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City of Oldsmar Reclaimed Water Aquifer Storage and Recovery Monitoring Well Completion Report

City of Oldsmar | April 2014

**CITY OF OLDSMAR
RECLAIMED WATER
AQUIFER STORAGE AND RECOVERY
MONITORING WELL COMPLETION REPORT**

Prepared for:

City of Oldsmar
100 State Street West
Oldsmar, Florida 34677

Prepared by:

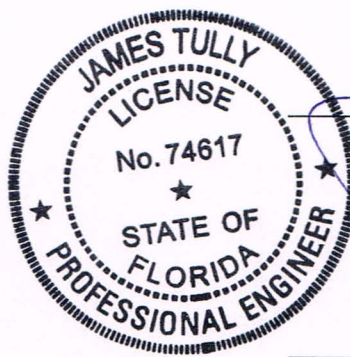
Jones Edmunds & Associates, Inc.
324 South Hyde Park Avenue, Suite 250
Tampa, Florida 33606

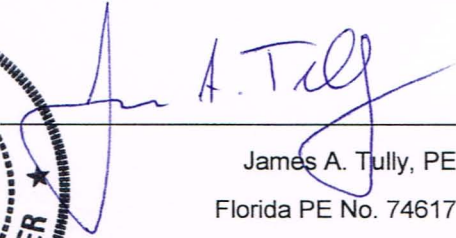
Certificate of Authorization #1841

April 2014

PROFESSIONAL ENGINEER

The engineering features of the *Reclaimed Water Aquifer Storage and Recovery Monitoring Well Completion Report* for the City of Oldsmar, April 2014, were prepared or reviewed by a Professional Engineer licensed in Florida. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.




James A. Tully, PE
Florida PE No. 74617

4/29/2014

Date

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LIST OF ACRONYMS

ABS	Advanced Borehole Solutions
APT	Aquifer Performance Test
ASR	Aquifer Storage Recovery
bls	Below Land Surface
FAC	Florida Administrative Code
FAS	Floridan Aquifer System
FDEP	Florida Department of Environmental Protection
gpm	Gallons per Minute
IAS	Intermediate Aquifer System
ICU	Intermediate Confining Unit
LSN	Long- and Short-Normal Resistivity
mg/L	Milligrams per Liter
mmho/m	Millimo per meter
SAS	Surficial Aquifer System
SWFWMD	Southwest Florida Water Management District
SP	Spontaneous Potential
UFA	Upper Floridan Aquifer
UIC	Underground Injection Control
µg/L	Micrograms per Liter
µS/cm	MicroSiemens per centimeter
USDW	Underground Source of Drinking Water
WRF	Water Reclamation Facility

1 INTRODUCTION

This report presents information collected during the construction of the monitoring wells for the City of Oldsmar Aquifer Storage and Recovery (ASR) system. The wells were constructed as part of the City of Oldsmar's reclaimed water ASR system, which is located at the City's Water Reclamation Facility (WRF) at 351 Lafayette Boulevard in Oldsmar. The wells were constructed under Florida Department of Environmental Protection (FDEP) Underground Injection Control (UIC) Permit No. 0265289-005-UC/5Q. In accordance with the July 1, 2012 modifications to Section 373.326, FAC the FDEP UIC Permit No. 0265289-005-UC/5Q serves as the well construction permit, and a separate well construction permit was not required by the Southwest Florida Water Management District (SWFWMD). Jones Edmunds & Associates, Inc. and ASRus, LLC provided observation services during the well construction. Applied Drilling Engineering, Inc. installed the Storage Zone Monitoring Well, the Transition Zone Monitoring Well, and one 2-inch Water Table Monitoring Well between March and May 2013. The permit also includes an existing monitoring well at the Oldsmar WRF, UZMW-1, that is included in the ASR system testing. UZMW-1 was constructed with a 14-inch steel casing to 62 feet below land surface (bls) and a 6-inch fiberglass casing to 303 feet bls, with an open hole to 350 feet bls. As required by Permit No. 0265289-005-UC/5Q, UZMW-1 was back-plugged to 320 feet bls to avoid upward migration of ASR injectate into a G-II aquifer at the site. UZMW-1 is also part of the monitoring system for the Class I injection well located at the WRF. Appendix A provides the weekly drilling reports and observation logs for the construction of the wells. The ASR well for this system (ASR-1) was constructed in 2010 as an exploratory well under FDEP UIC permit 0265289-004-UC.

2 GEOLOGY

2.1 PHYSIOGRAPHY AND STRUCTURE

Oldsmar is in the Gulf Coastal Lowlands province. The Gulf Coastal Lowlands tend to be wide, flat marine plains (White, 1970). The topography in Oldsmar is generally flat, with elevations near 15 feet above sea level at the north end of the City, sloping south to Mobbly Bay. Figure 2-1 shows the site location.

2.2 STRATIGRAPHY

North-south and west-east geologic cross sections from the Oldsmar area are presented in Figures 2-2 and 2-3, respectively. Lithologic classifications are taken from the Florida Geological Survey Lithologic Database and the exploratory well for the deep injection system (EX-1) at the Oldsmar WRF (Water Resource Solutions, 2007).

2.2.1 UNDIFFERENTIATED SEDIMENTS

The sediments nearest land surface are typically sand and shelly sand of Pleistocene age. In some parts of Pinellas County, the thickness of these Pleistocene-age sediments can range up to 90 feet (Causseaux, 1985). In the exploratory well, however, the base of the unconsolidated sediments is 20 feet bls.

2.2.2 HAWTHORN GROUP

In the Oldsmar area, the Hawthorn Group is comprised of two units: Undifferentiated Sediments and the Arcadia Formation (Arthur et al., 2008).

Undifferentiated Hawthorn Group sediments are Middle Miocene to Lower Pliocene in age. They typically include clay beds with interbedded quartz sand, carbonates, organic material, and shell fragments (Arthur et al., 2008). Olive-gray clay of the Hawthorn Group was encountered at 20 feet bls in the exploratory well.

The Arcadia Formation is Upper Oligocene to Middle Miocene in age. The Arcadia formation near Oldsmar is primarily the Tampa Member (Arthur et al., 2008), which is primarily comprised of limestone, with variable quartz sand and clay (Scott, 1988). Limestone of the Tampa Member of the Arcadia Formation was encountered approximately 40.5 feet bls at ASR-1. The Tampa Member was encountered at approximately 34 feet bls in TZMW-1 and between 35 and 46 feet bls in SZMW-1.

The Tampa Member overlies the Suwannee Limestone. As noted by Arthur et al. (2008), the contact between the Tampa Member and the Suwannee Limestone has been observed to be gradational in Pinellas and north Hillsborough Counties. The base of the Tampa Member is marked by greenish-gray clays, which were observed at approximately 148 feet bls in EX-1. The gamma ray logs from SZMW-1 and TZMW-1 show the clay base to be 140 feet bls and 142 feet bls, respectively. Between the clay at the base of the Tampa Member and the grain-supported limestone of the Suwannee Limestone is an approximately 8-foot transition zone of mud-supported limestone.

2.2.3 SUWANNEE LIMESTONE

The Suwannee Limestone is Lower Oligocene in age and is primarily light gray to white packstones and grainstones. In some areas, dolomitization and silicification (i.e., chert) have been observed in the Suwannee Limestone (Arthur et al., 2008). The packstones and grainstones of the Suwannee Limestone were encountered at approximately 156 feet bls at ASR-1. The Suwannee Limestone was observed at similar depths in SZMW-1 and TZMW-1.

The Suwannee Limestone overlies the Ocala Limestone at the site. The contact between the Suwannee Limestone and the Ocala Limestone can often be difficult to identify due to increasing mud content in the lower Suwannee Limestone, which can appear similar to the upper part of the Ocala Limestone (Arthur et al., 2008).

2.2.4 OCALA LIMESTONE

The Ocala Limestone normally occurs as a micritic, porous, fossiliferous limestone. The formation is marked at the top by a large quantity of the foraminifera *Lepidocyclina ocalana* (Arthur et al., 2008).

Other reports for this site have noted the occurrence of the Ocala Limestone above 450 feet bls (e.g., Water Resource Solutions, 2007). However, determination of this contact was based primarily on the abundance of foraminifera. Abundant foraminifera were not observed in core samples from ASR-1. Therefore, the contact with the Ocala Limestone is greater than 450 feet bls at this location.

An Underground Source of Drinking Water (USDW) is defined by Rule 62-528.200(66), FAC, as an aquifer with a total dissolved solids concentration of less than 10,000 mg/L. The base of the lowermost USDW was identified during drilling of ASR-1 at 260 feet bls.

3 HYDROGEOLOGY

Four major hydrogeologic units are in peninsular Florida: the Surficial Aquifer System (SAS), the Intermediate Aquifer System (IAS) or the Intermediate Confining Unit (ICU), the Floridan Aquifer System (FAS), and the sub-Floridan Confining Unit (Vechiolli et al., 1986). The FAS consists of the Upper Floridan Aquifer (UFA), Middle Confining Unit, and Lower Floridan Aquifer. The lowermost hydrogeologic

unit penetrated by the Oldsmar ASR system was the UFA. Figure 3-1 presents a hydrogeologic cross section of the site.

3.1 SURFICIAL AQUIFER SYSTEM

The surficial aquifer consists of undifferentiated sands and shelly sands varying in composition with depth and location. The top of the SAS is the water table, which typically reflects land surface elevations and is usually at a depth of 1 to 5 feet in Pinellas County. The base of the SAS, an unconformable contact with the underlying Hawthorn Group sediments (Causseaux, 1985), occurs at depths of up to 90 feet in northeast Pinellas County. At the Oldsmar ASR exploratory well, the base of the SAS is approximately 20 feet bls.

3.2 INTERMEDIATE CONFINING UNIT

The ICU separates the overlying surficial aquifer from the underlying and confined UFA. In many parts of Florida, the ICU is comprised of all the Hawthorn Group members at that location. However, in much of Pinellas and Hillsborough Counties, the lower members of the Hawthorn Group (e.g., the Tampa Member) are hydraulically connected to the UFA. Therefore, the ICU at the Oldsmar ASR site is comprised of the unconsolidated sediments of the Hawthorn Group only. The top of the ICU at the site is approximately 20 feet bls, and the base was observed between 34 and 46 feet bls.

3.3 FLORIDAN AQUIFER SYSTEM

The UFA at the Oldsmar ASR site includes in descending order the Tampa Member of the Arcadia Formation, Suwannee Limestone, Ocala Limestone, and the upper portion of the Avon Park Formation. As described above, ASR-1 penetrated the Tampa Member and the Suwannee Limestone. The top of the UFA is approximately 34 to 46 feet bls. The base of the UFA is the Middle Confining Unit, which is typically in the lower Avon Park Formation. Arthur et al. (2008) estimates the depth of the base of the UFA to be approximately 1,200 feet bls at the Oldsmar ASR site.

4 WELL CONSTRUCTION

Applied Drilling constructed the monitoring wells at the site between March 2013 and May 2013 in accordance with the requirements of the FDEP UIC permit. Details of the well construction are presented below. Figure 3-1 presents a hydrogeologic cross-section of the site that includes the well construction details.

4.1 WATER TABLE MONITORING WELL (WTMW-1)

As required by the FDEP Construction Permit, Applied Drilling constructed a drilling pad to collect any spillage of contaminants that may be encountered during drilling. The driller also installed monitoring well WTMW-1 next to the drilling pad to monitor the water table during drilling. WTMW-1 was installed to a total depth of 19.5 feet bls on March 28, 2013. The well was constructed with 10 feet of 0.010-inch slotted screen, and a filter pack of 20/30 silica sand was installed around the screen to a depth of approximately 7 feet bls. A 2-foot-thick bentonite seal was placed above the filter pack. The well was covered by a 2-foot-by-2-foot concrete pad with an aluminum protective cover completed approximately 2.5 feet above ground surface. Applied Drilling collected lithologic samples at 5-foot intervals from the drill cuttings. ASRus performed the lithologic characterization, which is included in the March 28, 2013 daily report in Appendix A. Figure 4-1 shows the well construction details.

4.2 STORAGE ZONE MONITORING WELL (SZMW-1)

Drilling at SZMW-1 began on April 1, 2013. SZMW-1 was constructed to monitor the ASR storage zone. Applied Drilling collected drill cuttings at 5-foot intervals during drilling. Figure 3-1 shows the construction details for SZMW-1. Appendix B provides the lithologic log for SZMW-1. After reaching the top of the rock around 46 feet bls, Applied Drilling installed 50 feet of 12-inch steel surface casing. The surface casing was grouted in place on April 2, 2013 using 2 cubic yards of cement. After setting the surface casing, Applied Drilling drilled through the concrete plug at the bottom and began drilling the pilot hole to 450 feet bls with a 7-7/8-inch diameter bit. At approximately 142 feet bls, sufficient water was reached to drill via the reverse-air method. After logging was complete, Applied Drilling drilled out the hole to 355 feet bls using a 12-inch-diameter bit and set a 6-inch-diameter steel casing to 355 feet bls. The FDEP Construction Permit specified a casing depth of 350 feet bls; however, a final casing depth of 355 feet bls was selected based on the results of the geophysical logs discussed in Section 5.2.1. The final well was constructed with an open-hole interval from 355 to 450 feet bls. Appendix C provides mill certificates for the well casings.

4.3 TRANSITION ZONE MONITORING WELL (TZMW-1)

Drilling at TZMW-1 began on April 3, 2013. Applied Drilling constructed TZMW-1 above the base of the lowermost USDW at the site (identified in the ASR exploratory well at approximately 275 feet bls). TZMW-1 was constructed to monitor the USDW and ensure that the injection activities do not cause a violation of the Primary Drinking Water Standards to occur within the USDW at the site. Applied Drilling collected drill cuttings at 5-foot intervals to 50 feet bls and then collected cuttings at 10-foot intervals from 50 to 260 feet bls. Figure 3-1 shows the construction details for TZMW-1. Appendix D provides the lithologic log for TZMW-1.

After reaching the top of the rock around 34 feet bls, Applied Drilling installed 40 feet of 12-inch steel surface casing. The surface casing was grouted in place on April 8, 2013 using approximately 2 cubic yards of cement. After setting the surface casing, Applied Drilling drilled through the concrete plug at the bottom and began drilling the pilot hole to 260 feet bls with a 7-7/8-inch diameter bit. After the pilot hole was completed, Advanced Borehole Services (ABS) ran geophysical logs to the total depth of 260 feet bls on April 29, 2013. The geophysical logs are discussed in Section 5.2.2. After the geophysical logs were completed, Applied reamed the hole to 250 feet and set 252 feet of 6-inch steel casing. Applied grouted the casing in place with 5.5 cubic yards of cement on April 16, 2013. On April 17, 2013, the monitor zone was drilled out from 250 to 260 feet bls using reverse air drilling. Appendix C provides mill certificates for the well casings.

4.4 UPPER ZONE MONITORING WELL (UZMW-1)

UZMW-1 was constructed at the Oldsmar WRF as a monitoring well for the City's UIC Class I injection well (IW-1). UZMW-1 was constructed with a 14-inch steel casing to 62 feet bls and a 6-inch fiberglass casing to 303 feet bls, with an open hole to 350 feet bls. Cardno Entrix submitted the *City of Oldsmar Water Supply Project UIC Well Construction Completion Report* to FDEP on May 5, 2011. UZMW-1 is included in the monitoring system for the ASR system testing. On April 22, 2013, Applied Drilling back-plugged the open-hole interval of UZMW-1 from 350 feet bls to approximately 320 feet bls with approximately 27 cubic feet of grout to prevent upward migration of ASR injectate into a G-II aquifer at the site. Applied Drilling measured the cement plug to be 323.75 feet below pad level on April 23, 2013. Figure 3-1 shows the construction details for UZMW-1.

5 TESTING

The testing program consisted of collection of drill cuttings, geophysical logging, specific capacity testing, and water quality sampling and analysis. The sampling and testing program was designed to ensure that the SZMW-1 and TZMW-1 were appropriately positioned to monitor the storage interval for the ASR system and the base of the USDW, respectively.

5.1 LITHOLOGIC DESCRIPTIONS

Appendices B and D includes lithologic descriptions for SZMW-1 and TZMW-1. The drill cuttings collected during drilling were used by geologists to create the lithologic descriptions. The lithology at the monitoring wells is generally consistent with the lithology at the ASR well.

5.2 SZMW-1 GEOPHYSICAL LOGGING

5.2.1 SZMW-1 PILOT HOLE

After completing the pilot hole for SZMW-1 to 450 feet bls, ABS completed geophysical logging on April 29, 2013. The borehole geophysical logging included the following:

- X-Y Caliper.
- Natural Gamma Ray.
- Long- and Short-Normal Resistivity (LSN).
- Fluid Temperature and Delta Temperature.
- Fluid Conductivity.
- Borehole Compensated Sonic with Variable Density Log.
- Dual Induction and Spontaneous Potential (SP).
- Spinning Flowmeter (Static and Dynamic).
- Color Video.

Appendix E provides the geophysical logs for SZMW-1.

5.2.1.1 SZMW-1 Pilot Hole Caliper Log

The caliper log, which records the borehole diameter, shows the 12-inch casing at a depth of 45 feet bls. The 12-inch-diameter casing was set to a depth of 50 feet; therefore, the bottom 5 feet of casing appears plugged with cement. The caliper log shows significant fractures from 317 to 320 feet bls and at 420 feet and 425 feet bls. The proposed final casing depth of 350 feet shows a minor wash-out to approximately 11 inches in diameter at this depth. The hole appears to be gauged (near bit size) at 345 feet and 355 feet bls. Therefore, it was determined that 355 feet bls would be a better casing seat depth.

5.2.1.2 SZMW-1 Pilot Hole Natural Gamma Ray Log

The gamma log records natural gamma radiation emitted from the host rock present in the borehole. The gamma-log spikes at approximately 140 to 144 feet bls (within the Tampa Member) indicates a clay layer. The gamma spikes are approximately 5 to 10 feet deeper than those collected during exploratory well

drilling of ASR-1, indicating that 355 feet bls is more representative of the top of the ASR storage zone lithology. Therefore, it was determined that the surface casing would be set to 355 feet bls instead of 350 feet bls.

5.2.1.3 SZMW-1 Pilot Hole Long- and Short-Normal Resistivity

The normal electrical resistivity logs record the electrical resistivity of the borehole and surrounding rocks and water as measured by variably spaced potential electrodes on the logging probe. Normal-resistivity logs are affected by bed thickness, borehole diameters, and borehole fluid. In general, resistance increases with increasing grain size and decreases with increasing borehole diameter, fracture density, and dissolved-solids concentration of the water. The LSN log indicated consistent resistivity from 340 to 365 feet bls, indicating a suitable zone to set the 6-inch casing.

5.2.1.4 SZMW-1 Pilot Hole Fluid Conductivity and Temperature

Fluid conductivity and temperature were recorded for static conditions. The fluid conductivity log went off scale at a depth of 230 feet bls, indicating high-conductivity formation water.

5.2.1.5 SZMW-1 Pilot Hole Velocity (Flowmeter) Logs

Fluid velocity (flowmeter) logs measure the velocity of the water moving up or down the borehole and are performed under static and dynamic (flowing or pumping) conditions. The static flow meter log indicated that the majority of the flow in the bore hole is from 123 to 127 feet bls and from 315 to 320 feet bls. The dynamic flow log indicates that the well could only be stressed to a depth of 320 feet at the available pumping rate of 128 gpm. The dynamic flow meter log indicates that the majority of flow is produced from 310 to 320 feet bls and the remaining flow produced from 120 to 130 feet bls.

5.2.1.6 SZMW-1 Pilot Hole Borehole Compensated Sonic (Acoustic Velocity) Log

The relatively consistent properties of the strata between approximately 340 to 360 feet indicate no major fracturing, which shows the proposed casing depth of 355 feet bls to be adequate.

5.2.1.7 SZMW-1 Pilot Hole Dual-Induction and Spontaneous Potential

The dual-induction log is a record of conductivity of the formation in the adjacent borehole by inducing an electrical current to flow in the formation. The strength of the signal received by the recording instrument is proportional to the conductivity of the formation. The instrument response is also affected by water quality in the formation (Schlumberger, 2010).

The dual induction log indicates high-resistivity rock at a depth of 355 feet bls, suggesting a suitable casing setting depth.

5.2.1.8 SZMW-1 Pilot Hole Video Log

A downhole video log was recorded of the pilot hole. Visibility was limited due to turbid water. The video becomes visible at approximately 395 feet bls. Fractures are visible at 411 and 415 feet bls. A large fracture zone is visible from 420 to 425 feet bls and significant downhole flow was observed. No visibility and no apparent flow occurred below 442 feet bls. Appendix E provides a DVD of the video logs.

5.2.2 SZMW-1 FINAL WELL

After completing the construction of SZMW-1 by installing the final 6-inch casing to 355 feet bls, ABS completed the following geophysical logs on May 23, 2013:

- X-Y Caliper.
- Natural Gamma Ray.
- Fluid Temperature and Delta Temperature (Static and Dynamic).
- Fluid Conductivity (Static and Dynamic).
- Borehole Compensated Sonic with Variable Density Log.
- Dual Induction.
- Spinning Flowmeter (Static and Dynamic).

Appendix E provides the geophysical logs for SZMW-1.

5.2.2.1 SZMW-1 Final Well Caliper Log

The caliper log of the well shows the bottom of the 6-inch casing at 355 feet bls and the bottom of the hole at approximately 449 feet bls.

5.2.2.2 SZMW-1 Final Well Natural Gamma Ray Log

The gamma ray log was relatively consistent over the open-hole interval.

5.2.2.3 SZMW-1 Final Well Dual-Induction

The dual induction log is consistent with the pilot hole log and indicates relatively consistently high resistivity rock throughout the open hole interval. Low-level spikes occur at approximately 425 feet bls where a fracture zone is indicated by the caliper log.

5.2.2.4 SZMW-1 Final Well Fluid Conductivity and Temperature

The fluid conductivity and temperature logs were run under static and dynamic conditions. The static logs show decreases in temperature at approximately 360 and 380 feet bls. After 380 feet bls, the temperature remained relatively constant at 78.5°F. The specific conductivity increases from approximately 40,000 $\mu\text{s}/\text{cm}$ at 350 feet bls to approximately 75,000 us/cm at 380 feet bls and then increased steadily to greater than 100,000 us/cm at 410 feet bls. Under dynamic conditions, the temperature and specific conductivity were consistent at approximately 78.5°F and greater than 100,000 us/cm , respectively.

5.2.2.5 SZMW-1 Final Well Velocity (Flowmeter) Logs

The static fluid velocity log showed no obvious flow zones. The well was pumped at approximately 112 gpm for the dynamic fluid velocity log. The majority of flow appears to come from above 426 feet bls.

5.2.2.6 SZMW-1 Final Well Borehole Compensated Sonic (Acoustic Velocity) Log

The acoustic velocity log measures the transit time of a compressional (sound) wave as it is emitted and received. The transit time is affected primarily by the mineralogy and porosity of the formation. The radius penetrated by the sound waves ranges from less than 1 foot to more than 4 feet, depending on the density of the material (USACE, 1999). The acoustic velocity log shows fractured zones from 362 to

367 feet bls, at 374 feet bls, from 387 to 389 feet bls, from 399 to 404 feet bls, and from 419 to 423 feet bls.

5.2.2.7 SZMW-1 Final Well Video Log

A downhole video log was recorded of the final well. The bottom of the 6-inch casing was observed at approximately 355 feet bls. A cavernous zone was observed from 419 to 425 feet bls. No visibility or flow occurred below 425 feet. Appendix E provides a DVD of the video log.

5.3 TZMW-1 GEOPHYSICAL LOGGING

5.3.1 TZMW-1 PILOT HOLE

After completing the pilot hole for TZMW-1 to 260 feet bls, ABS completed the following geophysical logs on April 11, 2013:

- X-Y Caliper.
- Natural Gamma Ray.
- LSN.
- Spontaneous Potential (SP).

Appendix F provides the geophysical logs for TZMW-1.

5.3.1.1 TZMW-1 Pilot Hole Caliper Log

The caliper log showed the 12-inch casing set to 42 feet bls and the open-pilot hole to 261.75 feet bls. The hole is gauged (near bit size) at the bottom and appeared satisfactory for installing the 6-inch casing to 250 feet bls.

5.3.1.2 TZMW-1 Pilot Hole Natural Gamma Ray Log

The gamma ray log indicates a possible clay layer at approximately 155 feet bls, which was observed during drilling.

5.3.1.3 TZMW-1 Pilot Hole LSN Log

The resistivity log indicates possibly harder, denser limestone at depths from approximately 100 to 120 feet, which was confirmed by Applied Drilling.

5.3.1.4 TZMW-1 Pilot Hole SP Log

SP is a measure of the electric potential between the borehole fluid and the formation (USACE, 1999). The SP log can be used in determining lithology and water quality. The SP log did not show any anomalies.

5.3.2 TZMW-1 FINAL WELL

After completing the construction of TZMW-1 by installing the final 6-inch casing to 250 feet bls, ABS completed the following geophysical logs on April 29, 2013:

- X-Y Caliper.
- Natural Gamma Ray.

- LSN.
- Fluid Temperature and Delta Temperature.
- Fluid Conductivity.
- Borehole Compensated Sonic with Variable Density Log.
- Dual Induction and Spontaneous Potential.
- Spinning Flowmeter (Static and Dynamic).
- Color Video.

Appendix F provides the geophysical logs for TZMW-1.

5.3.2.1 TZMW-1 Final Well Caliper Log

The caliper log of the well shows the bottom of the 6-inch casing at 251 feet bls and the bottom of the hole at approximately 258 feet bls.

5.3.2.2 TZMW-1 Final Well Natural Gamma Ray Log and SP

The gamma ray and SP were relatively consistent over the open-hole interval.

5.3.2.3 TZMW-1 Final Well Dual-Induction

The conductivity on the dual induction log peaks above 1,000 mmho/m at approximately 253 feet bls and then drops by an order of magnitude at 256 feet bls. This transition is attributed to a flow zone at this depth.

5.3.2.4 TZMW-1 Final Well Fluid Conductivity and Temperature

The fluid conductivity log records the conductivity of the borehole fluid. Fluid conductivity was relatively consistent within the casing to 255 feet bls and then increased to greater than 10,000 $\mu\text{S}/\text{cm}$ at total depth. Temperature decreased from 76.5°F to 75°F at total depth. The abrupt change in conductivity is consistent with flow from the formation within the open-hole interval.

5.3.2.5 TZMW-1 Final Well Velocity (Flowmeter) Logs

The static fluid velocity log showed no obvious flow zones. The well was pumped at approximately 64 gpm for the dynamic fluid velocity log. The majority of flow appears to come from 250 to 255 feet bls.

5.3.2.6 TZMW-1 Final Well Borehole Compensated Sonic (Acoustic Velocity) Log

An increase in porosity is observed at 250 feet bls on the acoustic velocity logs.

5.3.2.7 TZMW-1 Final Well Video Log

A downhole video log was recorded of the final well. At 65 feet bls, visibility was less than 1 foot and the casing could not be seen. The well was pumped at 64 gpm to attempt to improve visibility. After 30 minutes of pumping (five well volumes), the visibility remained poor. The video log was completed to the total depth. One casing joint was visible at 102 feet bls. The video cleared up at 237 feet bls, and the bottom of the casing was visible at 250 feet bls and appeared to be seated and cemented sufficiently. The open borehole was only visible from 250 to 255 feet bls, and the bottom 5 feet of the hole appears to be filled with fine gray sediment. Appendix F provides a DVD of the video log.

5.4 SPECIFIC CAPACITY TESTING

5.4.1 SZMW-1 SPECIFIC CAPACITY TESTING

Applied Drilling performed a three-step drawdown test on SZMW-1 on May 22, 2013. For the test, the well was pumped at approximately 51 gpm, 80 gpm, and 115 gpm. Each flow rate was maintained for approximately 1 hour. A pressure transducer was used to measure drawdown during the test. Collection of background water levels started 1 hour before the test. During the test, Specific Conductivity and Temperature readings were collected. A flow meter was used to measure the pumping rates during the test. The specific capacity of SZMW-1 was measured to be approximately 31 gpm/foot. Table 5-1 and Figure 5-1 present the results of the pumping test.

Table 5-1 SZMW-1 Pumping Test Results

Step	Flow Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/foot)
1	51	1.62	31.60
2	80	2.58	31.22
3	115	3.72	30.89

Analysis of the step-drawdown data according to the method described by Bierschenk (1963) indicates 2 to 4% of drawdown observed during the test was due to turbulent flow losses in the well. Transmissivity (T) can then be estimated according to the equation proposed by Driscoll (1986):

$$T = 2000 \frac{Q}{s}$$

Where “Q” is flow rate (in gpm) and “s” is drawdown (in feet).

The transmissivity of the monitored zone is estimated to be 8,604 feet²/day using this equation. Appendix G provides calculations.

5.4.2 TZMW-1 SPECIFIC CAPACITY TESTING

Applied performed a three-step drawdown test on TZMW-1 on April 25, 2013. For the test, the well was pumped at approximately 44 gpm, 79 gpm, and 101 gpm. Each flow rate was maintained for approximately 1 hour. A pressure transducer was used to measure drawdown during the test. Collection of background water levels started 1 hour before the test. During the test, Specific Conductivity and Temperature readings were collected. The flow rate was measured using a calibrated flow meter. The specific capacity of the well ranged from 2 to 3 gpm/foot. Table 5-2 and Figure 5-2 present the results of the pumping test.

Table 5-2 TZMW-1 Pumping Test Results

Step	Flow Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/foot)
1	44	16.64	2.64
2	79	34.68	2.28
3	101	47.65	2.12

Because no monitoring wells on site are open to the same interval as the pumping zone, aquifer characteristics (e.g., transmissivity, leakance, storativity) from the monitoring well data are difficult to accurately calculate. However, transmissivity can be estimated from drawdown in the well during pumping. Analysis of the step-drawdown data according to the method described by Bierschenk (1963) indicates 19 to 35% of drawdown observed during the test was due to turbulent flow losses in the well. Transmissivity (T) can then be estimated according to the equation proposed by Driscoll (1986):

$$T = 2000 \frac{Q}{s}$$

Where “Q” is flow rate (in gpm) and “s” is drawdown (in feet).

The transmissivity of the monitored zone is estimated to be 872 feet²/day using this equation. Appendix H provides calculations.

5.5 AQUIFER PERFORMANCE TEST (APT)

Applied Drilling performed a constant-rate aquifer performance test on February 6, 2014. During the test, the ASR well was pumped at an average pumping rate of approximately 831 gpm for 12 hours. Water levels were monitored in TZMW-1 and SZMW-1 before, during, and after the test using pressure transducers. Figure 5-3 shows the water levels in the monitoring wells and background well ROMP 14-1 during the test, which is approximately 3 miles southwest of the site. As Figure 5-3 shows, the wells are tidally influenced and the magnitude of the tidal oscillations is almost twice the magnitude of the uncorrected drawdown, which made background correction difficult. Therefore, we used the early time drawdown and recovery data to estimate the transmissivity and storage of the ASR storage zone. The data from SZMW-1 was used for the analysis since it monitors the storage zone that was pumped during the test. TZMW-1 has a shallower open-hole interval and, based on the lithology observed during construction, has a lower transmissivity than the storage zone. The drawdown and recovery data from SZMW-1 were analyzed using the program AQTESOLV and the Hantush (1960) early-time solution method (1955), which was developed for leaky confined aquifers and includes a correction for partially penetrating wells. To match the magnitude of the recovery data, a correction factor of 0.5 foot had to be added to the maximum drawdown. Table 5-3 shows the estimated aquifer parameters for the drawdown and recovery data. Appendix I provides the AQTESOLV results.

Table 5-3 APT Test Results

Data Analyzed	Estimated Transmissivity (ft ² /day)	Estimated Aquifer Storage Coefficient
SZMW-1 Early-Time Drawdown	60,850	0.0025
SZMW-1 Early-Time Recovery	73,000	0.0011

Southern Analytical collected water quality samples from the discharge water at 3-hour increments for analysis of field parameters, Chlorides, and Total Dissolved Solids. As Table 5-4 shows, the water quality remained stable during the APT. Appendix J provides the laboratory reports and field data sheets.

Table 5-4 Water Quality during APT

Time Since Start of Test (Hours)	pH	Temperature (°C)	Specific Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Turbidity	TDS (mg/L)	Chlorides (mg/L)
0	7.04	23.9	44,610	4.99	1.48	30,000	14,000
3	7.23	24.4	44,965	5.52	0.92	30,000	14,000
6	7.10	24.6	44,739	4.32	0.69	30,000	14,000
9	7.18	24.6	44,835	4.72	0.40	30,000	13,000
12	7.17	24.4	44,637	4.70	0.22	30,000	14,000

5.6 BACKGROUND WATER QUALITY DATA

Southern Analytical collected water quality samples from TZMW-1 and SZMW-1 during the step-drawdown tests completed on April 25, 2013 and May 22, 2013, respectively. Southern Analytical collected a background water quality sample from the ASR well during the APT performed on February 6, 2014. The background water quality sample was collected after 3 hours of pumping. The water samples were collected and analyzed in accordance with Standard Operating Procedures in DEP-SOP-001/01 (field procedures) and DEP-SOP-002/-1 (laboratory procedures), according to the FDEP Quality Assurance Chapter 62-160, FAC. The sample analysis included the permit required water quality criteria listed below:

- Primary and Secondary Drinking Water Standards established in Chapter 62-550, Part III, FAC (excluding Asbestos, Acrylamide, Epichlorohydrin, Dioxin).
- Additional Criteria for Reclaimed Water: Aldrin, Ammonia, Anthracene, Butylbenzylphthalate, Chloroethane, 2-chlorophenol, Dieldrin, Dimethylphthalate, Total Kjeldahl Nitrogen, Naphthalene, Organic Nitrogen, Dissolved Oxygen, Phenanthrene, Total Phosphorus, 2,4,6-Trichlorophenol, and Total Uranium.

In addition to the parameters listed above, the ASR background water quality sample was analyzed for the following parameters:

- Fecal coliform and enterococci.
- Additional Criteria for Reclaimed Water: Diethylphthalate and Soluble Orthophosphate.

Table 5-5 summarizes the background groundwater quality data, and Appendix I provides the laboratory reports.

Table 5-5 Background Water Quality Data

INORGANIC COMPOUNDS

ANALYTE	MCL ^a	Units	TZMW-1	SZMW-1	ASR-1
			4/25/2013	5/22/2013	2/6/2014
ANALYTE	MCL ^a	Units	Analysis Result	Analysis Result	Analysis Result
Antimony	6	µg/L	0.25 l	0.56	0.41
Arsenic	10	µg/L	13	80	<2.0
Asbestos	7	MFL	<i>Not Required</i>	<i>Not Required</i>	<i>Not Required</i>
Barium	2000	µg/L	64	150	0.16
Beryllium	4	µg/L	< 0.096	0.99 l	<0.096
Cadmium	5	µg/L	< 0.27	< 0.27	1.4 l
Chromium	100	µg/L	1.4 l	4.1 l	<4.0
Cyanide (as free Cyanide)	200	µg/L	< 2.4	< 2.4	<2.4
Fluoride	4	mg/L	< 0.010	< 1.0	0.21
Lead	15	µg/L	1.0	0.42 l	<2.0
Mercury	2	µg/L	< 0.10	< 0.10	<0.10
Nickel	100	µg/L	12	39	<1.0
Nitrate	10 (as N)	mg/L	< 0.01	< 1	<i>Not Sampled</i>
Nitrite	1 (as N)	mg/L	< 0.01	< 1	<i>Not Sampled</i>
Total Nitrate and Nitrite	10 (as N)	mg/L	< 0.01	< 1	<0.01
Orthophosphate as P		mg/L	<i>Not Analyzed</i>	<i>Not Analyzed</i>	0.15
Selenium	50	µg/L	45	310	1500
Sodium	160	mg/L	1,400	9,300	9,200
Thallium	2	µg/L	< 0.24	< 0.24	<5.0

DISINFECTION BYPRODUCTS

ANALYTE	MCL ^a	Units	TZMW-1	SZMW-1	ASR-1
			4/25/2013	5/22/2013	2/6/2014
ANALYTE	MCL ^a	Units	Analysis Result	Analysis Result	Analysis Result
Total Trihalomethanes (TTHM)	80	µg/L	< 0.1	< 0.1	< 0.1
Bromodichloromethane	See Total	µg/L	< 0.2	< 0.2	< 0.2
Bromoform	See Total	µg/L	< 0.2	< 0.2	< 0.2
Chloroform	See Total	µg/L	< 0.2	< 0.2	< 0.2
Dibromochloromethane	See Total	µg/L	< 0.1	< 0.1	< 0.1
Haloacetic Acids (Five) (HAA5)	60	µg/L	< 0.29	< 0.27	< 0.26
Dibromoacetic Acid	See Total	µg/L	< 0.29	< 0.27	< 0.26
Dichloroacetic Acid	See Total	µg/L	< 0.74	< 0.70	< 0.68
Monobromoacetic Acid	See Total	µg/L	< 0.36	< 0.34	< 0.33
Monochloroacetic Acid	See Total	µg/L	< 0.83	< 0.78	< 0.75
Trichloroacetic Acid	See Total	µg/L	< 0.37	< 0.35	< 0.34
Bromate	10	µg/L	<i>Not Sampled</i>	<i>Not Sampled</i>	< 500
Chlorite	1000	µg/L	<i>Not Sampled</i>	<i>Not Sampled</i>	3,400 l

VOLATILE ORGANIC CONTAMINANTS

ANALYTE	MCL ^a	Units	TZMW-1	SZMW-1	ASR-1
			4/25/2013	5/22/2013	2/6/2014
ANALYTE	MCL ^a	Units	Analysis Result	Analysis Result	Analysis Result
1,1-Dichloroethylene	7	µg/L	< 0.2	< 0.2	<i>Not Sampled</i>
1,1,1-Trichloroethane	200	µg/L	< 0.2	< 0.2	< 0.2
1,1,2-Trichloroethane	5	µg/L	< 0.2	< 0.2	< 0.2
1,2-Dichloroethane	3	µg/L	< 0.1	< 0.1	< 0.1
1,2-Dichloropropane	5	µg/L	< 0.2	< 0.2	< 0.2
1,2,4-Trichlorobenzene	70	µg/L	< 0.3	< 0.3	< 0.3
Benzene	1	µg/L	< 0.1	< 0.1	< 0.1
Carbon tetrachloride	3	µg/L	< 0.2	< 0.2	< 0.2
cis-1,2-Dichloroethylene	70	µg/L	< 0.09	< 0.09	< 0.09
Dichloromethane	5	µg/L	< 0.2	< 0.2	< 0.2
Ethylbenzene	700	µg/L	< 0.08	< 0.08	< 0.08
Monochlorobenzene	100	µg/L	< 0.1	< 0.1	< 0.1
o-Dichlorobenzene	600	µg/L	< 0.1	< 0.1	< 0.1
p-Dichlorobenzene	75	µg/L	< 0.2	< 0.2	< 0.2
Styrene	100	µg/L	< 0.05	< 0.05	< 0.05
Tetrachloroethylene	3	µg/L	< 0.1	< 0.1	< 0.1
Toluene	1000	µg/L	< 0.09	< 0.09	< 0.09
trans-1,2-Dichloroethylene	100	µg/L	< 0.2	< 0.2	< 0.2
Trichloroethylene	3	µg/L	< 0.2	< 0.2	< 0.2
Vinyl chloride	1	µg/L	< 0.3	< 0.3	< 0.3
Xylenes (total)	10000	µg/L	< 0.1	< 0.1	< 0.1

SYNTHETIC ORGANIC CONTAMINANTS

ANALYTE	MCL ^a	Units	TZMW-1	SZMW-1	ASR-1
			4/25/2013	5/22/2013	2/6/2014
ANALYTE	MCL ^a	Units	Analysis Result	Analysis Result	Analysis Result
2,3,7,8-TCDD (Dioxin)	3 X 10 ⁻⁵	µg/L	<i>Not Required</i>	<i>Not Required</i>	<i>Not Required</i>
2,4-D	70	µg/L	< 0.098	< 0.094	< 0.90
2,4,5-TP (Silvex)	50	µg/L	< 0.040	< 0.039	< 0.15
Alachlor	2	µg/L	< 0.03	< 0.03	< 0.03
Atrazine	3	µg/L	< 0.02	< 0.02	< 0.02
Benzo(a)pyrene	0.2	µg/L	< 0.02	< 0.02	< 0.02
Carbofuran	40	µg/L	< 0.6	< 0.6	< 0.60
Chlordane	2	µg/L	< 0.047	< 0.046	<i>Not Sampled</i>
Dalapon	200	µg/L	< 0.32	< 0.31	1.01
Di(2-ethylhexyl)adipate	400	µg/L	< 0.07	< 0.07	< 0.07
Di(2-ethylhexyl)phthalate	6	µg/L	< 0.9	< 0.6	< 0.6
Dibromochloropropane (DBCP)	0.2	µg/L	< 0.0053	< 0.0053	< 0.0053
Dinoseb	7	µg/L	< 0.15	< 0.14	< 0.16
Diquat	20	µg/L	< 0.48	< 0.39	< 0.45
Endothall	100	µg/L	< 7	< 6.7	< 6.6
Endrin	2	µg/L	< 0.05	< 0.05	<i>Not Sampled</i>
Ethylene dibromide (EDB)	0.02	µg/L	< 0.0053	< 0.0053	< 0.0053
Glyphosate	700	µg/L	< 2.7	< 2.7	< 2.7
Heptachlor	0.4	µg/L	< 0.08	< 0.08	<i>Not Sampled</i>
Heptachlor epoxide	0.2	µg/L	< 0.08	< 0.08	<i>Not Sampled</i>
Hexachlorobenzene	1	µg/L	< 0.04	< 0.04	< 0.04
Hexachlorocyclopentadiene	50	µg/L	< 0.06	< 0.06	< 0.06
Lindane	0.2	µg/L	< 0.02	< 0.02	<i>Not Sampled</i>
Methoxychlor	40	µg/L	< 0.02	< 0.02	<i>Not Sampled</i>
Oxamyl (vydate)	200	µg/L	< 0.88	< 0.88	< 0.88
Pentachlorophenol	1	µg/L	< 0.014	< 0.013	< 0.11
Picloram	500	µg/L	< 0.047	< 0.045	< 0.30
Polychlorinated biphenyls (PCBs)	0.5	µg/L	< 0.089	< 0.086	< 0.03
Simazine	4	µg/L	< 0.03	< 0.03	< 0.03
Toxaphene	3	µg/L	< 0.53	< 0.52	<i>Not Sampled</i>

SECONDARY DRINKING WATER STANDARDS

			TZMW-1	SZMW-1	ASR-1
			4/25/2013	5/22/2013	2/6/2014
ANALYTE	SMCL ^U	Units	Analysis Result	Analysis Result	Analysis Result
Aluminum	200	µg/L	230	650 l	< 50
Chloride	250	mg/L	2,900	16,000	14,000
Copper	1000	µg/L	13	120	4.9 l
Fluoride	2	mg/L	0.51	<1	0.2 l
Iron	300	µg/L	110	270 l	150
Manganese	50	µg/L	18	17 l	13
Silver	100	µg/L	< 0.069	< 0.069	< 1.1
Sulfate	250	mg/L	380	2,600	2,100
Zinc	5000	µg/L	27	42	< 3.0
Color	15	c.u.	10	45	50
Odor	3	t.o.n.	500	1	3
pH (Field)	6.5 - 8.5	S.U.	7.6	6.8	7.2
Total Dissolved Solids	500	mg/L	5,100	28,000	30,000
Foaming Agents	0.5	mg/L	0.06	0.11	0.13

RADIONUCLIDES

			TZMW-1	SZMW-1	ASR-1
			4/25/2013	5/22/2013	2/6/2014
ANALYTE	MCL ^a	Units	Analysis Result	Analysis Result	Analysis Result
Gross Alpha Particle Activity	15	pCi/L	25 +/- 3	49 +/- 3.5	26 +/- 2.9
Radium-226	5	pCi/L	9.7 +/- 0.42	11 +/- 0.41	14 +/- 0.51
Radium-228	5	pCi/L	< 0.8 +/- 0.4	1.0 +/- 0.4	< 0.6 +/- 0.4
Uranium, Combined	30	ug/L	0.71	0.96	0.054

ADDITIONAL PARAMETERS

			TZMW-1 4/25/2013	SZMW-1 5/22/2013	ASR-1 2/6/2014
ANALYTE		Units	Analysis Result	Analysis Result	Analysis Result
FIELD PARAMETERS					
Dissolved Oxygen	-	mg/L	0.6	0.5	5.52
Turbidity	-	NTU	40	32	0.92
Conductivity	-	µmhos/cm	9,522	49,080	44,965
Temperature	-	°C	24	26.7	24.4
INORGANICS					
Nitrogen, Ammonia (As N)	-	mg/L	1.0	1.2	0.8
Nitrogen, Organic	-	mg/L	0.18 l	0.37 l	0.17 l
Total Nitrogen, Kjeldahl (TKN)	-	mg/L	1.2	1.6	0.95
Total Phosphorus (as P)	-	mg/L	0.076	0.20	0.16
VOLATILE ORGANIC COMPOUNDS					
Chloroethane	-	µg/L	< 0.4	< 0.4	< 0.4
Chloroform	-	µg/L	< 0.2	< 0.2	< 0.2
para-Dichlorobenzene	-	µg/L	< 0.2	< 0.2	< 0.2
1,2-Dichloroethylene	-	µg/L	< 0.09	< 0.09	Not Sampled
BASE/NEUTRAL ORGANICS					
Anthracene	-	µg/L	< 0.30	< 0.30	< 0.31
Butyl benzyl phthalate	-	µg/L	< 0.85	< 0.84	< 0.86
Diethyl phthalate	-	µg/L	Not Sampled	Not Sampled	< 0.93
Dimethyl phthalate	-	µg/L	< 1.6	< 1.6	< 1.6
Naphthalene	-	µg/L	< 0.89	< 0.88	< 0.90
Phenanthrene	-	µg/L	< 0.97	< 0.96	< 0.98
PESTICIDES AND PCBs					
Aldrin	-	µg/L	< 0.04	< 0.04	< 0.005
Dieldrin	-	µg/L	< 0.1	< 0.1	< 0.010
ACID EXTRACTABLES					
2-chlorophenol	-	µg/L	< 2.9	< 2.9	< 2.9
Phenol	-	µg/L	< 1.5	< 1.4	Not Sampled
2,4,6-trichlorophenol	-	µg/L	< 2.8	< 2.8	< 2.8
MICROBIOLOGY					
Enterococci		MPN/100 mL	Not Sampled	Not Sampled	3
Fecal Coliforms		CFU/100 ml	Not Sampled	Not Sampled	< 1
OTHER					
Biochemical Oxygen Demand	-	mg/L	3	< 2	Not Sampled
Chemical Oxygen Demand	-	mg/L	30	260	Not Sampled

Legend

MCL = Maximum Contaminant Level from Chapter 62-550

a = Primary Drinking Water Standard

b = Secondary Drinking Water Standard

l = The reported value is between the laboratory method detection limit and the laboratory practical quantification limit

J5 = Matrix spike of this sample outside typical range. All other QC criteria were acceptable.

