 2350 gpm. Pocket PC reads a depth of 27.169'.
0930 – Rossum sand tester (RST) at 1.7 ml after 1 hour 30 mins. Started sand test.
0935 – Totalizer reads 5902
1000 – Rossum sand tester (RST) at .2 ml after 25 mins. Pocket PC reads a depth of 26.809'.
1005 – Totalizer reads 5976 Pumping at a rate of 2467 gpm (76-2=74 * 1000=74000 / 30 mins = 2,467 gpm)
1031 – Engine cut off, out of gas
1102 – Started sand test
1103 – Totalizer reads 6057. Pocket PC reads a depth of 27.846'.
1132 – Rossum sand tester (RST) at .3 ml after 30 mins
1133 – Totalizer reads 6130. Pumping at a rate of 2433 gpm (130-57=73 * 1000=73000 / 30 mins = 2,433 gpm)
1202 – Rossum sand tester (RST) at .4 ml after 1 hour
1203 – Totalizer reads 6202. Pumping at a rate of 2400 gpm
1232 – Rossum sand tester (RST) at .45 ml after 1 hour 30 mins
1233 – Totalizer reads 6275. Pumping at a rate of 2433 gpm
*** **Michael Bennett on site to perform specific capacity test/ Shamus English off site**

1240 – Michael Bennett on site
1405 – Manometer at 9'8"
1435 – Manometer at 11' 10"
1450 – Manometer at 11' 10"

Step 1 – 500 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1500	0	44.988	64477	700	500	11'10"
1505	5	42.650	64480	"	"	9'4"
1510	10	42.300	64483.5	"	"	9'3"
1515	15	43.612	64485.5	"	"	9'3"
1520	20	42.791	64488.5	"	"	9'2½"
1525	25	43.138	64491.5	"	"	9'2½"
1530	30	43.083	64494	"	"	9'2½"
1535	35	43.266	64497.5	"	"	9'2½"
1540	40	43.754	64501	"	"	9'3"
1545	45	42.839	64503.5	"	"	9'3"
1550	50					
1555	55	43.235	64508	"	"	9'3"
1600	60	42.967	64512	"	"	9'3"
			583 gpm			

Step 2 – 1,000 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft
1600	0	42.967	64512	1,000	1,000	9'3"
1605	5	40.354	64518	1,000	1,000	6'8"
1610	10	40.865	64523	"	"	6'6"
1615	15	39.963	64528	"	"	"
1620	20	40.554	64536	"	"	"
1625	25	40.871	64540	"	"	"
1630	30	39.945	64545	"	"	"
1635	35	40.183	64550	"	"	"
1640	40	40.085	64556	"	"	"
1645	45	40.207	64562	"	"	"
1650	50	40.475	64567	"	"	"
1755	55	40.103	64574	"	"	"
1700	60	40.402	64577	"	"	6'6"
			1058 gpm			

Step 3 – 1,500 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1700	0	40.402	64577	1,300	1,500	6'6"
1705	5	37.087	64587	1,300	1,500	2'3"
1710	10	36.272	64594	"	"	2'3"
1715	15	36.528	64600	"	"	2'3"
1720	20	35.754	64610	"	"	2'3"

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1725	25	36.058	64618	"	"	2'3"
1730	30	36.126	64626	"	"	2'2"
1735	35	36.332	64635	"	"	2'2"
1740	40	36.528	64642	"	"	2'2"
1745	45					
1750	50	36.259	64657	"	"	2'2"
1755	55	35.900	64666	"	"	2'2"
1800	60	36.168	64673	"	"	2'2"
			1600 gpm			

Step 4 – 2,000 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1800	0	36.168	64673	1,700	2,000	N/A
1805	5	31.134	64683	"	"	"
1810	10	31.092	64695	"	"	"
1815	15	31.171	64706	1,700	2,000	N/A
1820	20	31.159	64716	"	"	"
1825	25	30.898	64726	"	"	"
1830	30	31.032	64736	"	"	"
1835	35	31.257	64747	"	"	"
1840	40	31.324	64757	"	"	"
1845	45	31.202	64771	1,700	2,000	N/A
1850	50	31.141	64777	"	"	"
1855	55	31.330	64788	"	"	"
1900	60	31.038	64798	"	"	"
			2083 gpm			

Flow Meter Information: Item-M0312, Serial #07-04717

Same Hawthorn green clay in Rossum tube at 1500 and 2000 gpm

Recovery

Elapsed Time	Water Lvl Reading	Manometer Reading
0	31.038	-
5	44.545	10'7"
10	44.679	10'9"
15		
20	44.903	11'1"
25	44.994	11'2"
30	45.035	11'3"
35		
40		11'3½"

1945 – Michael Bennett off site.

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/19/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 84'	Ending Depth: 100'	Bit Size: 36"	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: WELL DRILLING FA-7 & CEMENT STEEL CASING

0800 – Shamus English on site. Drilling commenced just prior to my arrival. Depth at 84' due to fallout overnight
0825 – Depth at 85' bls
0930 – Shamus English off site to go to FB-3 site (to check on well development)
1318 – Contractors setting steel casing. Casing not fitting in borehole very well.
1808 – Cement (bulk unit) truck arrived on site. Trimmy Pipe set at 87' 11" (29' 5" + 27' 10" + 30' 8" = 87' 11")
1855 – Commenced pumping cement around steel casing (start with pre-flush)

1925 – Shamus English off site.

Recorded By: Shamus English

Date: 7/19/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/23/07	Day of Week: Monday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 93'	Ending Depth: 297'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: WELL DRILLING FA-9

0900 – Shamus English on site. Depth at 93.88'. Kelly down at TOA. Mick (All Webbs) explained that they started drilling plug yesterday and had problems with shell shaker almost immediately. He is unsure where they tagged or how far they drilled. Dave Webb Jr. arrived later in the day (15:45) and said the top of the plug was at 92' bls. Drilling has not started today.
0915 – Adding collar
1100 – Drilling commenced at 93.88' bls
1130 – Kelly down, drilling halted at 111' bls. Adding another collar.
1206 – Drilling resumed
1249 - Kelly down, drilling halted at 141' bls. Adding another collar.
1415 – Drilling resumed
1423 – Depth at 145' bls
1433 – Depth at 150' bls
1441 – Depth at 155' bls
1451 – Depth at 160' bls
1508 – Depth at 165' bls
1521 - Kelly down, drilling halted at 171' bls
1619 – Drilling resumed @ 171' bls
1630 – Depth at 175' bls
1648 – Depth at 180' bls
1650 – Drilling halted, Clay causing screen on primer to clog
1701 – Drilling resumed
1725 – Depth at 190' bls
1741 – Depth at 195' bls
1755 – Kelly down, drilling halted at 202.5'bls. Lightning storm-drilling halted until storm passes
1930 - Drilling resumed @ 202.5' bls
1954 – Depth at 215' bls
2001 – Depth at 220' bls
2039 - Kelly down, drilling halted at 234' bls
2120 – Drilling resumed @ 234' bls
2140 – Depth at 240' bls

2150 – Depth at 250' bls
2218 – Depth at 260' bls
2224 - Kelly down, drilling halted at 265' bls
2243 - Drilling resumed @ 265' bls
2247 – Depth at 270' bls
0019 - Kelly down, drilling halted at 296.71' bls. Contractors have to pump out mud tank and refill, will take approx. 1.5 hours.

0030 – Shamus English off site.

Recorded By: Shamus English

Date: 7/23/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/24/07	Day of Week: Tuesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 358'	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: WELL DRILLING FA-9

0730 – Shamus English on site. Depth at 358'. Drilling has not started today. Contractors worked last night until 5:00 am.
0839 – Upon adding next section of drill pipe, the clamp holding the drill string came loose and dropped the pipe string down borehole; will have to be fished out.
1122 – Drill string reconnected to Kelly.
1128 – Drilling commenced
1141 – Depth at 360' bls
1219 – Depth at 375' bls
1253 – Depth at 380' bls
1312 – Depth at 385' bls
1324 - Kelly down, drilling halted at 389.60' bls
1413 – Drilling resumed @ 390' bls
1433 – Depth at 395' bls
1612 – Depth at 400' bls
1805 – Depth at 405' bls
1844 – Drilling halted at 407' bls. Contractors pumping out mud tank & refilling. Also switching crew for the night shift. Dana Webb is operator
2000 – Steve Fowler (LBFH) arrived onsite to oversee night shift.

2030 – Shamus English off site.

Recorded By: Shamus English

Date: 7/24/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/25/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-4	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: ACIDIZATION (STAGE 1)

1435 – Michael Bennett on site
Initial flowing condition readings:
Manometer – 6'5" above pad level with flow meter reading 1,100 gpm
Shut in static artesian head reading – 13'2" above pad level, approx 20 mins after being shut in.
4,800 gallons of 32% HCL acid in storage tank w/ 2 gallons on inhibitor
Injection Line set at 625-feet below top of flange

1525 – Began pumping acid at 200 gpm @ 150 psi.
1537 – Stopped pumping acid – pumped a total of 2,400 gallons today
1545 – Pressure at well head 0 psi
1605 – Pressure at well head 0 psi
1610 – Manometer reading 12'3"
1620 – Manometer reading 12'5"
1625 – Manometer reading 12'9"
1632 – Manometer reading 13'0"
No significant pressure build up at well head after 1 hour.

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/25/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 457'	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: WELL DRILLING FA-9

0715 – Shamus English on site. Dana Webb is operator @ TOA. Contractors worked through the night. Depth at 457'. Drilling has not started today. Contractors worked last night until 5:00 am. Mud pit has been breached and drilling fluid is all over the ground.
0749 – Drilling halted at 459' bls. Site will have to be cleaned up, vac trucks needs to pump out mud pit, & mud tank needs to be pumped out and refilled.
1421 – Drilling resumed @ 459' bls
1930 – Alex (LBFH) arrived onsite to oversee night shift.
1953 – Kelly down drilling halted at 483'
2016 – Drilling resumed at 483'
2020 – Depth at 485'

2045 – Shamus English off site.

Recorded By: Shamus English

Date: 7/25/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/26/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-4	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: ACIDIZATION (STAGE 2)

1037 – Began pumping acid at about 165 psi.
1050 – Acid pumping halted, still about 200 gallons left, pressure at well head is 0 psi,
1054 – Acid pumping resumed at about 170 psi
1058 – Acid pumping finished, pressure at well head 0 psi
1103 – Pumping water-backside
1110 – Stopped pumping water. Pressure at well head 0 psi
1130 – Pressure at well head 0 psi
1145 - Pressure at well head 0 psi

1145 – Shamus English off site.

Recorded By: Shamus English

Date: 7/26/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/26/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Geophysical Logging & Set PVC Casing from 0-615' bls

0830 – Shamus English on site. Contractors performing wiper run.
0840 – Left FA-9 site to go to FB-4. Acidization of well FB-4 will be performed today.
0900 – Back at FA-9. Noticed that we only have 600 feet of casing but we need 615'-620'; Informed Dave Webb Sr. that we needed an additional section of casing.
1000 – Left FA-9 for FB-4
1330 – On site FA-9. Contractors breaking and removing collars. Geophysical Logging to be performed after drill string is removed from borehole.
*** **PVC Casing - Certainteed 17.4" Certa-Lok Well Casing IC-1 PVC SDR 17 Class 250 ASTM F480 SE B 05-03-07 B W5 NSF-WC 8:58 PM 657214**
1452 – Removing last collar and bit from borehole

Gamma/Flow Log (static & dynamic)

1519 – Lowering gamma/flow tool down borehole @ 30 ft/min
1548 – Tool at bottom 620'bls. Preparing to raise tool up borehole for repeat pass.
1550 – Tool at 428'. Preparing to lower tool back down hole.
1557 – Tool at bottom. Preparing to raise tool up borehole loggibg main pass
1612 – Tool at 100' bls; recording stopped
1615 – Tool at surface; removing tool from borehole.

Caliper Log

1644 – Calibrating tool to 15 ¼", Y caliper reads 15.2", X caliper reads 27.1" (problem with tool)
1702 – Contractor servicing tool
1720 – Calibrating tool to 15", Y caliper reads 17.9", X caliper reads 16.2"
Calibrating tool to 15 ¼", Y caliper reads 15.3", X caliper reads 14.9"
Calibrating tool to 27 ¼", Y caliper reads 27.1", X caliper reads 27.4"
Adjusted calipers to 27.1"
1738 – Lowering caliper tool down borehole
1749 – Tool at bottom, reading 621' bpl. Preparing to raise tool up borehole recording repeat pass at 30 ft/min
1807 – Tool at bottom. Preparing to raise tool up borehole recording main pass at 30 ft/min

1826 – Tool at 41' bpl. Main pass complete. Asked contractor to perform another repeat pass from 210' to 120' bpl.
1831 – Tool at 203', preparing to raise tool up hole recording another repeat pass to 130'.
1834 – Tool at 130'. Preparing to raise tool to surface.
1838 – Tool at sueface. Caliper log complete.

PVC Casing

Time	Casing #	Cumulative Length	Centralizers	Spline Set
2059	4	0'-20'	5'	X
2109	3	20'-40'	25'	X
2115	13	40'-60'	45'	X
2123	22	60'-80'		X
2126	21	80'-100'		X
2132	20	100'-120'	105'	X
2138	25	120'-140'		X
2142	23	140'-160'		X
2150	24	160'-180'		X
2155	5	180'-200'		X
2201	28	200'-220'	205'	X
2204	27	220'-240'		X
2207	26	240'-260'		X
2210	30	260'-280'		X
2213	29	280'-300'		X
2217	12	300'-320'	310'	X
2219	11	320'-340'		X
2228	8	340'-360'		X
2231	7	360'-380'		X
2235	6	380'-400'		X
2239	16	400'-420'	405'	X
2244	15	420'-440'		X
2249	14	440'-460'		X
2254	2	460'-480'		X
2257	1	480'-500'	490'	X
2309	10	500'-520'		X
2313	9	520'-540'		X
2319	19	540'-560'		X
2323	18	560'-580'		X
2331	17	580'-600'	585'	X
2346	31	600'-620'		X

2340 – Setting header on top section of casing
2349 – Finished setting PVC casing

2400 – Shamus English off site.

Recorded By: Shamus English

Date: 7/26/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/27/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Cement PVC Casing (1st Lift)

1115 – Shamus English on site. Contractors setting up for 1st lift of cement. Tremie pipe set at 591' bls. Pumping 45 barrels of cement today.
1239 – Started Pre-flush (20 barrels)
Problem with pressure getting cement into mixing tank.
1330 – problem was a pressure release valve was open, pumping pre flush again
1344 – Started pumping cement
1353 – Pressure inside casing at 0 psi.
1359 – 35 barrels of cement pumped
1403 – Finished pumping cement, total of 46 barrels. Pressure inside casing 0 psi. Flushing out pipe.
*** As per Dave Webb Sr., density of cement ranged from 15.2-15.6 lbs/gal
1416 – finished flushing

1445 – Shamus English off site.

Recorded By: Shamus English

Date: 7/27/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/28/07	Day of Week: Saturday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Cement PVC Casing (2nd Lift)

1100 – Shamus English on site. Contractors setting up for 2nd lift of cement. Depth at 420' bls from first stage of cement. Tremie pipe set at 419' bls. 1239 – Started Pre-flush (20 barrels)
1308 – Pre-flush started
1311 – Pre-flush finished (20 barrels)
1313 – Started pumping cement
1324 – Pumped 19 barrels. Density = 14.96 lbs/gal. Rate = 2.83 bpm.
1326 – Density at 15.01 lbs/gal
1327 – Pumped 28 barrels
1330 – Pumped 37 barrels. Density at 14.94 lbs/gal
1335 – Pumped 48 barrels.
1336 – Finished pumping cement, total of 52 barrels. As per Tony (All Webbs), density of cement ranged from 14.8-15.1 lbs/gal

1345 – Shamus English off site.

*** AWE pumped an additional 53 barrels of cement. A total of **105 barrels were pumped today.**

Recorded By: Shamus English

Date: 7/28/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 07/29/07	Day of Week: Sunday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Cement PVC Casing (3rd Lift)

0805 – Michael Bennett on site. Tagged cement at 95' from 2nd lift.
0820 - Started Pre-flush (20 barrels) water
0825 – Pre-flush finished (20 barrels)
0830 – Started pumping cement
0842 – Finished pumping cement, total of 49 barrels. Observed cement via discharge line. Density ranged from 14.82 to 15.08 lbs/gal.
0850 – Began pulling cement tubing
0900 – Finished pulling cement tubing
0930 – AWE plan to remove all mud rotary associated equipment and begin to set up for reverse air drilling.

0930 – Michael Bennett off site.

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/01/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 619'	Ending Depth: 702'	Bit Size:	Weather: Rainy

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling

0900 – Shamus English on site. Contractors setting up for reverse air drilling.
1109 – Reverse air drilling commenced. Tagged bottom at 619'. Should be about a 2' plug
1207 – Depth at 630'
1233 – Kelly down, drilling halted @ 640'
1301 – Drilling resumed at 640'
1315 – Off site, going to Palm City to get YSI
1420 – On site FA-9, Kelly down at time of arrival
1431 – Water sample collected at 671' bls,
Temp-25.17°C pH-8.04 cond.-1549 µS/cm TDS-1.005 g/l
1502 – Drilling resumed at 671'
1517 - Depth at 675'
1526 – Drilling halted at 678' bls due to lightning, Rig left circulating near bottom.
1617 – Drilling resumed at 678'
1621 – Drilling halted at 679'. Brake is too wet, keeps dropping.
1632 – Drilling resumed at 679'
1655 – Depth at 690'
1706 – Depth at 695'
1719 – Depth at 700'
1724 – Kelly down, drilling halted @ 702'
1731 - Water sample collected at 702' bls
Temp-24.86°C pH-8.27 cond.-1381 µS/cm TDS- .898 g/l
1740 – Drilling halted for the day

1745 – Shamus English off site.

Recorded By: Shamus English

Date: 8/01/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/02/07	Day of Week: Thursday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-4	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Rainy

ACTIVITY:

DESCRIPTION OF WORK: Well Development

1615 - Shamus English on site. Contractors preparing to turn pump, for development, on shortly.
1702 – Pump turned on.
1730 – Pumping about 2100 gpm
1737 – Rossum sand test (RST) started
1747 – RST at .9 after 10 mins.
1757 – RST at 1.4 after 20 mins

1805 – Shamus English off site.

Recorded By: Shamus English

Date: 8/02/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/02/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 702'	Ending Depth: 826'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling

0730 - Shamus English on site. Contractors performing rig maintenance, also have to change out the rubber boot at well head.
0930 – Raw water main is off. Contacted F.P. water plant to turn water on because contractors need it for circulation. Was informed that water is off because of a test on injection wells and probably will not be on for a couple of days.
0942 – Drilling commenced at 702'
0950 – Depth at 630'
1001 – Depth at 710'
1010 – Depth at 715'
1021 – Depth at 720'
1034 – Depth at 730'
1041 – Kelly down, drilling halted @ 733'
1052 - Water sample collected at 733' bls
Temp-25.22°C pH-8.07 cond.-1375 µS/cm TDS- .893 g/l
1116 – Drilling resumed at 733'
1124 – Depth at 735'
1147 – Depth at 745'
1156 – Depth at 750'
1204 – Depth at 755'
1214 – Depth at 760'
1221 – Kelly down, drilling halted @ 764'
1229 - Water sample collected at 764' bls
Temp-25.33°C pH-8.17 cond.-1392 µS/cm TDS- .903 g/l
1245 – Drilling resumed at 764'
1305 – Depth at 775'
1315 – Depth at 780'
1326 – Depth at 785'
1336 – Depth at 790'
1344 – Kelly down, drilling halted @ 795'

1352 - Water sample collected at 795' bls
Temp-25.32°C pH-7.97 cond.-1415 µS/cm TDS- .920 g/l
1418 – Drilling resumed at 795'
1431 – Depth at 800'
1507 – Depth at 815'
1516 – Depth at 820'
1525 – Kelly down, drilling halted @ 826'
1534 - Water sample collected at 826' bls
Temp-25.19°C pH-7.94 cond.-1402 µS/cm TDS- .911 g/l
1544 – Rig shut down until diversion drain line is installed

1600 – Shamus English off site.

Recorded By: Shamus English

Date: 8/02/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/03/07	Day of Week: Friday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-4	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Development

0800 - Shamus English on site. Pump running at about 2200 gpm. Pump started at 7:00 this morning. Pump ran for 3 hours yesterday.
0824 – Rossum sand test (RST) at 1.8 ml after 1 hour.
0830 – Rossum sand test (RST) started
0900 – RST at .4 ml after 30 mins.
0945 – Had contractor turn pump all the way up. Pumping at about 2350 gpm
0954 – Totalizer at 12069
1000 – RST at .9 ml after 1.5 hours.
1004 – Totalizer at 12093 93 - 69 = 24 x 1,000 = 24,000 / 10 mins = 2,400 gpm
1014 - Totalizer at 12116 (2,300 gpm)
1015 – off site to check on FA-9
1416 - Rossum sand test (RST) started
1420 - Totalizer at 12692
1430 - Totalizer at 12715.5 (2,350 gpm)
1431 – RST at .1 ml after 15 mins
1446 – RST at .2 ml after 30 mins
1500 - Totalizer at 12787 (2,383 gpm)
1501 – RST at .3 ml after 45 mins
1516 – RST at .4 ml after 60 mins
1530 – off site to check on FA-9

1805 – Shamus English off site.

Recorded By: Shamus English

Date: 8/03/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/03/07	Day of Week: Friday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 826'	Ending Depth: 921'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling

0730 - Shamus English on site. Contractors setting up diversion drain line
0745 – Off site to check on well development at FB-4
1029 – back on site. Drill started prior to my arrival. Depth at 830' bls
1042 – Depth at 835'
1049 – Depth at 840'
1105 – Depth at 850'
1125 – Kelly down, drilling halted @ 858'
1135 - Water sample collected at 858' bls
Temp-25.20°C pH-7.94 cond.-1384 µS/cm TDS- .900 g/l
1116 – Drilling resumed at 858'
1241 – Depth at 875'
1259 – Depth at 880'
1313 – Kelly down, drilling halted @ 889'
1321 - Water sample collected at 889' bls
Temp-25.27°C pH-7.91 cond.-1381 µS/cm TDS- .897 g/l
1347 – Air line fell down hole, contractors will have to retrieve
1350 – Off site to check on FB-4
1647 – Drilling resumed at 889'
1702 – Depth at 895'
1721 – Depth at 900'
1804 – Kelly down, drilling halted @ 921'

1815 – Shamus English off site.

Recorded By: Shamus English

Date: 8/03/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/04/07	Day of Week: Saturday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 921'	Ending Depth: 1044'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling

0800 - Shamus English on site. Drilling to begin shortly.
0834 – Drilling commenced at 921' bls
0846 – Depth at 925'
0903 – Depth at 930'
0918 – Depth at 935'
1017 – Depth at 945'
1046 – Depth at 950'
1058 – Kelly down, drilling halted @ 952'
1106 - Water sample collected at 952' bls
Temp-25.22°C pH-7.99 cond.-1542 µS/cm TDS- 1.002 g/l
1126 – Drilling resumed at 952'
1149 – Depth at 966'
1255 – Kelly down, drilling halted @ 983'
1302 - Water sample collected at 983' bls
Temp-25.24°C pH-7.97 cond.-1508 µS/cm TDS- .981 g/l
1323 – Drilling resumed at 983'
1439 – Kelly down, drilling halted @ 1014'
1447 - Water sample collected at 1014' bls
Temp-25.38°C pH-8.35 cond.-1488 µS/cm TDS- .966 g/l
1501 – Drilling resumed at 1014'
1527 – Depth at 1025'
1536 – Depth at 1030'
1549 – Depth at 1035'
1612 – Depth at 1040'
1634 – Kelly down, drilling halted @ 1044'
1642 - Water sample collected at 1044' bls
Temp-25.41°C pH-7.99 cond.-1470 µS/cm TDS- .958 g/l
1656 – Drilling halted for the day

1700 – Shamus English off site.

Recorded By: Shamus English

Date: 8/04/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/5/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-4	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Variable-Rate Pumping Test

0705 – Michael Bennett on site FB-4. Water level 28.28'
0740 –Water Level 28,196'. Manometer 14'2"
0750 – Changed Manometer tubing
0755 – Water Level 28.174'. Manometer 14'10" (may have had air bubble in line)

Step 1 – 500 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
0800	0	28.175	13523	700	500	14'10"
0805	5	26.256		"	550	12'10"
0810	10	26.076	13527	"	550	12'11"
0815	15	26.383	13530	"	600	12'10"
0820	20	26.377	13533	"	600	12'9"
0825	25	25.860	13537	"	600	12'9"
0830	30	25.546	13541	"	"	12'9"
0835	35	26.138	13545	"	"	12'9"
0840	40	26.020	13548	"	"	12'8"
0845	45	26.059	13552	"	"	12'8"
0850	50	26.187	13554	"	"	12'8"
0855	55	26.213	13558	"	"	12'8"
0900	60	26.377	13562	"	"	12'8"

Pump rate – 650 gpm
Drawdown – 2.167'
SC – 300gpm/ft

Step 2 – 1,000 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft
0900	0	26.377	13562	1,000	1,000	12'8"
0905	5	23.380	13567	1,000	1,000	10'2"
0910	10	23.461	13572	"	"	10'2"
0915	15	23.233	13578	"	"	10'2"
0920	20	23.831	13583	"	"	10'1"
0925	25		13589	"	1,050	10'1"
0930	30	23.921	13595	"	"	10'1"
0935	35		13601	"	"	10'0"
0940	40	23.698	13606	"	"	10'0"
0945	45					
0950	50	23.173	13617	"	"	10'0"
0955	55	23.356	13624	"	"	10'0"
1000	60	23.520	13629	"	"	10'0"

Pump rate – 1033 gpm
Drawdown – 4.83'
SC – 213.7gpm/ft

Step 3 – 1,500 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1000	0	23.173	13629	1,400	1,500	10'0"
1005	5	20.774	13634	1,400	1,500	6'6"
1010	10	19.319	13643	"	"	6'5"
1015	15	19.230	13651	"	"	6'5"
1020	20		13658	"	"	6'4"
1025	25		13666	"	"	6'4"
1030	30	19.014	13674	"	"	6'4"
1035	35		13583	"	"	6'4"
1040	40	19.623	13690	"	"	6'4"
1045	45		13698	"	"	6'3½"
1050	50	20.707	13706	"	"	6'3½"
1055	55	19.173	13713	"	"	6'3"
1100	60	19.629	13720	"	"	6'3"

Pump rate – 1516 gpm
Drawdown – 8.58'
SC – 176.7gpm/ft

Step 4 – 2,000 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1100	0	19.173	13720	1,800	2,000	6'3"
1105	5	14.459	13730	"	"	N/A
1110	10	14.173	13742	"	"	"
1115	15	14.276	13753	1,800	2,000	N/A
1120	20	14.288	13763	"	"	"
1125	25	14.208	13776	"	"	"
1130	30	14.270	13785	"	"	"
1135	35	14.416	13795	"	"	"
1140	40	14.392	13805	"	"	"
1145	45	14.440	13816	1,800	2,000	N/A
1150	50	14.446	13829	"	"	"
1155	55	14.428	13838	"	"	"
1200	60	14.557	13850	"	"	"

Pump rate – 2166 gpm
Drawdown – 13.75'
SC – 157.5gpm/ft

Recovery

Time	Water Lvl Reading	Manometer Reading
1200	14.557	
1210	27.325	13'11"
1220	27.469	14'1"
1230	27.555	14'2"
1240	27.615	14'3"
1250	27.669	14'3"
1300	27.705	14'3"
1315	27.756	14'3½

1320 – Extract data

1330 – Michael Bennett off site.

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/06/07	Day of Week: Monday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 1044'	Ending Depth: 1177'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling

0830 - Shamus English on site. Drilling started prior to my arrival. Depth at about 1052' bls
0852 – Depth at 1060'
0901 – Depth at 1065'
0916 – Depth at 1070'
0934 – Kelly down, drilling halted @ 1075'
0942 - Water sample collected at 1075' bls
Temp-25.26°C pH-8.06 cond.-1476 µS/cm TDS-.959 g/l
1014 – Drilling resumed at 1075'
1029 – Depth at 1080'
1037 – Depth at 1085'
1051 – Depth at 1090'
1109 – Depth at 1095'
1129 – Depth at 1100'
1153 – Kelly down, drilling halted @ 1105'
1201 - Water sample collected at 1105' bls
Temp-25.31°C pH-7.90 cond.-1546 µS/cm TDS- 1.006 g/l
1210 - Off site for lunch
1245 – On site, Drilling resumed prior to my arrival. Depth at 1114'
1259 – Depth at 1120'
1307 – Depth at 1125'
1318 – Depth at 1130'
1331 – Kelly down, drilling halted @ 1135'
1339 - Water sample collected at 1135' bls
Temp-25.32°C pH-7.97 cond.-1572 µS/cm TDS- 1.027 g/l
1406 – Drilling resumed at 1135'
1418 – Depth at 1140'
1434 – Depth at 1145'
1448 – Depth at 1150'
1503 – Depth at 1155'
1503 – Depth at 1160'

1544 – Kelly down, drilling halted @ 1166'
1554 - Water sample collected at 1166' bls
Temp-25.35°C pH-7.92 cond.-1567 µS/cm TDS- 1.017 g/l
1629 – Drilling resumed at 1166'
1642 – Depth at 1170'
1659 – Depth at 1175'
1719 – Drilling halted for the day at 1177' bls

1725 – Shamus English off site.

Recorded By: Shamus English

Date: 8/06/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/07/07	Day of Week: Tuesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth: 1177'	Ending Depth: 1250'	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Drilling

0730 - Shamus English on site. Drilling to start shortly.
0803 – Drilling commenced at 1177'
0820 – Depth at 1180'
0847 – Depth at 1185'
0925 – Depth at 1190'
0957 – Depth at 1195'
1007 – Kelly down, drilling halted @ 1197'
1016 - Water sample collected at 1197' bls
Temp-25.35°C pH-8.02 cond.-1529 µS/cm TDS-.993 g/l
1044 – Drilling resumed at 1197'
1103 – Depth at 1205'
1116 – Depth at 1210'
1129 – Depth at 1215'
1142 – Depth at 1220'
1155 – Depth at 1225'
1207 – Kelly down, drilling halted @ 1229'
1217 - Water sample collected at 1229' bls
Temp-25.36°C pH-7.99 cond.-1535 µS/cm TDS- .997 g/l
1245 – On site, Drilling resumed prior to my arrival. Depth at 1114'
1232 – Drilling resumed at 1229'
1252 – Depth at 1235'
1311 – Depth at 1240'
1325 – Depth at 1245'
1340 – Depth at 1250' Drilling halted, Circulating on bottom
1354 - Water sample collected at 1250' bls
Temp-25.42°C pH-7.95 cond.-1522 µS/cm TDS- .990 g/l
1500 – Contractors tripping up hole.
1640 – TD at bottom, wiper run, circulating
1747 - Contractors tripping up hole.

1800 – Shamus English off site.

Recorded By: Shamus English

Date: 8/07/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/08/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Geophysical Logging FA-9

0900 – On site FA-9, Contractors tripping out of hole
1015 – Having trouble breaking connections between collars. Contractors have to get torch to heat connections so they will separate easier.
1050 – Logging truck on site
1202 – Last collar out of borehole, attaching stand pipe

Video Survey

1400 – Lowering Video survey tool down borehole
1432 – At bottom of casing, 620' bls
1500 – Tool at bottom (1255'). Preparing to raise tool up borehole recording
1518 – Video Survey tool at surface.

Temp/Fluid Res. Log (static & dynamic)

1537 – Lowering. E-tool down borehole.
1557 – Tool at bottom, Preparing to raise tool up hole for main pass (dynamic conditions) at 30 ft/min
1606 – Tool at 1,000' bls
1621 – Tool at 547' bpl, recording main pass (dynamic conditions) finished. Preparing to send tool back down hole to log repeat pass
1624 – Tool at 702', preparing to raise tool up hole recording repeat pass (dynamic conditions) at 30 ft/min
1629 – Tool at 550' stopped recording repeat pass (dynamic conditions), shut well in, preparing to send tool to bottom of borehole for static conditions
1637 – Tool at bottom, Preparing to raise tool up hole for main pass (static conditions) at 30 ft/min
1646 – Tool at 1,000'
1702 – Tool at 550' bpl, recording main pass (static conditions) finished. Preparing to send tool back down hole to log repeat pass
1704 – Tool at 700', preparing to raise tool up hole recording repeat pass (static conditions) at 30 ft/min
1708 – Stopped recording. Temp/Fluid Res. Log complete. Raising tool to surface.
1715 – Tool at surface

Gamma/Flow Log (static & dynamic)

*** Problem with flow tool. Not reading counts as propeller is spun. Appears to be problem with connection. Contractor serviced tool for 1.75 hours before moving on to next log

Dual Induction Log

1903 – Lowering Dual Induction tool down borehole.
1916 – Tool at bottom, reading 1254'. Preparing to raise tool up borehole recording main pass at 30 ft/min
1943 – Tool at 550', stopped recording. Preparing to lower tool to bottom to perform main pass
1946 – Tool at 700'. Preparing to raise tool up borehole recording repeat pass at 30 ft/min
1952 – Tool at 550', stopped recording repeat pass. Raising tool to surface.

Caliper Log

2003 – Calibrating caliper tool to 15.25". X=15.3" Y= 15.2"
2010 – Lowering caliper tool down borehole
2022 – Tool at bottom, reading 1255' bpl. Preparing to raise tool up borehole recording main pass at 30 ft/min
2049 – Tool at 543' bpl. Main pass complete. Preparing to send tool down hole to perform repeat pass
2053 – Tool at 700'. Preparing to raise tool up hole recording repeat pass.
2059 – Tool at 550', repeat pass complete, recording stopped. Caliper log complete. Preparing to raise tool to surface.
2104 – Tool at surface. Will try flow tool again

2114 – Could not get flow tool working, will have to run log tomorrow. Will get field logs and DVD of video survey from Dominick (All Webbs) tomorrow.

2120 – Shamus English off site.

Recorded By: Shamus English

Date: 8/8/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/09/07	Day of Week: Wednesday	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Geophysical Logging FA-9

1150 – On site FA-9, No one on site at TOA.
1205 – Dave Webb Sr. on site. He explained that FA-7 will be acidized before FA-9. Dominic (All Webbs) to arrive shortly to perform flow log.
1240 – Logging truck on site. Dominic explained that the connection inside tool behind impeller was not passing connection & has been repaired for today's log

Gamma/Flow Log (static & dynamic)

1302 – Lowering gamma/flow tool down borehole.
1304 – Recording main pass (dynamic conditions) at 30 ft/min
1336 – Tool at bottom, reading 1253'. Preparing to raise tool up borehole stopping every 100' for stationary logs. First stationary log at 1230'.
1351 – Stopped at 1130' for stationary log for 2 mins.
1355 – Stopped at 1030' for stationary log for 2 mins
1400 – Stopped at 930' for stationary log for 2 mins
1405 – Stopped at 830' for stationary log for 2 mins
1409 – Stopped at 730' for stationary log for 2 mins
1414 – Stopped at 630' for stationary log for 2 mins
1417 – Raising tool to 550' to perform repeat pass (dynamic conditions)
1418 – Tool at 550'. Preparing to lower tool down hole recording repeat pass (dynamic conditions)
1423 – Tool at 704'. Preparing to raise tool up borehole and perform logs under static conditions
1427 – Tool at 550' bpl. Preparing to send tool down hole recording repeat pass (static conditions) at 30 ft/min.
1434 – Tool at 700'. Preparing to raise tool up to 550'
1436 – Tool at 550'. Preparing to lower tool down hole recording main pass (dynamic conditions)
1502 – Tool at bottom. Raising tool to surface. Gamma/Flow Log complete.
1800 – Received Field logs and DVD of video survey from Dominick (All Webbs)

1810 – Shamus English off site.

Recorded By: Shamus English

Date: 8/9/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/14/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth: 888'	Ending Depth: 908'	Bit Size: 11"	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-2 from 890' to 1,250' bls

0805 – Shamus English on site. Contractor's tagged down yesterday at 888'. Still have to set up air line, Compressor and discharge pump.
0830 – Off site to check on FA-7 (acidization scheduled for today).
1600 – On site FB-2. Drilling to commence shortly.
1654 – Drilling commenced at 888' bls.
1700 – Depth at 890' blsl
1722 – Depth at 895' bls
1745 – Depth at 900' bls
1756 – Drilling halted at 903', settling tank overflowing with water.
1821 – Drilling resumed at 903'
1828 – Depth at 905' bls
1842 – Kelly down, drilling halted at 908' bls.
1849 - Water sample collected at 908' bls. using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 8.16, temp.= 24.55°C, conductivity = 2341µS, TDS = 1.552 g/L.

1900 – Shamus English off site.

Recorded By: Shamus English

Date: 8/14/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/14/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Acidize Well (Stage 1)

0745 – Shamus English on site. AWE finishing setting up well head for acidization. Acid tank empty. Off site to check on FB-2.
1030 – On site. Acid truck delivering acid. Pipe set at 720' bls
1200 – 4,800 gallons of acid in storage tank
1205 – Bring well alive
1257 – Flow meter reads about 550 gpm free flow
1310 – Manometer is set on north edge of well head about 3" above ground surface.
1315 – Manometer @ 7'7" while flow at 250 gpm
1320 – Manometer @ 4'9" while flow is at 600 gpm. Well shut in.
1330 – Manometer at 9'1" after 10 mins
1350 – Manometer at 9'3½" after 30 mins
1453 – Commenced pumping acid
1501 – 3,600 gallons left in tank, pressure at well head 0 psi
1511 – 1,900 gallons left in tank, pressure at well head 0 psi
1522 – Finished pumping acid. Chasing with water.
1527 – Finished pumping water backside. Pressure at well head 15 psi
1529 – pressure at well head 20 psi
1545 – pressure at well head 20 psi
1550 – Pressure at well head 20 psi
1552 – Off site to go to FB-2

1552 – Shamus English off site.

Recorded By: Shamus English

Date: 8/14/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/15/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Acidize Well (Stage 2)

1045 – Michael Bennett on site. Pumped 4,800 gallons of acid on 8/14/07
1055 – Pressure at well head 0 psi
1120 – Dave Webb Jr. on site. Brought new flow meter to install on acid pump line
1140 – Dave Webb Jr. leaves site to get a new belt for the acid pump. Estimated time of repair 1 hour.
1300 – Dave Webb Jr. back on site with new alternator belt.
1315 – Pressure at well head 0 psi. Flow meter reading 590 gpm. 4,800 gallons of acid in storage tank.
1325 – Started acid pump to check for Leaks. Used 9 gallons of Crown L-60B Hydrochloric Inhibitor.
1344 – Started to pump acid into FA-7
1346 – Pressure at well head 0 psi
1356 – 2,400 gallons of acid left in tank, Pressure at well head 0 psi
1407 – Finished pumping acid, 4,800 gallons. Pressure at well head 0 psi
1408 – Pressure at well head 5 psi prior to pumping 500 gal of water backside.
1410 – Pressure at well head 10 psi
1412 – Finished pumping 500 gallons of water backside.
1423 – Pressure at well head 16 psi
Note: Requested acid delivery manifest. Manifest indicates 4000 gallons of acid delivered, but tank reads 4,800 gallons
1431 – Pressure at well head 22 psi
1440 – Pressure at well head 30 psi. Pumping fresh water into 28"-diameter casing to keep acid down hole.
1445 – Pressure at well head 36 psi. Pumped 500 gallons fresh water through tubing.
1500 – Pressure at well head 51 psi, pumping fresh water at 3 to 4 gpm because of outflows from the well head flange.
1525 – Pressure at well head 64 psi. Pressure relieved via well head flange
1535 – 55 psi
1545 – Pumped an additional 250 gallons @ surface of fresh water
1550 – 34 psi
1555 – 32 psi
1605 – 26 psi
1620 – 20 psi
1630 – 16 psi

1640 – 11 psi
1645 – Dave Webb Sr on site to try to seal leak at gasket and well acid flange
1652 – 5 psi

1715 – Michael Bennett off site.