The following parameters exceeded their Primary or Secondary Drinking Water Standard in the SZMW-1 background sample:

- Arsenic
- Selenium
- Sodium
- Aluminum
- Chloride

- Sulfate
- Color
- Total Dissolved Solids
- Gross Alpha
- Radium-226

The following parameters exceeded their Primary or Secondary Drinking Water Standard in the TZMW-1 background sample:

- Arsenic
- Sodium
- Aluminum
- Chloride
- Sulfate
- Odor
- Total Dissolved Solids
- Gross Alpha
- Radium-226

The following parameters exceeded their Primary or Secondary Drinking Water Standard in the ASR background sample:

- Selenium
- Sodium
- Thallium
- Chloride
- Sulfate
- Color
- Odor
- Total Dissolved Solids
- Radium-226

Volatile and Synthetic Organic compounds were primarily below detection limits. Exceedances of the drinking water standards discussed above are likely due to the brackish nature of the storage zone.

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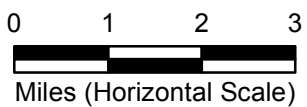
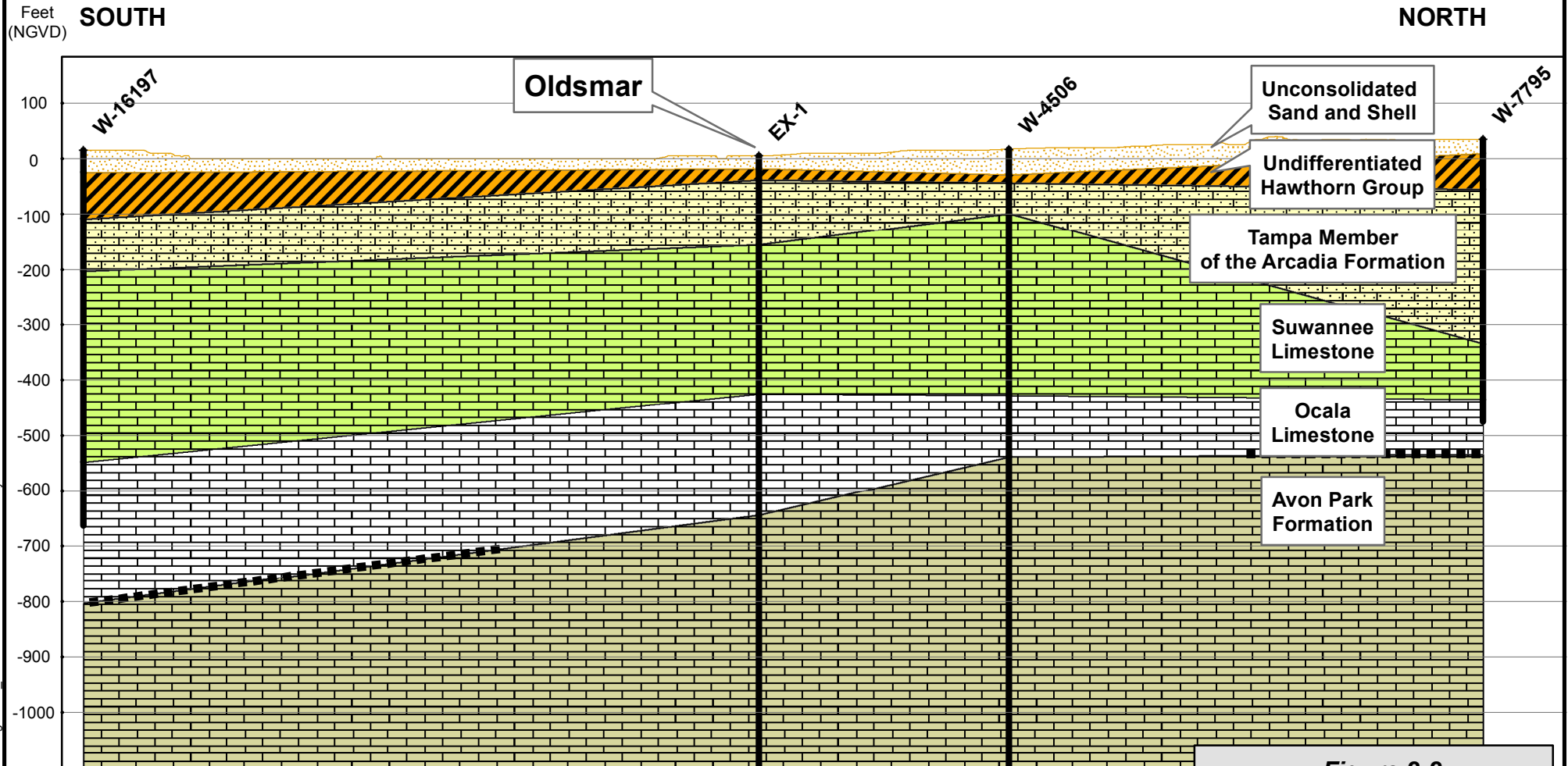
Figures

Figure 2-1

Water Reclamation Facility Site Map

City of Oldsmar ASR System Monitor Well Completion Report





Vertical Exaggeration is 40 times horizontal scale

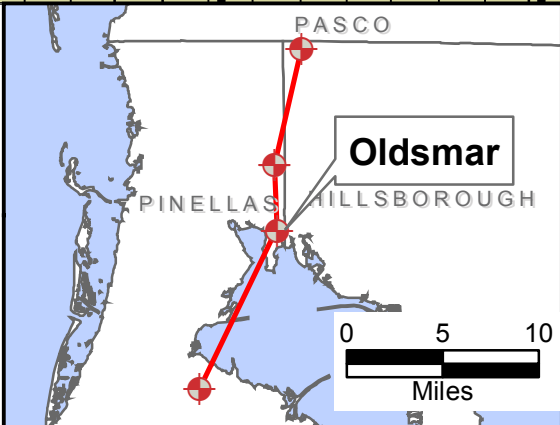
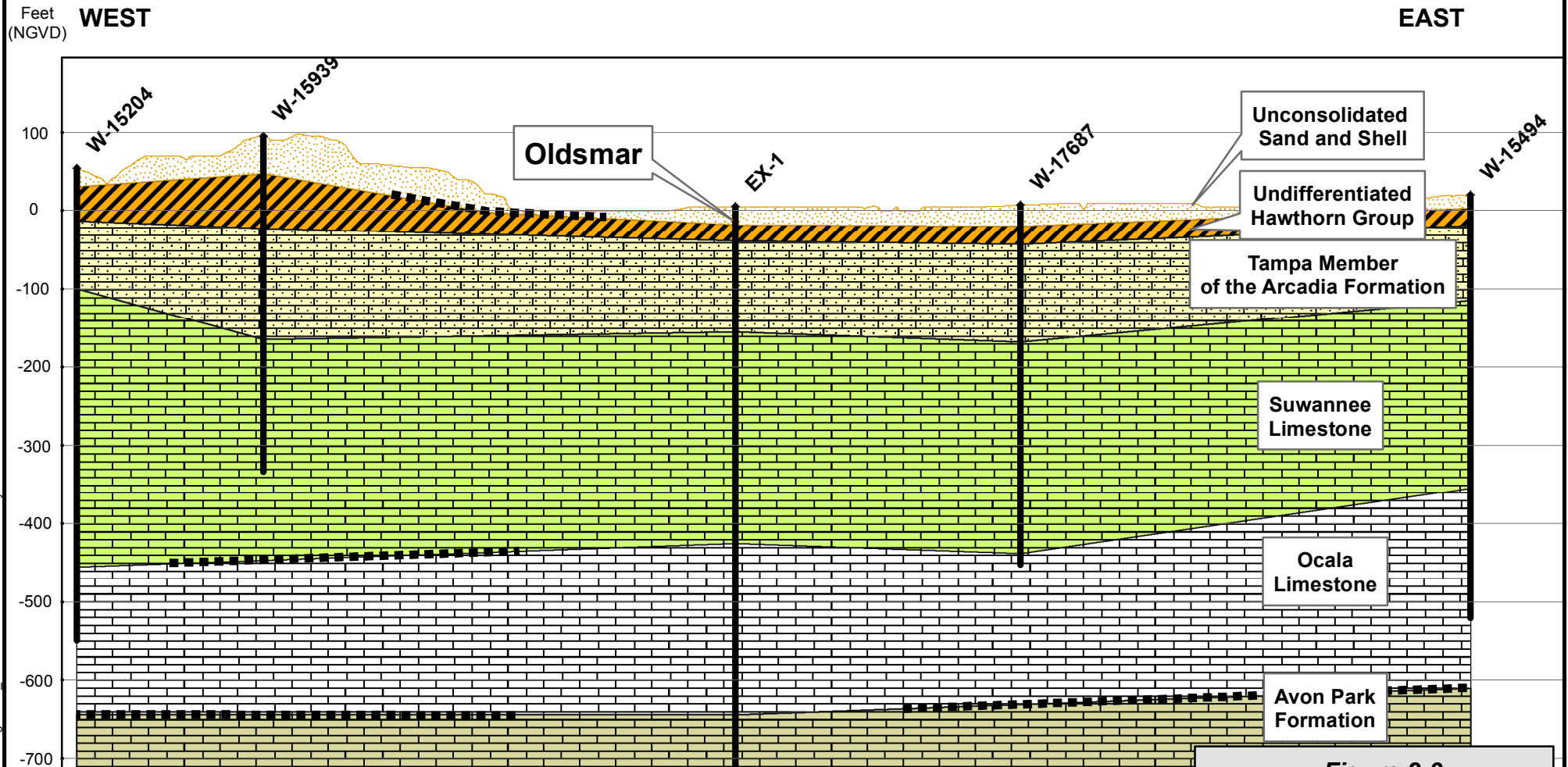


Figure 2-2
North-South Cross Section
 Oldsmar ASR
 Monitoring Well Completion Report

- Well
- Cross Section Line
- Estimated Contact
- Well Depth



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Miles (Horizontal Scale)

Vertical Exaggeration is 40 times horizontal scale

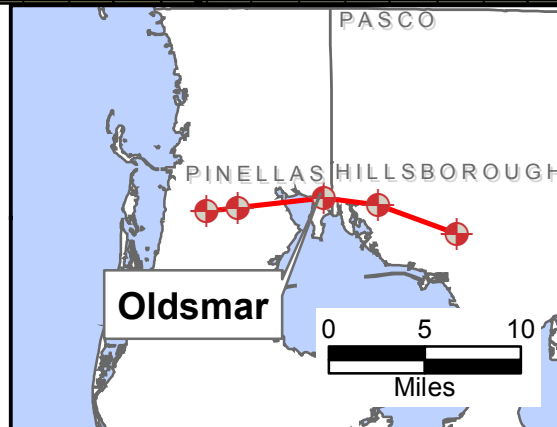


Figure 2-3
West-East Cross Section
 Oldsmar ASR
 Monitoring Well Completion Report

- Well
- Cross Section Line
- Estimated Contact
- Well Depth

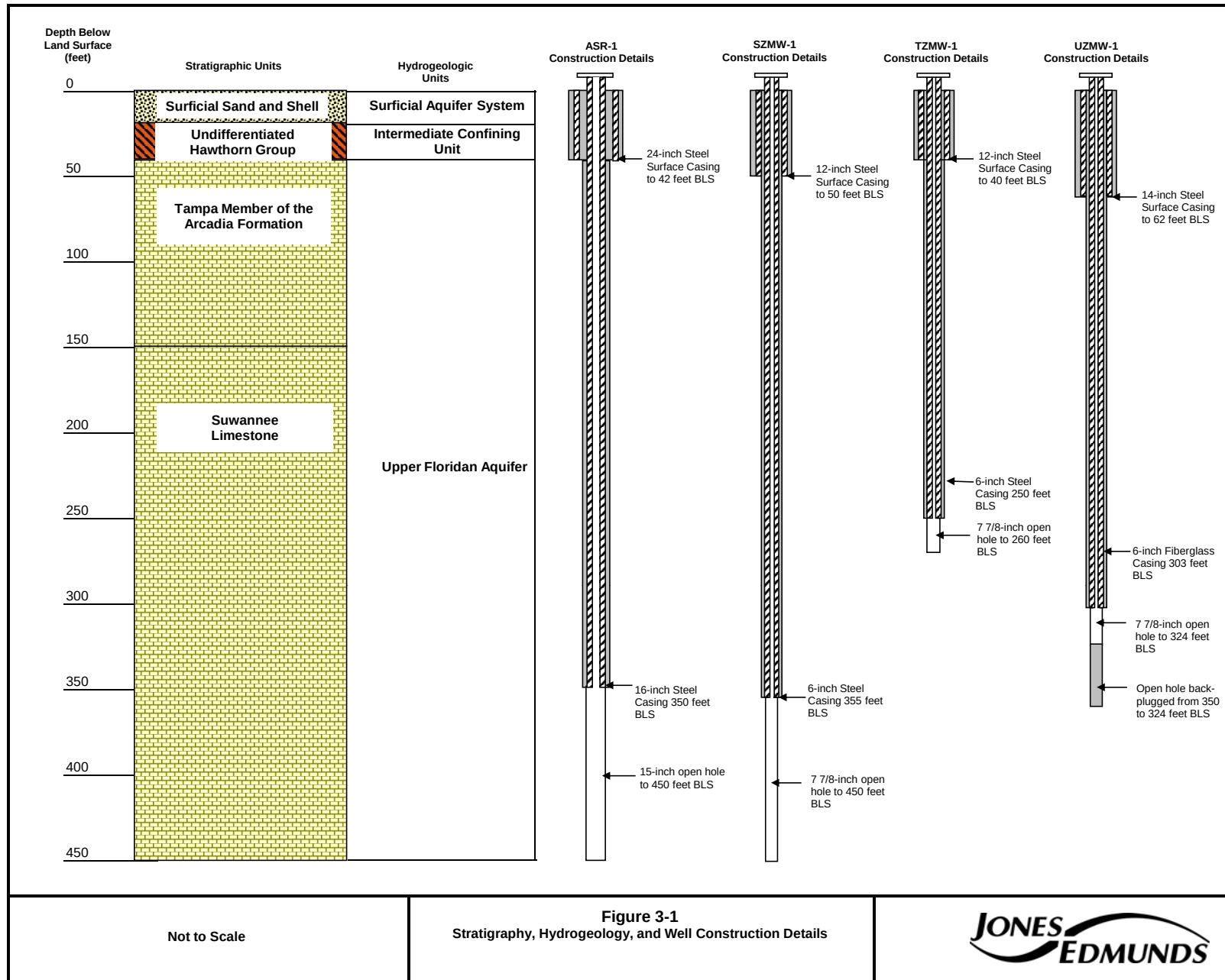


FIGURE 4-1
WTMW-1 WELL CONSTRUCTION DETAILS

Surface Completion: Locking Aluminum Stickup

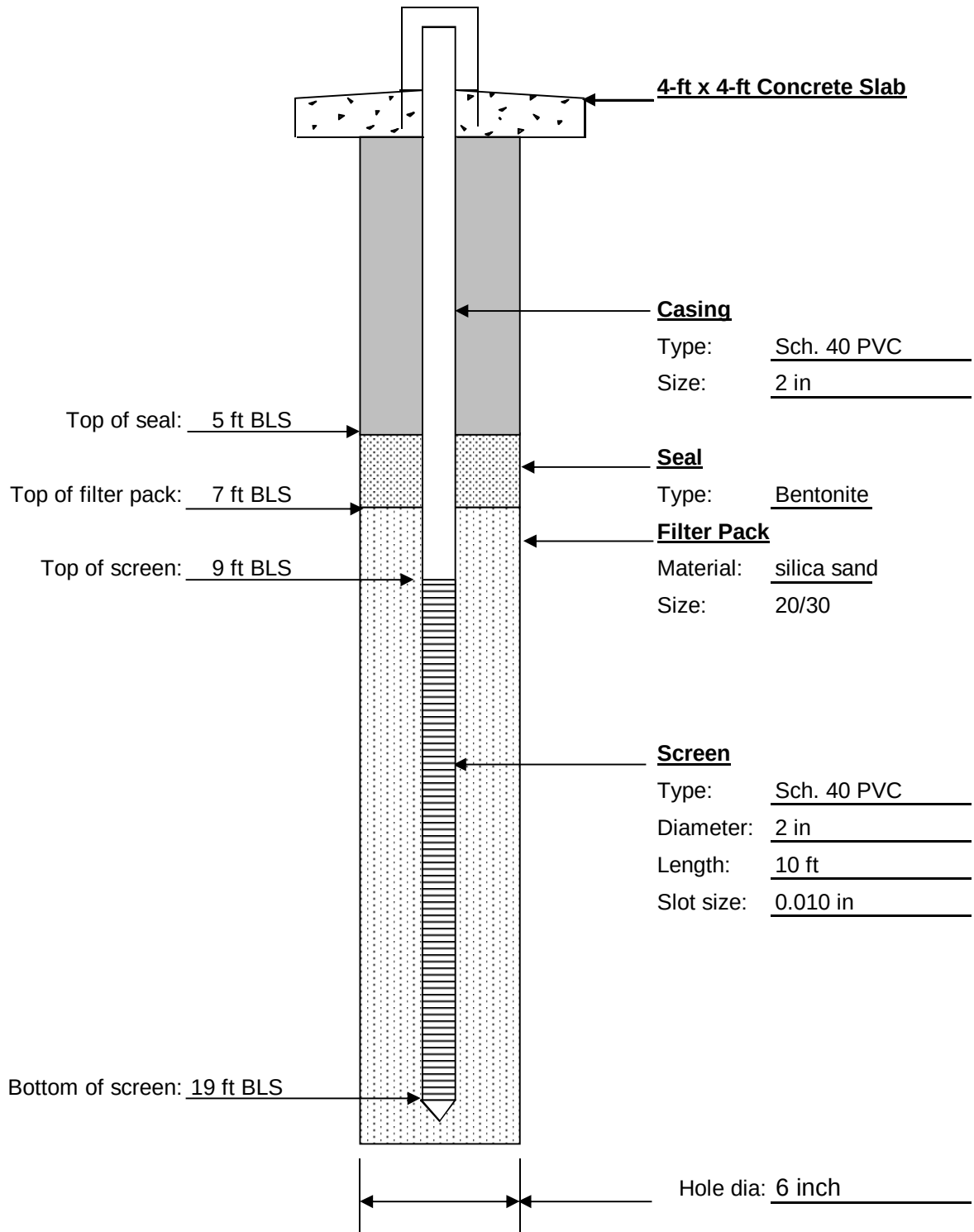


Figure 5-1
Oldsmar ASR SZMW-1
Step-Drawdown Test Results

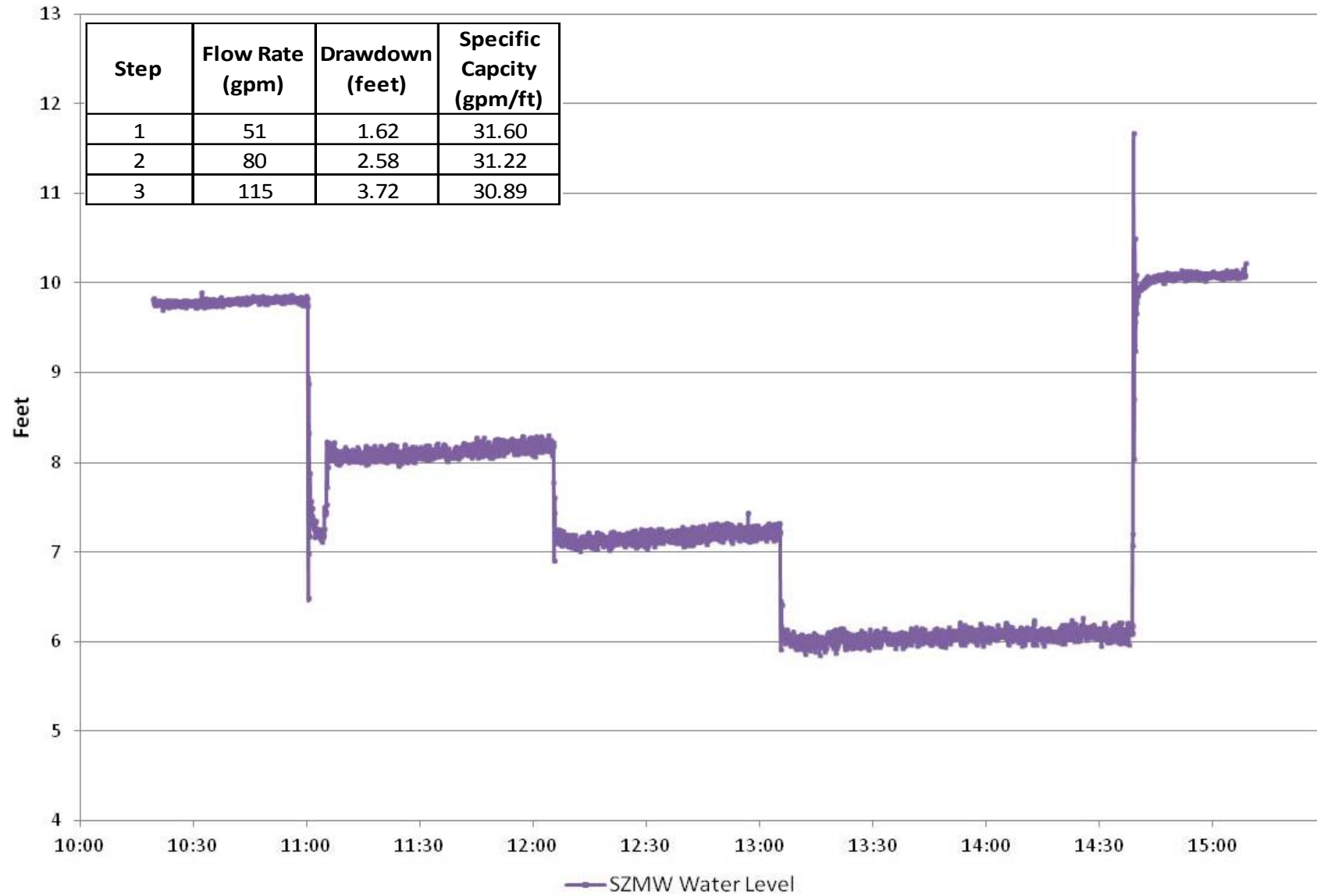


Figure 5-2
Oldsmar ASR TZMW-1
Step-Drawdown Test Results

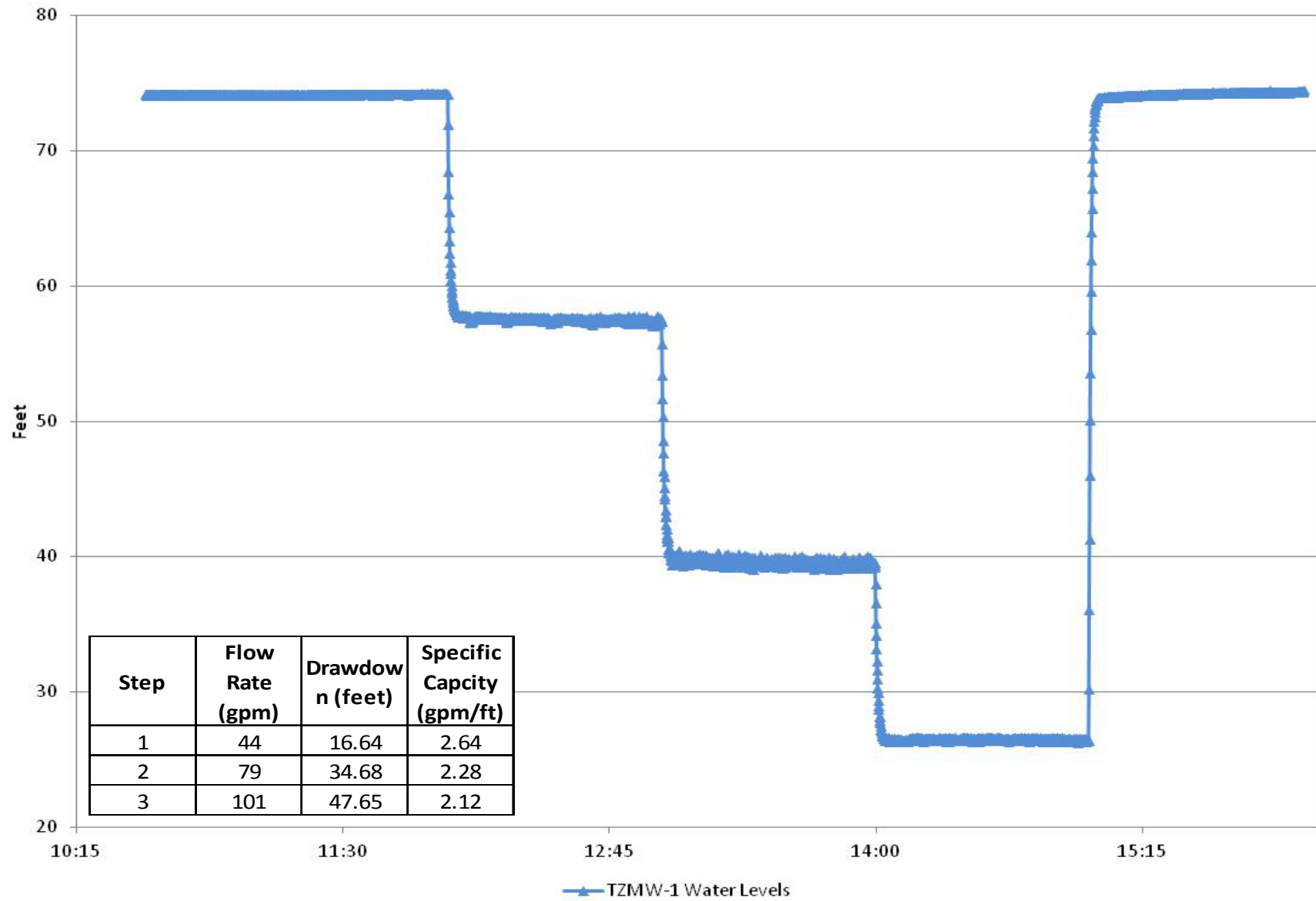
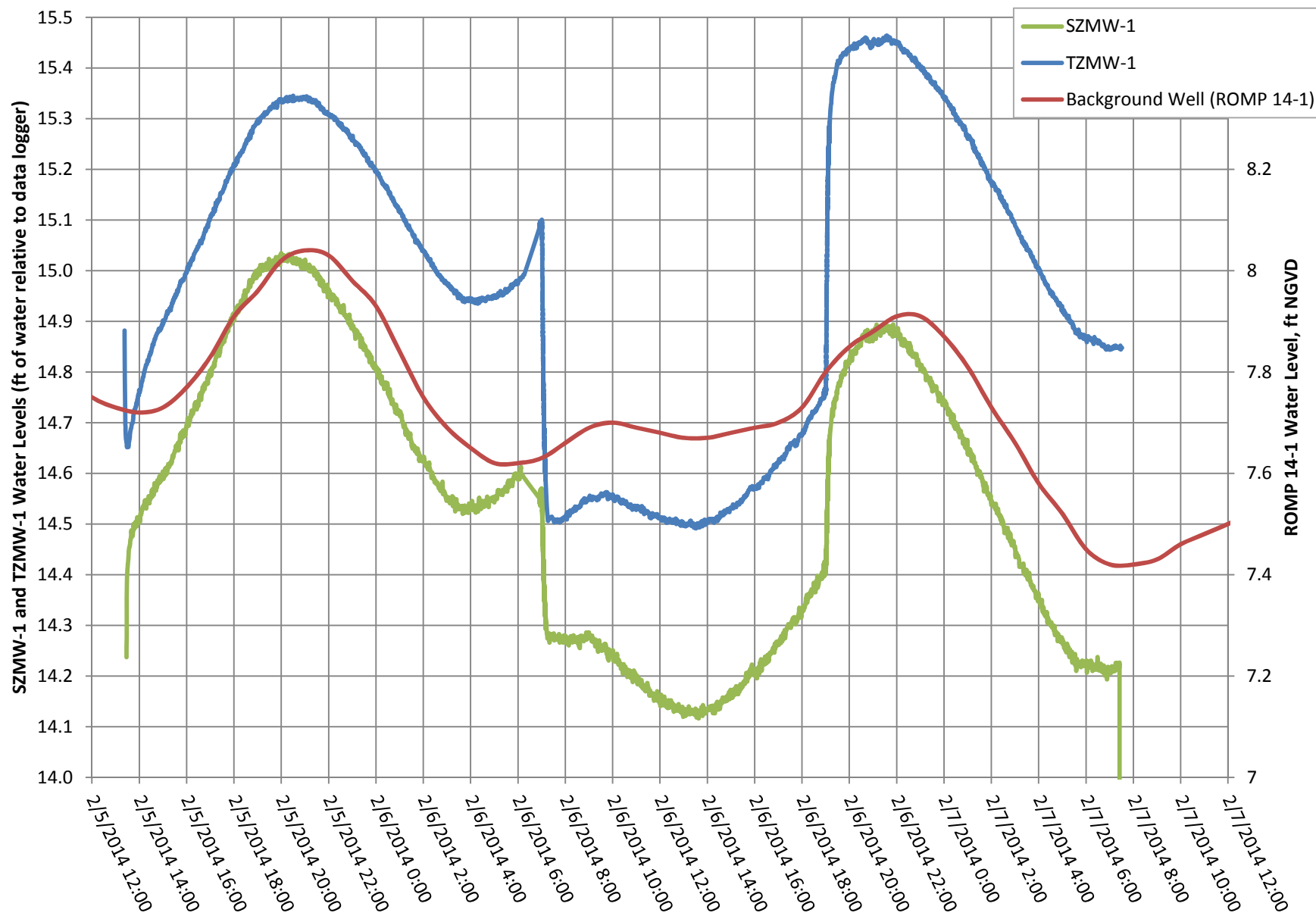


Figure 5-3 - Uncorrected APT Water Levels



Appendix A

Weekly Drilling Reports and Observation Logs

Weekly Drilling Reports

Report No: 1

Well Depth - Start of Shift : 0' Water Level - Start of Shift: _____
End of Shift : 20' End of Shift: _____

Formations from:

Safety Meeting ? Yes No ☒

Daily Topic

Accident on Site ? Yes No

Describe:

Driller: *Loz P.*

Helpers: TC4B, TC43.

Eng.Rep.:

Weather Conditions: *Sunny*

Drilling Mud Properties

Mud Weight (ppg)

Mud Viscosity

Drilling Assembly

Available WOB

In

Out

6" B.t

lbs



Daily Drilling Report

Report No: 2

Date: <u>3-29-13</u>	Project: <u>C.O. Oldemar</u>
Well Number:	Job Number: <u>1304</u>

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

Activities	From	To
POURED Poured cement pad on 2" m.w. cleaned site for drilling		

Formations from:	From	To

Safety Meeting ? Yes ___ No <u>x</u>	Weather Conditions: <u>Sunny</u>	
Daily Topic _____	Drilling Mud Properties	In Out
Accident on Site ? Yes ___ No <u>x</u>	Mud Weight (ppg)	
Describe: _____	Mud Viscosity	
Driller: <u>ROY R.</u>	Drilling Assembly	
Helpers: <u>JOE B. JONES</u>		
Eng.Rep.: _____	Available WOB	lbs

Report No: 3

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

Safety Meeting ? Yes ☐ No ☒	Weather Conditions: <u>Sunny</u>	
Daily Topic _____		
Accident on Site ? Yes ☐ No ☒	Drilling Mud Properties	In Out
Describe: _____	Mud Weight (ppg)	
	Mud Viscosity	
Driller: <u>Roy R.</u>	Drilling Assembly <u>8" bit</u>	
Helpers: <u>Jeff B.</u>		
Eng.Rep.: _____	Available WOB	lbs



Report No: 4

Well Depth - Start of Shift : 0 Water Level - Start of Shift: _____
End of Shift : 50 End of Shift: _____

Safety Meeting ? Yes ☐ No ☒		Weather Conditions: <u>Sunny</u>							
Daily Topic _____									
Accident on Site ? Yes ☐ No ☒		Drilling Mud Properties							
Describe: _____		Mud Weight (ppg)	<table border="1"> <tr> <th>In</th> <th>Out</th> </tr> <tr> <td></td> <td>☒</td> </tr> <tr> <td></td> <td></td> </tr> </table>	In	Out		☒		
In	Out								
	☒								
		Mud Viscosity							
Driller: <u>Rox R. / Bobby S.</u>		Drilling Assembly <u>17" H.O.</u>							
Helpers: <u>Jeff B. Jeff S.</u>									
Eng.Rep.: _____		Available WOB <table border="1" style="display: inline-table; width: 100px; height: 20px;"></table> lbs							

Report No: 5

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

Safety Meeting ? Yes ☐ No ☒	Weather Conditions: <u>Sunny</u>	
Daily Topic _____	Drilling Mud Properties	In Out
Accident on Site ? Yes ☐ No ☒	Mud Weight (ppg)	
Describe: _____	Mud Viscosity	
Driller: <u>Roy R. / L. L. S.</u>	Drilling Assembly	<u>8" bit</u>
Helpers: <u>Jeff B. Jeff S.</u>		
Eng.Rep.: _____	Available WOB	lbs

Report No: 6

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

Safety Meeting ? Yes ☐ No ☒	Weather Conditions: <u>Rain</u>	
Daily Topic _____	Drilling Mud Properties	In Out
Accident on Site ? Yes ☐ No ☒		
Describe: _____	Mud Weight (ppg)	☒
	Mud Viscosity	☐
Driller: <u>Rob R.</u>	Drilling Assembly <u>X</u>	
Helpers: <u>Jeff B Jeff S</u>		
Eng.Rep.: _____	Available WOB	lbs

Report No: 7

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

Safety Meeting ? Yes ☐ No ☒	Weather Conditions: <u>Rain</u>	
Daily Topic _____	Drilling Mud Properties	In Out
Accident on Site ? Yes ☐ No ☒	Mud Weight (ppg)	
Describe: _____	Mud Viscosity	
Driller: <u>Rox R.</u>	Drilling Assembly	
Helpers: <u>JFFB TCHS</u>		
Eng.Rep.: _____	Available WOB	lbs



Daily Drilling Report

Report No: _____

Date: <u>4/9/13 Tuesday</u>	Project: <u>oldemar ASR monitor well</u>
Well Number: <u>T2mw-1</u>	Job Number: <u>1304</u>

Well Depth - Start of Shift: 42' Water Level - Start of Shift: —
End of Shift: 103 End of Shift: 3'

Activities	From	To
Tag Cement outside of casing @ 8'		
Pump 10 bags of Mortar Cement around casing		
Get off hooker pulled tubing		
Trip in hole w/ 2 3/4 bit		
Drill Pilot Hole 8.0m	42'	103'

Formations from:	From	To
White Limestone	42'	103'

Safety Meeting ? Yes ☒ No ☐	Weather Conditions: <u>Sunny</u>	
Daily Topic <u>Drilling</u>	Drilling Mud Properties	In Out
Accident on Site ? Yes ☐ No ☒	Mud Weight (ppg)	90 92
Describe: _____	Mud Viscosity	42 44
Driller: <u>R. Schmitt</u>	Drilling Assembly	<u>2 3/4 button bit</u>
Helpers: <u>D. Sparks, J. Butler</u>	Available WOB	<u>4,000</u> lbs
Eng. Rep.: _____		



Daily Drilling Report

Report No: _____

Date: <u>4-10-13 Wed.</u>	Project: <u>665 mar ASR MW</u>
Well Number: <u>TZmw-1</u>	Job Number: <u>1304</u>

Well Depth - Start of Shift: 103' Water Level - Start of Shift: _____
 End of Shift: 260' End of Shift: _____

Activities	From	To
<u>Drilled from 103' - 260'</u>		
<u>Cleaned Hole</u>		
<u>Tipped bit to collars</u>		

Formations from:	From	To
<u>White Limestone</u>	<u>103'</u>	<u>260'</u>

Safety Meeting ? Yes ___ No <u>✓</u>		Weather Conditions: <u>Sunny</u>	
Daily Topic _____		Drilling Mud Properties	
Accident on Site ? Yes ___ No <u>✓</u>		In	Out
Describe: _____		Mud Weight (ppg)	<u>90</u> <u>92</u>
		Mud Viscosity	<u>41</u> <u>43</u>
Driller: <u>Roy R.</u>	Drilling Assembly <u>7 7/8 B.B.</u>		
Helpers: <u>J. & B.</u>			
Eng. Rep.: _____	Available WOB		<u>4,000</u> lbs



Daily Drilling Report

Report No: _____

Date: <u>4-11-13 Thur.</u>	Project: <u>oldsma ASR MW</u>
Well Number: <u>T2MW-1</u>	Job Number: <u>1304</u>

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

Activities	From	To
<u>Tripped in cleaned out hole</u>		
<u>Tripped out</u>		
<u>Logged Hole with Art Bersing</u>		
<u>Tripped in with 12" bit for Renew</u>		

Formations from:	From	To

Safety Meeting ? Yes ___ No <u>X</u> Daily Topic _____		Weather Conditions: <u>Sunny</u>							
Accident on Site ? Yes ___ No <u>X</u> Describe: _____		Drilling Mud Properties Mud Weight (ppg) Mud Viscosity	<table border="1"> <tr> <th>In</th> <th>Out</th> </tr> <tr> <td><u> </u></td> <td><u> </u></td> </tr> <tr> <td><u> </u></td> <td><u> </u></td> </tr> </table>	In	Out	<u> </u>	<u> </u>	<u> </u>	<u> </u>
In	Out								
<u> </u>	<u> </u>								
<u> </u>	<u> </u>								
Driller: <u>Jeff B</u> Helpers: <u>Jeff S</u> Eng.Rep.: _____		Drilling Assembly <u>11 7/8 T.B.</u> Available WOB lbs							



Daily Drilling Report

Report No: _____

Date: <u>4-15-13 Mon.</u>	Project: <u>oldsmar ASKmw</u>
Well Number: <u>T2mw1</u>	Job Number: <u>1304</u>

Well Depth - Start of Shift: 77'
End of Shift: 250'

Water Level - Start of Shift: 3'
End of Shift: 3'

Activities	From	To
<u>Drilled from 77' to 250'</u>		
<u>T.D. To casing depth.</u>		
<u>Tripped up to 0/hrs</u>		

Formations from:	From	To

Safety Meeting ? Yes ☒ No ☐ Daily Topic <u>Heat exposure</u>		Weather Conditions: <u>Sunny/Hot</u>							
Accident on Site ? Yes ☐ No ☒ Describe: _____		Drilling Mud Properties	<table border="1"> <tr> <th>In</th> <th>Out</th> </tr> <tr> <td><u>90</u></td> <td><u>93</u></td> </tr> <tr> <td><u>47</u></td> <td><u>49</u></td> </tr> </table>	In	Out	<u>90</u>	<u>93</u>	<u>47</u>	<u>49</u>
In	Out								
<u>90</u>	<u>93</u>								
<u>47</u>	<u>49</u>								
Driller: <u>Rox K.</u> Helpers: <u>JAKB JAKS.</u> Eng.Rep.: _____		Drilling Assembly <u>11 7/8 T.B.</u> Available WOB <u>4,000</u> lbs							



Daily Drilling Report

Report No: _____

Date: <u>4-16-13 Tue.</u>	Project: <u>Oldsmar ASR MW</u>
Well Number: <u>T2 MW-1</u>	Job Number: <u>1304</u>

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

Activities	From	To
<u>Tripped in Cleaned out Hole</u>		
<u>Set 252' of 6" Steel Casing</u>		
<u>Ran 216' of 2" Tubing</u>		
<u>pumped 5 1/2 yards of Act Cement</u>		
<u>Cleaned Site</u>		

Formations from:	From	To

Safety Meeting ? Yes ___ No <u>x</u>	Weather Conditions: <u>Sunny</u>	
Daily Topic _____	Drilling Mud Properties	In Out
Accident on Site ? Yes ___ No <u>x</u>	Mud Weight (ppg)	<u>x</u>
Describe: _____	Mud Viscosity	
Driller: <u>Roy Rowland</u>	Drilling Assembly _____	
Helpers: <u>Terry B Jeffs</u>		
Eng.Rep.: _____	Available WOB	<u> </u> lbs



Daily Drilling Report

Report No: _____

Date: <u>4-17-13 wed</u>	Project: <u>oldsmar ASR mw</u>
Well Number: <u>TZ MW-1</u>	Job Number: <u>1304</u>

Well Depth - Start of Shift: 248'
End of Shift: 260'

Water Level - Start of Shift: 3'
End of Shift: 3'

Activities	From	To
<u>Triped in Tag cement at 248'</u>		
<u>Drilled out plug</u>		
<u>pumped off Heavy Mud</u>		
<u>Drilled Reverse air from 250' - 260'</u>		
<u>develop well for 2 hrs.</u>		
<u>Rig downed</u>		

Formations from:	From	To

Safety Meeting ? Yes ___ No <u>✓</u>		Weather Conditions: <u>Sunny</u>	
Daily Topic _____		Drilling Mud Properties	
Accident on Site ? Yes ___ No <u>✓</u>		In	Out
Describe: _____		Mud Weight (ppg)	
		Mud Viscosity	
Driller: <u>RN</u>		Drilling Assembly _____	
Helpers: <u>Jeff B Jeff S.</u>			
Eng. Rep.: _____		Available WOB	lbs



Report No: _____

Job Number : 1304

End of Shift: _____

[illegible]

Available WOB		lbs
---------------	--	-----



Report No: _____

Job Number : 1304

End of Shift:

To

7 lbs



Daily Drilling Report

Report No: _____

Date: <u>4-22-13 Mon</u>	Project: <u>oldsmar ASR mw</u>
Well Number: <u>52mw-1</u>	Job Number: <u>1304</u>

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

Activities	From	To
<u>Tripped in whit 2 7/8 b.b.</u>		
<u>Tagged Cement at 48'</u>		
<u>Drilled out plug / Drilled to 62'</u>		
<u>Helped Mac whit back plugging</u>		

Formations from:	From	To
<u>whit Limestone</u>	<u>50'</u>	<u>62'</u>

Safety Meeting ? Yes ____ No <u>X</u>		Weather Conditions: <u>Sunny</u>	
Daily Topic _____		Drilling Mud Properties	
Accident on Site ? Yes ____ No <u>X</u>		In	Out
Describe: _____		Mud Weight (ppg)	
		Mud Viscosity	
Driller: <u>Roy Z.</u>		Drilling Assembly <u>7 1/8</u>	
Helpers: <u>JOE B JOE S.</u>			
Eng.Rep.: _____		Available WOB	<u>4,000</u> lbs



Daily Drilling Report

Report No: _____

Date: <u>4-23-13</u>	Project: <u>Oldsmar ASR mw</u>
Well Number: <u>52mw1</u>	Job Number: <u>1304</u>

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

Activities	From	To
<u>Drilled from 62' to 142'</u>		

Formations from:	From	To
<u>Limestone / clay</u>	<u>62'</u>	<u>142'</u>

Safety Meeting ? Yes ___ No <u>x</u>		Weather Conditions: <u>Sunny</u>	
Daily Topic _____		Drilling Mud Properties	
Accident on Site ? Yes ___ No <u>x</u>		In	Out
Describe: _____		Mud Weight (ppg)	
		Mud Viscosity	
Driller: <u>Rex R</u>		Drilling Assembly <u>728</u>	
Helpers: <u>Jeff B. Jeff S.</u>			
Eng.Rep.: _____		Available WOB	<u>4.000</u> lbs



Daily Drilling Report

Report No: _____

Date: <u>4-24-13</u>	Project: <u>oldsman ASR mw</u>
Well Number: <u>52mw-1</u>	Job Number: <u>1304</u>

Well Depth - Start of Shift: 142'
End of Shift: 325'

Water Level - Start of Shift: 5.65
End of Shift: 6.10

Activities	From	To
<u>Drilled from 142' to 325' Reverse air</u>		

Formations from:	From	To
<u>Limestone</u>	<u>142'</u>	<u>325'</u>

Safety Meeting ? Yes ☒ No ☐	Weather Conditions: <u>sunny</u>	
Daily Topic <u>Air purser</u>		
Accident on Site ? Yes ☐ No ☒	Drilling Mud Properties	In Out
Describe: _____	Mud Weight (ppg)	☒
	Mud Viscosity	
Driller: <u>Roy R.</u>	Drilling Assembly	<u>7 3/8</u>
Helpers: <u>Jeff B. Jeff S.</u>		
Eng.Rep.: _____	Available WOB	<u>4,000</u> lbs



Report No:

Water Level - Start of Shift: 5.1
End of Shift: 5.1

Applied
DRILLING
Engineering, Inc.