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/15/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth: 908'	Ending Depth:	Bit Size: 11"	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-2 from 890' to 1,250' bls

0805 – Shamus English on site. Contractor's changing out rubber boot at well head.
0845 – Contractor's having trouble connecting air line at bottom of Kelly. Thread for coupling on steel air line is stripped, Will have to be cut off and new one welded.
1256 – Drilling commenced at 908' bls.
1306 – Depth at 910' blsl
1327 – Depth at 915' bls
1334 – Depth at 920' bls
1348 – Drilling halted
1358 – Drilling resumed
1413 – Depth at 925' blsl
1437 – Depth at 930' bls
1454 – Depth at 935' bls
1500 – Kelly down, drilling halted at 939' bls.
1508 - Water sample collected at 939' bls. using YSI instrument 650 MDS with 600XL Multi-Parameter Water Quality Probe, pH = 7.91, temp.= 25.01°C, conductivity = 1515µS, TDS = .985 g/L.
1540 – Drilling resumed at 939' bls
1555 – Depth at 945' blsl
1601 – Depth at 950' bls
1613 – Depth at 955' bls
1626 – Depth at 960' bls
1647 – Depth at 965' bls
1700 – Kelly down, drilling halted at 971' bls.
1710 - Water sample collected at 971' bls.
temp.= 25.07°C pH = 8.03 conductivity = 1566µS TDS = 1.017 g/L.
1735 – Drilling resumed at 971' bls
1613 – Depth at 975' bls
1626 – Depth at 980' bls
1647 – Depth at 985' bls
1840 – Drilling halted for day at 987' bls

1845 – Shamus English off site.

Recorded By: Shamus English

Date: 8/15/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/16/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth: 908'	Ending Depth:	Bit Size: 11"	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-2 from 890' to 1,250' bls

0800 – Shamus English on site. Contractor's drilled from 987' to 994' prior to my arrival. Contractor's plan on killing well before resuming drilling. Contractor's were drilling without rubber boot at well head until they hit a flow zone at 994' bls and water started to flood site (diversion flow line could not keep up with flow. Contractor's installing rubber boot, to stop flow until well is killed, at the time I arrived.

1248 – Drilling resumed at 994' bls

1320 – Kelly down, drilling halted at 1000' bls.

1327 - Water sample collected at 1000' bls.
Temp = 25.08°C pH = 8.10 conductivity = 1693µS TDS = 1.10 g/L.
*** Conductivity high due to salt added to kill well

1428 – Drilling resumed at 1000' bls

1443 – Depth at 1005' bls

1529 – Depth at 1010' bls

1550 – Depth at 1015' bls

1601 – Depth at 1020' bls

1605 – Depth at 1025' bls

1608 – Kelly down, drilling halted at 1031' bls.

1615 - Water sample collected at 1031' bls.
Temp = 25.10°C pH = 8.0 conductivity = 1697µS TDS = 1.103 g/L.
*** Conductivity high due to salt added to kill well

1638 – Drilling resumed at 1031' bls

1646 – Depth at 1035' bls

1703 – Depth at 1040' bls

1720 – Depth at 1045' bls

1728 – Depth at 1050' bls

1742 – Depth at 1055' bls

1809 – Kelly down, drilling halted at 1061' bls.

1819 - Water sample collected at 1061' bls.
Temp = 24.96°C pH = 8.07 conductivity = 1689µS TDS = 1.098 g/L.

1830 – Off site to get something to eat, Mick will collect samples.

1915 – Back on site, depth at 1080'
1925 – Line clogged at 1088'
1945 – Contractor's lost air line while trying to unclog drill pipe, will have to trip down hole to retrieve.
1959 – Air line retrieved, appears air line only fell as far as clog in drill string. Tropping back down hole.
2028 – Air line reattached, trying to unclog drill string.
2120 – Drilling resumed at 1088' bls
2137 – Line clogged
2156 – Drilling resumed
2204 – Kelly down, drilling halted at 1092' bls.
2212 - Water sample collected at 1092' bls.
Temp = 24.73°C pH = 8.06 conductivity = 1647µS TDS = 1.071 g/L.

2225 – Drilling halted for day at 1092' bls

2230 – Shamus English off site.

Recorded By: Shamus English

Date: 8/16/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/17/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth: 1108'	Ending Depth: 1250'	Bit Size: 11"	Weather: Sunny & Warm

ACTIVITY:

DESCRIPTION OF WORK: Deepen well FB-2 from 890' to 1,250' bls

0805 – Shamus English on site. Depth at 1108' bls.
0825 – Depth at 1115' bls
0830 – Line clogged, drilling halted
0849 – Drilling resumed
0948 – Kelly down, drilling halted at 1122' bls.
0957 - Water sample collected at 1031' bls.
Temp = 24.99°C pH = 8.14 conductivity = 1645µS TDS = 1.069 g/L.
1026 – Drilling resumed at 1122' bls
1031 – Depth at 1125' bls
1045 – Depth at 1130' bls
1058 – Depth at 1135' bls
1123 – Depth at 1140' bls
1136 – Depth at 1145' bls
1206 – Depth at 1150' bls
1214 – Kelly down, drilling halted at 1153' bls.
1222 - Water sample collected at 1153' bls.
Temp = 25.22°C pH = 8.05 conductivity = 1597µS TDS = 1.038 g/L.
1241 – Drilling resumed at 1122' bls
1302 – Depth at 1155' bls
1313 – Depth at 1160' bls
1319 – Depth at 1165' bls
1348 – Depth at 1170' bls
1352 – Depth at 1175' bls
1356 – Depth at 1180' bls
1420 – Kelly down, drilling halted at 1184' bls.
1430 - Water sample collected at 1184' bls.
Temp = 25.21°C pH = 7.98 conductivity = 1642µS TDS = 1.067 g/L.
1448 – Drilling resumed at 1184' bls
1451 – Depth at 1185' bls

1505 – Line clogged
1525 – Drilling resumed
1543 – Depth at 1190' bls
1628 – Depth at 1195' bls
1657 – Depth at 1200' bls
1731 – Depth at 1205' bls
1734 – Depth at 1210' bls
1738 – Kelly down, drilling halted at 1215' bls.
1749 - Water sample collected at 1215' bls.
Temp = 25.08°C pH = 8.02 conductivity = 1591µS TDS = 1.033 g/L.
1805 – Drilling resumed at 1215' bls
1810 – Depth at 1220' bls
1815 – Depth at 1225' bls
1822 – Depth at 1230' bls
1827 – Depth at 1235' bls
1834 – Depth at 1240' bls
1841 – Kelly down, drilling halted at 1246' bls.
1850 - Water sample collected at 1246' bls.
Temp = 25.03°C pH = 8.08 conductivity = 1628µS TDS = 1.058 g/L.
1908 – Drilling resumed at 1246' bls
1921 – Drilling halted for day at 1250' bls

1930 – Shamus English off site.

Recorded By: Shamus English

Date: 8/17/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/20/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Geophysical Logging FB-2

0900 – Shamus English on site. Video Survey to commence shortly. Well development started at FA-7 about 8:30.

Video Survey

0927 – Lowering Video survey tool down borehole
0951 – Trouble with light bulb. Have to bring tool to surface and replace light bulb.
1015 – Lowering Video survey tool down borehole
1108 – Tool at bottom. Reading 1249' bls. Preparing to raise tool up borehole recording

1115 – offsite to check on FA-7
1145 – Back on site. Temp/Fluid Res. Log to commence shortly

Temp/Fluid Res. Log (static & dynamic)

1201 – Lowering tool down borehole to bottom.
1221 – Tool at bottom of borehole (reading 1249' bls). Preparing to raise tool up hole recording main pass (dynamic conditions) at 30 ft/min.
1248 – Tool at 450', sending tool back down to 600' bls for repeat pass (dynamic conditions).
1251 – Tool at 600' bls, Preparing to raise tool up hole for repeat pass (dynamic conditions) at 30 ft/min
1256 – Tool at 450'. Repeat pass complete. Lowering tool to bottom to log under static conditions.
1305 – Tool at bottom, preparing to raise tool up hole recording main pass (static conditions) at 30 ft/min
1338 – Tool at 450', sending tool back down to 600' for repeat pass (static conditions).
1339 – Tool at 600', Preparing to raise tool up hole for repeat pass (static conditions) at 30 ft/min
1345 – Tool at 450' stopped recording. Temp/Fluid Res. Log complete. Raising tool to surface.
1348 – Tool at surface

Caliper Log

Using 3-arm caliper tool for log. 4-arm caliper tool out of service.
1354 – Calibrating caliper tool
1435 – Calibration complete
1449 – Lowering tool down borehole to bottom

1501 – Tool at bottom, reading 1248' blsl. Preparing to raise tool up borehole recording main pass at 30 ft/min
1504 – Stopped recording. Caliper value stayed at 1.41". Mo signal from tool. Raising tool to surface.
1522 – Tool at surface. Trouble when opening and closing arms. Getting " No Tool Trans" message.
1548 – Received reading from tool. Sending tool back down hole.
1608 – Tool at bottom, opening arms, getting " No Tool Trans" message again.
1625 – Agreed to perform caliper another day when AWE gets their 4-arm caliper tool back
1632 – Raising tool to surface

Gamma/Flow Log (static & dynamic)

1643 – Attaching flow meter tool to cable. Preparing to send tool down borehole.
1652 – Tool at 450' – Begin recording to bottom for main pass

1702 – Left FB-2 site to check on well development at FA-7
1807 – Back on site FB-2. Flow log (dynamic) almost at bottom. Then to raise tool doing station passes every 100'
1823 – Tool at 1040 (dynamic) station pass,
1828 – 940' station pass
1837 – 840' station pass
1838 – Problems with flow meter tool. Logs are showing odd results. Bringing tool to surface.
1846 – Removing tool from borehole
1850 – Servicing tool
1910 – Something internally wrong with flow meter tool
1915 – Agreed to finish logs later this week after AWE can repair flow tool

1930 – Shamus English off site.

Recorded By: Shamus English

Date: 8/20/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/20/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Development FA-7

1120 – Shamus English on site FA-7. Pump not running at TOA. Paul (AWE) explained that they were changing gaskets and performing engine maintenance. Rossem sand tester not attached
1140 – Off site to go to FB-2, geophysical logging being conducted.
1702 – Back on site FA-7.
1709 – McCrometer reads about 2300 gpm. Totalizer reads 15695
1717 – Rossum Sand Tester (RST) started
1719 – Totalizer at 15718, 2,300 gpm
1727 – RST <1ml
1729 – Totalizer at 15740, 2,200 gpm
1732 – Increased RPM's on engine
1733 – Totalizer at 15747.5
1737 – RST<1ml
1743 - Totalizer at 15772, 2,450 gpm
1747 – RST at 1ml after 30 mins
1753 – Totalizer at 15797, 2,500 gpm
1757 – RST at .2ml
1800 – Off site to check on logging at FB-2

1800 – Shamus English off site.

Recorded By: Shamus English

Date: 8/20/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/21/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Development FA-7

0945 – Shamus English on site FA-7. Pump running at TOA.
0952 – Pump shut off
1000 – Pump restarted
1003 – Totalizer at 16050
1012 – Rossum Sand Tester (RST) started
1022 – RST <1ml
1023 - Totalizer at 16097, 2,350 gpm
1032 – RST <1ml
1033 – Totalizer at 16120, 2,300 gpm
1042 – RST<1ml
1052 – RST<1ml
1053 - Totalizer at 16166, 2,350 gpm
1102 – RST<1ml
1112 - RST<1ml
1122 - RST<1ml
1132 – RST at 1ml, after 1 hour and 20 mins
1312 – RST at .2ml
1325 - Surge Well, and set up for pump test
1515 – Started Pump Test
1657 – Pump cut off towards the end of the 2nd step test. Too late to start pump test over today, will have to wait till tomorrow to restart test.

1740 – Shamus English off site.

Recorded By: Shamus English

Date: 8/21/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/22/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Variable-Rate Pumping Test FA-7

0945 – Shamus English on site FA-7. Water level 25.207 feet above transducer
0950 – Water level 25.20 feet above pressure transducer. Manometer = 7' 10.5"
1000 – Variable-rate pumping test started.

Step 1 – 500 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1000	0	25.2	16624	7,000	500	7' 10.5"
1005	5	23.288	16627	"	500	6'1"
1010	10	23.059	16631	"	600	6'
1012 – Closed valve a little bit, flow was too high						
1015	15	23.509	16634	"	500	6'1.5"
1020	20	23.156	16636	"	500	6'1.5"
1025	25	23.277	16639	"	500	6'1"
1030	30	23.344	16642	"	"	"
1035	35	23.466	16645	"	"	6'.5"
1040	40	23.296	16654	"	"	6'.5"
1045	45	23.363	16651	"	"	6'.5"
1050	50	23.399	16654	"	"	6'.5"
1055	55	23.442	16657	"	"	6'.5"
1100	60	23.350	16660	"	"	6'.5"

Step 2 – 1,000 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft
1100	0	21.847	16660	10,000	1,000	N/A

1103 – Water Quality Sample Collected. Temp-25.72°C pH-6.55 cond.-3095uS/cm TDS-2.013g/L

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft
1105	5	21.513	16662	10,000	1,000	N/A
1110	10	21.367	16670	"	"	"
1115	15	21.362	16675	"	"	"
1120	20	20.958	16680	"	"	"
1125	25	20.515	16685	"	"	"
1130	30	20.521	16690	"	"	"
1135	35	20.467	16695	"	"	"
1140	40	20.346	16700	"	"	"
1145	45	20.328	16705	"	"	"
1150	50	20.353	16710	"	"	"
1155	55	20.346	16715	"	"	"
1160	60	20.359	16720	"	"	"

Step 3 – 1,500 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1200	0	18.020	16720	1,300	1,500	N/A
1203 – Water Quality Sample Collected.			Temp-25.89°C	pH-6.55	cond.-2948uS/cm	TDS-1.917g/L
1205	5	17.703	16728	1,300	1,500	N/A
1210	10	17.819	16736	"	"	"
1215	15	17.801	16743	"	"	"
1220	20	17.722	16750	"	"	"
1225	25	17.783	16758	"	"	"
1230	30	17.814	16765	"	"	"
1235	35	17.674	16773	"	"	"
1240	40	17.760	16780	"	"	"
1245	45	17.712	16788	"	"	"
1250	50	17.699	16795	"	"	"
1255	55	17.791	16803	"	"	"
1260	60	17.731	16810	"	"	"

Step 4 – 2,000 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1300	0	15.203	16810	1,600	2,000	N/A
1305	5	15.027	16820	"	"	"
1310	10	14.935	16829	"	"	"
1312 – Water Quality Sample Collected.			Temp-25.90°C	pH-6.53	cond.-2787uS/cm	TDS-1.811g/L
1315	15	14.875	16839	1,600	2,000	N/A
1320	20	14.917	16850	"	"	"
1325	25	14.850	16859	"	"	"
1330	30	14.808	16869	"	"	"
1335	35	14.820	16880	"	"	"
1340	40	14.765	16889	"	"	"

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1345	45	14.807	16899	1,600	2,000	N/A
1350	50	14.832	16908	"	"	"
1355	55	14.789	16918	"	"	"
1400	60	14.844	16927	"	"	"

Recovery

Time	Water Lvl Reading	Manometer Reading
1401	22.608	6"
1405	23.424	4'10"
1415	23.995	5'4"
1421	24.100	5'5"
1445	24.459	6'6"
1500	24.586	7'3"
1515	24.513	Taken off site

1523 – Water Quality Sample Collected. Temp-25.81°C pH-6.56 cond.-2717uS/cm TDS-1.766g/L
1533 – Left FA-7 site, acidization at FA-9

1533 – Shamus English off site.

Recorded By: Shamus English

Date: 8/22/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/22/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY: Acidization 1st Stage

1537 – On site FA-9. 4000 gallons of acid in storage tank
1542 – Water sample collected Temp-25.35°C pH-7.68 cond.-1458uS/cm TDS-.948 g/L
1639 – Shut in pressure head at 6'4"
At 200 gpm pressure head at 5'2"
At 400 gpm pressure head at 4'1"
1735 – Pumping acid in well
1737 – 3800 gal 0 psi
1740 – 3200 gal 0 psi
1740 – AWE stopped pump
1752 – Resumed acid pumping
1800 – 2200 gal 0 psi
1804 – 1600 gal 0 psi
1806 – Pressure at well head 5 psi
1807 – 12 psi
1808 – 15 psi
1810 – Acid pumping finished. Pressure at well head 20 psi
1813 – 27 psi
1816 – 24 psi
1826 – 16 psi
1830 – 15 psi
1835 – 12 psi
1840 – 7 psi
1843 – 5 psi

1845 – Shamus English off site.

Recorded By: Shamus English

Date: 8/22/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/23/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY: Acidization 2nd Stage

1030 – On site FA-9. Acid being delivered at TOA
1050 – About 4,500 gallons in tank
1105 – Water sample collected Temp-25.32°C pH-6.79 Cond.-2321uS/cm TDS-1.508 g/L
** Waiting on Dave Webb Jr. to arrive, was supposed to be on site at 11:00
1245 – Dave Webb Jr. on site.
1327 – begin pumping acid into well FA-9, 2nd stage
1338 – 2,400 gallons of remain in storage tank, pressure at well head 7 psi
1340 – Pressure at well head 10 psi
1341 - 2,000 gallons of remain in storage tank, pressure at well head 12 psi
1342 – 15 psi
1344 – 17 psi
1345 – 20 psi
1348 – pumping halted, 600 gallons of acid remain in storage tank. Wait for pressure at well head to get back down before pumping final 600 gallons.
1352 – 20 psi
1356 – 21 psi
1402 – 18 psi
1412 – 16 psi
1416 – pumping final 600 gallons if acid, pressure at well head 15 psi
1418 – 12 psi
1419 – finish pumping acid, pumping water backside (500 gal)
1424 – 12 psi, finished pumping water backside
1437 – 10 psi
1449 – 7 psi

1450 – Shamus English off site.

Recorded By: Shamus English

Date: 8/23/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/24/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Geophysical Logging

0900 – on site FB-2. Flow commenced prior to my arrival. Tool lowered into borehole at 0845. Tool at 415' bls

Gamma/Flow Log (static & dynamic)

0914 – Tool at 800' bpl. Lowering tool down hole recording main pass (dynamic conditions) at 30 ft/min
0930 – Tool at bottom, reading 1241' + 5.5' (tool) = 1247'bpl. Preparing to raise tool up borehole stopping every 100' for station pass
0933 – At 1140 station pass
0938 – At 1040 station pass
0943 – At 940 station pass
0948 – At 840 station pass
0952 – At 740 station pass
0957 – At 640 station pass
1001 – At 540 station pass
1004 – Tool at 450'. Preparing to lower tool down hole recording repeat pass (dynamic conditions)
1009 – Tool at 600. Shutting well in to perform logs under static conditions
1020 – Tool at 425' bpl. Preparing to send tool down hole recording main pass (static conditions)
1025 – Off site to check on FA-7
1044 – On site. Tool at 1150' bls, main pass, static conditions
1047 – Tool at bottom. Preparing to raise tool up to 450' bls for repeat pass, static
1058 – Tool at 425' bls. Preparing to lower tool down hole recording repeat pass at 30 ft/min
1105 – Repeat pass complete. Raising tool to surface.

Dual Induction Log

1130 – Lowering Dual Induction tool down borehole.
1143 – Tool at bottom. Preparing to raise tool up borehole recording main pass at 30 ft/min
1222 – Tool at 84' Preparing to lower tool to 600' to perform repeat pass
1226 – Tool at 625. Preparing to raise tool up borehole recording repeat pass at 30 ft/min
1234 – Tool at 450' bls, recording stopped, raising tool to surface.
1236 – Off site to check on FA-7
1300 – On site. Lowering caliper tool to bottom

Caliper Log

1300 – Lowering caliper tool down borehole
1306 – Tool at bottom, reading 1248.8' bpl. Preparing to raise tool up borehole recording main pass at 30 ft/min
1338 – Tool at 434' bpl. Main pass complete. Preparing to send tool down hole to perform repeat pass
1343 – Tool at 600'. Preparing to raise tool up hole recording repeat pass at 30 ft/min.
1352 – Tool at 450', repeat pass complete, recording stopped. Caliper log complete. Preparing to raise tool to surface.
1401 – Tool at surface

1455 – Received field logs from Dominick

1500 – Shamus English off site.

Recorded By: Shamus English

Date: 8/24/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/24/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Development

1025 – On site FA-7
1031 - Water sample collected
Temp-25.21°C pH-6.99 Cond.-1996 uS/cm TDS-1.297 g/L
1035 – Off site, geophysical logging being conducted at FB-2 today
1236 - Water sample collected
Temp-25.27°C pH-7.01 Cond.-1960 uS/cm TDS-1.274 g/L
1510 - Water sample collected
Temp-25.24°C pH-7.0 Cond.-1919 uS/cm TDS-1.248 g/L

1530 – Shamus English off site.

1700 - Water sample collected by contractors, parameters tested on 8/28/07
pH-7.07 Cond.-1886 uS/cm TDS-1.227 g/L

Recorded By: Shamus English

Date: 8/24/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/28/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Variable-Rate Pump Test FA-9

0945 – Shamus English on site FA-9.
1005 – Water sample collected
Temp.-25.45°C pH-6.85 Cond.-2018 uS/cm TDS-1.312 g/L
1018 – Totalizer at 30905
1028 – Rossum Sand Test (RST) Started
1038 – RST<.1. Totalizer at 30953, 2,400 gpm
1048 – RST<.1. Totalizer at 30976, 2,300 gpm
1058 – RST<.1
1107 – Pump shut off and well shut in for recovery. Transducer set at 22.9' (3.5' above ground surface)
1119 – Test started on pocket PC
1124 – Manometer at 6'.5"
1134 – Manometer at 6'3"
1145 – Pulled transducer out of well head until taut.
1150 – Turned pump back on full blast to see if at 2,500 gpm the water level falls below where the transducer is set. Its OK.
1202 – Turned pump off and shut well in.
1312 – Water level at 15.048'. Manometer at 6'9.5"
1324 – Water level at 15.084'. Manometer at 6'10"

1330 – Variable-rate pumping test started.

Step 1 – 500 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1330	0	13.989	31054	700	500	5'3"
1335	5	13.776	31057	"	500	5'2"
1340	10	14.184	31060	"	600	5'3"
1345	15	13.636	31062	"	500	5'2½"
1350	20	13.752	31065	"	500	5'2"

Time	Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1355	25	13.727	31067	"	500	5'2"
1400	30	13.471	31070	"	"	5'1½"
*** Water level on manometer is fluctuating by about 1-foot, hard to get exact measurement						
1405	35	13.617	31073	"	"	5'1"
1410	40	13.539	31076	"	"	5'1"
1415	45	13.679	31078	"	"	5'1"
1420	50	13.046	31081	"	"	5'1"
1425	55	13.813	31084	"	"	5'1"
1430	60	13.186	31087	"	"	5'1"

Flow Rate – (31087-31054)=33 x 1,000=33,000/60=**550gpm**

Step 2 – 1,000 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft
1430	0	13.186	31087	1,000	1,000	N/A
1435	5	10.927	31092	1,000	1,000	N/A
1440	10	11.037	31097	"	"	"
1445	15	10.764	31103	"	"	"
1450	20	10.917	31108	"	"	"
1455	25	10.929	31113	"	"	"
1500	30	10.844	31119	"	"	"
1505	35	10.887	31124	"	"	"
1510	40	11.003	31130	"	"	"
1515	45	10.991	31135	"	"	"
1520	50	10.802	31140	"	"	"
1525	55	11.003	31146	"	"	"
1530	60	10.777	31151	"	"	"

Flow Rate – (31151-31087)=64 x 1,000=64,000/60=**1067gpm**

Step 3 – 1,500 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1530	0	10.777	31151	1,200	1,500	N/A
1535	5	8.336	31159	1,200	1,500	N/A
1540	10	8.202	31167	"	"	"
1545	15	8.208	31174	"	"	"
1550	20	8.086	31183	"	"	"
1555	25	8.031	31190	"	"	"
1600	30	8.056	31198	"	"	"
1605	35	8.025	31206	"	"	"
1610	40	8.062	31214	"	"	"
1615	45	8.069	31222	"	"	"
1620	50	7.995	31230	"	"	"
1625	55	7.873	31238	"	"	"
1630	60	7.910	31246	"	"	"

Flow Rate – (31246-31151)=95 x 1,000=95,000/60=**1,583gpm**

Step 4 – 2,000 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1630	0	7.910	31246	1,500	2,000	N/A
1635	5	5.688	31256	"	"	"
1640	10		On phone with Michael Bennett			
1645	15	5.688	31277	1,500	2,000	N/A
1650	20	5.499	31287	"	"	"
1655	25	5.493	31298	"	"	"
1700	30	5.469	31308	"	"	"
1705	35	5.438	31318	"	"	"
1710	40	5.433	31328	"	"	"
1715	45	5.439	31339	1,500	2,000	N/A
1720	50	5.438	31349	"	"	"
1725	55	5.432	31359	"	"	"
1730	60	5.354	31369	"	"	"

Flow Rate – (31369-31246)=123 x 1,000=123,000/60=**2,050gpm**

Step 5 – 2,500 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1730	0	1.957	31369	1,950	2,500	N/A
1735	5	1.894	31383	"	"	"
1740	10	1.828	31396	"	"	"
1745	15	1.755	31409	1,950	2,500	N/A
1750	20	1.743	31422	"	"	"
1755	25	1.750	31436	"	"	"
1800	30	1.737	31448	"	"	"
1805	35	1.707	31461	"	"	"
1810	40	1.749	31474	"	"	"
1815	45	1.671	31487	1,950	2,500	N/A
1820	50	1.695	31500	"	"	"
1825	55	1.719	31514	"	"	"
1830	60	1.732	31527	"	"	"

Flow Rate – (31527-31369)=158 x 1,000=158,000/60=**2,633gpm**

1813 – Water Quality Sample Collected. pH-6.85 cond.-1915uS/cm TDS-1.244g/L
1830 – Pump shut off, well shut in

1845 – Shamus English off site.

Recorded By: Shamus English

Date: 8/28/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/29/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Acidization

1000 – Shamus English on site. Mick (AWE) on site prepping for acidization. Dave Webb Jr. to be here about 11:00.
1020 – Off site
1130 - On site. Dave Jr. not on site yet
1230 – Off site to FA-9 to check water quality
1250 – On site, approximately 4,850 gallons of acid in storage tank, Pipe set at 632' bls
1305 – Background water sample collected
Temp-25.09°C pH-7.77 Cond-1577uS/cm TDS-1.025 g/L
1335 – Dave Webb Jr. arrives on site
1451 – Shut in pressure head at 12'3" after 1 hour and 10 mins shut in.
@400gpm pressure head at 10'3"
@700gpm pressure head at 8'2"
@1000gpm pressure head at 5'3"
1506 – AWE performing leak test
1528 – Begin pumping acid
1534 – 3,500 gallons of acid left in tank. Pressure at well head 0 psi
1539 – Stopped pumping acid, approximately 2,400 gallons left in tank. Preparing to chase with water, backside
1542 – Pressure at well head 40 psi
*** Leak observed at valve on acid tank. Dave Webb Jr. wants to pump the remaining 2,400 gallons of acid today. Contacted Michael Bennett (Boyle), he explained that it would be alright to pump the rest of acid today after pressure at well head falls to 0psi
1546 – Pressure at well head 35 psi
1705 – Pressure at well head 10 psi
1715 – Pressure at well head 0 psi, Preparing to pump the rest of acid
1729 – Begin pumping the remaining 2,400 gallons of acid
1740 – Finished pumping acid. Pressure at well head 0 psi
1751 – Pressure at well head 13 psi
1757 - Pressure at well head 17 psi
1814 - Pressure at well head 23 psi

1835 - Pressure at well head 20 psi
1840 - Pressure at well head 17 psi

1845 – Shamus English off site.

Recorded By: Shamus English

Date: 8/29/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 08/29/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Finish Well Development

0800 – Shamus English on site FA-9. Extracting data from pressure transducer from yesterdays pump test. Will continue to develop well today.
0815 – Off site to FB-2, acidization of FB-2 being conducted today.
1245 – Water Quality Sample Collected.
Temp-25.47°C pH-7.15 cond.-1820uS/cm TDS-1.184g/L
Off site
1815 – Pump shut off, well development complete
1820 - Water Quality Sample Collected.
Temp-25.34°C pH-7.24 cond.-1799uS/cm TDS-1.170g/L

1845 – Shamus English off site.

Recorded By: Shamus English

Date: 8/29/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/04/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Development

1000 – On site FB-2. Pump ran for 3 hours on Saturday. Started today at 0745.
1026 – Rosum Sand Tester (RST) started. Totalizer at 24007
1031 – Water sample collected
Temp-25.2°C pH-7.09 Cond-1996 uS/cm TDS-1.297 g/L
1036 – RST at .3ml Totalizer at 24031 2,400 gpm
1056 – RST at .9ml Totalizer at 24076 2,250 gpm
1126 – RST at 1.5ml
1316 – RST at 3.5ml Totalizer at 24399

1320 – Shamus English off site.

Recorded By: Shamus English

Date: 9/4/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/06/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Development & Pump Test

0730 – On site FB-2. Pump not running at TOA, Battery dead. Pump ran last night until 1850.
0811 – Pump started.
0827 – Rossum Sand Test (RST) started.
0835 - Totalizer at 26268
0837 – RST at .1 ml after 10 mins
0845 – Totalizer at 26292. 2,400 gpm
0927 – RST at .5 ml after 1 hour
0930 – RST started
1000 – RST at .3 after 30 mins
1001 – RST started
1031 – RST at .25 after 30 mins
1101 – RST at .5 ml after 1 hour
1146 – Started pump test
1200 – Pump turned off for recovery, well shut in
1201 – RST at .8 ml after 2 hours
Flange on well head 1'10" above ground surface. Transducer set 14'11" below flange
1245 – Manometer reads 12'2". Transducer reads 24.095'
1315 – Manometer reads 12'4"
1334 – Manometer reads 12'4". Transducer reads 24.281'
1345 – Manometer reads 12'5". Transducer reads 24.311'
1350 – Manometer reads 12'5". Transducer reads 24.312'
1358 – Manometer reads 12'5". Transducer reads 24.329'

Serial Number for McCrometer 07-04717-12

Step 1 – 550 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1400	0	24.336	26742	700	500	12'5"
1405	5	23.146	26745	"	500	10'11"
1410	10	22.640	26748	"	500	10'11"
1415	15	23.037	26750	"	500	10'11"
1420	20	23.950	26753	"	500	10'11"
1425	25	23.055	26756	"	500	10'11"
1430	30	23.111	26759	"	"	10'10"
1435	35	23.482	26761	"	"	10'10"
1440	40	22.800	26764	"	"	10'10"
1445	45	22.319	26767	"	"	10'10"
1450	50	22.831	26770	"	"	10'10"
1455	55	23.647	26773	"	"	10'10"
1500	60	21.949	26775	"	"	10'10"

Flow Rate = 26775-26742=33*1,000=33,000/60=**550gpm**
Drawdown = 12'5"(starting pressure head) – 10'10"(final press. head)=1'7"=**1.583'**
Specific Capacity = 550gpm/1.583ft = **347 gpm/ft**

Step 2 – 1,083 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft
1500	0	21.949	26775	1,000	1,000	10'10"
1505	5	19.604	26781	1,000	1,000	8'½"
1510	10	19.446	26786	"	"	8'½"
1515	15	20.487	26792	"	"	8'
1520	20	20.177	26797	"	"	8'
1525	25	20.348	26802	"	"	7'11½"
1530	30	19.763	26807	"	"	7'11"
1535	35	On phone with Michael Bennett (Boyle)				
1540	40	19.628	26818	"	"	7'11"
1545	45	20.542	26824	"	"	7'11"
1523 – Water Quality Sample Collected. Temp-25.31°C pH-7.29 cond.-1719uS/cm TDS-1.118g/L						
1550	50	19.055	26830	"	"	7'11"
1555	55	19.810	26835	"	"	7'10½"
1600	60	19.762	26840	"	"	7'10½"

Flow Rate = 26840-26775=65*1,000=65,000/60=**1,083gpm**
Drawdown = 12'5"(starting pressure head) – 7'10½"(final press. head)=4'6½"=**4.542'**
Specific Capacity = 1,083gpm/4.542ft = **238 gpm/ft**

Step 3 – 1,600 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1600	0	19.762	26840	1,300	1,500	7'10½"
1605	5	16.175	26848	1,300	1,500	3'6"
1610	10	15.816	26856	"	"	3'6"
1615	15	16.126	26864	"	"	3'6"
1620	20	14.629	26872	"	"	3'5½"
1625	25	16.053	26879	"	"	3'5"
1630	30	14.939	26888	"	"	3'5"
1635	35	15.219	26895	"	"	3'5"
1640	40	15.547	26903	"	"	3'5"
1644 – Water Quality Sample Collected. Temp-25.52°C pH-7.10 cond.-1823uS/cm TDS-1.185g/L						
1645	45					
1650	50	15.182	26919	"	"	3'5"
1655	55	16.303	26928	"	"	3'5"
1700	60	15.566	26936	"	"	3'5"

Flow Rate = 26936-26840=96*1,000=96,000/60=**1,600gpm**
Drawdown = 12'5"(starting pressure head) – 3'5"(final press. head)=**9'**
Specific Capacity = 1,600gpm/9ft = **178 gpm/ft**

Step 4 – 2,033 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1700	0	15.566	26936	1,700	2,000	3'5"
1705	5	11.135	26945	"	"	N/A
1710	10	11.056	26956	"	"	"
1715	15	11.171	26966	1,700	2,000	N/A
1720	20	11.128	26976	"	"	"
1725	25	11.140	26987	"	"	"
1730	30	11.176	26997	"	"	"
1735	35	11.213	27007	"	"	"
1740	40	11.128	27017	"	"	"
1745	45	11.219	27027	1,700	2,000	N/A
1750	50	11.158	27038	"	"	"
1755	55	11.153	27048	"	"	"
1800	60	11.176	27058	"	"	"

Flow Rate = 27058-26936=122*1,000=122,000/60=**2,033gpm**
Drawdown = 24.336'(starting pressure head) – 11.176'(final press. head)=**13.16'**
Specific Capacity = 2,033gpm/13.16ft = **155 gpm/ft**

Step 5 – 2,350 gpm

Time	Elapsed Time	Water Lvl Reading (ft)	Totalizer Reading	Engine RPM	Flowmeter (gpm)	Manometer (ft)
1800	0	11.176	27058	1,700	2,350	N/A
1805	5	7.218	27070	"	"	N/A
1810	10	7.327	27083	"	"	"
1815	15	7.254	27094	"	"	"
1820	20	7.296	27105	"	"	"
1825	25	7.254	27117	"	"	"
1830	30			"	"	"
1835	35	7.249	27142	"	"	"
1840	40	7.322	27152	"	"	"
1842 – Water Quality Sample Collected.			Temp-25.42°C	pH-7.02	cond.-1911uS/cm	TDS-1.242g/L
1845	45	7.359	27164	"	"	"
1850	50	7.334	27175	"	"	"
1855	55	7.254	27187	"	"	"
1900	60	7.261	27199	"	"	"

Flow Rate = 27199-27058=141*1,000=141,000/60=**2,350gpm**
Drawdown = 24.336'(starting pressure head) – 7.261'(final press. head)=**17.075'**
Specific Capacity = 2,350gpm/17.075ft = **138 gpm/ft**

Pump test finished

1915 – Shamus English off site.

Recorded By: Shamus English

Date: 9/6/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/07/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FB-2	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Well Development

0730 – On site FB-2. Well was left alive all night. Will shut well in and let it recover until about 10:00 before extracting pump test data
0745 – Off site FB-2. P&A test being conducted today at FA-7 and FA-9
1025 – On site FB-2. extracting data from transducer. Manometer reads 13'10"
1045 – Water sample collected under artesian flow
Temp-25.07°C pH-7.59 Cond-1605uS/cm TDS-1.043 g/L
1115 – Flowing at 500gpm (artesian flow) Manometer reads 12'6"
1120 – Pump started. Checking sand content while pumping at 650 gpm
1124 – Rosum Sand Test (RST) started.
1125 – Totalizer at 27538
1128 – Water sample collected
pH-7.65 Cond-1647uS/cm TDS-1.071 g/L
1135 – Totalizer at 27545 pumping at 700gpm
1139 – Trace amounts of sand in RST after 15 mins. Manometer reads 11'3"
1154 – Trace amounts of sand in RST after 30 mins.
1158 – turn pump all the way up
1200 – RST started. Totalizer reads 27567
1204 – Water sample collected
pH-7.57 Cond-1692uS/cm TDS-1.100 g/L
1215 – RST at .3 ml after 15 mins at 2,450 gpm
1230 – RST at .4ml after 30 mins
1240 - Offsite FB-2. Pump will remain running at 2,450 gpm
1421 – On site FB-2.
1430 - RST at 1.3ml after 2.5 hours
Water sample collected
pH-7.33 Cond-1837uS/cm TDS-1.192 g/L
1456 – RST started
1526 – RST at .2ml after 30 mins
1550 - Water sample collected
Temp-25.54°C pH-7.17 Cond-1828uS/cm TDS-1.187 g/L

1556 – RST at .4ml after 1 hour

1600 – Shamus English off site.

Recorded By: Shamus English

Date: 9/7/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/07/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Plumb & Alignment Test FA-7

0800 – On site FA-7. P&A Test
0808 – Lowering tool into borehole
0813 – At 400'
0814 – At 500'
0815 – At 550'
0817 – Lunch truck arrived on site. Work halted
0837 – Raising tool out of hole
0843 – Tool at surface, waiting on welder
0909 – Welder on site
0920 – Welding centralizing bracket 10, above well head
0938 – Begin test

Depth	X (in)	Y (in)	ΔX	ΔY	Depth	X (in)	Y (in)	ΔX	ΔY
0	7.5	7.5	N/A	N/A	**110**	6.875	6.375	N/A	N/A
10	6.625	7	0.875	0.5	**120**	6.875	6.375	0	0
20	6.5	6.625	1	0.875	**130**	6.875	6.375	0	0
30	6.625	6.375	0.875	1.125	**140**	7	6.375	-0.125	0
40	6.625	6.375	0.875	1.125	**150**	6.875	6.5	0	-0.125
50	6.75	6.375	0.75	1.125	**160**	6.875	6.375	0	0
60	6.875	6.375	0.625	1.125	**170**	6.875	6.375	0	0
70	6.875	6.5	0.625	1	**180**	6.75	6.375	0.125	0
80	6.875	6.375	0.625	1.125	**190**	6.75	6.5	0.125	-0.125
90	6.875	6.375	0.625	1.125	**200**	6.75	6.375	0.125	0
100	6.75	6.375	0.75	1.125					

Finished P&A test

1530 – Shamus English off site.

Recorded By: Shamus English

Date: 9/07/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/07/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Plumb & Alignment Test FA-9

1250 – On site FA-9. P&A Test
1326 – Lowering tool into borehole
1338 – Dummy test to 550' bls
1345 – Adding centralizer bracket 10 feet above well head
1355 – Begin test

Depth	X (in)	Y (in)	ΔX	ΔY	Depth	X (in)	Y (in)	ΔX	ΔY
0	7.75	7.75	N/A	N/A	110	7.5	8	N/A	N/A
10	7.625	7.75	0.125	0	120	7.5	8.125	0	-0.125
20	7.625	7.75	0.125	0	130	7.5	8.25	0	-0.25
30	7.625	7.75	0.125	0	140	7.625	8.25	-0.125	-0.25
40	7.625	7.625	0.125	0.125	150	7.625	8.375	-0.125	-0.375
50	7.5	7.75	0.25	0	160	7.625	8.375	-0.125	-0.375
60	7.625	7.75	0.125	0	170	7.5	8.375	0	-0.375
70	7.5	8	0.25	-0.25	180	7.625	8.375	-0.125	-0.375
80	7.5	8	0.25	-0.25	190	7.625	8.375	-0.125	-0.375
90	7.5	8	0.25	-0.25	200	7.625	8.5	-0.125	-0.5
100	7.5	8	0.25	-0.25					

Finished P&A test

1530 – Shamus English off site.

Recorded By: Shamus English

Date: 9/07/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/10/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Video Survey

0900 – On site FA-7. Boom truck on site at time of arrival. Logging truck to arrive shortly
0918 – Logging truck on site
0948 – Lowering video survey tool into borehole
1018 - @ 745' a piece of cement is obstructing borehole. Will try to get camera passed it
1035 – Knocked piece of cement down borehole twice before getting camera passed it. Obstruction is now at 768' bls
1059 – Tool at bottom, reading 1256' bls. Preparing to raise tool to surface
1125 – Tool at surface. Video survey finished.
1155 – Offsite to conduct video survey at FA-9.
1155 – Shamus English off site.

Recorded By: Shamus English

Date: 9/10/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/10/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-9	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Video Survey

1158 – On site FA-9. Have to remove blind flange from well head.
1239 – Lowering video survey tool into borehole
1329 – Tool at bottom, reading 1256' bls. Preparing to raise tool to surface.
1350 – Tool at surface, finished with video survey. Video survey finished
1420 – Received copies of FA-7 and FA-9 video surveys. Shamus English off site.

Recorded By: Shamus English

Date: 9/10/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/14/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Swab Well

1000 – On site FA-7. No one on site at time of arrival.
1015 – Off site to check on status of FA-9, FB-2, FB-3 and FB-4
1045 – Called Dave Webb, Jr. He explained that someone would be on site shortly to swab well.
1220 – Contractors arrive on site. Setting up rig. Will drop bailer pipe tool down borehole with cable rig.
1405 – Lowering tool down borehole.
1425 – Working well from 607-895. Lowering tool and raising fairly rapid at least three times. Next did 895-1087 interval in same manner. Then 1087-1250 interval again in same manner.
1438 – Bring tool back to 600' bls and work well 100' intervals
1519 – Finished swabbing well. Bringing tool to surface.
While raising tool to surface a twisted knot in cable was observed.
1611 - Contractors get knot out and continue to raise tool to surface.
1618 – Another knot in line
1626 – Got 2nd knot out
1630 – Another knot in line, very bad knot (birds nest)
1715 – Mike (All Webbs) explained that Dave Webb Sr. needed to see how to get this knot untangled & work was done for the day.

1730 – Shamus English off site.

Recorded By: Shamus English

Date: 9/14/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/17/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Swab Well

1225 – On site FA-7. Contractor's on site at time of arrival. Swab tool and video survey tool at TOA
1245 – Raised camera out of borehole. Swabbing from 585'-605' bls.
1330 – Down to 794' then raise back to 600' working interval
1350 – Tool at bottom, raising back up to 600' bls and repeat.
1419 – Lowering video tool down borehole.
1443 - @ 748' bls 4-foot long piece of cement lodged into side of borehole
1445 - @773' bls another piece of cement lodged against side of borehole. @778' bls another piece of cement lodged against side of borehole
1447 - @ 799' bls another piece of cement obstructing borehole
1455 – raising video tool to surface
1510 – Working well with swab tool from 700'-800'
1550 – Working the area where 4' piece of PVC casing (600' bls)
1610 – Raising tool to surface
1613 – Lowering video tool down borehole
1622 – Area from 585'-600' still the same. @ 750' same piece of cement 4-feet long lodged into side of borehole. Pieces that were at 775' bls are gone. @ 795' and 800' obstructions blocking borehole.
1631 – Bulb on video tool blew out. Will continue to swab well after AWE can build a tool that will clear well out properly.

1650 – Shamus English off site.

Recorded By: Shamus English

Date: 9/17/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/19/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Swab Well

1100 – On site FA-7. Contactors on site at time of arrival. Swabbing tool is at bottom.
1132 – Logging truck on site
1220 – Lowering video survey tool down borehole.
1240 – 4-foot section of PVC is pushed against side of well. Can't get passed bottom of the 4-foot PVC section. Lowering swab tool down borehole to work well from 580'-600' bls
1355 – bulb on video tool burned out. Raising video tool to surface to replace bulb.
1420 – Bulb replaced lowering video survey tool down borehole again.
1439 - @665 obstruction in borehole
1450 – working well from 655'-700' bls
1505 – Obstruction at 665 is gone, appears to have been pushed down to 715' bls. Working well from 700' to 750' bls
1531 – Piece of cement approximately 5-feet long lodged into side of borehole at 750' bls
1535 – Obstruction at 775' bls. Preparing to raise tool to surface & work the well to bottom with swab tool. Working well to bottom in 100-foot intervals
1802 – Cable rig is out of gas. Dana Webb gone to refill rig. Sending video tool down borehole.
1838 – Borehole appears to be clear of obstructions to at least 1124' bls where water becomes to turbid to see anything
1845 – Plan is to use swab tool to work well to bottom and then perform video survey after well has ample time to clear up.

1900 – Shamus English off site.

Recorded By: Shamus English

Date: 9/19/07

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DAILY REPORT OF CONSTRUCTION

Project Number: 06-0039 32063.00	Project Name: FPUA – Floridan Aquifer Production Wells	Client: Fort Pierce Utilities Authority	Date: 09/22/07	Day of Week:	Contractor: All-Webbs Enterprises, Inc.
Well Name: FA-7	FDEP Permit #:	Starting Depth:	Ending Depth:	Bit Size:	Weather: Sunny and Warm

ACTIVITY:

DESCRIPTION OF WORK: Video Survey After Well Was Swabbed

1545 – Shamus English on site. Video survey tool at 588' bls at TOA.

- @ 590' A piece of cement along side of borehole, can't really tell what is holding it in place other than just being pushed into sidewall.
- @ 596'-601' Section of PVC approximately 5' long nested in borehole with no connection to the well casing. This section of PVC is cracked in several places and fairly beaten up.
- @ 630' Piece of PVC wedged into side of borehole.
- @ 750'-756' Large piece of arc shaped cement (approximately 5' long) wedged along side of borehole.
- @ 914' Piece of cement setting on a ledge along side of borehole.

There are no obstructions in the well at this time that would appear to hinder flow. However, some of the above mentioned objects could pose a future problem should they become displaced from their current position.

1700 – Shamus English off site.

Recorded By: Shamus English

Date: 9/22/07

APPENDIX C

Description of Subsurface Strata

APPENDIX C-1

Lithologic Description FB-2

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well - FB-2
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
8/14/2007	890	900	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
8/14/2007	900	910	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
8/15/2007	910	920	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2), moderately indurated, dolomitic limestone. Minimal secondary porosity.
8/15/2007	920	930	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2) to light gray (N7), moderately indurated, dolomitic limestone. Minimal secondary porosity.
8/15/2007	930	940	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
8/15/2007	940	950	**LIMESTONE** - white (N9), moderately indurated, chalky limestone; minimal secondary porosity.
8/15/2007	950	960	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone; pinhole porosity evident.
8/15/2007	960	970	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone; pinhole porosity evident.
8/15/2007	970	980	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone interbedded with medium gray (N5) moderatly indurated micritic limestone. Minimal secondary porosity.
8/15/2007	980	990	**DOLOMITE** - grayish orange (10 YR 7/4), moderately indurated, minimal secondary porosity, crystalline dolomite.
8/16/2007	990	1000	**DOLOMITIC LIMESTONE** - pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone; good pinhole porosity. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
8/16/2007	1000	1010	**DOLOMITE** - grayish orange (10 YR 7/4), moderately indurated, fairly good secondary porosity, crystalline dolomite.
8/16/2007	1010	1020	**LIMESTONE** - white (N9) to light gray (N7), moderately indurated, chalky limestone with areas that are partially dolomitic. Minimal secondary porosity.
8/16/2007	1020	1030	**LIMESTONE** - pale yellowish brown (10YR 6/2), poorly to moderately indurated, chalky limestone; minimal secondary porosity.Moderate fossil content with *Dictyoconus sp* .present.
8/16/2007	1030	1040	**DOLOMITIC LIMESTONE** - grayish orange pink (5YR 7/2), moderately indurated, limestone with areas of crystalline dolomite, grayish orange (10 YR 7/4); secondary porosity evident. *Dictyoconus sp* .present.
8/16/2007	1040	1050	**DOLOMITE** - dark yellowish orange (10YR 6/6), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
8/16/2007	1050	1060	**DOLOMITE** - dark yellowish orange (10YR 6/6), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
8/16/2007	1060	1070	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval.

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well - FB-2
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
8/16/2007	1070	1080	**DOLOMITE** - dark yellowish orange (10YR 6/6), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
8/16/2007	1080	1090	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone; pinhole porosity evident.
8/17/2007	1090	1100	**DOLOMITE** - grayish orange (10 YR 7/4), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
8/17/2007	1100	1110	**LIMESTONE** - white (N9) to light gray (N7), moderately indurated, chalky limestone with areas that are vuggy. Minimal secondary porosity.
8/17/2007	1110	1120	**DOLOMITIC LIMESTONE** - pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone; secondary porosity evident. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
8/17/2007	1120	1130	**DOLOMITIC LIMESTONE** - pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone; secondary porosity evident. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
8/17/2007	1130	1140	**LIMESTONE** - pale yellowish brown (10YR 6/2), poorly to moderately indurated, vuggy, good secondary porosity, sucrosic in nature. Partially dolomitic limestone.
8/17/2007	1140	1150	**DOLOMITE** - grayish orange (10 YR 7/4), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
8/17/2007	1150	1160	**DOLOMITIC LIMESTONE** - light gray (N7) to very pale orange (10 YR 8/2), moderately indurated, dolomitic limestone. Secondary porosity evident.
8/17/2007	1160	1170	**DOLOMITE** - grayish orange (10 YR 7/4), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
8/17/2007	1170	1180	**LIMESTONE** - very pale orange (10 YR 8/2), poorly indurated, chalky limestone intermixed with pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone. *Dictyoconus sp.* Present
8/17/2007	1180	1190	**DOLOMITE** - very pale orange (10 YR 8/2), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
8/17/2007	1190	1200	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2) to grayish orange (10YR 7/4), moderately indurated dolomitic limestone. Minimal secondary porosity
8/17/2007	1200	1210	**LIMESTONE** - very pale orange (10 YR 8/2), poorly indurated, chalky limestone intermixed with pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone.High fossil content. *Dictyoconus sp.* Present
8/17/2007	1210	1220	**LIMESTONE** - very pale orange (10 YR 8/2), poorly indurated, chalky limestone intermixed with pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone.High fossil content. *Dictyoconus sp.* Present
8/17/2007	1220	1230	**LIMESTONE** - very pale orange (10 YR 8/2), poorly indurated, chalky limestone intermixed with pale yellowish brown (10YR 6/2), vuggy, moderately indurated, dolomitic limestone.High fossil content. *Dictyoconus sp.* Present
8/17/2007	1230	1240	**LIMESTONE** - very pale orange (10 YR 8/2), poorly indurated, chalky limestone intermixed with pale yellowish brown (10YR 6/2), vuggy, moderately indurated, dolomitic limestone.High fossil content. *Dictyoconus sp.* Present

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well - FB-2
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
8/17/2007	1240	1250	**DOLOMITE** - grayish orange (10YR 7/4), vuggy, moderately indurated, dolomite. Sucrosic in nature, good porosity.

APPENDIX C-2

Lithologic Description FB-3

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well - FB-3
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
6/27/2007	890	900	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
6/27/2007	900	910	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
6/27/2007	910	920	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
6/27/2007	920	930	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
6/27/2007	930	940	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
6/27/2007	940	950	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2), moderately indurated, dolomitic limestone; good secondary porosity observed in some areas of sample interval.
6/27/2007	950	960	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
6/27/2007	960	970	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
6/27/2007	970	980	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone interbedded with light olive gray (5Y 6/1), moderate to well indurated, micritic limestone; minimal secondary porosity.
6/28/2007	980	990	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2) to grayish orange (10YR 7/4), moderately indurated dolomitic limestone. Minimal secondary porosity
6/28/2007	990	1000	**LIMESTONE** - very pale orange (10 YR 8/2) to pale yellowish brown (10YR 6/2), moderately to well indurated dolomitic limestone with moderate secondary porosity.
6/28/2007	1000	1010	**DOLOMITIC LIMESTONE** - pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone; secondary porosity evident.
6/28/2007	1010	1020	**DOLOMITIC LIMESTONE** - light olive gray (5Y 6/1), moderately indurated, dolomitic limestone; minimal secondary porosity.
6/28/2007	1020	1030	**LIMESTONE** - grayish orange (10YR 7/4), poorly indurated, chalky limestone; minimal secondary porosity.
6/29/2007	1030	1040	**DOLOMITE** - grayish orange (10 YR 7/4), moderately to well indurated dolomite and dolomitic limestone. Pinhole porosity evident. Vuggy areas with good secondary porosity also observed in sample interval. *Dictyoconus sp* .present.
6/29/2007	1040	1050	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; secondary porosity evident.*Dictyoconus sp* .present.
6/29/2007	1050	1060	**DOLOMITE** - grayish orange (10 YR 7/4), vuggy, moderately indurated, crystalline dolomite. sucrosic in nature. 30-40% porosity.
6/29/2007	1060	1070	**DOLOMITE** - grayish orange (10 YR 7/4), vuggy, moderately indurated, crystalline dolomite. sucrosic in nature. 30-40% porosity.

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well - FB-3
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
6/29/2007	1070	1080	**DOLOMITIC LIMESTONE** - grayish orange (10 YR 7/4), moderately indurated, good secondary porosity.
6/29/2007	1080	1090	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone.
6/30/2007	1090	1100	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2), moderately indurated, dolomitic limestone; good secondary porosity observed in some areas of sample interval.
6/30/2007	1100	1110	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone.
6/30/2007	1110	1120	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone.
6/30/2007	1120	1130	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone with high fossil content; minimal secondary porosity. *Dictyoconus sp.* Present
6/30/2007	1130	1140	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2), moderately indurated, dolomitic limestone; minimal secondary porosity.
7/1/2007	1140	1150	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval.
7/1/2007	1150	1160	**DOLOMITE** - very pale orange (10 YR 8/2), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
7/1/2007	1160	1170	**DOLOMITE** - dark yellowish orange (10YR 6/6), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
7/1/2007	1170	1180	**DOLOMITE** - dark yellowish orange (10YR 6/6), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
7/1/2007	1180	1190	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone with high fossil content; minimal secondary porosity. *Dictyoconus sp.* Present
7/1/2007	1190	1200	**DOLOMITIC LIMESTONE** - pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone; secondary porosity evident. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
7/1/2007	1200	1210	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval.
7/2/2007	1210	1220	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval.
7/2/2007	1220	1230	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone; secondary porosity evident.
7/2/2007	1230	1240	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone with high fossil content; minimal secondary porosity. *Dictyoconus sp.* Present

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well - FB-3
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
7/2/2007	1240	1250	**LIMESTONE** - pale yellowish brown (10YR 6/2), poorly to moderately indurated, chalky limestone; minimal secondary porosity.Moderate fossil content with *Dictyoconus sp* .present.

APPENDIX C-3

Lithologic Description FB-4

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
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Date	Depth (ft. bpl) From	To	Observer's Description
5/21/2007	880	890	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
5/21/2007	890	900	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
5/21/2007	900	910	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; pinhole porosity evident.
5/21/2007	910	920	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone interbedded with pale yellowish brown (10YR 6/2), moderately to well indurated dolomitic limestone.
5/21/2007	920	930	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone with minimal secondary porosity. Dark yellowish brown (10YR 4/2) cohesive clay also observed in sample interval.
5/21/2007	930	940	
5/22/2007	940	950	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone interbedded with pale yellowish brown (10YR 6/2), moderately to well indurated dolomitic limestone.
5/22/2007	950	960	**DOLOMITIC LIMESTONE** - pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone; secondary porosity evident. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
5/22/2007	960	970	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2) to grayish orange (10YR 7/4), moderately indurated dolomitic limestone. Minimal secondary porosity
5/22/2007	970	980	**LIMESTONE** - very pale orange (10 YR 8/2), poorly to moderately indurated, chalky limestone interbedded with pale yellowish brown (10YR 6/2), moderately to well indurated dolomitic limestone.
5/22/2007	980	990	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2) to pale yellowish brown (10YR 6/2), moderately to well indurated dolomitic limestone with minimal secondary porosity.Extremely vuggy, excellent secondary porosity, dolomitic limestone also included in sample interval.
5/22/2007	990	1000	**LIMESTONE** - grayish orange (10YR 7/4), poorly indurated, chalky limestone; minimal secondary porosity.
5/22/2007	1000	1010	**LIMESTONE** - very light gray (N8), poorly indurated limestone.Vuggy, good secondary porosity. Areas of dolomitic limestone also observed in sample interval.
5/22/2007	1010	1020	**DOLOMITE** - moderate yellowish brown (10 YR 5/4), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
5/22/2007	1020	1030	**LIMESTONE** - very light gray (N8), poorly indurated limestone.Extremely vuggy, excellent secondary porosity. Areas of dolomitic limestone also observed in sample interval.
5/22/2007	1030	1040	**DOLOMITE** - grayish orange (10 YR 7/4), moderately to well indurated dolomite. Pinhole porosity evident. Vuggy areas with good secondary porosity also observed in sample interval.
5/23/2007	1040	1050	**DOLOMITE** - grayish orange (10 YR 7/4), moderately to well indurated dolomite. Pinhole porosity evident. Vuggy areas with good secondary porosity also observed in sample interval.

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Date	Depth (ft. bpl) From	To	Observer's Description
5/23/2007	1050	1060	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone with medium light gray (N6) dolomitic limestone (minimal secondary porosity) at lower portion of interval.
5/23/2007	1060	1070	**DOLOMITIC LIMESTONE** - very pale orange (10 YR 8/2) to pale yellowish brown (10YR 6/2), moderately to well indurated dolomitic limestone with minimal secondary porosity.Extremely vuggy, excellent secondary porosity, dolomitic limestone also included in sample interval.
5/23/2007	1070	1080	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval.
5/23/2007	1080	1090	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval.
5/23/2007	1090	1100	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval. Moderate to high fossil content with *dictyoconus sp.* present.
5/23/2007	1100	1110	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval. Moderate to high fossil content with *dictyoconus sp.* present.
5/23/2007	1110	1120	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.Moderate fossil content with *dictyoconus sp* .present.
5/23/2007	1120	1130	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.*Dictyoconus sp* .present.
5/23/2007	1130	1140	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.Moderate fossil content with *dictyoconus sp* .present.
5/23/2007	1140	1150	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval.
5/23/2007	1150	1160	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval.
5/23/2007	1160	1170	**DOLOMITE** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. Vuggy areas with good secondary porosity observed in sample interval.
5/23/2007	1170	1180	**DOLOMITE** - very pale orange (10 YR 8/2), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
5/23/2007	1180	1190	**DOLOMITIC LIMESTONE** - pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone; secondary porosity evident. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
5/24/2007	1190	1200	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.Moderate fossil content with *dictyoconus sp* .present.

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Date	Depth (ft. bpl) From	To	Observer's Description
5/24/2007	1200	1210	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.Moderate fossil content with *dictyoconus sp* .present.
5/24/2007	1210	1220	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.Moderate fossil content with *dictyoconus sp* .present.
5/24/2007	1220	1230	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.Moderate fossil content with *dictyoconus sp* .present.
5/24/2007	1230	1240	**DOLOMITE** - very pale orange (10 YR 8/2), moderately indurated, vuggy, good secondary porosity, sucrosic in nature, crystalline dolomite
5/24/2007	1240	1250	**LIMESTONE** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.Moderate fossil content with *dictyoconus sp* .present.

APPENDIX C-4

Lithologic Description FA-7

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Date	Depth (ft. bpl) From	To	Observer's Description
5/17/2007	0	5	**Quartz Sand** - Unconsolidated, brown in color - fine to medium grained; moderately sorted; 20% porosity
5/17/2007	5	10	**Quartz Sand** - Unconsolidated, brown to light brown in color - fine to medium grained; moderately sorted; 20% porosity
5/17/2007	10	15	**Quartz Sand** - Unconsolidated, brown to light brown in color - fine to medium grained; moderately sorted; 20% porosity
5/17/2007	15	20	**Quartz Sand** - Unconsolidated, brown to dark brown in color - fine to medium grained; moderately sorted; 20% porosity
5/17/2007	20	25	**Quartz Sand** - Unconsolidated, brown to dark brown in color - fine to medium grained; moderately sorted; 20% porosity
5/17/2007	25	30	**Quartz Sand** - Unconsolidated, brown to dark brown in color - fine to medium grained; moderately sorted; 20% porosity
5/17/2007	30	35	**Quartz Sand** - Unconsolidated, grayish tan in color - fine grained with some silt (cohesive); moderately sorted; 20% porosity
5/17/2007	35	40	**Quartz Sand** - Unconsolidated, grayish olive in color - fine grained with silt; moderately sorted; 20% porosity
5/18/2007	40	45	**Quartz Sand** - Unconsolidated, medium gray in color - fine to medium grained; moderately sorted; 20% porosity
5/18/2007	45	50	**Quartz Sand** - Unconsolidated, ligth to medium gray in color - medium grained; moderately sorted with approximately 10% mollusk shells and shell fragments; 20 to 25% porosity
5/19/2007	50	55	**Quartz Sand** - Unconsolidated, ligth to medium gray in color - medium to coarse grained; moderately sorted with 10% to 15% mollusk shells and shell fragments; 20 to 25% porosity
5/19/2007	55	60	**Quartz Sand** - Unconsolidated, medium gray in color - fine to medium grained; moderately sorted with 5% to 10% mollusk shell fragments; 20% porosity
5/19/2007	60	65	**Quartz Sand** - Unconsolidated, medium gray in color - fine to medium grained; moderately sorted with 5% to 10% mollusk shell fragments; 20% porosity
5/19/2007	65	75	**Shell Bed** - unconsolidated to moderately consolidated; medium to dark gray in color (salt & pepper) with 40% unconsolidated quartz sand and moderately indurated sandstone; mollusk shells and shell fragment up to 2"
5/19/2007	75	81	**Quartz Sand** - Unconsolidated to poorly consolidated; light to medium gray in color - fine grained; moderately to well sorted with 10% to 15% mollusk shell fragments; minor amount of silt and carbonate muds - low permeabiltiy
5/19/2007	81	90	**Quartz Sand/Silt** - Unconsolidated; light gray in color - silt to fine sand grained; moderately sorted with 10% shell fragments; 10 to 15% carbonate mud; very soupy in nature - low permeabiltiy
5/19/2007	90	100	**Quartz Sand** - Unconsolidated to poorly consolidated; light to medium gray in color - fine grained; moderately sorted with 10% shell fragments; minor amount of silts intespersed with carbonate mud; good cohesion - low permeabiltiy
6/2/2007	100	110	**Quartz Sand** - Unconsolidated, yellowish grey (5Y 8/1) - fine grained with minimal shell fragments; moderately sorted.

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Date	Depth (ft. bpl) From	To	Observer's Description
6/2/2007	110	120	**Quartz Sand** - Unconsolidated, yellowish grey (5Y 8/1) - fine grained with minimal shell fragments; moderately sorted.
6/2/2007	120	130	**Quartz Sand** - Unconsolidated, yellowish grey (5Y 8/1) - fine to medium grained with minimal shell fragments; moderately sorted.
6/2/2007	130	140	**Quartz Sand** - Unconsolidated, yellowish grey (5Y 8/1) - fine to medium grained with minimal shell fragments; moderately sorted.
6/2/2007	140	150	**Quartz Sand** - Unconsolidated, light olive grey (5Y 6/1) - fine to medium grained with minimal shell fragments; moderately sorted.
6/2/2007	150	160	**Quartz Sand** - Unconsolidated, light olive grey (5Y 6/1) - fine to medium grained with minimal shell fragments; moderately sorted.
6/2/2007	160	170	**Quartz Sand** - Unconsolidated, light olive grey (5Y 6/1) - fine to medium grained with high silt content and minimal shell fragments; moderately sorted.
6/2/2007	170	180	**Quartz Sand** - Unconsolidated, light olive grey (5Y 6/1) - fine to medium grained with high silt content and minimal shell fragments; moderately sorted.
6/2/2007	180	190	**Quartz Sand** - Unconsolidated, light olive grey (5Y 6/1) - fine to medium grained with high silt content and minimal shell fragments; moderately sorted.
6/2/2007	190	200	**Quartz Sand** - Unconsolidated, light olive grey (5Y 6/1) - fine to medium grained with high silt content and minimal shell fragments; moderately sorted.
6/3/2007	200	210	**Quartz Sand** - Unconsolidated, light olive grey (5Y 6/1) - fine to medium grained with high silt content and minimal shell fragments; moderately sorted.
6/3/2007	210	220	**Quartz Sand** - Unconsolidated, light olive grey (5Y 6/1) - fine to medium grained with high silt content and minimal shell fragments; moderately sorted.
6/3/2007	220	230	**Clay** - pale olive (10Y 6/2), sandy, cohesive clay.
6/3/2007	230	240	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/3/2007	240	250	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/3/2007	250	260	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/3/2007	260	270	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/3/2007	270	280	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/3/2007	280	290	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/3/2007	290	300	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	300	310	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	310	320	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	320	330	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	330	340	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	340	350	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	350	360	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	360	370	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	370	380	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	380	390	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	390	400	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	400	410	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/4/2007	410	420	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/5/2007	420	430	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay.
6/5/2007	430	440	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay. High phosphate content.

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Date	Depth (ft. bpl) From	To	Observer's Description
6/5/2007	440	450	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay. High phosphate content.
6/5/2007	450	460	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay. High phosphate content.
6/6/2007	460	470	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay. High phosphate content.
6/6/2007	470	480	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay. High phosphate content.
6/6/2007	480	490	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay interbedded with white, chalky, poorly indurated limestone.
6/6/2007	490	500	**Clay** - grayish olive (10Y 4/2), sandy, cohesive clay interbedded with white, chalky, poorly indurated limestone.
6/6/2007	500	510	**Clay/Limestone** - grayish olive (10Y 4/2), sandy, cohesive clay interbedded with white, chalky, poorly indurated limestone.
6/6/2007	510	520	**Clay/Limestone** - grayish olive (10Y 4/2), sandy, cohesive clay interbedded with white, chalky, poorly indurated limestone.
6/6/2007	520	530	**Limestone** - yellowish gray (5Y 8/1), poorly indurated, chalky limestone interbedded with pale olive (10Y 6/2) clay
6/6/2007	530	540	**Limestone** - yellowish gray (5Y 8/1), poorly indurated, chalky limestone.
6/6/2007	540	550	**Limestone** - yellowish gray (5Y 8/1), poorly indurated, chalky limestone.
6/6/2007	550	560	**Limestone** - yellowish gray (5Y 8/1), chalky, poorly indurated limestone.
6/6/2007	560	570	**Limestone** - yellowish gray (5Y 8/1), chalky, poorly indurated limestone.
6/6/2007	570	580	**Limestone** - yellowish gray (5Y 8/1), chalky, poorly indurated limestone.
6/6/2007	580	590	**Limestone** - yellowish gray (5Y 8/1), chalky, poorly indurated limestone.
6/6/2007	590	600	**Limestone** - yellowish gray (5Y 8/1),poorly indurated, chalky limestone.
6/6/2007	600	610	**Limestone** - yellowish gray (5Y 8/1), chalky (poorly indurated) to fossiliferous, vuggy (moderately indurated) limestone.
6/6/2007	610	620	**Limestone** - yellowish gray (5Y 8/1), chalky, poorly indurated, limestone.
6/7/2007	620	630	**Limestone** - yellowish gray (5Y 8/1), chalky, poorly indurated, limestone with shell fragments and light olive gray (5Y 5/2) cohesive clay.
6/7/2007	630	640	**Limestone** - very pale orange (10YR 8/2), poorly indurated limestone with fossils evident. *lepidocyclina sp* . present
6/7/2007	640	650	**Limestone** - very pale orange (10YR 8/2), poorly indurated limestone with fossils evident. *lepidocyclina sp* . present
6/7/2007	650	660	**Limestone** - very pale orange (10YR 8/2), poorly indurated limestone with fossils evident. *lepidocyclina sp* . present
6/7/2007	660	670	**Limestone** - very pale orange (10YR 8/2), poorly indurated limestone with fossils evident. *lepidocyclina sp* . present
6/7/2007	670	680	**Limestone** - very pale orange (10YR 8/2), poorly indurated limestone with fossils evident. *lepidocyclina sp* . present
6/7/2007	680	690	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, extremely high fossil content. *lepidocyclina sp* . present
6/7/2007	690	700	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, extremely high fossil content. *lepidocyclina sp* . present
6/7/2007	700	710	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, extremely high fossil content. *lepidocyclina sp* . present

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Date	Depth (ft. bpl) From	To	Observer's Description
6/7/2007	710	720	**Limestone** - very pale orange (10YR 8/2), poorly indurated, chalky limestone with minimal shell fragments and fossil content. *lepidocyclina sp* . present
6/7/2007	720	730	**Limestone** - very pale orange (10YR 8/2), poorly indurated, chalky limestone with minimal shell fragments and fossil content. *lepidocyclina sp* . present
6/7/2007	730	740	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, high fossil content. *lepidocyclina sp* . present
6/7/2007	740	750	**Limestone** - very pale orange (10YR 8/2), poorly indurated, chalky limestone with minimal shell fragments and fossil content. *lepidocyclina sp* . present
7/7/2007	750	760	**Limestone** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
7/7/2007	760	770	**Limestone** - very pale orange (10YR 8/2), poorly to moderately indurated, chalky limestone; secondary porosity evident.
7/7/2007	770	780	**Limestone** - very pale orange (10YR 8/2), poorly to moderately indurated, chalky limestone; secondary porosity evident.
7/7/2007	780	790	**Limestone** - very pale orange (10YR 8/2), poorly to moderately indurated, chalky limestone; minimal secondary porosity. *Lepidocyclina sp.* present
7/7/2007	790	800	**Limestone** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
7/7/2007	800	810	**Limestone** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
7/7/2007	810	820	**Limestone** - white (N9), poorly to moderately indurated, chalky limestone; minimal secondary porosity.
7/7/2007	820	830	**Limestone** - very pale orange (10YR 8/2), moderately indurated limestone; minimal secondary porosity. In some areas limestone is partially dolomitic with better secondary porosity.
7/8/2007	830	840	**Limestone** - white (N9), chalky, moderately indurated limestone interbedded with.grayish olive (10Y 4/2), sandy, cohesive clay
7/8/2007	840	850	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone; minimal secondary porosity.
7/8/2007	850	860	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone; minimal secondary porosity.
7/8/2007	860	870	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone; minimal secondary porosity.
7/8/2007	870	880	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone; minimal secondary porosity.
7/8/2007	880	890	**Dolomitic Limestone** - light olive gray (5Y 6/1), moderately indurated, dolomitic limestone; minimal secondary porosity.
7/8/2007	890	900	**Dolomitic Limestone** - pale yellowish brown (10YR 6/2), moderately indurated, dolomitic limestone; secondary porosity evident.
7/8/2007	900	910	**Dolomitic Limestone** - grayish orange (10YR 7/4), moderately to well indurated, dolomitic limestone; secondary porosity evident. Clay also observed in sample interval.

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Date	Depth (ft. bpl) From	To	Observer's Description
7/8/2007	910	920	**Dolomitic Limestone** - grayish orange (10YR 7/4), moderately to well indurated, dolomitic limestone. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
7/9/2007	920	930	**Dolomitic Limestone** - very pale orange (10YR 8/2), moderately indurated, dolomitic limestone; secondary porosity evident.
7/9/2007	930	940	**Dolomitic Limestone** - very pale orange (10YR 8/2), moderately indurated, dolomitic limestone; secondary porosity evident.
7/9/2007	940	950	**Dolomitic Limestone** - very pale orange (10YR 8/2), moderately indurated, dolomitic limestone; secondary porosity evident.
7/9/2007	950	960	**Dolomite** - pale yellowish brown (10 YR 6/2), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
7/9/2007	960	970	**Dolomitic Limestone** - grayish orange (10YR 7/4), moderately to well indurated, dolomitic limestone. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
7/9/2007	970	980	**Dolomite** - very pale orange (10YR 8/2), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
7/10/2007	980	990	**Limestone** - very pale orange (10YR 8/2), poorly to moderately indurated limestone, high fossil content. *Dictyoconus sp* . present.
7/10/2007	990	1000	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone; minimal secondary porosity.
7/10/2007	1000	1010	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone; secondary porosity evident.
7/10/2007	1010	1020	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone; secondary porosity evident..*Dictyoconus sp* . present.
7/10/2007	1020	1030	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone; secondary porosity evident..*Dictyoconus sp* . present.
7/10/2007	1030	1040	**Dolomite** - pale yellowish brown (10 YR 6/2), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
7/10/2007	1040	1050	**Dolomitic Limestone** - grayish orange (10YR 7/4), moderately to well indurated, dolomitic limestone. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
7/10/2007	1050	1060	**Dolomitic Limestone** - grayish orange (10YR 7/4), moderately to well indurated, dolomitic limestone. Crystalline dolomite, vuggy, sucrosic in nature, good porosity, also observed in sample interval.
7/10/2007	1060	1070	**Dolomite** - pale yellowish brown (10 YR 6/2), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
7/10/2007	1070	1080	**Dolomitic Limestone** - yellowish gray (5Y 8/1), moderately indurated dolomitic limestone. Minimal secondary porosity
7/10/2007	1080	1090	**Dolomitic Limestone** - yellowish gray (5Y 8/1), moderately indurated dolomitic limestone. Minimal secondary porosity
7/10/2007	1090	1100	**Limestone** - yellowish gray (5Y 8/1), moderately indurated, chalky limestone. Minimal secondary porosity

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Date	Depth (ft. bpl) From	To	Observer's Description
7/10/2007	1100	1110	**Dolomitic Limestone** - very pale orange (10YR 8/2) to moderate yellowish brown (10 YR 5/4), moderately indurated dolomitic limestone. Minimal secondary porosity. *Dictyoconus sp* . present.
7/10/2007	1110	1120	**Dolomitic Limestone** - very pale orange (10YR 8/2) to moderate yellowish brown (10 YR 5/4), moderately indurated dolomitic limestone. Minimal secondary porosity. *Dictyoconus sp* . present.
7/10/2007	1120	1130	**Dolomite** - dark yellowish brown (10 YR 4/2), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
7/10/2007	1130	1140	**Dolomite** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. High fossil content. *Dictyoconus sp.* present.
7/10/2007	1140	1150	**Dolomite** - dark yellowish brown (10 YR 4/2), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
7/11/2007	1150	1160	**Dolomitic Limestone** - light olive gray (5Y 6/1), moderately indurated, dolomitic limestone; minimal secondary porosity.
7/11/2007	1160	1170	**Dolomitic Limestone** - very pale orange (10YR 8/2) to moderate yellowish brown (10 YR 5/4), moderately indurated dolomitic limestone. Minimal secondary porosity.
7/12/2007	1170	1180	**Dolomite** - very pale orange (10 YR 8/2), moderately indurated, vuggy, dolomitic limestone. High fossil content. *Dictyoconus sp.* present.
7/12/2007	1180	1190	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, extremely high fossil content. *Dictyoconus sp* . present
7/12/2007	1190	1200	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, extremely high fossil content. *Dictyoconus sp* . present
7/12/2007	1200	1210	**Dolomite** - very pale orange (10 YR 8/2), moderately to well indurated dolomite intermixed with white (N9) chalky limestone. High fossil content. *Dictyoconus sp.* present.
7/12/2007	1210	1220	**Dolomitic Limestone** - pale yellowish brown (10 YR 6/2), moderately indurated, dolomitic limestone. Secondary porosity evident.
7/12/2007	1220	1230	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, high fossil content. *Dictyoconus sp* . present
7/12/2007	1230	1240	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, high fossil content. *Dictyoconus sp* . present
7/12/2007	1240	1250	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, high fossil content. *Dictyoconus sp* . present

ft. bpl = feet below pad level

APPENDIX C-5

Lithologic Description FA-9

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well FA-9
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
7/17/2007	0	10	**Quartz Sand** - Unconsolidated, dark yellowish brown (10YR 4/2) - fine to medium grained; moderately sorted; 20% porosity
7/17/2007	10	20	**Quartz Sand** - Unconsolidated, pale yellowish brown (10YR 6/2)- fine to medium grained; moderately sorted; 20% porosity
7/17/2007	20	30	**Quartz Sand** - Unconsolidated, dusky yellowish brown (10 YR 2/2) - fine to medium grained; moderately sorted; 20% porosity
7/17/2007	30	40	**Quartz Sand** - Unconsolidated, dusky yellowish brown (10 YR 2/2) - fine to medium grained; moderately sorted; 20% porosity
7/18/2007	40	50	**Quartz Sand** - Unconsolidated, pale yellowish brown (10YR 6/2)- fine to medium grained; 30% shell fragments; moderately sorted; 20% porosity
7/18/2007	50	60	**Quartz Sand** - Unconsolidated, dusky yellowish brown (10 YR 2/2) - fine to medium grained; moderately sorted; 20% porosity
7/18/2007	60	70	**Silt** - cohesive to poorly consolidated, yellowish gray (5Y 8/1) - silt to fine grained quartz sand with 5 - 10% crushed shell.
7/18/2007	70	80	**Quartz Sand** - Unconsolidated, pale yellowish brown (10YR 6/2)- fine to medium grained; 20% shell fragments; moderately sorted; 20% porosity
7/19/2007	80	90	**Quartz Sand** - Unconsolidated, pale yellowish brown (10YR 6/2)- fine to medium grained; 5-10% shell fragments; moderately sorted; 20% porosity
7/19/2007	90	100	**Quartz Sand** - cohesive, light olive gray (5Y 8/1) - fine to medium grained with high silt content and 5% crushed shell.
7/23/2007	100	110	**Limestone** - Poorly consolidated chalky limestone; light olive gray (5Y 6/1) - with fine to medium grained quartz sand and moderate shell fragment content
7/23/2007	110	120	**Limestone** - Poorly consolidated chalky limestone; light olive gray (5Y 6/1) - with fine to medium grained quartz sand and moderate shell fragment content
7/23/2007	120	130	**Limestone** - moderately consolidated fossiliferous limestone (vuggy); light olive gray (5Y 6/1) - with fine to medium grained quartz sand and moderate to high content of shell fragments. Clay evident at lower part of interval
7/23/2007	130	140	**Clay** - highly cohesive; grayish olive (10Y 4/2) clay - sandy with shell fragments and limestone pieces evident.
7/23/2007	140	150	**Clay** - highly cohesive; grayish olive (10YR 4/2) clay - sandy with shell fragments and limestone pieces evident.
7/23/2007	150	160	**Clay** - highly cohesive; grayish olive (10Y 4/2) clay - sandy with minimal shell fragments and limestone pieces evident.
7/23/2007	160	170	**Clay** - highly cohesive; grayish olive (10Y 4/2) clay - sandy with shell fragments and limestone pieces evident.
7/23/2007	170	180	**Clay** - highly cohesive; grayish olive (10Y 4/2) clay - sandy with shell fragments and limestone pieces evident.
7/23/2007	180	190	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	190	200	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	200	210	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	210	220	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	220	230	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	230	240	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well FA-9
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
7/23/2007	240	250	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	250	260	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	260	270	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	270	280	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	280	290	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/23/2007	290	300	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	300	310	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	310	320	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	320	330	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	330	340	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	340	350	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	350	360	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	360	370	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	370	380	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	380	390	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	390	400	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	400	410	**Clay** - highly cohesive; sandy, grayish olive (10Y 4/2) clay.
7/24/2007	410	420	**Clay** - highly cohesive; sandy, pale olive (10Y 6/2) clay with fragments of chert evident.
7/24/2007	420	430	**Clay** - highly cohesive; sandy, pale olive (10Y 6/2) clay with fragments of chert evident and minimal phosphate content.
7/24/2007	430	440	**Clay** - highly cohesive; sandy, pale olive (10Y 6/2) clay with fragments of chert evident and minimal phosphate content.
7/24/2007	440	450	**Clay** - highly cohesive; sandy, pale olive (10Y 6/2) clay with fragments of chert evident and minimal phosphate content.
7/25/2007	450	460	**Clay** - highly cohesive; sandy, pale olive (10Y 6/2) clay with fragments of chert evident and minimal phosphate content.
7/25/2007	460	470	**Clay** - highly cohesive; pale olive (10Y 6/2) clay with fragments of chert evident and moderate phosphate content.
7/25/2007	470	480	**Clay** - highly cohesive; pale olive (10Y 6/2) clay with fragments of chert evident and moderate phosphate content.
7/25/2007	480	490	**Clay** - highly cohesive; pale olive (10Y 6/2) clay with fragments of limestone evident and moderate phosphate content.
7/25/2007	490	500	**Clay** - highly cohesive; pale olive (10Y 6/2) clay with fragments of limestone evident and high phosphate content.
7/25/2007	500	510	**Clay** - highly cohesive; pale olive (10Y 6/2) clay with fragments of limestone evident and high phosphate content.
7/25/2007	510	520	**Clay** - highly cohesive; pale olive (10Y 6/2) clay with fragments of limestone evident and high phosphate content.
7/25/2007	520	530	**Limestone** - yellowish gray (5Y 8/1), poorly indurated, chalky limestone interbedded with pale olive (10Y 6/2) clay with high phosphate content
7/25/2007	530	540	**Limestone** - yellowish gray (5Y 8/1), poorly indurated, chalky limestone.