TIMESHEET

Week Ending

5-3-13

Day of the Week	Monday	Tuesday	Wednesday	Thursday	Friday	Totals
Date	4-29	4-30	5-1	5-2	5-3	
Name: Roy R						
Job Number:	1304	1304	1304	1304	1304	
Start Time	6:00 AM	6:00 AM	5:00 AM	6:00	6:00	
Travel Time	1.0	1.0	11.0	1.0	1.0	
Lunch	.5	.5	.5	.5	.5	
Finish Time	6:00	4:00	6:30	5:30	2:00	
Total Working Hours	11.5	9.5	13	11	7.5	52.5
Name: Jeff B						
Job Number:	1304	1304	1304			
Start Time		6:00	5:00	6:00	6:00	
Travel Time	0	1.0	11.0	4.0	1.0	
Lunch	.5	.5	.5	.5	.5	
Finish Time	4	4:00	6:30	5:30	2:00	
Total Working Hours		9.5	13	11	7.5	52.5
Name: Jeff S						
Job Number:	1304					
Start Time	6:00					
Travel Time	1.0					
Lunch	.5					
Finish Time	5:00					
Total Working Hours	10.5					
Name:						
Job Number:						
Start Time						
Travel Time						
Lunch						
Finish Time						
Total Working Hours						
Name:						
Job Number:						
Start Time						
Travel Time						
Lunch						
Finish Time						
Total Working Hours						
Name:						
Job Number:						
Start Time						
Travel Time						
Lunch						
Finish Time						
Total Working Hours						
Job Number:						
Job Number:						
Job Number:						



Report No: _____

Well Depth - Start of Shift : 355' Water Level - Start of Shift: 5.2
End of Shift : 355' End of Shift: 5.2

Safety Meeting ? Yes ☐ No ☒	Weather Conditions: <u>Sunny</u>
Daily Topic _____	Drilling Mud Properties
Accident on Site ? Yes ☐ No ☒	Mud Weight (ppg)
Describe: _____	Mud Viscosity
Driller: <u>Roy R.</u>	Drilling Assembly
Helpers: <u>Jeff B. Mac, M.</u>	
Eng.Rep.: _____	Available WOB <u> </u> lbs



Report No: _____

Date: 5-14-13 Tues

Project: 065mar AS RMW

Well Number: 52mw-1

Job Number : 1304

Well Depth - Start of Shift : 355'

Water Level - Start of Shift:

End of Shift : _____

End of Shift: _____

Activities

From

To

Tagcol Cement at 317'

pumped 5 yards of Cement slurry mix

Formations from:

From

To

Safety Meeting ? Yes ___ No ✓

Weather Conditions: *Sunny*

Daily Topic

Drilling Mud Properties

In

Out

Accident on Site ? Yes No ☒

Mud Weight (ppg)

Describe:

Mud Viscosity

Driller: Roy L.

Drilling Assembly

Helpers: Jeff B.

Eng.Rep.:

Available WOB

7 lbs



Report No: _____

Date: 5-17-13 Fri	Project: Oldsmar ASRMW
Well Number: 52mw-1	Job Number: 1304

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

[illegible]

Safety Meeting ? Yes ____ No ____		Weather Conditions: _____							
Daily Topic _____									
Accident on Site ? Yes ____ No ____		Drilling Mud Properties							
Describe: _____		Mud Weight (ppg)	<table border="1"> <tr> <th>In</th> <th>Out</th> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>	In	Out				
In	Out								
		Mud Viscosity							
Driller: _____		Drilling Assembly _____							
Helpers: _____									
Eng.Rep.: _____		Available WOB	<table border="1"><tr><td></td></tr></table> lbs						



Report No: _____

Well Depth - Start of Shift: 450' Water Level - Start of Shift: _____
End of Shift: 450' End of Shift: _____

Safety Meeting ? Yes ☐ No ☒		Weather Conditions: <u>Sunny</u>							
Daily Topic _____		Drilling Mud Properties							
Accident on Site ? Yes ☐ No ☒		<table border="1"> <tr> <td>In</td> <td>Out</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>		In	Out				
In	Out								
Describe: _____		Mud Weight (ppg)							
		Mud Viscosity							
Driller: <u>Ray R.</u>		Drilling Assembly _____							
Helpers: <u>Jeff B.</u>									
Eng.Rep.: _____		Available WOB <table border="1"><tr><td></td></tr></table> lbs							

Observation Logs



DAILY REPORT



PROJECT NAME: City of Oldsmar ASR Monitoring Well Program			
PROJECT OWNER: City of Oldsmar		CONTRACTOR: Applied Drilling Engineering, Inc.	
PROJECT NO.:		OWNER'S PROJECT NO.:	
DAY: Thursday	DATE: March 28, 2013	CONTRACTOR'S WORK PERIOD: FROM: 9:00 ☒ A.M. ☐ P.M. TO: 5:00 ☐ A.M. ☒ P.M.	
WEATHER: 45- 70 clear		PRECIPITATION: None	

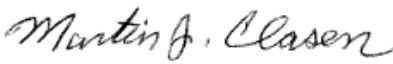
PERSONNEL ONSITE
Applied Drilling Company Inc. (Applied) – Bobby Schmidt/superintendent and 3-man crew

WORK ACCOMPLISHED TODAY

Installed 2-inch diameter water table monitoring well.

PROJECT ACTIVITIES

13:00	Marty Clasen arrives on site. Applied is onsite and set up over the water table monitoring well (WTMW-1) drilling site with a Speedstar 1500 top-head drive rotary drilling rig. Applied plans to install a 2-inch diameter PVC well with a 10-foot screened interval from 10-20 feet below land surface (bls). The well will be drilled using potable water and a 6-inch diameter tricone bit. Applied will collect lithologic samples every 5-feet during drilling.
13:25	Applied post-holed to approximately 3-feet and began drilling with the 6-inch diameter bit.
13:40	Applied has drilled the 6-inch diameter borehole using potable water to a depth of 20 feet bls and collected lithologic samples every 5 feet and installed the 2-inch diameter PVC well to a total depth of approximately 19.5 feet bls. The 0.010-inch slotted well screen extends from 9 feet to 19 feet bls with a 0.5-foot pointed cap on the bottom of the well. A 20/30 sand pack was installed to 2-feet above the screen, to approximately 7 feet bls.
13:50	After confirming with Jim Tully/Jones Edmonds & Associates, Applied installed a 2-foot thick bentonite seal above the sand pack using Enviroplug pellets in lieu of fine sand. The bentonite seal extends from approximately 7 feet to 5 feet bls.
14:00	Applied will let the well sit overnight and complete the well on Friday March 29, 2013 by cementing the remaining annular space with neat cement grout to land surface. A 4-foot by 4-foot by 6-inch thick concrete pad will be built around the well and an aluminum well cover will be installed over the 2-inch PVC well at a completion height of 2.5 feet above ground.
14:15	Marty Clasen leaves site.
0-5 ft	SAND, gray (N6) quartz, fine grained, well sorted, subrounded, trace roots and black organic material
5-10 ft	SAND/SHELL, 50% SAND light greenish gray (5GY 7/1), quartz, well sorted, subrounded, trace clayey sand; 50% SHELL, white fragments of mollusk and pelecypods
10-15 ft	SAND, with 10% SHELL fragments as above, light greenish gray (5GY 7/1) fine to very fine grained, well sorted, subrounded quartz
15-20 ft	SILTY SAND with 25% SHELL fragments as above, grayish green (5GY 5/1) very fine grained to silty quartz, less permeability than material from 5-15 feet

Author's Name: Martin J. Clasen, P.G.		03/28/2013
Title: Resident Observer	Signature	Date



DAILY REPORT



PROJECT NAME: City of Oldsmar ASR Monitoring Well Program			
PROJECT OWNER: City of Oldsmar		CONTRACTOR: Applied Drilling Engineering, Inc.	
PROJECT NO.:		OWNER'S PROJECT NO.:	
DAY: Thursday	DATE: April 11, 2013	CONTRACTOR'S WORK PERIOD: FROM: 9:00 ☒ A.M. ☐ P.M. TO: 5:00 ☐ A.M. ☒ P.M.	
WEATHER: 72- 85 cloudy		PRECIPITATION: None	

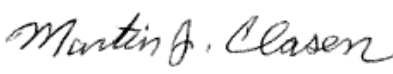
PERSONNEL ONSITE
Applied Drilling Company Inc. (Applied) – Jeff Butler/driller

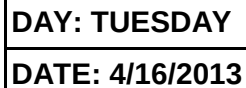
WORK ACCOMPLISHED TODAY

Geophysical logging of mudded pilot hole on TZMW-1 from 0-261 feet bls.
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PROJECT ACTIVITIES

12:00	Marty Clasen arrives on site. Applied is onsite and Art Benson from Advanced Borehole Services is onsite. Art had arrived at 11:00 am and already ran both the caliper/gamma ray log and long/short normal resistivity/SP logs on TZMW-1. M. Clasen inspected the logs and logs are satisfactory. Caliper log shows 12-inch casing set to 42 feet bls. The pilot hole is open to 261.75 feet bls. The bottom of the hole is near gauged and the hole appears satisfactory for installing the 6-inch casing to 250 feet bls. The gamma ray log indicates a possible clay layer at a depth of approximately 155 feet bls, which was confirmed by the driller. The resistivity log indicates possibly harder more dense limestone at depths from approximately 100 to 120 feet, which was confirmed by the driller. No anomalies were noted on the SP log.
12:30	Marty Clasen leaves site with one hard copy and pdf copy of geophysical logs.

Author's Name: Martin J. Clasen, P.G.		04/11/2013
Title: Resident Observer	Signature	Date



WELL NAME/NUMBER: TZMW-1

OBSERVER: James Tully

START DEPTH (FEET BLS): 0

END DEPTH (FEET BLS): 250

HUMIDITY: DRY

[illegible]



DAILY REPORT



PROJECT NAME: City of Oldsmar ASR Monitoring Well Program			
PROJECT OWNER: City of Oldsmar		CONTRACTOR: Applied Drilling Engineering, Inc.	
PROJECT NO.:		OWNER'S PROJECT NO.:	
DAY: Monday	DATE: April 22, 2013	CONTRACTOR'S WORK PERIOD: FROM: 7:30 ☒ A.M. ☐ P.M. TO: 5:00 ☐ A.M. ☒ P.M.	
WEATHER: 72- 85 cloudy		PRECIPITATION: None	

PERSONNEL ONSITE
Applied Drilling Company Inc. (Applied) – Paul Petrey/Manager, Mac McCarty/Superintendent, Jeff Butler/driller

WORK ACCOMPLISHED TODAY

Plug back open hole on UZMW-1 with neat cement from 35 0-320 feet bls.

PROJECT ACTIVITIES

14:45	Marty Clasen arrives on site. Applied is onsite and is set up over UZMW-1 with tremie pipe and neat cement grout and pneumatic pump ready to pump cement in the open hole interval from a depth of 350 feet bls to 320 feet bls. Applied tagged the bottom of the hole in UZMW-1 at a depth of 350.68 feet below pad level using 1.25-inch diameter tremie pipe. M. Clasen checked the tremie pipe tally and confirmed the tagged depth of the bottom of the hole. M. Clasen confirmed the borehole volume of the planned 30-ft interval to plug back by checking the caliper log run by MV Geophysical on 4-8-2010 which shows a borehole volume of 27 cubic feet from 350 feet to 320 feet bls. The 27 cubic feet converts to 202 gallons (27 cubic ft x 7.48 cubic feet per gallon).
15:00	Applied Drilling begins pumping 210 gallons of neat cement grout.
15:20	Finished pumping neat cement grout (210 gallons)
15:30	Pumped 50 gallons of potable water to flush the tremie line and pulled two 21-ft length joints of tremie pipe from the well.
15:45	Pulled a third 21-ft joint of tremie pipe.
16:00	Leave site. Applied will tag the cement in the morning.

Author's Name: Martin J. Clasen, P.G.		04/22/2013
Title: Resident Observer	Signature	Date



DAILY REPORT



PROJECT NAME: City of Oldsmar ASR Monitoring Well Program			
PROJECT OWNER: City of Oldsmar		CONTRACTOR: Applied Drilling Engineering, Inc.	
PROJECT NO.:		OWNER'S PROJECT NO.:	
DAY: Tuesday	DATE: April 23, 2013	CONTRACTOR'S WORK PERIOD: FROM: 7:30 ☒ A.M. ☐ P.M. TO: 5:00 ☐ A.M. ☒ P.M.	
WEATHER: 67- 85 clear, mild		PRECIPITATION: None	

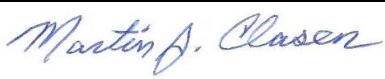
PERSONNEL ONSITE
Applied Drilling Company Inc. (Applied) – Mac McCarty/Superintendent, Jeff Butler/driller

WORK ACCOMPLISHED TODAY

Tagged cement plug in open hole on UZMW-1 at 324 feet bls.
--

PROJECT ACTIVITIES

07:30	Marty Clasen arrives on site. Applied tagged the cement plug at a depth of 323.75 feet below pad level. The target cement plug depth was 320 feet. Confirmed with Jim Tully/Jones Edmunds that tag within 5 feet +/- is satisfactory and no additional cement will be pumped.
08:00	Applied pumped UZMW-1 to remove the fresh water flush.
08:30	Checked water quality of discharge and conductivity was 40,000 micromhos/cm, confirming that the fresh water flush was removed.
08:30	M. Clasen leaves site.

Author's Name: Martin J. Clasen, P.G.		04/23/2013
Title: Resident Observer	Signature	Date



DAILY REPORT

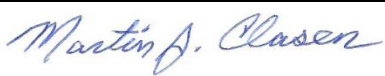


PROJECT NAME: City of Oldsmar ASR Monitoring Well Program			
PROJECT OWNER: City of Oldsmar		CONTRACTOR: Applied Drilling Engineering, Inc.	
PROJECT NO.:		OWNER'S PROJECT NO.:	
DAY: Thursday	DATE: April 25, 2013	CONTRACTOR'S WORK PERIOD: FROM: 7:30 ☒ A.M. ☐ P.M. TO: 5:00 ☐ A.M. ☒ P.M.	
WEATHER: 67- 85 clear, mild		PRECIPITATION: None	

PERSONNEL ONSITE
Applied Drilling Company Inc. (Applied) – Mac McCarty/Superintendent, Jeff Butler/driller, Jeff Sparks/helper, Roy Roland/helper

WORK ACCOMPLISHED TODAY

Conduct step test at well TZMW-1.
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PROJECT ACTIVITIES		
08:00	Marty Clasen arrives on site. Applied drilling is on site preparing to run pre-test in well TZMW-1 to set pumping rates for step drawdown test. Static water level in well TZMW-1 is 4.67 feet below top of casing (btoc).	
08:15	Applied pumped TZMW-1 at maximum rate of 103 gallons per minute (gpm) with 5-hp pump set at 120 feet below land surface (bls). Pumping level at 103 gpm is 53 feet btoc.	
08:30	Adjusted pumping rate to 47 gpm. Planned steps for test will be 47 gpm for 1 hour, approximately 75 gpm for 1 hour and 103 gpm for 1 hour. Lab is scheduled for 2:00 pm to collect background water quality samples.	
09:00	Letting well TZMW-1 recover to near background level. Plan is record 1 hour of background water levels from 11:00 to 12:00 and begin step test at 12:00.	
10:00	Paul Petrey/Applied arrives on site to set up mini-Troll data logger.	
10:30	Start background water level data recorder. Data collected every 5 seconds	
11:55	Pre-test water level is 5.52 feet btoc	
12:00	Start test, step 1 45 gpm	
12:04	Collected data every 10 minutes including pumping rate, water level, conductivity and temperature.	
13:00	Begin step 2, increased pumping rate to approximately 79 gpm	
14:00	Begin step 3, increased pumping rate to approximately 102 gpm	
14:15	Southern Analytical is on site, collected background sample for laboratory analysis.	
15:00	Stop test, start recovery data	
15:30	M. Clasen leaves site, Applied will email data files on Friday morning.	
Author's Name: Martin J. Clasen, P.G.		04/25/2013
Title: Resident Observer	Signature	Date



DAILY REPORT



PROJECT NAME: City of Oldsmar ASR Monitoring Well Program			
PROJECT OWNER: City of Oldsmar		CONTRACTOR: Applied Drilling Engineering, Inc.	
PROJECT NO.:		OWNER'S PROJECT NO.:	
DAY: Monday	DATE: April 29, 2013	CONTRACTOR'S WORK PERIOD: FROM: 7:30 ☒ A.M. ☐ P.M. TO: 6:00 ☐ A.M. ☒ P.M.	
WEATHER: 73- 85 cloudy, windy, mild		PRECIPITATION: Light rain in late afternoon	

PERSONNEL ONSITE
Applied Drilling Company Inc. (Applied) – Mac McCarty/Superintendent, Jeff Butler/driller, Jeff Sparks/helper, Roy Roland/helper

WORK ACCOMPLISHED TODAY

Conduct geophysical logging at well TZMW-1 and well SZMW-1.
--

PROJECT ACTIVITIES	
08:00	Marty Clasen arrives on site. Applied drilling is on site and Advanced Borehole Services/Art Benson (ABS) is on site preparing to run full suite of geophysical logs on well TZMW-1.
08:30	Begin running caliper/gamma ray tool into hole. Caliper tool shows 6-incg casing at approximately 251 feet below land surface (bls) and bottom of hole at approximately 258 feet bls.
08:55	Finish caliper/gamma ray logging. Set up to log with combination tool: electric (LSN), temperature, fluid conductivity, and SP.
09:00	Begin running LSN resistivity, temperature, fluid conductivity, and SP tool.
09:20	Finish running LSN resistivity, temperature, and SP logs.
09:25	Begin running static flow meter log.
09:45	Finish running static flow meter log. No obvious flow zones noted. Set 5 hp submersible pump at 42 feet bls and began pumping @ 64 gpm.
09:55	Finished pumping flow meter log. Majority of flow appears to be coming from 250 to 255 feet bls. Discharge became very turbid, dark gray colored. Continued pumping well TZMW-1 in attempt to clear up water. Water cleared up after pumping for 10 minutes.
10:20	Begin running sonic tool down hole.
10:32	Finish running sonic log. Set up for dual induction log.
10:50	Begin running dual induction log.
11:15	Finish running dual induction log. Set up for video log.
11:30	Start running video log down hole. At a depth of 65 feet, visibility is less than 1 foot. Cannot see well casing. Will install pump and see if pumping well @ 64 gpm helps improve visibility.
11:37	Start pumping well @ 64 gpm. Discharge water is very turbid, dark gray in color. Continued pumping well for 30 minutes (approximately 5 well volumes). Discharge water cleared up considerably, but was still slightly turbid.
12:15	Called Jim Tully/Jones Edmunds and Mark McNeal/ASRus to discuss poor visibility of video log and both agreed to run the video log with the current conditions of the well.

REPORT CONTINUED

12:38	Completed video log. One casing joint was visible at a depth of 102 feet bls. The video cleared up at a depth of 237 feet bls. The bottom of the casing was visible at a depth of 250 feet bls and appeared to be seated and cemented sufficiently. The open borehole was only visible from 250 feet to 255 feet bls. The bottom 5 feet of the hole appears to be filled with fine gray sediment. It is recommended to re-develop the well by air lifting until the sediment is removed and clear water produced from the well under the supervision of the field geologist.		
13:15	ABS moved geophysical logger to well SZMW-1. Current status of well is 12-inch diameter casing is set to a depth of 50 feet bls and a 7.875-inch diameter pilot hole has been drilled to a depth of 450 feet bls using reverse-air drilling methods (recirculating formation fluids back down the hole).		
13:20	ABS begins running caliper/gamma ray tool into hole. Tagged bottom of hole at a depth of 448.5 feet bls.		
13:48	Completed caliper/gamma ray log. Caliper log shows the 12-inch casing at a depth of 45 feet bls (however, this could be a cement plug inside the bottom 5 feet of casing). The caliper log shows significant fractures from 317-320 feet bls and 420 feet and 425 feet bls. The proposed final casing depth of 350 feet shows a minor wash out to approximately 11 inches in diameter at this depth. The hole appears to be gauged (near bit size) at 345 feet and 355 feet bls, which may be a better casing seat depth. The gamma ray log indicates a clay layer from approximately 140 to 144 feet bls.		
13:55	ABS begins running the combination tool (LSN resistivity, temperature, fluid conductivity, and SP).		
14:12	Finish combination log (LSN resistivity, temperature, fluid conductivity, SP). The LSN log indicates consistent resistivity from 340 to 365 feet, indicating a suitable zone to set the 6-inch casing. The fluid conductivity log went off scale at a depth of 230 feet bls indicating high conductivity formation water.		
14:45	ABS begins running the static flow meter log.		
15:05	Completed static flow meter log. The static flow meter log indicates that the majority of the flow in the well is from 123-127 feet bls and 315-320 feet bls.		
15:10	ABS starts dynamic flow meter log while pumping the well with a centrifugal pump at a rate of 128 gpm.		
15:20	Finished dynamic flow meter log. The log indicates that the well could only be stressed to a depth of 320 feet at the available pumping rate of 128 gpm. The dynamic flow meter log indicates that the majority of flow is produced from 310 to 320 feet bls and the remaining flow produced from 120 to 130 feet bls.		
15:28	ABS begins running the sonic tool.		
15:40	ABS finished running the sonic log. The sonic log indicates no major fracturing from 340 to 350 feet which shows the proposed casing setting depth of 350 feet to be adequate.		
15:55	ABS begins running the dual induction tool.		
16:25	ABS finished running the dual induction log. The dual induction log indicates high resistivity rock at a depth of 350 feet, suggesting a suitable casing setting depth.		
16:40	ABS begins running the video survey. Very limited visibility in borehole due to turbid water. The video becomes visible at a depth of approximately 395 feet bls Fractures are visible at depths of 411 feet and 415 feet bls. A large fracture zone is apparent from 420 to 425 feet bls. With the camera stationary, there appears to be significant downhole flow in the well. Below 442 feet there is no visibility and apparently no flow.		
17:05	ABS completes the video survey and is printing out five copies of each log.		
18:00	M. Clasen leaves site, ABS will email pdf and LAS files for SZMW-1 on Tuesday morning.		
Author's Name: Martin J. Clasen, P.G.			04/29/2013
Title: Resident Observer		Signature	Date

FIELD OBSERVATION REPORT

Page 1 of 2

PROJECT NAME: RECLAIMED WATER ASR PHASE 3 - CONSTRUCTION
 DATE : 05/22/13 CONTRACT DAY: 69
 REPORT NUMBER: 001

OWNER # CITY OF OLDSMAR
 JE PROJECT # 15125-025-02
 RPR: **GREGG S. FRUECHT**

CONDITIONS					
Weather	Clear	☒ Partly Cloudy	Overcast	Heavy Clouds	Fog
Temperature	82	Wind:	0-5 S	Rain:	0
				☐ 0-2 Hours	☐ 2-4 Hours
Soil Conditions:	Dry	☒ Wet	Saturated	☐ 4-6 Hours	☐ All Day

DESCRIPTION of WORK	
CONTRACTOR: TLC	SUBCONTRACTOR Applied Drilling (2 men) / Reliable Electric (2 men)

Personnel	No	Hours Worked		Materials Received
		Regular	OT	
Superintendent	1			Misc. conduit and electrical ground rods.
Foreman				
Skilled	1			
Labor				

	A	I		A	I		A	I		A	I	Other:
Air Compressor			Motor Grader			Truck, Dump			Jack & Bore Rig			MISC. HAND TOOL
Air Hammer			Power Broom			Truck, Flatbed			Drill Rig (HDD)			
Backhoe	x		Roller, Steel Wheel			Truck, Pickup			Vac Truck			
Bulldozer			Roller, Vibratory			Water Truck			Crane			
Track Hoe			Asphalt Distributor			Generator			Fork Lift			
Frontend Loader			Asphalt Paver			By-Pass Pump			Man Lift			
Mechanical Tamp						Wellpoint System			Tractor w/ Box Blade			
Concrete Saw	x					Dewatering Pump			Bobcat Loader			
Earth Scraper						Trencher			Service Truck			

OPERATION and LOCATION / GENERAL COMMENTS	
TIME	
10:30 AM	- ON SITE REVIEW PUMP TEST SCOPE FOR SZMW-1 _ W/ APPLIED DRILLING PERSONNEL : MAC MCCARTY, JEFF BUTLER.
	DRILLING SUBC EQUIPMENT IN PLACE: SOLINST AND MINITROLL DATALOGGER / TRANSDUCER; BAROMETRIC GAUGE SET FOR CORRECTION FACTOR;
	8.5 HP - 2" DIA. CENTRIFUGAL PUMP W/ 2" DIA . INTAKE HOSE SET AT 25' BELOW TOC.
	TEST PROTOCOL; 1 HR AT 50 GPM; 1 HR AT 75 GPM; 1 HR AT 100 GPM- THEN SAMPLE COLLECTION BY SOUTHERN ANALYTICAL LABS.
11:00	- BEGIN 50 GPM TEST - FLOW METER= 73,000.00 GALLONS
11:07	- FLOW TRIMMING RATE COMPLETE= STATIC 50 GPM; DISCHARGE FROM 2" DIA HOSE = CLEAR ; NO FINES, NO ODOR.
12:07	- END TEST AT 50 GPM; METER AT 76,420.00
12:08	- BEGIN 75 GPM TEST- FLOW METER AT 76,420.00
12:09	- FLOW TRIMMING RATE COMPLETE = STATIC 72- 73 GPM. ACCEPTABLE. DISCHARGE IS CLEAR, NO FINES, NO ODOR.
12:49	- OBSERVE FLOW RATE AT 74-75 GPM, CONTINUE TEST.
13:07	- END TEST AT 75 GPM; METER AT 81,245.00
13:08	- BEGIN 100 GPM TEST- FLOW METER AT 81,245.00
13:09	- FLOW TRIMMING RATE COMPLETE= STATIC 112 GPM; DISCHARGE FROM 2" DIA HOSE = CLEAR ; NO FINES, NO ODOR.
	(CONTINUED)

DATE: 05/22/13
JE PROJECT # 15125- 025-02

[illegible]

CONTRACT WORK COMPLETED				
BID ITEM No.	ITEM DESCRIPTION	Quantity	Unit	REMARKS AND CALCULATIONS
	TLC and Electrical subc continue work near well pad pipe manifold area.			
	Crews have installed all UG conduit and crossover conduit to west side of RCW reject water tank.			
	UG trench north- south is backfilled and compacted; East-West trench is openfor PCU electrcal inspection. Gsf advises TLC to as-built found in this trench area.			

Tests Conducted	3 PHASE PUMP TEST OF SZMW-1 ; LAB SAMPLES PROCURRED.
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Defective Work to be Corrected :	NONE

Visitors:	SOUTHERN ANALYTICAL LABS FIELD TECH- IAN GERALDI
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Contractor's Representative:	James Knepler (TLC)
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Resident Project Representative: Gregg S Fuecht

FIELD OBSERVATION REPORT

Page 1 of 2

PROJECT NAME: RECLAIMED WATER ASR PHASE 3 - CONSTRUCTION
 DATE : 05/23/13 CONTRACT DAY: 70
 REPORT NUMBER: 002

OWNER # CITY OF OLDSMAR
 JE PROJECT # 15125-025-02
 RPR: **GREGG S. FRUECHT**

CONDITIONS					
Weather	Clear	☒ Partly Cloudy	Overcast	Heavy Clouds	Fog
Temperature	84	Wind:	0-8 W- SW	Rain:	0
				☐ 0-2 Hours	☐ 2-4 Hours
Soil Conditions:	Dry	☒ Wet	Saturated	☐ 4-6 Hours	☐ All Day

DESCRIPTION of WORK	
CONTRACTOR: TLC	SUBCONTRACTOR Applied Drilling (2 men) / Reliable Electric (2 men)

Personnel	No	Hours Worked		Materials Received
		Regular	OT	
Superintendent	1			Misc. conduit sweeps and electrical fittings.
Foreman				
Skilled	1			
Labor				

	A	I		A	I		A	I		A	I	Other:
Air Compressor			Motor Grader			Truck, Dump			Jack & Bore Rig			MISC. HAND TOOL
Air Hammer			Power Broom			Truck, Flatbed			Drill Rig (HDD)			
Backhoe	x		Roller, Steel Wheel			Truck, Pickup			Vac Truck			
Bulldozer			Roller, Vibratory			Water Truck			Crane			
Track Hoe			Asphalt Distributor			Generator			Fork Lift			
Frontend Loader			Asphalt Paver			By-Pass Pump			Man Lift			
Mechanical Tamp						Wellpoint System			Tractor w/ Box Blade			
Concrete Saw	x					Dewatering Pump			Bobcat Loader			
Earth Scraper						Trencher			Service Truck			

OPERATION and LOCATION / GENERAL COMMENTS	
TIME	
10:00 AM	- ON SITE REVIEW SCOPE FOR SZMW-1 _ W/ APPLIED DRILLING PERSONNEL : MAC MCCARTY, JEFF BUTLER, AND ART BENSON - (AB XXX) ON SITE TO PERFORM GEOPHYSICAL LOGGING - PER SCOPE SPEC IV-134, SECTION 2.
	GEOPHYSICAL TESTING CALIPER AND MEASURING EQUIPMENT IS CONSOLIDATED WITHIN AND APPARATUS TO 4X4 PICKUP TRUCK
	WITH DEDICATED GENERATOR, COMPUTER, BOOM PULLEY, AND RECORDING INSTRUMENTS.
10:30 AM	- MAC MCCARTY AND JEFF BUTLER DEPART SITE TO DEMOB SOME SUPPLIES OFFSITE.
	AB CONTINUES SCOPE AND GEOPHYSICAL LOGGING AND RECORDS OVERALL DEPTH DATUM.
11:05 AM	- AB CONVERTS TO SECOND DOWNHOLE APPARATUS FOR MEASUREMENT.
11:30 AM	- APPLIED DRILLING ON SITE. SET-UP PUMP FOR REQUIRED TEST WITH LOGGING INSTRUMENT INSITU.
11:36 AM	- BEGIN LONG ELECTRONIC PROBE / GPM TEST AT 110 GPM STATIC
11:46 AM	- PUMP TURNED OFF, END LONG PROBE TEST W/ WELL EVACUATION AT 110 GPM.
12:10 PM	- BEGIN SHORT ELECTRONIC PROBE / STATIC INSITU WELL FLOW TEST .
12:25 PM	- END TEST, CREW TAKES LUNCH BREAK.
12:55 PM	- CREWS RESUMES TEST W/ SHORT ELECTRONIC PROBE IN CONJUNCTION WITH FLOW AT 110 GPM
13:06 PM	- END SHORT PROBE TEST W/ PUMP RUNNING. FLOW METER END AT 94,075.00
	(CONTINUED)

DATE:	05/23/13
JE PROJECT #	15125- 025-02

[illegible]

CONTRACT WORK COMPLETED				
BID ITEM No.	ITEM DESCRIPTION	Quantity	Unit	REMARKS AND CALCULATIONS
	TLC and Electrical subc continue work near well pad pipe manifold area.			
	Crews have installed all UG conduit and pullboxes and have begun installing pull-string w/l conduit runs.			
	UG trenches are compacted but, TLC will recompact all electrical and piping trenches when UG pipe is installed.			
	TLC anticipates UG pipe delivery on 5/24/13.			

Tests Conducted	PER SPEC IV-134, SEC : CALIPER;NATURAL GAMMA;DUAL INDUCTION;TEMPERATURE;COLOR BOREHOLE VIDEO LOG; FLUID RESISTIVITY; SPINNER LOWMETER (STATIC); SPINNER FLOWMETER DYNAMIC (MIN FLOW 100 GPM); ACOUSTIC BOREHOLE COMPENSATED FULL WAVE FORM.
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Defective Work to be Corrected :	
	NONE

Visitors:	STEVE MCFADDEN (CITY)
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Contractor's Representative:	James Knepler (TLC)
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Resident Project Representative: Gregg S Fuecht

Appendix B
SZMW-1 Lithologic Log

Oldsmar ASR Shallow Zone Monitoring Well
SZMW-1
Appendix B - Lithology

Top Depth (feet)	Bottom Depth (Feet)	Color	Material	Limestone Classification	Comments
0	5	Brown (7.5YR 3.5/2)	Silty SAND	SM	
5	10	Brown (10YR 5/3)	SAND, fine grained quartz with approximately 30% SHELL (2-10 mm)	SP	
10	15	Light gray (10YR 7/1)	SAND, fine grained quartz with approximately 25% SHELL (1-10 mm) minor cla	SP	
15	20	Light gray (10YR 7/1)	SAND, fine grained quartz with approximately 50% SHELL (2-15 mm) minor cla	GP	
20	25	Grayish brown (10YR 5/2)	Sandy CLAY with approximately 10% SHELL (1-3 mm)	CL	
25	30	Grayish brown (2.5Y 5/2)	Sandy CLAY with approximately 10% SHELL (1-3 mm)	CL	
30	35	Light brownish gray (2.5Y 6/2)	Sandy CLAY with less than 5% SHELL	CL	
35	40	White (5 YR 8/1)	Clayey SILT with less than 5% organics	CL-ML	
40	45	White (10YR 8/1)	Limestone	Mudstone	
45	50	White (10YR 8/1)	Limestone	Wackestone	
50	55	White (10YR 8/1)	Limestone	Wackestone	
55	60	White (2.5YR 8/1)	Limestone	Wackestone	
60	65	White (2.5YR 8/1)	Limestone	Mudstone	
65	70	White (2.5YR 8/1)	Limestone	Mudstone	
70	75	White (2.5YR 8/1)	Limestone	Mudstone	
75	80	White (2.5YR 8/1)	Limestone	Mudstone	
80	85	White (2.5YR 8/1)	Limestone	Mudstone	
85	90	Pale yellow (2.5Y 8/2) and minor light gray (2.5YR 7/1)	Limestone	Mudstone	
90	95	Dark gray (2.5Y 4/1)	Limestone	Mudstone	
95	100	Pale yellow (2.5Y 8/2) and minor light gray (2.5YR 7/1)	Limestone	Mudstone	
100	105	White (10YR 8/1)	Limestone	Mudstone	
105	110	White (10YR 8/1)	Limestone	Mudstone	
110	115	White (10YR 8/1)	Limestone	Mudstone	
115	120	White (10YR 8/1)	Limestone	Mudstone	
120	125	White (2.5Y 8/1)	Limestone	Mudstone	
125	130	White (2.5Y 8/1)	Limestone	Mudstone	
130	135	White (2.5Y 8/1)	Limestone	Mudstone	
135	140	White (2.5Y 8/1) with minor very dark gray (10YR 3/1)	Limestone	Mudstone	
140	145	White (2.5Y 8/1)	Limestone	Wackestone	
145	150	White (2.5Y 8/1)	Limestone	Mudstone	
150	155	White (2.5Y 8/1)	Limestone	Mudstone	
155	160	White (2.5Y 7.5/1)	Limestone	Packstone	
160	165	White (2.5Y 8/1.5)	Limestone	Mudstone	
165	170	White (2.5Y 8/1.5)	Limestone	Packstone	
170	175	White (2.5Y 8/1.5)	Limestone	Packstone	
175	180	White (2.5Y 8/1)	Limestone	Mudstone	
180	185	White (2.5Y 8/1)	Limestone	Mudstone	
185	190	White (2.5Y 8/1)	Limestone	Mudstone	
190	195	White (2.5Y 8/1)	Limestone	Wackestone	
195	200	White (2.5Y 8/1)	Limestone	Mudstone	large shell casts 2-5 cm
200	205	White (2.5Y 8/1)	Limestone	Mudstone	large shell casts 2-5 cm
205	210	White (2.5Y 8/1)	Limestone	Mudstone	
210	215	White (2.5Y 8/1)	Limestone	Wackestone	
215	220	White (2.5Y 8/1)	Limestone	Wackestone	
220	225	White (10YR 8/1)	Limestone	Wackestone	minor shell fragments
225	230	White (10YR 8/1)	Limestone	Wackestone	minor shell casts
230	235	White (10YR 8/1)	Limestone	Packstone	few bivalves
235	240	White (10YR 8/1.5)	Limestone	Wackestone	few bivalves
240	245	White (10YR 8/1.5)	Limestone	Wackestone	few bivalves
245	250	White (10YR 8/1.5)	Limestone	Wackestone	
250	255	White (10YR 8/1.5)	Limestone	Wackestone	few shell casts

Oldsmar ASR Shallow Zone Monitoring Well
SZMW-1
Appendix B - Lithology

Top Depth (feet)	Bottom Depth (Feet)	Color	Material	Limestone Classification	Comments
255	260	White (10YR 8/1.5)	Limestone	Wackestone	
260	265	White (10YR 8/1.5)	Limestone	Wackestone	
265	270	White (10YR 7.5/1)	Limestone	Wackestone	
270	275	White (10YR 7.5/1)	Limestone	Wackestone	
275	280	White (10YR 7.5/1)	Limestone	Wackestone	
280	285	White (10YR 7.5/1) and light gray (5Y 7/1)	Limestone	Wackestone	
285	290	White (10YR 7.5/1) and light gray (5Y 7/1)	Limestone	Wackestone	
290	295	Very pale brown (10YR 8/2)	Limestone	Wackestone	few gastropods
295	300	Very pale brown (10YR 8/2)	Limestone	Wackestone	few gastropods
300	305	Very pale brown (10YR 8/2)	Limestone	Wackestone	
305	310	Very pale brown (10YR 8/2)	Limestone	Wackestone	
310	315	Very pale brown (10YR 8/2)	Limestone	Wackestone	
315	320	White (10YR 8/1) and light gray (10YR 7/2)	Limestone	Wackestone	
320	325	Very pale brown (10YR 8/2)	Limestone	Mudstone	
325	330	Very pale brown (10YR 8/2) and light gray (10YR 7/2)	Limestone	Packstone/Mudstone Mix	
330	335	Very pale brown (10YR 8/2) and light gray (10YR 7/2)	Limestone	Packstone/Mudstone Mix	
335	340	Very pale brown (10YR 8/2) and light gray (10YR 7/2)	Limestone	Packstone/Mudstone Mix	
340	345	Very pale brown (10YR 8/2) and light gray (10YR 7/2)	Limestone	Packstone/Mudstone Mix	
345	350	Very pale brown (10YR 8/2)	Limestone	Packstone	
350	355	Very pale brown (10YR 8/2)	Limestone	Wackestone	
355	360	Very pale brown (10YR 8/2)	Limestone	Wackestone/Mudstone	
360	365	Very pale brown (10YR 8/2)	Limestone	Wackestone	
365	370	Very pale brown (10YR 8/2)	Limestone	Wackestone	
370	375	Very pale brown (10YR 8/2)	Limestone	Wackestone/Mudstone	
375	380	Very pale brown (10YR 8/2)	Limestone	Packstone	
380	385	Very pale brown (10YR 8/2)	Limestone	Packstone	few fossils & fossil casts
385	390	Very pale brown (10YR 8/2)	Limestone	Wackestone	
390	395	Very pale brown (10YR 8/2)	Limestone	Packstone	
395	400	Very pale brown (10YR 8/2)	Limestone	Packstone	

Appendix C
Casing Mill Certificates

SAHA THAI STEEL PIPE (PUBLIC) CO., LTD.

78 MOO 3 POOCHAO ROAD BANGYAPRAK, PHRAPRADAENG SAMUTPRABHARN, 10130,
THAILAND. TEL: (662)3859023 (6 LINES), FAX: (662)3859288, 7544100

MILL TEST CERTIFICATES

PAGE 5

NO. STB/05/12

CONTRACT FHO 12-01, PURCHASE ORDER NO. FHO-34005885 LOT 401 (FO 6427929)

SIZES	LGTH FT.	BUNDLES	NET WL. (MT)	PIECES	NO. OF PCS PILE	CHEMICAL COMPOSITION %										TENSILE TEST			PB %	AVERAGE ZINC COATING TEST(G/M ²)	HYDRO TEST PRESSURE PSI	UL TESTED	LENGTHS	HEAT NO.
						C	Mn	P	S	Ca	V	Ni	Cr	Mo	TS MPa	Y.P. MPa	EL %							
BLACK STEEL PIPE WITH PLAIN END (BPE), ASTM A53 GRADE A, SCH 40																								
1/2"	21	2	1.846	240	120	0.073	0.359	0.007	0.015	0.042	0.004	0.027	0.037	0.004	403.94	389.27	39.38	--	--	700	PASS	5,040	12201	
3/4"	21	3	2.578	252	84	0.036	0.246	0.014	0.005	0.001	0.002	0.014	0.014	0.002	408.15	386.64	39.96	--	--	700	PASS	5,292	12202	
1"	21	6	5.472	360	60	0.147	0.351	0.010	0.008	0.035	0.007	0.019	0.311	0.005	517.41	449.34	40.82	--	--	700	PASS	7,560	12203	
1-1/4"	21	6	5.176	252	42	0.044	0.279	0.013	0.005	0.001	0.004	0.018	0.015	0.003	384.43	362.23	27.16	--	--	1200	PASS	5,292	12204	
1-1/2"	21	3	2.658	108	36	0.034	0.270	0.008	0.004	0.001	0.003	0.011	0.006	0.002	381.50	346.75	28.12	--	--	1200	PASS	2,268	12205	
2"	21	7	6.011	182	26	0.036	0.261	0.010	0.004	0.001	0.001	0.008	0.006	0.002	354.70	324.64	34.48	--	--	2300	PASS	3,822	12206	
2-1/2"	21	1	0.943	18	18	0.066	0.360	0.006	0.004	0.112	0.002	0.029	0.008	0.004	397.43	387.83	24.00	--	--	2500	PASS	378	12207	
3"	21	3	2.881	42	14	0.144	0.597	0.012	0.007	0.003	0.001	0.010	0.021	0.001	408.06	300.99	32.60	--	--	2220	PASS	882	12208	
3-1/2"	21	1	0.989	12	12	0.148	0.774	0.012	0.003	0.001	0.003	0.009	0.017	0.001	466.19	418.04	31.93	--	--	2030	PASS	232	12209	
4"	21	4	3.906	40	10	0.063	0.155	0.011	0.003	0.006	0.001	0.016	0.307	0.001	353.34	325.16	41.04	--	--	1900	PASS	840	12210	
5"	21	1	0.926	7	7	0.157	0.867	0.013	0.008	0.065	0.015	0.036	0.057	0.006	468.90	438.92	34.40	--	--	1670	PASS	147	12211	
6"	21	4	4.806	28	7	0.158	0.554	0.010	0.011	0.001	0.003	0.004	0.010	0.002	465.50	410.92	31.73	--	--	1520	PASS	588	12212	
8"	21	3	3.579	15	5	0.057	0.128	0.009	0.003	0.007	0.006	0.013	0.293	0.009	336.26	299.18	43.10	--	--	1340	--	315	12213	
SUB TOTAL		44	42.071	1,556																		32,676		
BLACK STEEL PIPE WITH PLAIN END (BPE), ASTM A53 GRADE A, SCH 80																								
1"	21	1	1.178	60	60	0.042	0.268	0.013	0.005	0.001	0.001	0.013	0.043	0.001	395.17	294.25	35.50	--	--	850	--	1,260	12203	
1-1/4"	21	1	1.140	42	42	0.154	0.369	0.013	0.009	0.001	0.001	0.015	0.001	0.001	467.01	423.86	24.70	--	--	1300	--	882	12204	
1-1/2"	21	1	1.183	36	36	0.124	0.753	0.010	0.004	0.001	0.004	0.011	0.022	0.002	465.48	431.08	29.18	--	--	1800	--	736	12205	
2"	21	1	1.181	26	26	0.152	0.873	0.011	0.020	0.065	0.014	0.037	0.046	0.008	454.76	437.22	25.00	--	--	2500	--	546	12206	
SUB TOTAL		4	4.682	164																		3,444		

INSPECTOR: _____

APPROVED BY: _____

SAHA THAI STEEL PIPE (PUBLIC) CO., LTD.

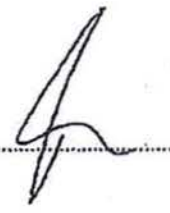
78 MOO 3 POOCHAO ROAD BANGYAPRAEK, PHRAPRADAENG SAMUTPRAKARN, 19138,
THAILAND. TEL: (662)3859023 (6 LINES), FAX: (662)3859288, 7544100

MILL TEST CERTIFICATES

PAGE 2
NO. STS/140/12

LOT: P.O. # FOR-6475036 STOCK

SIZES	LGTH /FT.	BUNDLES	NET WT. (MT.)	PIECES	NO. OF PCS/ B'DLE	CHEMICAL COMPOSITION %										TENSILE TEST			FB CONTENT	AVERAGE ZINC COATING TEST(G/M ²)	HYDRO TEST PRESSURE PSI	UL TESTED	LENGTHS	BEAT NO.	
						C	Mn	P	S	CU	V	NI	CR	MO	Y.S. MPa	Y.P. MPa	EL. %								
BLACK PLAIN ENDS PIPE (BPE), ASTM A53 GRADE A SCH 40																									
3/4"	21	70	60.152	5,880	84	0.031	0.258	0.009	0.007	0.014	0.004	0.017	0.020	0.001	387.91	378.72	39.26	-	-	700	PASS	123,480	12302		
1"	21	70	63.840	4,200	60	0.043	0.308	0.009	0.013	0.081	0.006	0.043	0.047	0.003	431.25	418.74	41.60	-	-	700	PASS	88,200	12303		
1 1/4"	21	100	86.268	4,200	42	0.064	0.257	0.016	0.012	0.049	0.003	0.046	0.022	0.001	385.41	364.45	31.67	-	-	1200	PASS	88,200	12304		
1 1/2"	21	100	88.596	3,600	36	0.055	0.277	0.017	0.014	0.039	0.001	0.036	0.017	0.001	379.89	346.03	32.76	-	-	1200	PASS	75,600	12305		
2 1/2"	21	40	37.721	720	18	0.145	0.449	0.010	0.011	0.024	0.001	0.024	0.029	0.001	458.97	423.32	30.74	-	-	2500	PASS	15,120	12307		
3"	21	40	38.410	560	14	0.134	0.770	0.011	0.005	0.001	0.004	0.011	0.019	0.003	442.06	412.42	32.22	-	-	2220	PASS	11,760	12308		
4"	21	70	68.348	700	10	0.171	0.567	0.010	0.008	0.001	0.002	0.009	0.015	0.001	468.18	383.03	31.82	-	-	1900	PASS	14,700	12310		
6"	21	50	60.081	350	7	0.163	0.854	0.012	0.015	0.001	0.003	0.012	0.016	0.001	462.99	381.71	31.84	-	-	1520	PASS	7,350	12312		
8"	21	20	25.863	100	5	0.052	0.085	0.012	0.010	0.039	0.001	0.017	0.298	0.001	344.03	295.04	38.24	-	-	1340	-	2,100	12313		
SUB TOTAL		560	529.279	20,310																			426,510		
BLACK STEEL PIPE WITH THREADED AND THREADED (BTT), ASTM A53 GRADE A SCH 40																									
1/2"	10	40	17.568	4,800	120	0.073	0.254	0.007	0.004	0.001	0.004	0.018	0.010	0.001	370.59	362.43	36.76	-	-	700	PASS	48,000	12301		
3/4"	10	40	16.363	3,360	84	0.031	0.258	0.009	0.007	0.014	0.004	0.017	0.020	0.001	387.91	378.72	39.26	-	-	700	PASS	33,600	12302		
1"	10	40	17.376	2,400	60	0.043	0.308	0.009	0.013	0.081	0.006	0.043	0.047	0.003	431.25	418.74	41.60	-	-	700	PASS	24,000	12303		
1-1/4"	10	50	20.538	2,100	42	0.064	0.257	0.016	0.012	0.049	0.003	0.046	0.022	0.001	385.41	364.45	31.67	-	-	1200	PASS	21,000	12304		
SUB TOTAL		170	71.845	12,660																			126,600		

INSPECTOR: 

APPROVED BY: 

CUSTOMER COPY

증명서번호

CERTIFICATE NO.: E201207-0252-001955(5008224)

제품명

COMMODITY : H.P.F STEEL PIPE

제정규격

SPECIFICATION : API 5LX42 PSL1/5LX44(h)/ASTM
A53B(2007)/ASME SA53B(2007)

INSPECTION CERTIFICATE

SeAH SeAH Steel Corp.
(주)세 아 제 강HEAD OFFICE : BONGNAE-DONG 1GA, JUNG-GU, SEOUL, KOREA
POHANG PLANT : 14-1, JANGHEUNG-DONG, NAM-GU, POHANG

발급일자

DATE OF ISSUE : 2012.07.25

계약서번호

L/C No. (P/O No.) : 122-1287(ETP-350101R2)

수요자

CUSTOMER

주분자

SHIPPER : SEAH STEEL AMERICA, INC.

NO.	HEAT NO. (BATCH NO.)	관 단 TYPE	주 문 치 수 ORDER SIZE			수 량 QUANTITY			비 고 REMARK																																													
						본 수 PLUS	총 길이 TOTAL LENGTH	중량(FT/T) WEIGHT																																														
17	5-71024 (SAM7043230)	BBE	5.9/16 "	X 0.375 "	X 21.000 FT	40	840.000 FT	7.921	CONFIRM TO NACE MR 0175 & MR 0103 •ERM : CHEMICAL COMPOSITION, HEAT TREATMENT AND HARDNESS ONLY •DSAW : CHEMICAL COMPOSITION HARDNESS ONLY EN10204 TYPE3.1.B																																													
18	SP35787 (SAM7131020)	BBE	6.5/8 "	X 0.280 "	X 42.000 FT	277	11,634.000 FT	100.169																																														
19	SP33735 (SGMG082040)	BBE	2.7/8 "	X 0.276 "	X 21.000 FT	562	11,802.000 FT	41.071																																														
20	M49062 (SHMG051080)	BBE	12.3/4 "	X 0.250 "	X 21.000 FT	53	1,113.000 FT	16.862																																														
NO.	HEAT NO. (BATCH NO.)	HYDROSTATIC TEST	N D T	V I S U E	F L A T T E N I N G	S H O C K	C O M P R E S S I O N	M A G N E T I C A L G A U S S	R E N D I N G	D R I F T	C R U S H	F L A R I N G	F L A N G E	P L A T T E N I N G	ZINC COATING TEST	CHEMICAL COMPOSITION(%)														TENSILE TEST (Gage Length : 50mm)			IMPACT TEST (°C)		HARD- NESS TEST	HEAT TREAT MENT																		
																WEIGHT OF ZINC COAT- ING	C.S	ALK	DESIG	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ti	CEQ	D I R	TENSILE STRENGTH			YIELD STRENGTH	E.L	EN- RGY	SHEAR AREA														
																																									2	3	2	2	2	3	3	3	C2	psi	psi	%	Joule	%
																																									4	5	6	7	8	9	psi	psi	%	Joule	%			
기준 SPEC								30									MAX MIN	26		120	30	30	40	40	40	15	80						99																					
17	5-71024 (SAM7043230)	2970	G	G	G	G		G									H P	16 15	18 19	44 45	15 14	4 4		TR	1 1	1 1	TR	1 1	1 1	23 23	L	70050	50460	33			82	G																
18	SP35787 (SAM7131020)	2670	G	G	G	G		G									H P	14 13	1 2	65 64	15 15	5 4		TR	1 2	TR	1 2	1 1	25 24	L	68450	57870	32			82	G																	
19	SP33735 (SGMG082040)	2970	G	G	G	G		G									H P	14 13	1 1	69 65	8 16	5 4		TR	2 2	TR	1 2	1 1	26 24	L	71500	62650	20			82	G																	
20	M49062 (SHMG051080)	1410	G	G	G	G		G									P H P	14 6 6	2 1 1	68 76 77	7 12 13	4 5 4	2 1 1	1 1 2	TR TR	1 1 20	1 1 1	26 19 19	L T W																									
NOTE	•1 - •11: Refer To Others	OTHERS	•1-BBE:Black Beveled End(30°) •2-U:Weld Seam Ultrasonic Test •6-H:Heat(Joule) Analysis, P:Product Analysis •7-2:X100 3:X1000 •8-C2:Cr/Mn/6+(Cr+Mo/V)/5+(Ni+Cu)/15 •9-L:Base Metal Longitudinal, T:Base Metal Transverse, W:Weld Part Transverse •10-E.L:Elongation, •11-S.N:Seam Normalizing														• THIS CERTIFICATE IS ISSUED ACCORDING TO EN 10204 3.1 •G:GOOD •Tr(ISO 10474 3.1.B)																																					

Surveyor :

WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH ABOVE SPECIFICATION AND THE RESULTS OF ALL TEST ARE ACCEPTABLE.
THE USE OF THE MATERIAL OUTSIDE THE SPECIFICATIONS INDICATED ON THIS CERTIFICATE MAY CAUSE SAFETY AND/OR MONETARY PROBLEMS. FURTHERMORE, ANY ORGANIZATION OR PERSON(S) WHO DELIBERATELY MODIFIES THIS CERTIFICATE WILL BE PROSECUTED FOR FORGING AN OFFICIAL DOCUMENT (ACCORDING TO THE PROVISIONS OF THE CRIMINAL CODE 231)

Manager of Q.M Dept.

N. J. Baek



* THIS CERTIFICATE IS
ISSUED ACCORDING TO EN 10204 3.1
*G:GOOD *Tr(ISO 10474 3.1.B)

Appendix D
TZMW-1 Lithologic Log

Oldsmar ASR Shallow Zone Monitoring Well
TZMW-1
Appendix D - Lithology

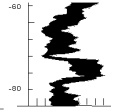
Top Depth (feet)	Bottom Depth (Feet)	Color	Material	Classification	Comments
0	5	Brown (10YR 4/3)	Silty SAND	SM	
5	10	White (10YR 8/1)	SHELL (3-20 mm)	GP	with light gray sand (10YR 7/1)
10	15	White (10YR 8/1)	SHELL (2-20 mm) with trace sand	GP	with light gray sand (10YR 7/1)
15	20	White (10YR 8/1)	SHELL (2-20 mm) with minor fine-grained quartz sand	GP	with light gray sand (10YR 7/1)
20	25	Gray (2.5Y 5/1)	Clayey SAND with approximately 5% SHELL (1-10 mm)	SC	
25	30	Light brownish gray (2.5Y 6/2)	Clayey SAND with approximately 5% SHELL (1-10 mm)	SC	
30	35	Light yellowish brown (2.5Y 6/4)	Clayey SAND with less than 5% SHELL (1-10 mm)	SC	
35	40	Gray (2.5Y 5/1)	Clayey SAND with SHELL and Limestone and less than 5% organics	SC	
40	45	White (2.5YR 8/1)	Limestone	Mudstone	silty with bivalves and gastropods
45	50	White (2.5YR 8/1)	Limestone	Mudstone	bivalves (2-20 mm)
50	60	White (2.5YR 8/1)	Limestone	Mudstone/Wackestone	
60	70	White (2.5YR 8/1)	Limestone	Mudstone/Wackestone	
70	80	White (2.5YR 8/1)	Limestone	Mudstone	
80	90	White (2.5YR 8/1)	Limestone	Mudstone	
90	100	White (2.5YR 8/1)	Limestone	Mudstone	
100	110	White (2.5YR 8/1)	Limestone	Mudstone	
110	120	White (2.5YR 8/1)	Limestone	Mudstone	
120	130	White (2.5YR 8/1)	Limestone	Mudstone	
130	140	White (2.5YR 8/1)	Limestone	Mudstone	
140	150	White (2.5YR 8/1)	Limestone	Mudstone	
150	160	White (2.5YR 8/1)	Limestone	Mudstone	
160	170	White (2.5YR 8/1)	Limestone	Mudstone	
170	180	White (2.5YR 8/1)	Limestone	Mudstone	
180	190	White (2.5YR 8/1)	Limestone	Mudstone	
190	200	White (2.5YR 8/1)	Limestone	Mudstone	
200	210	White (2.5YR 8/1)	Limestone	Mudstone	
210	220	White (2.5YR 8/1)	Limestone	Mudstone	
220	230	White (2.5YR 8/1)	Limestone	Mudstone	minor light gray (2.5YR 7/1)
230	240	White (2.5YR 8/1)	Limestone	Wackestone	
240	250	White (2.5YR 8/1)	Limestone	Mudstone	
250	260	White (2.5YR 8/1)	Limestone	Mudstone	

Appendix E
SZMW-1 Geophysical Logs

SZMW-1
Pilot Hole Geophysical Logs

ABS

Advanced Borehole Services



GAMMA RAY (API)-CALIPER

SZ-MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: SZ-MW-1	COMPL
FIELD	: CITY OLDSMAR	VIDEO
COUNTY	: PINELLAS	.
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 450	
BIT SIZE	: 7.8	
LOG TOP	: 1.25	
LOG BOTTOM	: 448.75	
CASING OD	:	
CASING BOTTOM	: 50	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

FEET

BIT

INCH

CALIPER

INCH

CALIPER

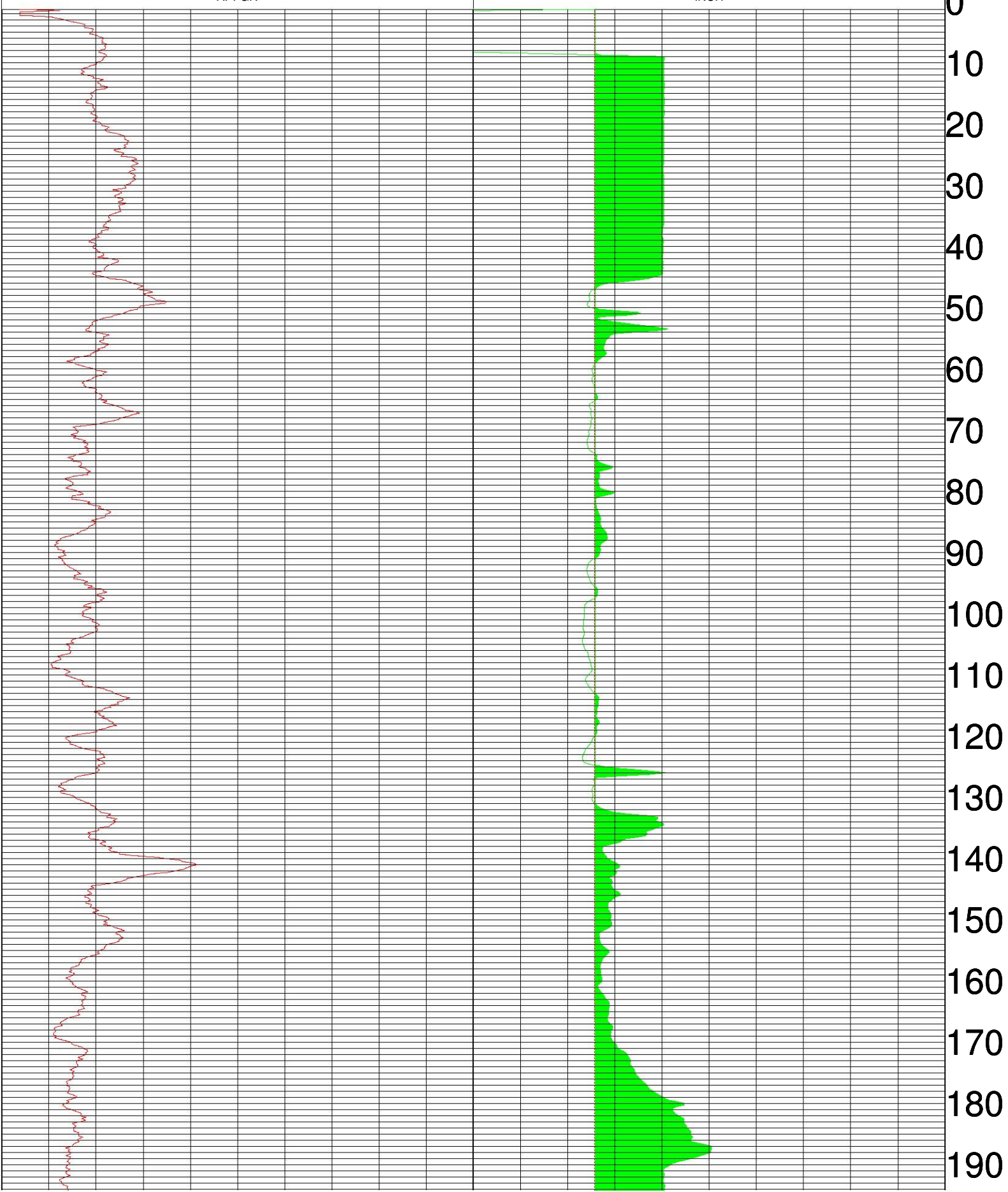
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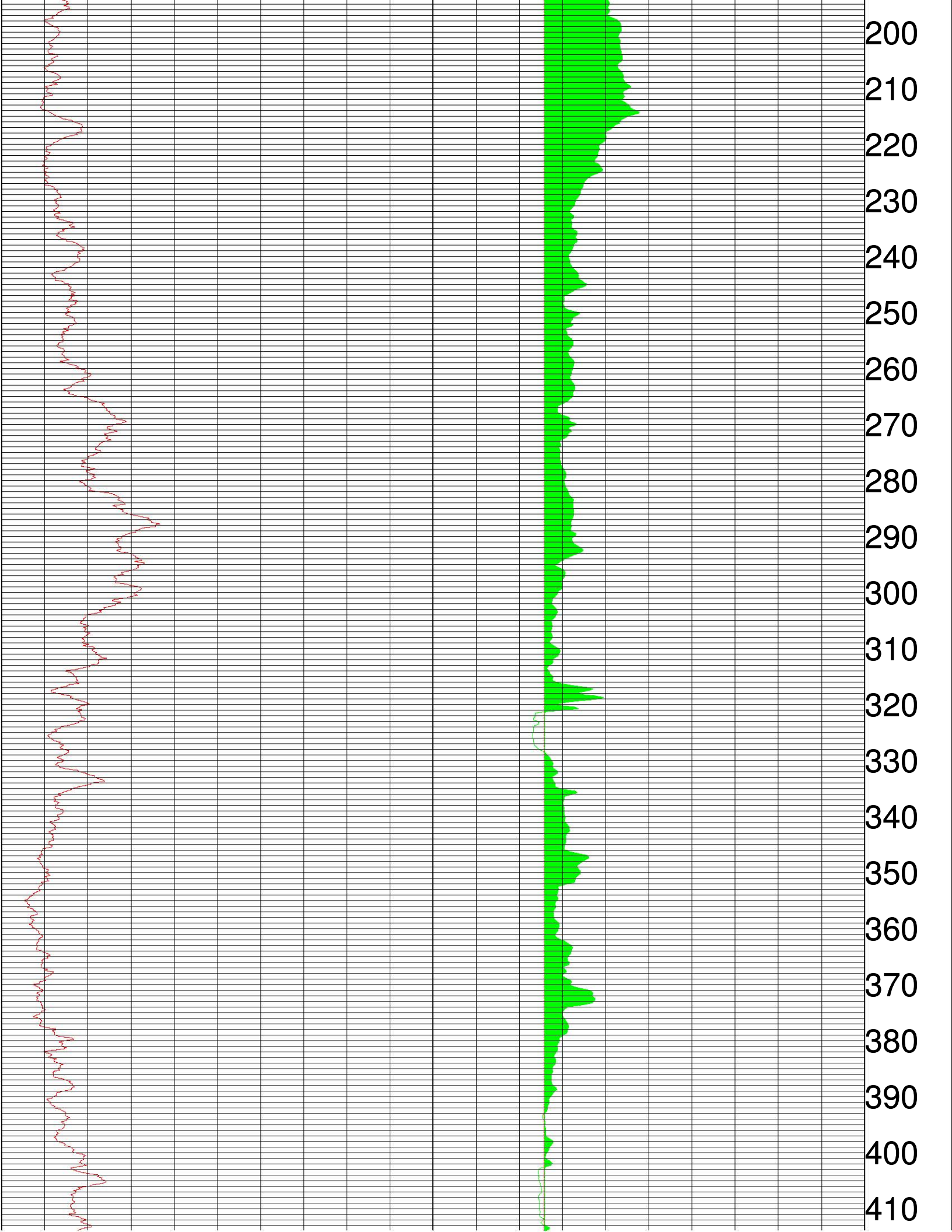
GAMMA

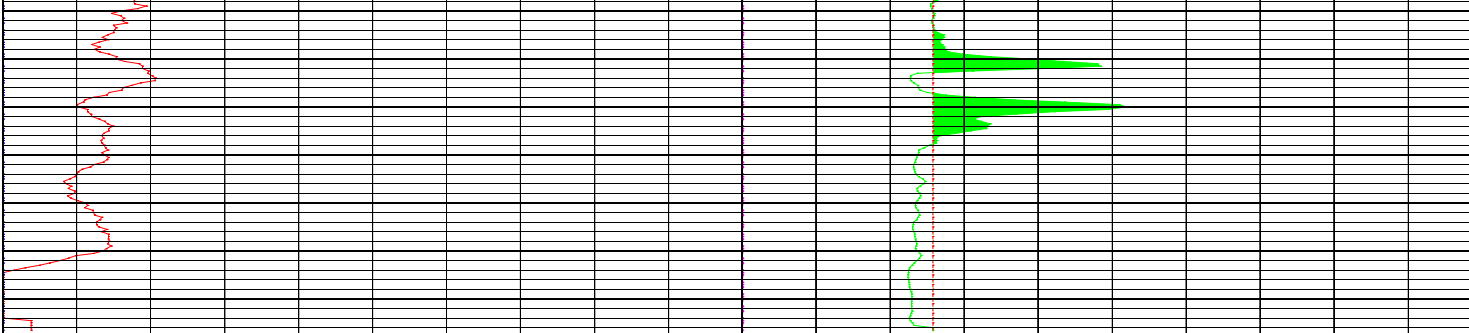
API-GR

GAMMA

API-GR







0	API-GR	2000	INCH	30
	GAMMA		CALIPER	
200	API-GR	60030	INCH	60
	GAMMA		CALIPER	
		0	INCH	30
			BIT	

420
430
440
450

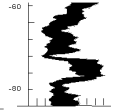
FEET

TOOL CALIBRATION SZ-MW-1 04/29/13 13:28
TOOL 9074A1 TM VERSION 0
SERIAL NUMBER 985

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan12,03	07:10:06	GAMMA	Default	[CPS]	Default	[CPS]
	Jan12,03	04:10:06	GAMMA	180.000	[API-GR]	205.00	[CPS]
2	Aug02,12	16:55:05	CALIPER	4.000	[INCH]	173274.00	[CPS]
	Aug02,12	16:55:05	CALIPER	10.000	[INCH]	157168.00	[CPS]
3	Feb15,13	18:29:50	CALIPERL	5.000	[INCH]	172602.00	[CPS]
	Feb15,13	18:29:50	CALIPERL	11.500	[INCH]	161840.00	[CPS]
4	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]

ABS

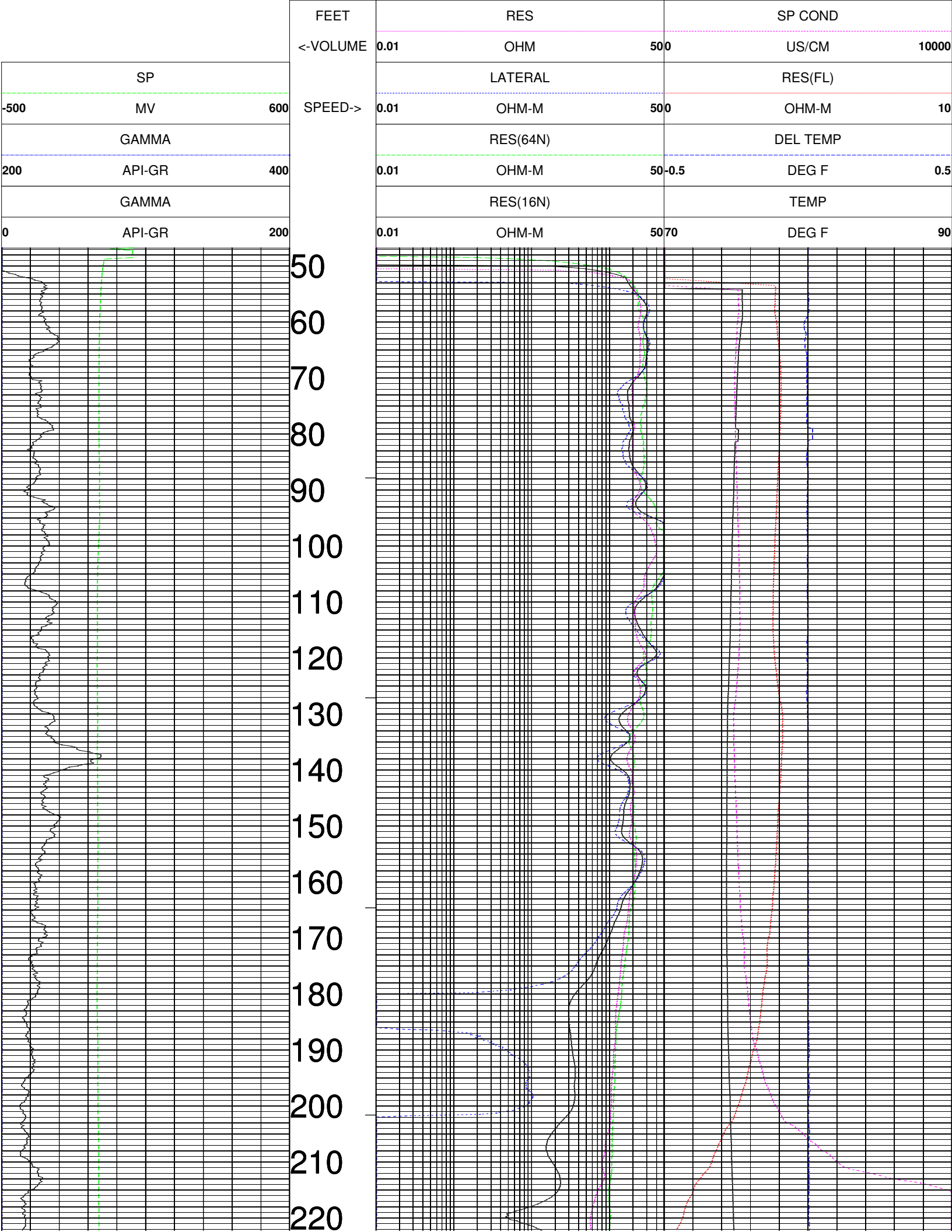
Advanced Borehole Services

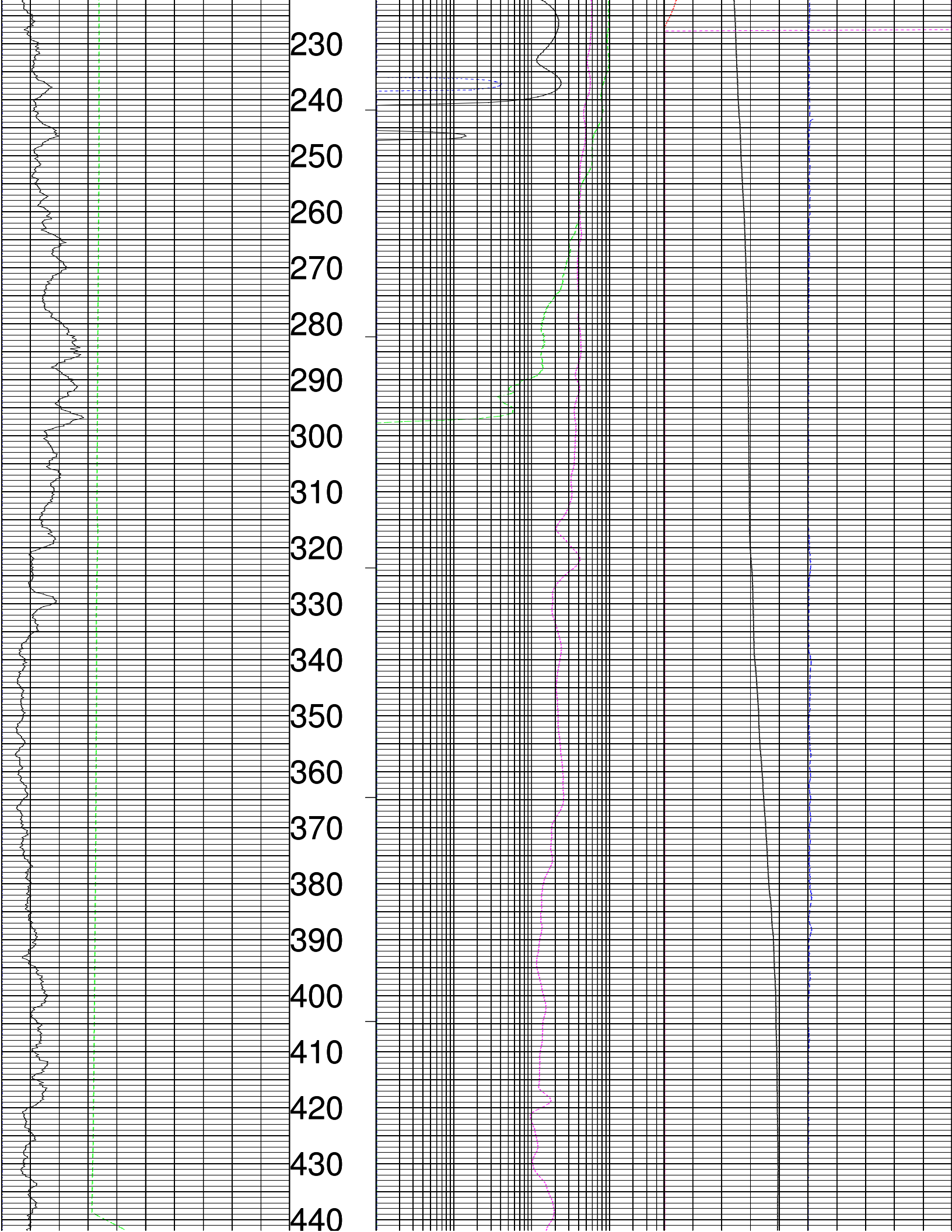


COMBINATION LOG

SZ-MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: COMPL VIDEO
WELL	: SZ-MW-1	
FIELD	: CITY OLDSMAR	
COUNTY	: PINELLAS	
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 450	
BIT SIZE	: 7.8	
LOG TOP	: 46.75	
LOG BOTTOM	: 447.75	
CASING OD	:	
CASING BOTTOM	: 50	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS		





TOOL CALIBRATION SZ-MW-1 04/29/13 13:56

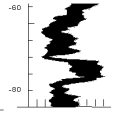
TOOL 8044A TM VERSION 0

SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan03,03	10:49:05	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Jan03,03	07:49:05	GAMMA	180.000	[API-GR]	169.00	[CPS]
2	Apr15,13	13:59:48	RES(FL)	41.600	[OHM-M]	65967.00	[CPS]
	Apr15,13	13:59:48	RES(FL)	0.001	[OHM-M]	13788.00	[CPS]
3	Nov14,10	17:54:51	SP	0.000	[MV]	59670.00	[CPS]
	Nov14,10	17:54:51	SP	395.000	[MV]	19917.00	[CPS]
4	Nov06,12	22:14:04	RES(16N)	0.000	[OHM-M]	4450.00	[CPS]
	Nov06,12	22:14:04	RES(16N)	1996.000	[OHM-M]	103589.00	[CPS]
5	Nov06,12	22:14:14	RES(64N)	0.000	[OHM-M]	4347.00	[CPS]
	Nov06,12	22:14:14	RES(64N)	1990.000	[OHM-M]	102351.00	[CPS]
6	Nov06,12	22:23:12	TEMP	69.600	[DEG F]	64003.00	[CPS]
	Nov06,12	22:23:12	TEMP	86.500	[DEG F]	55877.00	[CPS]
7	Nov06,12	22:14:25	RES	0.000	[OHM]	9921.00	[CPS]
	Nov06,12	22:14:25	RES	988.000	[OHM]	58884.00	[CPS]

ABS

Advanced Borehole Services

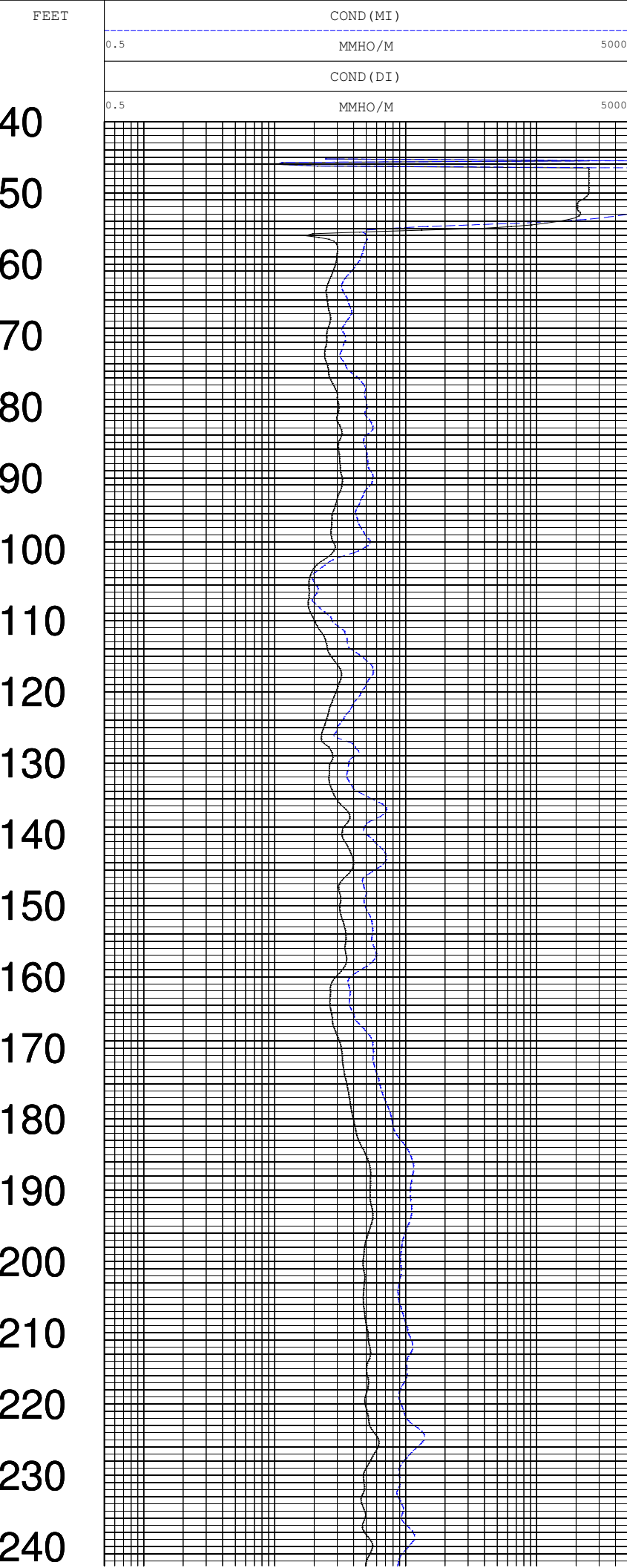
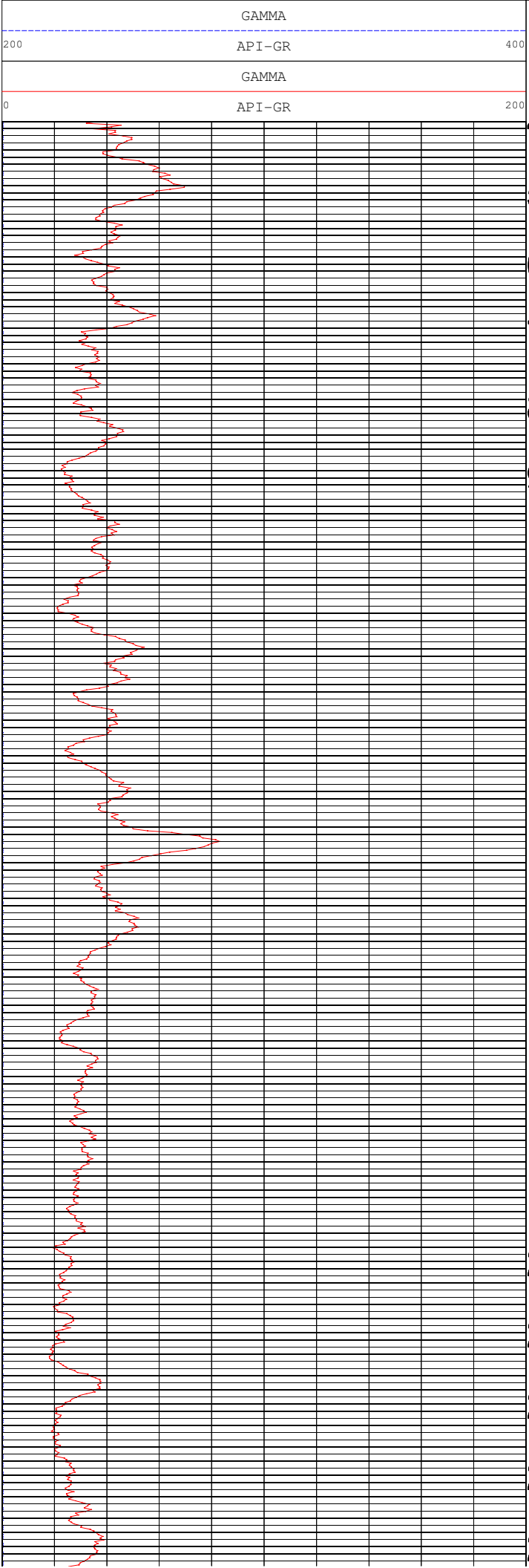


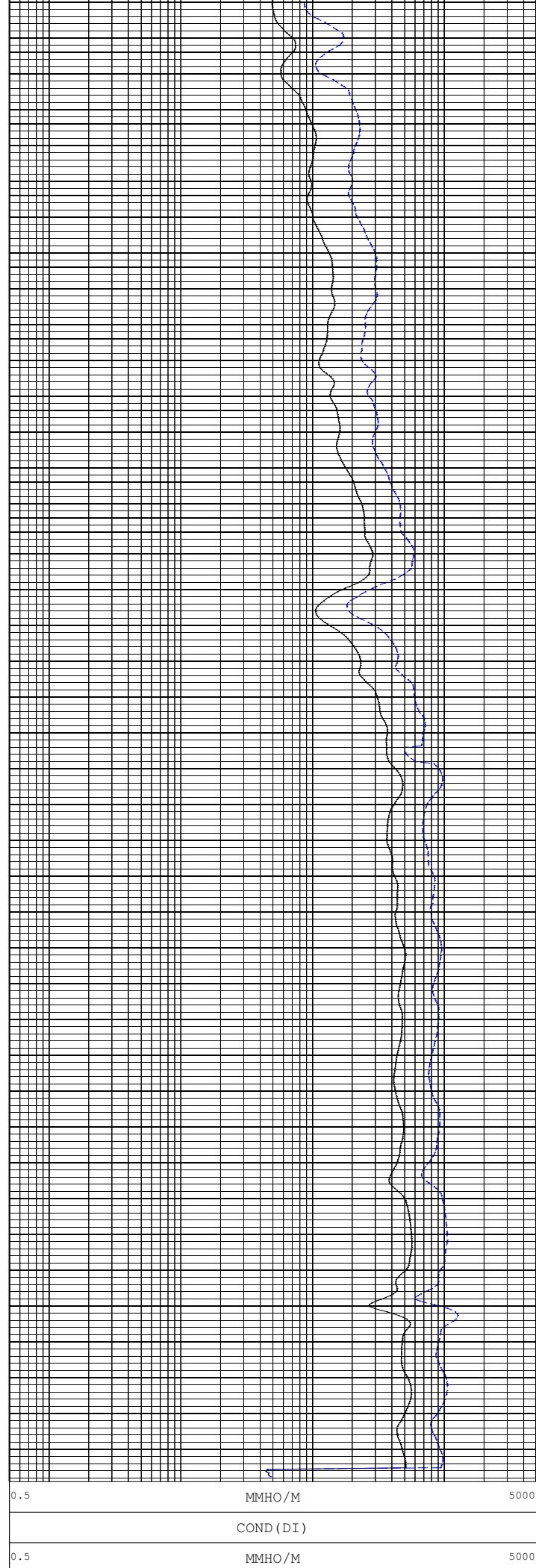
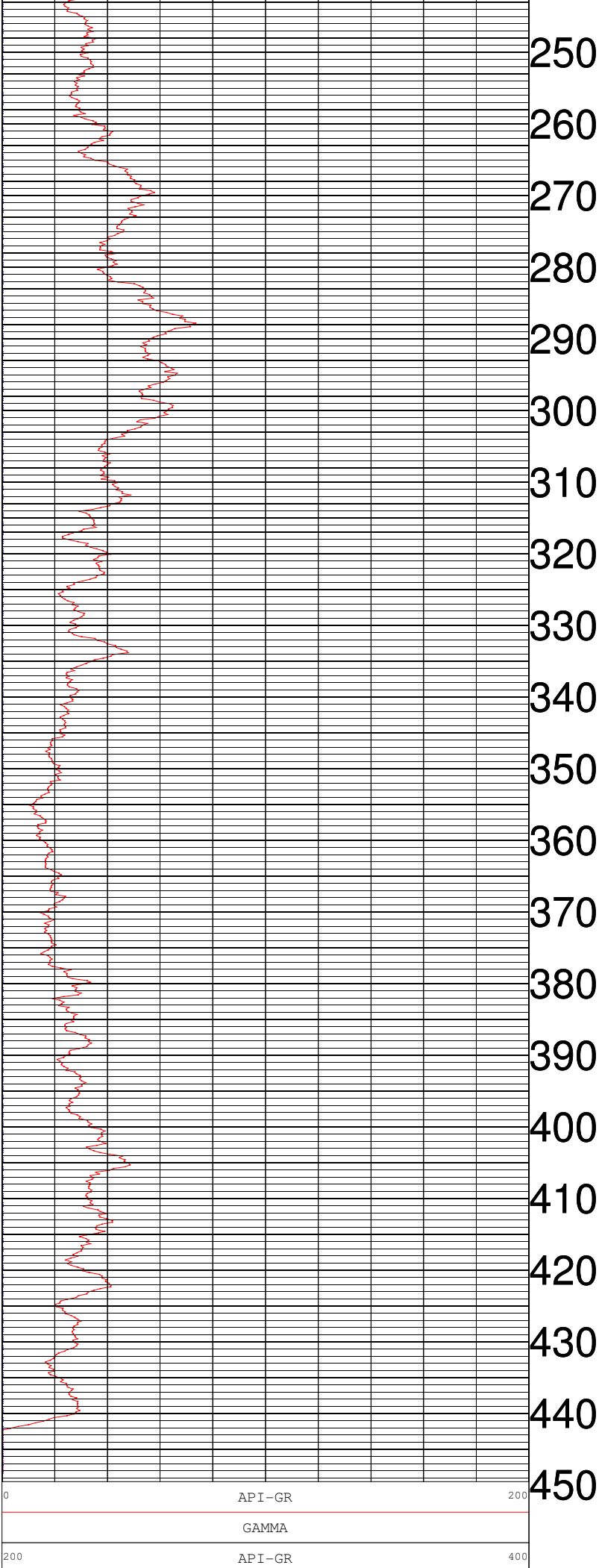
DUAL INDUCTION-GAMMA RAY

SZ-MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: COMPL VIDEO
WELL	: SZ-MW-1	
FIELD	: CITY OLDSMAR	
COUNTY	: PINELLAS	
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 450	
BIT SIZE	: 7.8	
LOG TOP	: 1.25	
LOG BOTTOM	: 449.15	
CASING OD	:	
CASING BOTTOM	: 50	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

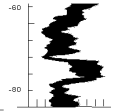




GAMMA	FEET	COND (MI)
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ABS

Advanced Borehole Services

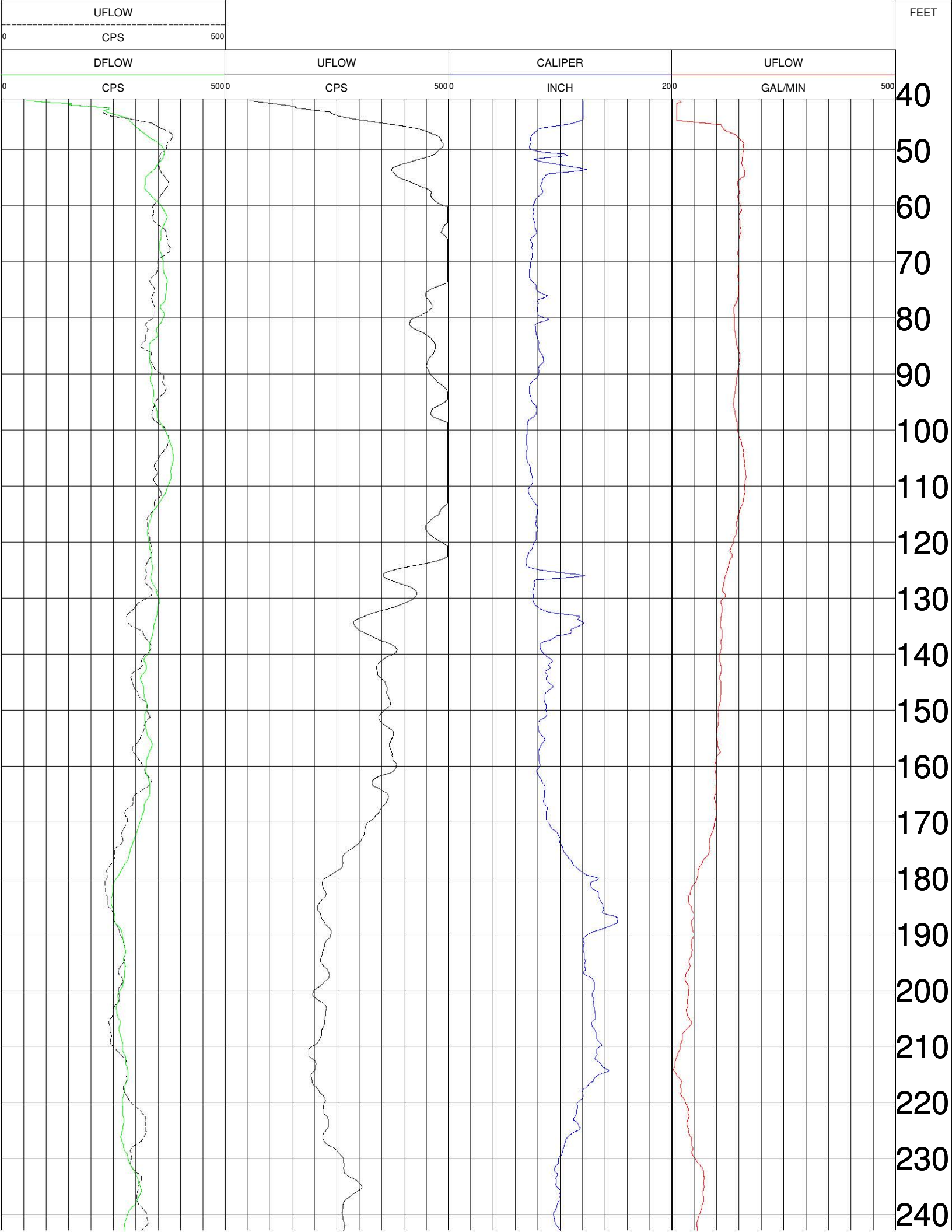


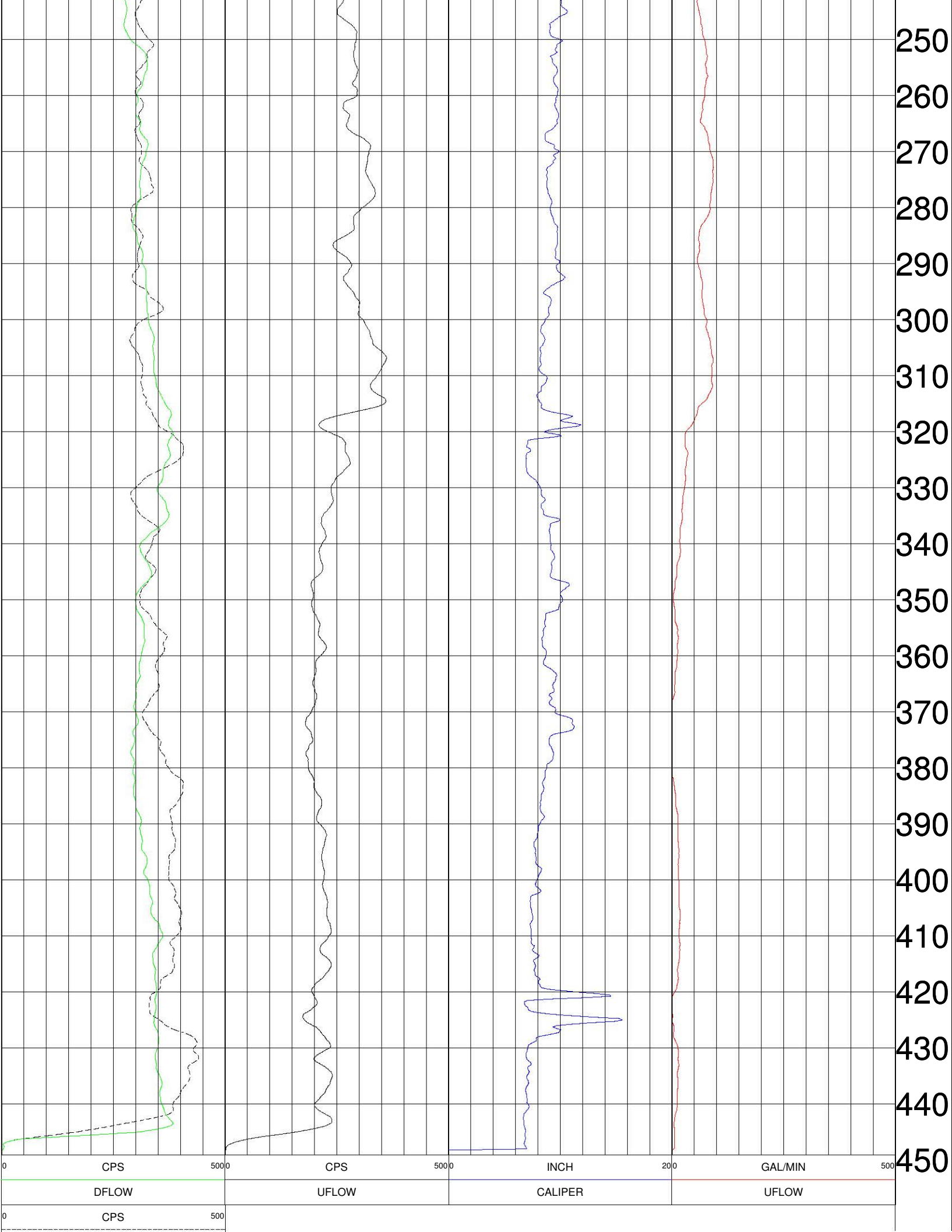
PRODUCTION-STATIC-PUMPING

SZ-MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: SZ-MW-1	COMPL
FIELD	: CITY OLDSMAR	VIDEO
COUNTY	: PINELLAS	.
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 450	
BIT SIZE	: 7.8	
LOG TOP	: 1.25	
LOG BOTTOM	: 448.75	
CASING OD	:	
CASING BOTTOM	: 50	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