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well FA-9
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
7/25/2007	540	550	**Limestone** - yellowish gray (5Y 8/1), poorly indurated, chalky limestone. Layer of chert observed within interval.
7/25/2007	550	560	**Limestone** - yellowish gray (5Y 8/1), chalky (poorly indurated) to fossiliferous, vuggy (moderately indurated) limestone.
7/25/2007	560	570	**Limestone** - yellowish gray (5Y 8/1), chalky (poorly indurated) to fossiliferous, vuggy (moderately indurated) limestone.
7/25/2007	570	580	**Limestone** - yellowish gray (5Y 8/1), chalky (poorly indurated) to fossiliferous, vuggy (moderately indurated) limestone.
7/25/2007	580	590	**Limestone** - yellowish gray (5Y 8/1), chalky (poorly indurated) to fossiliferous, vuggy (moderately indurated) limestone.
7/25/2007	590	600	**Limestone** - yellowish gray (5Y 8/1),poorly indurated, chalky limestone.
7/25/2007	600	610	**Limestone** - yellowish gray (5Y 8/1), chalky (poorly indurated) to fossiliferous, vuggy (moderately indurated) limestone.
7/25/2007	610	620	**Limestone** - yellowish gray (5Y 8/1), chalky (poorly indurated) to fossiliferous, vuggy (moderately indurated) limestone.
8/1/2007	620	630	**Limestone** - yellowish gray (5Y 8/1), moderately indurated, fossiliferous, vuggy limestone with shell fragments. *lepidocyclina sp* . present
8/1/2007	630	640	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone with shell fragments. *lepidocyclina sp* . present
8/1/2007	640	650	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone with shell fragments. *lepidocyclina sp* . present
8/1/2007	650	660	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone with shell fragments. *lepidocyclina sp* . present
8/1/2007	660	670	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, high fossil content. *lepidocyclina sp* . present
8/1/2007	670	680	**Limestone** - very pale orange (10YR 8/2), moderately indurated, fossiliferous limestone, minimal shell fragments, high fossil content. *lepidocyclina sp* . present
8/1/2007	680	690	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, extremely high fossil content. *lepidocyclina sp* . present
8/1/2007	690	700	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, extremely high fossil content. *lepidocyclina sp* . present
8/2/2007	700	710	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, extremely high fossil content. *lepidocyclina sp* . present
8/2/2007	710	720	**Limestone** - very light gray (N8), poorly indurated, chalky limestone with minimal shell fragments and fossil content. *lepidocyclina sp* . present
8/2/2007	720	730	**Limestone** - very light gray (N8), poorly indurated, chalky limestone with minimal shell fragments and fossil content. *lepidocyclina sp* . present
8/2/2007	730	740	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, high fossil content. *lepidocyclina sp* . present
8/2/2007	740	750	**Limestone** - very pale orange (10YR 8/2), poorly indurated, chalky limestone with minimal shell fragments and fossil content. *lepidocyclina sp* . present
8/2/2007	750	760	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, high fossil content. *lepidocyclina sp* . present

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well FA-9
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
8/2/2007	760	770	**Limestone** - very light gray (N8), poorly indurated, chalky limestone, minimal shell fragments, moderate fossil content. *lepidocyclina sp* . present
8/2/2007	770	780	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, minimal shell fragments, high fossil content. *lepidocyclina sp* . present
8/2/2007	780	790	**Limestone** - very light gray (N8), poorly indurated, chalky limestone, minimal shell fragments, moderate fossil content. *lepidocyclina sp* . present
8/2/2007	790	800	**Limestone** - very light gray (N8), poorly indurated, chalky limestone, moderate fossil content. *lepidocyclina sp* . present
8/2/2007	800	810	**Limestone** - very light gray (N8), moderately indurated, chalky limestone, pinhole porosity evident.
8/2/2007	810	820	**Limestone** - white (N9) to very light gray (N8), moderately indurated, chalky limestone, pinhole porosity evident. Chert observe within interval
8/2/2007	820	830	**Limestone** - white (N9) to very light gray (N8), moderately indurated, chalky limestone, pinhole porosity evident.
8/3/2007	830	840	**Limestone** - white (N9) to very light gray (N8), moderately indurated, chalky limestone, pinhole porosity evident.
8/3/2007	840	850	**Limestone** - very light gray (N8) to pale yellowish brown (10YR 6/2), moderately indurated limestone, pinhole porosity evident.
8/3/2007	850	860	**Limestone** - very pale orange (10 YR 8/2), poor to moderately indurated, chalky limestone.
8/3/2007	860	870	**Limestone** - very pale orange (10 YR 8/2), poor to moderately indurated, chalky limestone.
8/3/2007	870	880	**Limestone** - very pale orange (10 YR 8/2), moderately indurated limestone with good pinhole porosity.
8/3/2007	880	890	**Limestone** - very pale orange (10 YR 8/2), moderately indurated limestone with pinhole porosity.
8/3/2007	890	900	**Dolomitic Limestone** - pale yellowish brown (10 YR 6/2), moderately indurated dolomitic limestone. Some areas have good pinhole porosity.
8/3/2007	900	910	**Limestone** - very light gray (N8) to very pale orange (10YR 8/2), moderately indurated, chalky limestone, pinhole porosity evident.
8/3/2007	910	920	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone interbedded with pale yellowish brown (10 YR 6/2) poorly indurated mudstone.
8/4/2007	920	930	**Dolomite** - grayish orange (10YR 7/4), moderately to well indurated dolomite.
8/4/2007	930	940	**Dolomitic Limestone** - very pale orange (10YR 8/2), moderately indurated dolomitic limestone.
8/4/2007	940	950	**Dolomitic Limestone** - very pale orange (10YR 8/2), moderately indurated dolomitic limestone.
8/4/2007	950	960	**Limestone** - very pale orange (10YR 8/2), moderately indurated limestone, *Dictyoconus sp* . present.
8/4/2007	960	970	**Dolomite** - pale yellowish brown (10 YR 6/2), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
8/4/2007	970	980	**Limestone** - white (N9), moderately indurated, chalky limestone with minimal secondary porosity evident.

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well FA-9
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
8/4/2007	980	990	**Limestone** - very pale orange (10YR 8/2), poorly indurated, chalky limestone.
8/4/2007	990	1000	**Limestone** - white (N9), poorly indurated, chalky limestone, Dictyoconus sp. present.
8/4/2007	1000	1010	**Limestone** - white (N9), poorly indurated, chalky limestone, Dictyoconus sp. present.
8/4/2007	1010	1020	**Limestone** - white (N9), poorly indurated, chalky limestone, Dictyoconus sp. present.
8/4/2007	1020	1030	**Dolomite** - pale yellowish brown (10 YR 6/2), well to moderately indurated dolomite.
8/4/2007	1030	1040	**Dolomite** - pale yellowish brown (10 YR 6/2), well to moderately indurated dolomite.
8/6/2007	1040	1050	**Limestone** - very pale orange (10YR 8/2), poorly indurated limestone, pinhole porosity evident.
8/6/2007	1050	1060	**Limestone** - light gray (N8), moderately indurated, chalky limestone, pinhole porosity evident.
8/6/2007	1060	1070	**Limestone** - white (N9), poorly indurated, chalky limestone, *Dictyoconus sp* . present.
8/6/2007	1070	1080	**Limestone** - white (N9), poorly indurated, chalky limestone, *Dictyoconus sp* . present.
8/6/2007	1080	1090	**Dolomitic Limestone** - very pale orange (10YR 8/2), moderately indurated dolomitic limestone. Minimal secondary porosity.
8/6/2007	1090	1100	**Limestone** - light gray (N8), moderately indurated, micritic limestone, minimal pinhole porosity evident. *Dictyoconus sp* . present.
8/6/2007	1100	1110	**Limestone** - white (N9), poorly indurated, chalky limestone, *Dictyoconus sp.* present.
8/6/2007	1110	1120	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone. Partially dlolmitized in areas of interval.
8/6/2007	1120	1130	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone. Minimal pinhole porosity evident. *Dictyoconus sp* . present.
8/6/2007	1130	1140	**Limestone** - very pale orange (10YR 8/2), moderately indurated limestone. *Dictyoconus sp* . present.
8/6/2007	1140	1150	**Dolomite** - moderate yellowish brown (10 YR 5/4), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
8/6/2007	1150	1160	**Dolomite** - dark yellowish brown (10 YR 4/2), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
8/6/2007	1160	1170	**Dolomitic Limestone** - very pale orange (10YR 8/2) to moderate yellowish brown (10 YR 5/4), moderately indurated dolomitic limestone. Minimal secondary porosity.
8/6/2007	1170	1180	**Dolomite** - very pale orange (10YR 8/2), well to moderately indurated dolomite.
8/7/2007	1180	1190	**Dolomite** - very pale orange (10YR 8/2), well to moderately indurated dolomite.
8/7/2007	1190	1200	**Limestone** - very pale orange (10YR 8/2), poorly indurated, fossiliferous limestone, extremely high fossil content. *Dictyoconus sp* . present
8/7/2007	1200	1210	**Limestone** - very pale orange (10YR 8/2), poorly indurated, chalky limestone, *Dictyoconus sp* . present

Fort Pierce Utilities Authority
Floridan Aquifer Production Well Project
Production Well FA-9
Lithologic Description

Date	Depth (ft. bpl) From	To	Observer's Description
8/7/2007	1210	1220	**Limestone** - very pale orange (10YR 8/2), poorly indurated, chalky limestone, *Dictyoconus sp* . present
8/7/2007	1220	1230	**Dolomitic Limestone** - very pale orange (10YR 8/2) to moderate yellowish brown (10 YR 5/4), moderately indurated dolomitic limestone. Minimal secondary porosity.
8/7/2007	1230	1240	**Dolomite** - moderate yellowish brown (10 YR 5/4), moderately indurated crystalline dolomite. sucrosic in nature. 30-40% porosity.
8/7/2007	1240	1250	**Limestone** - very pale orange (10YR 8/2), moderately indurated, chalky limestone.

ft. bpl = feet below pad level

APPENDIX D

Mill Certificates for Steel Casing

Engineering Specifications for PVC Casing

Product Information Sheets

Calibration Test Reports

Cementing and Acidization Programs

APPENDIX D-1

Mill Certificates for Steel Casing

1, Smardan Street, Galati, 6200, ROMANIA
Phone: +40 236 407 633
Fax: +40 236 407 635
http://www.ispat.com; e-mail: office@sidex.ro

MITTAL

INSPECTION CERTIFICATE: 4902254751

ACCORDING TO: EN 10204/3.1 /2004

CUSTOMER:

ORDER: 900024/80004316

PRODUCT: DSAW CARBON STEEL LINE PIPE

STANDARD: API 5L 43EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.561"; NACE MR 0175 FOR HARDNESS

EXTERNAL ASPECT SUITABLE

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0

DATE 7-Nov-06

MSNA P.O.# 3636

MECHANICAL TESTS

TOTAL NO.OF PIECES 36 TOTAL WEIGHT: 152889 lbs

NO. CRT	NO.PIPE	NO. HEAT	QUALITY	DIAMETER [inch]	LENGTH [foot]	THICKNESS [inch]	WEIGHT [lbs.]	NO. TEST	DIRECTION	DIM.OF SPECIMENS [inch] BASE MATERIAL	RM[psi] BASE MATERIAL	RE[psi] BASE MATERIAL	A[%] BASE MATERIAL	RE/ RM [%]	DIM.OF SPECIMENS [inch] WELD	RM [psi] WELD	HARDNESS HV 10 FOR BASE MATERIAL	GUIDED BEND TEST TRANS.	HYDRO STATIC TEST 1250 psi/10SEC	X RAY INVESTIGATION ACC.ISO WIRE4%
1	181700	912778	X52-X42- B/PSL1	28	37.17	0.375	4115.20	181700	TRANS.	1.45x0.38	80851	64205	34	0.794	1.45x0.38	82450	156	SUITABLE	SUITABLE	SUITABLE
2	185047	924229		28	38.35	0.375	4245.31	185065	TRANS.	1.51x0.39	80067	64205	36	0.801	1.53x0.39	80764	184	SUITABLE	SUITABLE	SUITABLE
3	185048			28	38.19	0.375	4227.67												SUITABLE	SUITABLE
4	185058			28	38.55	0.375	4267.37												SUITABLE	SUITABLE
5	185061			28	38.32	0.375	4240.90												SUITABLE	SUITABLE
6	185062			28	38.42	0.375	4251.93												SUITABLE	SUITABLE
7	185063			28	38.19	0.375	4227.67												SUITABLE	SUITABLE
8	185085			28	37.24	0.375	4121.81												SUITABLE	SUITABLE
9	185086			28	38.35	0.375	4245.31												SUITABLE	SUITABLE
10	185067			28	38.32	0.375	4240.90												SUITABLE	SUITABLE
11	185068			28	38.58	0.375	4271.78												SUITABLE	SUITABLE
12	185069			28	38.52	0.375	4262.96												SUITABLE	SUITABLE
13	184775	933914		28	38.55	0.375	4267.37	184786	TRANS.	1.50x0.40	80417	63883	36	0.794	1.53x0.39	78520	192	SUITABLE	SUITABLE	SUITABLE
14	184776			28	38.65	0.375	4278.39												SUITABLE	SUITABLE
15	184778			28	38.65	0.375	4278.39												SUITABLE	SUITABLE
16	184779			28	38.68	0.375	4282.81												SUITABLE	SUITABLE
17	184781			28	38.58	0.375	4271.78												SUITABLE	SUITABLE
18	184782			28	38.68	0.375	4282.81												SUITABLE	SUITABLE
19	184783			28	37.99	0.375	4205.62												SUITABLE	SUITABLE
20	184786			28	37.11	0.375	4108.58												SUITABLE	SUITABLE
21	184787			28	38.29	0.375	4238.70												SUITABLE	SUITABLE
22	184790			28	38.32	0.375	4240.90												SUITABLE	SUITABLE
23	184791			28	38.29	0.375	4238.70												SUITABLE	SUITABLE
24	184793			28	38.42	0.375	4251.93												SUITABLE	SUITABLE
25	184796			28	38.06	0.375	4212.23												SUITABLE	SUITABLE
26	184952			28	38.19	0.375	4227.67												SUITABLE	SUITABLE
27	184953			28	38.68	0.375	4282.81												SUITABLE	SUITABLE
28	184955			28	38.52	0.375	4262.96												SUITABLE	SUITABLE
29	184956			28	38.68	0.375	4282.81												SUITABLE	SUITABLE
30	184957			28	38.68	0.375	4282.81												SUITABLE	SUITABLE
31	184959			28	38.39	0.375	4249.72												SUITABLE	SUITABLE
32	184960			28	38.68	0.375	4282.81												SUITABLE	SUITABLE
33	184963			28	38.70	0.375	4285.03												SUITABLE	SUITABLE
34	184964			28	38.68	0.375	4282.81												SUITABLE	SUITABLE
35	184965			28	38.65	0.375	4278.39												SUITABLE	SUITABLE
36	184966			28	38.62	0.375	4273.98												SUITABLE	SUITABLE

1, Smardan Street, Galati, ROMANIA
Phone: +40 236 407 633
Fax: +40 236 407 635
http://www.ispat.com; e-mail: office@sidex.ro

MITTAL

INSPECTION CERTIFICATE: 4902254751

ACCORDING TO: EN 10204/3.1 /2004

CUSTOMER:

PRODUCT: DSAW CARBON STEEL LINE PIPE

EXTERNAL ASPECT: SUITABLE

DATE: 07-Nov-06

ORDER: 900024/50004315

STANDARD: API 5L 43EDITION;API 2B FOR DIMENSIONAL TOLERANCES;STRAIGHTNESS MAX.0.551"; NACE MR 0175 FOR HARDNESS

DELIVERY STATE: EXPANDATED, BEVELLED ENDS AT 30° ; V=1,0 MSNA P.O.# 3536

CHEMICAL ANALYSIS, %

	No. Heat	C	MN	SI	S	P	AL	CR	NI	CU	V	MO	TI	NB	B	AS	N2 bellow	H2	ZR	Ceq
1	933914	0.09	1.14	0.32	0.007	0.018	0.042	0.030	0.010	0.010	0.05	0.003	0.013	0.045	0					
2	912778	0.13	1.17	0.21	0.006	0.018	0.036	0.020	0.010	0.010	0.05	0.003	0.015	0.048	0					
3	924229	0.09	1.15	0.31	0.007	0.018	0.035	0.020	0.020	0.020	0.05	0.002	0.011	0.042	0					

"THIS DOCUMENT CERTIFIES THAT THE MATERIALS ABOVE INDICATED HAVE BEEN INSPECTED IN ACCORDANCE WITH THE SPECIFICATIONS MENTIONED AND NACE 0175 FOR HARDNESS."

INSPECTOR NAME
MARIANA LUNGU

S.C. MITTAL STEEL GALATI S.A. CONTROLUL CALITATII 8 MITTAL J17/21/1991 GALATI-ROMANIA

REVISION 1

ATTN:

Customer Number:	All Webb
☐ Inventory Transfer To:	
All Webb's Enterprises, Inc. 309 Commerce Way Jupiter Fl 33458-	

158 Third Street
PO Box 583
Mineola, NY 11501
Phone (516) 741-8398
Fax (516) 741-8210
Toll Free 800-272-8277

Bill of Lading Packing List

Rel #	53346 - HT
Date	5/1/2007
Rel'd by	KISHOR
Whse	Vass

	P.O. # FPUA9B3
☐ Pick up at	☑ Ship to
JOB SITE **SEE DIRECTIONS** **CONTACT: TAMI** **PORT ST.LUCIE FL** **561-746-2079**	

Date Shipped	Sales Person	Terms

Issued for Account of Vass Pipe and Steel

Shipped Via	Freight	FOB Point

Quantity	Bndl	Pcs	DESCRIPTION OF PIPE TO BE RELEASED		B / L	Ship Name	Mill	Instructions
			Length	Product				
	0	7	D/R	28 BPE STD .375W WELDED API5L/X42/X52/PSL1/NACE/API 2B	WBCA1000512 95	FONTHIDA NAREE	MITTAL	

Received in good condition by_____ Signature_____ Date_____

SIGNED BILL OF LADING MUST ACCOMPANY FREIGHT INVOICE FOR PROMPT PAYMENT

CALL 24 HRS IN ADVANCE BEFORE DELIVERY

MAY 8. 2007 12:19PM FROM VASS PIPETUBULARS INC

TUBULARS, INC HTI

STRAIGHT BILL OF LADING Original - Not Negotiable - Domestic

Shipper's No. G 6147

T&T Carrier 21 Agent's No.

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading

at Pearland, TX 5-3 2007 from HTI/ Vass

The property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned and destined as shown below, which said company (the word company being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its own railroad, water line, highway route or route, or within the territory of its highway operations, otherwise to deliver to another carrier on the route to said destination. It is expressly agreed, as to each consignment and to every service to be performed hereunder, that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, herein contained, including the conditions on back hereof, which are hereby agreed to by the shipper and accepted for himself and his assigns.

(Mail or street address of consignee - For purposes of notification only)

Consigned to Vass

Destination ____ Street ____ City ____ State of ____ Zip Code ____ County of ____

Routing ____ Delivering Carrier ____ Vehicle or Car Initial ____ No. ____

Collect On Delivery

$ ____ and remit to: ____

RELEASE#: 53346 Street ____ City ____ State ____

No Packages	Description of Articles, Special Marks, and Exceptions	*Weight (Sub. to Cor.)	Class or Rate	Check Column
7	2813.75 OC X 40 /150 DRL	29,820		

*If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight." Note - Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding ____ per ____

C.O.D. charge to be paid by { Shipper ☐ Consignee ☐

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statements:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

If charges are to be prepaid, write or stamp here: "TO BE PREPAID."

Received $ ____ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per ____

(The signature here acknowledges only the amount Prepaid.)

Charges Advanced

$ ____

Shipper, Per ____ Agent, Per ____

HOUSTON TUBULARS INC HTI

13600 HATFIELD
PEARLAND, TEXAS 77581
TEL: 281-485-9932
FAX: 281-485-6378

SHIPPER NO.: SG 6147

DATE: 5/3/07

RELEASE NO.: 53346

FROM: Vass

ADDRESS:

TO: Vass

ADDRESS:

SHIPPED FROM: Fonthida Narce

RACK 126

SIZE: 28 WALL: 375 WEIGHT: 110.74 GRADE: X42/X52

LENGTH: DRL END: MILL: TYPE:

	TALLY		HEAT #	TALLY		HEAT #	TALLY		HEAT #
1	38	3	185067	✓		FA-7(2)	38.27'		
2	38	7	184963	✓		FA-7(3)	38.20'		104.72'
3	38	1	185063	✓		FA-7(1)	27.15'		
4	38	6	184960	✓		FA-9(3)	38.83'		
5	38	6	184957	✓		FA-9(1)	23.0		100.16'
6	38	6	184965	✓					
7	38	4	184793	✓		FA-9(2)	38.33'		
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
TL									

TALLIED BY

TOTAL JOINTS 7

TOTAL FOOTAGE 269.30

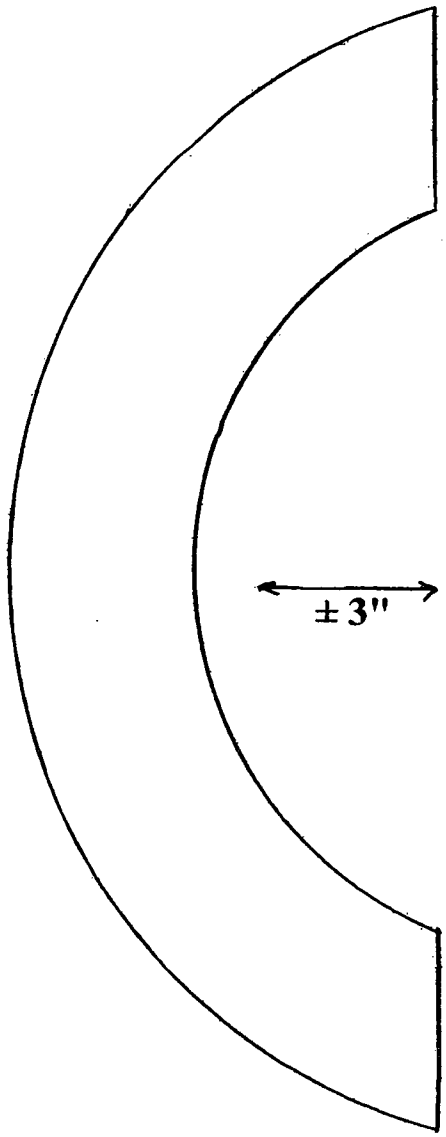
REMARKS:

TRUCK NO.:

DRIVER:

HTI 001

Carbon Steel Centralizer
3/8" X 2"



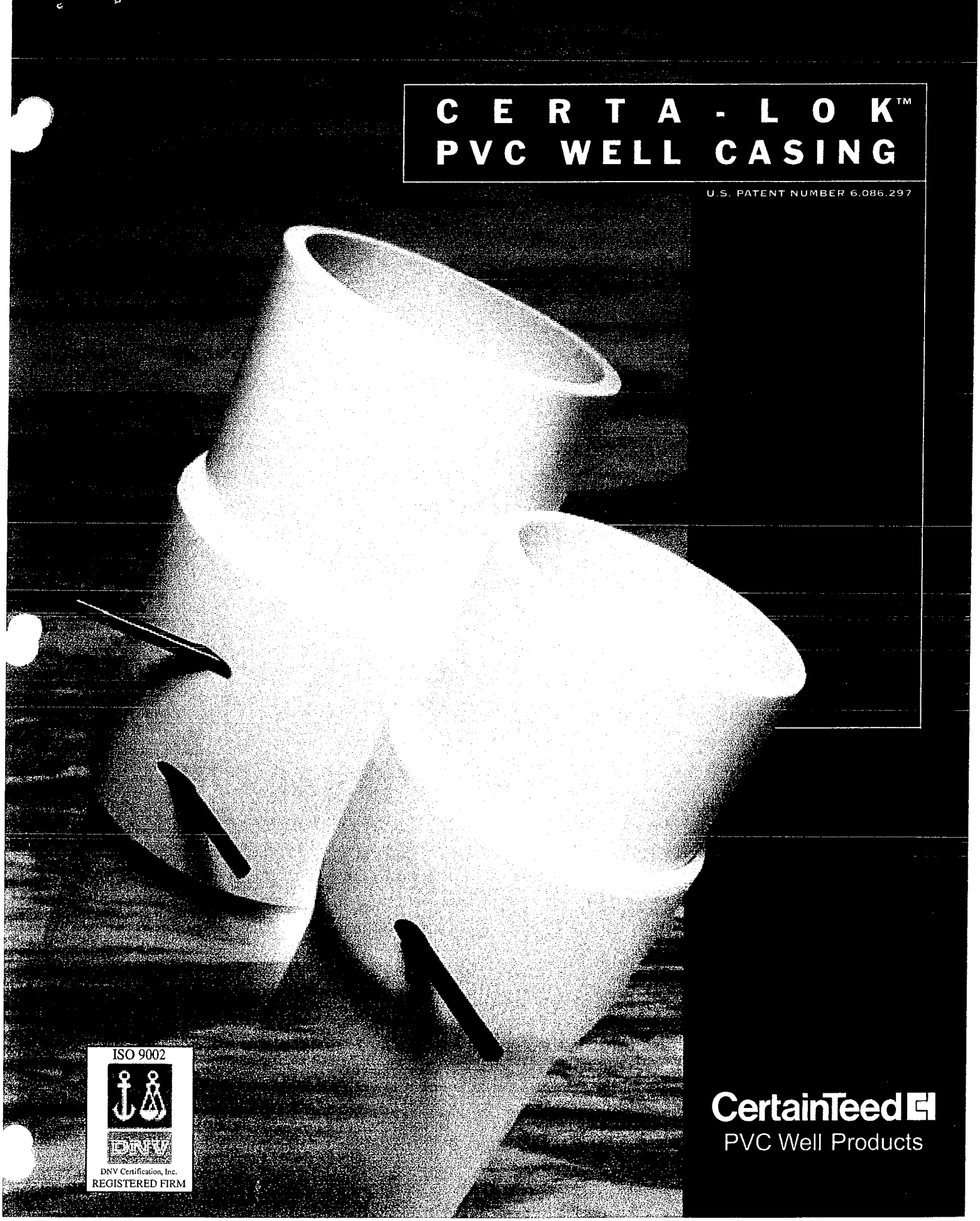
Centralizers are constructed by cutting sections from the casing used to construct the well. The 1/4 moon shapes are welded to the casing like "ears".

APPENDIX D-2

Engineering Specifications for PVC Casing

CERTA-LOK™ PVC WELL CASING

U.S. PATENT NUMBER 6,086,297



ISO 9002

DNV Certification, Inc.
REGISTERED FIRM

CertainTeed

PVC Well Products

CERTA-LOK™ – THE NEXT GENERATION IN PVC WELL CASING FROM THE INDUSTRY LEADER

Certa-Lok™ PVC Well Casing utilizes CertainTeed's field-proven spline-locking design to form a full strength joint instantly in all weather conditions. No solvents, arc welding, or reinforcement screw attachments are required. And now, with the introduction of small-to-medium diameter (4"-8") Integral Bell Well Casing (*U.S. Patent Number 6,086,297*), the best joint in town just got better! Certa-Lok Integral Bell Well Casing is supplied with a conventional belled-end joint for even faster assembly.

- No couplings required
- Greatly reduced assembly time
- Only one spline to install per joint
- Economical

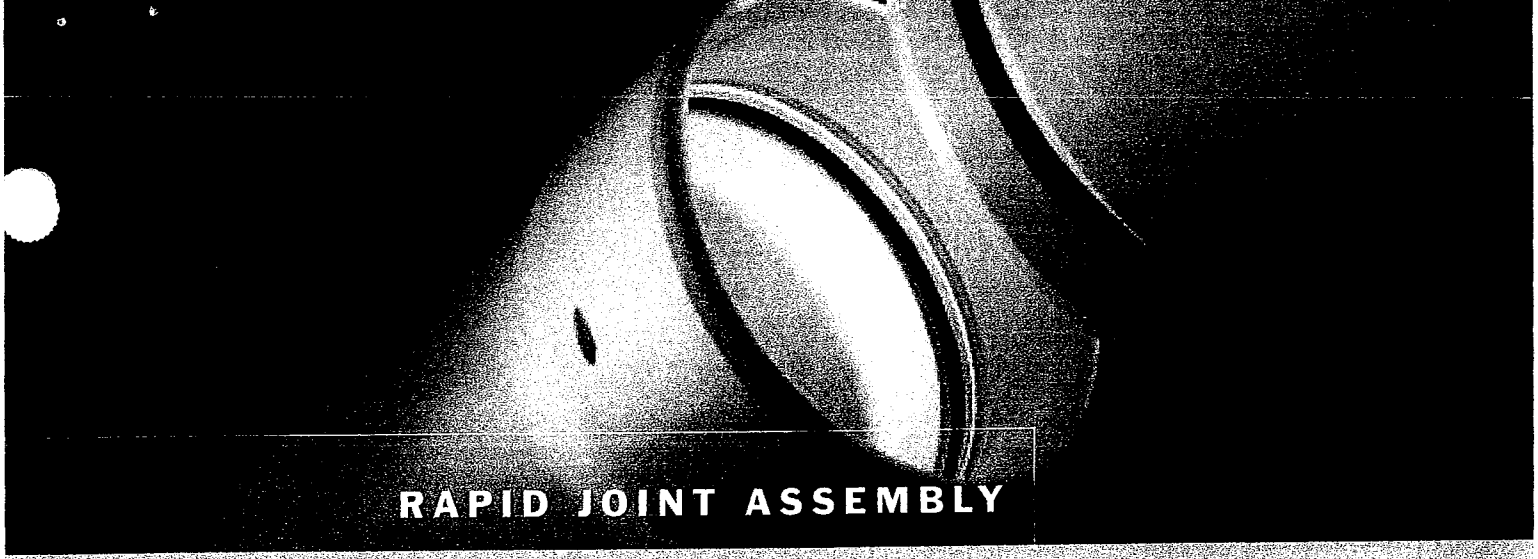
Designed and manufactured to meet or exceed the requirements of ASTM F480, all Certa-Lok PVC Well Casing products are also listed by NSF International as safe for use with potable water. Certa-Lok is ideal for a wide range of water well applications, including:

- Domestic
- Irrigation
- Municipal
- Aquifer Storage and Recovery

There are many good reasons why most smaller diameter residential systems, and more and more larger public water supply systems, now use PVC as the preferred casing material.

- Long Life: PVC is completely immune to electrolytic and galvanic corrosion, so it won't rust or rot like most metal pipe. PVC water inlet screens are also inherently more resistant than conventional steel products to clogging and encrustation, which means the amount of water a well can deliver will not be significantly reduced over time.
- PVC's excellent chemical resistance makes it immune to virtually all chemicals normally found in wells, including chlorine-based disinfectants and the highly corrosive acids used for well rehabilitation.
- NSF approved as safe for use with potable water.

When you combine the above features with the added benefits of economy, strength and reliability, it's easy to see why Certa-Lok PVC Well Casing has become the material of choice among modern well drillers.



RAPID JOINT ASSEMBLY

You simply can't beat Certa-Lok for down-the-hole installation speed. The Certa-Lok joint can be assembled or disassembled in seconds – by hand, without any special tools. Follow these simple steps for rapid joint assembly:

1. Clean

Clean the joining surfaces and make sure gaskets are clean and evenly seated in the gasket groove(s).

2. Lubricate

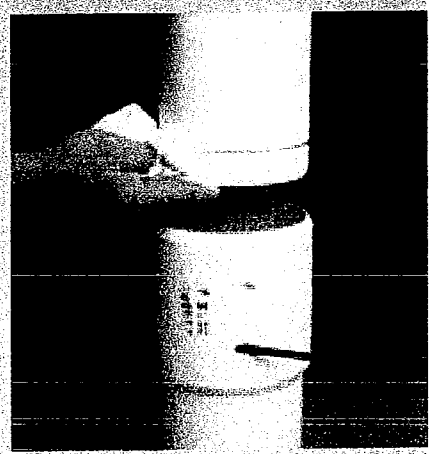
If lubrication is needed to ease joint assembly, soapy water or CertainTeed-approved PVC pipe lubricant can be applied to the joining surfaces prior to assembly. Apply only to the exposed gasket surface and to the tapered end of the casing.

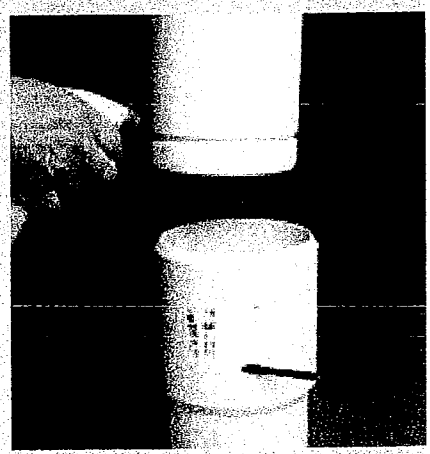
CAUTION: To maintain joint integrity, do not apply lubricant to the spline or to the spline grooves.

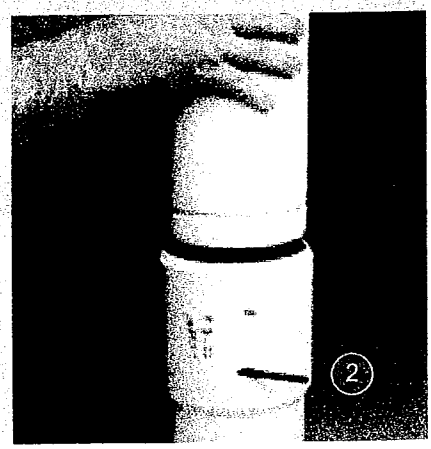
3. Assemble

Insert the casing into the coupling or bell until it seats against the stop. This automatically aligns the locking grooves for receiving the spline. The spline is then inserted through the entry hole until it is fully seated. This securely locks the joint, while the gasket is designed to provide a reliable, watertight seal. The joint is now complete – no waiting, no welding, no gluing or threading required. If needed, the joint can be just as easily disassembled and reused.

IMPORTANT: During the assembly process, it is standard practice to use a tight-fitting holding clamp which conforms to the pipe-to-bell transition section in order to provide adequate casing support. Contact CertainTeed for suggested source(s) of supply.







THE CERTA-LOK DIFFERENCE

Certa-Lok PVC Well Casing represents a new evolution in well products, offering distinct advantages that will boost your bottom line.

Cost effective – Lower installed cost on an annualized basis compared to conventional casing.

Reliable – The Certa-Lok joint has been used for over 30 years in demanding water supply applications.

Easy to handle – Weight is much less than comparable steel casing.

Instant joint – Joint achieves full strength immediately upon assembly in all weather conditions.

Weather resistant – Heat, cold, moisture, humidity, and wind do not affect Certa-Lok PVC Well Casing assembly or disassembly.

Solvent-free, environmentally sound – The environmentally acceptable Certa-Lok joint is ideal for monitoring well applications.

Adaptable – A full line of Certa-Lok adapters facilitates connection to plain-end PVC casing and threaded casing.

Easy removal – Certa-Lok casing can be quickly disassembled and removed from the bore hole without having to cut joints. Reinstallation does not require the use of special solvent weld couplings.

CONTRACTOR PROVEN

"Works in all weather conditions without special preparations. Easy to install and retract—a real benefit when drilling in heaving shales."

Ray Whisenant Jr.
Aquautility Construction
Dripping Springs, TX

"It used to take 4 hours to run 800' of glue casing. Now that time is cut to 45 minutes. I can do more holes per day."

Jim Blair
Bee Cave Drilling
Dripping Springs, TX

"Speed of installation is a critical factor for us—minimizing time spent on location allows us to drill more wells."

Joseph Roybal
Thompson Water Wells
Santa Fe, NM

"Certa-Lok gives us a competitive advantage because of its speed of installation. We've saved time and expense on every job where we've used this product."

Bill Stoner
Stoner Drilling Inc.
Corsicana, TX

"There have been several jobs where we've had to pull casing and re-set, which would have been very costly and time-consuming with glue-type joints. Have been using Certa-Lok for nine years—it's a proven product."

Mark Gorsuch
Beinhower Brothers Drilling Company
Johnstown, OH

"Ran 8" Certa-Lok casing to 410' with stainless steel screens in less than 1/2 hour."

Hewitt Fredebaugh
Fredebaugh Well Drilling
Grand River, OH

"Certa-Lok casing is quick and easy to assemble—no handling of solvents or glues, and we do not have to wait for glues to set-up before we can continue to set casing."

Todd Campbell
Henry Boysen Company
Hainesville, IL

Certa-Lok - Rapid assembly in all weather conditions without solvent cements.

ENGINEERING SPECIFICATION

1.0 SCOPE

This specification covers Polyvinyl Chloride (PVC) Well Casing which utilizes a spline-lock mechanical joining system. Pipe is produced in nominal sizes 4"–16", and is available in both solid and slotted configurations.

2.0 REFERENCE DOCUMENTS

American Society for Testing and Materials (ASTM):
ASTM D1784 – Standard Specification for Rigid PVC Compounds and Chlorinated PVC Compounds.

ASTM D2837 – Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.

ASTM F480 – Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80.

National Sanitation Foundation (NSF):
NSF14 – Plastic Piping System Components and Related Materials

NSF61 – Drinking Water System Components – Health Effects

3.0 REQUIREMENTS

3.1 Materials: Pipe and couplings shall be made from unplasticized PVC compounds having a minimum cell classification of 12454-B, as defined in ASTM D1784. The compound shall qualify for a Hydrostatic Design Basis (HDB) of 4000 psi for water at 73.4° F, in accordance with the requirements of ASTM D2837. White pipe shall be supplied, unless otherwise agreed upon at time of purchase.

3.2 Approvals: Products intended for contact with potable water shall be evaluated, tested, and certified for conformance with NSF61, or the health effects portion of NSF14, by an acceptable certifying organization, when required by the regulatory authority having jurisdiction.

3.3 Physical Requirements: Product dimensions, weights, and performance data are summarized on pages 5 & 6. Standard pipe laying length is 20'. Nominal casing size should be selected by the Design Engineer based on required flow performance, pump diameter, and the local installation conditions under which the well will be constructed.

3.4 Performance: All pipe supplied to this specification shall meet the stiffness (crush resistance), flattening, impact, and puncture test requirements of ASTM F480.

3.5 Joints: Pipe shall be joined using non-metallic couplings which, together, have been designed as an integral system for maximum reliability and interchangeability. On small to medium diameter casing, the coupling may be replaced by an integral bell spline lock joint. High-strength flexible thermoplastic splines shall be inserted into mating precision-machined grooves to provide full 360° restraint with evenly distributed loading. No external pipe-to-pipe restraining devices which clamp onto or otherwise damage the pipe surface as a result of point-loading shall be permitted. The joining system shall incorporate elastomeric sealing gasket(s) which are designed to provide a watertight seal. Note that this specification does not cover integral bell pipe with solvent-cement joints.