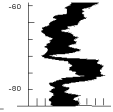


UFLOW

FEET

ABS

Advanced Borehole Services

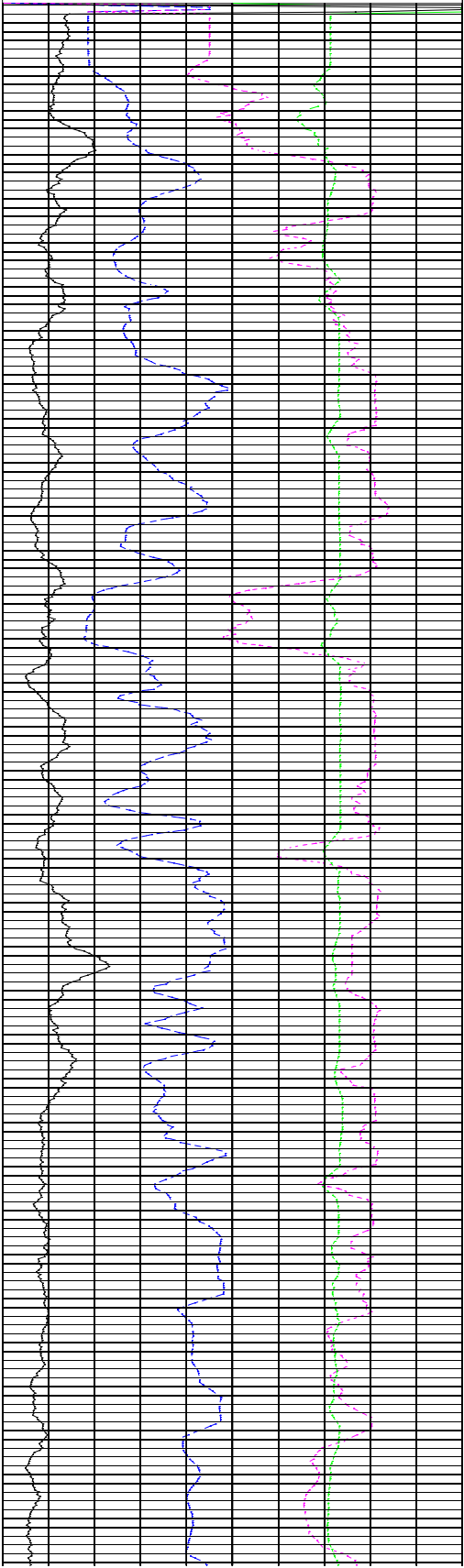


FULL WAVE BHC ACOUSTIC-VDL

SZ-MW-1

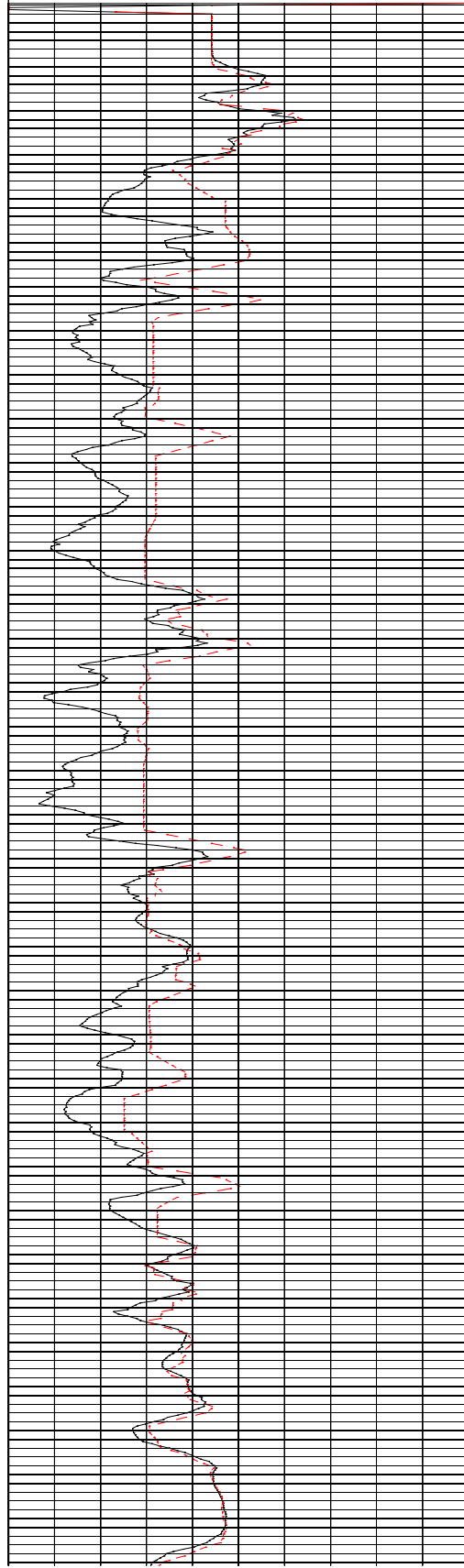
COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: COMPL VIDEO
WELL	: SZ-MW-1	
FIELD	: CITY OLDSMAR	
COUNTY	: PINELLAS	
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 450	
BIT SIZE	: 7.8	
LOG TOP	: 31.75	
LOG BOTTOM	: 447.00	
CASING OD	:	
CASING BOTTOM	: 50	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS		

POR (SON)		
-100	PERCENT	100
TIME (F)		
100	USEC	800
TIME (N)		
100	USEC	800
GAMMA		
0	API-GR	300

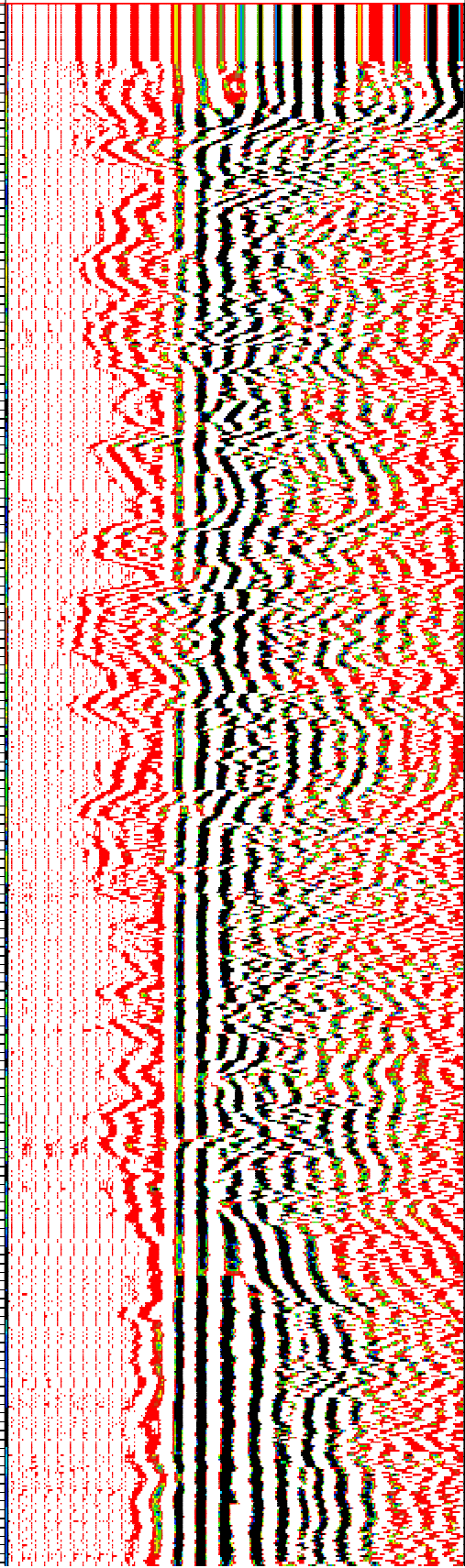


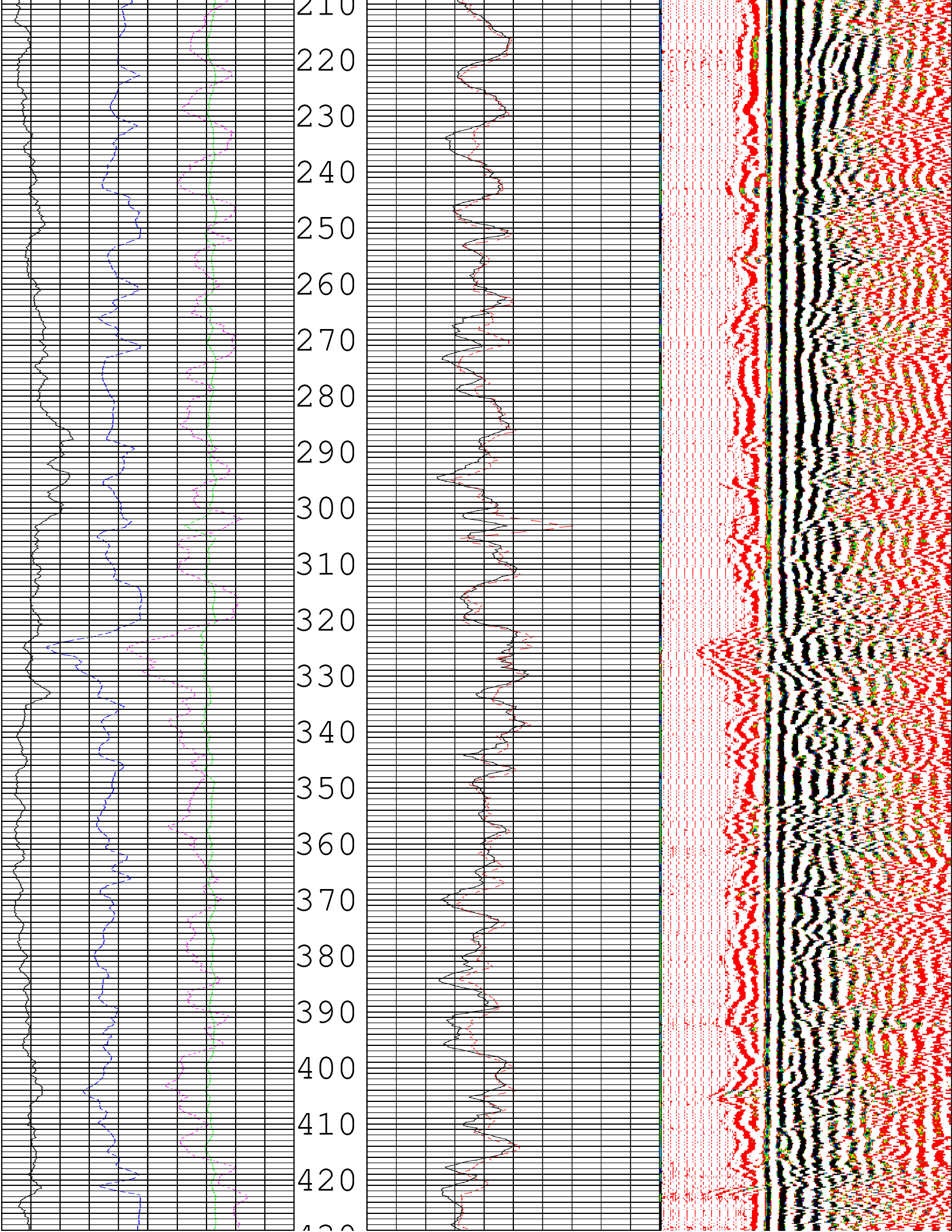
FEET	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
130	
140	
150	
160	
170	
180	
190	
200	
210	

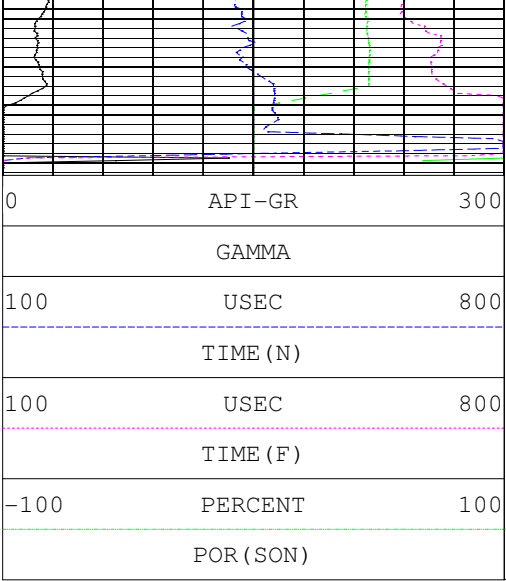
DELTAT	
300	USEC/FT
0	
BHC-DELT	
300	USEC/FT
0	



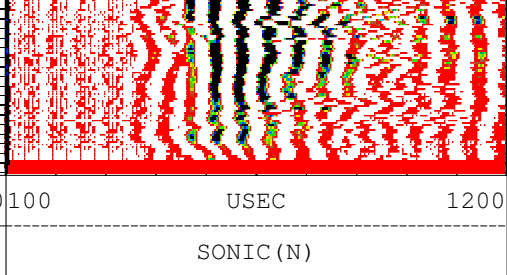
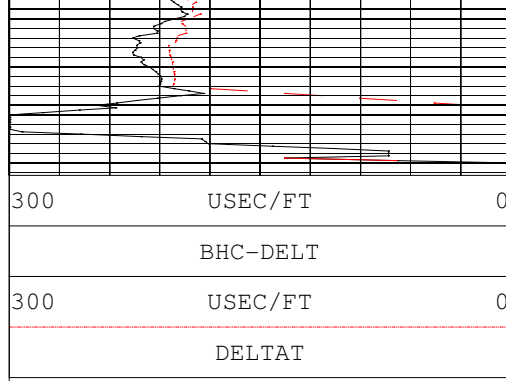
SONIC (N)		
100	USEC	1200







430
440
450
FEET



0	API-GR	300
	GAMMA	
100	USEC	800
	TIME (N)	
100	USEC	800
	TIME (F)	
-100	PERCENT	100
	POR (SON)	

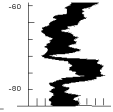
300	USEC/FT	0
	BHC-DELT	
300	USEC/FT	0
	DELTAT	

100	USEC	1200
	SONIC (N)	

SZMW-1
Final Well Geophysical Logs

ABS

Advanced Borehole Services

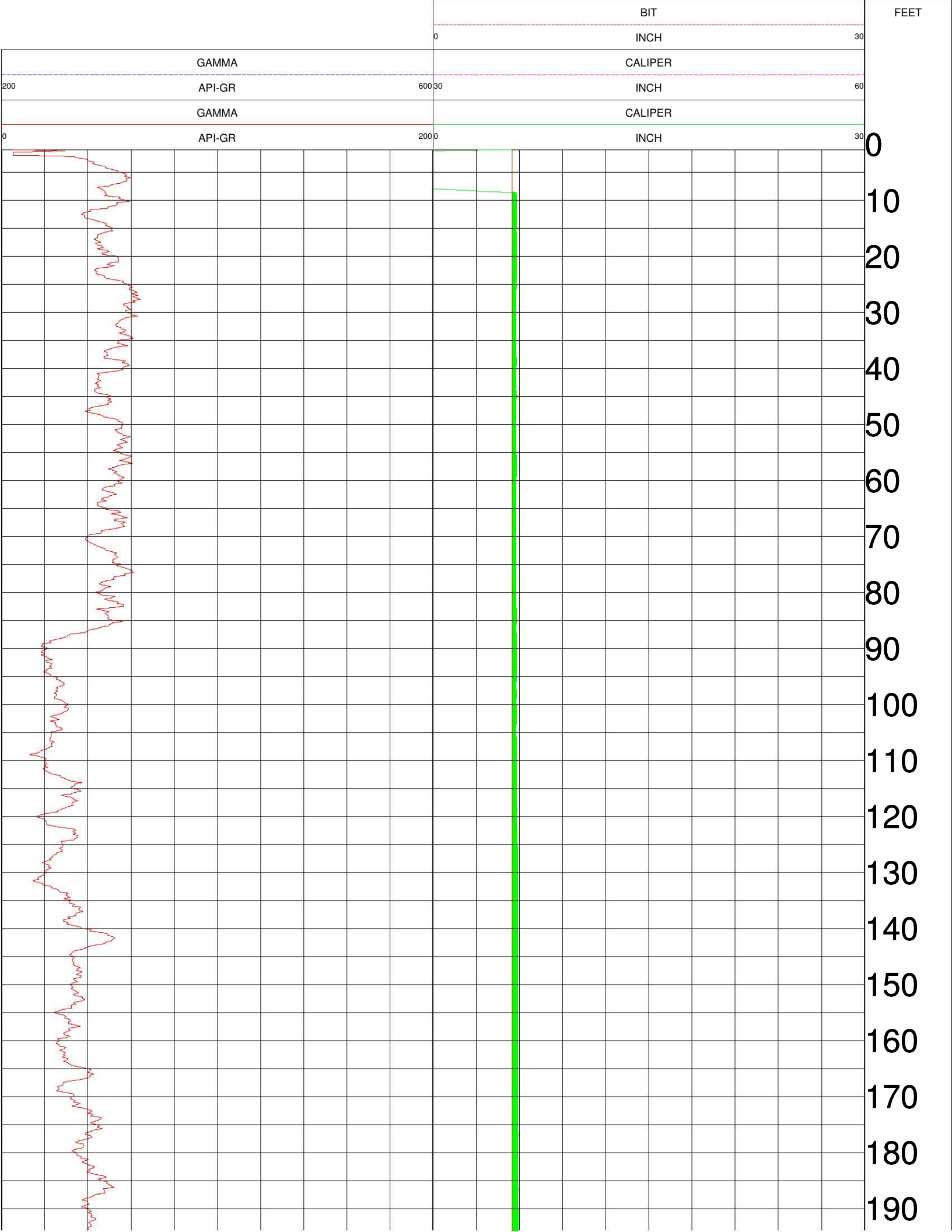


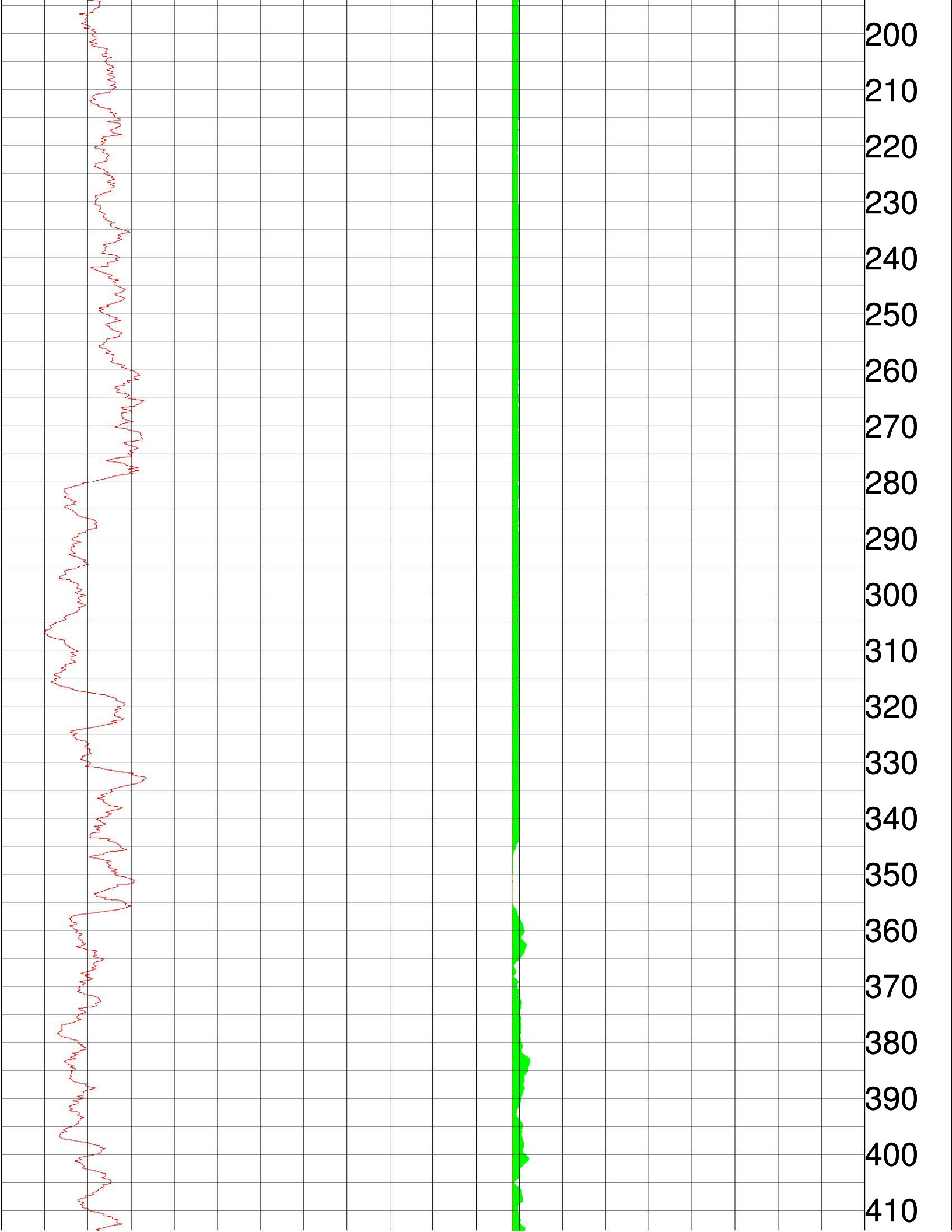
GAMMA RAY (API)-CALIPER

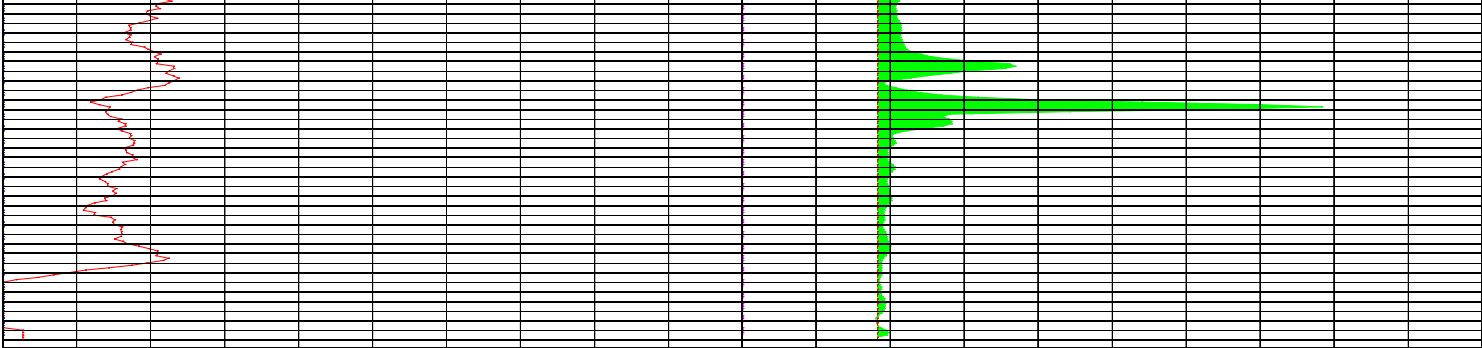
SZMW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: SZMW-1	8044
FIELD	: OLDSMAR	.8711
COUNTY	: PINELLAS	VIDEO
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 05/23/13	
DEPTH DRILLER	: 455	
BIT SIZE	: 5.5	
LOG TOP	: 1.00	
LOG BOTTOM	: 449.50	
CASING OD	:	
CASING BOTTOM	: 352	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: 0	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS







0	API-GR	200	0	INCH	30
GAMMA			CALIPER		
200	API-GR	600	30	INCH	60
GAMMA			CALIPER		
			0	INCH	30
			BIT		

420
430
440
450

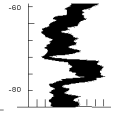
FEET

TOOL CALIBRATION SZMW-1 05/23/13 10:43
TOOL 9074A1 TM VERSION 0
SERIAL NUMBER 985

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jun02,13	17:22:26	GAMMA	Default	[CPS]	Default	[CPS]
	Jun02,13	14:22:26	GAMMA	Default	[CPS]	Default	[CPS]
2	Jun02,13	14:22:26	CALIPER	Default	[CPS]	Default	[CPS]
	Jun02,13	14:22:26	CALIPER	Default	[CPS]	Default	[CPS]
3	Jun02,13	14:30:33	CALIPERL	3.880	[INCH]	174613.00	[CPS]
	Jun02,13	14:30:33	CALIPERL	9.880	[INCH]	165005.00	[CPS]
4	Jun02,13	14:22:26	CALIPERX	Default	[CPS]	Default	[CPS]
	Jun02,13	14:22:26	CALIPERX	Default	[CPS]	Default	[CPS]

ABS

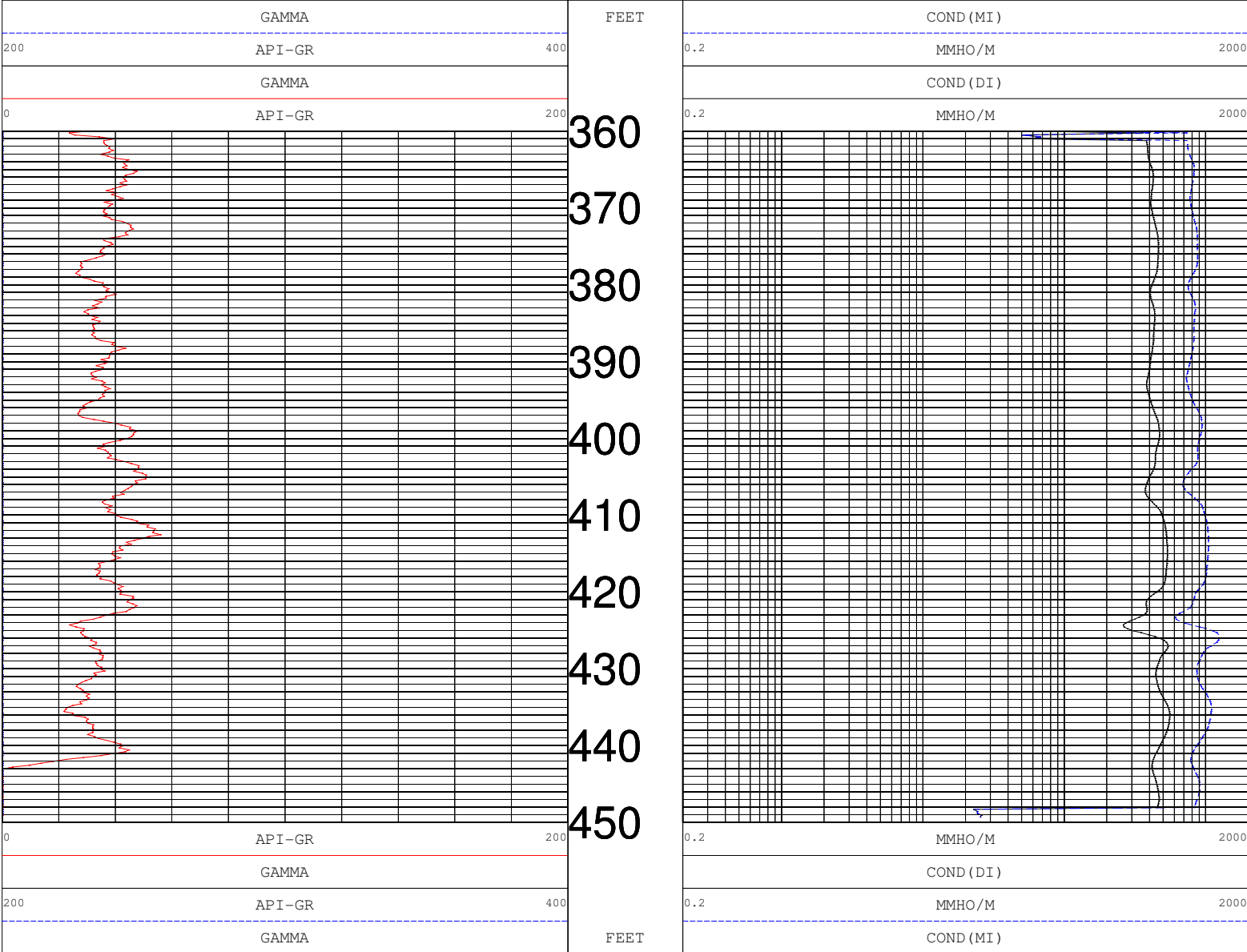
Advanced Borehole Services



DUAL INDUCTION-GAMMA RAY

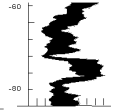
SZMW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: SZMW-1	8044
FIELD	: OLDSMAR	.8711
COUNTY	: PINELLAS	VIDEO
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 05/23/13	
DEPTH DRILLER	: 455	
BIT SIZE	: 5.5	
LOG TOP	: 1.00	
LOG BOTTOM	: 449.50	
CASING OD	:	
CASING BOTTOM	: 352	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: 0	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS		



ABS

Advanced Borehole Services



FULL WAVE BHC ACOUSTIC-VDL

SZMW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: SZMW-1	8044
FIELD	: OLDSMAR	.8711
COUNTY	: PINELLAS	VIDEO
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 05/23/13	
DEPTH DRILLER	: 455	
BIT SIZE	: 5.5	
LOG TOP	: 340.75	
LOG BOTTOM	: 447.75	
CASING OD	:	
CASING BOTTOM	: 352	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: 0	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS		

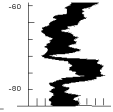
POR (SON)			FEET
-100	PERCENT	100	
TIME (F)			
100	USEC	800	
TIME (N)			
100	USEC	800	
GAMMA			
0	API-GR	300	340
			350
			360
			370
			380
			390
			400
			410
			420
			430
			440
0	API-GR	300	450
GAMMA			
100	USEC	800	
TIME (N)			
100	USEC	800	
TIME (F)			
-100	PERCENT	100	
POR (SON)			FEET

TOOL CALIBRATION SZMW-1 05/23/13 13:29
TOOL 9320A2 TM VERSION 0
SERIAL NUMBER 667

DATE		TIME	SENSOR	STANDARD		RESPONSE	
1	Apr12,99	23:12:30	GAMMA	Default	[CPS]	Default	[CPS]
	Apr12,99	20:12:30	GAMMA	Default	[CPS]	Default	[CPS]

ABS

Advanced Borehole Services

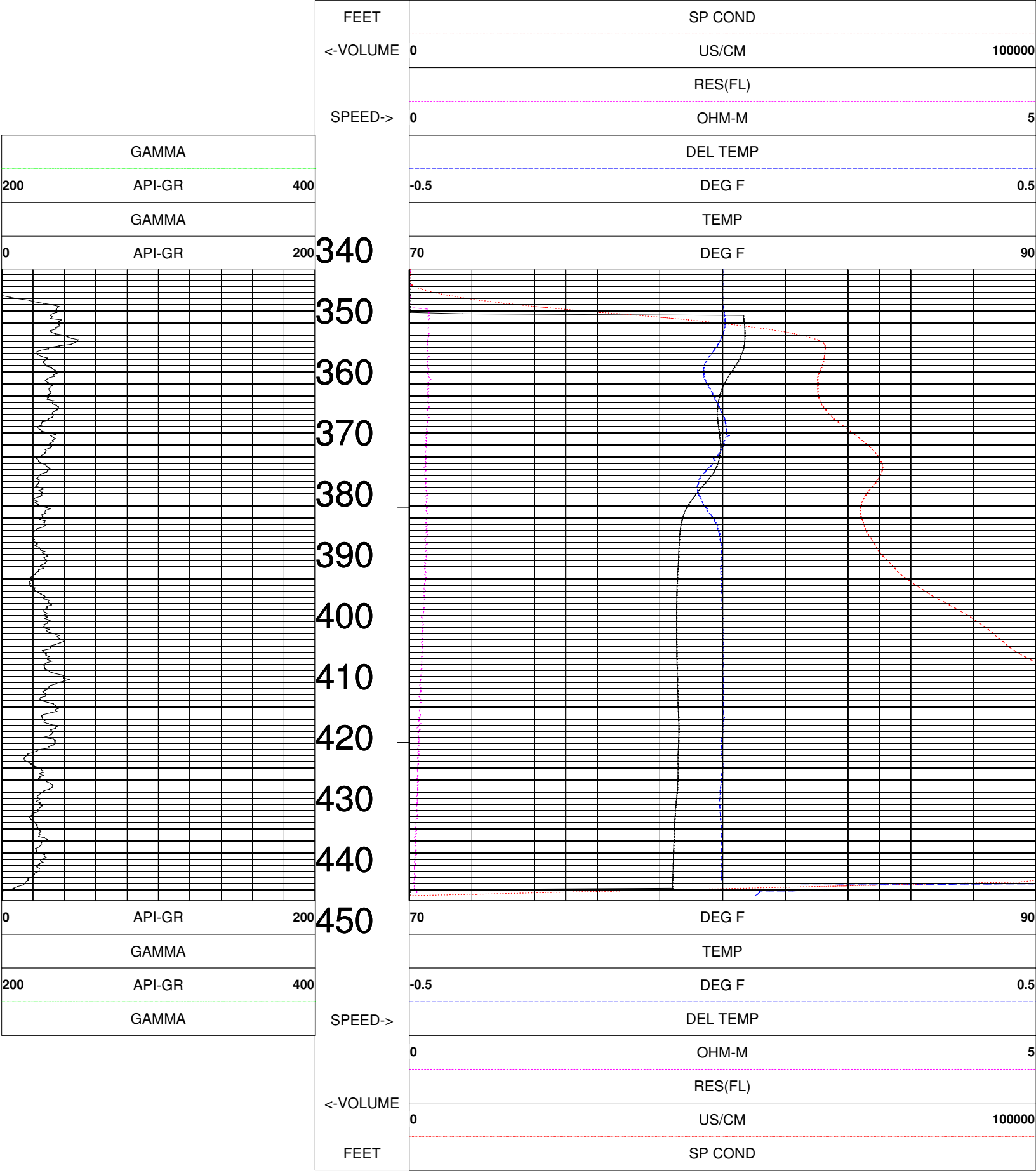


STATIC WATER QUALITY

SZMW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: SZMW-1	8044
FIELD	: OLDSMAR	.8711
COUNTY	: PINELLAS	VIDEO
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 05/23/13	
DEPTH DRILLER	: 455	
BIT SIZE	: 5.5	
LOG TOP	: 343.25	
LOG BOTTOM	: 446.50	
CASING OD	:	
CASING BOTTOM	: 352	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: 0	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



TOOL CALIBRATION SZMW-1 05/23/13 11:14

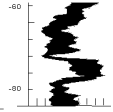
TOOL 8044A TM VERSION 0

SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan03,03	10:49:05	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Jan03,03	07:49:05	GAMMA	180.000	[API-GR]	169.00	[CPS]
2	May23,13	16:12:19	RES(FL)	41.600	[OHM-M]	65967.00	[CPS]
	May23,13	16:12:19	RES(FL)	0.500	[OHM-M]	12085.00	[CPS]
3	Nov14,10	17:54:51	SP	0.000	[MV]	59670.00	[CPS]
	Nov14,10	17:54:51	SP	395.000	[MV]	19917.00	[CPS]
4	Jun01,13	15:11:06	RES(16N)	0.000	[OHM-M]	4284.00	[CPS]
	Jun01,13	15:11:06	RES(16N)	1996.000	[OHM-M]	103533.00	[CPS]
5	Jun01,13	15:11:44	RES(64N)	0.000	[OHM-M]	4160.00	[CPS]
	Jun01,13	15:11:44	RES(64N)	1990.000	[OHM-M]	102299.00	[CPS]
6	Jun02,13	16:43:18	TEMP	71.700	[DEG F]	63355.00	[CPS]
	Jun02,13	16:43:18	TEMP	86.500	[DEG F]	55877.00	[CPS]
7	Jun01,13	15:12:40	RES	0.000	[OHM]	9855.00	[CPS]
	Jun01,13	15:12:40	RES	988.000	[OHM]	58925.00	[CPS]

ABS

Advanced Borehole Services



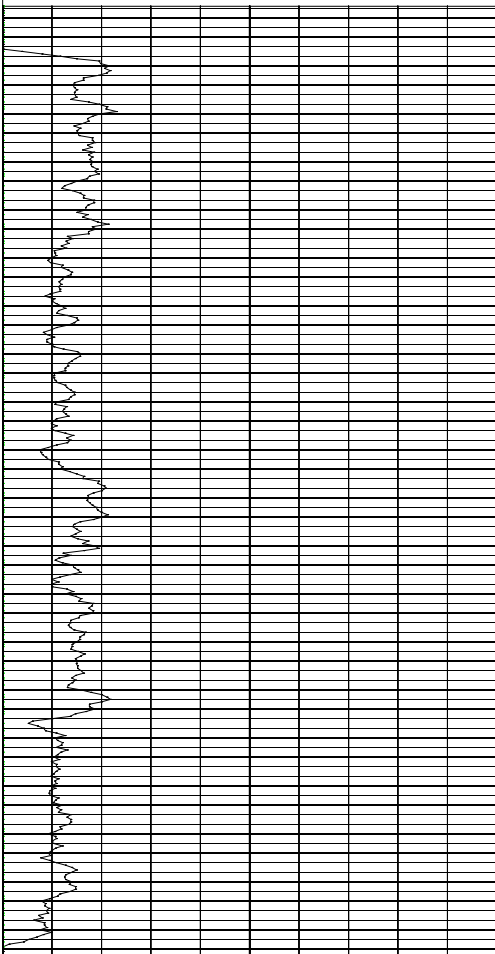
PUMPING WATER QUALITY

SZMW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: SZMW-1	8044
FIELD	: OLDSMAR	.8711
COUNTY	: PINELLAS	VIDEO
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 05/23/13	
DEPTH DRILLER	: 455	
BIT SIZE	: 5.5	
LOG TOP	: 348.75	
LOG BOTTOM	: 447.75	
CASING OD	:	
CASING BOTTOM	: 352	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: 0	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

COMMENTS1		
GAMMA		
200	API-GR	400
GAMMA		
0	API-GR	200
API-GR		
GAMMA		
200	API-GR	400
GAMMA		
COMMENTS1		



FEET

350

360

370

380

390

400

410

420

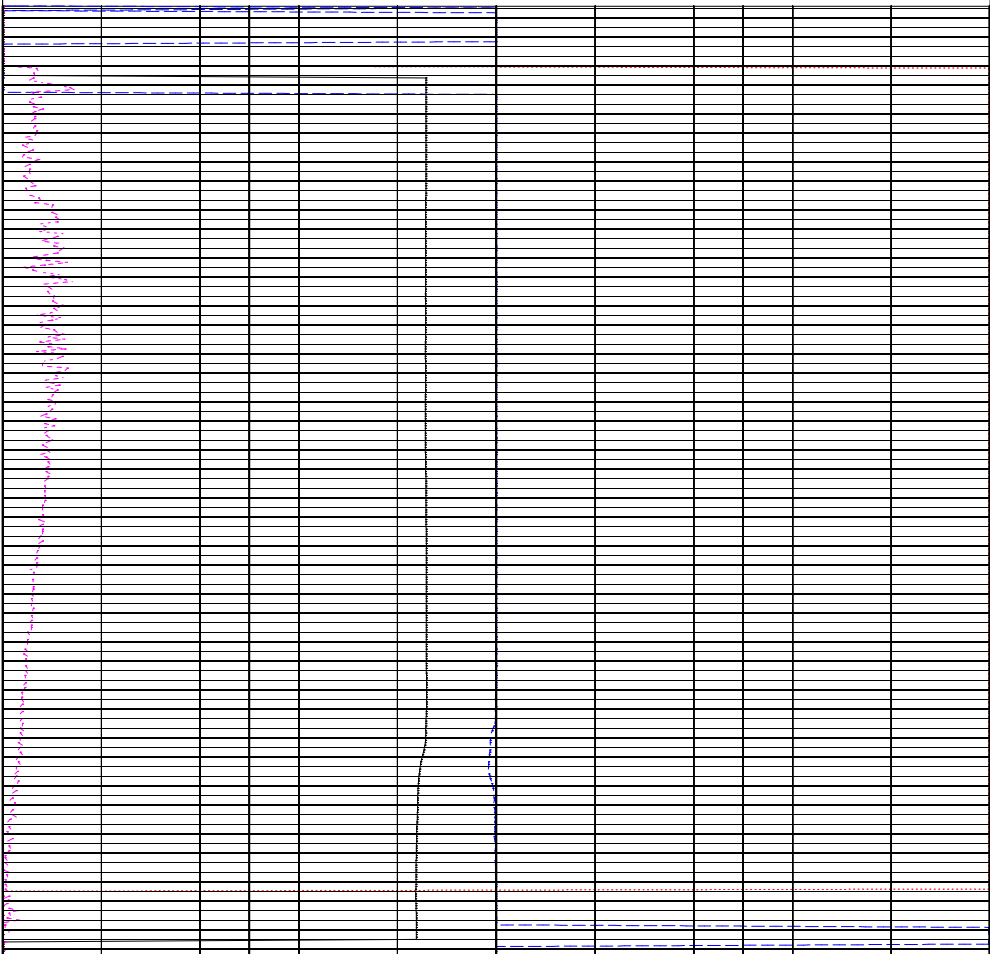
430

440

450

FEET

SP COND		
0	US/CM	100000
RES(FL)		
0	OHM-M	1
DEL TEMP		
-0.5	DEG F	0.5
TEMP		
70	DEG F	90
TEMP		
-0.5	DEG F	0.5
DEL TEMP		
0	OHM-M	1
RES(FL)		
0	US/CM	100000
SP COND		



TOOL CALIBRATION SZMW-1 05/23/13 11:36

TOOL 8044A TM VERSION 0

SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan03,03	10:49:05	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Jan03,03	07:49:05	GAMMA	180.000	[API-GR]	169.00	[CPS]
2	May23,13	16:36:11	RES(FL)	41.600	[OHM-M]	65967.00	[CPS]
	May23,13	16:36:11	RES(FL)	0.050	[OHM-M]	11112.00	[CPS]
3	Nov14,10	17:54:51	SP	0.000	[MV]	59670.00	[CPS]
	Nov14,10	17:54:51	SP	395.000	[MV]	19917.00	[CPS]
4	Jun01,13	15:11:06	RES(16N)	0.000	[OHM-M]	4284.00	[CPS]
	Jun01,13	15:11:06	RES(16N)	1996.000	[OHM-M]	103533.00	[CPS]
5	Jun01,13	15:11:44	RES(64N)	0.000	[OHM-M]	4160.00	[CPS]
	Jun01,13	15:11:44	RES(64N)	1990.000	[OHM-M]	102299.00	[CPS]
6	Jun02,13	16:43:18	TEMP	71.700	[DEG F]	63355.00	[CPS]
	Jun02,13	16:43:18	TEMP	86.500	[DEG F]	55877.00	[CPS]
7	Jun01,13	15:12:40	RES	0.000	[OHM]	9855.00	[CPS]
	Jun01,13	15:12:40	RES	988.000	[OHM]	58925.00	[CPS]

SZMW-1
Pilot Hole Video
(provided on DVD)

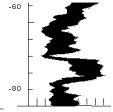
SZMW-1
Final Well Video
(provided on DVD)

Appendix F
TZMW-1 Geophysical Logs

TZMW-1
Pilot Hole Geophysical Logs

ABS

Advanced Borehole Services

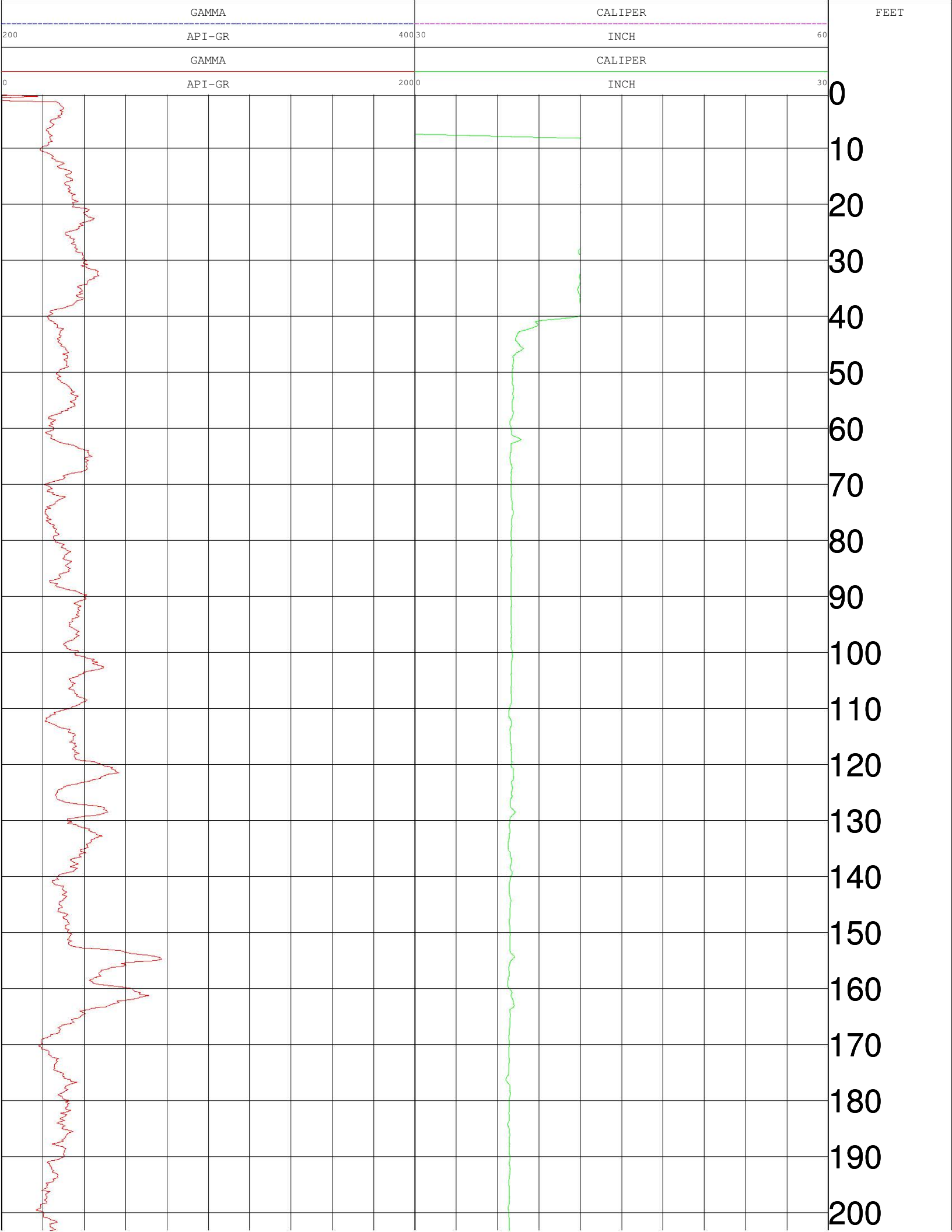


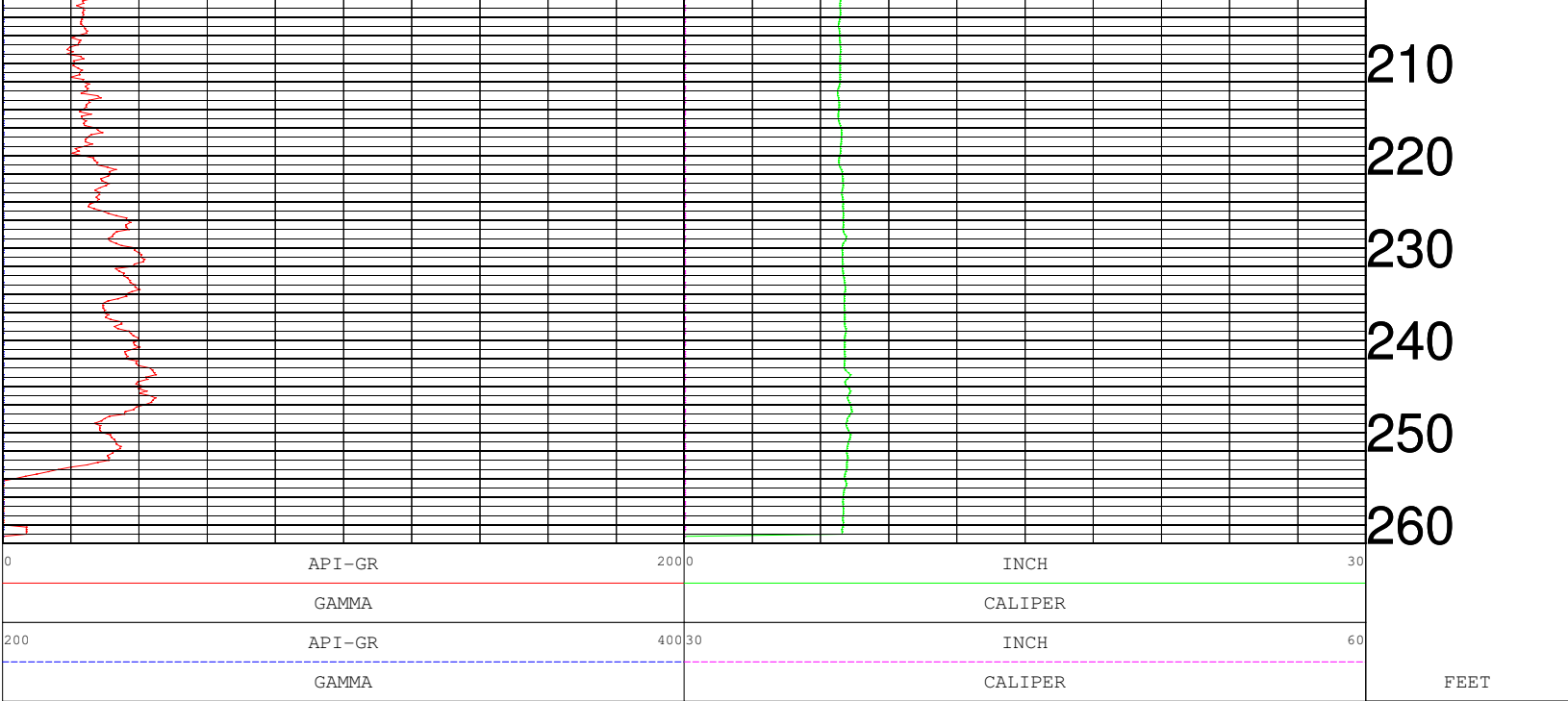
GAMMA RAY (API)-CALIPER

WELL TZ MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: .PILOT
WELL	: WELL TZ MW-1	
FIELD	: OLDSMAR	
COUNTY	:	
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/11/13	
DEPTH DRILLER	: 263	
BIT SIZE	: 7.8	
LOG TOP	: 0.50	
LOG BOTTOM	: 261.75	
CASING OD	:	
CASING BOTTOM	: 42	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: MUD	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS





TOOL CALIBRATION WELL TZ MW-1 04/11/13 11:07

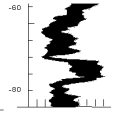
TOOL 9074A1 TM VERSION 0

SERIAL NUMBER 985

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan12,03	07:10:06	GAMMA	Default	[CPS]	Default	[CPS]
	Jan12,03	04:10:06	GAMMA	180.000	[API-GR]	205.00	[CPS]
2	Aug02,12	16:55:05	CALIPER	4.000	[INCH]	173274.00	[CPS]
	Aug02,12	16:55:05	CALIPER	10.000	[INCH]	157168.00	[CPS]
3	Feb15,13	18:29:50	CALIPERL	5.000	[INCH]	172602.00	[CPS]
	Feb15,13	18:29:50	CALIPERL	11.500	[INCH]	161840.00	[CPS]
4	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]

ABS

Advanced Borehole Services



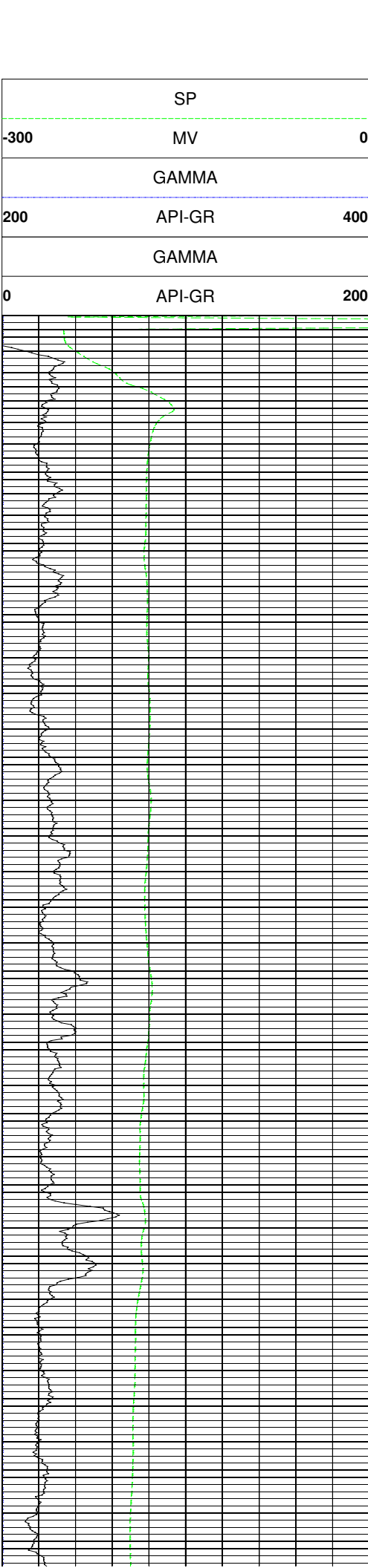
LONG SHORT (16-64) GRAY

<user entered title>

WELL TZ MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: .PILOT
WELL	: WELL TZ MW-1	
FIELD	: OLDSMAR	
COUNTY	:	
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/11/13	
DEPTH DRILLER	: 263	
BIT SIZE	: 7.8	
LOG TOP	: 28.00	
LOG BOTTOM	: 261.75	
CASING OD	:	
CASING BOTTOM	: 42	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: MUD	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



FEET

30

40

50

60

70

80

90

100

110

120

130

140

150

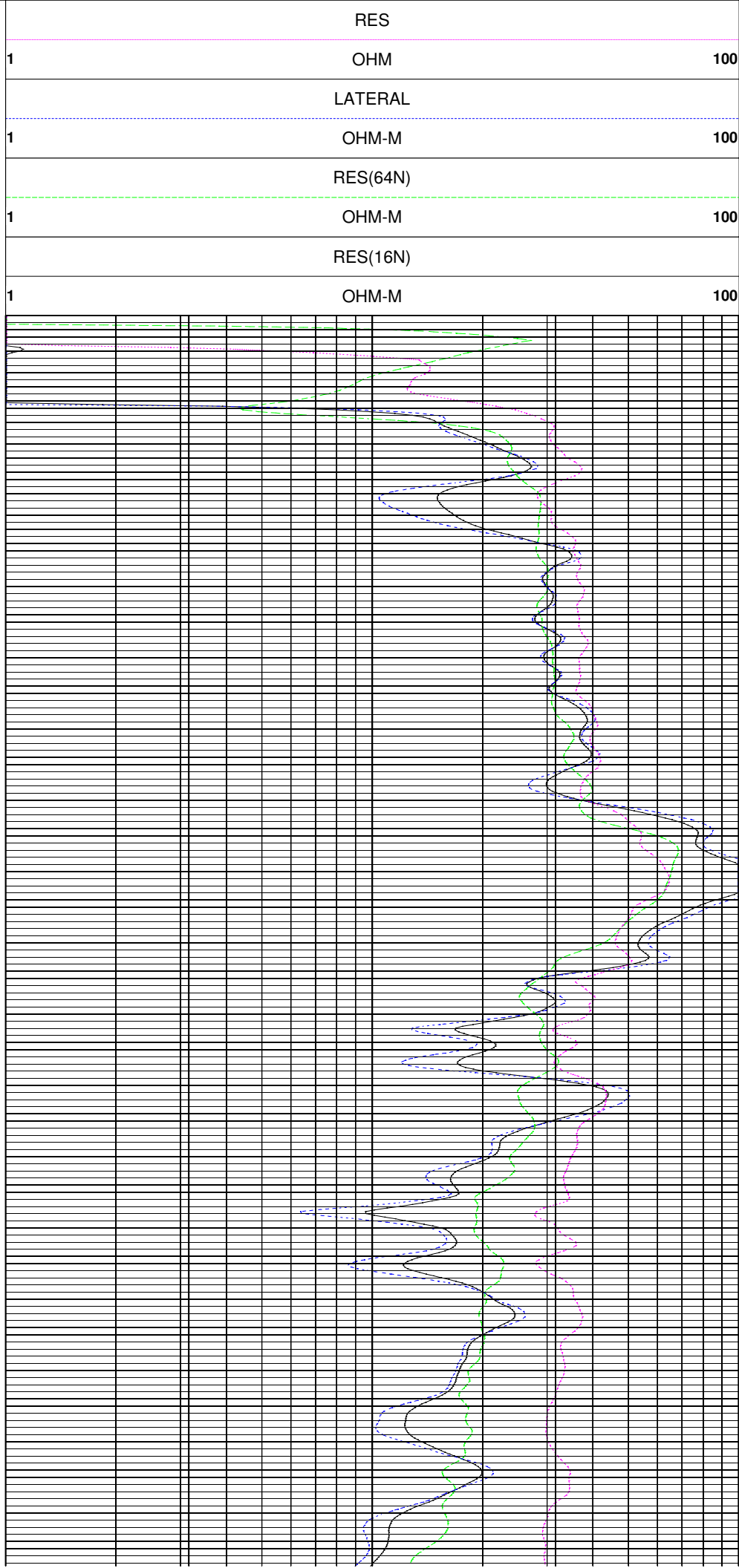
160

170

180

190

200



TOOL CALIBRATION WELL TZ MW-1 04/11/13 11:31

TOOL 8044A TM VERSION 0

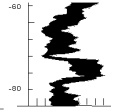
SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan03,03	10:49:05	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Jan03,03	07:49:05	GAMMA	180.000	[API-GR]	169.00	[CPS]
2	Feb18,13	18:37:03	RES(FL)	29.940	[OHM-M]	58054.00	[CPS]
	Feb18,13	18:37:03	RES(FL)	0.001	[OHM-M]	13788.00	[CPS]
3	Nov14,10	17:54:51	SP	0.000	[MV]	59670.00	[CPS]
	Nov14,10	17:54:51	SP	395.000	[MV]	19917.00	[CPS]
4	Nov06,12	22:14:04	RES(16N)	0.000	[OHM-M]	4450.00	[CPS]
	Nov06,12	22:14:04	RES(16N)	1996.000	[OHM-M]	103589.00	[CPS]
5	Nov06,12	22:14:14	RES(64N)	0.000	[OHM-M]	4347.00	[CPS]
	Nov06,12	22:14:14	RES(64N)	1990.000	[OHM-M]	102351.00	[CPS]
6	Nov06,12	22:23:12	TEMP	69.600	[DEG F]	64003.00	[CPS]
	Nov06,12	22:23:12	TEMP	86.500	[DEG F]	55877.00	[CPS]
7	Nov06,12	22:14:25	RES	0.000	[OHM]	9921.00	[CPS]
	Nov06,12	22:14:25	RES	988.000	[OHM]	58884.00	[CPS]

TZMW-1
Final Well Geophysical Logs

ABS

Advanced Borehole Services

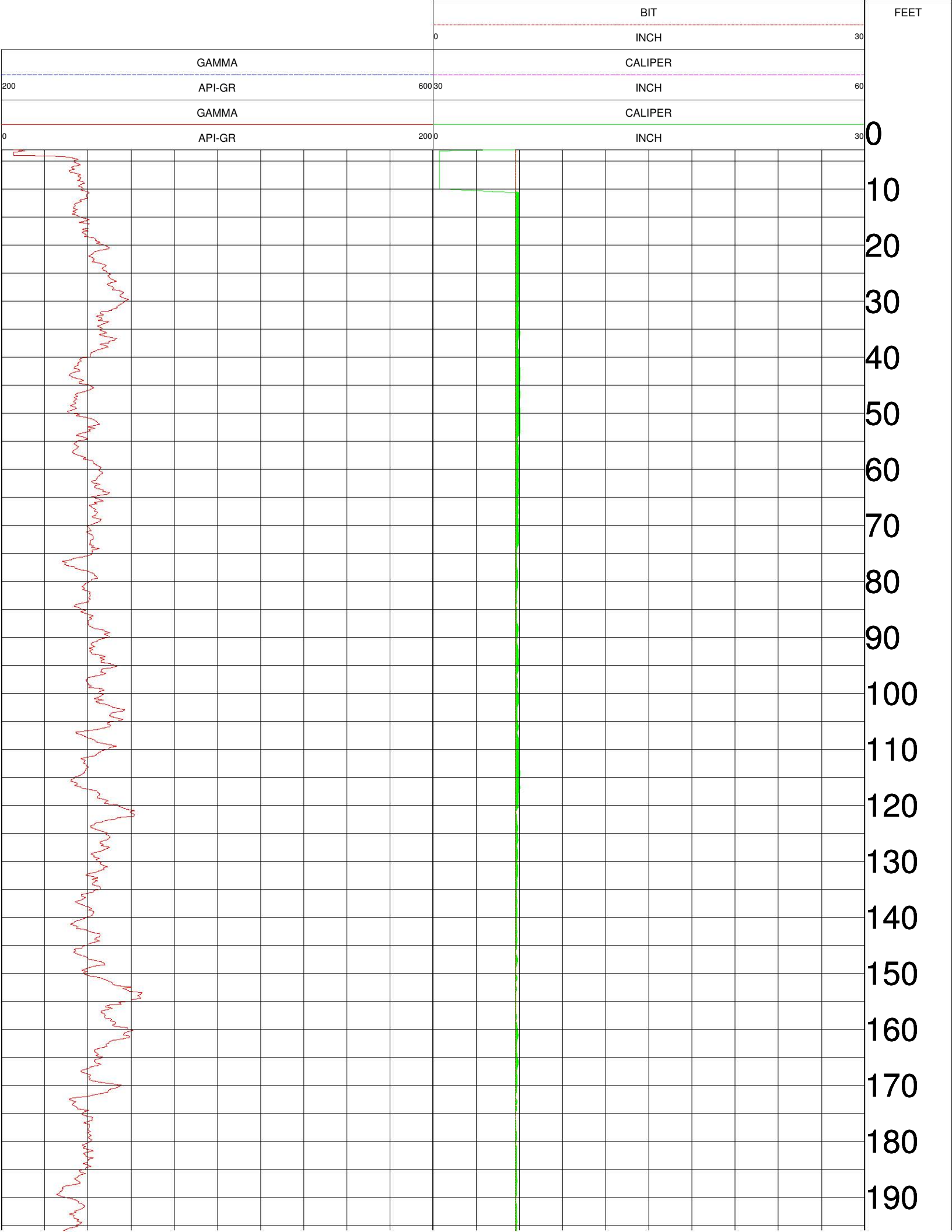


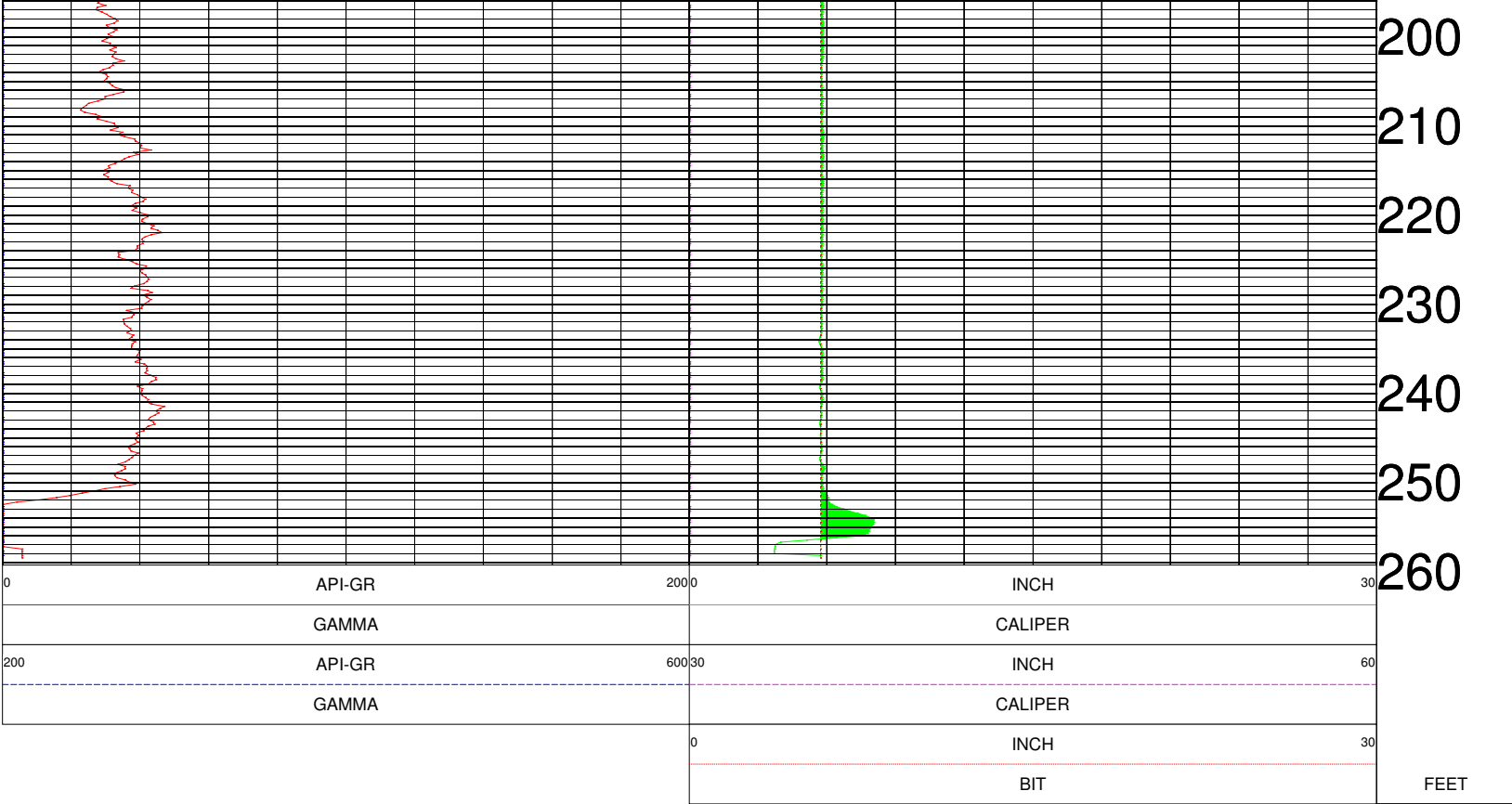
GAMMA RAY (API)-CALIPER

TZ-MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: COMPL VIDEO
WELL	: TZ-MW-1	
FIELD	: CITY OLDSMAR	
COUNTY	: PINELLAS	
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 260	
BIT SIZE	: 5.8	
LOG TOP	: 3.00	
LOG BOTTOM	: 259.00	
CASING OD	:	
CASING BOTTOM	: 250	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



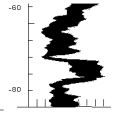


TOOL CALIBRATION TZ-MW-1 04/29/13 08:39
TOOL 9074A1 TM VERSION 0
SERIAL NUMBER 985

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1	Jan12,03	07:10:06	GAMMA	Default	[CPS]	Default	[CPS]
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2	Aug02,12	16:55:05	CALIPER	4.000	[INCH]	173274.00	[CPS]
	Aug02,12	16:55:05	CALIPER	10.000	[INCH]	157168.00	[CPS]
3	Feb15,13	18:29:50	CALIPERL	5.000	[INCH]	172602.00	[CPS]
	Feb15,13	18:29:50	CALIPERL	11.500	[INCH]	161840.00	[CPS]
4	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]

ABS

Advanced Borehole Services

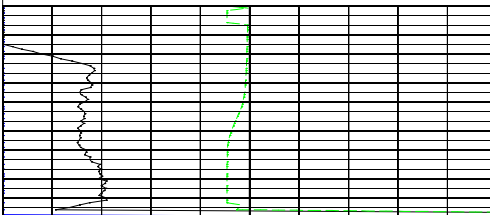
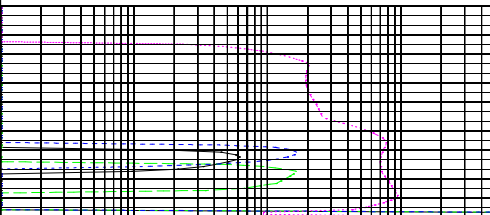


COMBINATION LOG

TZ-MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: COMPL VIDEO .
WELL	: TZ-MW-1	
FIELD	: CITY OLDSMAR	
COUNTY	: PINELLAS	
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 260	
BIT SIZE	: 5.8	
LOG TOP	: 237.00	
LOG BOTTOM	: 260.00	
CASING OD	:	
CASING BOTTOM	: 250	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

			FEET	RES	SP COND
			<-VOLUME	0.01 OHM 500	US/CM 10000
SP			SPEED->	LATERAL	RES(FL)
-500 MV 600	0.01 OHM-M 500			OHM-M 10	
GAMMA				RES(64N)	DEL TEMP
200 API-GR 400	0.01 OHM-M 50-0.5			DEG F 0.5	
GAMMA				RES(16N)	TEMP
0 API-GR 200	0.01 OHM-M 5070			DEG F 90	
					
0 API-GR 200	0.01 OHM-M 5070			DEG F 90	
GAMMA				RES(16N)	TEMP
200 API-GR 400	0.01 OHM-M 50-0.5			DEG F 0.5	
GAMMA			SPEED->	RES(64N)	DEL TEMP
-500 MV 600	0.01 OHM-M 500			OHM-M 10	
SP				LATERAL	RES(FL)
				0.01 OHM 500	US/CM 10000
				RES	SP COND

TOOL CALIBRATION TZ-MW-1 04/29/13 09:14

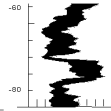
TOOL 8044A TM VERSION 0

SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan03,03	10:49:05	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Jan03,03	07:49:05	GAMMA	180.000	[API-GR]	169.00	[CPS]
2	Apr15,13	13:59:48	RES(FL)	41.600	[OHM-M]	65967.00	[CPS]
	Apr15,13	13:59:48	RES(FL)	0.001	[OHM-M]	13788.00	[CPS]
3	Nov14,10	17:54:51	SP	0.000	[MV]	59670.00	[CPS]
	Nov14,10	17:54:51	SP	395.000	[MV]	19917.00	[CPS]
4	Nov06,12	22:14:04	RES(16N)	0.000	[OHM-M]	4450.00	[CPS]
	Nov06,12	22:14:04	RES(16N)	1996.000	[OHM-M]	103589.00	[CPS]
5	Nov06,12	22:14:14	RES(64N)	0.000	[OHM-M]	4347.00	[CPS]
	Nov06,12	22:14:14	RES(64N)	1990.000	[OHM-M]	102351.00	[CPS]
6	Nov06,12	22:23:12	TEMP	69.600	[DEG F]	64003.00	[CPS]
	Nov06,12	22:23:12	TEMP	86.500	[DEG F]	55877.00	[CPS]
7	Nov06,12	22:14:25	RES	0.000	[OHM]	9921.00	[CPS]
	Nov06,12	22:14:25	RES	988.000	[OHM]	58884.00	[CPS]

ABS

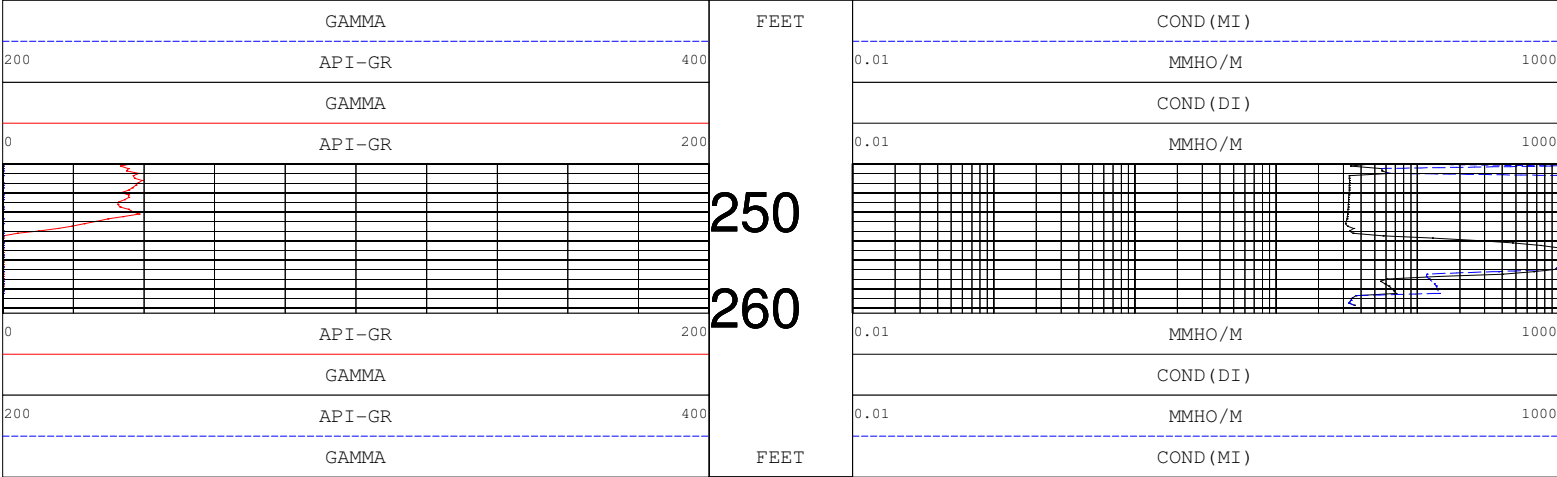
Advanced Borehole Services



DUAL INDUCTION-GAMMA RAY

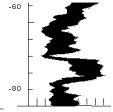
TZ-MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: COMPL VIDEO
WELL	: TZ-MW-1	
FIELD	: CITY OLDSMAR	
COUNTY	: PINELLAS	
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 260	
BIT SIZE	: 5.8	
LOG TOP	: 3.00	
LOG BOTTOM	: 259.00	
CASING OD	:	
CASING BOTTOM	: 250	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS		



ABS

Advanced Borehole Services

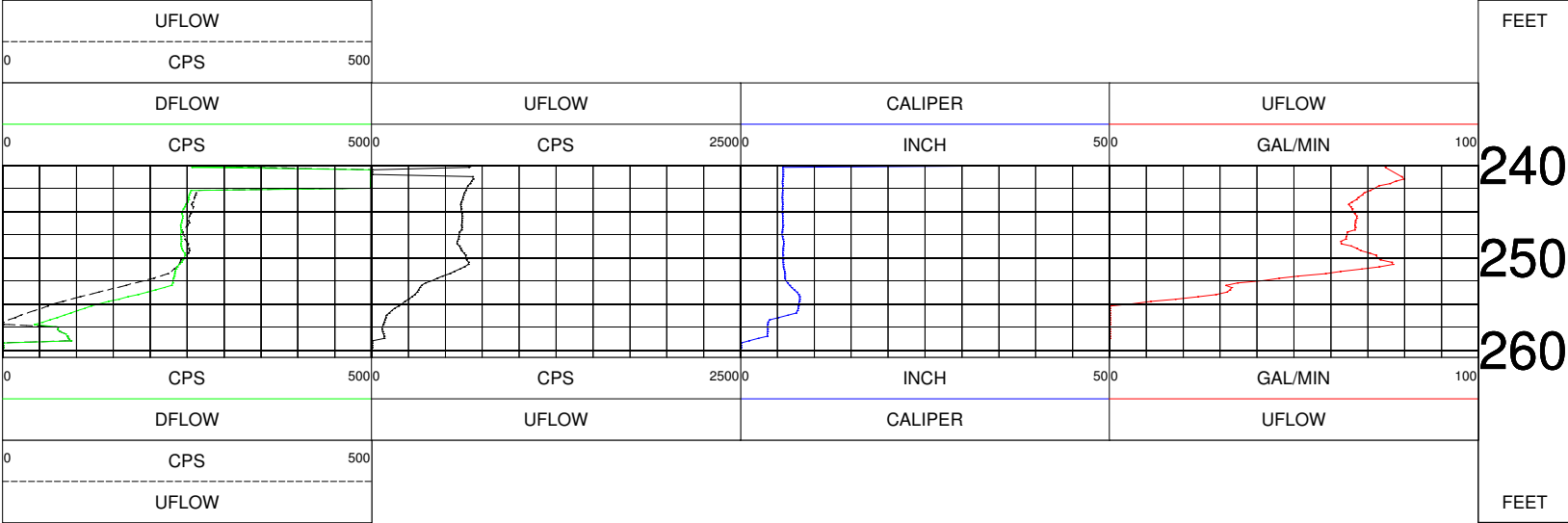


PRODUCTION-STATIC-PUMPING

TZ-MW-1

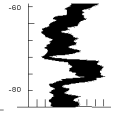
COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: TZ-MW-1	COMPL
FIELD	: CITY OLDSMAR	VIDEO
COUNTY	: PINELLAS	.
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 260	
BIT SIZE	: 5.8	
LOG TOP	: 3.00	
LOG BOTTOM	: 260.50	
CASING OD	:	
CASING BOTTOM	: 250	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



ABS

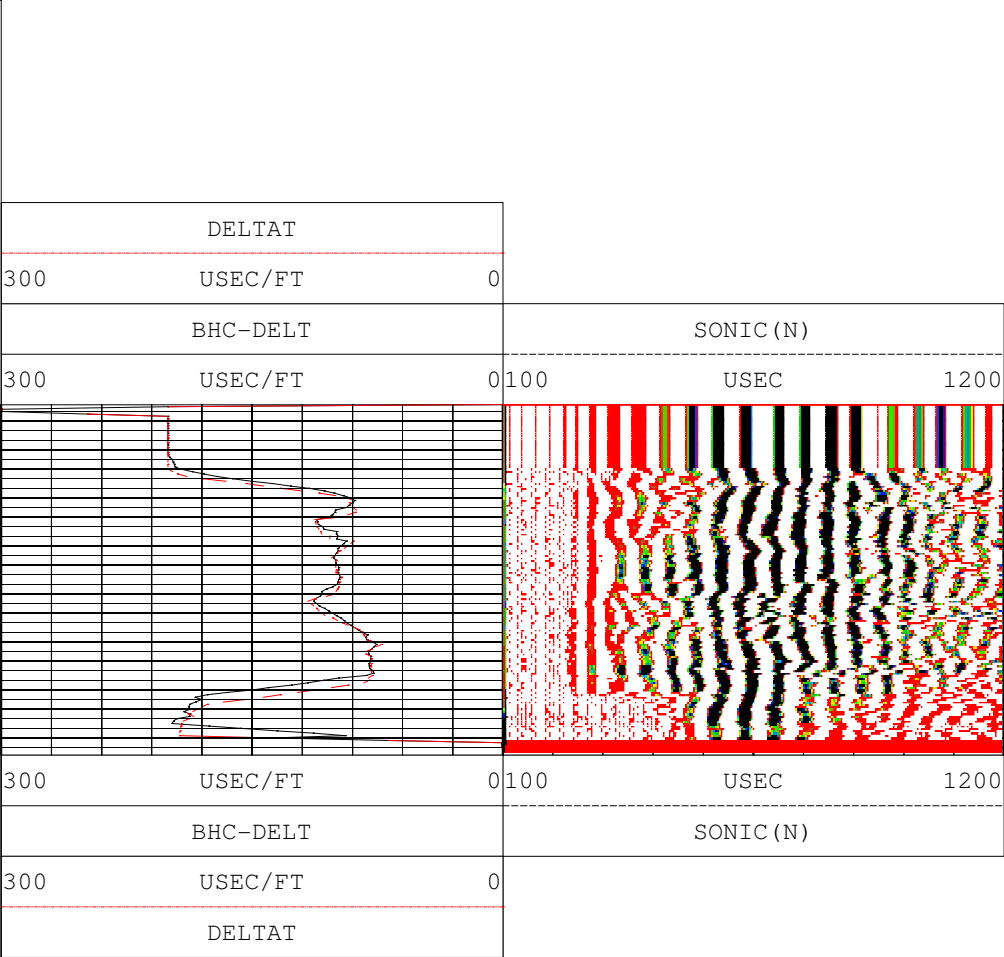
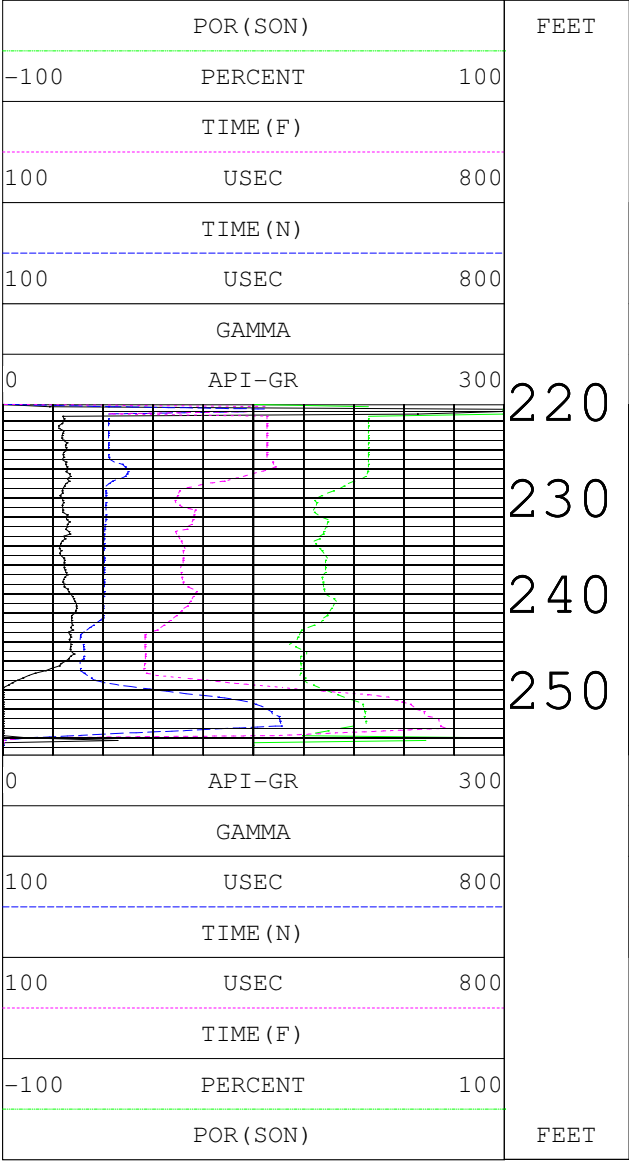
Advanced Borehole Services



FULL WAVE BHC ACOUSTIC-VDL

TZ-MW-1

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: COMPL VIDEO .
WELL	: TZ-MW-1	
FIELD	: CITY OLDSMAR	
COUNTY	: PINELLAS	
STATE	: FLORIDA	
LOCATION	:	
SECTION	: None	
TOWNSHIP	: None	
RANGE	: None	
API NO.	:	
UNIQUE WELL ID.	:	
PERMANENT DATUM	: None	ELEVATION KB: None
LOG MEASURED FROM:	GS	ELEVATION DF: None
DRL MEASURED FROM:	NA	ELEVATION GL: None
DATE	: 04/29/13	
DEPTH DRILLER	: 260	
BIT SIZE	: 5.8	
LOG TOP	: 220.25	
LOG BOTTOM	: 256.50	
CASING OD	:	
CASING BOTTOM	: 250	
CASING TYPE	: STEEL	
BOREHOLE FLUID	: FOR	
RM TEMPERATURE	: 0	
MUD RES	: 0	
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	: AFB	
REMARKS 1	:	
REMARKS 2	: None	
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS		



TOOL CALIBRATION TZ-MW-1 04/29/13 10:27
TOOL 9320A2 TM VERSION 0
SERIAL NUMBER 667

DATE		TIME	SENSOR	STANDARD		RESPONSE	
1	Apr12,99	23:12:30	GAMMA	Default	[CPS]	Default	[CPS]
	Apr12,99	20:12:30	GAMMA	Default	[CPS]	Default	[CPS]

TZMW-1
Final Well Video
(provided on DVD)

Appendix G

SZMW-1 Step-drawdown Test Results

SPECIFIC CAPACITY ANALYSIS FROM STEP-DRAWDOWN TEST

Oldsmar SZMW-1 ASR Storage Zone Monitoring Well

Jacob (1947), Bierschenk (1963) and Driscoll (1986)

$$s = BQ + CQ^n$$

s: Drawdown

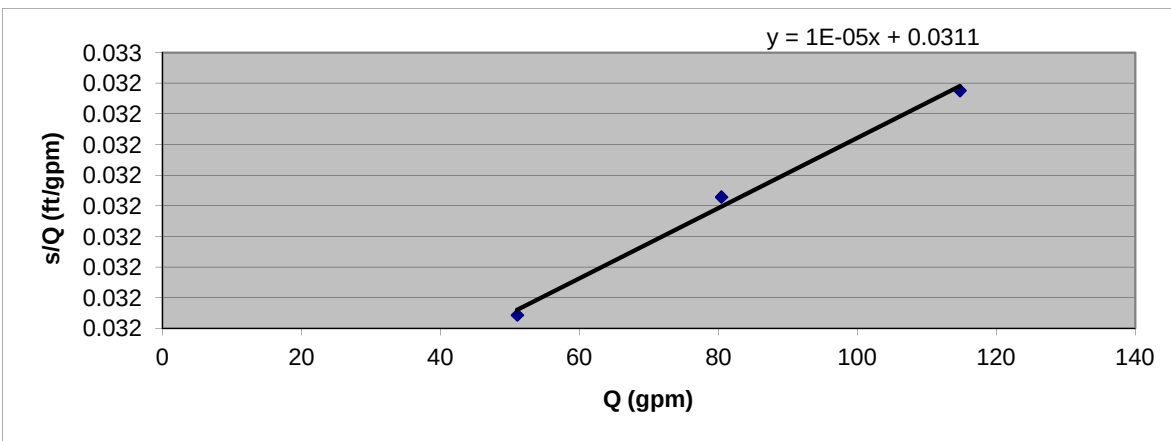
C: Well loss coefficient

n = 2

Q: Pumping rate

B: Aquifer loss coefficient

Specific Capacity			
Q (gpm)	s (ft)	Q/s (gpm/ft)	s/Q (ft/gpm)
51	1.62	32	0.032
80	2.58	31	0.032
115	3.72	31	0.032



$$C = 1.1462E-05$$

(slope of the line)

$$\text{Well Efficiency (\%)} = 100/(BQ/s)$$

$$B = 0.03107527$$

(value at Y-intercept)

Q (gpm)	s (ft)	Aquifer loss (ft)	Well loss (ft)	Well Efficiency
51.04477612	1.61522444	1.6	0.0	98%
80.41666667	2.5756411	2.5	0.1	97%
114.75	3.7151411	3.6	0.2	96%

The specific capacity of an ideal well (one that measures only aquifer losses) can be calculated from $Q/s = 1/B$, and Transmissivity can be estimated from this specific capacity using Driscoll's formula which is,

$$T = Q/s * 2000 \quad \text{where} \quad \begin{array}{l} Q/s: \text{specific capacity (gpm/ft)} \text{ and} \\ T: \text{Transmissivity (gpd/ft)} \end{array}$$

Therefore;

Q/s =	32.18 gpm/ft		
T =	64,360 gpd/ft	or	8,604 ft ² /day

References:

Bierschenk, W.H., 1963,

Determining well efficiency by multiple step-drawdown tests: International Association of Scientific Hydrology Publication 64, p. 493-507

Jacob, C.E., 1947,

Drawdown test to determine effective radius of artesian well: Transactions American Society of Civil Engineers, v. 112, paper 112, p. 1047.

Driscoll, F.G., 1986, Groundwater and Wells (2nd ed.): Johnson Division, St. Paul, Minnesota, p. 1021.

Appendix H

TZMW-1 Step-drawdown Test Results

SPECIFIC CAPACITY ANALYSIS FROM STEP-DRAWDOWN TEST

Oldsmar TZMW-1 ASR Transition Zone Monitoring Well

Jacob (1947), Bierschenk (1963) and Driscoll (1986)

$$s = BQ + CQ^n$$

s: Drawdown

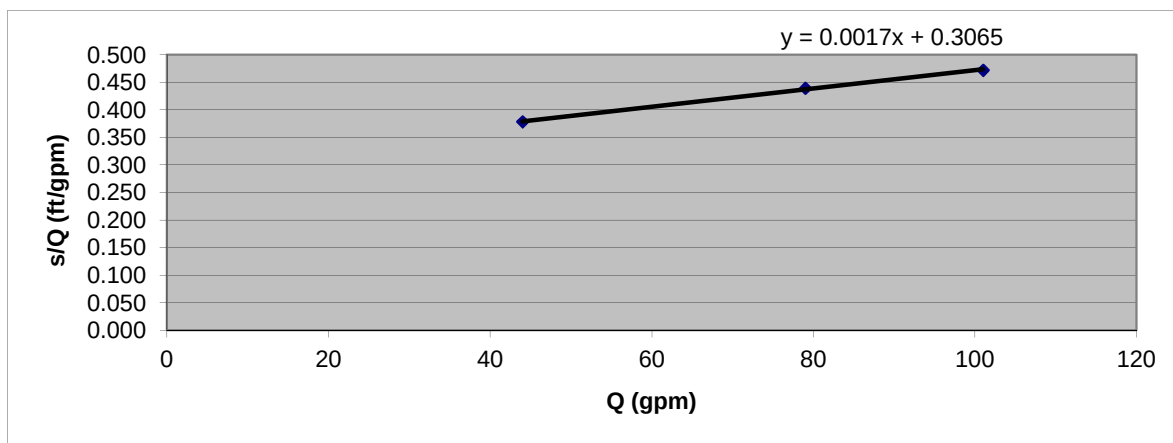
C: Well loss coefficient

n = 2

Q: Pumping rate

B: Aquifer loss coefficient

Specific Capacity			
Q (gpm)	s (ft)	Q/s (gpm/ft)	s/Q (ft/gpm)
44	16.64	3	0.378
79	34.68	2	0.439
101	47.65	2	0.472



$$C = 0.00165039$$

(slope of the line)

$$\text{Well Efficiency (\%)} = 100/(BQ/s)$$

$$B = 0.3064503$$

(value at Y-intercept)

Q (gpm)	s (ft)	Aquifer loss (ft)	Well loss (ft)	Well Efficiency
44	16.6421437	13.5	3.2	81%
79	34.6810225	24.2	10.3	70%
101	47.6526437	31.0	16.8	65%

The specific capacity of an ideal well (one that measures only aquifer losses) can be calculated from $Q/s = 1/B$, and Transmissivity can be estimated from this specific capacity using Driscoll's formula which is,

$$T = Q/s * 2000 \quad \text{where} \quad \begin{array}{l} Q/s: \text{specific capacity (gpm/ft) and} \\ T: \text{Transmissivity (gpd/ft)} \end{array}$$

Therefore;

Q/s =	3.26 gpm/ft		
T =	6,526 gpd/ft	or	872 ft ² /day

References:

Bierschenk, W.H., 1963,

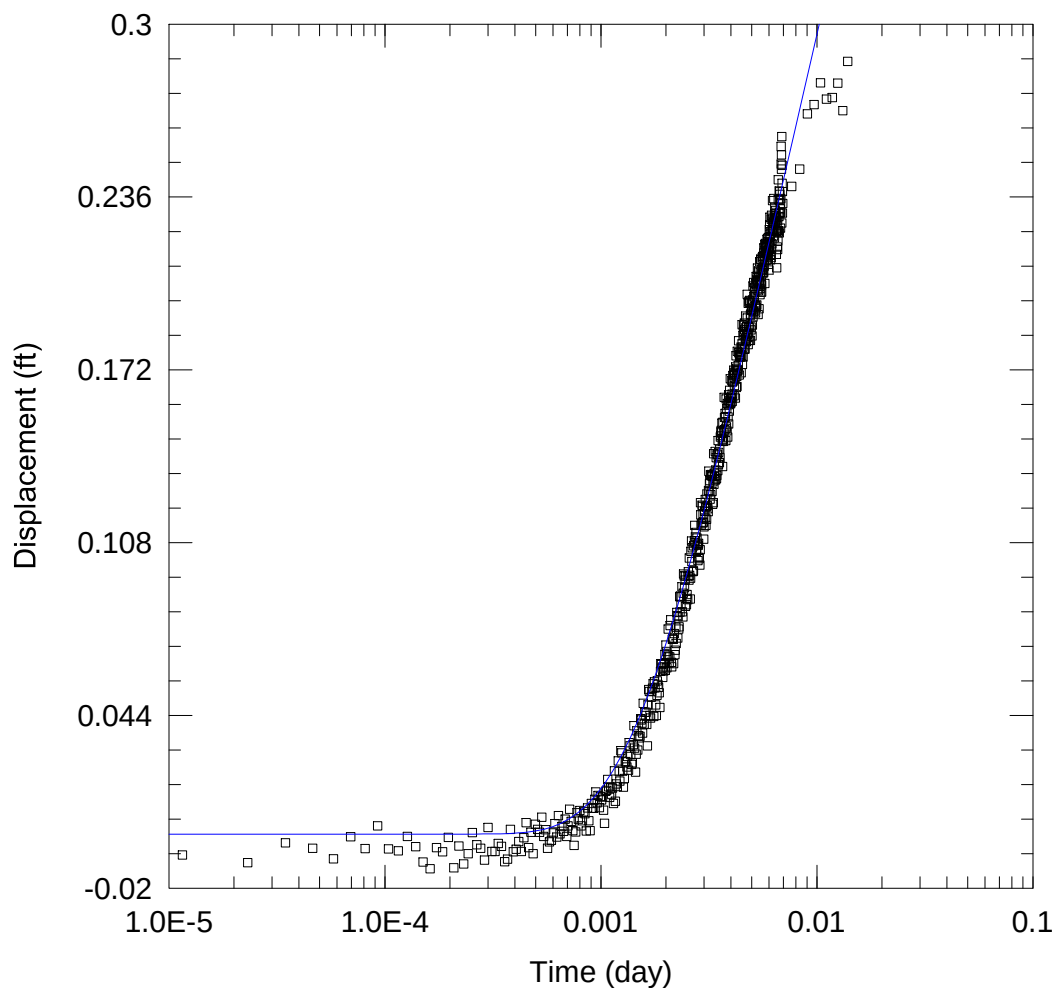
Determining well efficiency by multiple step-drawdown tests: International Association of Scientific Hydrology Publication 64, p. 493-507

Jacob, C.E., 1947,

Drawdown test to determine effective radius of artesian well: Transactions American Society of Civil Engineers, v. 112, paper 112, p. 1047.