3.6 Marking: Well Casing pipe shall be legibly and permanently marked in ink with the following information:

- Manufacturer and Trade Name
- Nominal Size & SDR or SCH Rating
- Manufacturing Date Code
- (NSF-61)

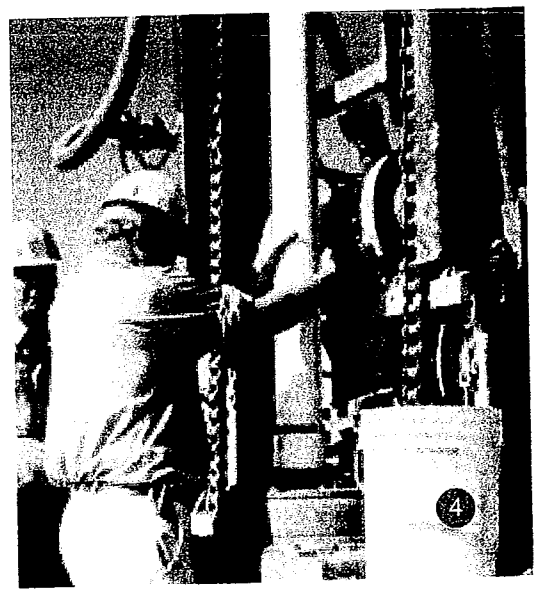
3.7 Workmanship: Pipe and couplings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, blisters and dents, interior roughness, and other injurious defects that may affect wall integrity. The pipe and couplings shall be as uniform as commercially practicable in color, opacity, density, and other physical characteristics.

4.0 SLOTTING

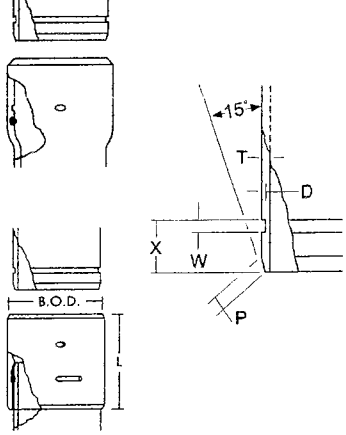
Pipe can be supplied with multiple rows of machined circumferential slots, to allow for water entry into the casing. Slot patterns should be specified to provide the required open area and flow rate (taking into account the surrounding embedment material), while maintaining structural integrity of the installed system. Consult the manufacturer for design data and product availability.

5.0 SUGGESTED SOURCE OF SUPPLY

Certa-Lok PVC Well Casing
as supplied by:
CertainTeed Corporation
P.O. Box 860
Valley Forge, PA 19482
866-CT4-PIPE



O.D. SIZE	X	W	D MIN.	D MAX.	P	L	COUPLING B.O.D.
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	
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

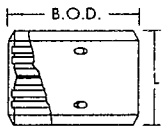
O.D. SIZE	CLASS	FEET PER FAST-PAK	FAST-PAKS PER T/L	FEET PER T/L	LBS. PER T/L
4.500"	SCH40	580	28	16240	33454
4.950"	SCH40	520	24	12480	29578
	SDR17	520	24	12480	34320
5.563"	SDR21/SCH40	460	24	11040	31574
	SDR17	460	24	11040	38530
6.625"	SCH40	400	20	8000	29040
	SDR21	400	20	8000	32560
	SDR17	400	20	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

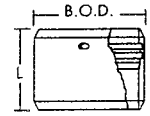


COUPLING

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

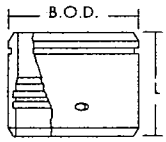
*Reducing



REDUCER BUSHING

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

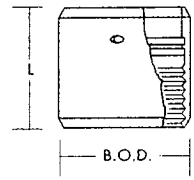
O.D. SIZE	PART NUMBER	L	B.O.D.
8.625" x 6.625"	71225	8.25	8.625
8.625" x 6.900"	71220	8.25	8.625
10.750" x 8.625"	71227	10.00	10.750
12.750" x 10.750"	71229	12.00	12.750
14.000" x 12.750"	71230	12.00	14.000
16.000" x 14.000"	71232	12.00	16.000
17.400" x 16.000"	71231	12.00	17.400



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 (GASKET) PART NUMBER	O-RING C/S	O-RING COLOR
4.500"	86479	18.4	.250③	86123	.210	Brown
4.950"	86479	18.4	.250③	86128	.210	Brown
5.563"	86479	18.4	.250③	86124	.210	Brown
6.625"	86463	24	.250①	86125	.210	Brown
6.900"	86463	24	.250①	86179	.210	Brown
8.625"	86464	32	.313②	86271	.375	Blue
10.750"	86465	39	.375②	86196	.375	Green
12.750"	86466	46	.375②	86178	.375	Green
14.000"	86490	48	.375②	86171	.375	Green
16.000"	86491	53	.375②	86172	.375	Green
17.400"	86492	60	.375②	86173	.407	Green

① Round Spline, Extruded
② Square Spline, Extruded
③ Round Spline, Injection molded

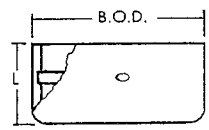
C/S = Ring Cross-Section Diameter

Material: 4.5"- 6.9" NBR
8.625" & up Poly Isoprene

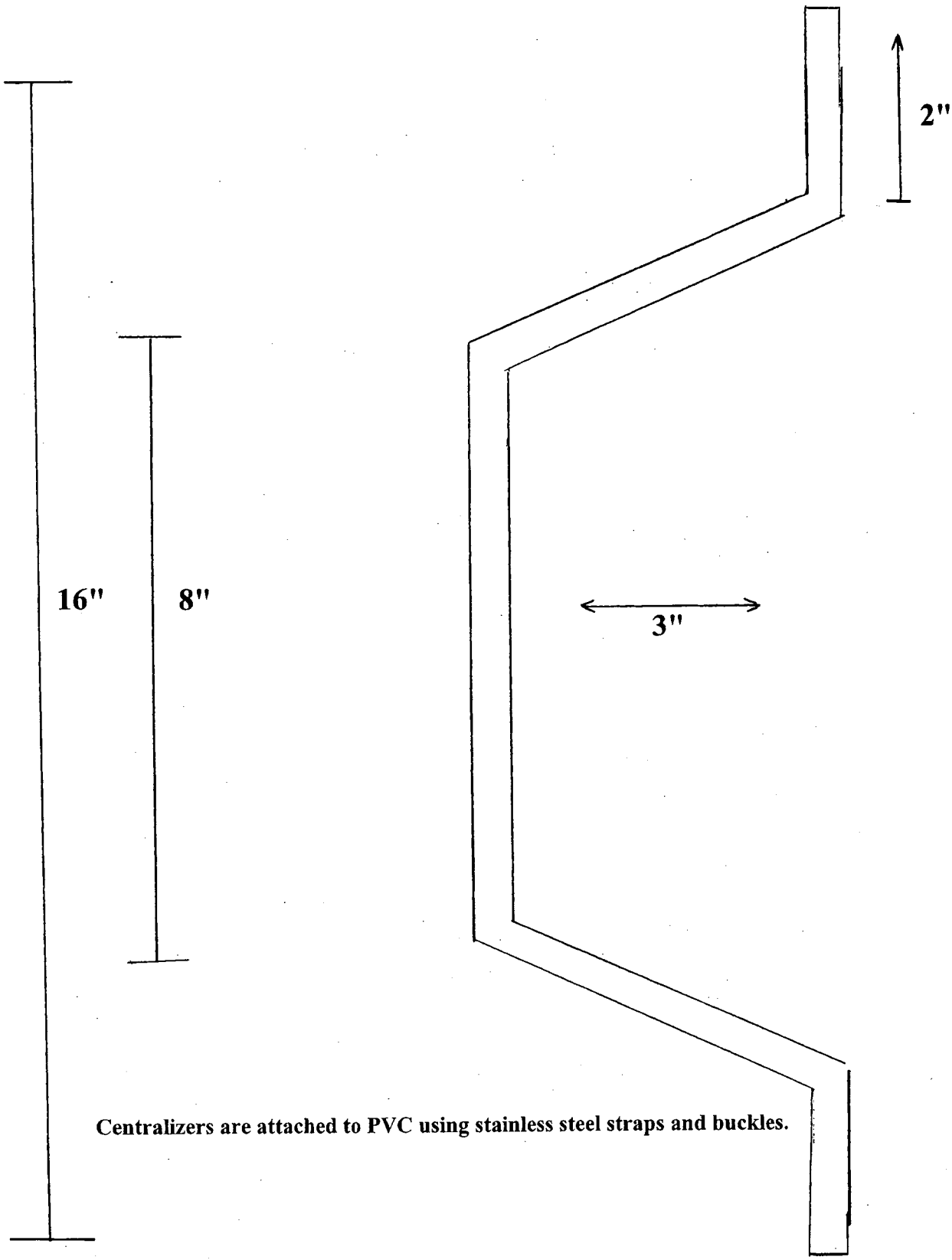
CASING & SCREEN CAP

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



Stainless Steel Centralizers
1/8" X 1" flatbar



Centralizers are attached to PVC using stainless steel straps and buckles.

APPENDIX D-3

Product Information Sheets

Cement

FLORIDA ROCK INDUSTRIES, INC
CONSTRUCTION AGGREGATES • CEMENT • READY-MIXED CONCRETE PRODUCTS
CEMENT GROUP

TAMPA PLANT
2001 Maritime Boulevard
Tampa, Florida 33605-6760
Phone: (813) 247-4831
Fax: (813) 247-5650

MILL TEST REPORT

Cement Type: Type II
Product Code: 2N0001
Source: Port Manatee
Silo: 1 & 2
December 15, 2004

CHEMICAL COMPOUNDS§	COMPOSITION	LIMIT	ASTM C-150	FLORIDA DOT 921 & AASHTO M-85
Silicon Dioxide (SiO_2)	20.61%	Min.	20.0%	20.0%
Aluminum Oxide (Al_2O_3)	4.99%	Max.	6.0%	6.0%
Iron Oxide (Fe_3O_2)	3.97%	Max.	6.0%	6.0%
Calcium Oxide (CaO)	63.79%			
Magnesium Oxide (MgO)	1.29%	Max.	6.0%	6.0%
Sulfur Trioxide (SO_3)	2.81%	Max.	3.0%	3.0%
Loss On Ignition	1.75%	Max.	3.0%	3.0%
Insoluble Residue	0.23%	Max.	0.75%	0.75%
Alkalies as Na_2O	0.56%	Max.	0.60%	0.60%
Tricalcium Silicate (C_3S) *	55.8%			58%
Dicalcium Silicate (C_2S) *	17.0%			
Tricalcium Aluminate (C_3A) *	6.5%	Max.	8%	8%
Tetracalcium Aluminoferrite (C_4AF) *	12.1%			
Sulphate Expansion (ASTM C 1038)	0.007%	Max.	0.020%	0.020%
PHYSICAL TEST RESULTS				
Blaine Surface, m^2/kg (ASTM C 204)	387	Min.	280	260
Gillmore Set, minutes (ASTM C 266)				
Initial	-	Min.	60	60
Final	-	Max.	600	600
Vicat Set, minutes (ASTM C 191)				
Initial	102	Min.	45	45
Final	196	Max.	375	375
Air Content (ASTM C 185)	6.2%	Max.	12%	12%
Autoclave Expansion (ASTM C 151)	-	Max.	0.80%	0.80%
Compressive Strenght, p.s.i. (ASTM C 109)				
1 day	2020			
3 days	3650	Min.	1450	1450
7 days	4740	Min.	2470	2470
28 days (Previous month)	6130			
Heat of Hydration, cal/g @7 days (ASTM C 186)	79	Max.	70	80

§ Chemical analysis performed as per ASTM C 114 Rapid Test Methods.
* Compounds are calculated as per ASTM C 150.

The cement covered by this report complies with the current specifications for:
ASTM C 150: Type I and Type II
Florida DOT 921 and AASHTO M 85: Type I

Aida E. Iglesias
Quality Control Manager

FLORIDA PORTLAND CEMENT

PRODUCT NAME

FLORIDA PORTLAND CEMENT
Types I, II & III

MANUFACTURER

LAFARGE CORPORATION
P.O. Box 22348
Tampa, Florida 33622
813/872-7777 800/282-9171
FLORIDA CEMENTS

PRODUCT DESCRIPTION

Type I is a general purpose portland cement suitable for all uses when the special properties of other types are not required.

Type II portland cement is used when precaution against moderate sulfate attacks and when moderate heat of hydration is required.

Type III is a high-early strength portland cement that provides high strengths at an earlier period than Type I.

Basic Use: Portland cement is used in pavements and sidewalks, reinforced concrete buildings, bridges, railway structures, tanks and reservoirs, culverts, water pipes, prestress, precast, ready mix, stucco, shotcrete, gunite and masonry units.

Size: Availabe in 94# paper bags containing a plastic moisture barrier and in bulk via pressurized air tankers.

Applicable Standards: FLORIDA PORTLAND CEMENTS conform to the requirements of ASTM C-150 and Federal Guide Specifications SS-C-1960/3B.

INSTALLATION

Mixing: All concrete should be mixed thoroughly until it is uniform in appearance, with all ingredients evenly distributed. The maximum allowable time between initial mixing and final placement will depend upon the mix, weather and placement conditions. The manufacturer should be contacted for detailed information.

Remixing: Concrete that is left to agitate in a mixer tends to stiffen. Such concrete can be made fluid by remixing due to the thixotropic nature of hydrated cement. Under careful supervision a small amount of water may be added during remixing provided the following conditions are met: (1) maximum allowable water-cement ratio is not exceeded, (2) maximum allowable slump is not exceeded, (3) maximum allowable time from initial mixing is not exceeded and, (4) concrete is remixed for at least half the minimum required mixing time or number of revolutions.

Remixed concrete tends to harden rapidly and requires coordination of placing and finishing.

Finishing: As the cement hydration conditions change the timing of finishing will have to be adjusted. For detailed information contact the manufacturer.

Note: Freshly mixed cement, mortar, grout or concrete may cause minor skin irritation. Avoid direct contact where possible and wash exposed skin areas promptly with water. If any of the cementitious material gets into the eye, rinse immediately and repeatedly with water, and get prompt medical attention.

AVAILABILITY

FLORIDA PORTLAND CEMENTS are available throughout most of the state of Florida.

TECHNICAL SERVICE

Trained and experienced FLORIDA PORTLAND CEMENT sales and technical representatives are strategically located in order to provide prompt, dependable technical service. For more information and consultation, write or call collect the FLORIDA PORTLAND CEMENT Sales Office.

CERTIFICATION

Florida Portland Cement certifies that all Type I, II & III Portland cements when shipped from its mills or terminals will meet the current requirements of Specifications for Portland Cement of ASTM C-150 and Federal Specification SS-C-1960/3B. The company makes no guarantee of finished work. The user is responsible for following recommended practices.

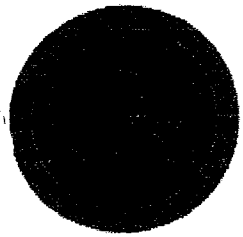
Lafarge Corporation

FLORIDA SUPER CEMENTS

APPENDIX D-4

Product Information Sheets

Drilling Fluid Solutes and Additives



Description *Polymer Extended Wyoming Bentonite*

Application *Recommended for oil well drilling, slurry trenching, pond sealing and most other civil engineering applications.*

Typical Yield *Black Hills Gel will yield 91 barrels (minimum) of API fluid to one ton of material*

Typical Chemical Analysis

ELEMENT	%	ELEMENT	%
SiO_2	64.7	CaO	1.3
$A1_2O_3$	17.6	K_20	.46
Fe_2O_3	4.4	Na_2O	2.5
MgO	1.8	TiO_2	.16
		H_2O (Crystal)	5.9

Specifications

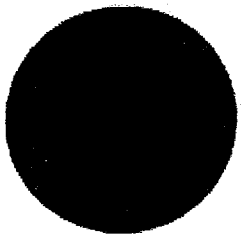
SPECS	TYPICAL ANALYSIS	API SPECS
Fann @ 600 rpm	35 - 40	30.00
Fann @ 300 rpm	25 - 30	
Plastic Viscosity	10	
Yield Point/Plastic Viscosity Ration	1.5 - 2.0	3 Maximum
Filtrate	13.5 ml.	15.0 Maximum
Dry Sieve Analysis	78% - 80% (-200 Mesh)	
Wet Sieve Analysis	2.5% - 3.0%	4.0 Maximum
Moisture	7.0% - 9.0%	10.0% Maximum
pH (6.0% solution)	8.5 - 9.5	

**NOTE: This product has been treated with a small amount (0.25%) of non toxic polyacrylate polymer to strengthen the viscosity of the bentonite. Please write or call if further information is needed on this.*

Testing conforms to API specification 13A, Section 4.

The information contained herein is based on tests believed to be reliable, however no warranty is implied.

HYG 200



Description **Polymer Extended Wyoming Sodium Bentonite*

Application *Specially modified for water well drilling or wherever a minimum 200 barrel yield is required.*

Typical Yield *HYG 200 will yield a minimum of 20 barrels of API fluid to one ton of material.*

Typical Chemical Analysis

ELEMENT	%	ELEMENT	%
SiO_2	66.9	CaO	1.8
$A1_2O_3$	16.3	K_20	.48
Fe_2O_3	3.3	Na_2O	2.6
MgO	1.5	TiO_2	.12
		H_2O (Crystal)	6.0

Specifications

SPECIFICATIONS	TYPICAL ANALYSIS
Fann @ 600 rpm *	30.0
Filtrate *	20 - 25 ml.
Dry Sieve Analysis	75 - 80% (-200 mesh)
Wet Sieve Analysis	2.5 - 3.5% Maximum (*Residue retained on a 200 mesh*)
Moisture	10% Maximum

**NOTE: Suspension, 10 grams bentonite mixed in 350 ml. distilled water*

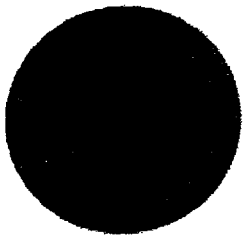
**NOTE: This products has been treated with a small amount of (.15%) non toxic polyacrylate polymer to strengthen the viscosity of the bentonite. Please write or call if further information is needed on this.*

The information contained herein is based on tests believed to be reliable, however no warranty is implied

Testing conforms to API specification 13A, Section 4.

The information contained herein is based on tests believed to be reliable, however no warranty is implied.

Black Hills Gel



Description *Polymer Extended Wyoming Bentonite*

Application *Recommended for oil well drilling, slurry trenching, pond sealing and most other civil engineering applications.*

Typical Yield *Black Hills Gel will yield 91 barrels (minimum) of API fluid to one ton of material*

Typical Chemical Analysis

ELEMENT	%	ELEMENT	%
SiO_2	64.7	CaO	1.3
$A1_2O_3$	17.6	K_20	.46
Fe_2O_3	4.4	Na_2O	2.5
MgO	1.8	TiO_2	.16
		H_2O (Crystal)	5.9

Specifications

SPECS	TYPICAL ANALYSIS	API SPECS
Fann @ 600 rpm	35 - 40	30.00
Fann @ 300 rpm	25 - 30	
Plastic Viscosity	10	
Yield Point/Plastic Viscosity Ration	1.5 - 2.0	3 Maximum
Filtrate	13.5 ml.	15.0 Maximum
Dry Sieve Analysis	78% - 80% (-200 Mesh)	
Wet Sieve Analysis	2.5% - 3.0%	4.0 Maximum
Moisture	7.0% - 9.0%	10.0% Maximum
pH (6.0% solution)	8.5 - 9.5	

**NOTE: This product has been treated with a small amount (0.25%) of non toxic polyacrylate polymer to strengthen the viscosity of the bentonite. Please write or call if further information is needed on this.*

CON DET®

Wetting Agent

THE Original DRILLING FLUIDS COMPANY

Description

CON DET, a proprietary blend of aqueous surfactants, is specially formulated for use in fresh water, salt water, and in low-solids drilling fluids as a wetting agent.

Applications/Functions

- Keep the drill bit clean
- Slow breakup of cuttings in the annulus while being pumped to the surface
- Counteract the sticking tendencies of clays, thereby reducing wall packing, bit balling, booting-off, and formation of mud rings
- Promote settling of cuttings at the surface

Advantages

- Effective in low concentrations
- Easy to mix with water
- Non-fermenting and biodegradable
- Compatible with other Baroid products

Typical Properties

• Appearance	clear red liquid
• Specific gravity	1.03
• pH (1 % solution)	8.9
• Flash point, PMCC °F	210
• Pour point, °F	28

Recommended Treatment

Approximate Amounts of CON DET Added to Fresh or Salt Water			
Desired Condition/Result	**Amount/ 100 gal**	**Amount/ bbl**	**Liters/m^3**
To promote bit cleaning and to settle cuttings	2-4 pints	1-2 pints	2-5 liters
To reduce stickiness of clays	2-4 quarts	1-2 quarts	5-10 liters

Packaging

CON DET is packaged in 5-gal (19-L) plastic pails with an integrated easy pour spout -- 24 plastic pails to a pallet.

Availability

CON DET can be purchased through any QUIK-GEL® distributor, or by contacting the Customer Service Department in Houston.

Baroid Drilling Fluids, Inc.
Industrial Drilling Products
3000 N. Sam Houston Pkwy E.
Houston, TX 77032
(281) 871-4612 (800) 735-6075

Baroid Drilling Fluids, Inc.
Industrial Drilling Products
1999 Broadway, Suite 4300
Denver, Colorado 80202
(303) 291-2964

BARAFOS™

Thinner and Dispersant

THE Original DRILLING FLUIDS COMPANY

Description

BARAFOS, a non-glassy, modified tripolyphosphate, is used as a thinner and dispersant in freshwater drilling fluids, and as an aid in water well development.

Applications/Functions

- Disperse the clay particles and sediments so they can be removed during well development
- Thin the mud and allow cuttings to settle out
- Disperse sticky clays which cause problems such as mud rings and bit balling

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Advantages

- Dissolves and will not recrystallize in cold water
- Lower pH than commonly available glassy polyphosphates
- Inorganic compound and non-toxic

Typical Properties

• Appearance	white crystalline
• Specific gravity	1.5
• pH (2% solution)	7.4

Recommended Treatment

To aid in water well development

Completely dissolve 10-20 pounds BARAFOS per 100 gallons water. Jet and surge this solution through the screen and gravel pack during well development. Repeat as necessary.

To thin the drilling mud

Add 0.5-1 pound BARAFOS per 100 gallons fluid slowly at the flow line. For best results, dissolve BARAFOS in a small quantity of water before adding. Becomes less effective if mud weight exceeds 10 pounds per gallon.

Packaging

BARAFOS is packaged in 50-lb (22.7-kg) sacks.

Availability

BARAFOS can be purchased through any QUIK-GEL® distributor, or by contacting the Customer Service Department in Houston.

Baroid Drilling Fluids, Inc.
Industrial Drilling Products
3000 N. Sam Houston Pkwy E.
Houston, TX 77032
(281) 871-4612 (800) 735-6075

Baroid Drilling Fluids, Inc.
Industrial Drilling Products
1999 Broadway, Suite 4300
Denver, Colorado 80202
(303) 291-2964

Rev. 10/96 • IDP 011

QUIK-GEL®

Viscosifier and Gellant

THE Original DRILLING FLUIDS COMPANY

Description

QUIK-GEL is an easy-to-mix, finely ground, premium-grade, high-yielding Wyoming sodium bentonite. QUIK-GEL provides viscosity, fluid loss control and gelling characteristics to freshwater-based drilling fluids.

Applications/Functions

- Viscosify water-based drilling fluids
- Form a thin, low permeability filter cake to reduce fluid loss
- Reduce water seepage into permeable formations
- Improve hole-cleaning ability of drilling fluids
- Provide lubricity for drilling fluids
- Mix with fresh water to form a low-solids drilling fluid for general drilling applications
- Mix with foaming agents to make "gel/foam" drilling fluids for air/foam drilling applications

Advantages

- Single-sack product and cost effective
- Mixes easily and quickly reaches maximum viscosity
- Non-fermenting and non-toxic, suitable for environmental exploration drilling and in drilling potable water wells
- Yields more than twice as much mud of the same viscosity as an equal weight of API oilfield grades of bentonite

Typical Properties

• Appearance	tan powder
• Bulk density, lb/ft^3	68 to 72 (as packaged)
• pH (3% solution)	8.9
• Yield, bbl/ton	>235

Recommended Treatment

- Add QUIK-GEL slowly through a jet mixer or sift into the vortex of a high-speed stirrer.
- As a general purpose drilling fluid, add 15-25 lb QUIK-GEL per 100 gallons of fresh water. In gravel or poorly consolidated formations, add 35-50 lb QUIK-GEL per 100 gallons of fresh water.
- To make up gel/foam systems, add 12-15 lb QUIK-GEL per 100 gallons of fresh water before adding foaming agents.

Notes:

- For optimum yield, pre-treat make-up water with 2-lbs soda ash per 100 gallons of water.
- This product has been certified by the National Sanitation Foundation (NSF) to contribute to no adverse health problems when used as the manufacturer recommends for the construction of potable water wells.

Packaging

QUIK-GEL is packaged in 50-lb (22.7-kg) sacks containing 0.7 ft^3

Availability

QUIK-GEL can be purchased through any QUIK-GEL® distributor, or by contacting the Customer Service Department in Houston.

Baroid Drilling Fluids, Inc.
Industrial Drilling Products
3000 N. Sam Houston Pkwy E.
Houston, TX 77032
(281) 871-4612 (800) 735-6075

Baroid Drilling Fluids, Inc.
Industrial Drilling Products
1999 Broadway, Suite 4300
Denver, Colorado 80202
(303) 291-2964

EZ-MUD®

Polymer Emulsion

THE Original DRILLING FLUIDS COMPANY

Description

EZ-MUD, a liquid polymer emulsion containing partially hydrolyzed polyacrylamide/polyacrylate (PHPA) copolymer, is used primarily as a viscosifying agent and as a borehole stabilizer to prevent reactive shale and clay from swelling and sloughing. EZ-MUD is added to low-solids drilling fluids to increase fluid viscosity, and is also used to improve carrying capacity of air/foam injection fluids or low-solids fluids formulated with QUIK-GEL®.

Applications/Functions

- EZ-MUD clay-free drilling fluid and QUIK-GEL®/EZ-MUD drilling mud system are applicable to all types of drilling operations.
  - Water wells
  - Diamond coring
  - Minerals exploration
  - Seismograph shot holes
  - Geo-construction
  - Horizontal directional drilling (HDD)
  - River crossing
  - Blast holes
- Stabilize water sensitive formations
- Improve borehole stability
- Enhance slurry rheological properties
- Alleviate mud rings, bit balling and booting-off in clay formations
- Reduce drill pipe torque and pumping pressure
- Minimize rod chatter in diamond core drilling
- Create "stiff-foam" and maintain foam integrity
- Flocculate non-reactive solids in reserve pit
- Reduce water loss effectively when added to pre-mixed QUIK-GEL® slurry and other drilling mud systems

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Advantages

- Mixes easily with minimum shear in fresh water
- Develops viscosity rapidly
- Rapid settling of cuttings in pit - aids in preventing recirculation of drilled cuttings back into the wellbore
- Non-fermenting and non-toxic
- Cost effective - small amounts produce desired results
- Chemically degradable

Typical Properties

• Appearance	thick, opaque white liquid
• Density	8.7 lb/gal
• pH (1 quart per 100 gallons water)	8.5
• Flash point, PMCC °F	>200
• Thermal stability, °F	250

Recommended Treatment

For best results, mix through a jet or mechanical hopper with fresh water at a rate no faster than two minutes per gallon of product. Pretreat calcium hardness with soda ash (one half to one pound per 100 gallons water). Avoid water solutions having pH over 11.0. Always premix the bentonite before adding EZ-MUD.

Approximate Amounts of EZ-MUD® Added to Drilling Fluid System

Drilling Application/Desired Result	Quarts/ 100 gal	Pints/bbl	Liters/m^3
Added to fresh water			
(To formulate a clay-free drilling fluid)			
• To stabilize water-sensitive formations	1.0	1.0	2.5
• To stop rod vibration, reduce torque and pumping pressure, and increase hole stability	1.5	1.25	3.75
Added to QUIK-GEL® bentonite drilling mud (25 lb/100 gal)			
(To improve performance properties)			
• To improve hole cleaning, increase hole stability and minimize thickness of filter cake	1.0	1.0	2.5
Added to injection liquid in air/foam drilling applications			
• To improve foam performance and hole conditions	0.5 - 1.0	0.5 - 1.0	1.25 - 2.50

Notes:

- EZ-MUD can be chemically broken down with liquid bleach in regular household concentration (5% sodium hypochlorite). Use one gallon of liquid bleach per 100 gallons of fluid formulated with EZ-MUD. Do not use perfumed liquid bleach or solid calcium hypochlorite.
- If spilled, use a POLY-BUSTER™ dilute solution to remove EZ-MUD from any surface. Do not use POLY-BUSTER™ to degrade EZ-MUD in the circulating system.

Packaging

EZ-MUD is packaged in 5-gal (19-L) and 1-gal (3.8-L) pails.

Availability

EZ-MUD can be purchased through any QUIK-GEL® distributor, or by contacting the Customer Service Department in Houston.

Baroid Drilling Fluids, Inc.
Industrial Drilling Products
3000 N. Sam Houston Pkwy E.
Houston, TX 77032
(281) 871-4612 (800) 735-6075

Baroid Drilling Fluids, Inc.
Industrial Drilling Products
1999 Broadway, Suite 4300
Denver, Colorado 80202
(303) 291-2964

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NSF Product and Service Listings

These Listings were Last Updated on **Tuesday, May 29, 2007** at 4:15 AM Eastern Time. Please contact NSF International to confirm the status of any Listing, report errors, or make suggestions.

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NSF/ANSI STANDARD 60
Drinking Water Treatment Chemicals - Health Effects

HALLIBURTON ENERGY SERVICES, INC.
BAROID PSL
3000 NORTH SAM HOUSTON PARKWAY EAST
HOUSTON, TX 77032
281-871-5900

Facility : # 5 USA

Bentonite[2]

Trade Designation	*Product Function*	*Max Use*
Holeplug 3/4	Well Sealant	NA
Holeplug 3/8	Well Sealant	NA

[2] The well is to be properly flushed and drained until the turbidity of the water is < 1 NTU.

Miscellaneous Water Supply Products [2]

Trade Designation	*Product Function*	*Max Use*
Barotherm™[1]	Well Sealant	NA

[1] To be mixed on site with sand specified by the manufacturer at a ratio of 1 part grout to 4 parts sand.
[2] The well is to be properly flushed and drained until the turbidity of the water is < 1 NTU.

HALLIBURTON ENERGY SERVICES, INC., BAROID PSL
3000 NORTH SAM HOUSTON PARKWAY EAST
HOUSTON, TX 77032
281-871-5900

Cert-Link® (Click here to visit this Company's Website)

Facility : # 1 USA

Miscellaneous Water Supply Products[1]

Trade Designation	*Product Function*	*Max Use*
N-Seal™	Drilling Fluid	NA

[1] These products are designed to be flushed out prior to using the system for drinking water. Before being placed in service, the well is to be properly flushed and drained according to the manufacturer's use instructions.

Facility : NEW ORLEANS, LA

Bentonite

Trade Designation	*Product Function*	*Max Use*
AQUAGEL GOLD SEAL®[1]	Drilling Fluid	NA
AQUAGEL®[1]	Drilling Fluid	NA
BORE-GEL[1]	Drilling Fluid	NA
QUIK-GEL®[1]	Drilling Fluid	NA

[1] The well is to be properly flushed until the turbidity of the water is <1 NTU.

Facility : BELLE FOURCHE, SD

Bentonite[1]

Trade Designation	*Product Function*	*Max Use*
Aquagel®	Drilling Fluid	NA
Aquagel® Gold Seal	Drilling Fluid	NA
Aquaguard	Well Sealant	NA
Benseal	Well Sealant	NA
Bore-Gel™	Drilling Fluid	NA
Quik-Gel®	Drilling Fluid	NA
Quik-Grout™	Well Sealant	NA

[1] These products are designed to be flushed out prior to using the system for drinking water. The well is to be properly flushed and drained until the turbidity of the water is < 1 NTU.

Miscellaneous Water Supply Products

Trade Designation	*Product Function*	*Max Use*
IDP-334[1]	Well Sealant	NA

[1] These products are designed to be flushed out prior to using the system for drinking water. The well is to be properly flushed and drained until the turbidity of the water is < 1 NTU.

Facility : HOUSTON, TX

Miscellaneous Water Supply Products [WS]

Trade Designation	*Product Function*	*Max Use*
AQF-2[1] [2]	Foaming Agent	NA

Aqua-Clear™ AE[5]	Well Rehabilitation Aid	NA
Aqua-Clear™ MGA[2]	Well Rehabilitation Aid	NA
Aqua-Grout®[2]	Well Sealant	NA
Penetrol[2]	Drilling Fluid	NA
QUIK-TROL®[4]	Well Drilling Aid	NA
QUIK-TROL® LV[4]	Well Drilling Aid	NA
Quik-Foam®[1] [2]	Foaming Agent	NA

[1] Certification of this product is based on a well drilling model using assumptions stated in NSF/ANSI Standard 60, Section 8 for well drilling foamers.
[2] These products are designed to be flushed out prior to using the system for drinking water. Before being placed in service, the well is to be properly flushed and drained according to the manufacturer's use instructions.
[4] These products are designed to be flushed out prior to using the system for drinking water. Before being placed into service, the well is to be properly flushed according to the manufacturer's use instructions. Certification of these products is based on a well drilling model with the following assumptions:
- The amount of well drilling fluid used is 3780 L (1000 U.S. gallons) to which the drilling fluid has been added at the manufacturer's recommended level.
- The aquifer contains 3.1 million liters of water (815,000 gallons) based on a 0.5 acre aquifer of 6.1 meter depth (20 ft.) and 25% porosity.
- The bore hole is 61 meters in total depth (200 ft.), the screen is 6.1 meters in length (20 ft.), and the bore hole is 25.4 cm in diameter (10 in.).
- The amount of well drilling fluid removed from the well during construction is equal to the combined volumes of the casing, the screen, and the bore hole annulus around the casing and the screen, plus an additional amount removed through the well disinfection and development (90% removed).

[5] A 6% solution of Aqua-Clear AE is to be added to the well in accordance with the dosage table (e.g., for a 2" well, a 6% solution is to be added at 0.04 gallons of product per 10 feet of standing water). The well should then be flushed as outlined in the use instruction.
[WS] The well shall be properly flushed and drained before being placed in service.

Polyacrylamide [PC]

Trade Designation	*Product Function*	*Max Use*
Aqua-Clear™ PFD[2]	Well Cleaning Aid	NA
EZ-MUD®[2] [6]	Well Drilling Aid	NA
EZ-MUD® DP[4]	Well Drilling Aid	NA
EZ-MUD® GOLD[2] [6]	Well Drilling Aid	NA
EZ-MUD® Plus[2]	Well Drilling Aid	NA
Poly-Bore™[2] [3]	Well Drilling Aid	NA

[2] These products are designed to be flushed out prior to using the system for drinking water. Before being placed in service, the well is to be properly flushed and drained according to the manufacturer's use instructions.
[3] These products should not be used in constructing wells in highly porous formations such as cavernous limestone. Certification of these products is based on a well drilling model with the following assumptions:
- The amount of well drilling aid used is 6.3 liters (6.9 quarts) in 3780 liters (1,000 gallons) of well drilling fluid.
- The aquifer contains 3.1 million liters of water (815,000 gallons), based on a 0.5 acre aquifer of 6.1 meters depth (20 ft) and 25% porsity.
- The bore hole is 61 meters in total depth (200 ft), the screen is 6.1 meters in length (20 ft.), and the bore hole is 25.4 cm in diamter (10 in.).
- The amount of well drilliing fluid removed from the well during contruction is equal to the combined volumes of the casing, the screen and the bore hole annulus around the casing and the screen, plus an additional amount removed through well disinfection and development (90% removed).

[4] These products are designed to be flushed out prior to using the system for drinking water. Before being placed into service, the well is to be properly flushed according to the manufacturer's use instructions. Certification of these products is based on a well drilling model with the following assumptions:
- The amount of well drilling fluid used is 3780 L (1000 U.S. gallons) to which the drilling fluid has been added at the manufacturer's recommended level.

- The aquifer contains 3.1 million liters of water (815,000 gallons) based on a 0.5 acre aquifer of 6.1 meter depth (20 ft.) and 25% porosity.
- The bore hole is 61 meters in total depth (200 ft.), the screen is 6.1 meters in length (20 ft.), and the bore hole is 25.4 cm in diameter (10 in.).
- The amount of well drilling fluid removed from the well during construction is equal to the combined volumes of the casing, the screen, and the bore hole annulus around the casing and the screen, plus an additional amount removed through the well disinfection and development (90% removed).

[6] Certification of these products is based on the following assumptions:
- The amount of well drilling fluid used 3780 L (1000 U.S. Gallons) to which the drilling fluid has been added at 7.6L.
- The aquifer contains 3.1 million liters of water (815,000 gallons) based on a 0.5 acre aquifer of 6.1 meter depth (20 ft.) and 25% porosity.
- The bore hole is 61 meters in total depth (200 ft.), the screen is 6.1 meters in length (20 ft.), and the bore hole is 25.4 cm. in diameter (10 in.).
- The amount of well drilling fluid removed from the well during construction is equal to the combined volumes of the casing and the screen, plus an additional amount removed through the well disinfection and development (90% removed).

[PC] Polyacrylamide Products Certified by NSF International comply with 40 CFR 141.111 requirements for percent monomer and dose.

Facility : LOVELL, WY

Bentonite [WL]

Trade Designation	*Product Function*	*Max Use*
Aquagel®[1]	Drilling Fluid	NA
Aquagel® Gold Seal[1]	Drilling Fluid	NA
Bore-Gel™[1]	Drilling Fluid	NA
EZ SEAL™	Well Sealant	NA
HOLEPLUG®	Well Sealant	NA
Quik-Gel®[1]	Drilling Fluid	NA

[1] The well is to be properly flushed and drained until the turbidity of the water is < 1 NTU.

[WL] These products are designed to be flushed out prior to using the system for drinking water. The well shall be properly flushed and drained before being placed in service.

Number of matching Manufacturers is 2
Number of matching Products is 36
Processing time was 0 seconds

POLY-BORE™

- Home
- Applications
- Awards
- Technical Assistance
- Research
- Product Information
  - Baroid Industrial Drilling Product Data Sheets
  - Material Safety Data Sheets
  - Water Well/Environmental Products
  - Grouting and Sealing Products
  - Development and Remediation Products
  - Horizontal Directional Drilling Products
  - Drilled Shaft Applications
  - Minerals Exploration Products
  - ANSI/NSF Standard 60 Certified Products
  - Need Specific Product Information?
- Contact IDP Personnel
- Meet IDP

Borehole Stabilizing Dry Polymer

Description POLY-BORE is a free flowing, water-soluble, easy mixing, 100% dry granular polymer. POLY-BORE is a very high molecular weight partially hydrolyzed polyacrylamide (PHPA) polymer. When mixed with fresh water, a small quantity of POLY-BORE provides a clear, solid-free, viscous borehole stabilizing fluid for use in drilled shaft, auger drilling, horizontal directional boring, trenching excavation and reverse circulation (RC) rotary drilling.

Applications/Functions

- Provide a clay-free boring fluid
- Inhibit sticky clay from swelling
- Stabilize the borehole while drilling or excavating
- Provide high cohesiveness to bind excavated sandy soil and gravel
- Facilitate the removal of drilled spoils from augers and increase excavation rate
- Maximize load transfer for drilled shaft application
- ANSI/NSF Standard 60 certified

Advantages

- Disperses easily with minimal shear
- Develops a viscous slurry with small amount
- Does not require solids control unit to clean the slurry
- Promotes stable and gage borehole
- Alleviates bit balling and mud rings
- Requires less mixing equipment, reducing capital investment
- Results in maximum skin friction and ultimate end bearing capacity for a drilled shaft
- Breaks down chemically with bleach (sodium hypochlorite)
- Non-fermenting

Typical Properties

- Appearance - White granular
- Bulk density, lb/ft³ - 52
- pH (0.25% solution) - 8.5 to 9.0

Recommended Treatment

Construction Application

Add 3 to 10 pounds (1.4 to 4.5 kilograms) POLY-BORE dry polymer slowly through the hopper to mix with 1,000 gallons (3.8 m³) of fresh water. (See general instructions listed below.)

Reverse Circulation Drilling

Add 0.5 to 1 pound (0.2 to 0.5 kilograms) POLY-BORE dry polymer slowly through the hopper to mix with 100 gallons (0.38 m³) of fresh water. (See general instructions listed below.)

General Instructions

Continue mixing for another 15 to 20 minutes to allow POLY-BORE to hydrate.

- If POLY-BORE is being added directly to a tank with paddle mixers, make sure the freshwater level is well above the paddles. Add the POLY-BORE slowly to the vortex of the spinning paddles.
- Measure the funnel viscosity of the polymer slurry and adjust according to required specifications.

Notes:

- Make-up water used to mix POLY-BORE should meet the following quality:
  - total chloride less than 1500 ppm (mg/L)
  - total hardness less than 150 ppm as calcium
  - total chlorine less than 100 ppm
  - water pH between 8.5-9.5
- Reduce total hardness of make-up water by adding 1 to 2 pounds (0.45 to 0.9 kilograms) soda ash (sodium carbonate) per 1,000 gallons (3.8 m^3) of make-up water. (Do not add in excess as overtreatment can lead to detrimental effects and reduced performance of the drilling fluid).
- POLY-BORE can be chemically broken down with regular household liquid bleach (5% sodium hypochlorite). Use one gallon of liquid bleach per 100 gallons (10 liters/m^3) of fluid formulated with POLY-BORE. Do not use perfumed liquid bleach or solid calcium hypochlorite.

Packaging POLY-BORE is packaged in 14 lb (6.35-kg) resealable plastic containers.

Availability POLY-BORE can be purchased through any Baroid Industrial Drilling Products Distributor. To locate the Baroid IDP distributor nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid, a Halliburton Company
Industrial Drilling Products
3000 N. Sam Houston Pkwy E.
Houston, TX 77032

Customer Service (800) 735-6075 (281) 871-4612
Toll Free

Technical Service (877) 379-7412 (281) 871-4613
Toll Free

Back

APPENDIX D-5

Calibration Test Reports

Propeller Meter

CERTIFIED TEST REPORT

CUSTOMER: ALL WEBBS ENTERPRISES, IN

MODEL NO: M0312

METER SERIAL NO: 05-05111

CONFIGURATION

METER INSIDE DIAMETER: 12

METER OUTSIDE DIAMETER: 12.75

TEST DATE: 7/18/2005

TEST FACILITY: Volumetric

IDEAL TEST CONSTANT: 1568

CALIBRATION DATA

	Tested TC	GPM	Accuracy
1	1574	3872	100.4

CERTIFIED BY: _____ **DATE:** 7-18-05

This calibration was performed on a gravimetric or volumetric test facility, traceable to the National Institute of Standards and Technology, USA. The estimated flow measurement uncertainty of the calibration facilities are: Gravimetric +/- 0.15% Volumetric +/- 0.5%

McCROMETER
3255 WEST STETSON AVENUE
HEMET, CA 92545 USA
PHONE (951) 652-6811 / FAX (951) 652-3078
WEB SITE: http://www.mccrometer.com E-MAIL: info@mccrometer.com

Propeller Meter

CERTIFIED TEST REPORT

CUSTOMER: ALL WEBBS ENTERPRISES

MODEL NO: M0312

METER SERIAL NO: 07-04717

CONFIGURATION

METER INSIDE DIAMETER: 12

METER OUTSIDE DIAMETER: 12.75

TEST DATE: 5/23/2007

TEST FACILITY:

IDEAL TEST CONSTANT: 1568

CALIBRATION DATA

	Tested TC	GPM	Accuracy
1	1582	2547	100.9

CERTIFIED BY: Paul Hobbs **DATE:** 5/29/2007

This calibration was performed on a gravimetric or volumetric test facility, traceable to the National Institute of Standards and Technology, USA. The estimated flow measurement uncertainty of the calibration facilities are:
Gravimetric +/- 0.15% Volumetric +/- 0.5%

McCROMETER
3255 WEST STETSON AVENUE
HEMET, CA 92545 USA
PHONE (951) 652-6811 / FAX (951) 652-3078
WEB SITE: http://www.mccrometer.com E-MAIL: info@mccrometer.com

APPENDIX D-6

Cementing Program

ALL WEBB'S ENTERPRISES, INC
CEMENTING PROGRAM

The mixture and placement of grout into water wells is detailed in the following sections Equipment, Calculations, and Method.

Equipment

Halliburton Type Recirculating Continuous Mixer Pumping Unit

- 10 bbL/min or 420 gal/min
- 5000 psi
- 2000 gal tank
- Electronic Mass Flow Meter w/datalogging

Dry Bulk Storage Unit

- Two 250 ft^3 tanks
- 350 cfm compressor
- 1500 lb/min
- Electronic Weighing System
- Dry Blending System

Pressure Grouting

- Steel header
- 4 ½" drill pipe
- Pumping head w/cement valve
- High Pressure Hoses

Tremie Method

- 2 1/16" OD, 1.9" ID Steel Tubing
- Steel Manifold
- High Pressure Cement Valves
- High Pressure Hoses

Calculations

The following calculations are performed for each lift and are provided in attached sheets.

Theoretical Volumes

- Grout (Annulus and Plug)
- Flush (Tremie and Casing)

Material Requirements

- Portland Cement (Type II)
- Pure Bentonite (API)
- Water (Potable)

Casing Critical Points

- Calculated Casing Collapse Pressure
- Expected Differential Pressure

Anticipated Differential Pressure

- External minus Internal Casing Pressure for each lift
- Factor of Safety

Methods

Pressure Grouting

Tremie pipe (drill pipe) is installed in the casing to the desired depth, approximately 20 to 40 ft from the bottom of the casing. The tremie pipe is connected to the steel casing pumping header providing a watertight seal, up to 150 psi internally. The casing load is supported by the drill rig during cementing leaving a minimum of 10" rat hole below the casing. Drilling fluid is circulated and air is evacuated from the casing. The steel drill pipe is connected to the pumping unit. Preflush water is pumped. The estimated volume of neat cement is continuously mixed and pumped to place cement in the annulus to target depth. Calculated volume of flush water is pumped to clear drill pipe and dress-off cement plug. The wellhead pressure is monitored. The well is shut in and the pressure recorded.

Tremie Method

Tremie pipe is installed in the annulus to the desired depth. The casing is pressurized internally. The tremie is connected to the cement pumping unit. Preflush water is pumped. The estimated volume of neat cement is continuously mixed and pumped to place cement in the annulus to target depth. Tremie pipe is removed as needed. Tremie is flushed as needed and shut in.

ALL WEBBS ENTERPRISES, INC.

Grout Program Summary Sheet

Job		Date	
Well		Casing	
Contact		Borehole	

Stage 1 Date: Start Time: End Time: 8:30

			Calculated	Actual
Avg Density		Start Depth		
% Bentonite		End Depth		
Sand		Volume		

Stage Date: Start Time: End Time:

			Calculated	Actual
Avg Density		Start Depth		
% Bentonite		End Depth		
Sand		Volume		

Stage Date: Start Time: End Time:

			Calculated	Actual
Avg Density		Start Depth		
% Bentonite		End Depth		
Sand		Volume		

Stage Date: Start Time: End Time:

			Calculated	Actual
Avg Density		Start Depth		
% Bentonite		End Depth		
Sand		Volume		

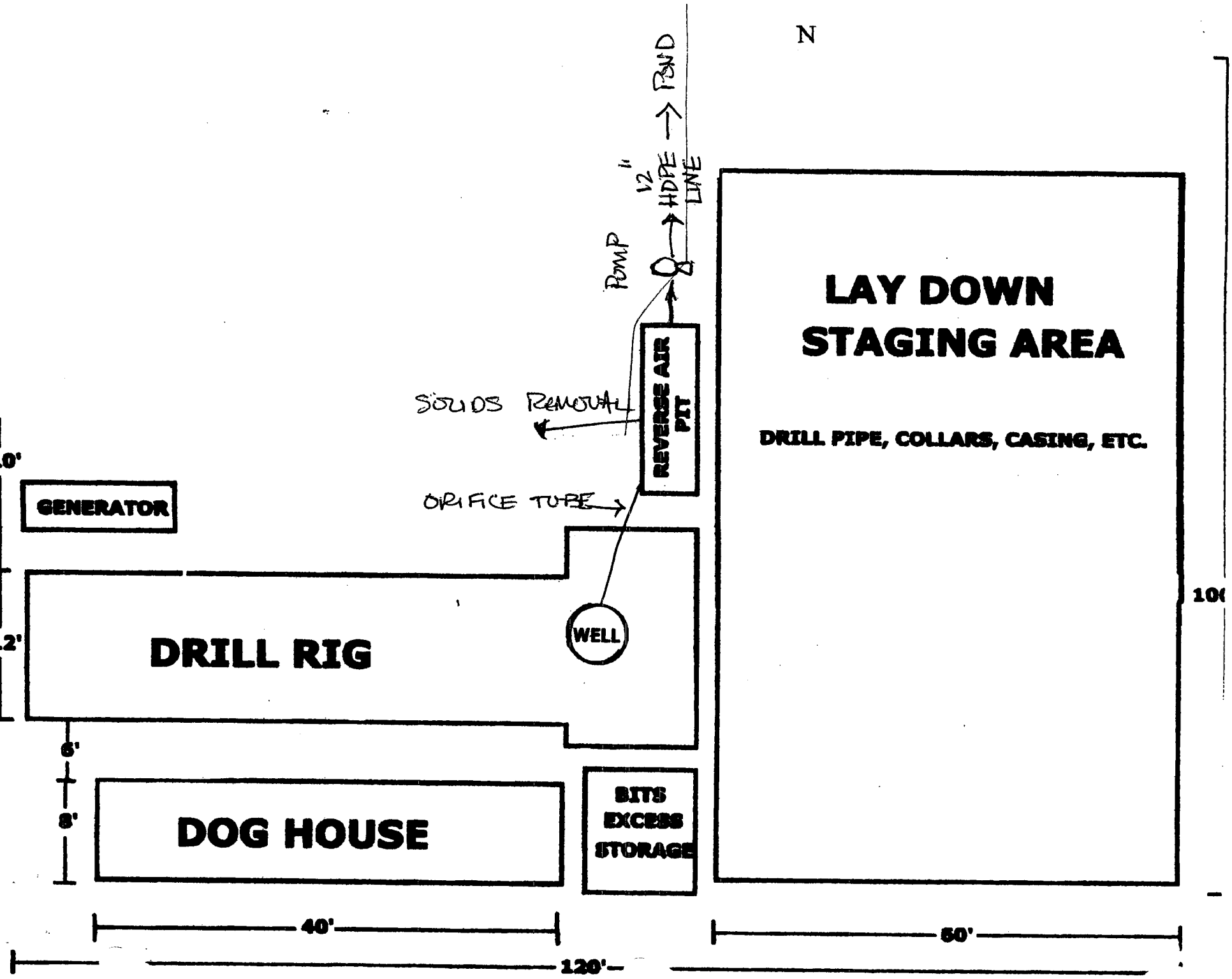
Stage Date: Start Time: End Time:

			Calculated	Actual
Avg Density		Start Depth		
% Bentonite		End Depth		
Sand		Volume		

Stage Date: Start Time: End Time:

			Calculated	Actual
Avg Density		Start Depth		
% Bentonite		End Depth		
Sand		Volume		

Unless otherwise noted units are as follows: density (lb/gal), depth (ft), volume(bbl).


N
POND
1/2" HDPE LINE
PUMP
SOLIDS REMOVAL
REVERSE AIR PIT
ORIFICE TUBE
LAY DOWN STAGING AREA
DRILL PIPE, COLLARS, CASING, ETC.
GENERATOR
WELL
DRILL RIG
DOG HOUSE
BITS EXCESS STORAGE
6'
8'
40'
50'
120'

ALL WEBB'S ENTERPRISES, INC.

Grout Program Summary Sheet

Job Seacoast
Well FA-7
Contact LBFH

Date
Casing 28
Borehole 34

Stage 1 Date: 5/19 Start Time: End Time:

			Actual		Calculated	Actual
Avg Density		Cement	15.6	Start Depth	0	
% Bentonite		Water	/	End Depth	100	
Sand		Mud	/	Volume	45	

Stage Date: Start Time: End Time:

			Actual		Calculated	Actual
Avg Density		Cement		Start Depth		
% Bentonite		Water		End Depth		
Sand		Mud		Volume		

Stage Date: Start Time: End Time:

			Actual		Calculated	Actual
Avg Density		Cement		Start Depth		
% Bentonite		Water		End Depth		
Sand		Mud		Volume		

Stage Date: Start Time: End Time:

			Actual		Calculated	Actual
Avg Density		Cement		Start Depth		
% Bentonite		Water		End Depth		
Sand		Mud		Volume		

Stage Date: Start Time: End Time:

			Actual		Calculated	Actual
Avg Density		Cement		Start Depth		
% Bentonite		Water		End Depth		
Sand		Mud		Volume		

Stage Date: Start Time: End Time:

			Actual		Calculated	Actual
Avg Density		Cement		Start Depth		
% Bentonite		Water		End Depth		
Sand		Mud		Volume		

Unless otherwise noted units are as follows: density (lb/gal), depth (ft), volume(bbL), cement (lbs), mud (saks).

ALL WEBB'S ENTERPRISES, INC
FPUA FA-7
ESTIMATES

Well Details:	26"			Total
Interval	*0-100*			
Borehole (in)	34.0			
Casing (in)	28.0			
Specific Volume (ft^3/ft)	2.0			
Specific Volume (bbl/ft)	0.4			
End Depth (ft)	660			
Start Depth (ft)	860			
Interval Depth (ft)	120			
Volume (ft^3)	243			
Volume (bbl)	43.4			43.4
Total Cement (lbs)				
Neat	19,395			19,395
6%				
8%				
Total Bentonite (sks)				
6%	0			0
8%				
Total Mixing Water (gal)				
Neat	1073			1,073
6%	0			
8%				

Collapse Pressure	Type	Depth (ft)	Density (lb/gal)	Pressure (psi)
Casing Fluid	Mud	100	8.3	43.1
Annular Fluid	Neat	100	15.6	81.0

Differential Pressure	37.9
Collapse Pressure 26" 0.375" wt	224
FOS	5.9

ALL WEBB'S ENTERPRISES, INC
FPUA FA-7
28" PRESSURE GROUT AND PLUG DRESSING FLUSH VOLUME

		Unit		Unit
Tremie ID	2	in	0.17	ft
Casing ID	27.25	in	2.3	ft
Tremie Specific Volume	0.0218	ft^3/ft	0.0039	bbls/ft
Casing Specific Volume	4.1	ft^3/ft	0.7213	bbls/ft
Tremie Depth	80	ft		
Casing Depth	100	ft		
Casing Flush Length	19	ft		
Tremie Flush Volume	1.7	ft^3	0.31	bbls
Casing Flush Volume	77.0	ft^3	13.7	bbls
Total Flush Volume	78.7	ft^3	14.0	bbls

APPENDIX D-7

Acidization Program

6 Acidizing

6.1 Introduction and Background

Blank

6.2 Materials and Equipment

The materials and equipment required to successfully perform acidization in water wells are listed in this section.

Inhibitor
Its addition to hydrochloric acid minimizes the undesired reaction with carbon steel. Added to acid and given time to mix before pumping. See Procedure for target concentrations and References for MSDS.

Hydrochloric Acid
Strong acid used to dissolve formation, increase porosity and therefore transmissivity of water producing zone. Liquid form approx 17 to 39%. Use extreme caution, very corrosive see References for MSDS.

Sulfamic Acid
Strong acid used on wellhead rehabilitations to remove scale, kill bacteria and open formation. Handled in 50 lb sacks of white powder. In solution very corrosive, use caution. Less reactive with metals than hydrochloric acid.

Base
Base is used to neutralize acid solution. Sodium bicarbonate or soda ash may be used. Per pound, soda ash will neutral more acid than sodium bicarbonate.

Storage Tank
The acid storage tank is used to store acid onsite. The storage tank should be rated for acid and have the capacity to store volume. The fittings on the tank should be rated for acid, estimated flow and leak free. The tank must have a fill pipe to receive acid from delivery service.

Mixing Tank
The acid mixing tank is used to detain acid mixture to increase mixing time. The mixing tank should be rated for acid. Fittings on the tank should be rated for acid, flow and be leak free.

Wellhead
A product of acidization is gas (carbon dioxide, hydrogen and sulfides) which cause elevated pressures in the well. Therefore the wellhead used during acidization should be rated for a minimum of 150 psi. The wellhead should also have an air relief and pressure gage.

Tubing or Drop Pipe
Tubing is used to introduce acid at the engineer specified depth. The tubing should be rated for acid, the depth, estimated flow and pressure. See Tubing section for tubing ratings.

Pumping Head
The pumping head connects tubing and hose. The head must have connections for both tubing and hose. The pumping head and connections must be rated for the acid, estimated flow and pressure. There should be no leaks. See Fittings sections for fitting ratings.

Valves
Valves are necessary to "shut in" the well and control flow from the tank. Valves must be in good condition, rated for acid, estimated flow and pressure. There should be no leaks.

Pumping Unit
Pumping unit is required to place acid at the desired rate, pressure and time. The unit must be rated for acid, estimated flow and pressure. The pump must be having sufficient suction head to empty acid storage tank. The pump unit must be in good working order and free from leaks.

Mixing Pump
The mixing pump is used for making sulfamic acid solution and pumping down hole. The pump including fittings should be rated for sulfamic acid, estimated flow and pressure.

Hopper
The hopper is used to mix dry sulfamic powder and water. The hopper should rated for sulfamic acid and estimated flow.

Pressure Gauges
Pressure gages are to monitor the wellhead pressure. The gauge should be sized so the expected pressure is mid range.

Hoses
Hoses are used to conduct fluids. Hoses, including connections must be rated for acid, flow and estimated pressure in the hose.

Water Supply
Water is used for makeup water and rinse water. It should be potable water.

Table 1.3.1-1 Acidization material and equipment with lead time.

Hydrochloric	Lead Time	Sulfamic	Lead Time
Inhibitor	10 days	Acid	10 days
Storage Tank	5 days	Wellhead	7 days
Acid	3 days	Drop Pipe	5 days
Base	3 days	Base	3 days
Wellhead	7 days	Pumping Head	3 days
Tubing	5 days	Valves	7 days
Pumping head	3 days	Pump Unit	7 days
Valves	2 days	Hoses	2 days
PumpUnit	7 days	Pressure Gages	2 days
Hoses	7 days	Mixing Tank	3 days
Pressure Gage	2 days	Mixing Pump	7 days
Flowmeter	3 days	Hopper	3 days
Water Supply	7 days	Water Supply	7 days
		Flowmeter	3 days

6.3 Procedure

6.3.1 Hydrochloric acid

1. Locate the materials and equipment within the specified time as shown for Hydrochloric acid in

Table 1.3.1-1.

2. Verify depth, acid/flush volumes, and date with Hydrogeologist.
3. Coordinate delivery of acid to allow for less than 1 day holding time.
4. Setup storage tank with filler system.
5. Install acid wellhead and pressure gauge.
6. Install tubing to specified depth.
7. Install pumping head.
8. Setup pumping unit.
9. Connect water supply and storage tank to pumping unit.
10. Add inhibitor to acid.
11. Place base at desired locations.
12. Note wind direction/ path of vapor and potential losses and take appropriate action.
13. Review safety and accident information.
14. Confirm plan with Hydrogeologist.
15. Test pumping unit hoses, valves, and connections for leaks using water.
16. Set annular flush water flow rate using flowmeter.
17. Pump acid with inhibitor.
18. Observe wellhead pressure. If wellhead pressure exceeds limit then stop acid and relieve pressure through vent line and continue to add water through annulus. If successful continue acid.
19. Pump flush water through tremie after acid.
20. Observe wellhead pressure. Add flush water as directed by Hydrogeologist.

21. Large volumes of gas are expected will exit the well as it is flowed after acidization (development) as well as low pH. pH must be adjusted with soda ash 6.5 to 8 before discharge.

6.4 Safety

6.4.1 Hydrochloric Acid Background

Hydrochloric Acid is a corrosive substance and can cause severe and painful burns on contact with any part of the body or taken internally. The mucous membranes of the eyes and the upper respiratory tract are especially susceptible to the irritation effects of high atmospheric concentrations. The gas or vapor is dangerous and when high concentrations exist there should be no persons in the area.

Acid will lower pH in the environment and cause damage and death to living species such as fish, plants and animals. It is important to make sure acid is neutralized before it can cause damage.

6.4.2 Hydrochloric Acid Proper Protective Equipment and First Aid

Eye and skin contact along with inhalation are most likely cause of injury while handling acid. Proper protective equipment minimizes the risk and should be worn as described in Table 6.4.2-1. If injury does occur follow first aid procedures as described in Table 6.4.2-1.

Table 6.4.2-1 PPE and First Aid

Route of Entry	Protective Equipment	First Aid Treatment
Ingestion	Respirator	If conscious, give large amounts of water. Do not induce vomiting.
Eye Contact	Goggles and Face shield	Immediately flush with water while holding eyes open.
Skin Contact	Chemical Suit, Goggles, Faceshield, Footgear and Gloves	Rinse with water and remove protective clothing.
Inhalation	Respirator with chemical cartridge	Remove from contaminated area. If not breathing call 911 begin CPR.

6.4.3 Environmental Safety

Acid is corrosive and lowers pH leading to adverse effects on the environment. To minimize the corrosive effects on the environment the following should be implemented.

Spill/Leak Prevention

All materials used to handle acid must be rated for the use of acid at the operating pressure. Plastic, stainless steel, carbon steel and black iron are acceptable with the use of an inhibitor. The storage tank must have a lid to minimize vapor release. Access to the area must be limited by signage, fencing, etc.

Spill/Leak Containment

The working area must be lined or bermed to contain any leaks or spills to the designated area. ~~The area must be cleared accept for equipped personel.~~

Neutralization

Soda ash must be applied to spills in order to neutralize acid. During development of spent acid solution the pH must be raised to 7 before discharge to environment.

6.5 Troubleshooting

Blank

6.6 References

MSDS Reagent Chemical and Research Hydrochloric Acid

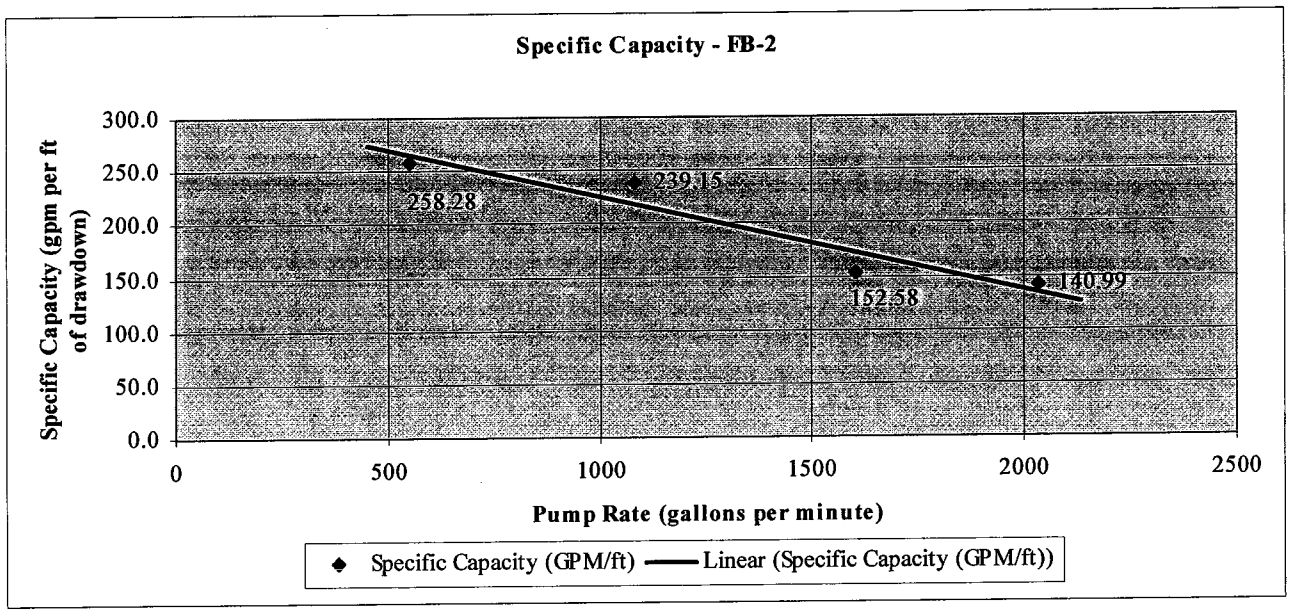
APPENDIX E

Step Test Profiles

Casing Installation Summaries

APPENDIX E-1

Step Test Profile FB-2



Specific Capacity FB-2 (9/06/07)

Q Pumping Rate (GPM)	s Drawdown (feet)	s/Q	Formation Loss (feet)	Well Loss (feet)	Well Efficiency (%)	Specific Capacity (GPM/ft)
550	2.13	0.0039	0.95	1.18	44	258.28
1083	4.53	0.0042	1.86	2.66	41	239.15
1600	10.49	0.0066	2.76	7.73	26	152.58
2033	14.42	0.0071	3.50	10.92	24	140.99
2350	18.28	0.0078	4.05	14.24	22.13	128.53

BOYLE

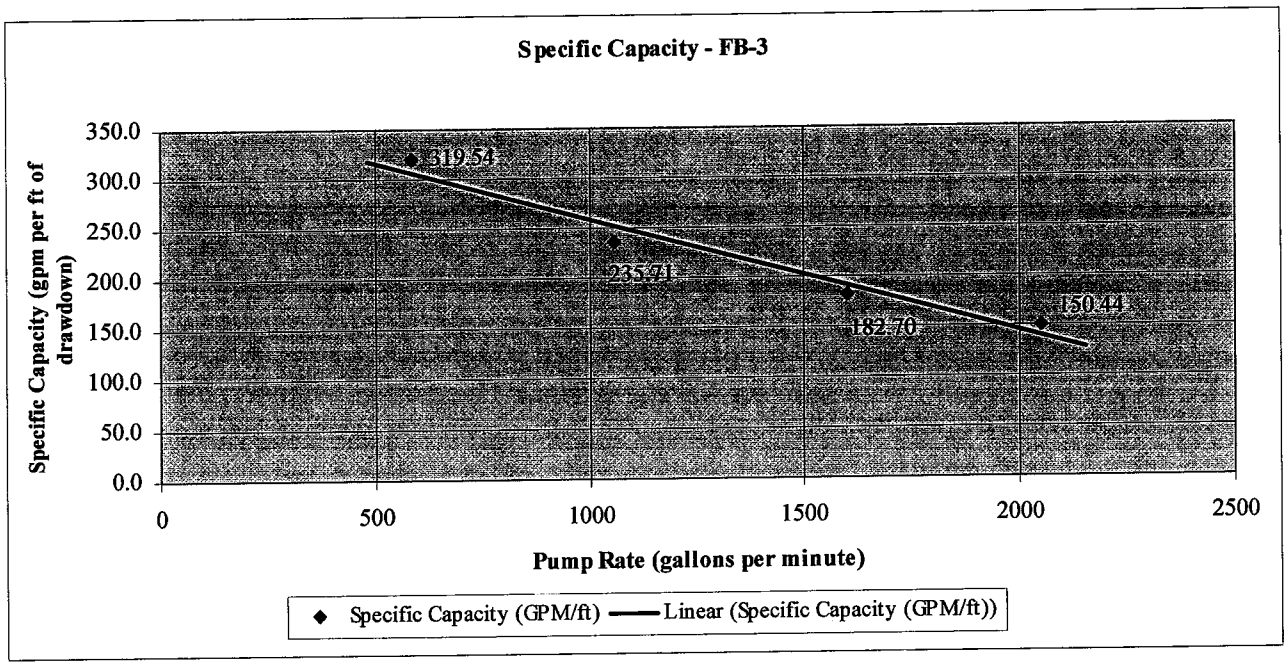
Project: 06-0039
Created By: SME
Date: 11/14/2007

Fort Pierce Utilities Authority

Specific Capacity Results
FB-2 (9/6/07)

APPENDIX E-2

Step Test Profile FB-3



Specific Capacity FB-3 (7/19/07)

Q Pumping Rate (GPM)	s Drawdown (feet)	s/Q	Formation Loss (feet)	Well Loss (feet)	Well Efficiency (%)	Specific Capacity (GPM/ft)
583	1.82	0.0031	1.00	0.82	55	319.54
1058	4.49	0.0042	1.82	2.67	41	235.71
1600	8.76	0.0055	2.76	6.00	31	182.70
2050	13.63	0.0066	3.53	10.10	25.91	150.44

BOYLE

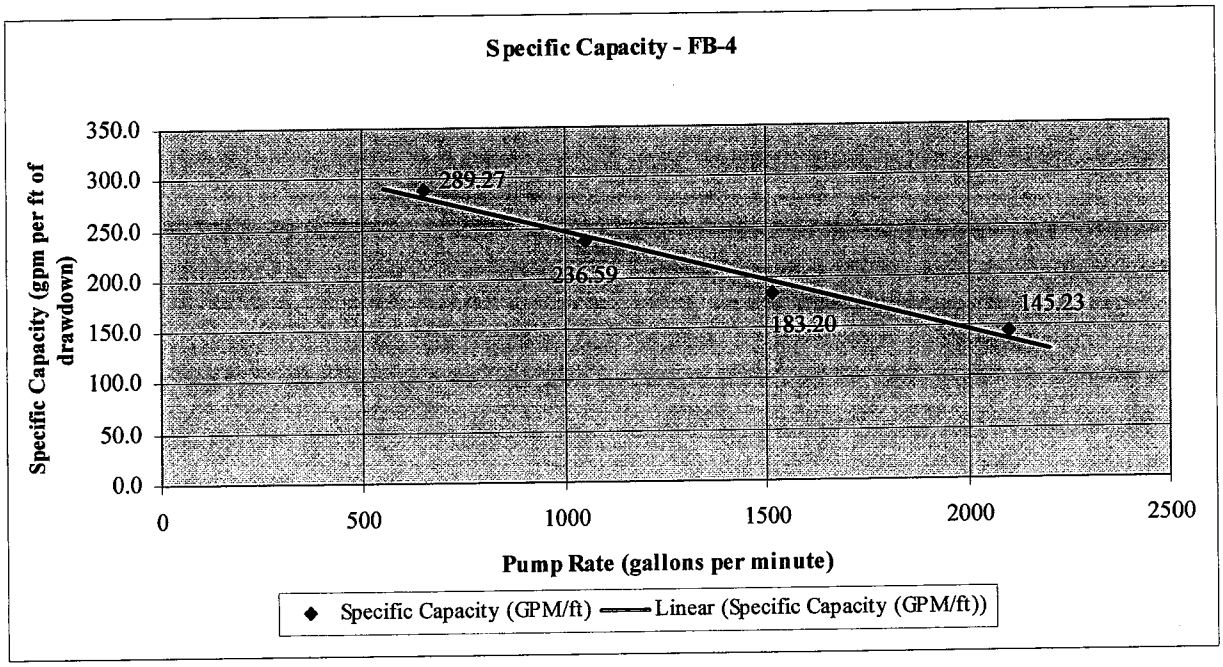
Project: 06-0039
Created By: SME
Date: 11/14/2007

Fort Pierce Utilities Authority

Specific Capacity Results
FB-3 (7/19/07)

APPENDIX E-3

Step Test Profile FB-4



Specific Capacity FB-4 (8/5/07)

Q Pumping Rate (GPM)	s Drawdown (feet)	s/Q	Formation Loss (feet)	Well Loss (feet)	Well Efficiency (%)	Specific Capacity (GPM/ft)
650	2.25	0.0035	1.18	1.07	53	289.27
1050	4.44	0.0042	1.91	2.53	43	236.59
1516	8.28	0.0055	2.76	5.52	33	183.20
2100	14.46	0.0069	3.82	10.64	26.41	145.23

BOYLE

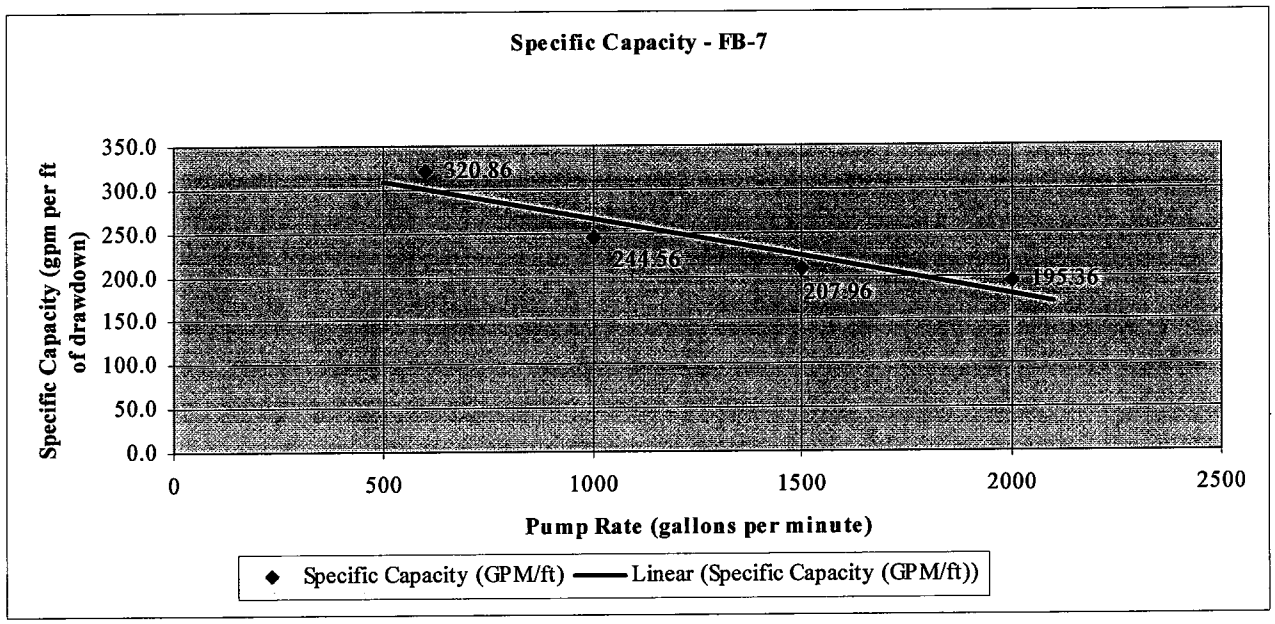
Project: 06-0039
Created By: SME
Date: 11/14/2007

Fort Pierce Utilities Authority

Specific Capacity Results
FB-4 (8/5/07)

APPENDIX E-4

Step Test Profile FA-7



Specific Capacity FA-7 (8/22/07)

Q Pumping Rate (GPM)	s Drawdown (feet)	s/Q	Formation Loss (feet)	Well Loss (feet)	Well Efficiency (%)	Specific Capacity (GPM/ft)
600	1.87	0.0031	1.49	0.38	80	320.86
1000	4.09	0.0041	2.48	1.61	61	244.56
1500	7.21	0.0048	3.72	3.49	52	207.96
2000	10.24	0.0051	4.96	5.27	48.48	195.36

BOYLE

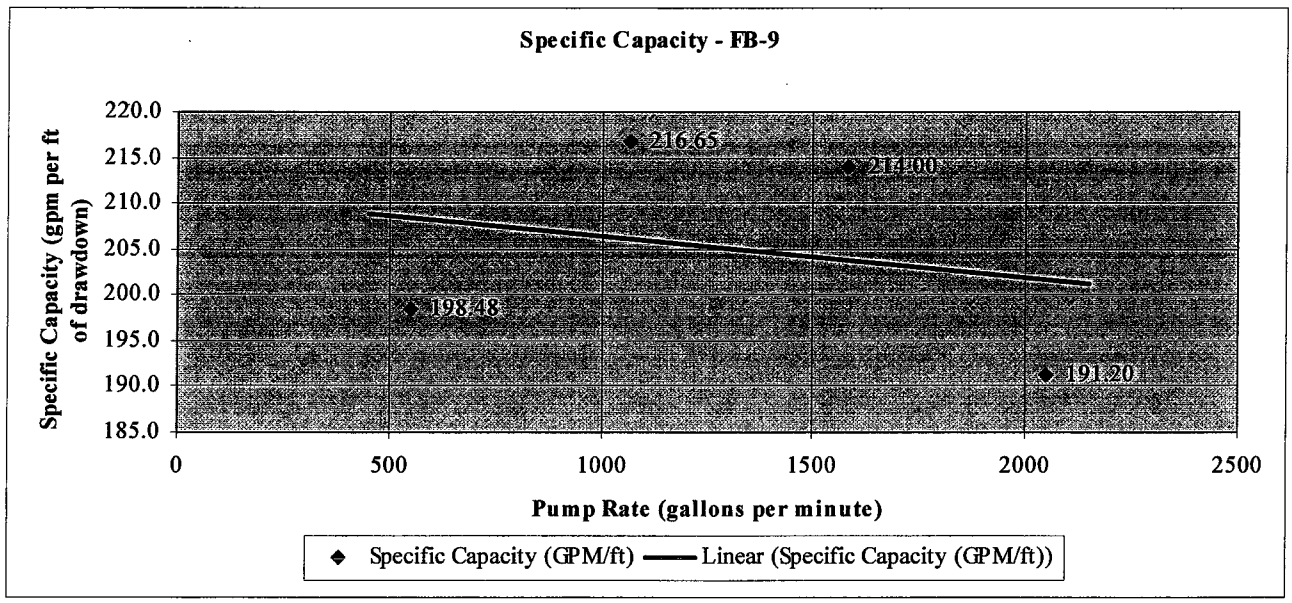
Project: 06-0039
Created By: SME
Date: 11/14/2007

Fort Pierce Utilities Authority

Specific Capacity Results
FA-7 (8/22/07)

APPENDIX E-5

Step Test Profile FA-9



Specific Capacity FA-9 (8/28/07)

Q Pumping Rate (GPM)	s Drawdown (feet)	s/Q	Formation Loss (feet)	Well Loss (feet)	Well Efficiency (%)	Specific Capacity (GPM/ft)
550	2.77	0.0050	0.95	1.82	34	198.48
1067	4.93	0.0046	1.84	3.09	37	216.65
1583	7.40	0.0047	2.73	4.67	37	214.00
2050	10.72	0.0052	3.53	7.19	32.92	191.20
2635	14.469	0.0055	4.54	9.93	31.36	182.11

BOYLE

Project: 06-0039
Created By: SME
Date: 11/14/2007

Fort Pierce Utilities Authority

Specific Capacity Results
FA-9 (8/28/07)

APPENDIX E-6

Casing Installation Summary FA-7

Fort Pierce Utilities Authority
City of Fort Pierce, Florida
Production Well FA-7
Casing Installation Summary

24-inch Diameter Steel Outer Casing

Date Installed	Time Installed	Joint #	Heat #	Length of Joint*	Cumulative Length
5/20/2007		1	185063	27.15	27.15
5/20/2007		2	185067	38.27	65.42
5/20/2007		3	184693	38.70	104.12

17.4-inch Diameter PVC Inner Casing

Date Installed	Time Installed	Joint #	Batch #	Length of Joint*	Cumulative Length
6/17/2007	1703	13<	**	20.00	20.00
6/17/2007	1715	12<	**	20.00	40.00
6/17/2007	1720	6<	**	20.00	60.00
6/17/2007	1727	3	**	20.00	80.00
6/17/2007	1732	8<	**	20.00	100.00
6/17/2007	1739	4	**	20.00	120.00
6/17/2007	1844	5	**	20.00	140.00
6/17/2007	1850	1	**	20.00	160.00
6/17/2007	1854	2	**	20.00	180.00
6/17/2007	1858	10<	**	20.00	200.00
6/17/2007	1906	11	**	20.00	220.00
6/17/2007	1911	7	**	20.00	240.00
6/17/2007	1915	30	**	20.00	260.00
6/17/2007	1920	9	**	20.00	280.00
6/17/2007	1924	27<	**	20.00	300.00
6/17/2007	1934	28	**	20.00	320.00
6/17/2007	1939	24	**	20.00	340.00
6/17/2007	1943	25	**	20.00	360.00
6/17/2007	1947	26	**	20.00	380.00
6/17/2007	1950	22<	**	20.00	400.00
6/17/2007	1959	29	**	20.00	420.00
6/17/2007	2003	23	**	20.00	440.00
6/17/2007	2006	20	**	20.00	460.00
6/17/2007	2009	21	**	20.00	480.00
6/17/2007	2013	19<	**	20.00	500.00
6/17/2007	2035	18	**	20.00	520.00
6/17/2007	2041	16	**	20.00	540.00
6/17/2007	2045	17	**	20.00	560.00
6/17/2007	2049	14<	**	20.00	580.00
6/17/2007	2056	15	**	20.00	600.00

Subtract 2 feet from cumulative length for stick up

Note: One section, 20 feet, was lost during ensuing drilling operations

PVC Casing set to 578 feet bpl

* - All lengths measured in feet.

** - Certainteed 17.4" Cert-lok Well Casing IC-1 SDR 17 Class 250 ASTM F480 Batch #657214

> = Centralizers

APPENDIX E-7

Casing Installation Summary FA-9

Fort Pierce Utilities Authority
City of Fort Pierce, Florida
Production Well FA-9
Casing Installation Summary

24-inch Diameter Steel Outer Casing

Date Installed	Time Installed	Joint #	Heat #	Length of Joint	Cumulative Length
7/19/2007	1318	1	184957	23.00	23.00
7/19/2007		2	184793	38.33	61.33
7/19/2007		3	184960	38.83	100.16

17.4-inch Diameter PVC Inner Casing

Date Installed	Time Installed	Joint #	Batch #	Length of Joint	Cumulative Length
7/26/2007	2059	4<	**	20.00	20.00
7/26/2007	2109	3<	**	20.00	40.00
7/26/2007	2115	13<	**	20.00	60.00
7/26/2007	2123	22	**	20.00	80.00
7/26/2007	2126	21	**	20.00	100.00
7/26/2007	2132	20<	**	20.00	120.00
7/26/2007	2138	25	**	20.00	140.00
7/26/2007	2142	23	**	20.00	160.00
7/26/2007	2150	24	**	20.00	180.00
7/26/2007	2155	5	**	20.00	200.00
7/26/2007	2201	28<	**	20.00	220.00
7/26/2007	2204	27	**	20.00	240.00
7/26/2007	2207	26	**	20.00	260.00
7/26/2007	2210	30	**	20.00	280.00
7/26/2007	2213	29	**	20.00	300.00
7/26/2007	2217	12<	**	20.00	320.00
7/26/2007	2219	11	**	20.00	340.00
7/26/2007	2228	8	**	20.00	360.00
7/26/2007	2231	7	**	20.00	380.00
7/26/2007	2235	6	**	20.00	400.00
7/26/2007	2239	16<	**	20.00	420.00
7/26/2007	2244	15	**	20.00	440.00
7/26/2007	2249	14	**	20.00	460.00
7/26/2007	2254	2	**	20.00	480.00
7/26/2007	2257	1<	**	20.00	500.00
7/26/2007	2309	10	**	20.00	520.00
7/26/2007	2313	9	**	20.00	540.00
7/26/2007	2319	19	**	20.00	560.00
7/26/2007	2323	18	**	20.00	580.00
7/26/2007	2331	17<	**	20.00	600.00
7/26/2007	2346	31	**	20.00	620.00

Subtract 2 feet from cumulative length for stick up

PVC Casing set to 618 feet bpl

* - All lengths measured in feet.

** - Certainteed 17.4" Cert-lok Well Casing IC-1 SDR 17 Class 250 ASTM F480 Batch #657214

> = Centralizers

APPENDIX F

Geophysical Logging Schedule

Geophysical Logs

Video Surveys

APPENDIX F-1

Geophysical Logging Schedule

Fort Pierce Utilities Authority
City of Fort Pierce, Florida
Record of Geophysical Logs and Video Surveys

Date	Well	Logs	Depth
7/26/2007	FA-9	Gamma & Caliper	0-615'
8/8/2007	FA-9	Gamma, Caliper, Flow, Fluid Res., Temp., DIL	0-1250'
8/8/2007	FA-9	Video Survey	0-1250'
9/10/2007	FA-9	Video Survey - Final	0-1250'
5/20/2007	FA-7	Gamma & Caliper	0-100'
6/8/2007	FA-7	Gamma, Caliper, Temp., DIL w/ SPR	0-750' Pilot Hole
6/8/2007	FA-7	Sonic	0-750' Pilot Hole
6/17/2007	FA-7	Caliper	0'-600' Reamed pilot hole
7/14/2007	FA-7	Gamma, Caliper, Flow, Fluid Res., Temp., DIL	0-1250'
7/14/2007	FA-7	Video Survey	0-1250'
9/10/2007	FA-7	Video Survey - 2nd	0-1250'
9/24/2007	FA-7	Video Survey - 3rd	0-1250'
5/31/2007	FB-4	Sonic	0-1250'
5/31/2007	FB-4	Gamma, Caliper, Flow, Fluid Res., Temp., DIL	0-1250'
5/28/2007	FB-4	Video Survey	0-1250'
7/3/2007	FB-3	Gamma, Caliper, Flow, Fluid Res., Temp., DIL	0-1250'
7/3/2007	FB-3	Video Survey	0-1250'
8/24/2007	FB-2	Gamma, Caliper, Flow, Fluid Res., Temp., DIL	0-1250'
8/20/2007	FB-2	Video Survey	0-1250'

APPENDIX F-2

Geophysical Logging Suite – FB-2

0' – 1,250'

Natural Gamma Ray, 4-Arm Caliper, Flow Meter, Temperature, Fluid Resistivity & Dual Induction

GAMMA, DIL, XY CALIPER, STATIC AND DYNAMIC RES(FL), TEMP, FLOW LOGS

ALLWEBBS ENTERPRISES, INC.

Company	FPUA
Well	FB-2
Field	Treatment Plant
County	St. Lucie
State	Florida
Location	5 35 40
Other Services	
Permanent Datum	GL
Log Measured From	GL
Drilling Measured From	GL
Elevation	K.B. / D.F. / G.L.

Date	24 Aug 2007
Run Number	1
Depth Driller	1250'
Depth Logger	1250'
Bottom Logged Interval	1250
Top Log Interval	400'
Open Hole Size	11"
Type Fluid	WATER
Density / Viscosity	NA
Max. Recorded Temp.	80F
Estimated Cement Top	
Time Well Ready	0830
Time Logger on Bottom	0930
Equipment Number	VA-201
Location	Treatment Plant
Recorded By	D. MARCHESANI
Witnessed By	Shamus English

Borehole Record

Run Number	Bit	From	To

Tubing Record

Size	Weight	From	To

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

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Comments

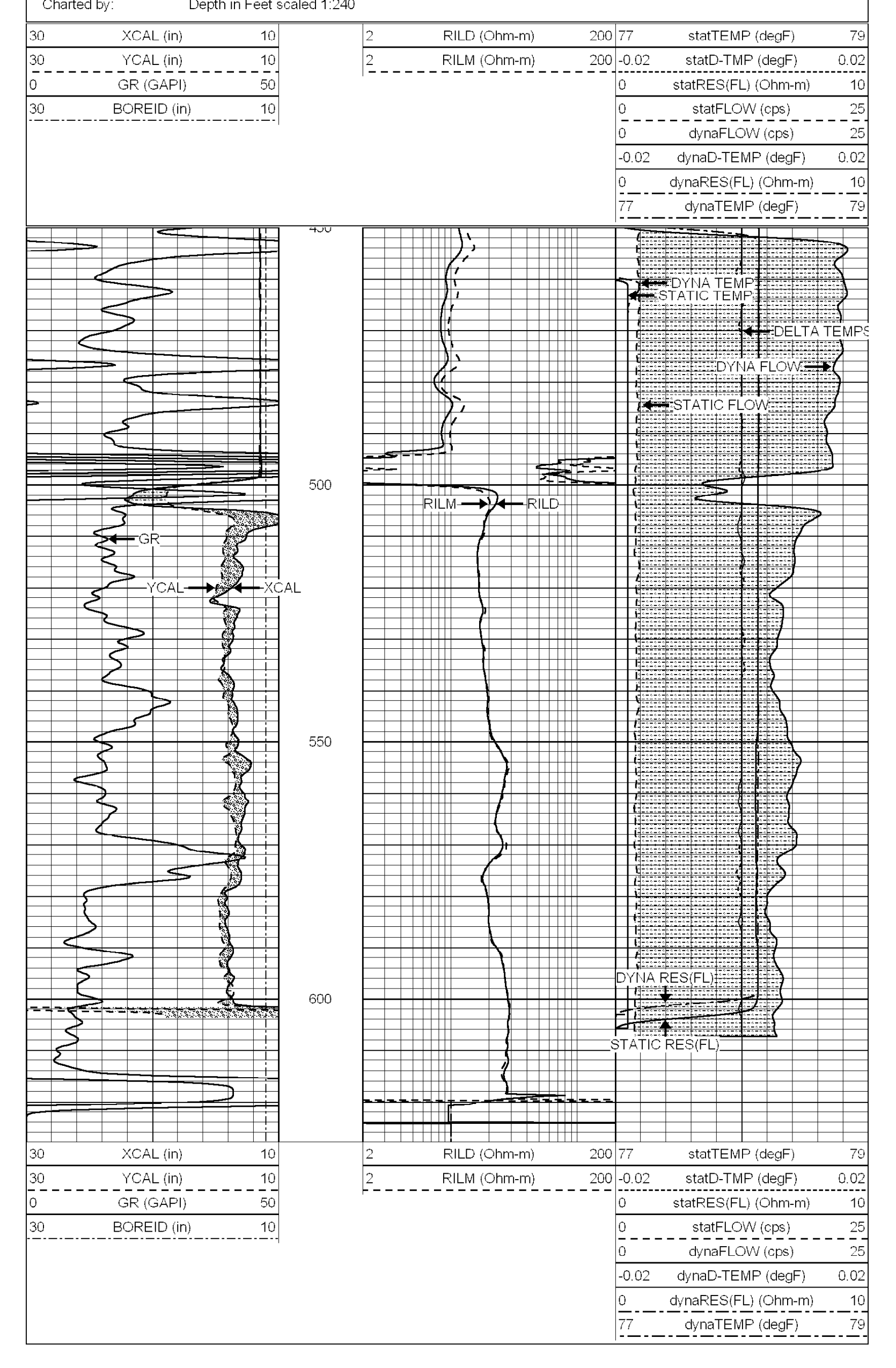
LOGS RECORDED STATICALLY AND DYNAMICALLY.
WHILE FLOWING THE Q~= 1500gpm

MAINS

Database File: c:\warrior\data\fpua folder\fb-2\merge folder\elog24.db
Dataset Pathname: merge2
Presentation Format: AG-T-F~2
Dataset Creation: Fri Aug 24 13:46:50 2007
Charted by: Depth in Feet scaled 1:240

REPEATS

Database File: c:\warrior\data\fpua folder\fb-2\merge folder\elog24.db
Dataset Pathname: REPEATS/merge1
Presentation Format: a g-t-fr
Dataset Creation: Fri Aug 24 12:01:47 2007
Charted by: Depth in Feet scaled 1:240



Calibration Report

Database File: fpua.db
Dataset Pathname: t-plant/fb-2/XY/MAIN
Dataset Creation: Fri Aug 24 13:07:47 2007 by Log Open-Cased 070814

XY Caliper Calibration Report

Serial Number/Model: Probe1-Probe
Performed: Wed Aug 22 08:25:45 2007

Ring			X Caliper		Y Caliper	
1:	9.375	in	381.438	cps	414.174	cps
2:	11.625	in	410.438	cps	444.869	cps
3:	12.75	in	425.715	cps	458.778	cps
4:	15.25	in	458.5	cps	494.2	cps
5:	29.125	in	675.5	cps	711.6	cps
6:	35.25	in	786.769	cps	824.844	cps

Calibration Report

Database File: fpua.db
Dataset Pathname: t-plant/fb-2/DIL/REPEAT
Dataset Creation: Fri Aug 24 12:27:22 2007 by Log Open-Cased 070814

Gamma Ray Calibration Report

Serial Number: 5562
Tool Model: 6CHAN
Performed: Sun Jun 13 15:33:21 1993

Calibrator Value: 1.0 GAPI

Background Reading: 0.0
Calibrator Reading: 1.0

Sensitivity: 1.0000 GAPI/

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
			XYC-Probe (Probe1)	5.17	3.50	99.00
XCAL	0.00					
YCAL	0.00					

Dataset: fpua.db: t-plant/fb-2/XY/MAIN
Total Length: 5.17 ft
Total Weight: 99.00 lb
O.D. 3.50 in

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	6.50					
			RGDILGR-6CHAN (5562) Robertson Geologging Dual Induction Gamma Ray	7.06	1.50	13.67
CILD	2.63					
CPSD	2.63					
CILM	1.54					
CPSM	1.54					

Dataset: fpua.db: t-plant/fb-2/DIL/MAIN
Total Length: 7.06 ft
Total Weight: 13.67 lb
O.D. 1.50 in

APPENDIX F-3

Geophysical Logging Suite – FB-3

0' – 1,250'

Natural Gamma Ray, 4-Arm Caliper, Flow Meter, Temperature, Fluid Resistivity & Dual Induction

GAMMA, DIL, XY CALIPER, STATIC AND DYNAMIC RES(FL), TEMP, FLOW LOGS

ALLWEBBS ENTERPRISES, INC.

Company	FPUA
Well	FB-3
Field	DREAMLAND
County	St. Lucie
State	Florida

Location: 5 35 40

Other Services:

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

Date	07/03/2007
Run Number	1
Depth Driller	1250'
Depth Logger	1250'
Bottom Logged Interval	1250
Top Log Interval	400'
Open Hole Size	11"
Type Fluid	WATER
Density / Viscosity	NA
Max. Recorded Temp.	80F
Estimated Cement Top	
Time Well Ready	0930
Time Logger on Bottom	1110
Equipment Number	VA-201
Location	DREAMLAND PARK
Recorded By	D. MARCHESANI
Witnessed By	M. BENNETT

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To

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

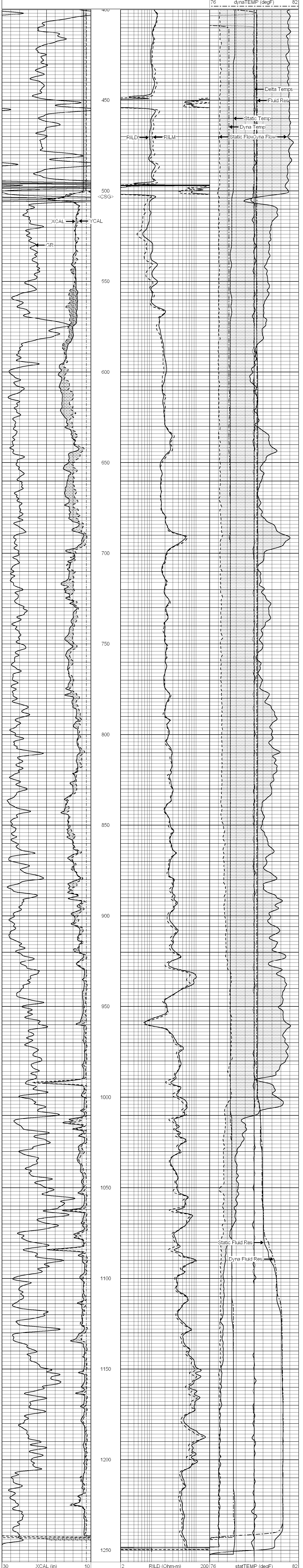
<<< Fold Here >>>

Comments

MAIN PASSES

Database File:	c:\warrior\data\fpua folder\fb-3\merge folder\elog.db
Dataset Pathname:	Composite/pass1
Presentation Format:	a g-t-fr
Dataset Creation:	Thu Aug 16 09:28:45 2007
Charted by:	Depth in Feet scaled 1:240

30	XCAL (in)	10	2	RILD (Ohm-m)	200	76	statTEMP (degF)	82
30	YCAL (in)	10	2	RILM (Ohm-m)	200	-0.02	statD-TEMP (degF)	0.02
0	GR (GAPI)	50				0	statRES(FL) (Ohm-m)	10
30	Bit Size (in)	10				0	statFLOW (cps)	12
						0	dynaFLOW (cps)	12
						-0.02	dynaD-TEMP (degF)	0.02
						0	dynaRES(FL) (Ohm-m)	10
						76	dynaTEMP (degF)	82

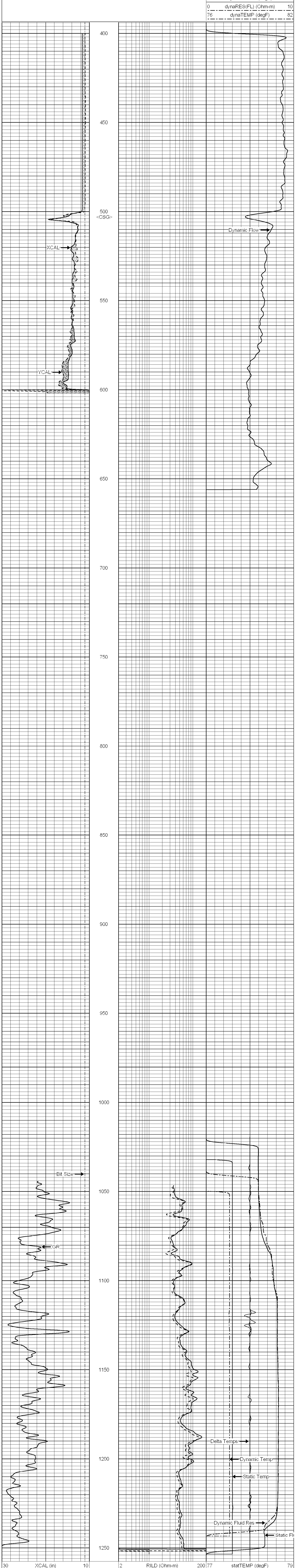


0	dynaFLOW (cps)	12
-0.02	dynaD-TEMP (degF)	0.02
0	dynaRES(FL) (Ohm-m)	10
76	dynaTEMP (degF)	82

REPEAT PASSES

Database File:	c:\warrior\data\fpua folder\fb-3\merge folder\elog.db
Dataset Pathname:	REPEATS/well/COMPOSITE/merge1
Presentation Format:	a g-t-fr
Dataset Creation:	Thu Aug 16 10:15:07 2007
Charted by:	Depth in Feet scaled 1:240

30	XCAL (in)	10	2	RILD (Ohm-m)	200	77	statTEMP (degF)	79
30	YCAL (in)	10	2	RILM (Ohm-m)	200	-0.02	statD-TMP (degF)	0.02
0	GR (GAPI)	50				0	statRES(FL) (Ohm-m)	10
30	BOREID (in)	10				0	dynaFLOW (cps)	12
						-0.02	dynaD-TEMP (degF)	0.02
						0	dynaRES(FL) (Ohm-m)	10
						76	dynaTEMP (degF)	82



30	XCAL (in)	10	2	RILD (Ohm-m)	200	77	statTEMP (degF)	79
30	YCAL (in)	10	2	RILM (Ohm-m)	200	-0.02	statD-TMP (degF)	0.02
0	GR (GAPI)	50				0	statRES(FL) (Ohm-m)	10
30	BOREID (in)	10				0	dynaFLOW (cps)	12
						-0.02	dynaD-TEMP (degF)	0.02
						0	dynaRES(FL) (Ohm-m)	10
						76	dynaTEMP (degF)	82

Calibration Report

Database File: c:\warrior\data\fpua folder\fb-3\merge folder\elog.db
Dataset Pathname: Composite/pass1
Dataset Creation: Thu Aug 16 09:28:45 2007

Gamma Ray Calibration Report

Serial Number:	5562	
Tool Model:	6CHAN	
Performed:	Sun Jun 13 15:33:21 1993	
Calibrator Value:	1.0	GAPI
Background Reading:	0.0	
Calibrator Reading:	1.0	
Sensitivity:	1.0000	GAPI/

Calibration Report

Database File: fpua.db
Dataset Pathname: DREAMLAND/FB-3/XY/MAIN
Dataset Creation: Tue Jul 03 18:20:11 2007 by Log Open-Cased 061129

XY Caliper Calibration Report

Serial Number/Model: Probe1-Probe
Performed: Thu Jun 14 11:33:49 2007

	Ring		X Caliper		Y Caliper	
1:	7.9375	in	361.4	cps	372.8	cps
2:	11.625	in	408.8	cps	421.1	cps
3:	14.4375	in	442.8	cps	454.5	cps
4:	21	in	538.3	cps	554	cps
5:	29.125	in	667.5	cps	687.7	cps
6:	35.3125	in	771.5	cps	797.8	cps

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	6.50					
			RGDILGR-6CHAN (5562) Robertson Geologging Dual Induction Gamma Ray	7.06	1.50	13.67
CILD	2.63					
CPSD	2.63					
CILM	1.54					
CPSM	1.54					

Dataset: elog.db: field/well/Composite/pass1
Total Length: 7.06 ft
Total Weight: 13.67 lb
O.D. 1.50 in

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
			XYC-Probe (Probe1)	5.17	3.50	99.00
XCAL	0.00					
YCAL	0.00					

Dataset: fpua.db: DREAMLAND/FB-3/XY/MAIN
Total Length: 5.17 ft
Total Weight: 99.00 lb
O.D. 3.50 in

APPENDIX F-4

Geophysical Logging Suite – FB-4

0' – 1,250'

Natural Gamma Ray, 4-Arm Caliper, Flow Meter, Temperature, Fluid Resistivity, Dual Induction & Compensated Sonic

Caliper Flow with GAMMA, FLUID RES. TEMPERATURE, DIL

ALLWEBBS

Company	FPUA
Well	FB-4
Field	Dreamland
County	ST. LUCIE
State	FLORIDA

Company FPUA
Well FB-4
Field Dreamland
County ST. LUCIE
State FLORIDA
Location 5 35 40
Permanent Datum
Log Measured From
Drilling Measured From
Elevation
K.B.
D.F.
G.L.
Other Services

Date 05/30/2007
Run Number
Depth Driller
Depth Logger
Bottom Logged Interval
Top Log Interval
Open Hole Size
Type Fluid WATER
Density / Viscosity
Max. Recorded Temp.
Estimated Cement Top
Time Well Ready
Time Logger on Bottom
Equipment Number
Location
Recorded By
Witnessed By

Borehole Record: Run Number | Bit | From | To
Tubing Record: Size | Weight | From | To
Casing Record: Surface String | Prot. String | Production String | Liner — Size | Wgt/Ft | Top | Bottom

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

Comments

MAIN PASS

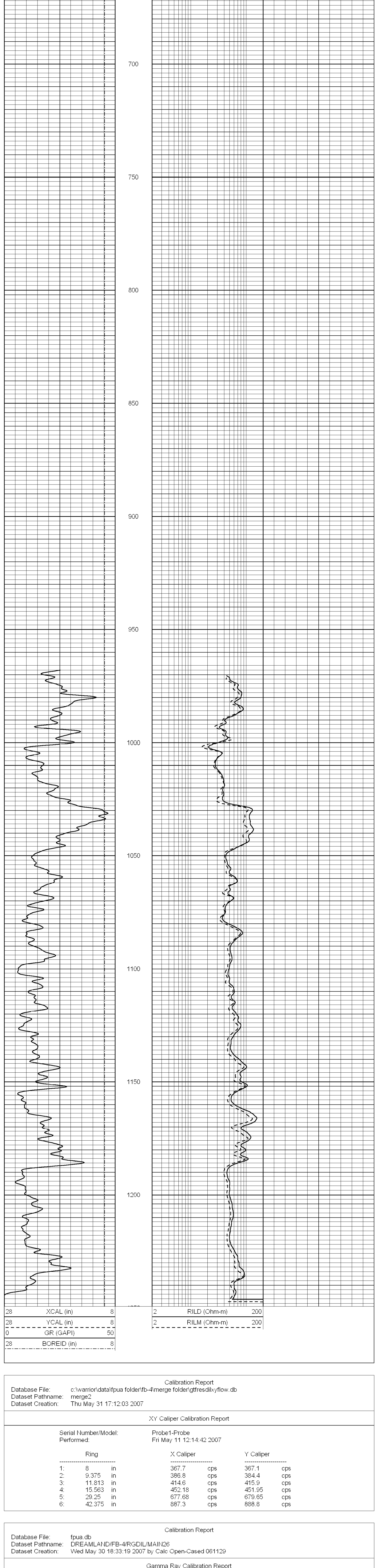
Database File: c:\warrior\data\fpua folder\fb-4\merge folder\gtfresdilxyflow.db
Dataset Pathname: merge4
Presentation Format: awe_gtfr
Dataset Creation: Wed Jun 13 14:20:26 2007
Charted by: Depth in Feet scaled 1:240

Track 1	Track 2	Track 3
XCAL (in) 28–8	RILD (Ohm-m) 2–200	TEMP (degF) 70–80
YCAL (in) 28–8	RILM (Ohm-m) 2–200	RES(FL) (Ohm-m) 0–10
GR (GAPI) 0–50		FLOWS (cps) 0–20
BOREID (in) 28–8		FLOWD (cps) 0–20
		TEMPD (degF) -0.05–0.05
		DynRES(FL) (Ohm-m) 0–10
		DynTEMP (degF) 70–80

XY AND DIL REPEATS

Database File: c:\warrior\data\fpua folder\fb-4\merge folder\gtfresdilxyflow.db
Dataset Pathname: REPEAT
Presentation Format: awe_gtfr
Dataset Creation: Wed Jun 13 15:24:26 2007
Charted by: Depth in Feet scaled 1:240

Track 1	Track 2
XCAL (in) 28–8	RILD (Ohm-m) 2–200
YCAL (in) 28–8	RILM (Ohm-m) 2–200
GR (GAPI) 0–50	
BOREID (in) 28–8	



Calibration Report

Database File: c:\warrior\data\fpua folder\fb-4\merge folder\gtfresdilxyflow.db
Dataset Pathname: merge2
Dataset Creation: Thu May 31 17:12:03 2007

XY Caliper Calibration Report

Serial Number/Model: Probe1-Probe
Performed: Fri May 11 12:14:42 2007

Ring		X Caliper		Y Caliper	
1: 8	in	367.7	cps	367.1	cps
2: 9.375	in	386.8	cps	384.4	cps
3: 11.813	in	414.6	cps	415.9	cps
4: 15.563	in	452.18	cps	451.95	cps
5: 29.25	in	677.68	cps	679.65	cps
6: 42.375	in	887.3	cps	888.8	cps

Calibration Report

Database File: fpua.db
Dataset Pathname: DREAMLAND/FB-4/RGDIL/MAIN26
Dataset Creation: Wed May 30 18:33:19 2007 by Calc Open-Cased 061129

Gamma Ray Calibration Report

Serial Number: 5562
Tool Model: 6CHAN
Performed: Sun Jun 13 15:33:21 1993

Calibrator Value: 1.0 GAPI

Background Reading: 0.0
Calibrator Reading: 1.0 GAPI/

Sensitivity: 1.0000

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
XCAL	0.00		XYC-Probe (Probe1)	5.17	3.50	99.00
YCAL	0.00					

Dataset: gtfresdilxyflow.db: field/well/run1/merge2
Total Length: 5.17 ft
Total Weight: 99.00 lb
O.D.: 3.50 in

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	6.50		RGDILGR-6CHAN (5562) Robertson Geologging Dual Induction Gamma Ray	7.06	1.50	13.67
CILD	2.63					
CPSD	2.63					
CILM	1.54					
CPSM	1.54					

Dataset: fpua.db: DREAMLAND/FB-4/RGDIL/MAIN26
Total Length: 7.06 ft
Total Weight: 13.67 lb
O.D.: 1.50 in

APPENDIX F-5

Geophysical Logging Suite – FA-7

0' – 100'

Natural Gamma Ray & 4-Arm Caliper

0' – 750'

Natural Gamma Ray, 4-Arm Caliper, Temperature & Dual Induction with SPR

0' – 1,250'

Natural Gamma Ray, 4-Arm Caliper, Flow Meter, Temperature, Fluid Resistivity & Dual Induction

GAMMA AND XY CALIPER LOG

ALLWEBBS ENTERPRISES, INC.

Company	FPUA
Well	FA-7
Field	33rd St Canal
Country	USA
State/Prv	FLORIDA

Company	FPUA		
Well	FA-7		
Field	33rd St Canal		
Country	USA	State/Province	FLORIDA
Location	SECTION; TOWNSHIP; RANGE 5; 35; 40	Other Services	
Permanent Datum	GL	Elevation	K.B. D.F. G.L.
Log Measured From	GL		
Drilling Measured From	GL		

Date	20 MAY 2007
Run Number	2
Depth Driller	99'
Depth Logger	98.4
Bottom Logged Interval	83'
Top Log Interval	10'
Casing Driller	na
Casing Logger	na
Bit Size	34"
Type Fluid in Hole	BENTONITE
Density / Viscosity	
pH / Fluid Loss	NA
Source of Sample	NA
Rm @ Meas. Temp	NA
Rmf @ Meas. Temp	NA
Rmc @ Meas. Temp	NA
Source of Rmf / Rmc	NA
Rm @ BHT	NA
Time Circulation Stopped	NA
Time Logger on Bottom	0840
Maximum Recorded Temperature	NA
Equipment Number	VA-201
Location	33RD ST CANAL
Recorded By	D.MARCHESANI
Witnessed By	MIKE BENNETT

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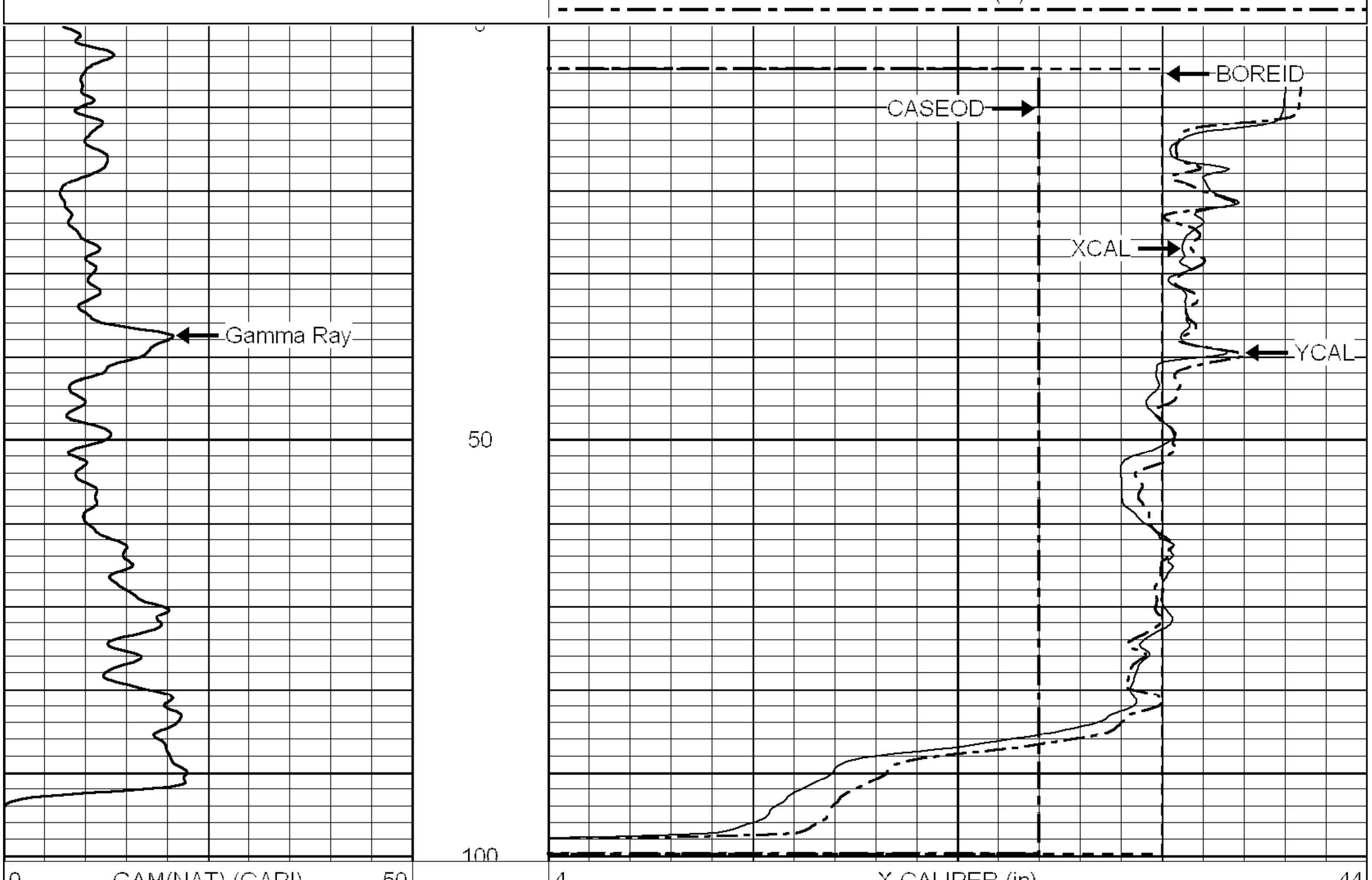
Comments

MAIN PASS

Database File: c:\warrior\data\fpua folder\fa-7\surface casing.db
Dataset Pathname: 33rd/FA-7/run1/pass1
Presentation Format: xy_gam
Dataset Creation: Sun May 20 09:56:43 2007
Charted by: Depth in Feet scaled 1:240

0	GAM(NAT) (GAPI)	50
4	X-CALIPER (in)	44
4	Y-CALIPER (in)	44
4	BIT SIZE (in)	44
4	CASEOD (in)	44

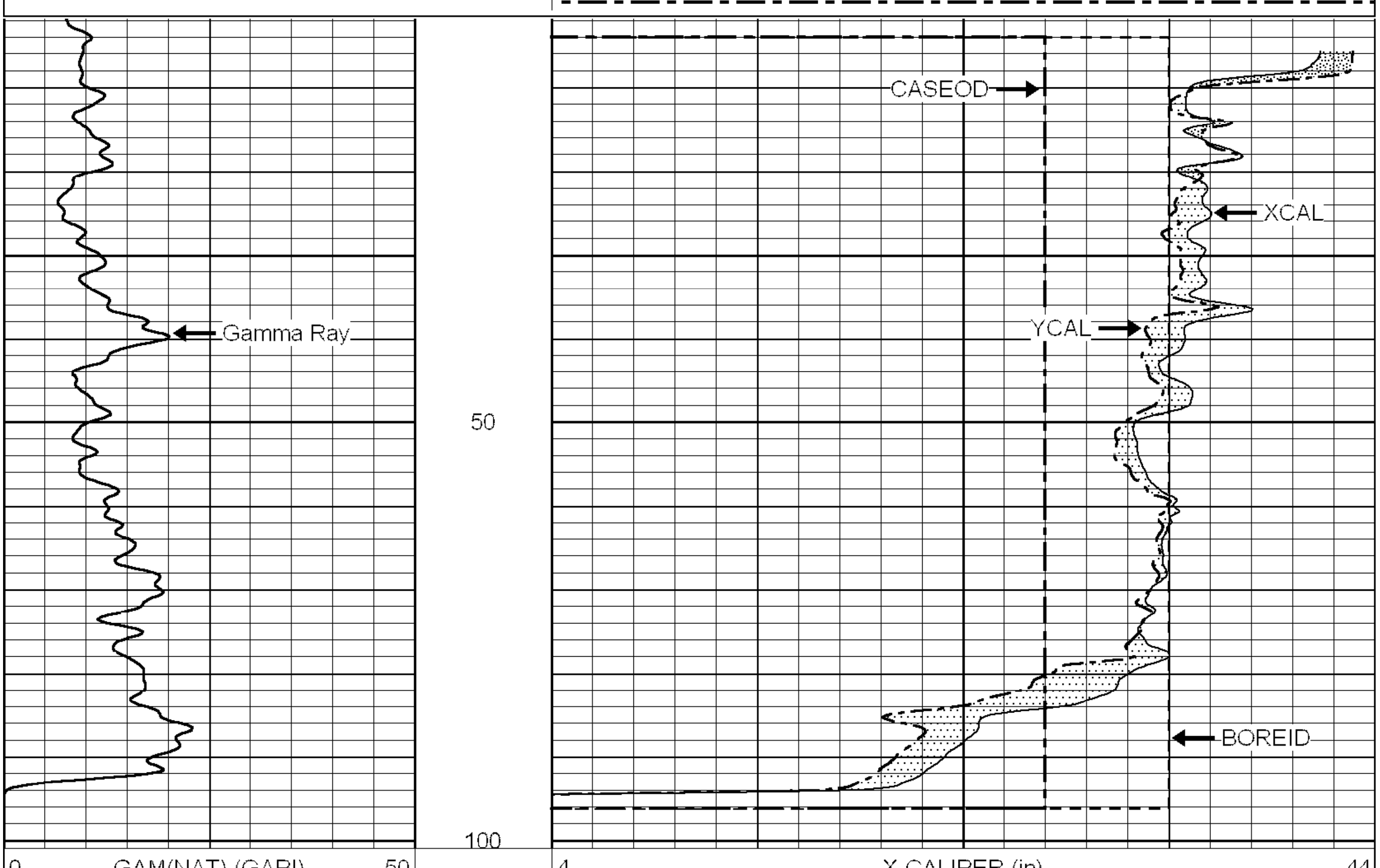


0	GAM(NAT) (GAPI)	50
4	X-CALIPER (in)	44
4	Y-CALIPER (in)	44
4	BIT SIZE (in)	44
4	CASEOD (in)	44

REPEAT

Database File: c:\warrior\data\fpua folder\fa-7\surface casing.db
Dataset Pathname: 33rd/FA-7/run1/repeat
Presentation Format: xy_gam
Dataset Creation: Sun May 20 10:19:59 2007
Charted by: Depth in Feet scaled 1:240

0	GAM(NAT) (GAPI)	50
4	X-CALIPER (in)	44
4	Y-CALIPER (in)	44
4	BIT SIZE (in)	44
4	CASEOD (in)	44



0	GAM(NAT) (GAPI)	50
4	X-CALIPER (in)	44
4	Y-CALIPER (in)	44
4	BIT SIZE (in)	44

Calibration Report

Database File: c:\warrior\data\fpua folder\fa-7\surface casing.db
Dataset Pathname: 33rd/FA-7/run1/pass1
Dataset Creation: Sun May 20 09:56:43 2007

Gamma Ray Calibration Report

Serial Number:	5562	
Tool Model:	6CHAN	
Performed:	Sun Jun 13 15:33:21 1993	
Calibrator Value:	1.0	GAPI
Background Reading:	0.0	
Calibrator Reading:	1.0	
Sensitivity:	1.0000	GAPI/

Calibration Report

Database File: fpua.db
Dataset Pathname: CANAL/FA-7/XY/MAIN
Dataset Creation: Sun May 20 09:00:35 2007 by Log Open-Cased 061129

XY Caliper Calibration Report

Serial Number/Model: Probe1-Probe
Performed: Fri May 11 12:14:42 2007

Ring			X Caliper		Y Caliper	
1:	8	in	367.7	cps	367.1	cps
2:	9.375	in	386.8	cps	384.4	cps
3:	11.813	in	414.6	cps	415.9	cps
4:	15.563	in	452.18	cps	451.95	cps
5:	29.25	in	677.68	cps	679.65	cps
6:	42.375	in	887.3	cps	888.8	cps

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	6.50					
			RGDILGR-6CHAN (5562) Robertson Geologging Dual Induction Gamma Ray	7.06	1.50	13.67
CILD	2.63					
CPSD	2.63					
CILM	1.54					
CPSM	1.54					

Dataset: surface casing.db: 33rd/FA-7/run1/pass1
Total Length: 7.06 ft
Total Weight: 13.67 lb
O.D. 1.50 in

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
			XYC-Probe (Probe1)	5.17	3.50	99.00
XCAL	0.00					
YCAL	0.00					

Dataset: fpua.db: CANAL/FA-7/XY/MAIN
Total Length: 5.17 ft
Total Weight: 99.00 lb
O.D. 3.50 in

ALLWEBBS ENTERPRISES, INC.

PILOT HOLE LOGS: XY w/ GAMMA, DIL w/ SPR, TEMPERATURE

Company	FPUA
Well	FA-7
Field	33rd St Canal
County	ST. LUCIE
State	FLORIDA
Location	5 35 40
Other Services	
Permanent Datum	GL
Log Measured From	GL
Drilling Measured From	GL
Elevation	K.B. / D.F. / G.L.

Date	06/08/2007
Run Number	1
Depth Driller	754
Depth Logger	754
Bottom Logged Interval	754
Top Log Interval	30
Open Hole Size	12.25"
Type Fluid	BENTONITE
Density / Viscosity	
Max. Recorded Temp	90.7 F
Estimated Cement Top	
Time Well Ready	0700
Time Logger on Bottom	0840
Equipment Number	V-2-01
Location	33rd St Canal
Recorded By	D. MARCHESANI
Witnessed By	SHAMUS ENGLISH

Borehole Record			Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To

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

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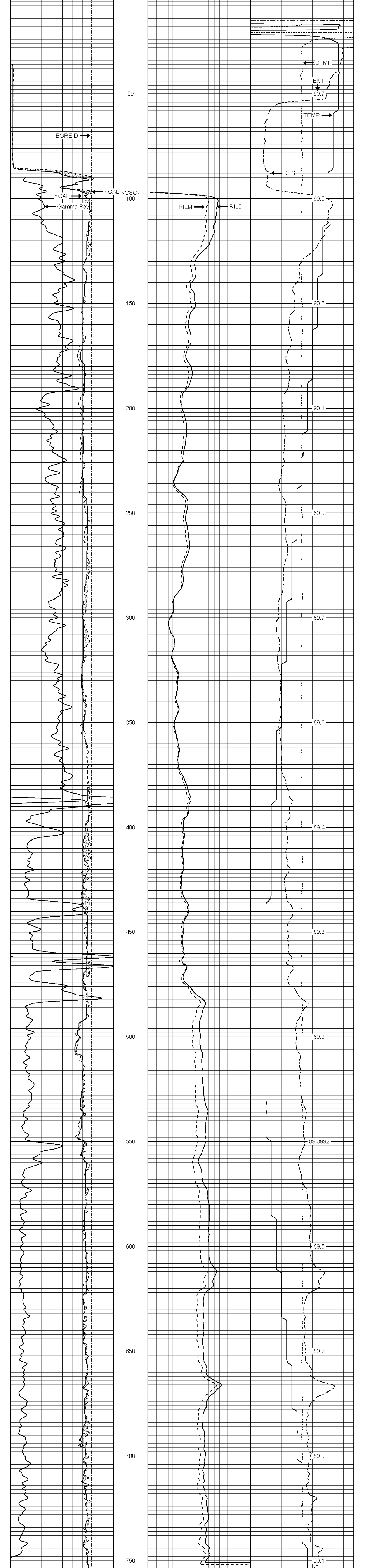
Comments

ALLWEBBS

MAIN PASS

Database File: c:\warrior\data\fpua folder\fa-7\xygditspr.db
Dataset Pathname: 33rd_St_Ca/FA-7/Composite/pass2
Presentation Format: a_dil-xy
Dataset Creation: Tue Jun 12 13:22:04 2007
Charted by: Depth in Feet scaled 1:240

GR (GAPI) 0–100	RILD (Ohm-m) 2–200	TEMP (degF) 89–91
XCAL (in) 28–8	RILM (Ohm-m) 2–200	DTMP (degF) 0.05 – -0.05
YCAL (in) 28–8		RES(OHM) (Ohm) 15–35
BOREID (in) 28–8		



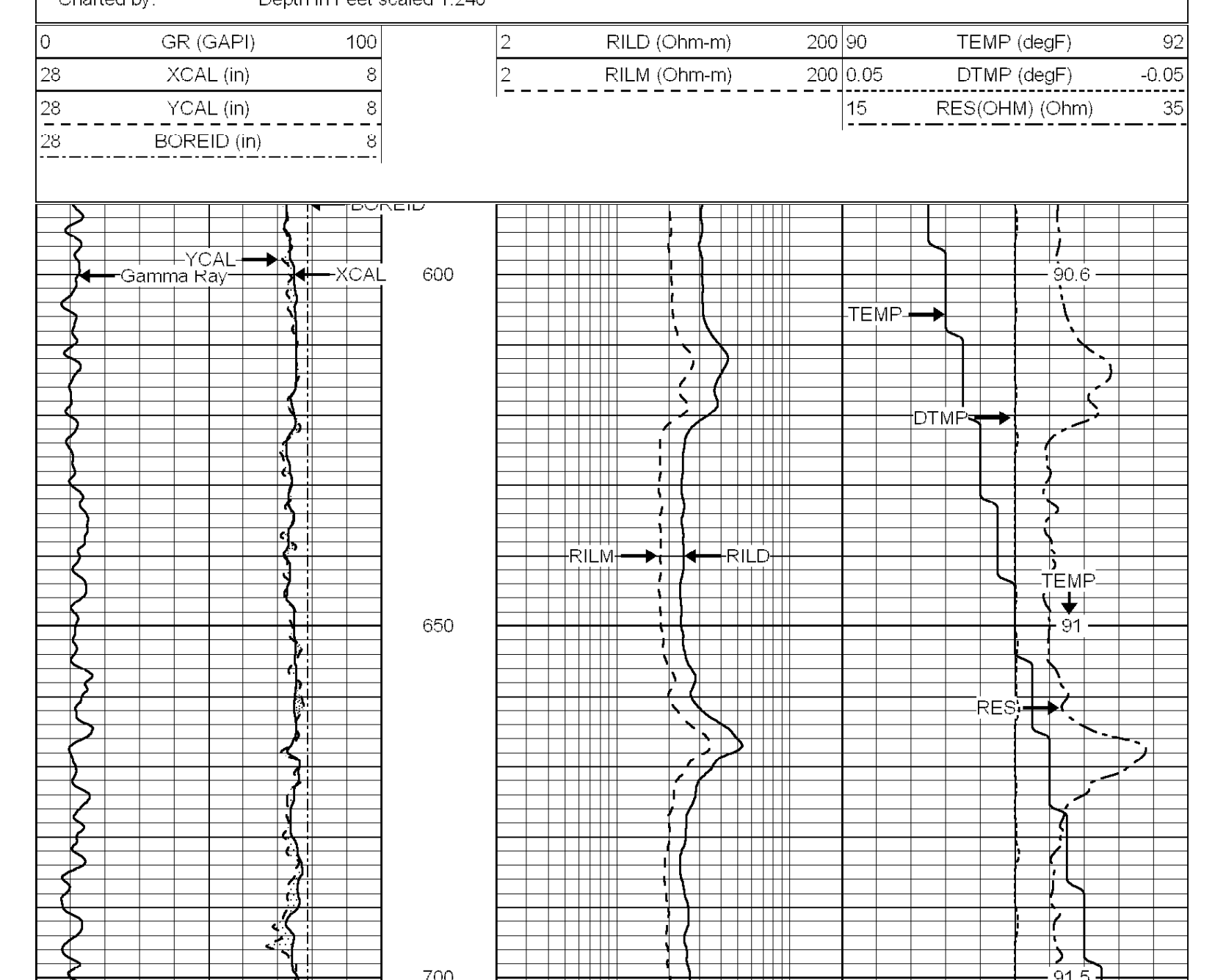
GR (GAPI) 0–100	RILD (Ohm-m) 2–200	TEMP (degF) 89–91
XCAL (in) 28–8	RILM (Ohm-m) 2–200	DTMP (degF) 0.05 – -0.05
YCAL (in) 28–8		RES(OHM) (Ohm) 15–35
BOREID (in) 28–8		

ALLWEBBS

REPEAT PASS

Database File: c:\warrior\data\fpua folder\fa-7\xygditspr.db
Dataset Pathname: 33rd_St_Ca/FA-7/Composite/Repeat
Presentation Format: a_dil-xy
Dataset Creation: Tue Jun 12 13:41:20 2007
Charted by: Depth in Feet scaled 1:240

GR (GAPI) 0–100	RILD (Ohm-m) 2–200	TEMP (degF) 90–92
XCAL (in) 28–8	RILM (Ohm-m) 2–200	DTMP (degF) 0.05 – -0.05
YCAL (in) 28–8		RES(OHM) (Ohm) 15–35
BOREID (in) 28–8		



GR (GAPI) 0–100	RILD (Ohm-m) 2–200	TEMP (degF) 90–92
XCAL (in) 28–8	RILM (Ohm-m) 2–200	DTMP (degF) 0.05 – -0.05
YCAL (in) 28–8		RES(OHM) (Ohm) 15–35
BOREID (in) 28–8		

Calibration Report

Database File: fpua.db
Dataset Pathname: 33rd_St_C/FA-7/XY/MAIN
Dataset Creation: Fri Jun 08 11:53:03 2007 by Log Open-Cased 061129

XY Caliper Calibration Report

Serial Number/Model: Probe1-Probe
Performed: Fri May 11 12:14:42 2007

	Ring		X Caliper		Y Caliper	
1:	8	in	367.7	cps	367.1	cps
2:	9.375	in	386.8	cps	384.4	cps
3:	11.813	in	414.6	cps	415.9	cps
4:	15.563	in	452.18	cps	451.95	cps
5:	29.25	in	677.68	cps	679.65	cps
6:	42.375	in	887.3	cps	888.8	cps

Calibration Report

Database File: fpua.db
Dataset Pathname: 33rd_St_C/FA-7/DIL/MAIN
Dataset Creation: Fri Jun 08 10:24:20 2007 by Log Open-Cased 061129

Gamma Ray Calibration Report

Serial Number: 5562
Tool Model: 6CHAN
Performed: Sun Jun 13 15:33:21 1993

Calibrator Value: 1.0 GAPI

Background Reading: 0.0
Calibrator Reading: 1.0

Sensitivity: 1.0000 GAPI/

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
			XYC-Probe (Probe1)	5.17	3.50	99.00
XCAL	0.00					
YCAL	0.00					

Dataset: fpua.db: 33rd_St_C/FA-7/XY/MAIN
Total Length: 5.17 ft
Total Weight: 99.00 lb
O.D.: 3.50 in

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	6.50					
			RGDILGR-6CHAN (5562) Robertson Geologging Dual Induction Gamma Ray	7.06	1.50	13.67
CILD	2.63					
CPSD	2.63					
CILM	1.54					
CPSM	1.54					

Dataset: fpua.db: 33rd_St_C/FA-7/DIL/MAIN
Total Length: 7.06 ft
Total Weight: 13.67 lb
O.D.: 1.50 in

ALLWEBBS ENTERPRISES, INC.

Company	FPUA
Well	FA-7
Field	33rd St Canal
County	ST. LUCIE
State	FLORIDA

XY, GAMMA, DIL, TEMPERATURE, FLUID RES, FLOW LOGS

Company	FPUA		
Well	FA-7		
Field	33rd St Canal		
County	ST. LUCIE	State	FLORIDA
Location	5 35 40	Other Services	
Permanent Datum	GL	Elevation	K.B.
Log Measured From	GL		D.F.
Drilling Measured From	GL		G.L.

Date	14 JUL 07
Run Number	1
Depth Driller	1254'
Depth Logger	1254'
Bottom Logged Interval	1254'
Top Log Interval	500'
Open Hole Size	14.75"
Type Fluid	WATER
Density / Viscosity	
Max. Recorded Temp.	78.5 F
Estimated Cement Top	
Time Well Ready	0700
Time Logger on Bottom	0830
Equipment Number	VA-201
Location	33rd St Canal
Recorded By	D. MARCHESANI
Witnessed By	SHAMUS ENGLISH

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To

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

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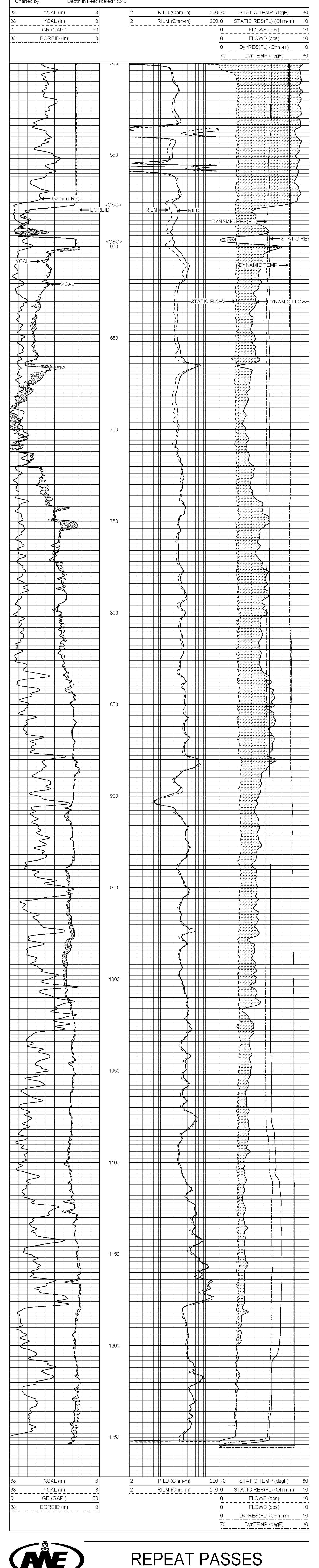
Comments

LOGS RECORDED STATICALLY AND DYNAMICALLY
WHILE FLOWING Q~= 500 gpm

MAIN PASSES

Database File: c:\warrior\data\fpua folder\fa-7\14 jul folder\elog.db
Dataset Pathname: merge2
Presentation Format: awe_gtfr
Dataset Creation: Sat Jul 14 18:43:52 2007
Charted by: Depth in Feet scaled 1:240

38	XCAL (in)	8	2	RILD (Ohm-m)	200	70	STATIC TEMP (degF)	80
38	YCAL (in)	8	2	RILM (Ohm-m)	200	0	STATIC RES(FL) (Ohm-m)	10
0	GR (GAPI)	50				0	FLOWS (cps)	10
38	BOREID (in)	8				0	FLOWD (cps)	10
						0	DynRES(FL) (Ohm-m)	10
						70	DynTEMP (degF)	80

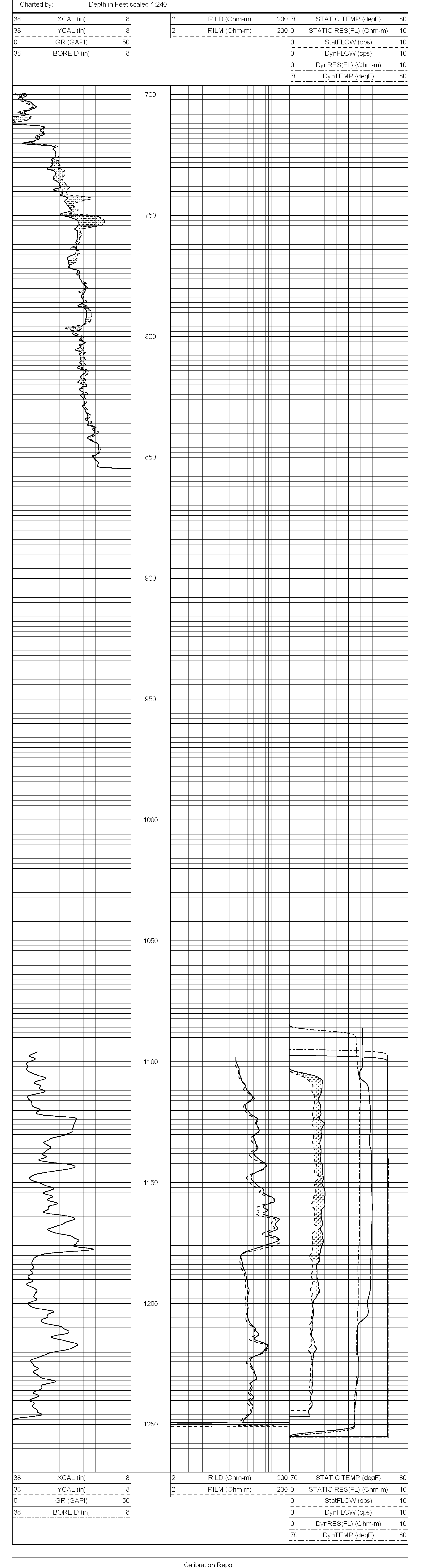


38	XCAL (in)	8	2	RILD (Ohm-m)	200	70	STATIC TEMP (degF)	80
38	YCAL (in)	8	2	RILM (Ohm-m)	200	0	STATIC RES(FL) (Ohm-m)	10
0	GR (GAPI)	50				0	FLOWS (cps)	10
38	BOREID (in)	8				0	FLOWD (cps)	10
						0	DynRES(FL) (Ohm-m)	10
						70	DynTEMP (degF)	80

REPEAT PASSES

Database File: c:\warrior\data\fpua folder\fa-7\14 jul folder\elog.db
Dataset Pathname: repeats/merge3
Presentation Format: awe_gtfr
Dataset Creation: Tue Oct 02 11:12:27 2007
Charted by: Depth in Feet scaled 1:240

38	XCAL (in)	8	2	RILD (Ohm-m)	200	70	STATIC TEMP (degF)	80
38	YCAL (in)	8	2	RILM (Ohm-m)	200	0	STATIC RES(FL) (Ohm-m)	10
0	GR (GAPI)	50				0	StatFLOW (cps)	10
38	BOREID (in)	8				0	DynFLOW (cps)	10
						0	DynRES(FL) (Ohm-m)	10
						70	DynTEMP (degF)	80



38	XCAL (in)	8	2	RILD (Ohm-m)	200	70	STATIC TEMP (degF)	80
38	YCAL (in)	8	2	RILM (Ohm-m)	200	0	STATIC RES(FL) (Ohm-m)	10
0	GR (GAPI)	50				0	StatFLOW (cps)	10
38	BOREID (in)	8				0	DynFLOW (cps)	10
						0	DynRES(FL) (Ohm-m)	10
						70	DynTEMP (degF)	80

Calibration Report

Database File: c:\warrior\data\fpua folder\fa-7 db folder\fpua.db
Dataset Pathname: 33rd_St_C/FA-7/DIL/MAIN
Dataset Creation: Sat Jul 14 15:41:16 2007 by Log Open-Cased 061129

Gamma Ray Calibration Report

Serial Number:	5562	
Tool Model:	6CHAN	
Performed:	Sun Jun 13 15:33:21 1993	
Calibrator Value:	1.0	GAPI
Background Reading:	0.0	
Calibrator Reading:	1.0	
Sensitivity:	1.0000	GAPI/

Calibration Report

Database File: c:\warrior\data\fpua folder\fa-7 db folder\fpua.db
Dataset Pathname: 33rd_St_C/FA-7/XY/MAIN
Dataset Creation: Sat Jul 14 13:07:28 2007 by Log Open-Cased 061129

XY Caliper Calibration Report

Serial Number/Model: Probe1-Probe
Performed: Thu Jun 14 11:33:49 2007

Ring			X Caliper		Y Caliper	
1:	7.9375	in	361.4	cps	372.8	cps
2:	11.625	in	408.8	cps	421.1	cps
3:	14.4375	in	442.8	cps	454.5	cps
4:	21	in	538.3	cps	554	cps
5:	29.125	in	667.5	cps	687.7	cps
6:	35.3125	in	771.5	cps	797.8	cps

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	6.50					
			RGDILGR-6CHAN (5562) Robertson Geologging Dual Induction Gamma Ray	7.06	1.50	13.67
CILD	2.63					
CPSD	2.63					
CILM	1.54					
CPSM	1.54					

Dataset: fpua.db: 33rd_St_C/FA-7/DIL/MAIN
Total Length: 7.06 ft
Total Weight: 13.67 lb
O.D. 1.50 in

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
			XYC-Probe (Probe1)	5.17	3.50	99.00
XCAL	0.00					
YCAL	0.00					

Dataset: fpua.db: 33rd_St_C/FA-7/XY/MAIN
Total Length: 5.17 ft
Total Weight: 99.00 lb
O.D. 3.50 in

APPENDIX F-6

Geophysical Logging Suite – FA-9

0' – 615'

Natural Gamma Ray & 4-Arm Caliper

0' – 1,250'

Natural Gamma Ray, 4-Arm Caliper, Flow Meter, Temperature, Fluid Resistivity & Dual Induction

GAMMA AND XY CALIPER LOG

ALLWEBBS ENTERPRISES, INC.

Company	FPUA
Well	FA-7
Field	33rd St Canal
Country	USA
State/Prv	FLORIDA

Company	FPUA
Well	FA-9
Field	33rd St Canal
Country	USA
State/Province	FLORIDA
Location	SECTION; TOWNSHIP; RANGE 5; 35; 40
Other Services	
Elevation	K.B. D.F. G.L.

Permanent Datum	GL	Elevation	
Log Measured From	GL		
Drilling Measured From	GL		
Date	26 Jul 2007		
Run Number	1		
Depth Driller	615		
Depth Logger	615		
Bottom Logged Interval	615		
Top Log Interval	95		
Casing Driller	30"		
Casing Logger	na		
Bit Size	34"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity			
pH / Fluid Loss	NA		
Source of Sample	NA		
Rm @ Meas. Temp	NA		
Rmf @ Meas. Temp	NA		
Rmc @ Meas. Temp	NA		
Source of Rmf / Rmc	NA		
Rm @ BHT	NA		
Time Circulation Stopped	NA		
Time Logger on Bottom	0840		
Maximum Recorded Temperature	NA		
Equipment Number	VA-201		
Location	33RD ST CANAL		
Recorded By	D.MARCHESANI		
Witnessed By	MIKE BENNETT		

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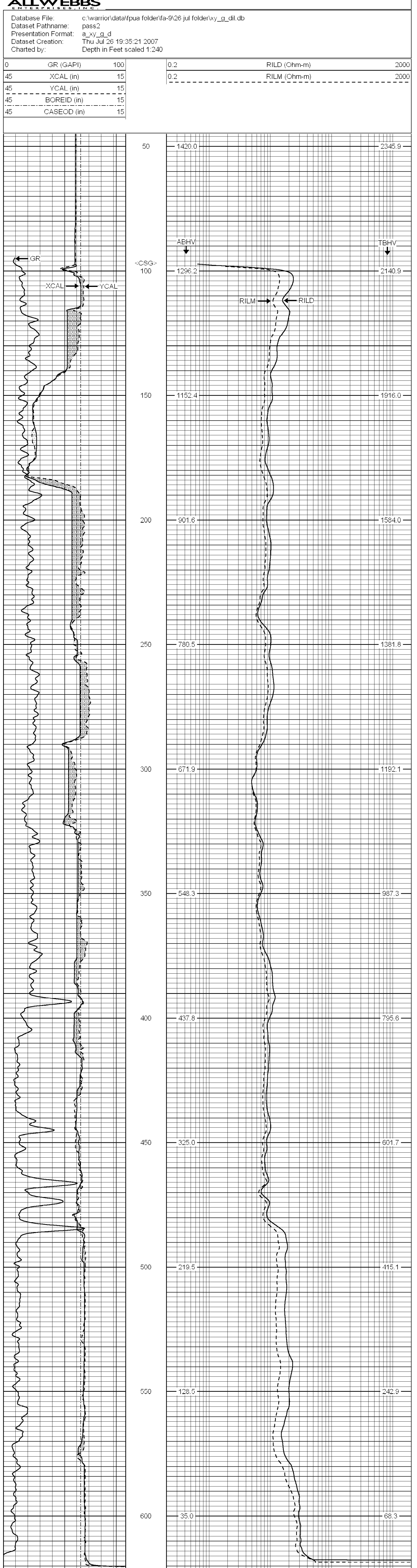
Comments

MAIN PASS

ALLWEBBS ENTERPRISES, INC.

Database File: c:\warrior\data\fpua folder\fa-9\26 jul folder\xy_g_dil.db
Dataset Pathname: pass2
Presentation Format: a_xy_g_d
Dataset Creation: Thu Jul 26 19:35:21 2007
Charted by: Depth in Feet scaled 1:240

0	GR (GAPI)	100	0.2	RILD (Ohm-m)	2000
45	XCAL (in)	15	0.2	RILM (Ohm-m)	2000
45	YCAL (in)	15			
45	BOREID (in)	15			
45	CASEOD (in)	15			



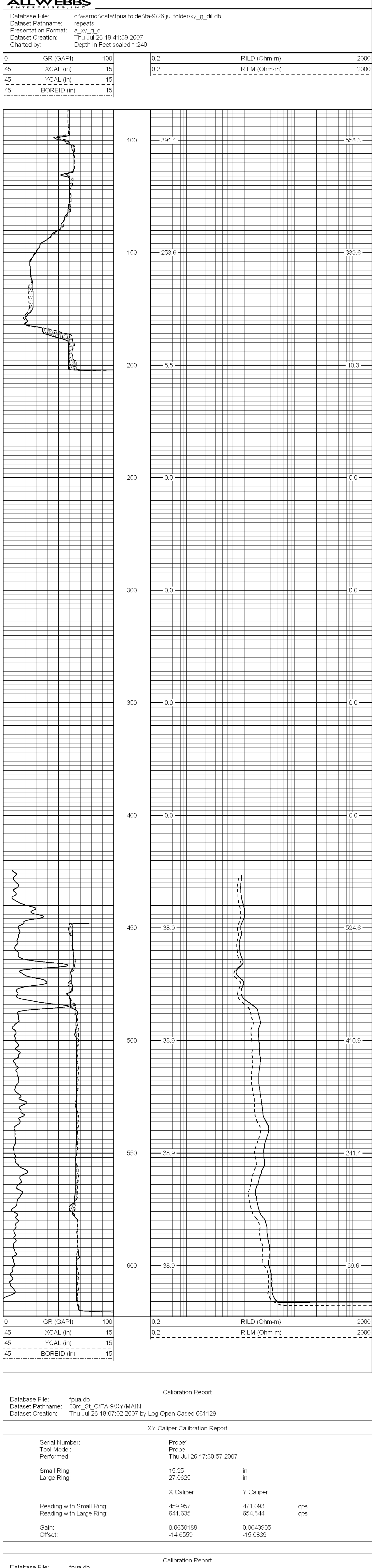
0	GR (GAPI)	100	0.2	RILD (Ohm-m)	2000
45	XCAL (in)	15	0.2	RILM (Ohm-m)	2000
45	YCAL (in)	15			
45	BOREID (in)	15			
45	CASEOD (in)	15			

REPEAT PASSES

ALLWEBBS ENTERPRISES, INC.

Database File: c:\warrior\data\fpua folder\fa-9\26 jul folder\xy_g_dil.db
Dataset Pathname: repeats
Presentation Format: a_xy_g_d
Dataset Creation: Thu Jul 26 19:41:39 2007
Charted by: Depth in Feet scaled 1:240

0	GR (GAPI)	100	0.2	RILD (Ohm-m)	2000
45	XCAL (in)	15	0.2	RILM (Ohm-m)	2000
45	YCAL (in)	15			
45	BOREID (in)	15			



0	GR (GAPI)	100	0.2	RILD (Ohm-m)	2000
45	XCAL (in)	15	0.2	RILM (Ohm-m)	2000
45	YCAL (in)	15			
45	BOREID (in)	15			
45	CASEOD (in)	15			

Calibration Report

Database File: fpua.db
Dataset Pathname: 33rd_St_C/FA-9/XY/MAIN
Dataset Creation: Thu Jul 26 18:07:02 2007 by Log Open-Cased 061129

XY Caliper Calibration Report

Serial Number:	Probe1		
Tool Model:	Probe		
Performed:	Thu Jul 26 17:30:57 2007		
Small Ring:	15.25	in	
Large Ring:	27.0625	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	459.957	471.093	cps
Reading with Large Ring:	641.635	654.544	cps
Gain:	0.0650189	0.0643905	
Offset:	-14.6559	-15.0839	

Calibration Report

Database File: fpua.db
Dataset Pathname: 33rd_St_C/FA-9/DIL/main
Dataset Creation: Thu Jul 26 15:58:00 2007 by Log Open-Cased 061129

Gamma Ray Calibration Report

Serial Number:	5562	
Tool Model:	6CHAN	
Performed:	Sun Jun 13 15:33:21 1993	
Calibrator Value:	1.0	GAPI
Background Reading:	0.0	
Calibrator Reading:	1.0	
Sensitivity:	1.0000	GAPI/

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
			XYC-Probe (Probe1)	5.17	3.50	99.00
XCAL	0.00					
YCAL	0.00					

Dataset: fpua.db: 33rd_St_C/FA-9/XY/MAIN
Total Length: 5.17 ft
Total Weight: 99.00 lb
O.D. 3.50 in

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	6.50					
			RGDILGR-6CHAN (5562) Robertson Geologging Dual Induction Gamma Ray	7.06	1.50	13.67
CILD	2.63					
CPSD	2.63					
CILM	1.54					
CPSM	1.54					

Dataset: fpua.db: 33rd_St_C/FA-9/DIL/main
Total Length: 7.06 ft
Total Weight: 13.67 lb
O.D. 1.50 in

GAMMA, DIL, XY CALIPER, STATIC AND DYNAMIC: RES(FL), TEMP, FLOW LOGS

Company	FPUA
Well	FA-7
Field	33rd St Canal
Country	USA
State/Prv	FLORIDA

Company	FPUA		
Well	FA-9		
Field	33rd St Canal		
Country	USA	State/Province	FLORIDA
Location	SECTION; TOWNSHIP; RANGE 5; 35; 40	Other Services	
Permanent Datum	GL	Elevation	K.B. D.F. G.L.
Log Measured From	GL		
Drilling Measured From	GL		

Date	8 August 2007
Run Number	1
Depth Driller	1251
Depth Logger	1255
Bottom Logged Interval	1255
Top Log Interval	550
Casing Driller	15.25"
Casing Logger	618'
Bit Size	14"
Type Fluid in Hole	WATER
Density / Viscosity	NA
pH / Fluid Loss	NA
Source of Sample	NA
Rm @ Meas. Temp	NA
Rmf @ Meas. Temp	NA
Rmc @ Meas. Temp	NA
Source of Rmf / Rmc	NA
Rm @ BHT	NA
Time Circulation Stopped	NA
Time Logger on Bottom	1600
Maximum Recorded Temperature	78.5
Equipment Number	VA-201
Location	33RD ST CANAL
Recorded By	D.MARCHESANI
Witnessed By	SHAMUS ENGLISH

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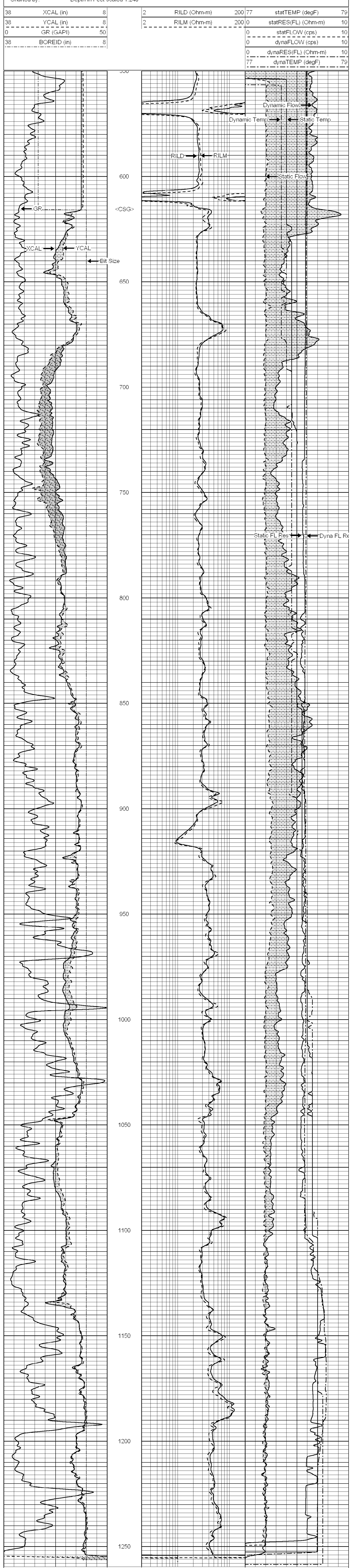
Comments

LOGS RECORDED STATICALLY AND DYNAMICALLY.
WHILE WELL WAS FLOWING, Q~= 500 gpm.

MAIN PASSES

Database File:	c:\warrior\data\fpua folder\fa-9\8 aug folder\merge folder\elog.db
Dataset Pathname:	pass1
Presentation Format:	a g-t-fr
Dataset Creation:	Thu Aug 09 16:30:14 2007
Charted by:	Depth in Feet scaled 1:240

38 XCAL (in) 8	2 RILD (Ohm-m) 200	77 statTEMP (degF) 79
38 YCAL (in) 8	2 RILM (Ohm-m) 200	0 statRES(FL) (Ohm-m) 10
0 GR (GAPI) 50		0 statFLOW (cps) 10
38 BOREID (in) 8		0 dynaFLOW (cps) 10
		0 dynaRES(FL) (Ohm-m) 10
		77 dynaTEMP (degF) 79

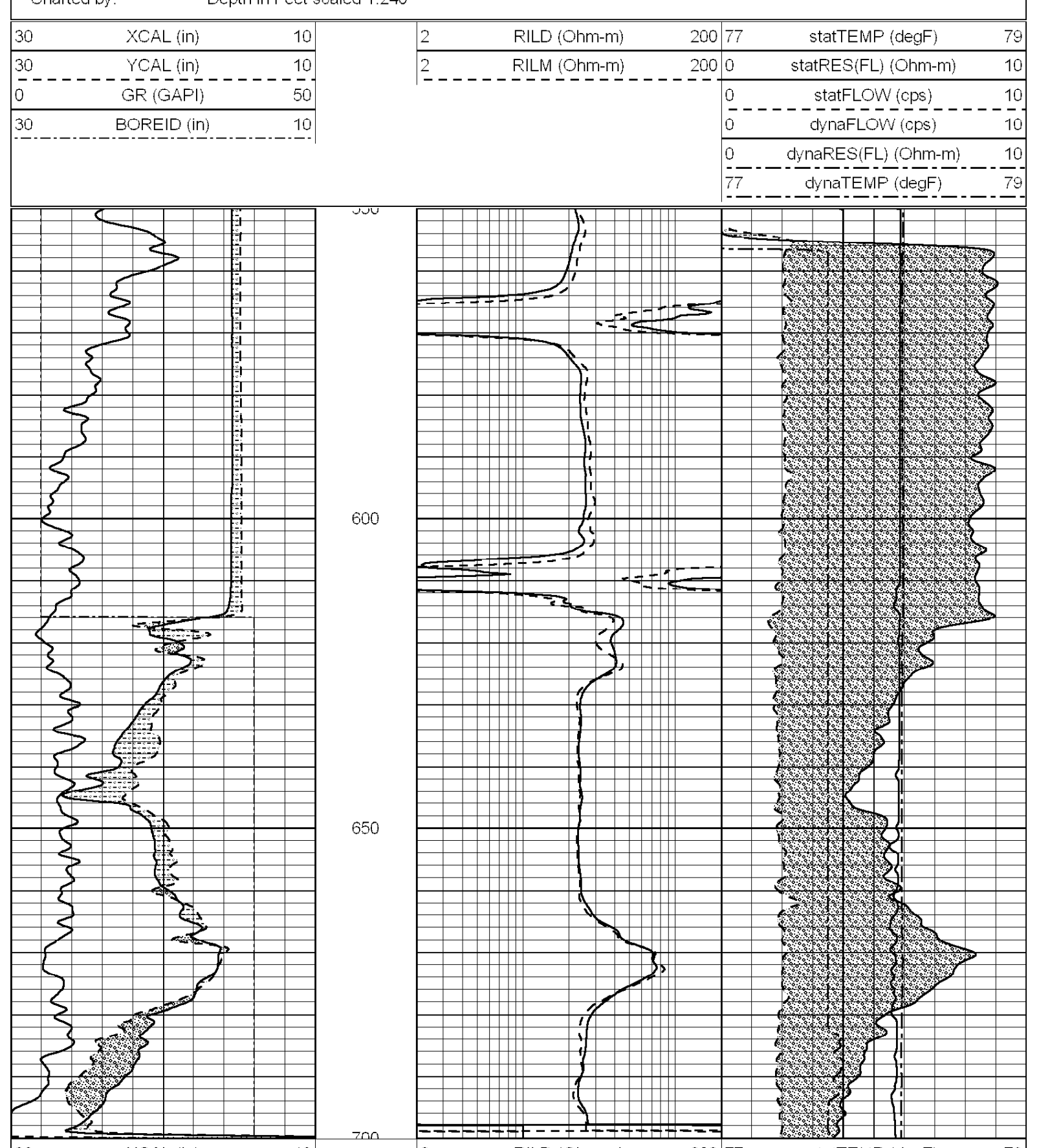


38 XCAL (in) 8	2 RILD (Ohm-m) 200	77 statTEMP (degF) 79
38 YCAL (in) 8	2 RILM (Ohm-m) 200	0 statRES(FL) (Ohm-m) 10
0 GR (GAPI) 50		0 statFLOW (cps) 10
38 BOREID (in) 8		0 dynaFLOW (cps) 10
		0 dynaRES(FL) (Ohm-m) 10
		77 dynaTEMP (degF) 79

REPEAT PASSES

Database File:	c:\warrior\data\fpua folder\fa-9\8 aug folder\merge folder\elog.db
Dataset Pathname:	REPEATS/pass1
Presentation Format:	AG-T-F~2
Dataset Creation:	Thu Aug 09 17:25:42 2007
Charted by:	Depth in Feet scaled 1:240

30 XCAL (in) 10	2 RILD (Ohm-m) 200	77 statTEMP (degF) 79
30 YCAL (in) 10	2 RILM (Ohm-m) 200	0 statRES(FL) (Ohm-m) 10
0 GR (GAPI) 50		0 statFLOW (cps) 10
30 BOREID (in) 10		0 dynaFLOW (cps) 10
		0 dynaRES(FL) (Ohm-m) 10
		77 dynaTEMP (degF) 79



30 XCAL (in) 10	2 RILD (Ohm-m) 200	77 statTEMP (degF) 79
30 YCAL (in) 10	2 RILM (Ohm-m) 200	0 statRES(FL) (Ohm-m) 10
0 GR (GAPI) 50		0 statFLOW (cps) 10
30 BOREID (in) 10		0 dynaFLOW (cps) 10
		0 dynaRES(FL) (Ohm-m) 10
		77 dynaTEMP (degF) 79

Calibration Report

Database File:	fpua.db
Dataset Pathname:	33rd/FA-9/XY/MAIN
Dataset Creation:	Wed Aug 08 20:25:45 2007 by Log Open-Cased 061129

XY Caliper Calibration Report

Serial Number:	Probe1		
Tool Model:	Probe		
Performed:	Thu Jul 26 17:30:57 2007		
Small Ring:	15.25	in	
Large Ring:	27.0625	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	459.957	471.093	cps
Reading with Large Ring:	641.635	654.544	cps
Gain:	0.0650189	0.0643905	
Offset:	-14.6559	-15.0839	

Calibration Report

Database File:	fpua.db
Dataset Pathname:	33rd/FA-9/DIL/MAIN
Dataset Creation:	Wed Aug 08 19:18:52 2007 by Log Open-Cased 061129

Gamma Ray Calibration Report

Serial Number:	5562	
Tool Model:	6CHAN	
Performed:	Sun Jun 13 15:33:21 1993	
Calibrator Value:	1.0	GAPI
Background Reading:	0.0	
Calibrator Reading:	1.0	
Sensitivity:	1.0000	GAPI/

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
			XYC-Probe (Probe1)	5.17	3.50	99.00
XCAL	0.00					
YCAL	0.00					

Dataset:	fpua.db: 33rd/FA-9/XY/MAIN
Total Length:	5.17 ft
Total Weight:	99.00 lb
O.D.	3.50 in

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)
GR	6.50					
			RGDILGR-6CHAN (5562) Robertson Geologging Dual Induction Gamma Ray	7.06	1.50	13.67
CILD	2.63					
CPSD	2.63					
CILM	1.54					
CPSM	1.54					

Dataset:	fpua.db: 33rd/FA-9/DIL/MAIN
Total Length:	7.06 ft
Total Weight:	13.67 lb
O.D.	1.50 in