Driscoll, F.G., 1986, Groundwater and Wells (2nd ed.): Johnson Division, St. Paul, Minnesota, p. 1021.

Appendix I
APT AQTESOLV Results



WELL TEST ANALYSIS

Data Set: M:\15125-Oldsmar\025-01-ASR Well Completion\SZMW-1_EarlyDrawdown.aqt

Date: 03/07/14

Time: 07:35:26

PROJECT INFORMATION

Company: Jones Edmunds

Client: City of Oldsmar

Project: 15125-025-01

Location: Oldsmar

Test Well: ASR-1

Test Date: 2/6/2014

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
ASR-1	444759.74	1344171.02

Observation Wells

Well Name	X (ft)	Y (ft)
□ SZMW-1	444690.04	1344630.6

SOLUTION

Aquifer Model: Leaky

Solution Method: Hantush

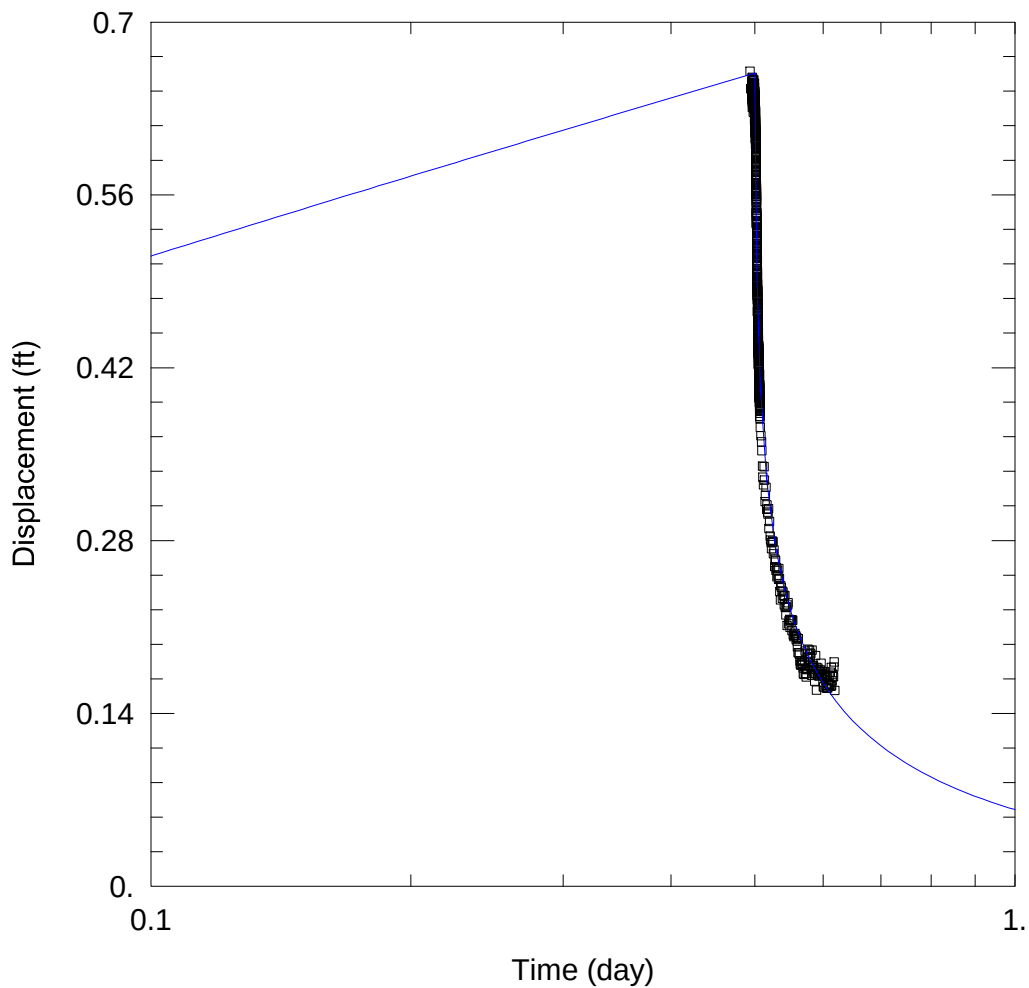
T = 6.085E+4 ft²/day

S = 0.0026

β = 0.23

Kz/Kr = 0.35

b = 1160. ft



WELL TEST ANALYSIS

Data Set: M:\15125-Oldsmar\025-01-ASR Well Completion\SZMW-1_EarlyRecovery.aqt

Date: 03/07/14

Time: 07:38:05

PROJECT INFORMATION

Company: Jones Edmunds

Client: City of Oldsmar

Project: 15125-025-01

Location: Oldsmar

Test Well: ASR-1

Test Date: 2/6/2014

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
ASR-1	444759.74	1344171.02

Observation Wells

Well Name	X (ft)	Y (ft)
□ SZMW-1	444690.04	1344630.6

SOLUTION

Aquifer Model: Leaky

Solution Method: Hantush

T = 7.3E+4 ft²/day

S = 0.0011

β = 0.52

Kz/Kr = 0.3

b = 1160 ft

Appendix J

Water Quality Data

SZMW-1
Laboratory Report

Jones Edmunds
730 NE Waldo Road
Gainesville, FL 32641

June 12, 2013
Work Order: 1305403

Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		SZMW1						
Matrix		Groundwater						
SAL Sample Number		1305403-01						
Date/Time Collected		05/22/13 14:15						
Collected by		Ian Gerald						
Date/Time Received		05/22/13 15:00						
Field Parameters								
pH	SU	6.8	DEP FT1100	0.1	0.1		05/22/13 14:15	1
Water Temperature	°C	26.7	DEP FT1400	0.1	0.1		05/22/13 14:15	1
Specific conductance	umhos/cm	49,080	DEP FT1200	0.1	0.1		05/22/13 14:15	1
Turbidity	NTU	32	DEP FT1600	0.01	0.01		05/22/13 14:15	1
Dissolved Oxygen	mg/L	0.5	DEP FT1500	0.1	0.1		05/22/13 14:15	1
Volatile Organic Compounds (Primary DW)								
Benzene	ug/L	0.1 U	EPA 524.2	0.8	0.1		05/23/13 19:27	1
Carbon tetrachloride	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
Chlorobenzene	ug/L	0.1 U	EPA 524.2	0.8	0.1		05/23/13 19:27	1
Methylene Chloride	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
1,2-Dichlorobenzene	ug/L	0.1 U	EPA 524.2	0.8	0.1		05/23/13 19:27	1
1,4-Dichlorobenzene	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
1,2-Dichloroethane	ug/L	0.1 U	EPA 524.2	0.8	0.1		05/23/13 19:27	1
1,1-Dichloroethene	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
cis-1,2-Dichloroethene	ug/L	0.09 U	EPA 524.2	0.8	0.09		05/23/13 19:27	1
trans-1,2-Dichloroethene	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
1,2-Dichloropropane	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
Ethylbenzene	ug/L	0.08 U	EPA 524.2	0.8	0.08		05/23/13 19:27	1
Styrene	ug/L	0.05 U	EPA 524.2	0.8	0.05		05/23/13 19:27	1
Tetrachloroethene	ug/L	0.1 U	EPA 524.2	0.8	0.1		05/23/13 19:27	1
Toluene	ug/L	0.09 U	EPA 524.2	0.8	0.09		05/23/13 19:27	1
1,2,4-Trichlorobenzene	ug/L	0.3 U	EPA 524.2	0.8	0.3		05/23/13 19:27	1
1,1,1-Trichloroethane	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
1,1,2-Trichloroethane	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
Trichloroethene	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
Vinyl chloride	ug/L	0.3 U	EPA 524.2	1.6	0.3		05/23/13 19:27	1
Xylenes- Total	ug/L	0.1 U	EPA 524.2	0.8	0.1		05/23/13 19:27	1
Surrogate for EPA 524.2		Dibromofluoromethane	102 %	Limits	65-135			
Trihalomethane Analysis								
Bromodichloromethane	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
Bromoform	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
Chloroform	ug/L	0.2 U	EPA 524.2	0.8	0.2		05/23/13 19:27	1
Dibromochloromethane	ug/L	0.1 U	EPA 524.2	0.8	0.1		05/23/13 19:27	1
Total Trihalomethanes	ug/L	0.1 U	EPA 524.2	0.8	0.1		05/23/13 19:27	1
Surrogate for EPA 524.2		Dibromofluoromethane	102 %	Limits	65-135			
Volatile Organic Compounds								

Jones Edmunds
730 NE Waldo Road
Gainesville, FL 32641

June 12, 2013
Work Order: 1305403

Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		SZMW1						
Matrix		Groundwater						
SAL Sample Number		1305403-01						
Date/Time Collected		05/22/13 14:15						
Collected by		Ian Gerald						
Date/Time Received		05/22/13 15:00						
Chloroethane	ug/L	0.4 U	EPA 524.2	1.6	0.4		05/23/13 19:27	1
Chloroform	ug/L	0.2 U	EPA 524.2	1.0	0.2		05/23/13 19:27	1
Surrogate for EPA 524.2	Dibromofluoromethane	102 %	Limits		65-135			
Total Haloacetic Acids Analyses								
Dibromoacetic Acid	ug/L	0.27 U	EPA 552.2	1.0	0.27	05/24/13 13:11	05/25/13 12:49	1
Dichloroacetic Acid	ug/L	0.70 U	EPA 552.2	1.0	0.70	05/24/13 13:11	05/25/13 12:49	1
Monobromoacetic Acid	ug/L	0.34 U	EPA 552.2	1.0	0.34	05/24/13 13:11	05/25/13 12:49	1
Monochloroacetic Acid	ug/L	0.78 U	EPA 552.2	2.0	0.78	05/24/13 13:11	05/25/13 12:49	1
Trichloroacetic Acid	ug/L	0.35 U	EPA 552.2	1.0	0.35	05/24/13 13:11	05/25/13 12:49	1
Total Haloacetic Acids	ug/L	0.27 U	EPA 552.2	1.0	0.27	05/24/13 13:11	05/25/13 12:49	1
Surrogate for EPA 552.2	2-Bromo-n-butyric Acid	106 %	Limits		70-130			
Pesticide Analyses								
1,2-Dibromo-3-chloropropane	ug/L	0.0053 U	EPA 504.1	0.021	0.0053	05/30/13 08:34	05/30/13 19:39	1
1,2-Dibromoethane	ug/L	0.0053 U	EPA 504.1	0.021	0.0053	05/30/13 08:34	05/30/13 19:39	1
Diquat	ug/L	0.39 U	EPA 549.2	6.0	0.39	05/23/13 15:13	05/24/13 16:17	1
Endothall	ug/L	6.7 U	EPA 548.1	80	6.7	05/28/13 11:13	06/05/13 19:47	1
Glyphosate	ug/L	2.7 U	EPA 547	40	2.7		05/23/13 22:49	1
Surrogate for EPA 504.1	2-Bromo-1-chloropropane	109 %	Limits		70-130			
Chlorinated Pesticides								
Chlordane	ug/L	0.046 U	EPA 508.1	0.52	0.046	05/28/13 09:11	06/05/13 04:45	1
Polychlorinated biphenyls	ug/L	0.086 U	EPA 508.1	0.10	0.086	05/28/13 09:11	06/05/13 04:45	1
Toxaphene	ug/L	0.52 U	EPA 508.1	0.52	0.52	05/28/13 09:11	06/05/13 04:45	1
Surrogate for EPA 508.1	4,4'-Dibromobiphenyl	73 %	Limits		70-130			
Chlorinated Herbicides								
Dalapon	ug/L	0.31 U	EPA 515.3	0.94	0.31	05/23/13 15:44	05/24/13 06:23	1
2,4-D	ug/L	0.094 U	EPA 515.3	0.47	0.094	05/23/13 15:44	05/24/13 06:23	1
Pentachlorophenol	ug/L	0.013 U	EPA 515.3	0.094	0.013	05/23/13 15:44	05/24/13 06:23	1
2,4,5-TP	ug/L	0.039 U	EPA 515.3	0.38	0.039	05/23/13 15:44	05/24/13 06:23	1
Dinoseb	ug/L	0.14 U	EPA 515.3	0.47	0.14	05/23/13 15:44	05/24/13 06:23	1
Picloram	ug/L	0.045 U	EPA 515.3	0.71	0.045	05/23/13 15:44	05/24/13 06:23	1
Surrogate for EPA 515.3	2,4-Dichlorophenylacetic Acid	87 %	Limits		70-130			
Carbamate Pesticides								
Carbofuran	ug/L	0.60 U	EPA 531.1	2.0	0.60		06/01/13 01:02	1
Oxamyl	ug/L	0.88 U	EPA 531.1	2.0	0.88		06/01/13 01:02	1
Surrogate for EPA 531.1	BDMC	94 %	Limits		70-130			

Jones Edmunds
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June 12, 2013
Work Order: 1305403

Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		SZMW1						
Matrix		Groundwater						
SAL Sample Number		1305403-01						
Date/Time Collected		05/22/13 14:15						
Collected by		Ian Gerald						
Date/Time Received		05/22/13 15:00						
<u>Semivolatile Analyses</u>								
Alachlor	ug/L	0.03 U	EPA 525.2	0.2	0.03	05/28/13 09:14	05/28/13 18:25	1
Aldrin	ug/L	0.04 U	EPA 525.2	0.2	0.04	06/04/13 10:09	06/04/13 18:15	1
Anthracene	ug/L	0.30 U	EPA 625	10	0.30	05/29/13 12:34	05/30/13 22:03	1
Atrazine	ug/L	0.02 U	EPA 525.2	0.1	0.02	05/28/13 09:14	05/28/13 18:25	1
Benzo(a)pyrene	ug/L	0.02 U	EPA 525.2	0.1	0.02	05/28/13 09:14	05/28/13 18:25	1
gamma-BHC	ug/L	0.02 U	EPA 525.2	0.1	0.02	05/28/13 09:14	05/28/13 18:25	1
Butyl benzyl phthalate	ug/L	0.84 U	EPA 625	10	0.84	05/29/13 12:34	05/30/13 22:03	1
2-Chlorophenol	ug/L	2.9 U	EPA 625	10	2.9	05/29/13 12:34	05/30/13 22:03	1
Dieldrin	ug/L	0.1 U	EPA 525.2	0.2	0.1	06/04/13 10:09	06/04/13 18:15	1
Dimethylphthalate	ug/L	1.6 U	EPA 625	10	1.6	05/29/13 12:34	05/30/13 22:03	1
Endrin	ug/L	0.05 U	EPA 525.2	0.2	0.05	05/28/13 09:14	05/28/13 18:25	1
Bis(2-ethylhexyl)adipate	ug/L	0.07 U	EPA 525.2	0.5	0.07	05/28/13 09:14	05/28/13 18:25	1
Bis(2-ethylhexyl)phthalate	ug/L	0.6 U	EPA 525.2	1	0.6	05/28/13 09:14	05/28/13 18:25	1
Heptachlor	ug/L	0.08 U	EPA 525.2	0.1	0.08	05/28/13 09:14	05/28/13 18:25	1
Heptachlor epoxide	ug/L	0.08 U	EPA 525.2	0.2	0.08	05/28/13 09:14	05/28/13 18:25	1
Hexachlorobenzene	ug/L	0.04 U	EPA 525.2	0.1	0.04	05/28/13 09:14	05/28/13 18:25	1
Hexachlorocyclopentadiene	ug/L	0.06 U	EPA 525.2	0.2	0.06	05/28/13 09:14	05/28/13 18:25	1
Methoxychlor	ug/L	0.02 U	EPA 525.2	0.2	0.02	05/28/13 09:14	05/28/13 18:25	1
Simazine	ug/L	0.03 U	EPA 525.2	0.1	0.03	05/28/13 09:14	05/28/13 18:25	1
Naphthalene	ug/L	0.88 U	EPA 625	10	0.88	05/29/13 12:34	05/30/13 22:03	1
Phenanthrene	ug/L	0.96 U	EPA 625	10	0.96	05/29/13 12:34	05/30/13 22:03	1
Phenol	ug/L	1.4 U	EPA 625	10	1.4	05/29/13 12:34	05/30/13 22:03	1
2,4,6-Trichlorophenol	ug/L	2.8 U	EPA 625	10	2.8	05/29/13 12:34	05/30/13 22:03	1
Surrogate for EPA 525.2	Triphenyl Phosphate		110 %	Limits	70-130			
<u>Inorganics</u>								
Ammonia as N	mg/L	1.2	EPA 350.1	0.40	0.095		06/10/13 14:27	10
Biochemical Oxygen Demand	mg/L	2 U	SM 5210B	2	2	05/23/13 07:00	05/28/13 16:47	1
Chemical Oxygen Demand	mg/L	260	EPA 410.4	25	10	05/30/13 08:26	05/30/13 13:30	1
Chloride	mg/L	16,000	EPA 300.0	200	50		05/23/13 20:53	1000
Color	Color Units	45	SM 2120B	5	5		05/23/13 09:59	1
Cyanide	mg/L	0.0024 U	SM 4500CN-E	0.020	0.0024	05/30/13 11:25	05/31/13 14:28	1
Fluoride	mg/L	1.0 U	EPA 300.0	4.0	1.0		05/23/13 20:53	100
Nitrate (as N)	mg/L	1.0 U	EPA 300.0	4.0	1.0		05/23/13 20:53	100
Nitrite (as N)	mg/L	1.0 U	EPA 300.0	4.0	1.0		05/23/13 20:53	100
Odor at 25C	T.O.N.	1	SM 2150B	1	1	05/23/13 11:00	05/23/13 11:10	1
Organic Nitrogen (N)	mg/L	0.37 I	EPA 351.2	0.40	0.095	06/10/13 14:27	06/11/13 10:08	10

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June 12, 2013
Work Order: 1305403

Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		SZMW1						
Matrix		Groundwater						
SAL Sample Number		1305403-01						
Date/Time Collected		05/22/13 14:15						
Collected by		Ian Gerald						
Date/Time Received		05/22/13 15:00						
Phosphorous - Total as P	mg/L	0.20	SM 4500P-E	0.040	0.010	06/05/13 14:15	06/06/13 14:32	1
Sulfate	mg/L	2,600	EPA 300.0	600	200		05/23/13 20:53	1000
Surfactants (MBAS,mw342)	mg/L	0.11	SM 5540C	0.080	0.048	05/24/13 07:49	05/24/13 10:32	1
Total Dissolved Solids	mg/L	28,000	SM 2540C	10	10	05/25/13 14:47	05/26/13 10:59	1
Total Kjeldahl Nitrogen	mg/L	1.6	EPA 351.2	0.20	0.05	06/10/13 09:22	06/11/13 10:08	1
Metals								
Aluminum	mg/L	0.65 I	EPA 200.7	2.5	0.50	05/23/13 08:34	05/24/13 16:35	10
Antimony	mg/L	0.00056	EPA 200.8	0.00050	0.000071	06/03/13 12:30	06/06/13 10:35	1
Arsenic	mg/L	0.080	EPA 200.8	0.0050	0.00093	05/29/13 15:18	05/31/13 16:32	1
Barium	mg/L	0.15	EPA 200.8	0.0050	0.0018	05/29/13 15:18	06/03/13 08:53	10
Beryllium	mg/L	0.00099 I	EPA 200.7	0.010	0.00096	05/23/13 08:34	05/24/13 16:35	10
Cadmium	mg/L	0.00027 U	EPA 200.8	0.00050	0.00027	05/29/13 15:18	05/31/13 16:32	1
Chromium	mg/L	0.0041 I	EPA 200.8	0.0050	0.00035	05/29/13 15:18	05/31/13 16:32	1
Copper	mg/L	0.12	EPA 200.8	0.00050	0.00013	05/29/13 15:18	05/31/13 16:32	1
Iron	mg/L	0.27 I	EPA 200.7	1.0	0.20	05/23/13 08:34	05/24/13 16:35	10
Lead	mg/L	0.00042 I	EPA 200.8	0.00050	0.00025	05/29/13 15:18	05/31/13 16:32	1
Manganese	mg/L	0.017 I	EPA 200.7	0.10	0.010	05/23/13 08:34	05/24/13 16:35	10
Mercury	mg/L	0.00010 U	EPA 245.1	0.00050	0.00010	05/24/13 11:10	05/24/13 15:31	1
Nickel	mg/L	0.039	EPA 200.8	0.0050	0.00046	05/29/13 15:18	05/31/13 16:32	1
Selenium	mg/L	0.31	EPA 200.8	0.050	0.0093	06/03/13 12:30	06/06/13 10:42	10
Silver	mg/L	0.000069 U	EPA 200.8	0.00050	0.000069	05/29/13 15:18	05/31/13 16:32	1
Sodium	mg/L	9,300	EPA 200.7	50	13	05/23/13 08:34	05/28/13 13:17	100
Thallium	mg/L	0.00024 U	EPA 200.8	0.00050	0.00024	05/29/13 15:18	05/31/13 16:32	1
Zinc	mg/L	0.042	EPA 200.8	0.0050	0.00088	05/29/13 15:18	05/31/13 16:32	1
Radiochemistry								
Gross Alpha (Incl. Uranium)	pCi/L	49 ± 3.5	EPA 00-02	2.5	2.5	05/30/13 08:59	06/03/13 09:14	1
Radium-226	pCi/L	11 ± 0.41	EPA 903.1	0.1	0.1	05/24/13 10:34	06/03/13 12:19	1
Radium-228	pCi/L	1.0 ± 0.4	EPA Ra-05	0.5	0.5	05/24/13 10:38	05/31/13 10:58	1
Uranium, Combined (mass)	ug/L	0.96	EPA 200.8	0.50	0.054	05/29/13 15:18	05/31/13 16:32	1

Jones Edmunds
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Gainesville, FL 32641

June 12, 2013
Work Order: 1305403

*** Qualifiers, Notes and Definitions**

Results followed by a "U" indicate that the sample was analyzed but the compound was not detected. Results followed by "I" indicate that the reported value is between the laboratory method detection limits and the laboratory practical quantitation limit.

A statement of estimated uncertainty of test results is available upon request.

For methods marked with **, all QC criteria have been met for this method which is equivalent to a SAL certified method.

Test results in this report meet all the requirements of the NELAC standards. Any applicable qualifiers are shown below.

Questions regarding this report should be directed to :

Christy Whitehurst

Telephone (813) 855-1844 FAX (813) 855-2218

Christy@southernanalyticallabs.com

Christy@southernanalyticallabs.com



110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2219

1305403

Chain of Custody.xls
Rev.Date 11/19/01

Chain of Custody

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 FAX 813-855-2218

GROUNDWATER SAMPLING LOG

Client Name: <u>Edmond Jones</u>	Location: <u>Oldsmar WW plant</u>	Contact: _____ Phone: _____
Date Sampled: <u>4/22/13</u>	SAL Project #: <u>1305403</u>	Project Name: _____
Well Number: <u>SZ MW1</u>	Sample ID: _____	GPS LAT: _____ GPS LONG: _____

PURGING DATA

WELL DIAMETER (Inches)	WELL CAPACITY (gal/ft)	Screen Interval (Feet)	UNK	To	UNK	Static Depth to Water (Feet)	PURGE PUMP CODE	PP	GP		
TOTAL WELL DEPTH (Feet)	REFERENCE ELEVATION (NGVD)	GROUND WATER ELEVATION (REFERENCE-STATIC)				TUBING DIAMETER (Inches)	TUBING CAPACITY (gal/ft)				
Purge Technique: q Submerged Screen (1, 1/4, 1/4 Well) q Submerged Screen (1EQ Volume, 3, 3 Minutes) q Partially Submerged Screen (1 Well, 3, 3 minutes)											
WELL VOLUME = (TOTAL DEPTH - STATIC DEPTH) x WELL CAPACITY = _____											
ONE WELL VOLUME	1/4 WELL VOLUME	3 WELL VOLUMES		5 WELL VOLUMES							
EQUIPMENT VOLUME = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME											
PUMP VOLUME	TUBING LENGTH	FLOW CELL VOLUME		EQUIPMENT VOLUME							
INITIAL TUBING LENGTH IN WELL (FEET)	FINAL TUBING LENGTH IN WELL (FEET)	PURGE TIME START	PURGE TIME END	TOTAL PURGED							
INST. ID				SAL-SAM-63	SAL-SAM-65	SAL-SAM-63	SAL-SAM-55	SAL-SAM-0			
TIME	VOLUME PURGED (Gallons)	TOTAL VOLUME PURGED (Gallons)	PURGE RATE (gpm)	Depth to Water (Feet)	pH (SU) ($\Delta < 0.2$)	TEMP (oC) ($\Delta < 0.2$)	SP COND (uS/cm) ($\Delta < 5\%$)	DO (mg/L) (% SAT < 20)	TURBIDITY (NTUs) (< 20 NTU)	COLOR (Describe)	ODOR (Describe)
1400					6.83	26.7	49085	1.02	37.3	slightly cloudy	sulfur
1405					6.82	26.6	49131	.75	37.5	↓	↓
1410					6.82	26.7	49076	.53	31.5	↓	↓
Well Capacity (gallons/foot): 0.75"=0.02, 1.25"=0.06, 2"=0.16, 3"=0.37, 4"=0.65, 5"=1.02, 6"=1.47, 12"=5.88											
TUBING INSIDE DIA. CAPACITY (Gal./ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016											

SAMPLING DATA

SAMPLED BY / COMPANY (PRINT)	PP PE NP TL TT	SAMPLE TUBING LENGTH IN WELL (FEET)	SAMPLER(S) SIGNATURES: <u>[Signature]</u>	SAMPLE PUMP FLOW RATE (mL/min)
TUBING MATERIAL CODE (CIRCLE ONE)				
SAMPLING INITIATED	SAMPLING ENDED	FIELD CLEANED	CLEANING STEPS	
FIELD FILTERED? <u>Y</u> ☒	FILTER SIZE (um)	DUPLICATE	VOC COLLECTED BY REVERSE FLOW? <u>Y</u> ☒	SEMI-VOLS COLLECTED THROUGH TRAP? <u>Y</u> ☒
PRESERVATION CHECKED IN FIELD? <u>Y</u> ☒	LIST PRESERVATIVES ADDED			
WEATHER CONDITIONS	<u>Clear 85°F</u>			
COMMENTS	<u>3 stabilization readings - Well was purged @ 100 gpm for 3 hours</u>			
PUMP CODES: PP=Peristaltic Pump, GP= Submersible Grundfos Pump, IBP= In-place Bladder Pump				
TUBING MATERIAL CODES: PP= Polypropylene, PE= Polyethylene, NP= Non-inert Plastic, TL= Teflon Lined, TT= Teflon				
Reviewed By: _____	Date: _____			

TZMW-1
Laboratory Report

Jones Edmunds
730 NE Waldo Road
Gainesville, FL 32641

May 17, 2013
Work Order: 1304467

Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		Sample 1						
Matrix		Groundwater						
SAL Sample Number		1304467-01						
Date/Time Collected		04/25/13 14:20						
Collected by		Ian Gerald						
Date/Time Received		04/25/13 15:00						
Field Parameters								
pH	SU	7.0	DEP FT1100	0.1	0.1		04/25/13 14:20	1
Water Temperature	°C	24.0	DEP FT1400	0.1	0.1		04/25/13 14:20	1
Specific conductance	umhos/cm	9,522	DEP FT1200	0.1	0.1		04/25/13 14:20	1
Turbidity	NTU	40	DEP FT1600	0.01	0.01		04/25/13 14:20	1
Dissolved Oxygen	mg/L	0.6	DEP FT1500	0.1	0.1		04/25/13 14:20	1
<u>Volatile Organic Compounds (Primary DW)</u>								
Benzene	ug/L	0.1 U	EPA 524.2	0.8	0.1		04/26/13 19:58	1
Carbon tetrachloride	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
Chlorobenzene	ug/L	0.1 U	EPA 524.2	0.8	0.1		04/26/13 19:58	1
Methylene Chloride	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
1,2-Dichlorobenzene	ug/L	0.1 U	EPA 524.2	0.8	0.1		04/26/13 19:58	1
1,4-Dichlorobenzene	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
1,2-Dichloroethane	ug/L	0.1 U	EPA 524.2	0.8	0.1		04/26/13 19:58	1
1,1-Dichloroethene	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
cis-1,2-Dichloroethene	ug/L	0.09 U	EPA 524.2	0.8	0.09		04/26/13 19:58	1
trans-1,2-Dichloroethene	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
1,2-Dichloropropane	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
Ethylbenzene	ug/L	0.08 U	EPA 524.2	0.8	0.08		04/26/13 19:58	1
Styrene	ug/L	0.05 U	EPA 524.2	0.8	0.05		04/26/13 19:58	1
Tetrachloroethene	ug/L	0.1 U	EPA 524.2	0.8	0.1		04/26/13 19:58	1
Toluene	ug/L	0.09 U	EPA 524.2	0.8	0.09		04/26/13 19:58	1
1,2,4-Trichlorobenzene	ug/L	0.3 U	EPA 524.2	0.8	0.3		04/26/13 19:58	1
1,1,1-Trichloroethane	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
1,1,2-Trichloroethane	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
Trichloroethene	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
Vinyl chloride	ug/L	0.3 U	EPA 524.2	1.6	0.3		04/26/13 19:58	1
Xylenes- Total	ug/L	0.1 U	EPA 524.2	0.8	0.1		04/26/13 19:58	1
Surrogate for EPA 524.2		Dibromofluoromethane	104 %	Limits	65-135			
<u>Trihalomethane Analysis</u>								
Bromodichloromethane	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
Bromoform	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
Chloroform	ug/L	0.2 U	EPA 524.2	0.8	0.2		04/26/13 19:58	1
Dibromochloromethane	ug/L	0.1 U	EPA 524.2	0.8	0.1		04/26/13 19:58	1
Total Trihalomethanes	ug/L	0.1 U	EPA 524.2	0.8	0.1		04/26/13 19:58	1
Surrogate for EPA 524.2		Dibromofluoromethane	104 %	Limits	65-135			
<u>Volatile Organic Compounds</u>								

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May 17, 2013
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Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		Sample 1						
Matrix		Groundwater						
SAL Sample Number		1304467-01						
Date/Time Collected		04/25/13 14:20						
Collected by		Ian Gerald						
Date/Time Received		04/25/13 15:00						
Chloroethane	ug/L	0.4 U	EPA 524.2	1.6	0.4		04/26/13 19:58	1
Chloroform	ug/L	0.2 U	EPA 524.2	1.0	0.2		04/26/13 19:58	1
Surrogate for EPA 524.2	Dibromofluoromethane	104 %	Limits		65-135			
Total Haloacetic Acids Analyses								
Dibromoacetic Acid	ug/L	0.29 U	EPA 552.2	1.1	0.29	05/03/13 11:31	05/04/13 06:41	1
Dichloroacetic Acid	ug/L	0.74 U	EPA 552.2	1.1	0.74	05/03/13 11:31	05/04/13 06:41	1
Monobromoacetic Acid	ug/L	0.36 U	EPA 552.2	1.1	0.36	05/03/13 11:31	05/04/13 06:41	1
Monochloroacetic Acid	ug/L	0.83 U	EPA 552.2	2.1	0.83	05/03/13 11:31	05/04/13 06:41	1
Trichloroacetic Acid	ug/L	0.37 U	EPA 552.2	1.1	0.37	05/03/13 11:31	05/04/13 06:41	1
Total Haloacetic Acids	ug/L	0.29 U	EPA 552.2	1.1	0.29	05/03/13 11:31	05/04/13 06:41	1
Surrogate for EPA 552.2	2-Bromo-n-butyric Acid	112 %	Limits		70-130			
Pesticide Analyses								
1,2-Dibromo-3-chloropropane	ug/L	0.0053 U	EPA 504.1	0.021	0.0053	05/07/13 16:03	05/08/13 00:28	1
1,2-Dibromoethane	ug/L	0.0053 U	EPA 504.1	0.021	0.0053	05/07/13 16:03	05/08/13 00:28	1
Diquat	ug/L	0.48 U	EPA 549.2	7.3	0.48	04/25/13 16:58	04/30/13 18:58	1
Endothall	ug/L	7.0 U	EPA 548.1	83	7.0	04/30/13 11:00	05/06/13 15:49	1
Glyphosate	ug/L	2.7 U	EPA 547	40	2.7		05/02/13 21:26	1
Surrogate for EPA 504.1	2-Bromo-1-chloropropane	95 %	Limits		70-130			
Chlorinated Pesticides								
Chlordane	ug/L	0.047 U	EPA 508.1	0.53	0.047	04/29/13 09:10	05/04/13 18:05	1
Polychlorinated biphenyls	ug/L	0.089 U	EPA 508.1	0.11	0.089	04/29/13 09:10	05/04/13 18:05	1
Toxaphene	ug/L	0.53 U	EPA 508.1	0.53	0.53	04/29/13 09:10	05/04/13 18:05	1
Surrogate for EPA 508.1	4,4'-Dibromobiphenyl	80 %	Limits		70-130			
Chlorinated Herbicides								
Dalapon	ug/L	0.32 U	EPA 515.3	0.98	0.32	05/03/13 11:11	05/04/13 08:30	1
2,4-D	ug/L	0.098 U	EPA 515.3	0.49	0.098	05/03/13 11:11	05/04/13 08:30	1
Pentachlorophenol	ug/L	0.014 U	EPA 515.3	0.098	0.014	05/03/13 11:11	05/04/13 08:30	1
2,4,5-TP	ug/L	0.040 U	EPA 515.3	0.39	0.040	05/03/13 11:11	05/04/13 08:30	1
Dinoseb	ug/L	0.15 U	EPA 515.3	0.49	0.15	05/03/13 11:11	05/04/13 08:30	1
Picloram	ug/L	0.047 U	EPA 515.3	0.73	0.047	05/03/13 11:11	05/04/13 08:30	1
Surrogate for EPA 515.3	2,4-Dichlorophenylacetic Acid	99 %	Limits		70-130			
Carbamate Pesticides								
Carbofuran	ug/L	0.60 U	EPA 531.1	2.0	0.60		04/26/13 03:37	1
Oxamyl	ug/L	0.88 U	EPA 531.1	2.0	0.88		04/26/13 03:37	1
Surrogate for EPA 531.1	BDMC	95 %	Limits		70-130			

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Sample Description		Sample 1						
Matrix		Groundwater						
SAL Sample Number		1304467-01						
Date/Time Collected		04/25/13 14:20						
Collected by		Ian Gerald						
Date/Time Received		04/25/13 15:00						
Semivolatile Analyses								
Alachlor	ug/L	0.03 U	EPA 525.2	0.2	0.03	05/02/13 09:00	05/02/13 21:35	1
Aldrin	ug/L	0.04 U	EPA 525.2	0.2	0.04	05/02/13 09:00	05/02/13 21:35	1
Anthracene	ug/L	0.30 U	EPA 625	11	0.30	04/29/13 15:07	04/29/13 19:51	1
Atrazine	ug/L	0.02 U	EPA 525.2	0.1	0.02	05/02/13 09:00	05/02/13 21:35	1
Benzo(a)pyrene	ug/L	0.02 U	EPA 525.2	0.1	0.02	05/02/13 09:00	05/02/13 21:35	1
gamma-BHC	ug/L	0.02 U	EPA 525.2	0.1	0.02	05/02/13 09:00	05/02/13 21:35	1
Butyl benzyl phthalate	ug/L	0.85 U	EPA 625	11	0.85	04/29/13 15:07	04/29/13 19:51	1
2-Chlorophenol	ug/L	2.9 U	EPA 625	11	2.9	04/29/13 15:07	04/29/13 19:51	1
Dieldrin	ug/L	0.1 U	EPA 525.2	0.2	0.1	05/02/13 09:00	05/02/13 21:35	1
Dimethylphthalate	ug/L	1.6 U	EPA 625	11	1.6	04/29/13 15:07	04/29/13 19:51	1
Endrin	ug/L	0.05 U	EPA 525.2	0.2	0.05	05/02/13 09:00	05/02/13 21:35	1
Bis(2-ethylhexyl)adipate	ug/L	0.07 U	EPA 525.2	0.5	0.07	05/02/13 09:00	05/02/13 21:35	1
Bis(2-ethylhexyl)phthalate	ug/L	0.9 I	EPA 525.2	1	0.6	05/02/13 09:00	05/02/13 21:35	1
Heptachlor	ug/L	0.08 U	EPA 525.2	0.1	0.08	05/02/13 09:00	05/02/13 21:35	1
Heptachlor epoxide	ug/L	0.08 U	EPA 525.2	0.2	0.08	05/02/13 09:00	05/02/13 21:35	1
Hexachlorobenzene	ug/L	0.04 U	EPA 525.2	0.1	0.04	05/02/13 09:00	05/02/13 21:35	1
Hexachlorocyclopentadiene	ug/L	0.06 U	EPA 525.2	0.2	0.06	05/02/13 09:00	05/02/13 21:35	1
Methoxychlor	ug/L	0.02 U	EPA 525.2	0.2	0.02	05/02/13 09:00	05/02/13 21:35	1
Simazine	ug/L	0.03 U	EPA 525.2	0.1	0.03	05/02/13 09:00	05/02/13 21:35	1
Naphthalene	ug/L	0.89 U	EPA 625	11	0.89	04/29/13 15:07	04/29/13 19:51	1
Phenanthrene	ug/L	0.97 U	EPA 625	11	0.97	04/29/13 15:07	04/29/13 19:51	1
Phenol	ug/L	1.5 U	EPA 625	11	1.5	04/29/13 15:07	04/29/13 19:51	1
2,4,6-Trichlorophenol	ug/L	2.8 U	EPA 625	11	2.8	04/29/13 15:07	04/29/13 19:51	1
Surrogate for EPA 525.2	Triphenyl Phosphate	119 %	Limits	70-130				
Inorganics								
Ammonia as N	mg/L	1.0	EPA 350.1	0.040	0.009		05/01/13 10:22	1
Biochemical Oxygen Demand	mg/L	3	SM 5210B	2	2	04/26/13 12:58	05/02/13 10:50	1
Chemical Oxygen Demand	mg/L	30	EPA 410.4	25	10	05/07/13 10:13	05/07/13 15:25	1
Chloride	mg/L	2,900	EPA 300.0	0.20	0.050		04/29/13 16:25	1
Color	Color Units	10	SM 2120B	5	5		04/26/13 08:51	1
Cyanide	mg/L	0.0024 U	SM 4500CN-E	0.020	0.0024	05/04/13 07:20	05/04/13 10:56	1
Fluoride	mg/L	0.010 U	EPA 300.0	0.040	0.010		04/26/13 15:31	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		04/26/13 15:31	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		04/26/13 15:31	1
Odor at 25C	T.O.N.	500 Q	SM 2150B	1	1		04/25/13 16:00	1
Organic Nitrogen (N)	mg/L	0.18 I	EPA 351.2	0.20	0.050	05/01/13 10:37	05/07/13 12:41	1

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Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		Sample 1						
Matrix		Groundwater						
SAL Sample Number		1304467-01						
Date/Time Collected		04/25/13 14:20						
Collected by		Ian Gerald						
Date/Time Received		04/25/13 15:00						
Phosphorous - Total as P	mg/L	0.076	SM 4500P-E	0.040	0.010	04/26/13 15:25	04/29/13 12:29	1
Sulfate	mg/L	380	EPA 300.0	0.60	0.20		04/29/13 16:25	1
Surfactants (MBAS,mw342)	mg/L	0.060 I	SM 5540C	0.080	0.048	04/26/13 15:40	04/27/13 08:54	1
Total Dissolved Solids	mg/L	5,100	SM 2540C	10	10	04/26/13 08:48	04/30/13 08:49	1
Total Kjeldahl Nitrogen	mg/L	1.2	EPA 351.2	0.20	0.05	05/01/13 10:37	05/07/13 12:41	1
Metals								
Aluminum	mg/L	0.23 I	EPA 200.7	0.25	0.050	05/03/13 12:38	05/06/13 11:06	1
Antimony	mg/L	0.00025 I	EPA 200.8	0.00050	0.000071	05/02/13 11:57	05/03/13 09:47	1
Arsenic	mg/L	0.013	EPA 200.8	0.0050	0.00093	04/26/13 16:56	05/01/13 17:51	1
Barium	mg/L	0.064	EPA 200.8	0.00050	0.00018	04/26/13 16:56	05/01/13 17:51	1
Beryllium	mg/L	0.000096 U	EPA 200.7	0.0010	0.000096	05/03/13 12:38	05/06/13 11:06	1
Cadmium	mg/L	0.00027 U	EPA 200.8	0.00050	0.00027	04/26/13 16:56	05/01/13 17:51	1
Chromium	mg/L	0.0014 I	EPA 200.8	0.0050	0.00035	04/26/13 16:56	05/01/13 17:51	1
Copper	mg/L	0.013	EPA 200.8	0.00050	0.00013	04/26/13 16:56	05/01/13 17:51	1
Iron	mg/L	0.11	EPA 200.7	0.10	0.020	05/03/13 12:38	05/06/13 11:06	1
Lead	mg/L	0.0010	EPA 200.8	0.00050	0.00025	04/26/13 16:56	05/01/13 17:51	1
Manganese	mg/L	0.018	EPA 200.7	0.010	0.0010	05/03/13 12:38	05/06/13 11:06	1
Mercury	mg/L	0.00010 U	EPA 245.1	0.00050	0.00010	04/26/13 09:14	04/26/13 13:22	1
Nickel	mg/L	0.012	EPA 200.8	0.0050	0.00046	04/26/13 16:56	05/01/13 17:51	1
Selenium	mg/L	0.045	EPA 200.8	0.0050	0.00093	05/02/13 11:57	05/02/13 16:15	1
Silver	mg/L	0.000069 U	EPA 200.8	0.00050	0.000069	04/26/13 16:56	05/01/13 17:51	1
Sodium	mg/L	1,400	EPA 200.7	50	13	05/03/13 12:38	05/06/13 16:39	100
Thallium	mg/L	0.00024 U	EPA 200.8	0.00050	0.00024	04/26/13 16:56	05/01/13 17:51	1
Zinc	mg/L	0.027	EPA 200.8	0.0050	0.00088	04/26/13 16:56	05/01/13 17:51	1
Radiochemistry								
Gross Alpha (Incl. Uranium)	pCi/L	25 ± 3	EPA 00-02**	2.5	2.5	05/02/13 15:40	05/04/13 14:34	1
Radium-226	pCi/L	9.7 ± 0.42	EPA 903.1	0.1	0.1	05/06/13 06:54	05/16/13 11:36	1
Radium-228	pCi/L	0.6 ± 0.4 U	EPA Ra-05	0.6	0.6	05/06/13 06:59	05/14/13 11:43	1
Uranium, Combined (mass)	ug/L	0.71	EPA 200.8	0.50	0.054	04/26/13 16:56	05/01/13 17:51	1

Jones Edmunds
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May 17, 2013
Work Order: 1304467

*** Qualifiers, Notes and Definitions**

Results followed by a "U" indicate that the sample was analyzed but the compound was not detected. Results followed by "I" indicate that the reported value is between the laboratory method detection limits and the laboratory practical quantitation limit.

A statement of estimated uncertainty of test results is available upon request.

For methods marked with **, all QC criteria have been met for this method which is equivalent to a SAL certified method.

Test results in this report meet all the requirements of the NELAC standards. Any applicable qualifiers are shown below.

Q Sample held beyond the accepted holding time.

Questions regarding this report should be directed to :

Christy Whitehurst

Telephone (813) 855-1844 FAX (813) 855-2218

Christy@southernanalyticallabs.com

Christy@southernanalyticallabs.com



110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2218

SAL Project No.

[illegible]

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 FAX 813-855-2218

GROUNDWATER SAMPLING LOG

Client Name: <u>Oldsmar - Jones Edwards</u>	Location: <u>Oldsmar RO plant</u>	Contact: _____	Phone: _____
Date Sampled: <u>4/25/13</u>	SAL Project #: <u>1304467</u>	Project Name: _____	
Well Number: <u>T2 MW-1</u>	Sample ID: <u>-01</u>	GPS LAT: _____	GPS LONG: _____

PURGING DATA

WELL DIAMETER (Inches)	WELL CAPACITY (gal/ft)	Screen Interval (Feet)	UNK	To	UNK	Static Depth to Water (Feet)	PURGE PUMP CODE	PP	GP		
TOTAL WELL DEPTH (Feet)	REFERENCE ELEVATION (NGVD)	GROUND WATER ELEVATION (REFERENCE-STATIC)				TUBING DIAMETER (Inches)	TUBING CAPACITY (gal/ft)				
Purge Technique: ☒ Submerged Screen (1, 1/4, 1/4 Well) ☐ Submerged Screen (1EQ Volume, 3, 3 Minutes) ☐ Partially Submerged Screen (1 Well, 3, 3 minutes)											
WELL VOLUME = (TOTAL DEPTH - STATIC DEPTH) x WELL CAPACITY = _____											
ONE WELL VOLUME		1/4 WELL VOLUME		3 WELL VOLUMES		5 WELL VOLUMES					
EQUIPMENT VOLUME = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME											
PUMP VOLUME		TUBING LENGTH		FLOW CELL VOLUME		EQUIPMENT VOLUME					
INITIAL TUBING LENGTH IN WELL (FEET)		FINAL TUBING LENGTH IN WELL (FEET)		PURGE TIME START		PURGE TIME END		TOTAL PURGED			
INST. ID	XXXX	XXXX	XXXX	XXXX	SAL-SAM-63-108	SAL-SAM-65-65	SAL-SAM-63-65	SAL-SAM-55-7	SAL-SAM-0109		
TIME	VOLUME PURGED (Gallons)	TOTAL VOLUME PURGED (Gallons)	PURGE RATE (gpm)	Depth to Water (Feet)	pH (SU) ($\Delta < 0.2$)	TEMP (oC) ($\Delta < 0.2$)	SP COND (uS/cm) ($\Delta < 5\%$)	DO (mg/L) (% SAT < 20)	TURBIDITY (NTUs) (< 20 NTU)	COLOR (Describe)	ODOR (Describe)
1413					6.99	24.0	9355	.72	73.1	cloudy	Sulfur
1416					7.00	23.9	9444	.63	50.8		
1419					7.00	24.0	9522	.59	41.4		
Well Capacity (gallons/foot): 0.75"=0.02, 1.25"=0.06, 2"=0.16, 3"=0.37, 4"=0.65, 5"=1.02, 6"=1.47, 12"=5.88											
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016											

SAMPLING DATA

SAMPLED BY / COMPANY (PRINT)	TO EG / SAL	SAMPLER(S) SIGNATURES:	J. Hall		
TUBING MATERIAL CODE (CIRCLE ONE)	PP PE NP TL TT	SAMPLE TUBING LENGTH IN WELL (FEET)			SAMPLE PUMP FLOW RATE (mL/min)
SAMPLING INITIATED	1420	SAMPLING ENDED	1425	FIELD CLEANED	Y ☒
FIELD FILTERED?	Y ☒	FILTER SIZE (um)		DUPLICATE	Y ☒
PRESERVATION CHECKED IN FIELD?	☒ N N/A	LIST PRESERVATIVES ADDED			
WEATHER CONDITIONS	Clear 85°F				
COMMENTS					

PUMP CODES: PP=Peristaltic Pump, GP= Submersible Grundfos Pump, IBP= In-place Bladder Pump

TUBING MATERIAL CODES: PP= Polypropylene, PE= Polyethylene, NP= Non-inert Plastic, TL= Teflon Lined, TT= Teflon

Reviewed By: _____

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Date: _____

ASR-1
Laboratory Report

Jones Edmunds
730 NE Waldo Road
Gainesville, FL 32641

February 27, 2014
Work Order: 1401224

Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		0 hrs after 12 hrs of pumping-7a.m						
Matrix		Groundwater						
SAL Sample Number		1401224-01						
Date/Time Collected		02/06/14 07:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
<u>Client Provided Field Data</u>								
<u>Field Parameters</u>								
pH	SU	7.0	DEP FT1100	0.1	0.1		02/06/14 07:00	1
Water Temperature	°C	23.9	DEP FT1400	0.1	0.1		02/06/14 07:00	1
Specific conductance	umhos/cm	44,610	DEP FT1200	0.1	0.1		02/06/14 07:00	1
Dissolved Oxygen	mg/L	5.0	DEP FT1500	0.1	0.1		02/06/14 07:00	1
<u>Inorganics</u>								
Chloride	mg/L	14,000	EPA 300.0	200	50		02/21/14 11:53	1000
Total Dissolved Solids	mg/L	30,000	SM 2540C	10	10	02/11/14 13:28	02/12/14 11:47	1
Sample Description		3 hrs after 12 hrs of pumping-10a.m.						
Matrix		Groundwater						
SAL Sample Number		1401224-02						
Date/Time Collected		02/06/14 10:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
<u>Client Provided Field Data</u>								
<u>Field Parameters</u>								
pH	SU	7.2	DEP FT1100	0.1	0.1		02/06/14 10:00	1
Water Temperature	°C	24.4	DEP FT1400	0.1	0.1		02/06/14 10:00	1
Specific conductance	umhos/cm	44,960	DEP FT1200	0.1	0.1		02/06/14 10:00	1
Dissolved Oxygen	mg/L	5.5	DEP FT1500	0.1	0.1		02/06/14 10:00	1
<u>Volatile Organic Compounds (Primary DW)</u>								
Benzene	ug/L	0.1 U	EPA 524.2	0.8	0.1		02/06/14 21:04	1
Carbon tetrachloride	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
Chlorobenzene	ug/L	0.1 U	EPA 524.2	0.8	0.1		02/06/14 21:04	1
Methylene Chloride	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
1,2-Dichlorobenzene	ug/L	0.1 U	EPA 524.2	0.8	0.1		02/06/14 21:04	1
1,4-Dichlorobenzene	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
1,2-Dichloroethane	ug/L	0.1 U	EPA 524.2	0.8	0.1		02/06/14 21:04	1
1,1-Dichloroethene	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
cis-1,2-Dichloroethene	ug/L	0.09 U	EPA 524.2	0.8	0.09		02/06/14 21:04	1
trans-1,2-Dichloroethene	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
1,2-Dichloropropane	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
Ethylbenzene	ug/L	0.08 U	EPA 524.2	0.8	0.08		02/06/14 21:04	1
Styrene	ug/L	0.05 U	EPA 524.2	0.8	0.05		02/06/14 21:04	1

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Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		3 hrs after 12 hrs of pumping-10a.m.						
Matrix		Groundwater						
SAL Sample Number		1401224-02						
Date/Time Collected		02/06/14 10:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
Tetrachloroethene	ug/L	0.1 U	EPA 524.2	0.8	0.1		02/06/14 21:04	1
Toluene	ug/L	0.09 U	EPA 524.2	0.8	0.09		02/06/14 21:04	1
1,2,4-Trichlorobenzene	ug/L	0.3 U	EPA 524.2	0.8	0.3		02/06/14 21:04	1
1,1,1-Trichloroethane	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
1,1,2-Trichloroethane	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
Trichloroethene	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
Vinyl chloride	ug/L	0.3 U	EPA 524.2	1.6	0.3		02/06/14 21:04	1
Xylenes- Total	ug/L	0.1 U	EPA 524.2	0.8	0.1		02/06/14 21:04	1
Surrogate for EPA 524.2	Dibromofluoromethane	101 %	Limits		65-135			
Trihalomethane Analysis								
Bromodichloromethane	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
Bromoform	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
Chloroform	ug/L	0.2 U	EPA 524.2	0.8	0.2		02/06/14 21:04	1
Dibromochloromethane	ug/L	0.1 U	EPA 524.2	0.8	0.1		02/06/14 21:04	1
Total Trihalomethanes	ug/L	0.1 U	EPA 524.2	0.8	0.1		02/06/14 21:04	1
Surrogate for EPA 524.2	Dibromofluoromethane	101 %	Limits		65-135			
Volatile Organic Compounds								
Chloroethane	ug/L	0.4 U	EPA 524.2	1.6	0.4		02/06/14 21:04	1
Chloroform	ug/L	0.2 U	EPA 524.2	1.0	0.2		02/06/14 21:04	1
Surrogate for EPA 524.2	Dibromofluoromethane	101 %	Limits		65-135			
Total Haloacetic Acids Analyses								
Dibromoacetic Acid	ug/L	0.26 U	EPA 552.2	0.97	0.26	02/10/14 10:32	02/11/14 07:13	1
Dichloroacetic Acid	ug/L	0.68 U	EPA 552.2	0.97	0.68	02/10/14 10:32	02/11/14 07:13	1
Monobromoacetic Acid	ug/L	0.33 U	EPA 552.2	0.97	0.33	02/10/14 10:32	02/11/14 07:13	1
Monochloroacetic Acid	ug/L	0.75 U	EPA 552.2	1.9	0.75	02/10/14 10:32	02/11/14 07:13	1
Trichloroacetic Acid	ug/L	0.34 U	EPA 552.2	0.97	0.34	02/10/14 10:32	02/11/14 07:13	1
Total Haloacetic Acids	ug/L	0.26 U	EPA 552.2	0.97	0.26	02/10/14 10:32	02/11/14 07:13	1
Surrogate for EPA 552.2	2-Bromo-n-butyric Acid	100 %	Limits		70-130			
Pesticide Analyses								
1,2-Dibromo-3-chloropropane	ug/L	0.0053 U	EPA 504.1	0.021	0.0053	02/14/14 11:49	02/14/14 21:27	1
1,2-Dibromoethane	ug/L	0.0053 U	EPA 504.1	0.021	0.0053	02/14/14 11:49	02/14/14 21:27	1
Diquat	ug/L	0.45 U	EPA 549.2	6.8	0.45	02/07/14 11:18	02/10/14 17:14	1
Endothall	ug/L	6.6 U	EPA 548.1	78	6.6	02/07/14 15:41	02/18/14 19:26	1
Glyphosate	ug/L	2.7 U	EPA 547	40	2.7		02/10/14 19:45	1
Surrogate for EPA 504.1	2-Bromo-1-chloropropane	118 %	Limits		70-130			

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February 27, 2014
 Work Order: 1401224

Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		3 hrs after 12 hrs of pumping-10a.m.						
Matrix		Groundwater						
SAL Sample Number		1401224-02						
Date/Time Collected		02/06/14 10:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
<u>Organo Chlorine Pesticides</u>								
Aldrin	ug/L	0.005 U	EPA 608	0.044	0.005	02/13/14 17:54	02/27/14 01:33	1
Dieldrin	ug/L	0.010 U	EPA 608	0.044	0.010	02/13/14 17:54	02/27/14 01:33	1
Surrogate for EPA 608	Tetrachloro-meta-xylene	59 %	Limits		18-158			
<u>Chlorinated Herbicides</u>								
2,4-D	ug/L	0.90 U	SM 6640B	2.0	0.90	02/13/14 12:23	02/15/14 04:42	1
Dalapon	ug/L	1.0 I	SM 6640B	2.0	0.66	02/13/14 12:23	02/15/14 04:42	1
Dinoseb	ug/L	0.16 U	SM 6640B	1.0	0.16	02/13/14 12:23	02/15/14 04:42	1
Pentachlorophenol	ug/L	0.11 U	SM 6640B**	0.20	0.11	02/13/14 12:23	02/15/14 04:42	1
Picloram	ug/L	0.30 U	SM 6640B**	1.5	0.30	02/13/14 12:23	02/15/14 04:42	1
2,4,5-TP	ug/L	0.15 U	SM 6640B	0.50	0.15	02/13/14 12:23	02/15/14 04:42	1
Surrogate for SM 6640B	2,4-Dichlorophenylacetic Acid	88 %	Limits		60-135			
<u>Carbamate Pesticides</u>								
Carbofuran	ug/L	0.60 U	EPA 531.1	2.0	0.60		02/24/14 22:47	1
Oxamyl	ug/L	0.88 U	EPA 531.1	2.0	0.88		02/24/14 22:47	1
Surrogate for EPA 531.1	BDMC	90 %	Limits		70-130			
<u>Semivolatile Analyses</u>								
Alachlor	ug/L	0.03 U	EPA 525.2	0.2	0.03	02/11/14 08:15	02/12/14 19:21	1
Anthracene	ug/L	0.31 U	EPA 625	11	0.31	02/11/14 11:54	02/11/14 23:29	1
Atrazine	ug/L	0.02 U	EPA 525.2	0.1	0.02	02/11/14 08:15	02/12/14 19:21	1
Benzo(a)pyrene	ug/L	0.02 U	EPA 525.2	0.1	0.02	02/11/14 08:15	02/12/14 19:21	1
Butyl benzyl phthalate	ug/L	0.86 U	EPA 625	11	0.86	02/11/14 11:54	02/11/14 23:29	1
2-Chlorophenol	ug/L	2.9 U	EPA 625	11	2.9	02/11/14 11:54	02/11/14 23:29	1
Diethyl phthalate	ug/L	0.93 U	EPA 625	11	0.93	02/11/14 11:54	02/11/14 23:29	1
Dimethylphthalate	ug/L	1.6 U	EPA 625	11	1.6	02/11/14 11:54	02/11/14 23:29	1
Bis(2-ethylhexyl)adipate	ug/L	0.07 U	EPA 525.2	0.5	0.07	02/11/14 08:15	02/12/14 19:21	1
Bis(2-ethylhexyl)phthalate	ug/L	0.6 U	EPA 525.2	1	0.6	02/11/14 08:15	02/12/14 19:21	1
Hexachlorobenzene	ug/L	0.04 U	EPA 525.2	0.1	0.04	02/11/14 08:15	02/12/14 19:21	1
Hexachlorocyclopentadiene	ug/L	0.06 U	EPA 525.2	0.2	0.06	02/11/14 08:15	02/12/14 19:21	1
Simazine	ug/L	0.03 U,J5	EPA 525.2	0.1	0.03	02/11/14 08:15	02/12/14 19:21	1
Naphthalene	ug/L	0.90 U	EPA 625	11	0.90	02/11/14 11:54	02/11/14 23:29	1
Phenanthrene	ug/L	0.98 U	EPA 625	11	0.98	02/11/14 11:54	02/11/14 23:29	1
2,4,6-Trichlorophenol	ug/L	2.8 U	EPA 625	11	2.8	02/11/14 11:54	02/11/14 23:29	1
Surrogate for EPA 525.2	Triphenyl Phosphate	98 %	Limits		70-130			
<u>Inorganics</u>								
Ammonia as N	mg/L	0.78	EPA 350.1	0.040	0.009		02/21/14 08:13	1

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February 27, 2014
Work Order: 1401224

Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		3 hrs after 12 hrs of pumping-10a.m.						
Matrix		Groundwater						
SAL Sample Number		1401224-02						
Date/Time Collected		02/06/14 10:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
Bromate	ug/L	500 U	EPA 300.0	2000	500		02/11/14 09:50	100
Chloride	mg/L	14,000	EPA 300.0	200	50		02/21/14 12:02	1000
Chlorite	ug/L	3,400 I	EPA 300.1	20000	1000		02/11/14 09:50	100
Color	Color Units	50	SM 2120B	5	5		02/06/14 15:59	1
Cyanide	mg/L	0.0024 U	SM 4500CN-E	0.020	0.0024	02/06/14 13:20	02/06/14 16:45	1
Fluoride	mg/L	0.21	SM 4500F-C	0.10	0.020		02/11/14 15:23	1
Nitrate+Nitrite (N)	mg/L	0.01 U	EPA 353.2	0.04	0.01		02/13/14 10:21	1
Odor at 25C	T.O.N.	3	SM 2150B	1	1	02/07/14 09:15	02/07/14 09:35	1
Organic Nitrogen (N)	mg/L	0.17 I	EPA 351.2	0.20	0.050	02/21/14 08:13	02/24/14 15:30	1
Orthophosphate as P	mg/L	0.15	SM 4500P-E	0.040	0.012		02/08/14 08:51	1
Phosphorous - Total as P	mg/L	0.16	SM 4500P-E	0.040	0.010	02/19/14 10:50	02/24/14 15:34	1
Sulfate	mg/L	2,100	EPA 300.0	60	20		02/19/14 16:32	100
Surfactants (MBAS,mw342)	mg/L	0.13	SM 5540C	0.080	0.048	02/07/14 11:23	02/07/14 12:19	1
Total Dissolved Solids	mg/L	30,000	SM 2540C	10	10	02/11/14 13:28	02/12/14 11:47	1
Total Kjeldahl Nitrogen	mg/L	0.95	EPA 351.2	0.20	0.05	02/19/14 10:50	02/24/14 15:30	1
Total Nitrogen	mg/L	0.95	351.2+353.2	0.24	0.06	02/19/14 10:50	02/24/14 15:30	1
Metals								
Aluminum	mg/L	0.050 U	EPA 200.7	0.25	0.050	02/10/14 11:55	02/11/14 13:49	1
Antimony	mg/L	0.41	EPA 200.7	0.10	0.0085	02/10/14 11:55	02/11/14 13:49	1
Arsenic	mg/L	0.0020 U	SM 3113B	0.0080	0.0020	02/14/14 10:20	02/18/14 16:24	2
Barium	mg/L	0.16	EPA 200.7	0.10	0.0050	02/10/14 11:55	02/11/14 13:49	1
Beryllium	mg/L	0.000096 U	EPA 200.7	0.0010	0.000096	02/10/14 11:55	02/11/14 13:49	1
Chromium	mg/L	0.0040 U	EPA 200.7	0.010	0.0040	02/10/14 11:55	02/11/14 13:49	1
Iron	mg/L	0.11	EPA 200.7	0.10	0.020	02/10/14 11:55	02/11/14 13:49	1
Manganese	mg/L	0.013	EPA 200.7	0.010	0.0010	02/10/14 11:55	02/11/14 13:49	1
Mercury	mg/L	0.00010 U	EPA 245.1	0.00050	0.00010	02/06/14 11:04	02/07/14 15:32	1
Selenium	mg/L	1.5	EPA 200.7	0.20	0.050	02/10/14 11:55	02/11/14 17:57	1
Silver	mg/L	0.0011 U	EPA 200.7	0.020	0.0011	02/10/14 11:55	02/11/14 13:49	1
Sodium	mg/L	9,200	EPA 200.7	50	13	02/10/14 11:55	02/11/14 17:53	100
Thallium	mg/L	0.0050 U	EPA 200.7	0.010	0.0050	02/10/14 11:55	02/11/14 13:49	1
Metals, Chelated								
Cadmium	mg/L	0.0014 I	EPA 200.7	0.010	0.0010	02/12/14 14:25	02/18/14 15:14	1
Copper	mg/L	0.0049 I	EPA 200.7	0.010	0.0010	02/12/14 14:25	02/18/14 15:14	1
Iron	mg/L	0.15	EPA 200.7	0.10	0.020	02/12/14 14:25	02/18/14 16:23	1
Lead	mg/L	0.0020 U	EPA 200.7	0.0050	0.0020	02/12/14 14:25	02/18/14 15:14	1
Nickel	mg/L	0.0010 U	EPA 200.7	0.010	0.0010	02/12/14 14:25	02/18/14 15:14	1
Zinc	mg/L	0.0030 U	EPA 200.7	0.10	0.0030	02/12/14 14:25	02/18/14 15:14	1
Radiochemistry								

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Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		3 hrs after 12 hrs of pumping-10a.m.						
Matrix		Groundwater						
SAL Sample Number		1401224-02						
Date/Time Collected		02/06/14 10:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
Gross Alpha (Incl. Uranium)	pCi/L	26 ± 2.9	EPA 00-02	2.5	2.5	02/18/14 13:54	02/19/14 14:41	1
Radium-226	pCi/L	14 ± 0.51	EPA 903.1	0.1	0.1	02/06/14 15:47	02/13/14 12:57	1
Radium-228	pCi/L	0.6 ± 0.4 U	EPA Ra-05	0.6	0.6	02/06/14 15:49	02/14/14 11:51	1
Uranium, Combined (mass)	ug/L	0.054 U	EPA 200.8	0.50	0.054	02/10/14 13:53	02/12/14 14:45	1
<u>Microbiology</u>								
Enterococci	MPN/100 mL	3	Enterolert	1	1	02/06/14 11:15	02/07/14 11:24	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	02/06/14 13:14	02/07/14 11:34	1
Sample Description		6 hrs after 12 hrs of pumping-1pm						
Matrix		Groundwater						
SAL Sample Number		1401224-03						
Date/Time Collected		02/06/14 13:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
<u>Client Provided Field Data</u>								
<u>Field Parameters</u>								
pH	SU	7.1	DEP FT1100	0.1	0.1		02/06/14 13:00	1
Water Temperature	°C	24.6	DEP FT1400	0.1	0.1		02/06/14 13:00	1
Specific conductance	umhos/cm	44,740	DEP FT1200	0.1	0.1		02/06/14 13:00	1
Dissolved Oxygen	mg/L	4.3	DEP FT1500	0.1	0.1		02/06/14 13:00	1
<u>Inorganics</u>								
Chloride	mg/L	14,000	EPA 300.0	200	50		02/21/14 12:12	1000
Total Dissolved Solids	mg/L	30,000	SM 2540C	10	10	02/11/14 13:28	02/12/14 11:47	1
Sample Description		9 hrs after 12 hrs of pumping-4pm						
Matrix		Groundwater						
SAL Sample Number		1401224-04						
Date/Time Collected		02/06/14 16:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
<u>Client Provided Field Data</u>								
<u>Field Parameters</u>								
pH	SU	7.2	DEP FT1100	0.1	0.1		02/06/14 16:00	1
Water Temperature	°C	24.6	DEP FT1400	0.1	0.1		02/06/14 16:00	1
Specific conductance	umhos/cm	44,840	DEP FT1200	0.1	0.1		02/06/14 16:00	1

Jones Edmunds
730 NE Waldo Road
Gainesville, FL 32641

February 27, 2014
Work Order: 1401224

Laboratory Report

Project Name		Oldsmar Water Reclamation Facility						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		9 hrs after 12 hrs of pumping-4pm						
Matrix		Groundwater						
SAL Sample Number		1401224-04						
Date/Time Collected		02/06/14 16:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
Dissolved Oxygen	mg/L	4.7	DEP FT1500	0.1	0.1		02/06/14 16:00	1
<u>Inorganics</u>								
Chloride	mg/L	13,000	EPA 300.0	200	50		02/21/14 12:21	1000
Total Dissolved Solids	mg/L	30,000	SM 2540C	10	10	02/11/14 13:28	02/12/14 11:47	1
Sample Description		12 hrs after 12 hrs of pumping-7pm						
Matrix		Groundwater						
SAL Sample Number		1401224-05						
Date/Time Collected		02/06/14 19:00						
Collected by		Ian Gerald						
Date/Time Received		02/06/14 19:15						
<u>Client Provided Field Data</u>								
<u>Field Parameters</u>								
pH	SU	7.2	DEP FT1100	0.1	0.1		02/06/14 19:00	1
Water Temperature	°C	24.4	DEP FT1400	0.1	0.1		02/06/14 19:00	1
Specific conductance	umhos/cm	44,640	DEP FT1200	0.1	0.1		02/06/14 19:00	1
Dissolved Oxygen	mg/L	4.7	DEP FT1500	0.1	0.1		02/06/14 19:00	1
<u>Inorganics</u>								
Chloride	mg/L	14,000	EPA 300.0	200	50		02/21/14 20:48	1000
Total Dissolved Solids	mg/L	30,000	SM 2540C	10	10	02/11/14 13:28	02/12/14 11:47	1

Jones Edmunds
730 NE Waldo Road
Gainesville, FL 32641

February 27, 2014
Work Order: 1401224

* Qualifiers, Notes and Definitions

Results followed by a "U" indicate that the sample was analyzed but the compound was not detected. Results followed by "I" indicate that the reported value is between the laboratory method detection limits and the laboratory practical quantitation limit.

A statement of estimated uncertainty of test results is available upon request.

For methods marked with **, all QC criteria have been met for this method which is equivalent to a SAL certified method.

Test results in this report meet all the requirements of the NELAC standards. Any applicable qualifiers are shown below.

J5 Matrix spike of this sample was outside typical range. All other QC criteria were acceptable.

Questions regarding this report should be directed to :

Christy Whitehurst

Telephone (813) 855-1844 FAX (813) 855-2218

Christy@southernanalyticallabs.com



SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYMEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2218

SAL Project No.

1401224

Client Name Jones Edmunds	Contact / Phone Jim Tulley
Project Name / Location Oldsmar WRF-ASR Testing	

Samplers: (Signature)

[Signature]

PARAMETER / CONTAINER DESCRIPTION

Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water		Date	Time	Matrix	Composite	Grab	250ml P, NaOH Cyanide	500ml P, Cool Chloride, TDS	250ml aG, Cool Odor	500ml P, Cool 4°C Misc. Inorganics, Bromate	125ml P, H ₂ SO ₄ Nutrients, TN, Total P, Organic Nitrogen	250ml P, HNO ₃ Metals	40ml V, Na ₂ S ₂ O ₃ 624 (inc. THMs), 524-GII	1LaG, Na ₂ SO ₃ 525.2-aq-62-550, 608-aq- 62-550	40ml V, MCAA, Na ₂ S ₂ O ₃ 531.1-prim	1LaG, Cool 625-PP	40ml V, Na ₂ S ₂ O ₃ 504.1	40ml aV, EDA Chlorite	40ml aV , Na ₂ S ₂ O ₃ 6640B	1/2 gal, HNO ₃ GA, Ra226, Ra228, U	1LaP, Na ₂ S ₂ O ₃ 549.2	40ml V, Na ₂ S ₂ O ₃ 547	40ml V, NH ₄ Cl 548.1	40ml aV, NH4Cl 552.2	125ml P, Na ₂ S ₂ O ₃ FC-MF, Enterococci	
SAL Use Only	Sample No.																									Sample Description
	01	0 hours after start of pumping- 7am	2/4	0700	GW	X		1																		
	02	3 hours after start of pumping- 10am		1000	GW	X	1		1	1	1	1	3	4	1	3	3	2	3	3	1	1	1	3	4	
	03	6 hours after start of pumping-1pm		1300	GW	X		1																		
	04	9 hours after start of pumping-4pm		1600	GW	X		1																		
	05	12 hours after start of pumping-7pm		1900	GW	X		1																		
	06	Trip Blank			R								1													

Containers Prepared/ Relinquished:	Date/Time: e:	Received: <i>[Signature]</i>	Date/Time: 2/6/14 0600	Seal intact? ☒ N NA	Instructions / Remarks Field Readings: pH, Temp, D.O, Conductivity on all intervals 1401224
Relinquished: <i>[Signature]</i>	Date/Time: e: 2/6/14 1050	Received: <i>[Signature]</i>	Date/Time: 2/6/14 1050	Samples intact upon arrival? ☒ N NA	
Relinquished: <i>[Signature]</i>	Date/Time: e: 2/6/14 1050	Received: <i>[Signature]</i>	Date/Time: 2/6/14 1050	Received on ice? Temp _____ ☒ N NA	
Relinquished: <i>[Signature]</i>	Date/Time: e: 2/6/14 1915	Received: <i>[Signature]</i>	Date/Time: 2-6-14 1915	Proper preservatives indicated? ☒ N NA	
Relinquished:	Date/Time: e:	Received:	Date/Time:	Rec'd within holding time? ☒ N NA	
				Volatiles rec'd w /out headspace? ☒ N NA	
				Proper containers used? ☒ N NA	

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 (813) 855-1844 fax (813) 855-2218

GROUNDWATER SAMPLING LOG

Client Name:	Jones Edmunds	Project Name:	Oldsmar Water Reclamation Facility	Contact:	Elizabeth Kennelley
Date Sampled:	2/6/14	SAL WO#	1401224	Phone:	(352) 377-5821
Well Number:	0 hrs after 12 hrs of pumping-7a.m	Sample ID	1401224-01	Location:	ASR well - Oldsmar Plant
			GPS LAT		
			GPS LONG		

PURGING DATA

Well Diameter (inches)		WELL CAPACITY (gal/ft)		Screen Interval (Feet)	UNK To UNK	Static Depth to Water (Feet)		PURGE PUMP CODE	PP GP IBP
Total Well Depth (Feet)		REFERENCE ELEVATION (NGVD)		GROUND WATER ELEVATION (REFERENCE-STATIC)		TUBING DIAMETER (inches)		TUBING CAPACITY (gal/ft)	

Purge Technique: q Submerged Screen (1,1/4,1/4 Well) q Submerged Screen (1EQ Volume,3,3 Minutes) q Partially Submerged Screen (1 Well,3,3 minutes)

WELL VOLUME = (TOTAL DEPTH - STATIC DEPTH) x WELL CAPACITY =

ONE WELL VOLUME	1/4 WELL VOLUME	3 WELL VOLUMES	5 WELL VOLUMES
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EQUIPMENT VOLUME = PUMP VOLUME + (TUBING CAPACITY x TUBING LENGTH) + FLOW CELL VOLUME

PUMP VOLUME		TUBING LENGTH		FLOW CELL VOLUME		EQUIPMENT VOLUME	
INITIAL TUBING LENGTH IN WELL (FEET)		FINAL TUBING LENGTH IN WELL (FEET)		PURGE TIME START		PURGE TIME END	
INSTRUMENT ID#:							

TIME	VOLUME PURGED (Gallons)	TOTAL VOLUME PURGED (Gallons)	PURGE RATE (gpm)	Depth to Water (Feet)	pH (SU) (Δ<0.2)	TEMP (oC) (Δ<0.2)	SPECIFIC COND (uS/cm) (Δ<5%)	DO (mg/L) (% SAT <20)	TURBIDITY (NTUs) (<20 NTU)	COLOR (Describe)	ODOR (Describe)
0700					7.04	23.9	44610	4.99	1.48	clear	none

Well Capacity (gallons/foot): 0.75"=0.02, 1.25"=0.06, 2"=0.16, 3"=0.37, 4"=0.65, 5"=1.02, 6"=1.47, 12"=5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

SAMPLING DATA

PUMP CODES: PP=Peristaltic Pump, GP= Submersible Grundfor Pump, IBP= In-place Bladder Pump

TUBING MATERIAL CODES: PP= Polypropylene, PE = Polyethylene, NP=Non-inert Plastic, TL= Teflon Lined, TT= Teflon

TUBING MATERIAL CODE (CIRCLE ONE)	PP PE NP TL TT	SAMPLE TUBING LENGTH IN WELL (FEET)		SAMPLE PUMP FLOW RATE (gpm)	
SAMPLING INITIATED	0700	SAMPLING ENDED	0701	FIELD CLEANED	Y ☒
FIELD FILTERED?	Y ☒	FILTER SIZE (um)		DUPLICATE	Y ☒
PRESERVATION CHECKED IN FIELD?	Y N ☒	LIST PRESERVATIVES ADDED		VOC COLLECTED BY REVERSE FLOW?	Y N ☒
				SEMI-VOLS COLLECTED THROUGH TRAP?	Y N ☒

WEATHER CONDITIONS	Overcast 62°F
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COMMENTS	Sample # 1 0 hrs After start of pumping
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SAMPLED BY/COMPANY:	Southern Analytical Laboratories, Inc.	Sampler's Initials:	
---------------------	--	---------------------	--

DATE SIGNED:

SAMPLER'S SIGNATURE:

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 (813) 855-1844 fax (813) 855-2218

GROUNDWATER SAMPLING LOG

Client Name:	Jones Edmunds	Project Name:	Oldsmar Water Reclamation Facility	Contact:	Elizabeth Kennelley
Date Sampled:	7/6/14	SAL WOH	1401224	Phone:	(352) 377-5821
Well Number:	3 hrs after 12 hrs of pumping-10a.m	Sample ID	1401224-02	Location:	
				GPS LAT	
				GPS LONG	

PURGING DATA

Well Diameter (inches)		WELL CAPACITY (gal/ft)		Screen Interval (Feet)	UNK To UNK	Static Depth to Water (Feet)		PURGE PUMP CODE	PP GP IBP
Total Well Depth (Feet)		REFERENCE ELEVATION (NGVD)		GROUND WATER ELEVATION (REFERENCE-STATIC)		TUBING DIAMETER (inches)		TUBING CAPACITY (gal/ft)	

Purge Technique: q Submerged Screen (1,1/4,1/4 Well) q Submerged Screen (1EQ Volume,3,3 Minutes) q Partially Submerged Screen (1 Well,3,3 minutes)

WELL VOLUME = (TOTAL DEPTH - STATIC DEPTH) x WELL CAPACITY =

ONE WELL VOLUME	1/4 WELL VOLUME	3 WELL VOLUMES	5 WELL VOLUMES
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EQUIPMENT VOLUME = PUMP VOLUME + (TUBING CAPACITY x TUBING LENGTH) + FLOW CELL VOLUME

PUMP VOLUME		TUBING LENGTH		FLOW CELL VOLUME		EQUIPMENT VOLUME	
INITIAL TUBING LENGTH IN WELL (FEET)		FINAL TUBING LENGTH IN WELL (FEET)		PURGE TIME START		PURGE TIME END	
INSTRUMENT ID#:				7/5/16			

TIME	VOLUME PURGED (Gallons)	TOTAL VOLUME PURGED (Gallons)	PURGE RATE (gpm)	Depth to Water (Feet)	pH (SU) (Δ<0.2)	TEMP (oC) (Δ<0.2)	SPECIFIC COND (uS/cm) (Δ<5%)	DO (mg/L) (% SAT <20)	TURBIDITY (NTUs) (<20 NTU)	COLOR (Describe)	ODOR (Describe)
1000					7.23	24.4	44965	5.52	.92	clear	strong smell

Well Capacity (gallons/foot): 0.75"=0.02, 1.25"=0.06, 2"=0.16, 3"=0.37, 4"=0.65, 5"=1.02, 6"=1.47, 12"=5.88

TUBING INSIDE DIA. CAPACITY (Gal./ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

SAMPLING DATA

PUMP CODES: PP=Peristaltic Pump, GP= Submersible Grundfor Pump, IBP= in-place Bladder Pump

TUBING MATERIAL CODES: PP= Polypropylene, PE = Polyethylene, NP=Non-inert Plastic, TL= Teflon Lined, TT= Teflon

TUBING MATERIAL CODE (CIRCLE ONE)	PP PE NP TL TT	SAMPLE TUBING LENGTH IN WELL (FEET)		SAMPLE PUMP FLOW RATE (gpm)	
SAMPLING INITIATED	1000	SAMPLING ENDED	1075	FIELD CLEANED	Y ☒
FIELD FILTERED?	Y ☒	FILTER SIZE (um)		DUPLICATE	Y ☒
PRESERVATION CHECKED IN FIELD?	☒ N N/A	LIST PRESERVATIVES ADDED		VOC COLLECTED BY REVERSE FLOW?	Y ☒ N ☒
				SEMI-VOLS COLLECTED THROUGH TRAP?	Y ☒ N ☒

WEATHER CONDITIONS	Drizzle 65°F
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COMMENTS	
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SAMPLED BY/COMPANY: Southern Analytical Laboratories, Inc.

Sampler's Initials: *JS*

DATE SIGNED: 7/6/14

SAMPLER'S SIGNATURE: *[Signature]*

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 (813) 855-1844 fax (813) 855-2218

GROUNDWATER SAMPLING LOG

Client Name:	Jones Edmunds	Project Name:	Oldsmar Water Reclamation Facility	Contact:	Elizabeth Kennelley
Date Sampled:	2/6/14	SAL WO#	1401224	Phone:	(352) 377-5821
Well Number:	6 hrs after 12 hrs of pumping-1 p.m	Sample ID	1401224-03	Location:	
				GPS LAT	
				GPS LONG	

PURGING DATA

Well Diameter (inches)		WELL CAPACITY (gal/ft)		Screen Interval (Feet)	UNK To UNK	Static Depth to Water (Feet)		PURGE PUMP CODE	PP GP IBP
Total Well Depth (Feet)		REFERENCE ELEVATION (NGVD)		GROUND WATER ELEVATION (REFERENCE-STATIC)		TUBING DIAMETER (inches)		TUBING CAPACITY (gal/ft)	

Purge Technique: q Submerged Screen (1,1/4,1/4 Well) q Submerged Screen (1EQ Volume,3,3 Minutes) q Partially Submerged Screen (1 Well,3,3 minutes)

WELL VOLUME = (TOTAL DEPTH - STATIC DEPTH) x WELL CAPACITY =

ONE WELL VOLUME		1/4 WELL VOLUME		3 WELL VOLUMES		5 WELL VOLUMES	
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EQUIPMENT VOLUME = PUMP VOLUME + (TUBING CAPACITY x TUBING LENGTH) + FLOW CELL VOLUME

PUMP VOLUME		TUBING LENGTH		FLOW CELL VOLUME		EQUIPMENT VOLUME	
INITIAL TUBING LENGTH IN WELL (FEET)		FINAL TUBING LENGTH IN WELL (FEET)		PURGE TIME START		PURGE TIME END	TOTAL PURGED (gallons)

INSTRUMENT ID#:					451801			451801		
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TIME	VOLUME PURGED (Gallons)	TOTAL VOLUME PURGED (Gallons)	PURGE RATE (gpm)	Depth to Water (Feet)	pH (SU) ($\Delta < 0.2$)	TEMP (oC) ($\Delta < 0.2$)	SPECIFIC COND (uS/cm) ($\Delta < 5\%$)	DO (mg/L) (% SAT < 20)	TURBIDITY (NTUs) (< 20 NTU)	COLOR (Describe)	ODOR (Describe)
1300					7.10	24.6	44739	4.32	.69	None	strong sulfur

Well Capacity (gallons/foot): 0.75"=0.02, 1.25"=0.06, 2"=0.16, 3"=0.37, 4"=0.65, 5"=1.02, 6"=1.47, 12"=5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

SAMPLING DATA

PUMP CODES: PP=Peristaltic Pump, GP= Submersible Grundfor Pump, IBP= In-place Bladder Pump											
TUBING MATERIAL CODES: PP= Polypropylene, PE = Polyethylene, NP=Non-inert Plastic, TL= Teflon Lined, TT= Teflon											
TUBING MATERIAL CODE (CIRCLE ONE)			PP PE NP TL TT	SAMPLE TUBING LENGTH IN WELL (FEET)		SAMPLE PUMP FLOW RATE (gpm)					
SAMPLING INITIATED	1300	SAMPLING ENDED	1301	FIELD CLEANED	Y ☒	CLEANING STEPS					
FIELD FILTERED?	Y ☒	FILTER SIZE (um)		DUPLICATE	Y ☒	VOC COLLECTED BY REVERSE FLOW?	Y N ☒	SEMI-VOLS COLLECTED THROUGH TRAP?	Y N ☒		
PRESERVATION CHECKED IN FIELD?		Y N ☒	LIST PRESERVATIVES ADDED								
WEATHER CONDITIONS		Overcast / Drizzle 65°F									
COMMENTS											
SAMPLED BY/COMPANY: Southern Analytical Laboratories, Inc. Sampler's Initials: AL											

DATE SIGNED:

SAMPLER'S SIGNATURE:

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 (813) 855-1844 fax (813) 855-2218

GROUNDWATER SAMPLING LOG

Client Name:	Jones Edmunds	Project Name:	Oldsmar Water Reclamation Facility	Contact:	Elizabeth Kennelley
Date Sampled:	2/6/14	SAL WO#	1401224	Phone:	(352) 377-5821
Well Number:	9 hrs after 12 hrs of pumping-4 p.m	Sample ID	1401224-04	Location:	
				GPS LAT	
				GPS LONG	

PURGING DATA

Well Diameter (inches)		WELL CAPACITY (gal/ft)		Screen Interval (Feet)	UNK To UNK	Static Depth to Water (Feet)		PURGE PUMP CODE	PP GP IBP
Total Well Depth (Feet)		REFERENCE ELEVATION (NGVD)		GROUND WATER ELEVATION (REFERENCE-STATIC)		TUBING DIAMETER (inches)		TUBING CAPACITY (gal/ft)	

Purge Technique: q Submerged Screen (1,1/4,1/4 Well) q Submerged Screen (1EQ Volume,3,3 Minutes) q Partially Submerged Screen (1 Well,3,3 minutes)

WELL VOLUME = (TOTAL DEPTH - STATIC DEPTH) x WELL CAPACITY =

ONE WELL VOLUME	1/4 WELL VOLUME	3 WELL VOLUMES	5 WELL VOLUMES
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EQUIPMENT VOLUME = PUMP VOLUME + (TUBING CAPACITY x TUBING LENGTH) + FLOW CELL VOLUME

PUMP VOLUME		TUBING LENGTH		FLOW CELL VOLUME		EQUIPMENT VOLUME	
INITIAL TUBING LENGTH IN WELL (FEET)		FINAL TUBING LENGTH IN WELL (FEET)		PURGE TIME START		PURGE TIME END	
INSTRUMENT ID#:							

TIME	VOLUME PURGED (Gallons)	TOTAL VOLUME PURGED (Gallons)	PURGE RATE (gpm)	Depth to Water (Feet)	pH (SU) ($\Delta < 0.2$)	TEMP (oC) ($\Delta < 0.2$)	SPECIFIC COND (uS/cm) ($\Delta < 5\%$)	DO (mg/L) (% SAT < 20)	TURBIDITY (NTUs) (< 20 NTU)	COLOR (Describe)	ODOR (Describe)
1600					7.18	24.6	44835	4.72	40	clear	slight sulfur

Well Capacity (gallons/foot): 0.75"=0.02, 1.25"=0.06, 2"=0.16, 3"=0.37, 4"=0.65, 5"=1.02, 6"=1.47, 12"=5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

SAMPLING DATA

PUMP CODES: PP=Peristaltic Pump, GP= Submersible Grundfor Pump, IBP= In-place Bladder Pump											
TUBING MATERIAL CODES: PP= Polypropylene, PE = Polyethylene, NP=Non-inert Plastic, TL= Teflon Lined, TT= Teflon											
TUBING MATERIAL CODE (CIRCLE ONE)		PP PE NP TL TT	SAMPLE TUBING LENGTH IN WELL (FEET)			SAMPLE PUMP FLOW RATE (gpm)					
SAMPLING INITIATED	1600	SAMPLING ENDED	1601	FIELD CLEANED	Y ☒	CLEANING STEPS					
FIELD FILTERED?	Y ☒	FILTER SIZE (um)		DUPLICATE	Y ☒	VOC COLLECTED BY REVERSE FLOW?	Y N ☒	SEMI-VOLS COLLECTED THROUGH TRAP?	Y N ☒		
PRESERVATION CHECKED IN FIELD?		Y N ☒	LIST PRESERVATIVES ADDED								
WEATHER CONDITIONS											
COMMENTS											
SAMPLED BY/COMPANY: Southern Analytical Laboratories, Inc. Sampler's Initials: JB											

DATE SIGNED:

SAMPLER'S SIGNATURE:

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 (813) 855-1844 fax (813) 855-2218

GROUNDWATER SAMPLING LOG

Client Name:	Jones Edmunds	Project Name:	Oldsmar Water Reclamation Facility	Contact:	Elizabeth Kennelley
Date Sampled:	2/6/14	SAL WOH	1401224	Phone:	(352) 377-5821
Well Number:	12 hrs after 12 hrs of pumping-7 p.m	Sample ID	1401224-05	Location:	
				GPS LAT	
				GPS LONG	

PURGING DATA

Well Diameter (inches)		WELL CAPACITY (gal/ft)		Screen Interval (Feet)	UNK To UNK	Static Depth to Water (Feet)		PURGE PUMP CODE	PP GP IBP
Total Well Depth (Feet)		REFERENCE ELEVATION (NGVD)		GROUND WATER ELEVATION (REFERENCE-STATIC)		TUBING DIAMETER (inches)		TUBING CAPACITY (gal/ft)	

Purge Technique: q Submerged Screen (1,1/4,1/4 Well) q Submerged Screen (1EQ Volume,3,3 Minutes) q Partially Submerged Screen (1 Well,3,3 minutes)

WELL VOLUME = (TOTAL DEPTH - STATIC DEPTH) x WELL CAPACITY =

ONE WELL VOLUME	1/4 WELL VOLUME	3 WELL VOLUMES	5 WELL VOLUMES
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EQUIPMENT VOLUME = PUMP VOLUME + (TUBING CAPACITY x TUBING LENGTH) + FLOW CELL VOLUME

PUMP VOLUME		TUBING LENGTH		FLOW CELL VOLUME		EQUIPMENT VOLUME	
INITIAL TUBING LENGTH IN WELL (FEET)		FINAL TUBING LENGTH IN WELL (FEET)		PURGE TIME START		PURGE TIME END	
INSTRUMENT ID#:				45160		74601	

TIME	VOLUME PURGED (Gallons)	TOTAL VOLUME PURGED (Gallons)	PURGE RATE (gpm)	Depth to Water (Feet)	pH (SU) ($\Delta < 0.2$)	TEMP (oC) ($\Delta < 0.2$)	SPECIFIC COND (uS/cm) ($\Delta < 5\%$)	DO (mg/L) (% SAT < 20)	TURBIDITY (NTUs) (< 20 NTU)	COLOR (Describe)	ODOR (Describe)
1900					7.17	24.4	44637	4.70	22	clear	

Well Capacity (gallons/foot): 0.75"=0.02, 1.25"=0.06, 2"=0.16, 3"=0.37, 4"=0.65, 5"=1.02, 6"=1.47, 12"=5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

SAMPLING DATA

PUMP CODES: PP=Peristaltic Pump, GP= Submersible Grundfor Pump, IBP= In-place Bladder Pump											
TUBING MATERIAL CODES: PP= Polypropylene, PE = Polyethylene, NP=Non-inert Plastic, TL= Teflon Lined, TT= Teflon											
TUBING MATERIAL CODE (CIRCLE ONE)			PP PE NP TL TT	SAMPLE TUBING LENGTH IN WELL (FEET)			SAMPLE PUMP FLOW RATE (gpm)				
SAMPLING INITIATED	1900	SAMPLING ENDED	1901	FIELD CLEANED	Y ☒	CLEANING STEPS					
FIELD FILTERED?	Y ☒	FILTER SIZE (um)		DUPLICATE	Y ☒	VOC COLLECTED BY REVERSE FLOW?	Y N ☒	SEMI-VOLS COLLECTED THROUGH TRAP?	Y N ☒		
PRESERVATION CHECKED IN FIELD?		Y N ☒	LIST PRESERVATIVES ADDED								
WEATHER CONDITIONS		Drizzle 59°F									
COMMENTS											
SAMPLED BY/COMPANY: Southern Analytical Laboratories, Inc. Sampler's Initials: JL											

DATE SIGNED:

SAMPLER'S SIGNATURE: