

**Construction and Testing Report
Holly Hill Lower Floridan Aquifer Deep Exploratory Well No. 1
Northeast Regional Utility Service Area
Polk County, Florida**

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CERTIFICATION PAGE

This report on the construction and testing of the Lower Floridan aquifer Deep Exploratory Well HH-1 for Polk County Utilities, Polk County, Florida was prepared by or under the direction of a Registered Professional Geologist in the State of Florida.

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Executive Summary

Polk County has been seeking additional water supplies to meet future demands for the Northeast Regional Utilities Service Area (NERUSA) in northeast Polk County. A potential source of additional water for them, as well as others in the east-central and northeastern areas of the Southwest Florida Water Management District (District) is the Lower Floridan aquifer. In 2004, The District and Polk County entered into a cooperative funding agreement to construct and test a deep exploratory well to determine the hydrogeology, hydraulic properties and water quality of the Lower Floridan aquifer and overlying confining units in northeast Polk County. Construction of the deep exploratory well was initiated in January 2006 and substantially completed in January 2008.

The deep exploratory well (HH-1) was constructed to meet construction standards for public water system wells per Chapter 62-532 of the Florida Administrative Code (FAC). HH-1 was constructed to allow the withdrawal of groundwater from the Lower Floridan aquifer through a series of telescoped steel casings including 24-inch diameter casing from land surface to 433 feet below land surface (ft bls), 18-inch diameter casing from 387 to 606 ft bls, and 12-inch casing from 495 to 1,685 ft bls. A nominal 12-inch diameter open borehole extends from 1,685 to 2,130 ft bls.

Hydrogeologic units identified during construction and testing of HH-1 included the surficial aquifer system, the Upper Floridan aquifer, the middle semi-confining unit, the middle confining unit, the Lower Floridan aquifer and the sub-Floridan confining unit.

Analyses of packer test data indicate that the transmissivity of the middle semi-confining unit, which extends from 595 to 1,070 ft bls at HH-1, ranges from approximately 1,900 to 4,000 feet square per day. This transmissivity range is approximately one order of magnitude less than the reported transmissivity values for the Upper Floridan aquifer along the Lake Wales ridge and approximately two orders of magnitude less than the reported values for the Lower Floridan aquifer. The relatively low transmissivity is consistent with the unit being identified as a semi-confining layer between the overlying Upper Floridan aquifer and the underlying Lower Floridan aquifer.

Lithology, air-lift specific capacity and water quality data collected during reverse-air drilling, a water level difference of approximately 32 feet between the middle semi-confining unit and the Lower Floridan aquifer, and analyses of rock core samples provide evidence that the middle confining unit, which extends from 1,070 to 1,615 ft bls at HH-1, forms an essentially non-leaky confining bed that separates groundwater in the Upper Floridan aquifer below the site from groundwater water in the underlying Lower Floridan aquifer.

Lithology, air-lift specific capacity and water quality data collected during reverse-air drilling, geophysical logs, a down-hole video survey, and the results of a 13-day pumping test of HH-1 provide evidence of a very permeable zone within the Lower Floridan aquifer consisting of fractured limestone and dolostone from approximately 2,000 to 2,080 ft bls. Analyses of the pumping test data showed a specific capacity of 120 gallons per minute per foot of drawdown

while pumping at 3,000 gallons per minute and provided an estimated transmissivity of approximately 193,400 feet square per day for the Lower Floridan aquifer.

Water samples were collected from HH-1 on the last day of the pumping test and submitted to a certified laboratory for analysis. The results of the analysis show that water quality of the Lower Floridan aquifer at HH-1 meets select Primary Drinking Water Standards including inorganic compounds, volatile organic contaminants, synthetic organic contaminants, and radionuclides and Secondary Drinking Water Standards, and, therefore, is a potential source of potable water for public supply.

Information obtained from the construction and testing of HH-1 shows that the Lower Floridan aquifer has the potential to produce significant quantities of potable water with minimal impacts occurring to the overlying aquifers as a result of the withdrawals. However, determining the long term viability of utilizing the Lower Floridan aquifer as a source of water for potable use and/ or to augment the County's reuse system requires further evaluation. This could be accomplished through a long term pumping test of HH-1, which would include monitoring of water levels in the Upper Floridan aquifer and the surficial aquifer system, and performing laboratory analyses of samples collected from the discharge water on a regular basis. This would provide an additional means to evaluate the hydraulic connection between the Lower Floridan aquifer and the overlying aquifers and provide additional information on water quality changes from further pumping and whether the Lower Floridan aquifer would continue to produce potable water over time.

It is recommended that an extended pumping test of HH-1 be conducted for a minimum period of one year to provide additional information for determining the long term viability of utilizing the Lower Floridan aquifer as a source of water. The County's planned reuse facility, which will be built in the vicinity of HH-1, would provide a discharge point for the pumping test so as not impact water levels in the surficial aquifer system and the Upper Floridan aquifer and allow for the beneficial use of the discharge water.

1.0 Introduction

1.1. Background

Polk County Utilities (PCU) has been seeking additional water supplies to meet future demands for the Northeast Regional Utilities Service Area (NERUSA) in northeast Polk County. A potential source of additional water for them, as well as others in the east-central and northeastern areas of the Southwest Florida Water Management District (District) is the Lower Floridan aquifer (LFA). To date, all ground water supply developed in the District has come from the Upper Floridan aquifer (UFA), or one of the minor aquifers above it. The LFA has proved to be too mineralized to provide a viable source of water in the southern and western portions of the District. However, in the north-central part of the state, particularly Lake, Seminole, and Orange counties, the LFA is a well-established water supply resource. The potential exists for LFA water to provide a supplemental source of water for northeast Polk County and areas of the District to the north.

Accordingly, PCU requested that the District cooperatively fund the appropriate exploration with Polk County (County). In 2004, The District and the County entered into a cooperative funding agreement to construct and test a deep exploratory well (HH-1) at the future location of the Holly Hill water treatment facility to determine the hydrogeology and hydraulic properties and water quality of the LFA and overlying confining units in Northeast Polk County. The exploration also included the construction of an UFA observation well and a surficial aquifer system (SAS) observation well to monitor for the effects of pumping well HH-1.

Technical specifications on the design, construction, and testing of well HH-1 and associated observation wells were prepared by PBS&J and submitted to PCU for incorporation into contract documents used in soliciting bids from licensed drilling contractors. The contract for the construction and testing of the wells was awarded to Rowe Drilling Co., Inc. (RDC) of Tallahassee, Florida. The Notice to Proceed was issued by PCU on December 19, 2005. Rowe mobilized to the project site on January 9, 2005 and following construction of an access road began drilling operations for the UFA observation well on February 07, 2006.

1.2. Site Location and Description

As depicted on **Figure 1-1**, the HH-1 site is located within Section 13, Township 25 South, Range 26 East on a 5-acre rectangular parcel owned by the Polk County, Board of County Commissioners, approximately 600 ft. north of Sand Mine Road and approximately 1,000 ft. east of U.S. Highway 27. The physical address is 49585 U.S. Highway 27, Davenport, Florida, 33897-9507. HH-1 is geographically located at 28° 18' 48.23659" North Latitude and 81° 39' 52.15319" West Longitude. Land surface elevations at the site range from approximately 205 to 190 feet above the National Geodetic Vertical Datum of 1929 (NGVD). The land surface elevation at HH-1 is approximately 196 feet above NGVD.

HH-1 is located on the Lake Wales Ridge, which extends from the northeast corner of Polk County into the southern part of Highlands County. It is the most prominent topographic feature in peninsular Florida with elevations ranging from 150 to 305 feet above NGVD (Gilboy, 1988). The sediments, which form the ridge, are composed of coarse clastic material which has been dissected by streams and karst activity and straightened on its flanks by coastal erosion to produce its present western bounding scarp and a probable buried former eastern bounding scarp (White, 1958).

Long known by local water well drillers as a difficult area to construct water wells, the Lake Wales Ridge overlies more than 1,200 feet of carbonate bedrock (Gates, M.T. and D. J. DeWitt, 2008). The contact between the coarse clastics and underlying carbonates is highly variable with respect to depth, due to the karstic surface present at the top of the carbonates. Past weathering of the limestone surface during aerial exposure has resulted in cutter-pinnacle structures now buried by the overlying quartz sand (Gates, M.T. and DeWitt, 2008). This was evident at the Holly Hill site where top of limestone was encountered at a depth of 295 feet below land surface (ft-bls) during drilling for the UFA observation well and at 405 ft-bls during drilling of the deep exploratory well HH-1, which is located approximately 85 feet south of the observation well.

2.0 Regional Hydrogeology

2.1. Hydrogeologic Framework

The hydrogeologic units underlying the NERUSA consist of deposits of sand, clay, marl, and carbonate rocks that were primarily deposited in a marine environment. Principal hydrogeologic units consist of the surficial aquifer system (SAS), the intermediate confining unit ICU, and the Floridan aquifer system (FAS). These hydrogeologic units, their equivalent stratigraphic units, and brief lithologic descriptions are presented in **Figure 2-1**, which was modified from O'Reilly and others (2002) to reflect the approximate thickness of the hydrogeologic units within and in the vicinity of the NERUSA as identified in McGurk and Presley (2002) and O'Reilly and others, (2002). The thicknesses of the hydrogeologic units identified at HH-1 from lithologic, geophysical, and video logs obtained during construction and testing are presented and discussed in the Summary Section at the end of this report.

2.1.1. Surficial Aquifer System

The SAS or water table aquifer is contiguous with land surface and overlies the ICU. It consists chiefly of a single unconfined layer of sand that generally grade into less permeable clayey or silty sands with depth (Yobbi, 1996). Sediments that comprise the SAS within the NERUSA are associated with the Cypresshead Formation along the Lake Wales Ridge and reworked Cypresshead Formation sediments east and west of the Ridge (Scott, 2001). The Cypresshead Formation, which is a shallow marine near shore deposit, consists of reddish brown to reddish orange, unconsolidated to poorly consolidated fine to very coarse grained, clean to clayey sands that range in thickness from approximately 130 feet in the Upland and Plain areas of the NERUSA to 220 feet along the Ridge. Discoid quartzite pebbles and mica are often present. Clay beds are scattered and not really extensive. Original fossil material is not present in the sediments although poorly preserved molds and casts of mollusks and burrow structures are occasionally present.

The top of the SAS (the water table) can be found several tens of feet below land surface (ft bls) in the Lake Wales Ridge area that trends north to south in the NERUSA and where land surface elevations generally range from 120 to 220 feet above NGVD. Water table levels at the Ridge WRAP 4 water table monitoring well, which is located approximately 4.7 miles south of deep exploratory well HH-1 at a land surface elevation of 197.81 feet above NGVD, ranged from a high of approximately 73 ft bls in 1998 to a low of approximately 85 feet bls in 1976. In the wetland areas that flank the ridge, land surface elevations generally range from 110 to 115 feet above NGVD and the water table is generally at or within a few feet of land surface. Thickness of the SAS (base of the Holocene, Pleistocene undifferentiated sediments to the water table) within the NERUSA ranges from approximately 100 to 130 feet.

The SAS receives recharge from rainfall, irrigation water derived from either groundwater, nearby surface water bodies, or reclaimed water and also from septic tank effluent. The largest rates of recharge occur where the soils of the unsaturated zone consist of permeable sand and

overland runoff is minimal. The UFA also supplies recharge to the SAS in lowland areas where the potentiometric surface of the UFA is higher than the water table. Water discharges from the SAS via ET from the water table, by seepage to surface water bodies, by pumpage, and by downward leakage to the underlying UFA where the elevation of the water table is higher than the UFA potentiometric surface. A significant source of man-made recharge to the SAS comes from reclaimed-water distribution systems. Reclaimed water is applied to the land surface in two ways: through rapid infiltration basins (RIBs) or by spray irrigation. RIBs are designed to act as recharge sites. Large-scale RIB sites are located in western Seminole County, Lake County, western Orange County, and northwestern Osceola County (McGurk and Presley, 2002). The RIBs in Osceola County are located approximately two miles south of HH-1.

No aquifer tests of the SAS within the NERUSA were identified from available reports (SWFWMD, 2000) (Sezell, 1993). The East Central Florida (ECF) groundwater flow model (McGurk, B. and P. Presley, 2002) identified a hydraulic conductivity of 20 feet per day (ft/d) for the SAS. Pride and others (1966) and Stewart (1966) determined a specific yield of 0.3 for the SAS in Polk County.

2.1.2. Intermediate Confining Unit

The ICU separates and restricts groundwater flow between the overlying SAS and the underlying UFA. It consists of unconsolidated sand, silt, clay, and shell and consolidated beds of shell, limestone and dolomite of the Pliocene and Miocene age Hawthorne Group. Hawthorne Group Formations identified in FGS lithology logs for the well constructed within the NERUSA include the Peace River Formation and the Arcadia Formation.

The Peace River Formation is composed of interbedded sands, clays and carbonates (Scott, 2001). The sands are generally light gray to olive gray, poorly consolidated, clayey, variably dolomitic, very fine to medium grained and phosphatic. The clays are yellowish gray to olive gray, poorly to moderately consolidated, sandy, silty, phosphatic and dolomitic. The carbonates are usually dolostone. The dolostones are light gray to yellowish gray, poorly to well indurated, variably sandy and clayey, and phosphatic. Opaline chert is often found in these sediments. Fossil mollusks occur as reworked casts, molds, and limited original shell material. Silicified corals and wood, and vertebrate fossils are also present.

The Arcadia Formation is predominantly a carbonate unit with a variable siliciclastic component, including thin beds of siliciclastic. The Arcadia Formation is composed of yellowish gray to light olive gray to light brown, micro to finely crystalline, variably sandy, clayey, dolomitic and phosphatic, fossiliferous limestones and dolostones. Thin beds of sand and clay are common. The sands are yellowish gray, very fine to medium grained, poorly to moderately indurated, clayey, dolomitic, and phosphatic. The clays are yellowish gray to light olive gray, poorly to moderately indurated, sandy, silty, phosphatic and dolomitic. Molds and cast of mollusk are common in the dolostones. Silicified carbonates and opalized claystone are found in the Arcadia Formation.

Inspection of FGS lithology logs indicates the ICU is absent along the Lake Wales Ridge north of Interstate Highway 4 and no more than 20 feet thick at the south end of the NERUSA. Leakance Values of the ICU in the NERUSA as identified in the ECF model generally range from 0.0004 to 0.0015 per day and average approximately 0.001 per day.

2.1.3. Floridan Aquifer System

The FAS is a vertically continuous sequence of carbonate rocks that are mostly of Tertiary age. The geologic formations that comprise the FAS consist of interbedded limestone, dolomite, and dolomitic limestone in which the amount of primary porosity, secondary porosity, and secondary infilling of pores or fractures is highly variable with depth (McGurk and Presley, 2002). Throughout the ECF region, the FAS has been subdivided into three hydrostratigraphic subunits on the basis of relative hydraulic conductivity: the UFA, the middle semi-confining unit (MSCU)/ middle confining unit (MCU), and the LFA.

2.1.4. Upper Floridan Aquifer

The UFA, which is the primary source of groundwater for the irrigation and public supply wells within the NERUSA, consists of the Ocala Limestone and approximately the upper one-third of the Avon Park Formation (McGurk and Presley, 2002).

The Ocala Limestone consists of nearly pure limestone and occasional dolostone (Scott, 2001). It can be subdivided into lower and upper facies on the basis of lithology. The lower facies is composed of a white to cream-colored, fine to medium grained, poorly to moderately indurated, very fossiliferous limestone. The lower facies may not be present throughout the areal extent of the Ocala Limestone and may be partially to completely dolomitized. The upper facies is a white, poorly to well indurated, poorly sorted, very fossiliferous limestone. Silicified limestone (chert) is common in the upper facies. Fossils present in the Ocala Limestone include abundant large and small foraminifera, echinoids, bryozoans, and mollusks. The large foraminifera *Lepidocyclina* sp. is abundant in the upper facies and extremely limited in the lower facies. The presence of these large foraminifera in the upper facies is quite distinctive.

The Avon Park Formation consists of cream to light-brown or tan, poorly indurated to well indurated, variably fossiliferous, limestone. These limestones are interbedded with tan to brown, very poorly indurated to well indurated, very fine to medium crystalline, fossiliferous (molds and casts), vuggy dolostones. The fossils present include mollusks, foraminifera, echinoids, algae, and carbonized plant remains, molds and casts of gypsum crystals occur locally. Parts of the Avon Park Formation, which is part of the FAS, comprise important, subregional confining units within the FAS (Miller, 1986),

Within the NERUSA, the elevation of the top of the UFA varies between 0 feet NGVD to approximately 25 feet below NGVD (McGurk and Presley, 2002). Permeability within the UFA is not uniform with depth. Numerous reports describing production well drilling and testing in the ECF region have documented the presence of a zone of hard, fractured dolostone within the

Avon Park Formation containing abundant secondary porosity features (McGurk and Presley, 2002) (Wolansky et al., 1980), which is often a major source of production within the UFA. The elevations of the top of the dolostone zone in the NERUSA range from approximately 250 feet below NGVD in the northern sections of the NERUSA to approximately 300 feet below NGVD in the southern sections (McGurk and Presley, 2002). The bottom of the UFA in the NERUSA ranges from approximately 380 to 400 feet below NGVD. Thickness of the UFA in the NERUSA is approximately 400 feet.

Aquifer performance tests conducted by the County at their Polo Davenport facility, which is located near the Lake county line, and their Bella Tescano facility, which is located near the intersection of U.S. Highway 27 and County road 54, identified transmissivities for the UFA along the Lake Wales Ridge that range from 14,200 to 30,700 feet square per day (ft²/d), storativity values that range from 0.000046 to 0.0035, and leakance values that range of 0.0034 to 0.0096 per day.

2.1.5. Middle Semi-confining Unit/ Middle Confining Unit

The MSCU consists of relatively soft, micritic limestone, and dense, dolomitic limestone with little secondary porosity compared to the aquifer units above and below. The MSCU is leaky, and its lithology is very similar to that of the overlying and underlying aquifer units. It is considered a semi-confining unit primarily because it lacks abundant fracture zones and solution cavities. Within the NERUSA, the altitude of the top of the MSCU lies at an elevation of approximately 500 feet below NGVD and its thickness ranges between 300 and 400 feet (O'Reilly and others, 2002).

In west-central Florida, including all of Polk County there is a separate and distinct second confining unit underlying the MSCU. The unit, called the middle confining unit (MCU), is composed primarily of anhydritic and gypsiferous dolostone and dolomitic limestone (Spechler and Kroening, 2006). This unit generally corresponds to the lower part of the Avon Park Formation and is considerably less permeable than the overlying MSCU. It forms an essentially non-leaky confining bed that separates freshwater in the UFA from the more mineralized water in the underlying rocks (Spechler and Kroening, 2006). Within the NERUSA, the altitude of the top of the MCU, which is generally defined as the first occurrence of evaporites, lies at an elevation between approximately 800 and 900 feet below NGVD and its thickness ranges between 200 and 400 feet (O'Reilly and others, 2002).

Little information is available on the hydraulic properties of the MCU in Polk County. Hydraulic testing of the carbonate rocks containing evaporates in the intergranular pore spaces indicates that they are extremely low in permeability (Wolansky and others, 1979). Horizontal hydraulic conductivities from cores taken at different depths within the MCU at the Polk City Test well generally ranged from approximately 0.000024 to 0.90 feet per day (ft/d) (Spechler and Kroening, 2006). Two samples taken from this interval, however, had hydraulic conductivities of 6.6 and 19.0 ft/d, indicating that isolated zones of higher horizontal hydraulic conductivity exist within the MCU. The location of the Polk City well is shown on **Figure 2-2**.

2.1.6. Lower Floridan Aquifer

The geologic units comprising the LFA are the lower part of the Avon Park Formation, the Eocene Oldsmar Formation, and the upper part of the Paleocene Cedar Keys Formation. The thickness of the LFA within the NERUSA is approximately 1,100 feet (O'Reilly and others, 2002). In east-central Florida, the LFA is highly productive and is composed of alternating beds of limestone and fractured dolostone (O'Reilly and others, 2002). In much of Polk County, the LFA is composed of alternating beds of limestone and dolostone containing intergranular evaporates and generally is not productive (Spechler and Kroening, 2006).

Lithology and permeability within the LFA are not homogeneous throughout its thickness. Borehole data from some LFA wells indicates that layers of differing permeability exist. At the southeast well near Lake Nona in south-central Orange County (**Figure 2-2**), the vertical sequence within the LFA consists of two highly permeable zones separated by a less permeable zone or semi-confining unit (O'Reilly and others, 2002). The two highly permeable zones consist primarily of dolostone and dolomitic limestone and contain borehole zones where inflow or outflow was noted during logging. Static water-level measurements during packer tests indicated an upward hydraulic gradient with several feet of head difference between the two permeable zones.

The base of the LFA is characterized by an increased presence of less permeable rocks. This unit of lower permeability rocks, called the sub-Floridan confining unit, consists of dolomite and limestones that contain abundant evaporate minerals (O'Reilly and others, 2002). The altitude of the top of the sub-Florida confining unit near the location of HH-1 based on the first occurrence of evaporates was identified in O'Reilly and others (2002) at an elevation of 2,200 feet below sea level.

2.1.7. Lower Floridan Aquifer Water Quality

Three LFA wells/ corings reported in O'Reilly and others (2002) and the District's ROMP 74X Davenport Corehole #2, which, like the location of deep exploratory well HH-1, are located west of the easternmost extent of the MCU, provide information on LFA water quality in the vicinity of the NERUSA. The locations of the wells/ corings are also shown on **Figure 2-2**.

Polk City USGS Core Hole 2 is located approximately 15 miles west-southwest of deep exploratory well HH-1. The well is cased to 1,000 ft bls or 863 feet below NGVD, open hole to 1,996 ft-blis or 1,859 feet below NGVD, and open to the MCU and LFA. St. Cloud OSF-0081 is located approximately 21 miles east of well HH-1. The well is 2,210 feet deep and is open to the LFA. The casing depth was not reported. Lake Louisa State Park L-0727 is located approximately 8.5 miles northwest of well HH-1. The well is cased to 1,295 feet bls, open hole to 1,410 feet bls, and open to the LFA.

ROMP 74X Davenport Corehole #2 is located approximately 12 miles southeast of the deep exploratory well HH-1 well. The corehole is cased to 450 feet bls, open hole to 1,560 feet bls and open to the LFA.

Chemical and physical parameters for water samples collected in 2000 from the three wells/ corings identified in O' Reilly et al. and in 2003 from ROMP 74X are provided in **Table 2-1**. The data shows considerable variation in concentrations of key parameters including sulfate, dissolved solids, and chloride. Of the four wells/ corings, only water quality at the Lake Louisa State Park L-0727 well met drinking water standards for TDS, sulfate, and chlorides. Sulfate concentrations ranged from 20 to 1,700 milligrams per Liter (mg/L), dissolved solids ranged from 210 to 2,840 mg/L, and chloride ranged from 8.3 to 730 mg/L. The maximum chloride concentration of 730 mg/L at the St. Cloud well is consistent with its location being closest of the four wells/ corings to the Atlantic Ocean.

2.1.8. Lower Floridan Aquifer Hydraulic Characteristics

There are no Aquifer Performance Test (APT) sites identified in either McGurk and Presley, (2002) or O'Reilly and others (2002) for the LFA within the area where the MCU is present. The closest APT site to the proposed exploratory well is approximately 18 miles to the east in Orange County. The results of the APTs were not reported. However, the range of transmissivity values for the LFA reported from APTs conducted in the east-central Florida region was typically greater than the transmissivity values reported for the UFA. Reported transmissivity values from approximately ten APTs of the LFA ranged from 200,535 to 688,450 ft²/day (McGurk and Presley, 2002).

3.0 Lower Floridian Aquifer Deep Exploratory Well Construction and Testing

This section summarizes the construction and testing of the Holly Hill Lower Floridian Aquifer Deep Exploratory Well (HH-1). A detailed description is provided for the well drilling methodology used, casing installation and grouting procedures, and the quantity of materials used in the well. The as-built diagram for HH-1 is depicted on **Figure 3-1**. Data on the geology, hydraulics and water quality of the Floridan aquifer system collected during construction of HH-1 is also presented and discussed in this section. Data was obtained through the performance of air-lift specific capacity test and water quality sampling and analysis during reverse-air drilling, the collection of lithologic samples during drilling at 10-foot depth intervals, geophysical logging, rock core sampling and analysis, packer testing, and a 13-day pumping test of the LFA following well construction completion.

The construction of the UFA monitor well (HH-MW-1) is described in a technical memorandum included in **Appendix A**. The construction of the SAS monitor well (HH-MW-2) is described in a technical memorandum included in **Appendix B**. Well construction permits are included in **Appendix C**. As-built diagrams for the Upper Floridan monitor well and Surficial Aquifer monitor well are included as **Figure 3-2** and **Figure 3-3**, respectively.

3.1. Drilling

HH-1 was drilled with a Gardner-Denver 3000 trailer-mounted drill rig incorporating a Kelly drive rotary system with a turntable located approximately 5 feet above land surface. Photographs of the drilling activities are presented in **Appendix D**. The drill rods were approximately 30 feet in length with a 3.75-inch inside diameter (I.D.). Various drill bit sizes were used during well construction ranging in diameter from 12-inches to 36-inches.

Mud rotary and reverse-air rotary drilling techniques, which are described below, were utilized in the construction of HH-1. Both the 36-inch diameter casing and the 30-inch diameter casing required the use of a vibrating hammer to install and to achieve their desired depth. Once the casing was installed, it was then drilled out using mud-rotary drilling to remove borehole cuttings. A nominal 30-inch diameter borehole was drilled to a depth of 440 ft bls prior to the installation of the 24-inch diameter casing using a mud-rotary drilling system. Mud-rotary drilling was utilized to a depth of approximately 440 feet bls where circulation of the drilling mud was lost. A nominal 24-inch diameter borehole was drilled to a depth of approximately 608 ft bls prior to the installation of the 24-inch diameter casing using a combination of reverse-air drilling and mud rotary drilling with either drilling mud or cement grout as the drilling fluid.

3.1.1. Mud Rotary Drilling

Mud rotary drilling is typically used in Florida to drill through unconsolidated or poorly consolidated deposits that generally are unstable, have a tendency to collapse into the borehole, and yield relatively low quantities of groundwater. The drilling mud stabilizes the borehole and

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removes the drill cuttings during drilling operations. The mud drilling operation at the site used bentonite-drilling mud as the drilling fluid which was mixed in an approximately 8,000-gallon dug pit, temporarily located on-site.

During mud rotary drilling, the drilling mud is pumped through the drill rods and exits out the drill bit. The viscous drilling fluid suspends the cuttings and circulates back up the borehole to land surface. The returning mud, laden with formation cuttings, is routed back into the open pit, which is tiered allowing the formation cuttings to settle out. The drilling fluids are collected in another tier and re-circulated back down the drill rod. Following completion of the well, the drill cuttings were excavated and backfilled with clean sand.

3.1.2. Reverse-Air Drilling

Reverse-air drilling is used in Florida primarily to drill in competent water-bearing formations. Water produced by the formation serves as the drilling fluid. Compressed air is piped down a 1-inch diameter air-line inside the drill pipe that aerates the water. This aeration causes a pressure differential, which in turn causes upward flow of the water inside the drill pipe. The drill pipe in effect becomes an air-lift pump. Water and cuttings at the bottom of the borehole are drawn into the drilling bit and conveyed up the drill rod to land surface. The water and cuttings from the drill rod are then routed to the open pit. Reverse-air drilling allows for the collection of formation water samples through the drill rod for water quality analyses and the performance of air-lift specific capacity test to evaluate borehole hydraulics during drilling operations. Reverse-air drilling was used after a depth of approximately 685 ft bls on well HH-1.

3.1.3. Rotary Drilling with Cement Grout

Rotary drilling with cement grout is primarily used to drill through extremely unstable formations that would have a tendency to collapse into the borehole even if bentonite mud drilling methods were utilized. The cement having a higher viscosity and strength than bentonite mud stabilizes the borehole wall in addition to sealing off loose unconsolidated formations.

During rotary drilling with cement grout, the drilling cement is pumped through the drill rods and exits out the drill bit into the formation. As the cement is being pumped the drill bit is advanced into the formation approximately 5-8 feet forcing the cement grout into the formation. Afterwards the drill bit is raised and water is flushed through out the drill rod to remove cement from the drill pipe. The cement is then allowed to cure before pilot hole drilling resumes utilizing mud-rotary drilling.

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3.2. Casing Installation

3.2.1. HH-1 36-Inch Casing

Construction of HH-1 was initiated by RDC on May 18, 2006 with the installation of a 36-inch diameter surface casing to prevent unconsolidated, near surface sediments at the site from collapsing into the borehole during drilling activities. The surface casing was installed by vibrating the nominal 36-inch diameter, 3/8-inch thick wall, steel casing into the ground until refusal, which was encountered at an approximate depth of 220 ft bls. Mill certificates for the 36-inch casing are included in **Appendix E** of this report.

3.2.2. HH-1 30-Inch Casing

On June 8, 2006 installation of HH-1 30-inch diameter casing was begun since competent limestone rock was not encountered at this point in construction and the need to prevent unconsolidated sediments at the site from collapsing into the borehole during drilling activities was still necessary. The 30-inch casing was installed by vibrating each section of nominal 30-inch diameter, 0.375-inch thick wall, steel casing into the ground until refusal, which was encountered at a depth of 292 feet bls. Mill certificates for the 30-inch casing are included in **Appendix E** of this report.

3.2.3. HH-1 24-Inch Casing

After a nominal 29-inch bore hole was drilled to a depth of 436 ft bls, the 24-inch diameter casing was installed. The intermediate casing of HH-1 consisted of nominal 42 foot sections of 0.375 inch wall, 24-inch diameter steel casing that were butt-welded as the casing was installed. Centralizers at 90° orientation were placed at the bottom of the casing and every 40 feet thereafter. The casing was installed to a total depth of 434 ft bls. Mill certificates for the 24-inch casing are included in **Appendix E** of this report.

3.2.4. HH-1 18-Inch Casing

After a nominal 24-inch bore hole was drilled to a depth of 610 ft bls, the 18-inch diameter casing was installed. The 18-inch casing for HH-1 consisted of nominal 42 foot sections of 0.375 inch wall, 18-inch diameter steel casing that were butt-welded together as the casing was installed. Centralizers at 90° orientation were placed at the bottom of the casing and every 40 feet thereafter. The 18-inch casing was installed to a total depth of 605 ft. without encountering any obstructions. Mill certificates for the 18-inch casing are included in **Appendix E** of this report.

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3.2.5. HH-1 Final Casing (12 in)

After the nominal 12-inch pilot hole was reamed to a nominal 18-inch diameter from the bottom of the 18-inch diameter casing to approximately 1,690 ft-bls utilizing reverse-air drilling techniques, the 12-inch diameter steel casing was installed from a depth of 485 to 1,685 feet bls resulting in 120 feet of overlap between the 18-inch and 12-inch casings. The overlap exceeded the minimum 20 feet of overlap required by rule to provide a cemented casing through and above the gravel-filled annulus between the nominal 24-inch borehole and 18-inch casing from 508 to 580 ft-bls. Mill casing certificates for the 12-inch casing are included in **Appendix E**.

3.3. Casing Grouting

Deep exploratory well HH-1 was constructed with five steel casings including a 36-inch, 30-inch, 24-inch, 18-inch, and 12-inch, as shown in **Figure 3-1**. The 24-inch, 18-inch and 12-inch casings were grouted with Portland Type II cement with up to 4% bentonite using both pressure grout and tremie grout techniques. Details of the grouting for the three cemented casings are provided below. The 36-inch and 30-inch diameter casings were driven in place utilizing a vibrating hammer and/ or a pneumatic hammer and, therefore, only the annulus between the two casings was tremie grouted with Portland Type II cement.

3.3.1. HH-1 Intermediate 2 (24 inch) Casing

RDC performed the cementing operations on the 24-inch casing installed at HH-1 with Portland Type II neat cement. Grouting of the 24-inch casing was performed in one pressure grout stage and one tremie grout stage. Grout was mixed at a ratio of 5.5 to 6.0 gallons of water per 94 pounds of cement.

The initial pressure grout stage was conducted on June 23, 2006 which consisted of pumping eight cubic yards of cement. A pressure gauge installed on the header assembly read 30 pounds per square inch (psi) at the end of the pressure grouting operation and maintained 30 psi for 3.5 hours until the grout set. The pressure was released at that time and the tubing was pulled up a safe distance from the bottom of the casing. The top of the cement in the annular space between the borehole and the final casing was tagged at a depth of 278 feet bls approximately 24 hours after the pressure grouting.

The tremie grout stage was conducted on June 26, 2006 and consisted of 16.36 cubic yards of Portland Type II cement mixed with 6% bentonite gel. The cement was pumped into the annular space between the inside of the 30-inch casing and the outside of the 24-inch casing. A full cement return was observed at ground surface during the tremie grouting procedure.

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The theoretical volume of grout to place a 2-foot “cement shoe” at the bottom of the casing and fill the annulus between the nominal 30-inch diameter borehole and the 24-inch casing is approximately 24.6 cubic yards. However, less grout was required due to the relatively gauged borehole from the bottom of the 30-inch casing at 292 feet bls to the total depth of 434 feet bls. The total quantity of grout used was 24.4 cubic yards.

3.3.2. HH-1 Intermediate Casing 3 (18 inch) Grouting

The RDC performed the cementing operations on the 18-inch casing using five tremie grout stages and one gravel stage. Portland Type II cement was used for all grout stages.

The initial tremie grout stage was conducted on December 13, 2006 and consisted of 10 cubic yards of Portland Type II neat cement grout. The cement was pumped into the annular space between the inside of the 24-inch casing and the outside of the 18-inch casing. The tremie pipe was installed to a depth of 600 ft bls. The top of the cement in the annular space was tagged at 580 feet bls approximately 24 hours after the initial tremie grouting.

Beginning on December 18, 2006 and ending on December 28, 2006, FDOT #57 limestone gravel was placed into the annular space between the 18-inch casing and borehole due to the apparent high permeability of the formation. A total of 40 cubic yards of gravel was used to fill the annular space from 508 to 580 ft-bl. After installing the gravel, a sand seal consisting of one cubic yard of 6/20 grade sand was placed on top of the gravel. The sand seal was tagged at a depth of 506 feet bls. The purpose of the sand seal is to prevent grout from migrating into the graveled zone of high permeability.

The second tremie grout stage was conducted on December 28, 2006 and consisted of 0.6 cubic yards of Portland Type II cement mixed with +/- 10% bentonite gel. The cement was pumped into the annular space between the inside of the 24-inch casing and the outside of the 18-inch casing. The tremie pipe was installed to a depth of 500 feet bls. The top of the cement in the annular space was tagged at 508 feet bls approximately 24 hours after the second tremie grouting.

The third tremie grout stage was conducted on January 2, 2007 and consisted of four cubic yards of Portland Type II neat cement. The tremie pipe was installed to a depth of 489 feet bls. The top of the cement was tagged at 366 feet bls approximately 24 hours after the third tremie grouting.

The fourth tremie grout stage was conducted on February 22, 2007 and consisted of five cubic yards of Portland Type II neat cement and the fifth grout stage consisted of 0.46 cubic yards.

3.3.3. HH-1 Final Casing (12 inch) Grouting

The grouting of the 12-inch diameter final casing consisted of ten tremie grout stages and two stages of coarse sand installation. The 12-inch casing was installed with two cement baskets set

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at approximately 3 ft and 8 ft from the bottom of the 12-inch casing, which was installed to a depth of 1,685 ft-bls. Initially, a small batch of cement (25 sacks) and sand (six sacks) was spotted at the bottom of the casing to stabilize the cement basket. Four tremie grout stages of Portland cement mixed with 4% bentonite and water totaling 37 cubic yards were pumped between November 27, 2007 and December 13, 2007 with cement levels rising through the third tremie grouting to 1,629 ft-bls. Following the fourth tremie grouting, cement was tagged at 1,671 ft-bls. On the basis that the cement was lost through permeable zones in the formation, permission was granted from the District to install two cubic yards of sand to bridge the permeable zone. The sand was installed using the tremie method from a depth of 1,671 feet bls to 1,636 feet bls.

Eight cubic yards of cement mixed with 4% bentonite and water were tremie grouted on December 17th, 2007, which were tagged the following day at 1,600 ft bls. Following the tremie grouting, the static water level in the well rose from 115.95 to 106.1 ft bls. Seven cubic yards of cement mixed with 4% bentonite were tremie grouted on December 18th, 2007, which were also tagged at 1,600 ft bls. The District was contacted again and permission was granted to install two cubic yards of sand to bridge the permeable zone. The sand was installed December 19th, 2007 from a depth of 1,600 to 1,580 ft bls using the tremie method. Following placement of the sand, fourteen cubic yards of cement mixed with water were tremie grouted that same day and tagged at 1,399 ft bls. Following the tremie grouting, the static water level in the well rose from 106 to 94.1 ft bls.

The 12-inch casing was then tremie grouted to 485 ft bls using three stages of Portland cement with 4% bentonite totaling 28.5 cubic yards.

Following installation of the 12-inch casing, reverse-air drilling was used to clear the nominal 12-inch open hole below the casing of drill cuttings that had filled the open hole above the bottom of the cement plug at 2,232 ft bls. The drill cuttings were a result of reaming the pilot hole to a nominal 18-inches in diameter from 605 to 1,685 ft bls. While reaming the pilot hole, five of the nine cones on the reaming bit broke and fell into the bore hole. The drilling contractor was not able to retrieve four of these cones, which apparently collected in sufficient numbers at a depth of approximately 2,130 ft bls during clearing of the pilot hole to block any further advancement of the drill bit. As a result, the open hole section of the well was completed to a depth of 2,130 ft bls.

3.4. Air-Lift Specific Capacity Tests

A total of forty-nine air-lift specific capacity tests were conducted during reverse-air drilling of the 12-inch diameter pilot hole at depths below land surface between 685 feet through 2,440 feet. The specific capacity of the drilled pilot hole, which is reported in gallons per minute per foot of drawdown (gpm/ft), was calculated by measuring the discharge rate during reverse-air drilling and the resulting drop in water level from the static water level measured before the start of drilling. **Table 3-1** presents daily static water level depths and elevations measured during reverse-air drilling of the pilot hole. **Table 3-2** presents the air-lift specific capacity test results

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from measurements collected during reverse-air drilling of the pilot hole. Water samples collected during reverse-air drilling were tested for specific conductivity in the field and also submitted to a laboratory for analysis of sulfate, chloride, calcium, Total Dissolved Solids (TDS), hardness and specific conductivity. Electronic copies of the laboratory analytical reports are included on the CD in Appendix G. The field specific conductivity readings and laboratory analytical results are presented in **Table 3-2**. Graphs of the specific capacity and water quality parameters changes with depth are provided in **Figures 3-4 through 3-11**. Air-lift specific capacities generally remained constant with values up to 25 gpm/ft to a depth of 1,600 ft bls, doubled and quadrupled in values to approximately 2,000 ft bls, and then increased to values ranging from 500 to greater than 1000 gpm/ft at depths below 2,000 ft bls. The increase in specific capacities at 1,600 and 2,000 ft bls coincided with a drop in the measured static water levels in the well at these depths. From a starting water level of approximately 88 ft bls, water levels dropped from approximately 91 ft bls to 114 ft bls while drilling between 1,590 and 1,615 ft bls and also dropped from approximately 114 ft bls to 123 ft bls while drilling between 2,005 and 2,015 ft bls. Based on these data, the water level elevation of the LFA is as much as 35 feet lower than the water level elevation of the UFA at the site, which indicates that the hydraulic connection between the UFA and the LFA at the site is poor or conversely the confinement between the two aquifers is good.

Water quality changes with depth generally remained constant from 650 to 1,050 ft bls, increased in concentrations between approximately 1,050 and 2,000 ft bls, remained relatively constant between approximately 2,000 and 2,250 ft bls, and increased slightly below 2,250 ft bls.

3.5. Formation Sampling

Formation samples were collected at 10 ft. depth intervals and examined on-site by a PBS&J geologist during pilot-hole drilling at the UFA monitor well HH-MW2 and LFA deep exploratory well HH-1. The formation samples were used to prepare lithologic logs for the wells, which are presented in **Appendix F**. The formation samples were collected by the Contractor from the discharge line during mud-rotary and reverse-air drilling, bagged and labeled and submitted to the Engineer.

Formation samples were described on the basis of composition, color, texture, visible porosity, fossil content, and structure. In general, the lithology consisted of unconsolidated quartz sands to 295 ft-bls at HH-MW2 and 405 ft-bls at HH-1, poorly to well indurated limestone and dolomitic limestone from 295 to 460 ft bls at HH-MW2 and from 405 to 1,070 ft bls at HH-1, limestone and dolomitic limestone with some gypsum and anhydrite from 1,070 to 1,710 ft bls, limestone, dolomitic limestone, and dolostone from 1,710 to 2,230 ft bls, and clayey limestone with gypsum from 2,230 to 2,470 ft bls.

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3.6. Geophysical Logging

An extensive geophysical logging program was performed by Advance Borehole Services of Dade City, Florida. The logging program included collection of geophysical data under static (non-pumping) conditions and logging under dynamic (pumping) conditions for use in the interpretation of hydrogeologic conditions beneath the site. The pumping rate during the suite of dynamic geophysical logs was approximately 2,000 gpm. Paper copies of all the geophysical logs are presented in **Appendix G** along with electronic copies of the Run No.2 geophysical logs on CD. **Table 3-3** on the following page presents the geophysical logging events performed at HH-1.

Table 3-3
Geophysical Logging Events

Logging Event	Run No. 1	Run No. 2	Run No. 3	Run No. 4
Date	November 6, 2006	June 25, 26, 2007	September 7, 2007	March 7, 2008
Casing diameter and Depth	24-inch casing to 433 ft bls	24-in. casing to 433 ft-bls, 18-in. to 605 ft.-bls	24-in. casing to 433 ft.-bls, 18-in. to 605 ft.-bls	12-in. casing from 495 ft.-bls to 1,685 ft.-bls
Borehole Configuration	24-inch hole	12 in. pilot (reverse-air)	18-in. reamed (reverse-air)	18 in. reamed (reverse-air)
Interval Logged	Land surface to 611 ft bls	Land surface to 2,480 ft.-bls	Land surface to 1,822 ft.-bls	Land surface to 2,332 ft.-bls
Static Logs	X-Y Caliper, Gamma Ray	X-Y Caliper, Gamma Ray, Spontaneous Potential, acoustic, Temperature, Static Fluid Conductivity, Long-Short Normal Resistivity, Flow Meter, video	Caliper and Gamma Ray	Caliper and Gamma Ray
Dynamic Logs	No logs	Flow meter, Temperature, Fluid Conductivity	No logs	No logs

Run No. 1 was conducted on November 6, 2006 and included an X-Y caliper log and a gamma ray log. The Run No. 1 caliper log was run to measure the depths and average diameter of the casing and borehole prior to installation of the 18-inch diameter casing to 605 ft bls. The caliper tool used in this investigation utilized three, 40-inch long or 20 -inch long arms that are spaced 120 degrees apart and mechanically coupled together. The arms contract and expand with the changes in the borehole diameter as the caliper tool is pulled up from the bottom of the borehole to land surface. The Run No. 1 caliper log confirmed that the 24-inch diameter casing depth is 433 feet bls. The open-hole interval extended from 433 feet to 611 feet bls and was drilled with a nominal 24-inch bit. The caliper log indicated that the borehole was ranged from 24-30 inches from 433 feet to 500 feet bls and was washed out to diameters of 39 to 44 inches from 512 feet to 540 feet bls. From depths of 565 feet to 575 feet the diameter ranged from 33 to 36 inches and from 580 feet to 611 feet the diameter ranged from 25 to 33 inches.

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Natural gamma ray logging can be performed in either cased wells or open boreholes containing air, water or drilling fluid. Measurements are made of naturally occurring radiation coming from the material encountered in the borehole. It has been estimated that 90 percent of the gamma rays detected during logging originate from material within a 6 to 12 in. of the borehole wall (Driscoll, 1986). The record of naturally occurring gamma radiation is used as a qualitative guide for stratigraphic correlation. Clays typically contain high concentrations of radioactive isotopes, usually potassium. Mature sands contain primarily silica, a stable substance, and, therefore, emit only low levels of radiation. Limestone and dolomite also typically emit little radiation. Several factors must be considered in interpreting gamma-ray logs. Gamma-rays are given off at random intervals by the radioactive materials. As a result, the detector measures a proportion of the emitted gamma rays that strikes the detector on an irregular basis. In addition, the size of the borehole and the position of the probe vis-a-vis the borehole wall will also have some effect on gamma measurements (Driscoll, 1986). The Run No. 1 gamma ray log showed gamma counts from 10 to 20 counts per second (cps) with only one minor deflection at 543 feet bls.

The Run No. 2 caliper log conducted on June 26, 2007 of the 24-inch cased well to 433 feet bls and 18-inch cased to 605 feet bls was calibrated to both the 24-inch intermediate casing no.2 and the 18-inch intermediate casing no.3 to a depth of 605 feet bls. At the bottom of the 18-inch casing the borehole expands to approximately 29-inches to a depth of 667 feet bls. From 667 feet bls to 880 feet bls indicated a relatively gauged hole with diameters ranging from 15-inches to 18-inches. From 880 feet bls to 1,140 feet bls the borehole diameter increased from 15-inches to 23-inches indicative of a cavernous zone. From 1,140 feet bls to 1,414 feet bls the diameter remains relatively gauged at 13.5-inches. From 1,414 to 1,474 feet bls the borehole expands to a approximately 16.5-inches indicating a moderately cavernous zone over this 60 feet. From 1,474 feet bls to 1,848 feet bls the borehole diameter reduces to a nearly gauged 13.5-inches. From 1,848 feet bls to 1,914 feet bls a cavernous zone is observed and at its widest point is 18-inches in diameter. From 1,914 feet bls to 1,996 feet bls the borehole is relatively gauged at 13.5-inches. From 1,996 feet bls to 2,088 feet bls the borehole is highly cavernous with diameters exceeding 39-inches. After 2,088 feet bls through the bottom of the borehole at 2,467 feet bls the borehole remains relatively gauged with diameters ranging from 12-inches to 15-inches.

The Run No. 2 gamma ray log indicated gamma measurements along the borehole to a depth of 2,250 ft bls were relatively constant at 10 to 20 cps with increases to approximately 50 cps at depth intervals between 1,710 and 1,755 ft bls and between 2,075 and 2,110 ft bls that have no apparent correlation to the formation material identified in the lithologic log (**Appendix F**). Gamma counts, which correlate with the presence of clay and clayey limestone associated with the sub-Floridian confining unit, increase below 2,250 ft bls with the highest counts (90 cps) measured at approximately 2,395 feet bls.

The Spontaneous Potential (SP) log is a passive log that measures the natural electrical potential of rock units. The SP log is mainly used for geologic correlation, for finding bed thickness, and for separating non-porous beds from porous beds in shale-sandstone and shale-carbonate

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sequences (Wellenco, 1993). The SP log measurement is actually an approximation of the sum of two separate potentials that exist between the rocks: the fluids in interconnected rock pores and the fluid in the borehole. The potential is negative if fluids in the permeable rock are more conductive (greater concentration of dissolved solids) than fluid or mud in the borehole. Conversely, the potential is positive if the formation fluid is lower in dissolved solids than fluid in the borehole. The decreasing SP potential below 2,300 ft bls (where effects on water quality from downhole flow is expected to be minimal) indicate greater concentration of dissolved solids in the formation relative to the borehole, which is consistent with this depth being identified as the sub-Floridan confining unit.

To obtain an electric log, one or more electrodes are suspended on a conductor cable and lowered into a borehole filled with fluid. An electric current is forced to flow from these electrodes to other electrodes that may be in the borehole or placed in the ground near the top of the well. The electric logging instrument then measures the current loss (resistance to flow) between the two electrodes. Changes in electrical resistance of the entire circuit are recorded against depth to produce a graph or curve called a resistivity log. These logs require an uncased hole filled with fluid. The logging device used in this investigation consists of a current electrode and two potential electrodes in the borehole. There is one arrangement with an electrode spacing of 16 inches (short normal) and a second arrangement with an electrode spacing of 64-inch (long normal). The spacing of the current and potential electrodes determines the depth of penetration into the formation for a given borehole diameter. The larger the spacing in relation to the borehole diameter, the deeper the penetration, and the lower the bed resolution. Short space electrodes read a smaller part of the formation, which makes possible more precise identification of formation interfaces. Wider electrode spacing read more of the formation, is less affected by borehole fluids, and delivers truer measurements of formation resistivity (Driscoll, 1986).

The resistivity log, by itself, cannot be used to identify the material along the borehole because the measured resistivity is also a function of the resistivity of the borehole, interstitial fluids, the diameter of the borehole and the distance between the electrodes on the borehole probe. Samples recovered during drilling are required for positive identification of specific geological material (Driscoll, 1986). There are, however, general differences in the resistivity of various saturated formations that the logger can detect. Resistivity values increase from clays to silts to sands to limestones to dolostones that are saturated with fresh water. A decrease in the resistivity of a section of limestone can indicate an increase in the porosity of the limestone due to a greater quantity of ground water, which is less resistant than limestone. Water quality also effects resistivity. In general, the resistivity of a formation will vary inversely with the total dissolved solids (TDS) contained in the water. If all other conditions remain the same, resistivity decreases as TDS increases.

Deflections on the Run No. 2 SP and Long-Short Normal (LSN) Resistivity logs at approximately 1,050 ft bls and 2,350 feet bls indicate a change in formation material and/or water quality at these depth intervals. Review of the lithologic description of samples at these

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depths shows gypsum was first encountered at a depth of 1,070 ft bls and significant clay and clays limestone was encountered at 2,230 ft bls and below.

Sonic logs, also called acoustic logs, use a transducer to transmit an acoustic wave through the fluid in the borehole and in the surrounding rocks and can be used to provide data on porosity, lithology, cement, and the location and character of fractures (Keys, 1989).

Run No. 2 included a waveform sonic log, borehole compensated sonic (BHC) log and a porosity log. The porosity log shows an increase in porosity that correlates with the water producing zones from approximately 1,605 to 1,615 ft bls from 1,975 to 2,075 feet bls. The porosity log also shows an increase at approximately 2,220 to 2,270 feet bls, where clay and limestone was reported in the lithologic log from 2,230 to 2,260 ft bls. The higher porosity at this depth interval is associated with the clay, which typically has a porosity range between 40 and 70 percent (Freeze and Cherry, 1979). The BHC log shows deflections at these depths also.

Temperature logs can provide useful information on the movement of water through a borehole including the location of depth intervals that produce or accept water; thus, they can provide information related to permeability distribution and relative hydraulic head (Keys, 1989). If there is no flow in or adjacent to a borehole, the temperature gradually will increase with depth, as a function of the geothermal gradient. In most cases, however, the geothermal gradient in different rock units surrounding the borehole is altered because of vertical flow in the borehole; vertical flow is caused mainly by pressure differences, but also by temperature differences in discreet aquifers. If vertical flow is slight, the temperature gradient may be almost the same as that found in the formation (Driscoll, 1986). Ordinary geothermal temperature gradients range from 1 to 1.3 degrees Fahrenheit (°F) per 100 ft. of depth (Driscoll, 1986).

The Run No. 2 static temperature log showed a constant temperature of 77°F and remained constant to 2,225 feet bls, except for a minor deflection at 1,065 feet bls. The deflection at 1,065 feet corresponds to a lithologic change where the middle confining unit begins which contains greater amounts of gypsum. From 2,225 ft bls to the bottom of the open borehole at 2,467 feet bls the temperature increased from approximately 77 to 93°F. The dramatic increase in temperature at the bottom of the hole is thought to be due to the downhole groundwater flow disrupting the normal geothermal gradient. After the static temperature log was completed, the dynamic temperature log was performed. The Run No. 2 dynamic temperature log was similar to the static temperature log except for a decrease in temperature from approximately 1,980 to 2,180, which is associated with the highly fractured zone between approximately 2,000 and 2,080 ft bls.

Fluid Resistivity Surveys are used to measure water resistivity within cased or uncased wells under both pumping and non-pumping conditions. The log presents a qualitative measurement of Total Dissolved Solids (TDS) in the borehole fluid. In a non-pumping well, it may be possible to detect the layering effect of different waters across the borehole (Welenco, 1993). In a pumping situation, TDS changes quite often correlate with actual entries of water into the borehole

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(Welenco, 1993). The specific conductivity log measures water conductivity in microsiemens per centimeter ($\mu\text{S}/\text{cm}$) and also represents a qualitative measurement of TDS in the borehole fluid.

The Run No. 2 static and dynamic fluid resistivity logs show a gradual increase in TDS within the open borehole section of the well from approximately 605 feet bls to 965 feet bls. From 965 feet bls to 1,065 feet bls fluid resistivity decreases slightly. From 1,065 feet bls to 2,215 feet bls the water quality is very stable. Below 2,215 feet bls, fluid resistivity decreases sharply to the bottom of the borehole. The static and dynamic specific conductivity logs also indicate an increase in borehole fluid TDS at the bottom of the hole below 2,215 ft bls.

Flow meter logging is used to determine the production rate from any zone in a well. The flow of water into a well usually varies significantly over the open borehole because strata having the highest permeability contribute a high percentage of the total flow. Continuous surveys run up and down the borehole under non-pumping conditions yield information as to the direction of groundwater flow. If the water is moving downward, then the up run will show a higher count over the interval where the water is moving. Conversely, if the water is moving up then the down run will show a higher count rate (Welenco, 1993). Under pumped conditions, a flow meter survey can be made which will log the different flow contributions of each water bearing zone (Welenco, 1993).

The static flow meter log shows downhole flow increasing from approximately 650 feet bls to approximately 1,050 feet bls. No substantial change in flow is observed from 1,050 feet bls to approximately 1,625 feet bls, where down hole flow appears to decrease slightly then remain constant to approximately 2,000 ft bls where down hole flow decreases and then stops at approximately 2,100 ft bls. No flow is observed from 2,100 feet bls to the bottom of the borehole. The dynamic flow meter log was run in the downhole direction while pumping the well at a rate estimated at 2,200 gpm due to a failure of the flowmeter. Further evaluation of the flow rate based on pump curves indicated that the flow rate was on the order of 2,000 gpm. The pumping flowmeter log indicates that no up-hole flow occurs in the bottom of the well from 2,450 to 2,100 feet bls. The majority of the up-hole flow starts at 2,100 feet bls, increases to 1,995 feet bls then remains relatively constant to 605 ft bls. There was no visible increase in up-hole flow between 1,600 and 1,650 ft bls.

Logging Run No. 3 consisted of X-Y Caliper and gamma ray logs and was performed on September 7, 2007 after the nominal 12-inch pilot had been reamed to a nominal 18-inch diameter from the bottom of the 18-inch casing to approximately 1,685 feet bls in preparation for installation of the 12-inch casing. The Run No. 3 X-Y Caliper showed that the borehole was washed out to diameters of 25 to 28 inches from 610 feet bls to 670 feet bls. The borehole ranged in diameter from 18 to 21 inches from depths of 700 feet bls to 950 feet bls. From 1,100 feet bls to 1,680 feet bls the caliper log shows mostly a gauged hole, with diameters from 17 to 19 inches, except for a washout to 25 inches in diameter at a depth of 1,380 feet bls. The log shows a 12-inch diameter hole from 1,680 feet bls to 1,824 feet bls. The majority of the gamma ray log shows low gamma ray counts of less than 10 cps. From approximately 1,715 feet bls to 1,750 feet bls gamma ray counts were from approximately 20 to 40 cps.

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Logging Run No. 4 for HH-1 was conducted after construction of the well was completed and consisted of an X-Y caliper log. The X-Y caliper log of Run No. 4 confirmed the 12-inch final casing depth at 1,685 feet bls and a total borehole depth of 2,124 feet bls. The borehole diameter ranged from approximately 15 to 43 inches with the largest diameters located at an apparent fractured zone between approximately 2,000 feet bls and 2,075 feet bls. The borehole is washed out to 20 inches in diameter from 1,855 feet bls to 1,915 feet bls. The borehole ranges in diameter from 12 to 15 inches from 2,080 feet bls to 2,124 feet bls.

The 24-inch well casing, 18-inch weld casing, all casing welds, and the open-hole section of HH-1 were examined during the video survey conducted on June 25, 2007. Prior to and during the video survey, potable water from a 2-inch hose connected to HH-MW2 was discharged down the well to improve visibility. Water in the well was clear to approximately 2,300 feet bls, but became somewhat cloudy below that depth. A copy of the video survey DVD is included in **Appendix H**. Visual inspection of the well casing and casing welds from land surface to 402 feet bls showed no cracks or deformities in the well casing or gaps at the casing welds. The open borehole section was generally circular except for a highly fractured zone visible at depths between approximately 1,996 and 2,080 feet bls.

3.7. Hydraulic Testing

3.7.1. HH-1 Rock Core Sampling

A total of six rock core samples were collected while advancing the HH-1 pilot-hole from 840 to 2,470 ft bls. Three rock coring attempts while drilling the pilot hole between 605 and 840 ft bls were unsuccessful. Targeted coring depths were determined from the regional geologic information and lithology encountered during pilot-hole drilling.

The first and second rock cores were collected while drilling in the MSCU. C-1 was collected at 840 to 850 feet bls and C-1A at 1,050 to 1,060 feet bls. The third and fourth rock cores were collected from the MCU. C-2 was collected at 1,130 to 1,140 feet bls and C-3 at 1,270 feet bls to 1,280 feet bls. The fifth core (C-5) was collected from the LFA at 1,900 to 1,910 feet bls. The sixth core (C-6) was collected from the sub-Floridian confining unit at 2,470 to 2,480 feet bls.

3.7.2. Rock Core Methodology

The cores were collected using a 10 ft. core barrel with a 4-inch diameter receiver sleeve inside the barrel. The rock cores were collected by advancing the pilot hole to the targeted coring depth and attaching the coring tool to the drilling rod. The core barrel was lowered to the proposed coring depth and was drilled into the rock formation at a constant rotation and water pressure. After the core barrel was advanced approximately 10 to 12 feet, it was withdrawn from the pilot hole. Rock core samples were extracted from the inner core barrel sleeve and placed directly

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into wooden core boxes. Core sample boxes were labeled with the core number, core interval, date and time.

3.7.3. Rock Core Sample Analysis

Representative sections of the core, longer than 4-inches in length, were submitted to Core Laboratories, of Midland, Texas, for analyses of vertical and horizontal permeability, porosity, and grain density. Formation permeability, which is reported in millidarcy (md) was converted to hydraulic conductivity based on standard conditions of freshwater at ground surface conditions. The conversion factor used is 0.0027 feet per day per md. A copy of the laboratory reports are presented in **Appendix I**. Upon arriving at Core laboratories samples were dried using a convection oven to remove all fluids from rock pore spaces. Once the samples were completely dried they were then tested for porosity by direct pore volume measurement using Boyle's law. Bulk Volume was then measure by Archimedes Principles. In addition, the Grain Density was calculated from dividing the dry weight into the bulk volume, less all pore volume measurements. Steady State Air Permeability was measured in two horizontal directions and vertically while the core was confined in a Hassler rubber sleeve at 400 psi confining stress.

Analytical results for the six cores, which are summarized in **Table 3-4**, show a vertical hydraulic conductivity ranging between 0.016 and 0.00044 ft/d with an average of approximately 0.0076 ft/d. The maximum horizontal hydraulic conductivity values of the six cores ranged from approximately 0.18 to 0.0029 ft/d with an average of approximately 0.062 ft/d.

Hydraulic conductivity values for the two cores taken from the MCU, C-2 and C-3, ranged from 0.026 to 0.0048 ft/d. These values lie within the range of values of horizontal hydraulic conductivities from cores taken at different depths within the MCU at the Polk City Test well, which generally ranged from approximately 0.000024 to 0.90 ft/d.

3.7.4. HH-1 Single Packer Tests

Four single packer tests were performed following pilot hole drilling of HH-1 to the completion depth of 2,480 ft bls to obtain hydraulic and/ or water quality data on the MSCU, LFA, and Sub-Floridian Confining Unit. Specific setting depths for the packers were based on the caliper log and down-hole video survey obtained during the geophysical logging of the 12-inch pilot hole. By utilizing the caliper log and video survey, optimal locations for setting the packers consisting of circular sections of the pilot hole with smooth walls were identified.

A Baski 9.4 inch-diameter (expandable to 18 inches) single seal, open hole packer assembly was used for the four single packer tests. The packer assembly (5.8 feet in length) was attached to 200 feet of 8-inch inside diameter (I.D.) drop pipe and 3.75 inch I.D. drill rod and lowered to the selected depth for testing. The single packer tests at 1,083 feet bls, 1,605 feet bls and 1,951 feet bls were inflated using water pressure to approximately 400 psi in order to isolate the selected test interval above or below the chosen packer setting depth. The single packer tests at 2,263 feet

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bls was inflated to approximately 300 psi using Nitrogen gas in order to isolate the sub-Floridian confining unit below the packer setting depth. Water was initially used to inflate the packer but due to the depth to water inside the pilot hole (approximately 130 feet bls) combined with the very deep packer setting depth (2,263 feet bls) the packer would inflate from the weight of the water in the hose line above the water level in the pilot hole before obtaining the chosen depth. Nitrogen gas, being substantially lighter than water did not inflate the packer until it was pressurized.

A submersible pump was then lowered into the 8-inch drop pipe assembly or the annulus between the drop pipe and the 24-inch casing. Discharge rates were measured with a flow meter installed in the discharge line assembly. Water levels were measured with Well Logger PT2X down-hole pressure transducers manufactured by Instrumentation North West, Inc. One transducer was placed outside in the annular space between casing or borehole and 8-inch drop pipe assembly and the other transducer was placed inside the 8-inch drop pipe assembly. Field measurements of water quality, water levels and pumping rates collected during the packer tests are included in **Appendix J**. **Appendix K** presents the laboratory analytical reports for water samples collected at the end of the packer test. Analytical estimates of transmissivity for the MSCU based on packer test data are provided in **Appendix L**.

3.7.4.1. HH-1 Packer Test (605 to 1,083 feet bls Test Interval)

A single packer test was performed in order to obtain hydraulic and water quality data on the Middle Semi-Confining Unit (MSCU). The center line of the packer was set to 1,083 ft. on July 23, 2007 and inflated to approximately 360 psi. The pressure was maintained between 340 and 360 psi on the packer throughout the testing. The interval above the packer and below the 18-inch casing at 605 ft bls, which comprised the MSCU, was pumped for this packer test.

The packer test was started at 12:14 on July 23, 2007. A total of 88,320 gallons of water were pumped during the 240 minute test resulting in an average pumping rate of 368 gpm, which resulted in the removal of approximately 6 "well" volumes above the packer. A water sample was collected at the end of the test and submitted to Florida Analytical, Inc. Laboratories. The laboratory analysis showed a chloride concentration of 10.5 mg/L, a dissolved calcium concentration of 56.2 mg/L, a specific conductance of 350 μ mhos/cm, a sulfate concentration of 19.9 mg/L, a TDS concentration of 160 mg/L, and a total hardness (CaCO_3) concentration of 177 mg/L. The analytical results is consistent with the air-lift analytical water quality results from 685 ft bls to approximately 1,025 ft bls. The well was allowed to recover for a total of sixty minutes to collect recovery water levels, which were not affected by return flow down the drop pipe since the submersible pump was equipped with a check valve.

The drawdown observed at the end of the packer test was 15.3 ft. The water level in the annulus recovered to within 2.0 ft. of the pre-pumping water level sixty minutes after the end of pumping. Estimates of the transmissivity for the interval between 605 and 1,080 feet bls were calculated from the drawdown data using the Hantush Method and the Neumann-Witherspoon Method for a leaky aquifer and the Theis Method for a confined aquifer on the drawdown as well

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as the recovery data. The analyses for a leaky aquifer resulted in estimated transmissivities ranging between approximately 1,900 and 2,500 ft²/day, while the analyses for a confined system resulted in a transmissivity estimate of 4,000 ft²/day. These transmissivity values are approximately one order of magnitude less than the reported values of 14,200 to 30,700 ft²/day for the UFA along the Lake Wales ridge and approximately two orders of magnitude less than the reported values of 200,535 to 688,450 ft²/day for the LFA, which is consistent with the unit being identified as a semi-confining unit.

3.7.4.2. HH-1 Packer Test (1,605 to 2,480 feet bls Test Interval)

A single packer was set at 1,605 ft bls in order to obtain water quality data on the permeable zone between approximately 1,615 and 1,630 ft bls. The center line of the packer was set to 1,605 feet on July 13, 2007 and inflated to approximately 400 psi. The pressure was maintained between 400 and 440 psi on the packer throughout the testing. A difference of 30.94 feet in the static water levels above and below the packer was consistent with the water levels measured during reverse-air drilling of the pilot hole. Setting the packer on July 13, 2007 resulted in the permeable zone being purged for 3 days before the water sample was collected on July 16, 2007 due to downward flow caused by the 8-foot water level difference between the permeable zone at 1,615 ft bls and the very permeable zone at 2,000 ft bls.

The packer test was started at 09:35 on July 16, 2007. A total of 108,845 gallons of water were pumped from the pilot hole below 1,605 ft through the drop pipe assembly during the 6 hour and 55 minute test resulting in an average pumping rate of 262 gpm. A water sample was collected at the end of the test and submitted to Florida Analytical, Inc. Laboratories. The laboratory analysis showed a chloride concentration of 15.6 mg/L, a dissolved calcium concentration of 79.5 mg/L, a specific conductance of 530 µmhos/cm, a sulfate concentration of 127.0 mg/L, a TDS concentration of 428.0 mg/L, and a total CaCO₃ hardness concentration of 288 mg/L. The sample meets the secondary drinking water standards for chlorides (250 mg/L), sulfate (250 mg/L and TDS (500 mg/L).

3.7.4.3. HH-1 Packer Test (1,951 to 2,480 feet bls Test Interval)

A single packer was set at 1,951 ft bls in order to obtain water quality data on the very permeable zone in the Lower Floridian Aquifer between approximately 2,000 and 2,080 ft bls. A determination was made to perform a packer test in order to obtain hydraulic data on the production zone identified over the interval of 1,996 feet bls to 2,290 feet bls to determine the hydraulic conductivity of the Lower Floridian Aquifer. The center line of the packer was set to 1,951 feet on July 11, 2007 and inflated to approximately 400 psi. The pressure was maintained at 400 psi on the packer throughout the testing.

The packer test was started at 09:05 on July 23, 2007. A total of 73,060 gallons of water were pumped during the 6 hour and 54 minute test. A water sample was collected at the end of the test and submitted to Florida Analytical, Inc. Laboratories. The laboratory analysis indicated a

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chloride concentration 15.0 mg/L, a dissolved calcium concentration of 77.9 mg/L, a specific conductance of 499 μ mhos/cm, a sulfate concentration of 112.0 mg/L, a TDS concentration of 366 mg/L, and a total CaCO_3 hardness concentration of 272 mg/L. The well was allowed to recover for a total of sixty minutes to collect recovery water levels.

3.7.4.4. HH-1 Packer Test (2,263 to 2,480 feet bls Test Interval)

A single packer was set at 2,263 ft bls in order to obtain water quality data on the sub Floridan confining unit between approximately 2,270 and 2,480 ft bls. The center line of the packer was set to 2,263 feet on July 26, 2007 and inflated to approximately 400 psi. The pressure was maintained between 400 and 440 psi on the packer throughout the testing.

The packer test was started at 09:35 on July 26, 2007. A total of 44,855 gallons of water were pumped during the 6 hour and 54 minute test resulting in an average pumping rate of 108 gpm, which resulted in the removal of approximately 36 "well" volumes below the packer. A water sample was collected at the end of the test and submitted to Florida Analytical, Inc. Laboratories. The laboratory analysis indicated a chloride concentration of 15.0 mg/L, a dissolved calcium concentration of 65.8 mg/L, a specific conductance of 418 μ mhos/cm, a sulfate concentration of 72.1 mg/L, a TDS concentration of 306 mg/L, and a total CaCO_3 hardness concentration of 214 mg/L.

3.7.5. HH-1 Straddle Packer Tests

Four straddle packer tests were attempted following the single packer tests of HH-1 to obtain hydraulic and native water quality data on the middle confining unit (MCU).

Two Baski 9.4 inch-diameter (expandable to 18 inches) single seal, open-hole packer assemblies were used for the tests. The top and bottom straddle packer assemblies (each 5.8 feet in length) were attached to each other by screened 6-inch I.D. drop pipe and then attached to 200 feet of 8-inch I.D. drop pipe and 3.75 inch I.D. drill rod and lowered to the selected depth (approved by Engineer) for testing. The attempted straddle packer tests were inflated using water pressure to approximately 400 psi in order to isolate the selected test interval between the chosen upper and lower packer setting depths.

Between July 27, 2007 and August 10, 2007, RDC attempted to obtain hydraulics and water quality data on the middle confining unit (MCU) between approximately 1,100 and 1,600 ft-bls utilizing a straddle packer assembly consisting of two packers set 87 feet apart, but were not successful. Either both packers would not seat and therefore the open-hole interval between them could not be tested or the packers were seated, but upon testing the water level above the top packer would drop indicating the packer was leaking.

Following completion of packer testing, the nominal 12-inch pilot hole was tremie grouted from the bottom of the borehole to 2,230 ft bls with 14 yard of neat cement.

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3.8. Well Development

Development of the open borehole interval (1,685 ft bls to 2,230 ft bls) at HH-1 was initiated on January 21, 2008 and completed on January 22, 2008. The well was developed utilizing a American Marsh vertical turbine pump with 14-inch diameter pump bowls set 200 feet bls on 12-inch diameter pump column. Development was performed at variable pumping rates from 2,600 gallons per minute (gpm) to 3,500 gpm until a minimum quantity of sand was measured using a Rossum sand sampler and until the water quality stabilized. Over the two-day well development period, the well was pumped a total of 2,027,950 gallons. The total pumping time was 625 minutes at an average rate of 3,245 gpm. Sand quantities were initially measured at 0.9 milligrams per liter (mg/L). At the end of development the sand quantity was 0.1 mg/L, indicating a significant reduction in sand content during development. Water quality was measured using a field specific conductivity/total dissolved solids (TDS) meter. Specific conductivity values ranged from 547 micro Siemens per centimeter ($\mu\text{S}/\text{cm}$) to 587 $\mu\text{S}/\text{cm}$ and averaged 574 $\mu\text{S}/\text{cm}$.

Specific capacity of the well was calculated during well development. The pumping rate (gpm) and drawdown (feet) were measured during the two-day development period. Specific capacity values ranged from 112.6 gallons per minute per foot of drawdown (gpm/ft) to 135.4 gpm/ft. Data are summarized in **Table 3-5** below.

Table 3-5 Specific Capacity Measurements During Development

Date	Pumping Rates (gpm)	Drawdown (ft)	Spec. Cap. (gpm/ft)
1/21/08	2,600	19.2	135.4
1/21/08	3,000	24.5	122.4
1/22/08	3,400	28.3	120.0
1/21/08	3,500	31.1	112.6

3.9. Well Head Completion

HH-1 was completed by cutting the 24-inch diameter intermediate casing to a height of three feet above ground surface. A flat-face, hub type flange was welded to the casing, which was capped with 1/4-inch thick steel plate with a 1-inch threaded plug installed in the approximate center of the plate to allow access to the well for water level measurements. The steel plate was secured to the flange with steel bolts and nuts. Casing, flange, cap, nuts and bolts were coated with a coal-tar epoxy to inhibit rust. A copy of the well completion report is included in **Appendix M**.

4.0 Pumping Test

4.1. HH1 Pumping Test Execution and Results

The pumping test consisted of pumping HH-1 while monitoring pumping rates at a calibrated flow meter, measuring and recording changes in water levels at the pumping well and associated monitor wells manually and electronically, and monitoring the water quality of the discharge water. The pump make and model, pump intake depth, and discharge line location and direction did not vary from the aforementioned well development set-up. Discharge measurements were manually recorded from observed flow dial readings and calculation-based totalizer flow readings using a calibrated 12-inch in-line flow meter. The in-line flow meter calibration record is provided in **Appendix N**. Water level measurements were collected at the pumping well and on-site monitor wells electronically using Levellogger® pressure transducers and manually using dedicated water level indicators. With measurements collected prior to daily transducer downloads, manual measurements were collected as a back-up to the electronic data. Water level changes were also monitored manually using a water level indicator and electronically using Levellogger® pressure transducers at the U.S. Geological Survey shallow (SA) and Deep (UFA) monitor wells near the intersection of U.S. Highway 27 and Ronald Regan Parkway (S.R. 54), which is approximately 3 miles south of HH-1, for the purpose of identifying background regional water level trends in the two aquifers. The locations of the wells are shown **Figure 1-1**. Electronic files of the Levellogger recorded water level data are provide on CD in **Appendix O**. Copies of the recorded manual water level measurements and pumping rates are provided in **Appendix P**.

The pumping phase of the constant rate pumping test was initially started at 11:15 on Monday January 28, 2008. At approximately 20:00 on January 28, 2008, RDC field staff noticed the motor was “spraying oil” and the test was stopped due to mechanical problems with the diesel motor. Within the tested timeframe, approximately 1,561,050 gallons of groundwater was pumped from HH-1 at an average rate of approximately 2,973 gpm. Manual static water levels collected on Tuesday January 29, 2008 indicated that the system had returned to pre-test conditions. This was verified with electronic data records which indicated the return to pre-test conditions after the motor was turned off.

The pumping phase of the constant rate pumping test was re-started at 10:00 on Wednesday January 30, 2008 with a new diesel motor and was completed at 13:00 on Tuesday February 12, 2008. At the conclusion of the re-started pumping phase, a total of 56,049,600 gallons of groundwater were pumped from the LFA over this 315 hour period resulting in an average pumping rate of 2,966 gpm.

It was noted that the new diesel engine started having issues with the oil filter clogging during the first day of testing. Six times during the test, RDC replaced the oil filter on the diesel motor resulting in temporary test shut-downs of 15 to 30 minutes resulting in water level recoveries within the pumping well. To keep the withdrawal rate constant, RDC field staff on occasion had to throttle up or down the pump motor due to pumping rate drift. Three instances were noted where RDC field staff over compensated the rate resulting in additional drawdown within the

well. The withdrawal rate for these situations was corrected and the water level returned to prior pumping levels. As recorded by a Levellogger® pressure transducer installed in HH-1, **Figure 4-1** presents the change in water levels during the testing of HH-1 including impacts to the recorded water levels due to the above mentioned mechanical/operator matters.

During testing, the pumped water was discharged through 12-inch diameter PVC piping to land surface at a location approximately 1,400 ft northeast of the pumping well; however, the distance to the discharge point was reduced to approximately 900 ft within a few days of the start of pumping as a result of discharge pipe failure.

Noted manually and electronically, changes in water levels at the on-site surficial aquifer and UFA monitor wells trended with water level changes recorded at the U.S. Geological Survey monitor wells for the first two days of pumping, but then showed rising water levels for the duration of the pumping phase of the pumping test, which are attributed to mounding of the discharge water in the surficial aquifer and UFA. As recorded by Levellogger® pressure transducers, **Figures 4-2** and **4-3** present the change in water levels during testing at the on-site surficial aquifer and UFA monitor wells and the aforementioned U.S. Geological Survey Shallow and Deep monitor wells.

Depths to water in the pumping well dropped from a pre-pumping static water level of 121.98 ft bls to approximately 146.8 ft bls within 24 hours of the start of pumping and remained near that level until the end of pumping, which results in a total drawdown of 24.82 ft and a specific capacity of 120 gpm/ft. An estimate of the transmissivity of the LFA can be derived from specific capacity test results utilizing empirical equations based on the Jacob's equation. The empirical equations simplify to the following equation for most cases.

$$T = \left(\frac{Q}{s} \right) 2000$$

Where: **T** equals transmissivity in gallons per day per foot (gpd/ft);
s equals well drawdown in feet; and
Q equals well yield in gallons per minute (gpm).

Well efficiency losses must be accounted for and removed from the drawdown prior to using the above equation. Loss of head in steel pipe from friction is reported in Appendix 17.A Table 1 of *Groundwater and Wells* by Driscoll (1986). Total head loss from pipe friction while pumping 3,000 gpm through 1,200 ft of 12-inch diameter casing plus 100 ft of 18-inch casing plus 200 ft of 24-inch casing is approximately 20.7 ft, which results in a formation head loss of 4.1 ft (24.8 ft - 20.7 ft). Based on this analysis, the resulting transmissivity for the LFA is approximately 1,447,000 gpd/ft or 193,400 feet square per day (ft²/day).

4.2. HH-1 Pumping Test Water Quality

Discharge water samples were collected twice daily during the pumping test for analysis of chloride, sulfate, calcium, magnesium, TDS, specific conductivity and hardness by Florida Analytical, Inc of Lakeland, Florida – FL certification #E84098. The laboratory analytical results are presented in **Table 4-1**. **Figures 4-4 through 4-10** are graphs of the changes in the water quality parameters over time during the pumping test. In general, water quality parameters stabilized by the ninth day of pumping and remained relatively constant for the duration of the pumping test. Copies of the laboratory analytical reports are included in **Appendix Q**.

Water samples were collected from a spigot at the wellhead on the last day of the pumping test and submitted to the laboratory for analysis of inorganic parameters, organic parameters, radionuclides, and microbiological parameters having Primary Drinking Water Standards, those parameters having Secondary Drinking Water Standards, and select operational parameters. Copies of the laboratory analytical reports are included in **Appendix R**. The results of the laboratory analysis, which are summarized in **Table 4-2**, show that water quality of the LFA below the site meets select Primary Drinking Water Standards including inorganic compounds, volatile organic contaminants, synthetic organic contaminants, and radionuclides and Secondary Drinking Water Standards, and, therefore, is a potential source of potable water for public supply.

5.0 Summary and Recommendation

Based on the information provided in the previous sections, the following can be ascertained:

The deep exploratory well (HH-1) was constructed to meet construction standards for public water system wells per Chapter 62-532 of the Florida Administrative Code. HH-1 was constructed to allow the withdrawal of groundwater from the Lower Floridan Aquifer through a series of telescoped steel casings including 24-inch diameter casing from land surface to 433 feet below land surface (ft bls), 18-inch diameter casing from 387 to 606 ft bls, and 12-inch casing from 495 to 1,685 ft bls. A nominal 12-inch diameter open borehole extends from 1,685 to 2,130 ft bls.

Hydrogeologic units identified during construction and testing of HH-1 included the surficial aquifer system, the Upper Floridan aquifer, the middle semi-confining unit, the middle confining unit, the Lower Floridan aquifer and the sub-Floridan confining unit. The depths to the hydrogeologic units based on data obtained during the construction and testing of HH-1 are presented in **Figure 3-1**.

The depth from land surface to the base of the surficial aquifer system/ top of the Upper Floridan aquifer varied substantially at the site due to the karstic surface present at the top of the carbonate rocks (limestone, dolomitic limestone and dolostone) that comprise the Upper Floridan aquifer. Past weathering of the carbonate rock surface during aerial exposure has resulted in cutter-pinnacle structures now buried by overlying quartz sands that comprise the surficial aquifer system.

The base of the Upper Floridan aquifer/ top of the middle semi-confining unit at HH-1 was identified at approximately 595 ft bls or 399 ft below the National Geodetic Vertical Datum of 1929 (NGVD) based on a change in lithology from a well indurated, dolomitic limestone to a soft, friable limestone.

The base of the middle semi-confining unit / top of the middle confining unit at HH-1 was identified at approximately 1,070 ft bls or 874 ft below NGVD based on the first occurrence of evaporites at 1,070 ft bls, increasing concentrations of dissolved constituents in water quality samples collected while reverse-air drilling below 1,050 ft bls, and the static temperature, fluid resistivity, and flow meter logs. The static temperature and resistivity logs showed deflections at 1,065 ft bls. The static flow meter log shows downhole flow increasing from approximately 650 feet bls to approximately 1,050 feet bls and no substantial change in flow from 1,050 feet bls to approximately 1,625 feet bls.

Analyses of packer test data indicate that the transmissivity of the middle semi-confining unit, which extends from 595 to 1,070 ft bls at HH-1, ranges from approximately 1,900 to 4,000 feet square per day. This transmissivity range is approximately one order of magnitude less than the reported transmissivity values for the Upper Floridan aquifer along the Lake Wales ridge and approximately two orders of magnitude less than the reported values for the Lower Floridan aquifer. The relatively low transmissivity is consistent with the unit being identified as a semi-

Summary and Recommendation

confining layer between the overlying Upper Floridan aquifer and the underlying Lower Floridan aquifer.

The base of the middle confining unit / top of the Lower Floridan aquifer at HH-1 was identified at approximately 1,615 ft bls or 1,419 ft below NGVD based on the occurrence of a permeable dolostone between 1,610 and 1,630 ft bls, a 23-foot drop in the water level in the well while reverse-air drilling between 1,584 and 1,648 ft bls, and the static flow log. The static flow log shows no substantial change in flow from approximately 1,050 feet bls to 1,625 feet bls, where down hole flow appears to decrease slightly then remain constant to approximately 2,000 ft bls.

Hydraulic conductivity values for two cores taken from the middle confining unit at HH-1 ranged from 0.026 to 0.0048 feet per day. These values lie within the range of values of horizontal hydraulic conductivities from cores taken at different depths within the middle confining unit at the Polk City Test well, which generally ranged from approximately 0.000024 to 0.90 ft/d.

Lithology, air-lift specific capacity and water quality data collected during reverse-air drilling, a water level difference of approximately 32 feet between the middle semi-confining unit and the Lower Floridan aquifer, and analysis of rock core samples provide evidence that the middle confining unit forms an essentially non-leaky confining bed that separates groundwater in the Upper Floridan aquifer from the groundwater in the underlying Lower Floridan aquifer. The altitude of the top of the middle confining unit at HH-1 at an elevation of 874 ft below NGVD is within the expected elevation between approximately 800 and 900 feet below NGVD based on regional data, but the 545-foot thickness of the middle confining unit at HH-1 is greater than the expected 200 to 400 feet based on regional data.

The base of the Lower Floridan aquifer/ top of the sub-Floridan confining unit at HH-1 was identified at approximately 2,230 ft bls or 2,034 ft below NGVD based on the occurrence of clay, clayey limestone and gypsum, and deflections/ changes on the Spontaneous Potential, Long-Short Normal Resistivity, temperature, and fluid resistivity/ conductivity logs at or near 2,230 ft bls. The interface is 166 feet shallower than the elevation of 2,200 feet below seal level indicated by regional data.

In addition to the permeable zone at 1,615 ft bls, the air lift specific capacity and water quality data, the flow logs, video survey, and pumping test data provided evidence of a very permeable zone consisting of fractured limestone and dolostone from approximately 2,000 to 2,080 ft bls. Additional evidence of a permeable zone at 2,000 ft bls was provided by an 8-foot drop in the water level in the well while reverse-air drilling between 1,995 and 2,015 ft bls.

Water level data collected during reverse-air drilling and the pumping test indicate a water level difference of approximately 35 ft between the Upper Floridan aquifer and Lower Floridan aquifer suggesting good confinement (hydraulic separation) between the two aquifers. The observed head difference suggests that any flow between the aquifers would move from the Upper Floridan aquifer to the Lower Floridan aquifer (downward gradient).

Summary and Recommendation

Due to the potential for water quality degradation in the very permeable zone of the Lower Floridan aquifer at 2,000 ft bls from downward flow from the permeable zone at 1,615 ft bls and the lack of contribution to flow from the permeable zone under pumping conditions as evidenced by the dynamic flow log, the permeable zone was cased off from the very permeable zone when the well construction was completed.

The completed well produced potable water while being test pumped for 13 days at a constant rate of 3,000 gallons per minute. Discharge water samples were collected twice daily during the pumping test for analysis of chloride, sulfate, calcium, magnesium, TDS, specific conductivity and hardness by a certified laboratory. These parameters showed some increasing trends in selected constituents, but generally stabilized by the ninth day of pumping and remained relatively constant for the duration of the pumping test. Water samples were collected from a spigot at the wellhead on the last day of the pumping test and submitted to the certified laboratory for analysis. The results of the laboratory analysis show that water quality of the Lower Floridan aquifer below the site meets select Primary Drinking Water Standards including inorganic compounds, volatile organic contaminants, synthetic organic contaminants, and radionuclides and Secondary Drinking Water Standards, and, therefore, is a potential source of potable water for public supply. However, the long term viability of the Lower Floridan aquifer as a potable water source at the site needs further testing through additional pumping of HH-1 and laboratory analysis of the discharged water.

During the 13 day pumping test of HH-1, depth to water in the well dropped from a pre-pumping static water level of 121.98 ft bls to approximately 146.8 ft bls within 24 hours of the start of pumping and remained near that level until the end of pumping, which results in a total drawdown of 24.82 feet and a specific capacity of 120 gallons per minute per foot of drawdown.

An analysis utilizing empirical equations based on the Jacob's equation of the pumping test data, which were corrected for head loss from pipe friction while pumping, provided an estimate of the transmissivity for the Lower Floridan aquifer of approximately 193,400 feet square per day.

During the 13-day pumping test, changes in water levels at the on-site surficial aquifer and Upper Floridan aquifer monitor wells trended with water level changes recorded at the background U.S. Geological Survey monitor wells for the first two days of pumping, but then showed rising water levels for the duration of the pumping phase of the pumping test, which are attributed to mounding of the discharge water in the surficial aquifer system and Upper Floridan aquifer. The rising water levels in the surficial aquifer and the Upper Floridan aquifer monitor wells after the start of pumping would mask any response of these aquifers to pumping from the Lower Floridan aquifer.

Information obtained from the construction and testing of HH-1 shows that the Lower Floridan aquifer has the potential to produce significant quantities of potable water with minimal impacts occurring to the overlying aquifers as a result of the withdrawals. However, determining the long term viability of utilizing the Lower Floridan aquifer as a source of water for potable use and/ or a supplemental supply to augment the County's reuse system requires further evaluation. This could be accomplished through a long term pumping test of HH-1, which would include monitoring of water levels in the Upper Floridan aquifer and the surficial aquifer system, and

Summary and Recommendation

Floridan aquifer and the overlying aquifers and provide additional information on water quality changes from further pumping and whether the Lower Floridan aquifer would continue to produce potable water over time.

It is recommended that an extended pumping test of HH-1 be conducted for a minimum period of one year to provide additional information for evaluating the long term viability of utilizing the Lower Floridan aquifer as a source of water. The County's planned reuse facility, which will be built in the vicinity of HH-1, would provide a discharge point for the pumping test that would not impact water levels in the surficial aquifer system and the Upper Floridan aquifer, and allow for the beneficial use of the discharge water.

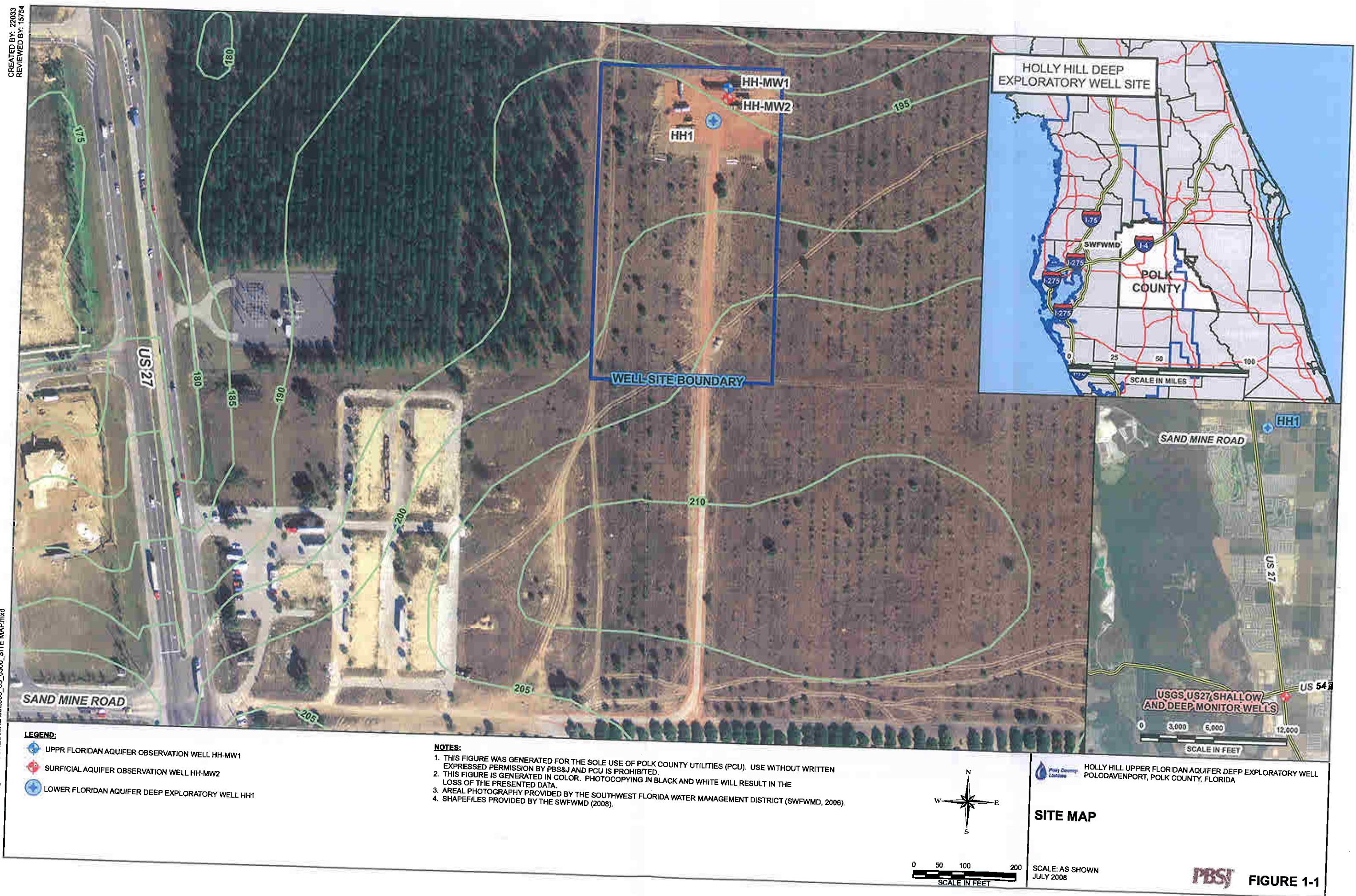
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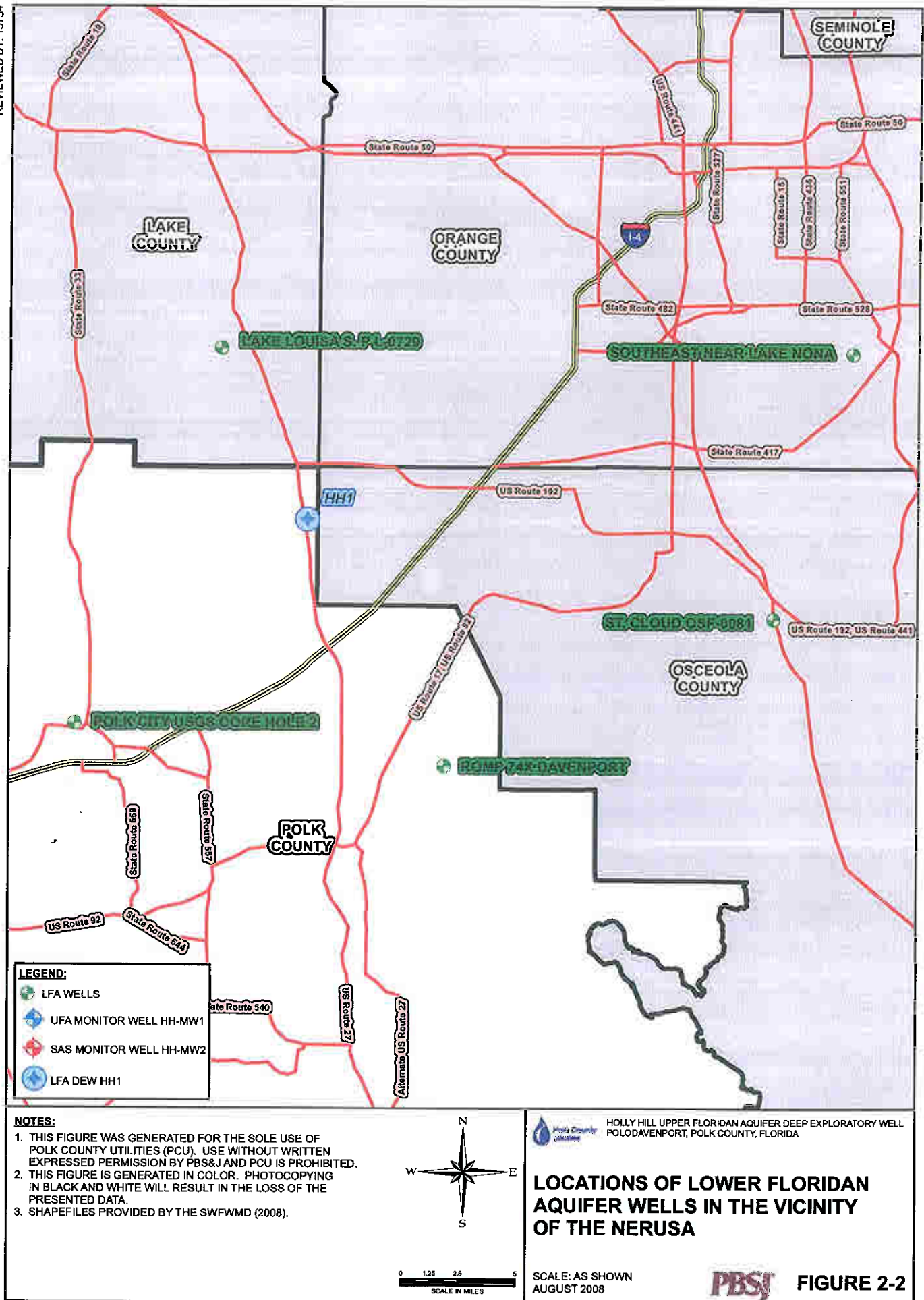
FIGURES



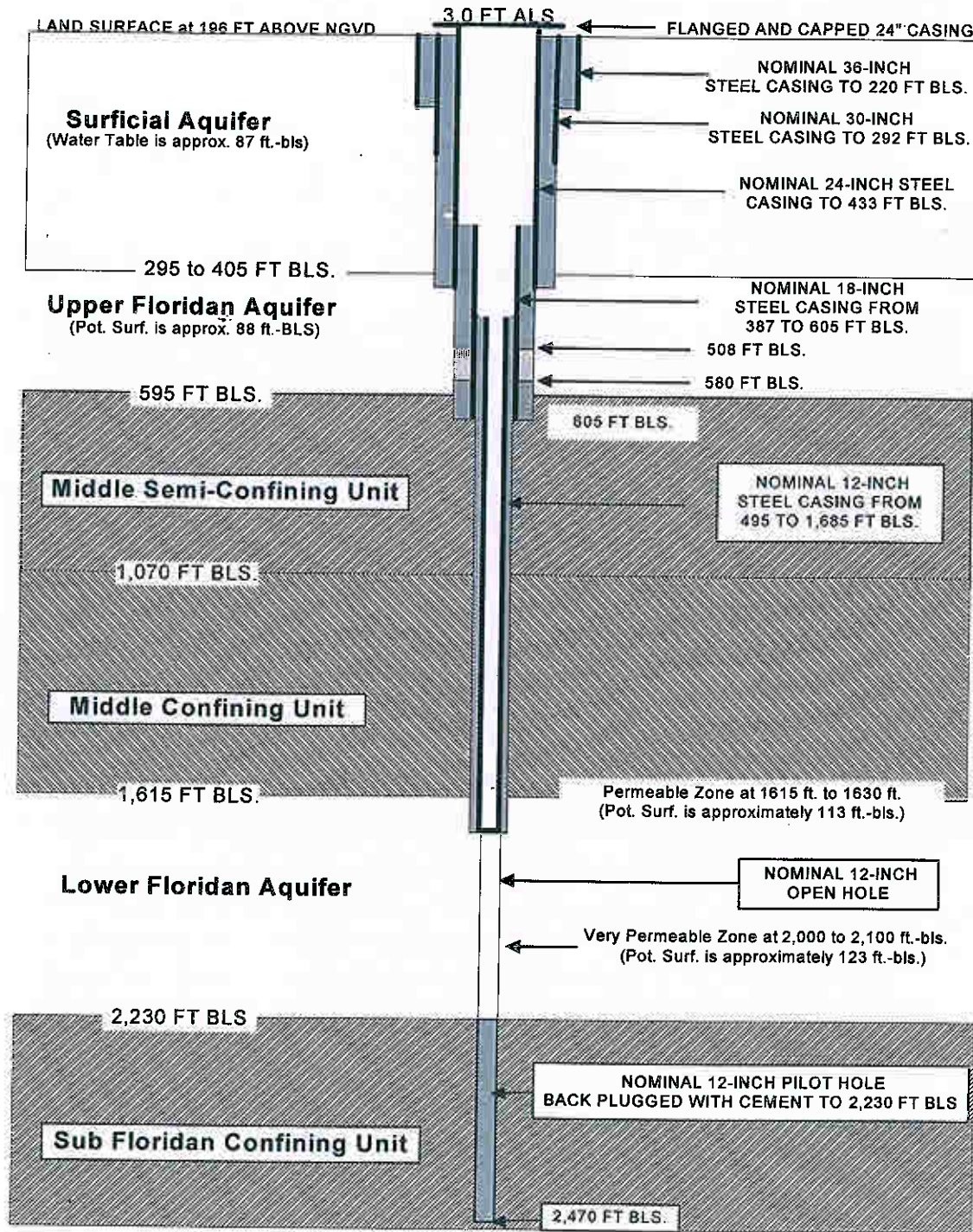
**Holly Hill Lower Floridan Aquifer Deep Exploratory Well
Northeast Regional Utilities Service Area, Polk County, Florida**

Geologic Series/ Stratigraphic Unit	Lithology	Hydrogeologic Unit (thickness in Feet)
Holocene, Pleistocene/ undifferentiated	Interbedded sand and clay	Surficial Aquifer (100 to 300)
Pleiocene, Miocene undifferentiated sediments, Hawthorne Group	Interbedded clay, sandy clay, and sand, often phosphatic, with some phosphatic limestone and dolostone	Intermediate confining unit (less than 50 feet)
Upper Eocene/ Ocala Limestone	Predominantly soft to hard porous limestone, minor amounts of hard, crystalline dolostone	Upper Floridan Aquifer Upper zone (200 to 350)
Middle Eocene/ Avon Park Formation	Upper part: predominantly hard, crystalline dolostone with abundant fractures and solution cavities	Upper Floridan aquifer Lower Zone (30 to 50)
	Middle part: predominantly soft porous limestone and dolomitic limestone with minor amounts of hard crystalline dolostone Lower part: soft to hard porous limestone and hard, fractured crystalline dolostone	Middle semiconfining unit (300 to 400)
		Middle confining unit (200 to 300)
		Lower Floridan aquifer (up to 1,200)
Lower Eocene Oldsmar Formation	Soft to hard porous limestone and hard, fractured crystalline dolostone, minor amounts of peat chert, anhydrite, and gypsum	
Paleocene/ Cedar Keys Formation	Interbedded carbonate rocks and evaporites	Sub-Floridan confining unit

Figure 2-1 Generalized geology and hydrogeology within the NERUSA
(Modified from O'Reilly and Others, 2002)



**As Built Drawing – Holly Hill Lower Floridan Aquifer
Deep Exploratory Well No. 1
North East Region Utilities Service Area, Polk County Florida**



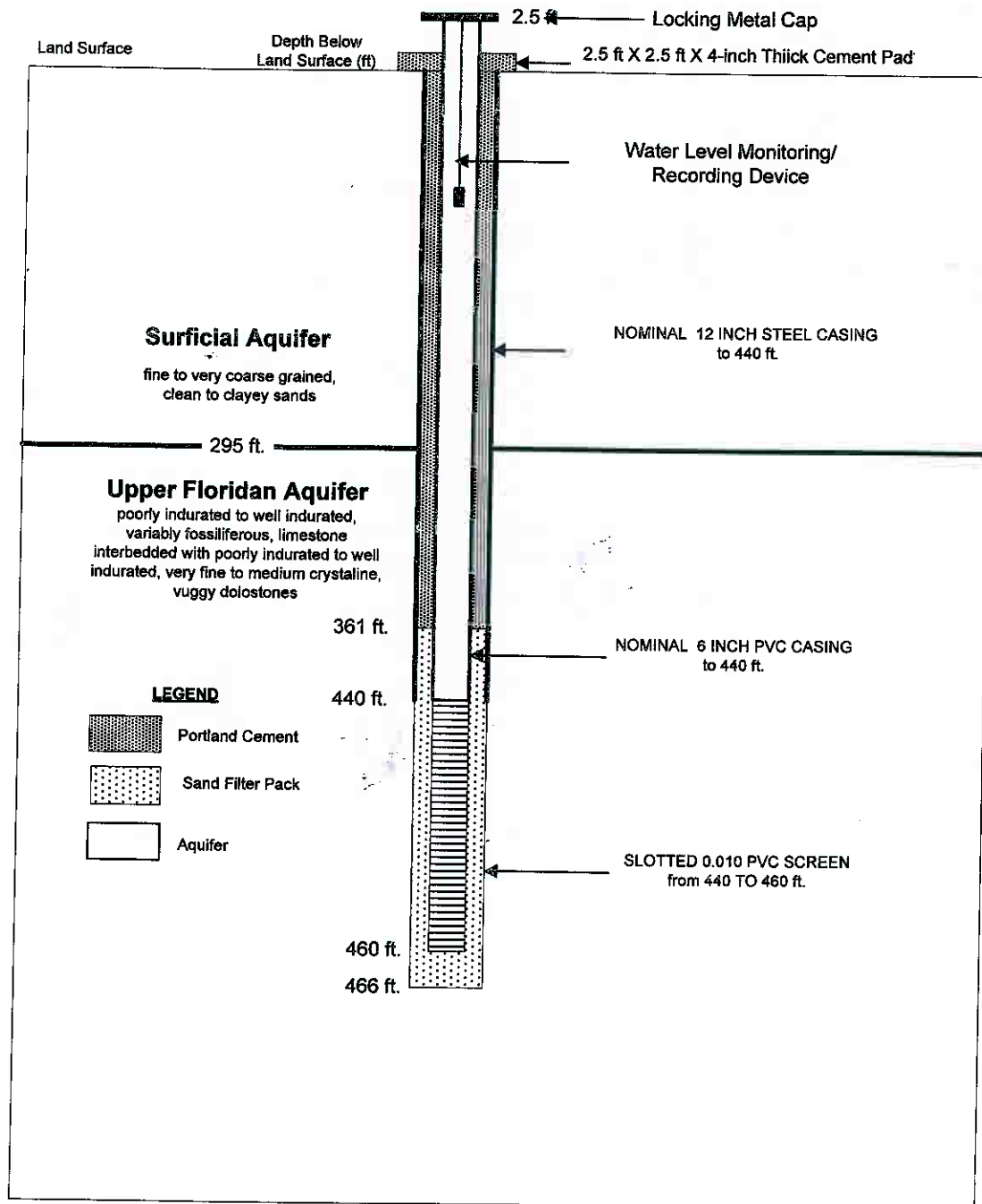
LEGEND

Portland Type II Cement Grout	Confining Unit	Aquifer	Limestone Gravel

PBSJ

Figure 3-1

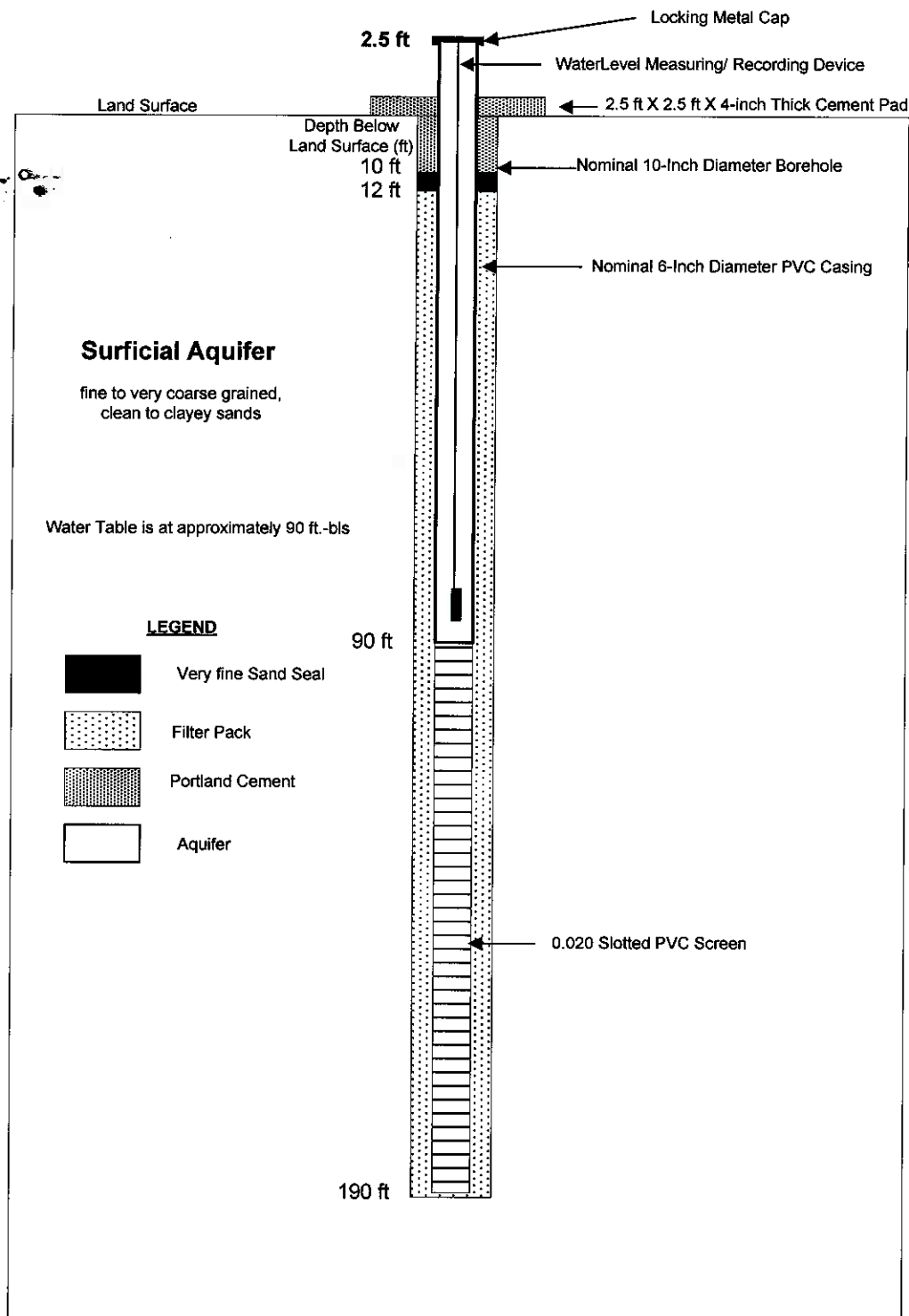
**As Built Drawing – Holly Hill Upper Floridan Aquifer Monitor Well No. 1
Northeast Regional Utilities Service Area, Polk County Florida**



PBSJ

Figure 3-2

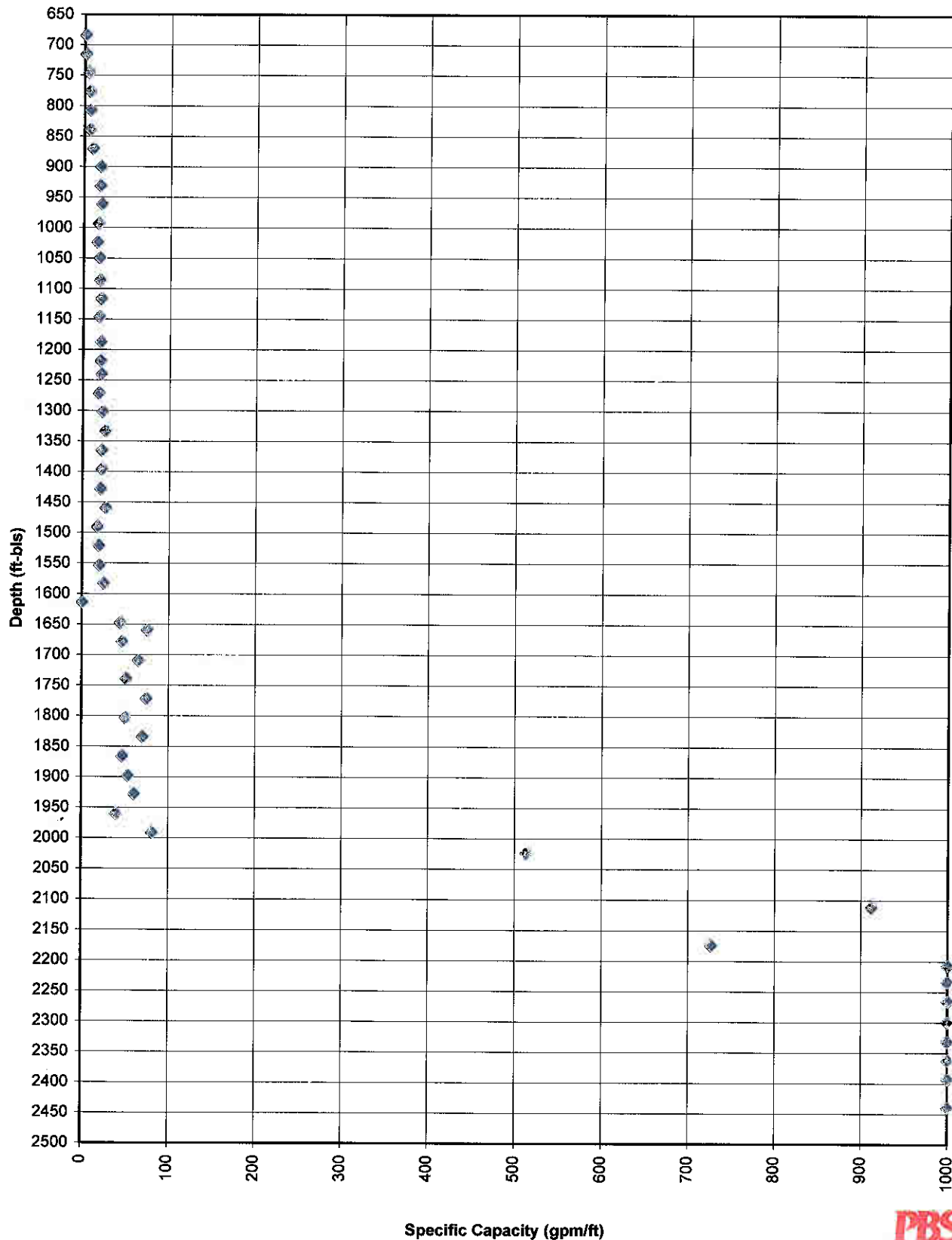
**As Built Drawing – Holly Hill Surficial Aquifer Monitor Well No. 2
Northeast Regional Utilities Service Area, Polk County Florida**



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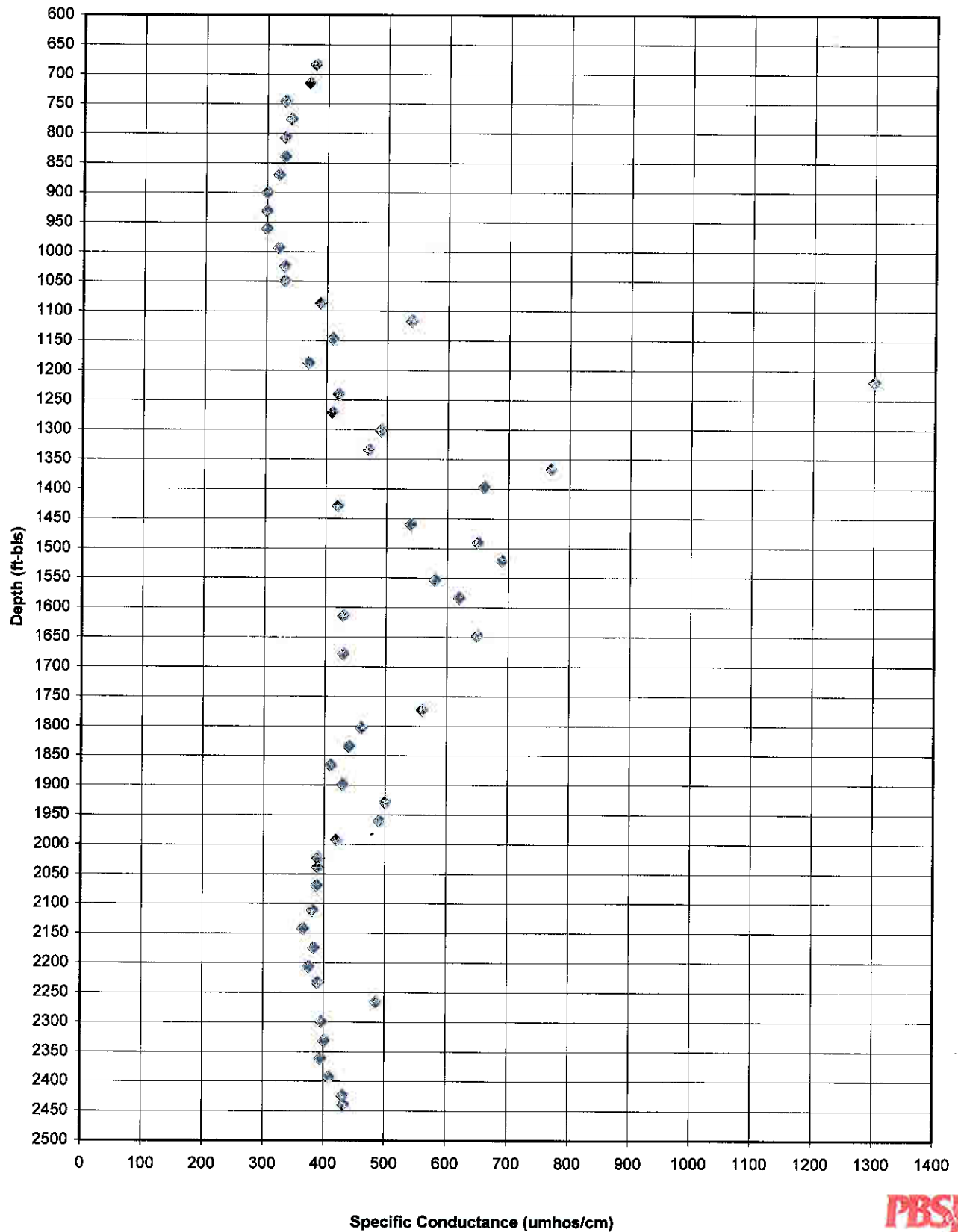
Figure 3-3

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, FL
Air-Lift Specific Capacity During Reverse Air Drilling



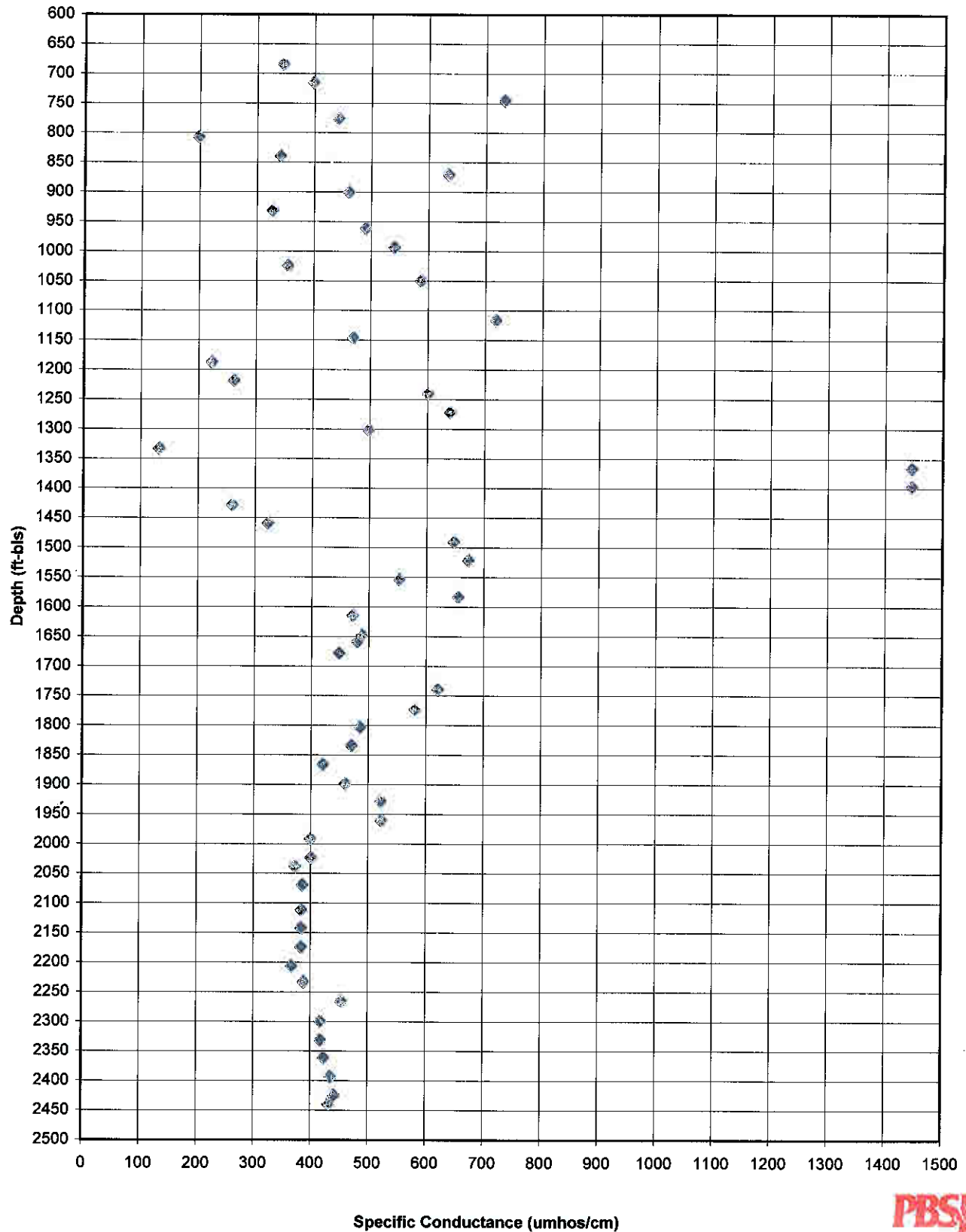
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Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, FL
Lab Specific Conductance During Reverse Air Drilling



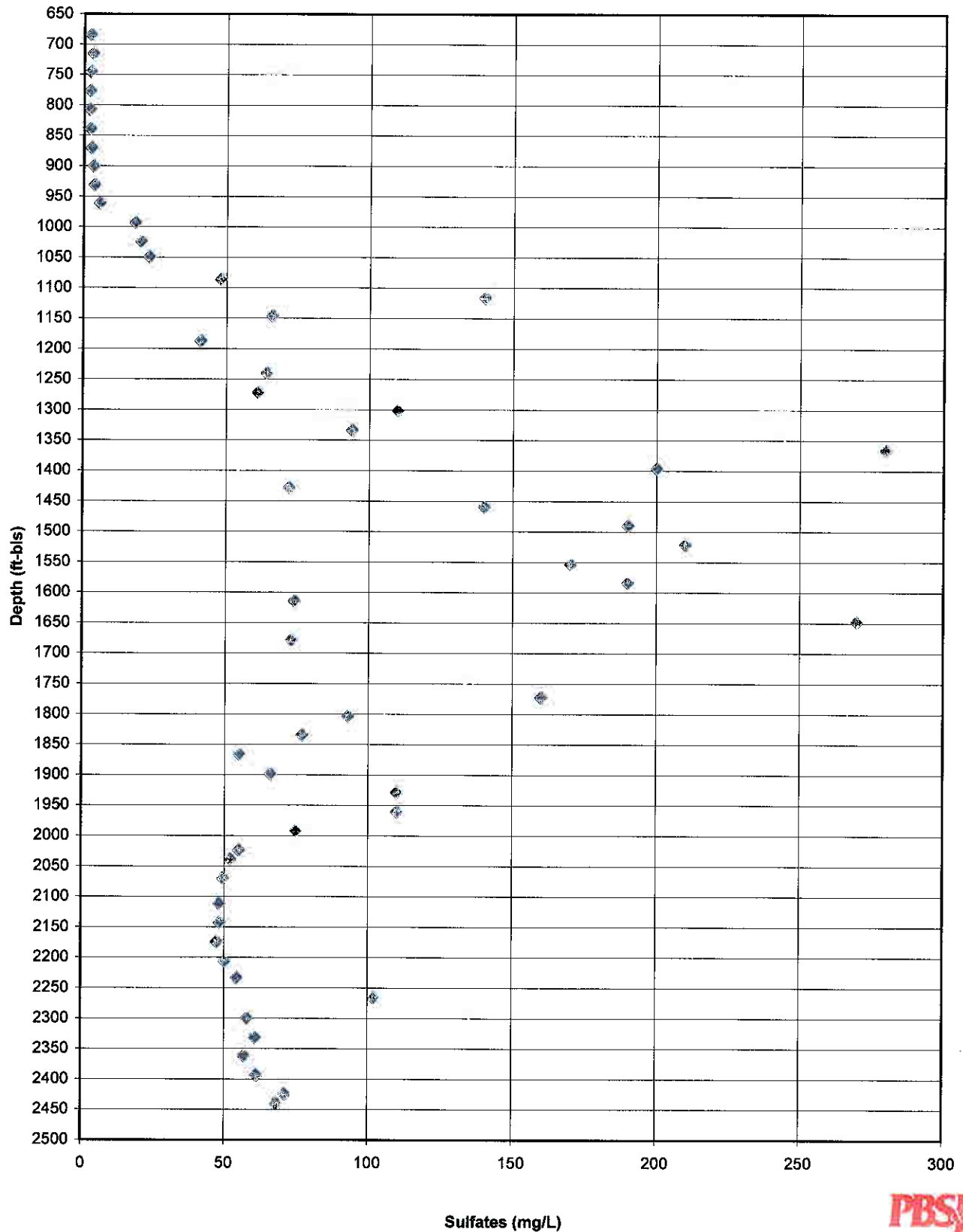
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**Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, FL
Field Specific Conductance During Reverse Air Drilling**



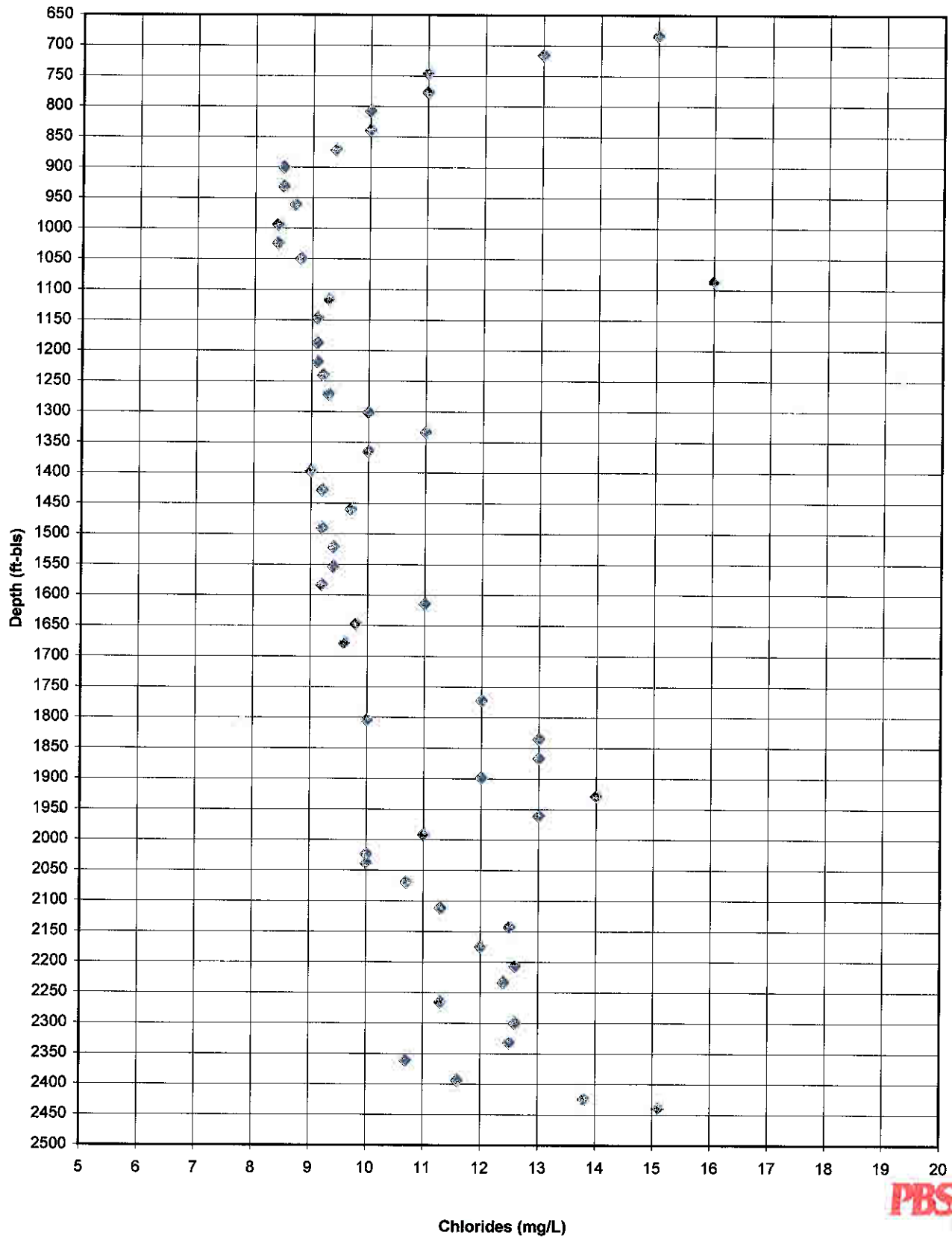
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**Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, FL
Lab Sulfates During Reverse Air Drilling**



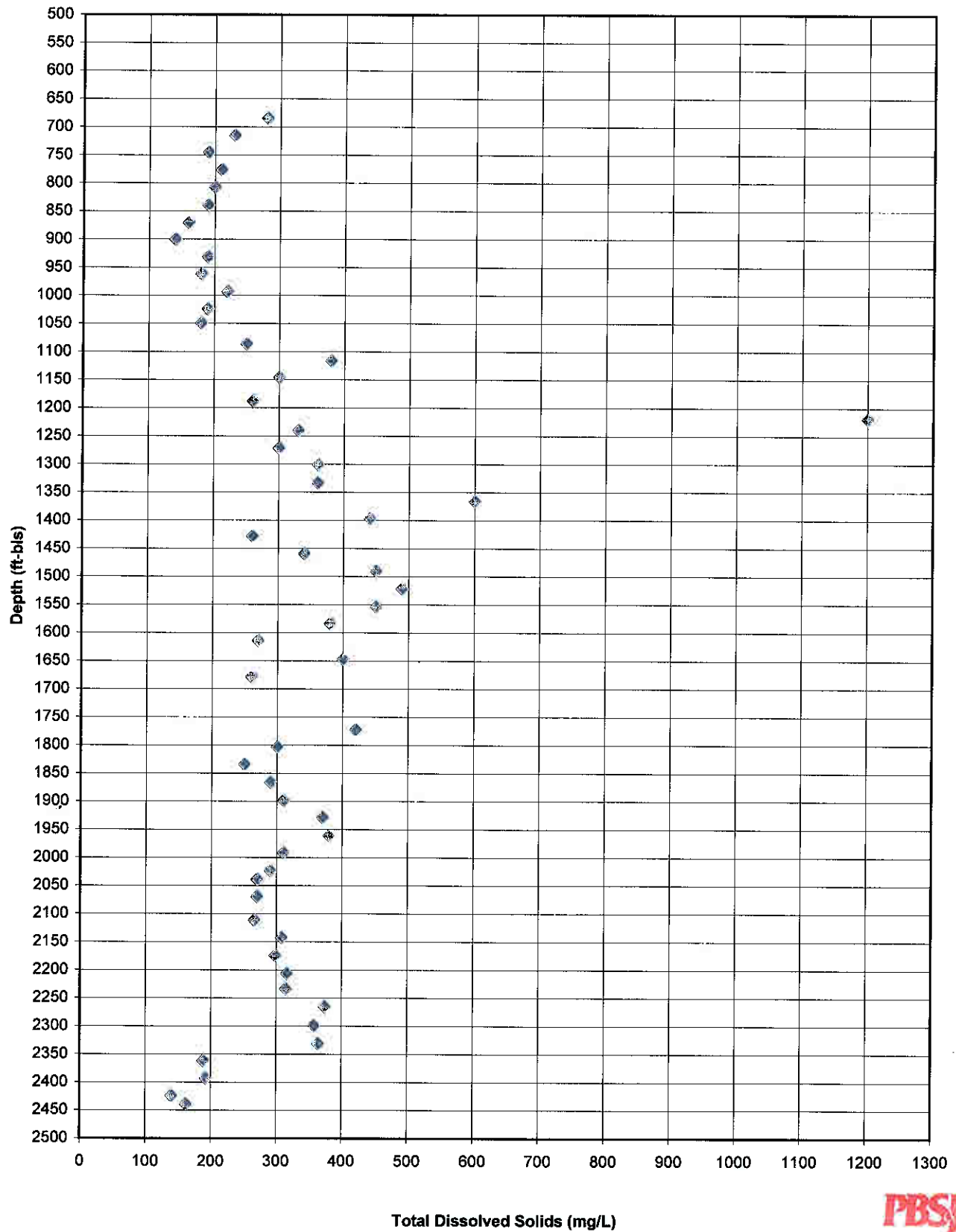
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**Holly Hill LFA Deep Exploratory Well , NERUSA, Polk County, FL
Lab Chlorides During Reverse Air Drilling**



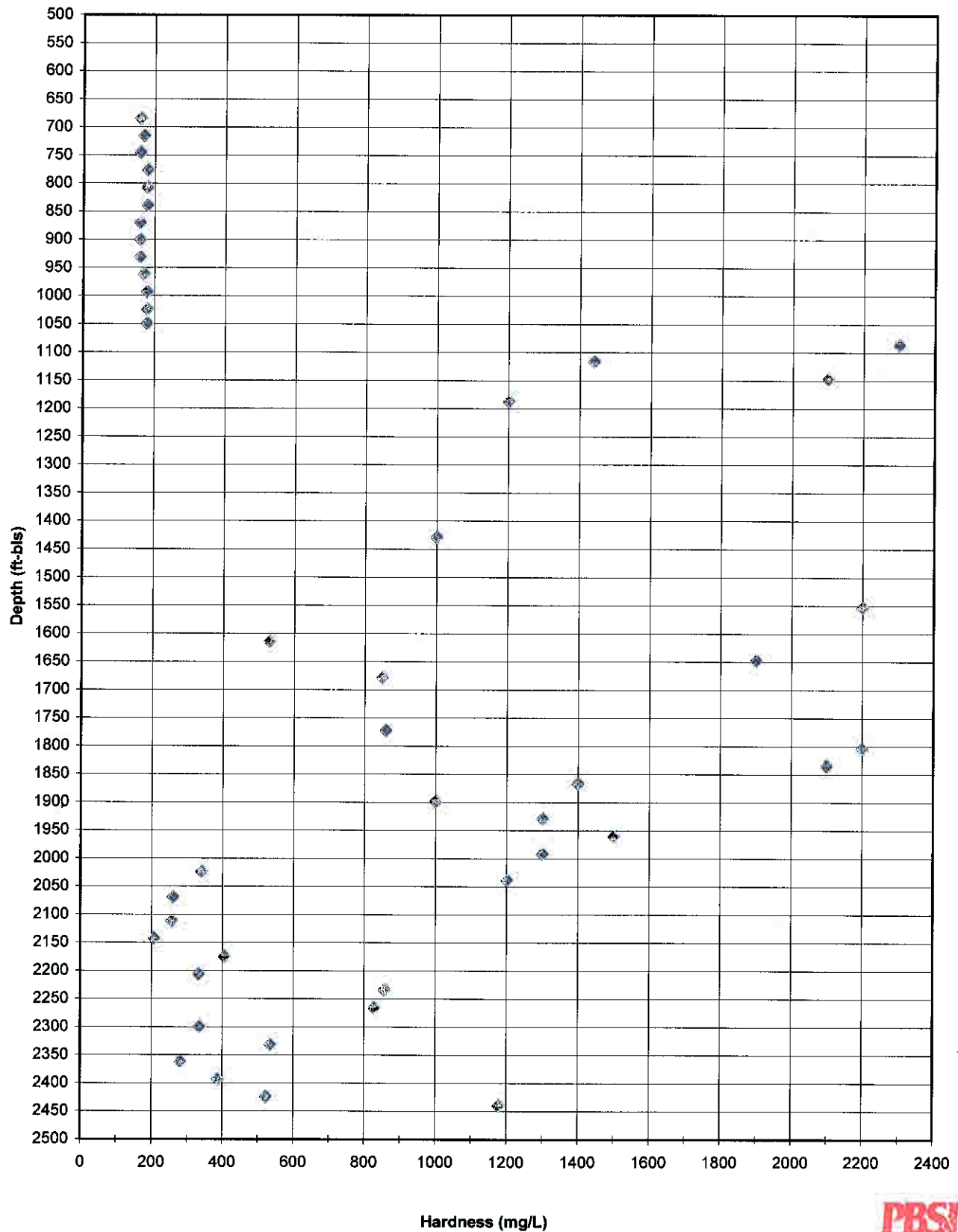
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**Holly Hill LFA Deep Exploratory Well , NERUSA, Polk County, FL
Lab Total Dissolved Solids During Reverse Air Drilling**



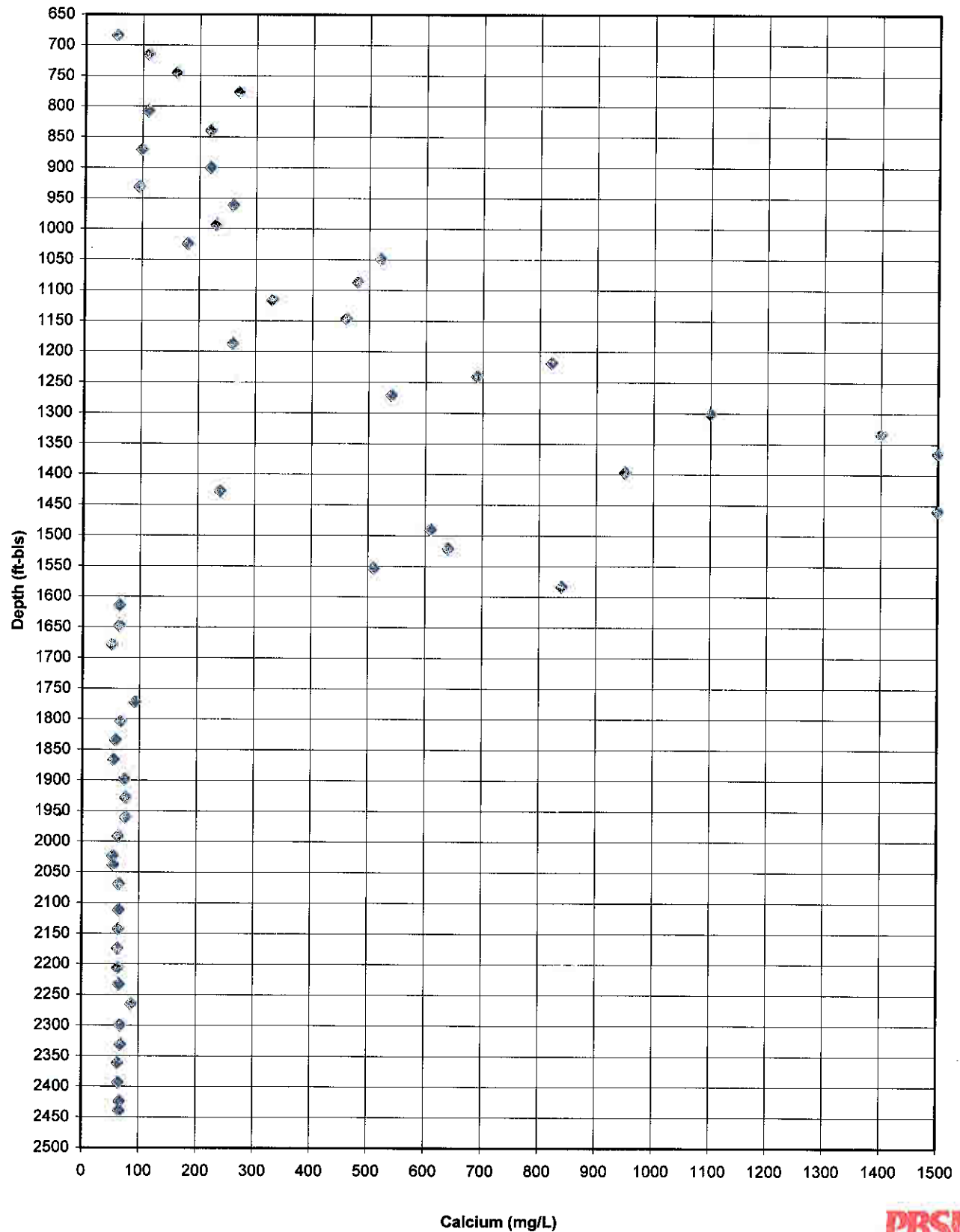
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**Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, FL
Lab Hardness During Reverse Air Drilling**



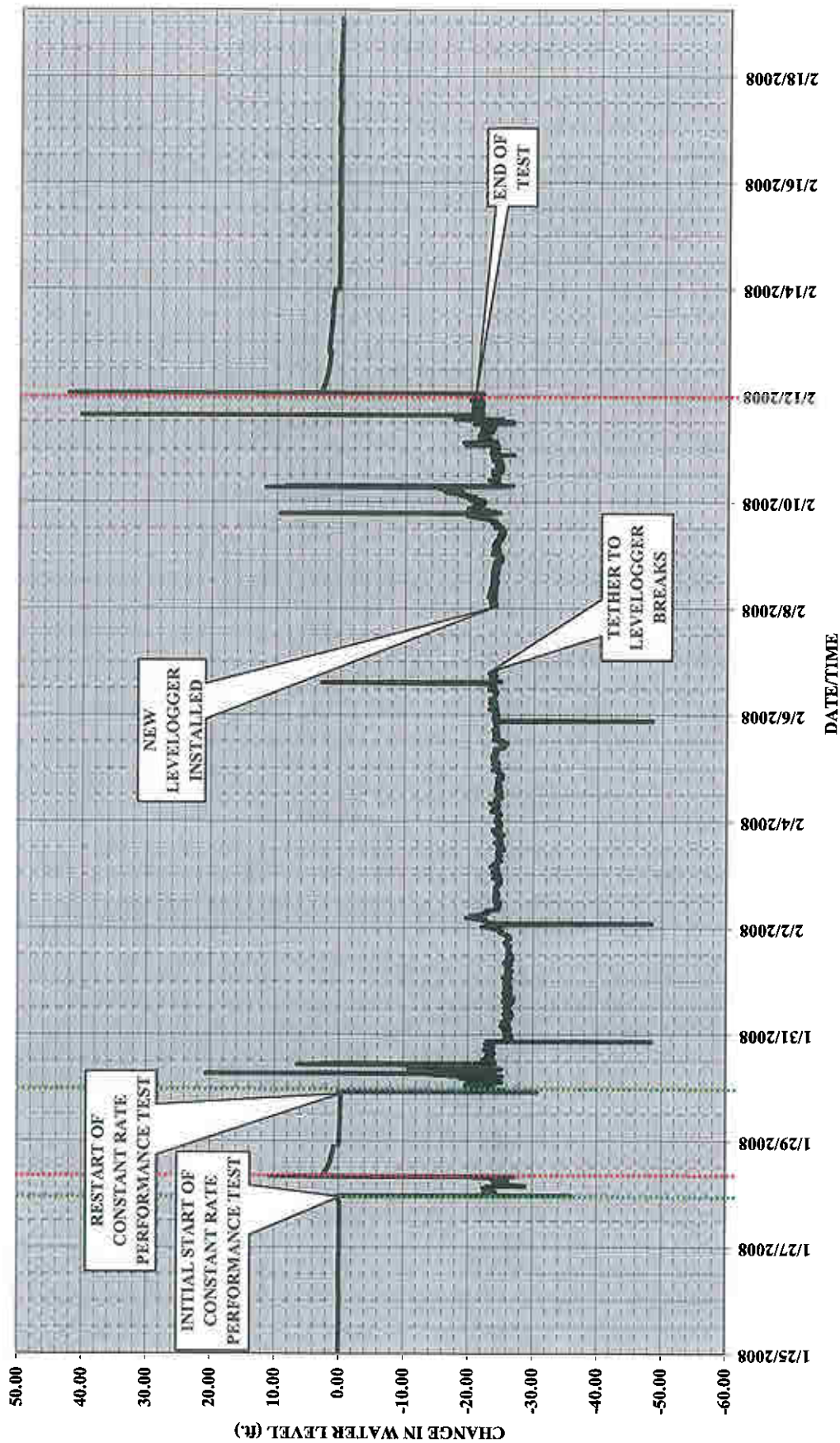
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Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, FL
Lab Calcium During Reverse Air Drilling



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CHANGE IN WATER LEVEL OVER TIME - JANUARY/FEBRUARY, 2008 PUMPING TEST
 HOLLY HILL LOWER FLORIDAN AQUIFER DEEP EXPLORATORY WELL
 NERUSA, POLK COUNTY, FLORIDA



PRO

FIGURE 4-1
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CHANGE IN WATER LEVEL OVER TIME - JANUARY/FEBRUARY, 2008 PUMPING TEST
USGS US27 UPPER FLORIDAN AQUIFER MONITOR WELL VERSUS HOLLY HILL UFA-MW
NERUSA, POLK COUNTY, FLORIDA

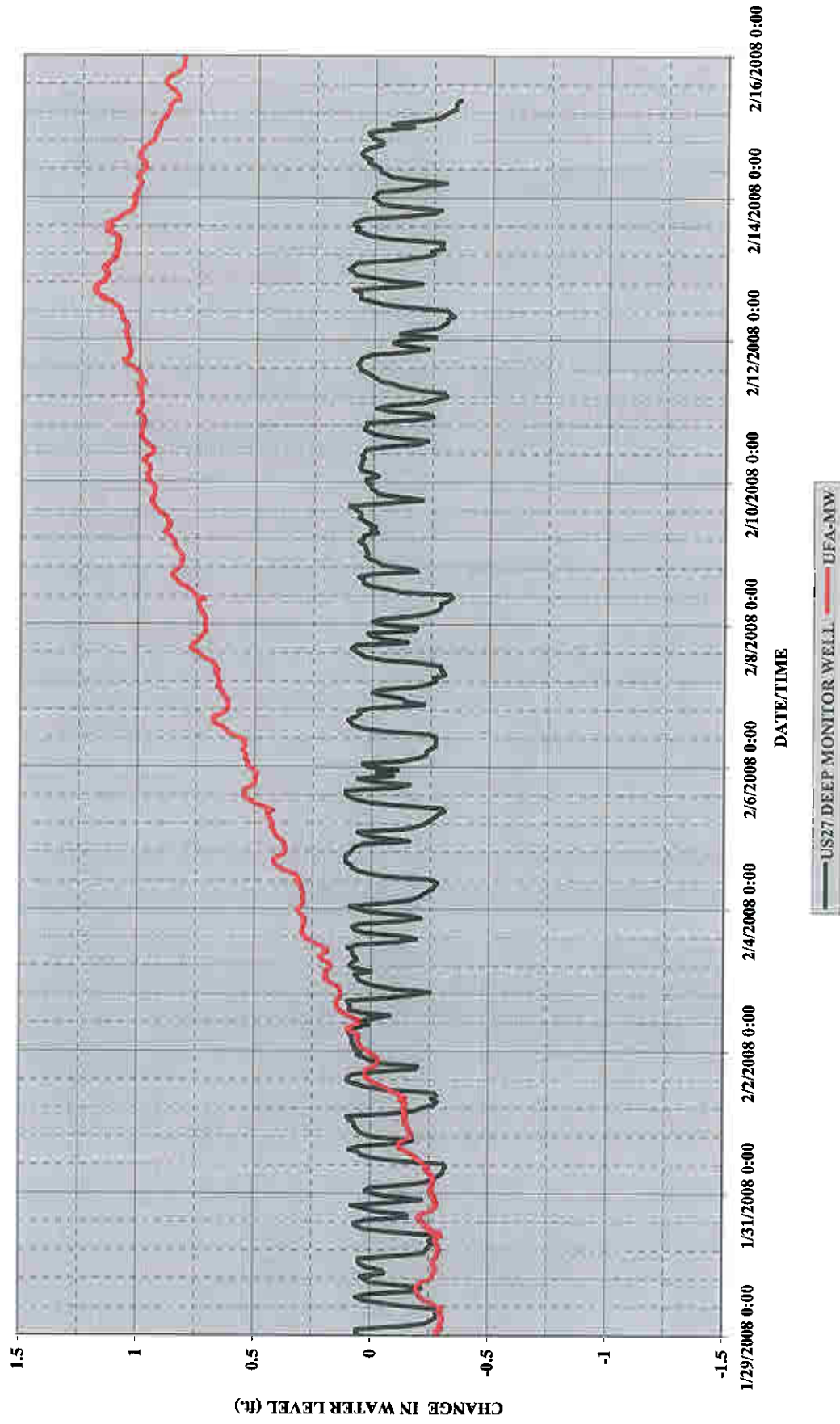


FIGURE 4-2
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CHANGE IN WATER LEVEL OVER TIME - JANUARY/FEBRUARY, 2008 PUMPING TEST USGS US27 SURFICIAL AQUIFER MONITOR WELL VERSUS HOLLY HILL SA-MW NERUSA, POLK COUNTY, FLORIDA

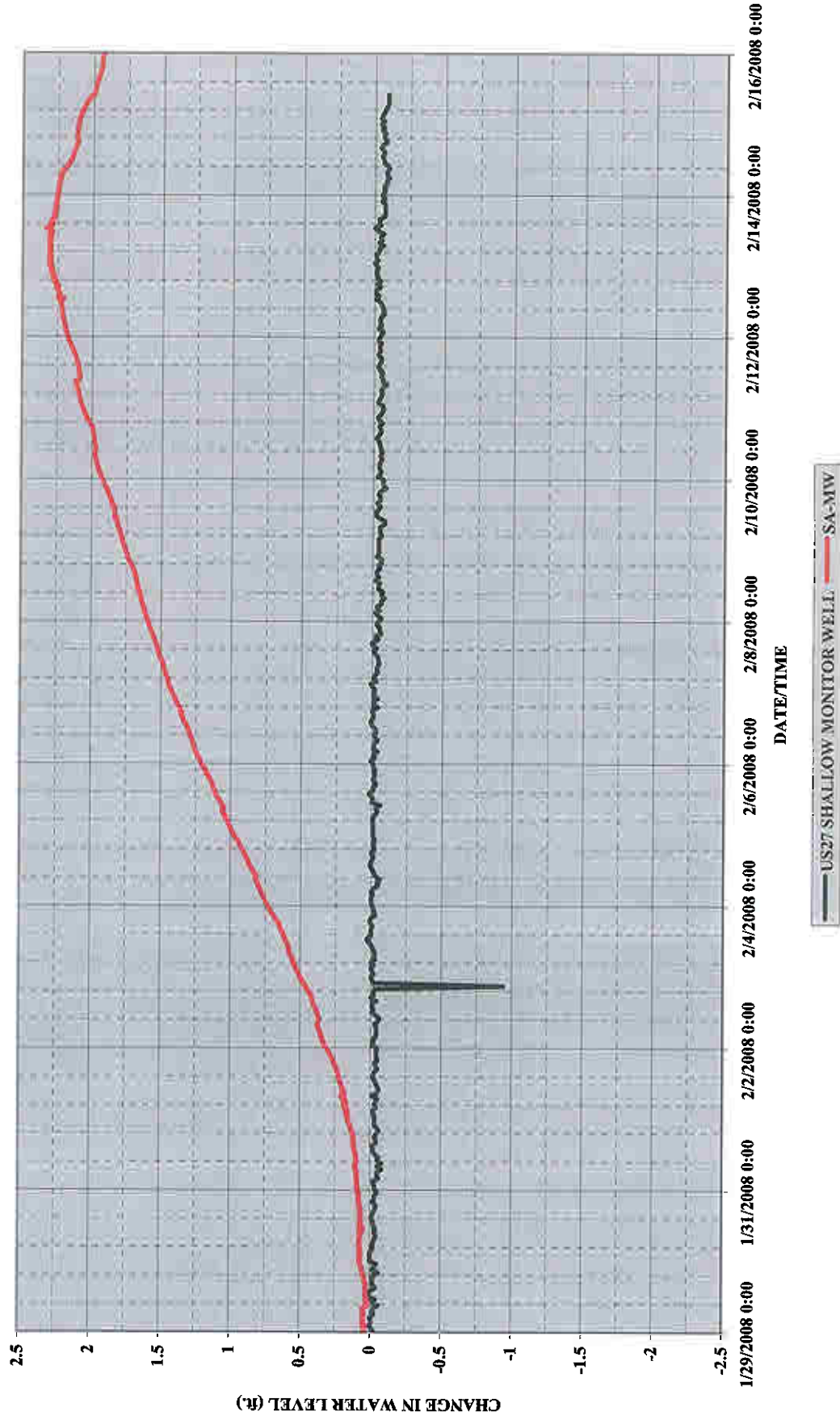


FIGURE 4-3
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Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida Pumping Test Water Quality over Time

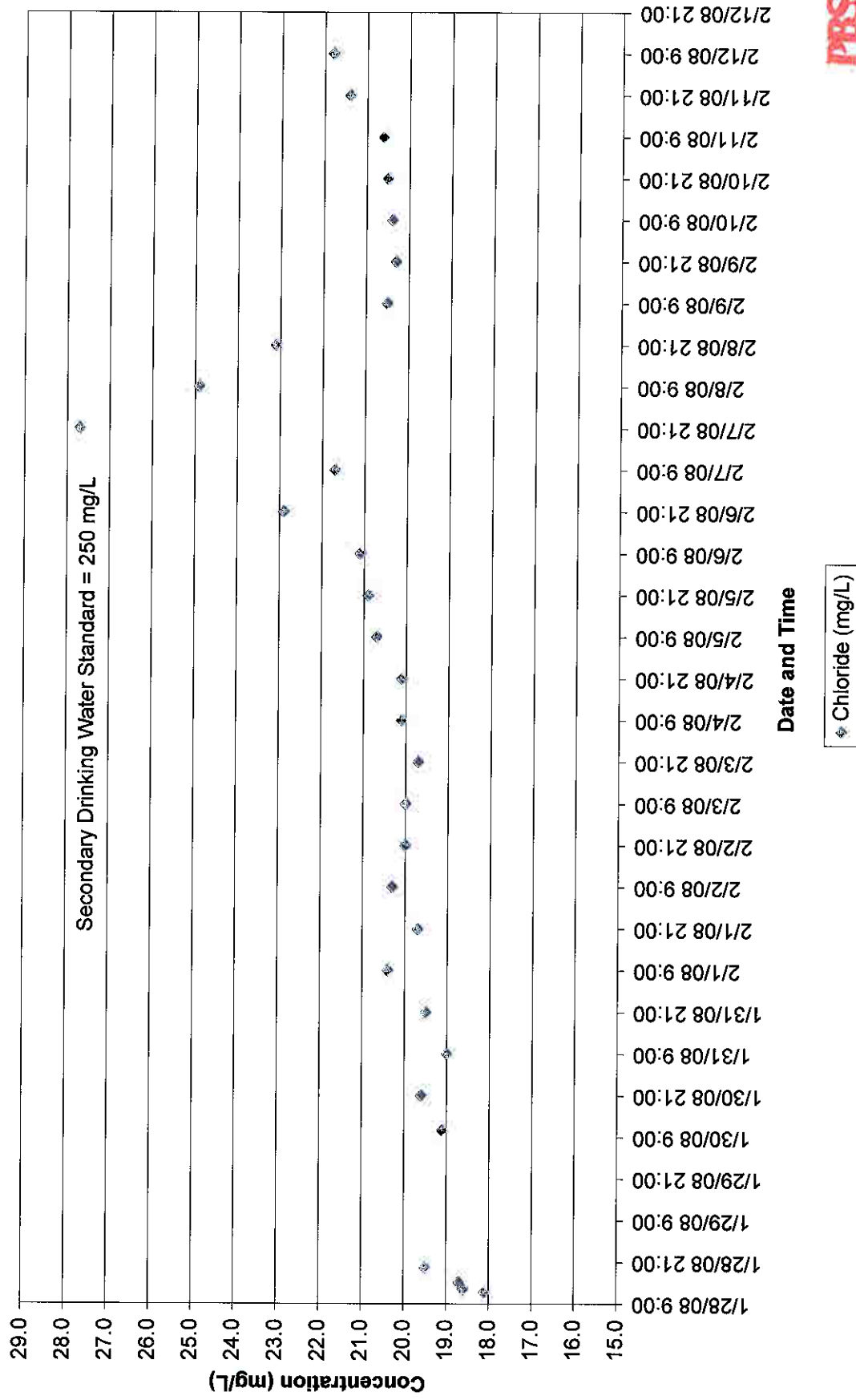


Figure 4-4

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida Pumping Test Water Quality over Time

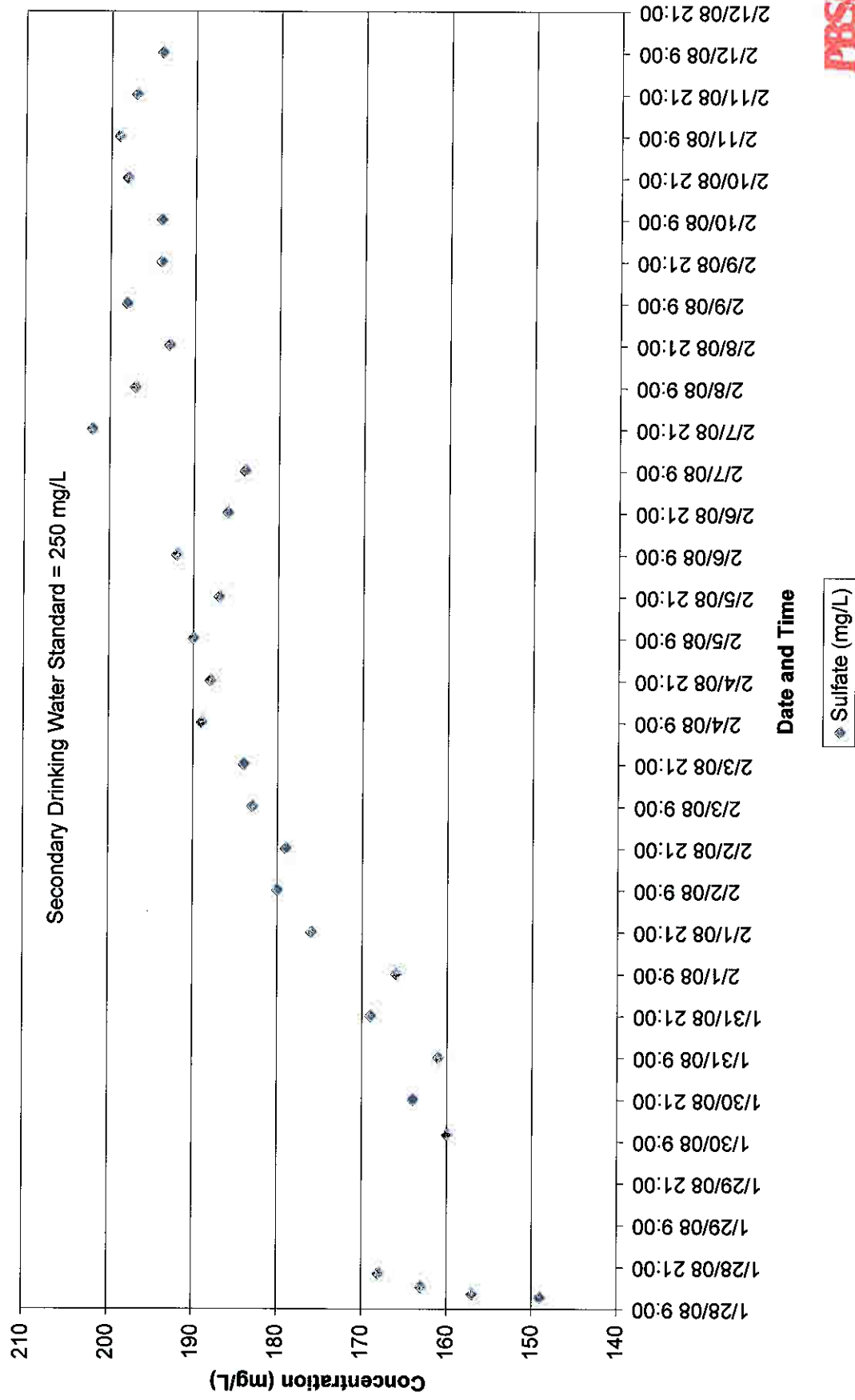
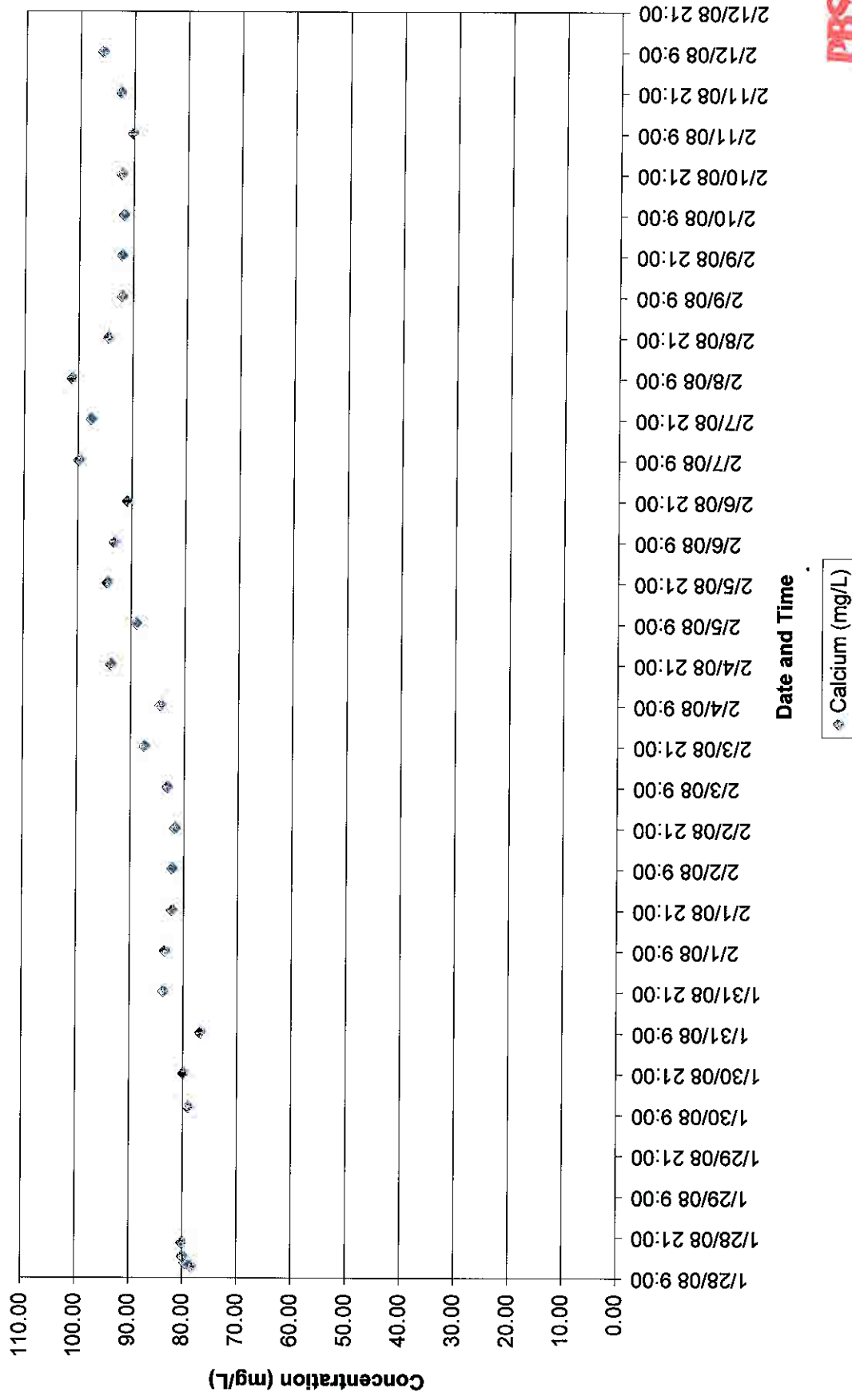


Figure 4-5

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida Pumping Test Water Quality over Time



PBSJ

Figure 4-6

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida Pumping Test Water Quality over Time

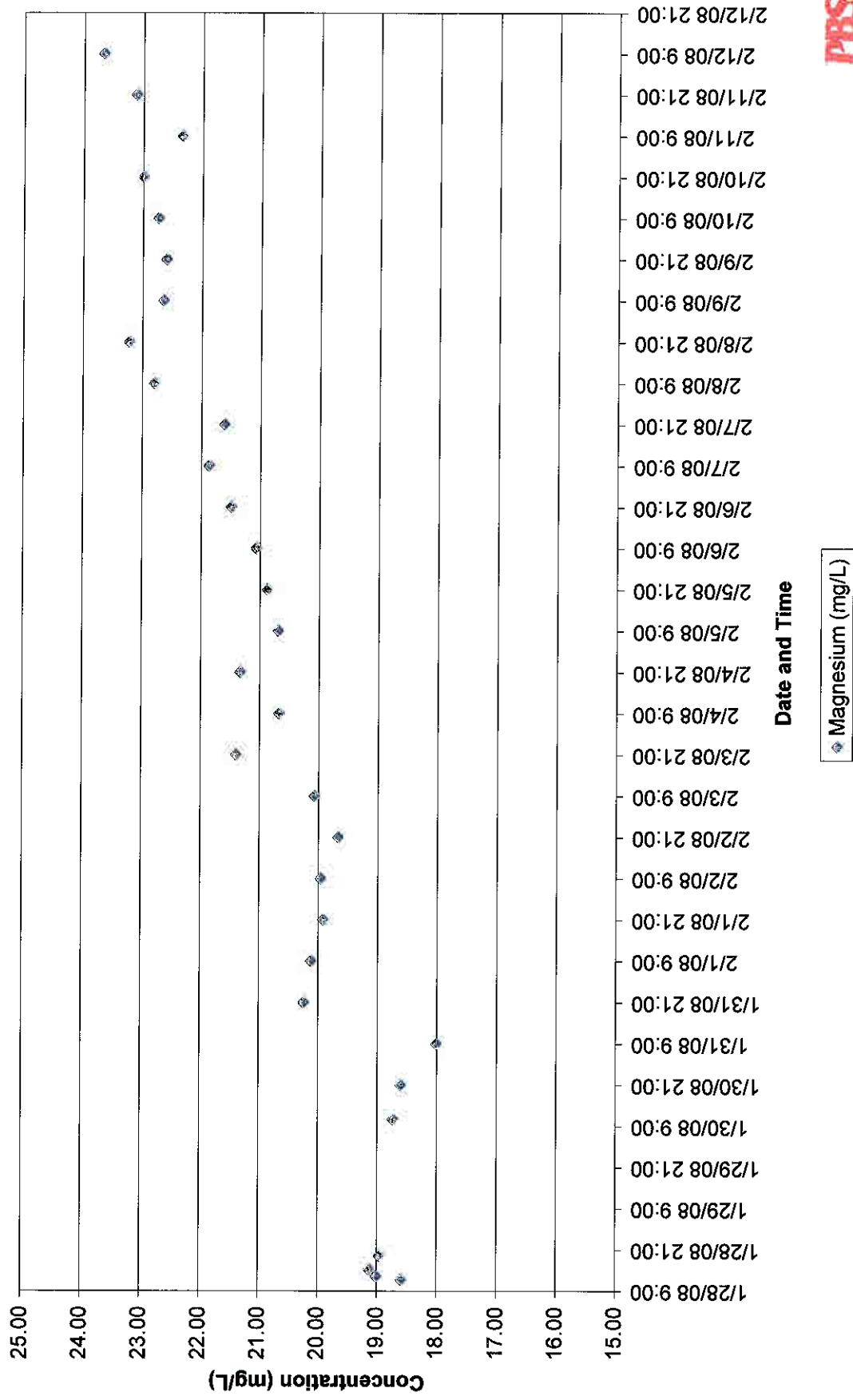


Figure 4-7

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida Pumping Test Water Quality over Time

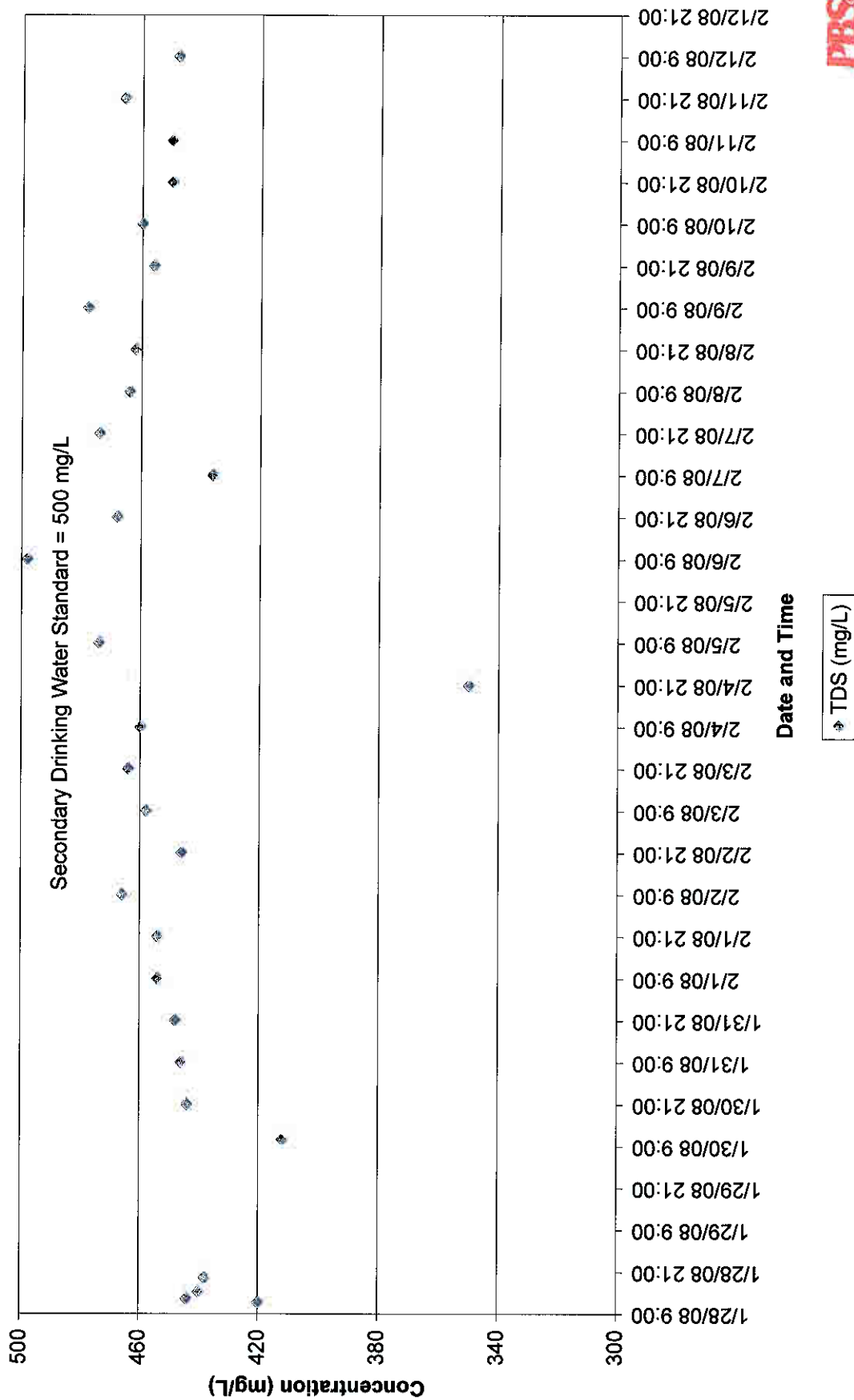


Figure 4-8

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida Pumping Test Water Quality over Time

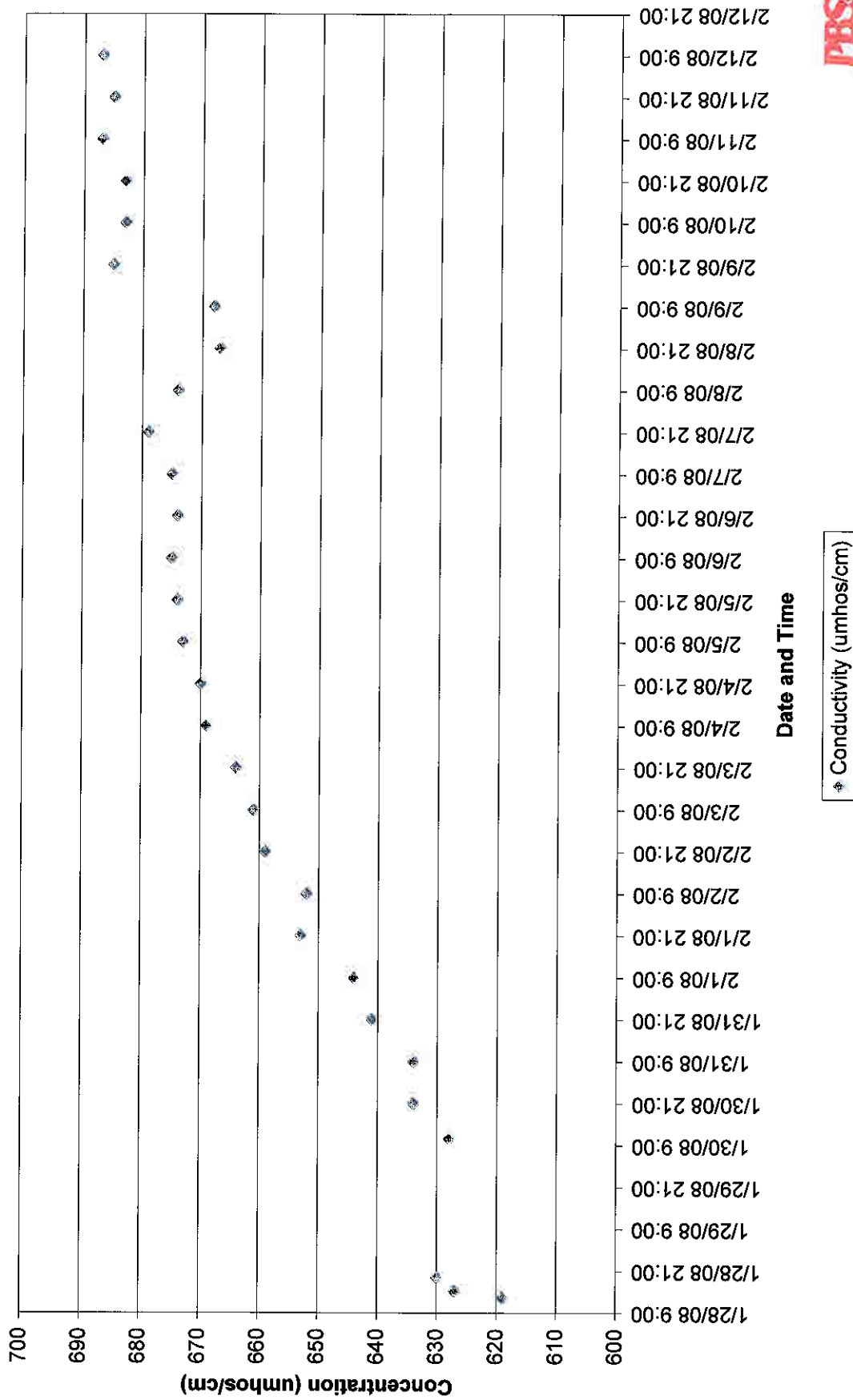


Figure 4-9

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida Pumping Test Water Quality over Time

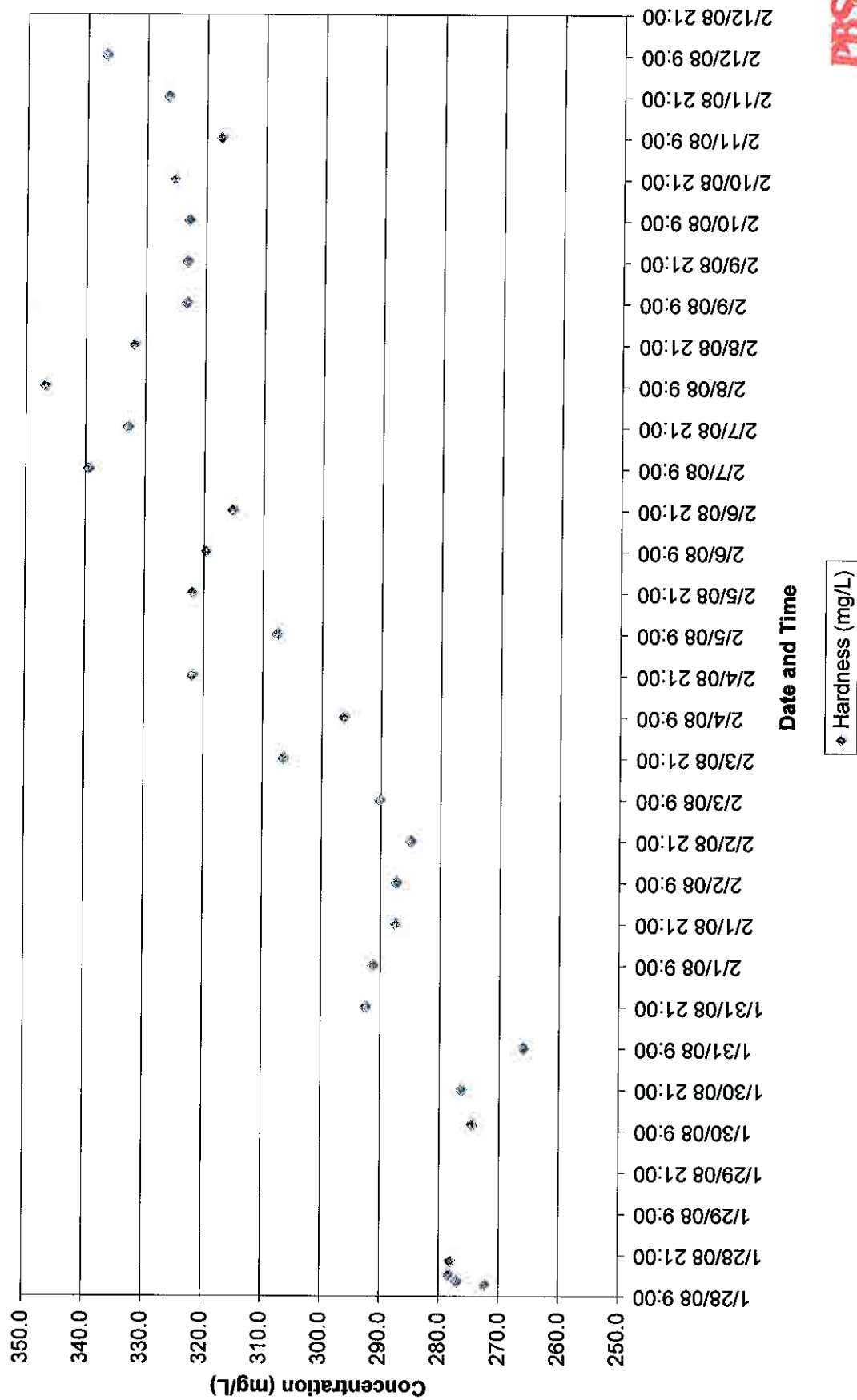


Figure 4-10

TABLES

Holly Hill Lower Floridan Aquifer Deep Exploratory Well, Northeast Regional Utility Service Area, Polk County, Florida

Table 2-1. Lower Floridan aquifer Water Quality in the vicinity of the NERUSA

Well No.	Well Name	Date	Temp. (C)	Specific Cond. (uS/cm)	Dissolved Solids (mg/L)	pH S.U.	Total Hardness (mg/L)	Silica (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Strontium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Alkalinity (mg/L)
8	Polk City USGS Core Hole 2	8/24/2000	26.1	2,800	2,840	7.4	--	20	590	122	7.9	3.3	11.9	12	1,700	1.1	145
9	St. Cloud OSF-0081	1/6/2000	28.9	3,510	2,280	8	900	12	210	90	410	15	5.9	730	630	0.49	87
21	Lake Louisa S. P L-0729	2/15/2000	25.0	341	210	7.4	--	*6.2	*45	*11	*6.7	*1.2	*621	8.3	20	0.2	146
14	Romp 74X Davenport	5/12/2003 5/21/2003	27.0 27.2	792 2,280	615 2,220	7.89 7.91	--	10.7 13.2	129 468	24.8 87.2	4.82 7.72	1.20 1.99	7.05 8.87	7 9	320 1,340	-- --	84.8 103.0

Notes: Samples analyzed by the USGS are dissolved concentrations

Samples with an asterisk (*) are total concentrations

In groundwater, dissolved and total constituents are comparable if particulate matter is negligible

C, degrees Celcius

uS/cm, microsiemens per centimeter at 25 C

mg/L, milligrams per Liter

S.U., standard units

--, not analyzed

Well No. 9 and 21 data from Table 1. in O'Reilly et al. (2002)

Well No. 8 data from USGS NWIS Internet site at <http://waterdata.usgs.gov/nwis>

ROMP 74X was sampled from two Depth intervals, from 1,256 to 1286 ft bls on 5/12/03 and from 1,351 to 1,391 ft bls on 5/21/03

**Holly Hill Lower Floridan Aquifer Deep Exploratory Well
Northeast Regional Utility Service Area, Polk County, Florida**

Table 3-1 Daily Water Level Measurements During Reverse-air Drilling

Date D/M/Y	Time Hr:Min	Drilled Borehole Depth (ft bls)	Static Water Level Depth (ft bls)	Static Water Level Elevation (ft-NGVD)
3/8/07	9:30	685	88	108.0
3/9/07	11:40	716	88	108.0
3/12/07	11:45	746	89	107.0
3/12/07	15:15	777	89	107.0
3/14/07	13:30	808	88.5	107.5
3/14/07	17:00	840	87.5	108.5
3/29/07	15:40	901	91.8	104.2
3/30/07	9:35	932	90.25	105.8
3/31/07	13:10	962	90.3	105.7
4/2/07	10:31	994	89.5	106.5
4/2/07	15:16	1,025	89.5	106.5
4/2/07	17:40	1,050	89.5	106.5
4/4/07	16:45	1,087	90.5	105.5
4/5/07	11:35	1,117	89.5	106.5
4/5/07	13:45	1,137	89.5	106.5
4/6/07	16:30	1,188	89.65	106.4
4/11/07	12:45	1,219	90.08	105.9
4/12/07	10:35	1,241	90.1	105.9
4/16/07	12:18	1,272	89.5	106.5
4/16/07	18:04	1,302	90.3	105.7
4/17/07	12:43	1,334	90.5	105.5
4/17/07	14:15	1,366	90.5	105.5
4/18/07	15:00	1,397	90.6	105.4
4/19/07	11:00	1,429	90.7	105.3
4/19/07	18:00	1,460	90.7	105.3
4/20/07	10:55	1,491	90.4	105.6
4/23/07	10:06	1,518	90.5	105.5
4/23/07	17:05	1,554	90.5	105.5
4/24/07	10:50	1,584	91.49	104.5
4/25/07	10:00	1,615	unknown	unknown
4/25/07	17:20	1,648	113.8	82.2
4/26/07	12:30	1,660	113.7	82.3
4/27/07	14:07	1,649	112.9	83.1
4/30/07	11:11	1,710	113.7	82.3
4/30/07	16:08	1,740	113.7	82.3
5/1/07	11:12	1,773	112.9	83.1
5/1/07	17:20	1,804	112.9	83.1
5/2/07	12:00	1,835	113.0	83.0
5/3/07	7:30	1,867	112.9	83.1
5/3/07	13:45	1,899	112.9	83.1
5/8/07	15:55	1,929	112.4	83.6
5/9/07	12:00	1,961	111.4	84.6
5/9/07	17:55	1,992	114.4	81.6
5/10/07	7:23	1,995	114.39	81.6
5/11/07	7:30	2,005	113.8	82.2
5/15/07	8:30	2,015	122.4	73.6

**Holly Hill Lower Floridan Aquifer Deep Exploratory Well
Northeast Regional Utility Service Area, Polk County, Florida**

Table 3-1 Daily Water Level Measurements During Reverse-air Drilling

Date D/M/Y	Time Hr:Min	Drilled Borehole Depth (ft bls)	Static Water Level Depth (ft bls)	Static Water Level Elevation (ft-NGVD)
5/16/07	7:15	2,024	122.4	73.6
5/18/07	8:30	2,017	122.5	73.5
5/21/07	8:45	2,030	122.9	73.1
5/22/07	9:30	2,025	122.68	73.3
5/23/07	9:00	2,039	122.71	73.3
5/24/07	8:30	2,040	122.9	73.1
5/25/07	8:23	2,050	122.9	73.1
5/29/07	8:30	2,055	123.1	72.9
5/30/07	8:00	2,065	123.0	73.0
5/31/07	8:00	2,100	123.1	72.9
6/4/07	7:30	2,115	123.0	73.0
6/6/07	8:45	2,150	122.9	73.1
6/7/07	7:00	2,207	123.1	72.9
6/7/07	7:00	2,234	123.1	72.9
6/7/07	7:00	2,266	123.1	72.9
6/8/07	7:00	2,300	123.0	73.0
6/12/07	8:30	2,312	123.1	73.0
6/14/07	9:00	2,400	122.9	73.2

ft-bls = feet below land surface

ft-NGVD = feet above the National Geodetic Vertical Datum of 1929.

Based on a surveyed land surface elevation of 196 ft-NGVD

Holly Hill Lower Floridan Aquifer Deep Exploratory Well - Northeast Regional Utility Service Area, Polk County, Florida

Table 3-2 Air-Lift Water Quality and Specific Capacity Tests Results

Date	Time	Depth	Field	Lab	SO ₄	CL	TDS	Total	Ca	Static	Air-Lift	Pumping	Draw	Specific
D/M/Y	Hr:Min	(ft-bis)	Sp. Cond. (umhos/cm)	Sp. Cond. (umhos/cm)	(mg/L)	(mg/L)	(mg/L)	Hardness (mg/L)	(mg/L)	(ft-bis)	(ft-bis)	Rate (GPM)	(feet)	Capacity (GPM/ft)
3/8/07	9:30	685	345	380	2.3	15	280	160	55	88.00	146.0	62	84.00	1
3/9/07	11:40	716	398	370	3	13	230	170	110	88.00	139.5	70	51.50	1
3/12/07	11:45	746	732	330	2.3	11	190	160	160	89.00	106.0	78	17.00	5
3/12/07	15:15	777	442	340	2.1	11	210	180	270	89.00	102.0	79	13.00	6
3/14/07	13:30	808	198	330	2	10	200	180	110	88.50	100.0	79	11.50	7
3/14/07	17:00	840	341	330	2.2	10	190	180	220	87.50	100.0	79	12.50	8
3/29/07	11:25	871	635	320	2.6	9.4	160	160	99	90.00	98.5	85	8.50	10
3/29/07	15:10	901	481	300	3.3	8.5	140	160	220	91.80	96.3	87	4.50	19
3/30/07	9:30	932	328	300	3.7	8.5	190	160	95	90.25	95.4	96	5.15	19
3/31/07	13:10	962	491	300	5.6	8.7	180	170	260	90.30	95.4	105	5.10	21
4/2/07	10:45	994	541	320	18	8.4	220	180	230	89.50	95.3	100	6.00	17
4/2/07	15:30	1025	355	330	20	8.4	190	180	180	89.50	95.8	99	6.30	16
4/2/07	17:30	1050	588	330	23	8.8	180	180	520	89.50	94.8	98	5.30	18
4/4/07	16:45	1087		390	48	16	250	2,300	480	90.50	95.7	99	5.20	19
4/5/07	11:35	1117	719	540	140	9.3	380	1,440	330	89.50	94.7	107	5.20	21
4/5/07	13:45	1147	470	410	66	9.1	300	2,100	460	89.50	94.3	87	4.75	18
4/6/07	16:30	1188	223	370	41	9.1	260	1,200	260	89.65	94.3	94	4.60	20
4/11/07	12:45	1219	262	1,300	670	9.1	1,200	3,800	820	90.08	94.9	97	4.82	20
4/12/07	10:35	1241	601	420	64	9.2	330	3,300	690	90.10	94.9	102	4.82	21
4/16/07	12:18	1272	640	410	61	9.3	300	2,500	540	89.50	94.3	88	4.80	18
4/16/07	18:04	1302	498	490	110	10	360	5,300	1,100	90.30	94.6	98	4.32	23
4/17/07	12:43	1334	132	470	94	11	360	6,800	1,400	90.50	94.6	107	4.10	26
4/17/07	14:15	1366	1447	770	280	10	600	6,700	1,500	90.50	95.1	102	4.64	22
4/18/07	15:00	1397	1447	660	200	9	440	4,300	950	90.60	95.1	99	4.50	22
4/19/07	11:00	1429	260	420	72	9.2	260	1,000	240	90.70	95.0	90	4.30	21
4/19/07	18:00	1460	323	540	140	9.7	340	5,600	1,500	90.70	94.3	96	3.60	27
4/20/07	10:55	1491	648	650	190	9.2	450	2,600	610	90.40	97.3	119	6.85	17
4/23/07	10:06	1522	673	690	210	9.4	490	2,700	640	90.50	96.7	119	6.20	19
4/23/07	17:05	1554	553	580	170	9.4	450	2,200	510	90.50	97.1	130	6.60	20
4/24/07	10:50	1584	656	620	190	9.2	380	3,700	840	91.49	96.8	132	5.31	25
4/25/07	10:00	1615	472	430	74	11	270	530	64	unknown	113.0	125	unknown	0
4/25/07	17:20	1648	488	650	270	9.8	400	1,900	64	113.10	115.8	117	2.65	44
4/26/07	12:30	1660	480							113.67	114.8	85	1.13	75
4/27/07	14:07	1679	449							112.93	115.4	116	2.50	46
4/30/07	11:11	1710	2550	430	73	9.6	260	850	52	113.68	115.5	119	1.82	65
4/30/07	16:08	1740	621							113.70	116.0	118	2.30	51
5/1/07	11:12	1773	581	560	160	12	420	860	92	112.90	114.3	104	1.40	74
5/1/07	17:20	1804	486	460	93	10	300	2,200	67	112.90	115.3	119	2.37	50
5/2/07	12:00	1835	471	440	77	13	250	2,100	58	112.98	114.6	114	1.62	70
5/3/07	7:30	1867	421	410	55	13	290	1,400	55	112.92	115.3	109	2.33	47
5/3/07	13:45	1899	460	430	66	12	310	1,000	74	112.92	115.1	119	2.22	54

Holly Hill Lower Floridan Aquifer Deep Exploratory Well - Northeast Regional Utility Service Area, Polk County, Florida

Table 3-2 Air-Lift Water Quality and Specific Capacity Tests Results

Date	Time	Depth	Field	Lab	SC ₁	CL	TDS	Total	Ca	Static	Air Lift	Pumping	Draw	Specific
D/M/Y	Hr:Min	(ft-bis)	Sp. Cond. (umhos/cm)	Sp. Cond. (umhos/cm)	(mg/L)	(mg/L)	(mg/L)	Hardness (mg/L)	(mg/L)	W.L. (ft-bis)	W.L. (ft-bis)	Rate (GPM)	Down (feet)	Capacity (GPM/ft)
5/8/07	15:55	1929	522	500	110	14	370	1,300	76	112.43	114.3	115	1.89	61
5/9/07	12:00	1961	523	490	110	13	380	1,500	76	111.40	114.2	112	2.84	40
5/9/07	17:55	1992	399	420	75	11	310	1,300	63	114.40	115.9	118	1.45	81
5/15/07	17:55	2024	401	390	55	10	290	340	54	122.40	122.6	118	0.23	513
5/23/07	14:06	2039	373	390	52	10	270	1,200	55	122.71	122.8	113	0.09	1256
5/30/07	0:00	2070	386	388	49.4	10.7	270	260	64.7	123.00	123.02	92	0.02	4600
5/1/07	13:12	2112	384	381	48.2	11.3	268	257	65	123.00	123.1	91	0.10	912
5/5/07	0:00	2143	384	366	48.4	12.5	308	207	64.3	123.00	123.1	114	0.10	1136
5/6/07	13:55	2175	384	383	47.4	12	298	405	62.9	122.90	123.05	109	0.15	727
5/7/07	0:00	2207	387	375	50.1	12.6	316	333	63.1	123.10	123.1	112	< 0.01*	1000
5/7/07	1:00	2234	388	390	54.4	12.4	314	857	65.7	123.10	123.1	111	< 0.01*	1000
5/8/07	8:34	2266	454	486	102	11.3	374	829	87	123.10	123.2	108	0.10	1000
5/11/07	0:00	2300	418	396	58	12.6	358	335	67.8	123.05	123.05	111	< 0.01*	1000
5/12/07	0:00	2332	418	401	60.9	12.5	364	535	68.1	123.05	123.05	111	< 0.01*	1000
5/13/07	0:00	2362	424	395	57	10.7	188	281	63.4	123.00	123	113	< 0.01*	1000
5/13/07	0:00	2394	436	409	61.3	11.6	192	387	64.6	123.00	123	89	< 0.01*	1000
5/14/07	14:25	2425	442	432	71.2	13.8	140	523	67.1	122.85	123	113	0.20	1000
5/14/07	18:00	2440	432	433	68.2	15.1	162	1178	66.6	122.85	122.85	111	< 0.01*	1000

Notes:

1. Sp. Cond. = Specific Conductivity
2. umhos/cm = micromhos per centimeter
3. mg/L = milligrams per Liter
4. SO₄ = sulfate, CL = Chlorides, TDS = Total Dissolved Solids, Ca = Calcium
5. ft-bis = feet below land surface
6. GPM = Gallons per Minute
7. GPM/ft = Gallons per Minute per Foot of Drawdown
8. * = No measurable draw down recorded. To determine specific capacity the pumping rate is divided by the accuracy of water level indicator which is rated at 1/100 ft.
9. The high calcium concentrations relative to TDS are the results of the calcium solids at the bottom of the sample bottle being dissolved into the solution during sample preparation prior to analysis. Future samples will be filtered prior to preparation to better reflect dissolved calcium concentrations.

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Holly Hill Lower Floridan Aquifer Deep Exploratory Well - Northeast Regional Utility Service Area, Polk County, Florida

Table 3-4 Rock Core Analysis Results

Core No.	C-1	C-1A	C-2	C-3	C-5	C-6
Date Cored	15-Mar-07	03-Apr-07	06-Apr-07	13-Apr-07	07-May-07	19-Jun-07
% Recovery	80	77	96	70	83	80
Interval Begin	840	1,050	1,133	1,272	1,906	2,460
Interval End	850	1,060	1,143	1,282	1,916	2,470
Interval Begin	848	1,050	1,135	1,277	1,908	2,468
Interval End	849	1,051	1,136	1,278	1,909	2,469
Remarks	Dolomitic limestone, fossiliferous, vuggy	Limestone, micritic, fossiliferous, vuggy	Limestone, micritic, fossiliferous, gypsum	Limestone, micritic with gypsum	Limestone, micritic, tan	Limestone, micritic, clayey, gray
Porosity (%)	18.7	46.5	28.7	17.7	7.8	25.8
Vertical k	0.59	3.81	5.32	0.16	0.92	5.86
Vertical K	0.00162	0.01044	0.01458	0.00044	0.00252	0.01606
Horizontal k	3.98	39.8	9.46	1.76	0.98	7.92
Horizontal K	0.01091	0.10905	0.02592	0.00482	0.00269	0.02170
Max Horiz. k	6.33	43.4	9.66	66.9	1.06	8.18
Max Horiz. K	0.01734	0.11892	0.02647	0.18331	0.00290	0.02241

Cored intervals are referenced in feet below land surface

k = permeability in millidarcy

K = estimated Hydraulic Conductivity in feet per day where $K = k * 0.00274$

PRSI

Holly Hill Lower Floridan Aquifer Deep Exploratory Well - Northeast Regional Utility Service Area, Polk County, Florida

Table 4-1 Pumping Test Water Quality Over Time

Date (DD/MM/YY)	Time (Hr:Min)	Chloride (mg/L)	Conductivity (umhos/cm)	Hardness (mg/L)	Calcium (mg/L)	TDS (mg/L)	Magnesium (mg/L)	Sulfate (mg/L)
1/28/2008	12:15	18.1	2210	272.3	78.40	420	18.59	149
1/28/2008	13:15	18.6	619	276.9	79.56	444	19.01	157
1/28/2008	15:15	18.7	627	278.4	79.95	440	19.13	163
1/28/2008	19:15	19.5	630	278.1	80.09	438	18.96	168
1/30/2008	11:00	19.1	628	274.5	79.04	412	18.74	160
1/30/2008	21:00	19.6	634	276.3	79.96	444	18.61	164
1/31/2008	9:00	19.0	634	265.9	76.78	446	18.01	161
1/31/2008	21:00	19.5	641	292.4	83.73	448	20.24	169
2/1/2008	9:00	20.4	644	291.2	83.45	454	20.12	166
2/1/2008	21:00	19.7	653	287.4	82.26	454	19.92	176
2/2/2008	9:00	20.3	652	287.3	82.14	466	19.96	180
2/2/2008	21:00	20.0	659	284.9	81.69	446	19.67	179
2/3/2008	9:00	20.0	661	290.2	83.12	458	20.07	183
2/3/2008	21:00	19.7	664	306.4	87.44	464	21.40	184
2/4/2008	9:00	20.1	669	296.2	84.52	460	20.67	189
2/4/2008	21:00	20.1	670	321.8	93.69	350	21.33	188
2/5/2008	9:00	20.7	673	307.5	89.01	474	20.69	190
2/5/2008	21:00	20.9	674	321.8	94.47	504	20.88	187
2/6/2008	9:00	21.1	675	319.5	93.21	498	21.07	192
2/6/2008	21:00	22.9	674	315.1	90.75	468	21.49	186
2/7/2008	9:00	21.7	675	339.4	99.88	436	21.87	184
2/7/2008	21:00	27.7	679	332.8	97.65	474	21.61	202
2/8/2008	9:00	24.9	674	346.7	101.20	464	22.80	197
2/8/2008	21:00	23.1	667	331.8	94.58	462	23.22	193
2/9/2008	9:00	20.5	668	323.1	92.05	478	22.65	198
2/9/2008	21:00	20.3	685	323.0	92.10	456	22.60	194
2/10/2008	9:00	20.4	683	322.8	91.78	460	22.74	194
2/10/2008	21:00	20.5	683	325.2	92.30	450	23.00	198
2/11/2008	9:00	20.6	687	317.4	90.25	450	22.34	199
2/11/2008	21:00	21.4	685	326.3	92.54	466	23.12	197
2/12/2008	9:00	21.8	687	336.8	95.85	448	23.67	194
Secondary DW Standard		250	N/A	N/A	N/A	500	N/A	250

Notes: TDS = Total Dissolved Solids

umhos/cm = micromhos per centimeter, mg/L = milligrams per liter, N/A = Not Applicable



**Holly Hill Lower Floridan Aquifer Deep Exploratory Well
Northeast Regional Utility Service Area Polk County, Florida**

Table 4-2 Laboratory Analytical Results on the Pumping Test Water Quality Sample

Primary Drinking Water Standards: Inorganics				
Parameter	MCL	Units	Analytical Results	Qualifier
Antimony	0.006	mg/L	0.002	U
Arsenic	0.01	mg/L	0.0007	U
Barium	2.0	mg/L	0.0223	I
Beryllium	0.004	mg/L	0.0002	U
Cadmium	0.005	mg/L	0.001	U
Chromium	0.10	mg/L	0.0016	I
Cyanide	0.20	mg/L	0.002	U
Fluoride	4.0	mg/L	0.38	--
Lead	0.015	mg/L	0.0005	U
Mercury	0.002	mg/L	0.00004	U
Nickel	0.1	mg/L	0.002	U
Nitrate	10 (as N)	mg/L	0.086	I
Nitrite	1 (as N)	mg/L	0.025	U
Total Nitrate and Nitrite	10 (as N)	mg/L	0.381	--
Selenium	0.05	mg/L	0.002	U
Sodium	160	mg/L	11.19	--
Thallium	0.002	mg/L	0.0006	U
Primary Drinking Water Standards: Organics				
Parameter	MCL	Units	Analytical Results	Qualifier
1,1,1-Trichloroethane	0.2	mg/L	0.0003	U
1,1,2-Trichloroethane	0.005	mg/L	0.0003	U
1,1-Dichloroethene	0.007	mg/L	0.0005	U
1,2,4-Trichlorobenzene	0.07	mg/L	0.0002	U
1,2-Dichloropropane	0.005	mg/L	0.0003	U
2,4,5-TP (Silvex)	0.05	mg/L	0.00025	U
2,4-D	0.07	mg/L	0.0001	U
Alachlor	0.002	mg/L	0.0002	U
Atrazine	0.003	mg/L	0.00006	U
Benzene	0.001	mg/L	0.0005	U
Benzo(a)pyrene	0.0002	mg/L	0.0001	U
Carbofuran	0.04	mg/L	0.0005	U,Y
Carbon Tetrachloride	0.003	mg/L	0.0003	U
Chlordane	0.002	mg/L	0.00005	U
Cis-1,2-Dichloroethene	0.07	mg/L	0.0002	U
Dalapon	0.2	mg/L	0.001	U
Di(2-ethylhexyl)adipate	0.4	mg/L	0.0003	U
Di(2-ethylhexyl)phthalate	0.006	mg/L	0.001	U
Dibromochloropropane	0.0002	mg/L	0.000005	U
Dichloromethane (Methylene Chloride)	0.005	mg/L	0.0005	U
Dinoseb	0.007	mg/L	0.0005	U
Diquat	0.02	mg/L	0.001	U
Endothall	0.1	mg/L	0.02	U
Endrin	0.002	mg/L	0.0001	U
Ethylbenzene	0.7	mg/L	0.0005	U
Ethylene Dibromide (1,2-Dibromoethane)	0.00002	mg/L	0.000005	U
Glyphosate (Roundup)	0.7	mg/L	0.01	U

**Holly Hill Lower Floridan Aquifer Deep Exploratory Well
Northeast Regional Utility Service Area Polk County, Florida**

Table 4-2 Laboratory Analytical Results on the Pumping Test Water Quality Sample

Heptachlor	0.0004	mg/L	0.00008	U
Heptachlor Epoxide	0.0002	mg/L	0.0001	U
Hexachlorobenzene	0.0001	mg/L	0.00005	U
Hexachlorocyclopentadiene	0.05	mg/L	0.0002	U
Lindane	0.0002	mg/L	0.00006	U
Methoxychlor	0.04	mg/L	0.00005	U
Monochlorobenzene (Chlorobenzene)	0.1	mg/L	0.0005	U
Oxamyl (Vydate)	0.2	mg/L	0.0005	U,Y
p-Dichlorobenzene (1,4-Dichlorobenzene)	0.075	mg/L	0.0005	U
Pentachlorophenol	0.001	mg/L	0.0001	U
Picloram	0.5	mg/L	0.00075	U
Polychlorinated Biphenyl (PCB)	0.0005	mg/L	0.00002	U
Simazine	0.004	mg/L	0.00007	U
Styrene	0.1	mg/L	0.00005	U
Tetrachloroethene	0.003	mg/L	0.0002	U
Toxaphene	0.003	mg/L	0.0005	U
Trans-1,2-Dichloroethene	0.1	mg/L	0.0005	U
Trichloroethene	0.003	mg/L	0.0002	U
Vinyl Chloride	0.001	mg/L	0.0005	U
Xylenes (Total)	10	mg/L	0.0005	U
Primary Drinking Water Standards: Radionuclides				
<i>Parameter</i>	<i>MCL</i>	<i>Units</i>	<i>Analytical Results</i>	<i>Qualifier</i>
Radium 226	5	pCi/L	1.5+/- 0.1	--
Radium 228	5	pCi/L	0.78 U+/-0.3 J4	U and J4
Gross Alpha	15	pCi/L	6.23+/- 8.03	--
Uranium	30	ug/L	NA	--
Primary Drinking Water Standards: Microbiological				
<i>Parameter</i>	<i>MCL</i>	<i>Units</i>	<i>Analytical Results</i>	<i>Qualifier</i>
Total Coliform	Absent		Present	--
E Coli	Absent		Absent	--
Secondary Drinking Water Standards				
<i>Parameter</i>	<i>MCL</i>	<i>Units</i>	<i>Analytical Results</i>	<i>Qualifier</i>
Aluminum	0.2	mg/L	0.0323	I
Chloride	250	mg/L	18.3	--
Copper	1.0	mg/L	0.001	U
Fluoride	2.0	mg/L	0.38	--
Color	15	Color Units	1	U
Foaming Agents (MBAS)	0.5	mg/L	0.01	U
Iron	0.3	mg/L	0.0735	I
Manganese	0.05	mg/L	0.0016	I
Odor	3	TON	1	U
pH (at Collection Point)	6.5 - 8.5	mg/L	7.69	Q
Silver	0.1	mg/L	0.003	U
Sulfate	250	mg/L	191	--
Total Dissolved Solids (TDS)	500	mg/L	438	--
Zinc	5.0	mg/L	0.0257	I

**Holly Hill Lower Floridan Aquifer Deep Exploratory Well
Northeast Regional Utility Service Area Polk County, Florida**

Table 4-2 Laboratory Analytical Results on the Pumping Test Water Quality Sample

Operational Parameters				
Parameter	MCL	Units	Analytical Results	Qualifier
Calcium	DNA	mg/L	108	--
Magnesium	DNA	mg/L	26.9	--
Total Sulfides	DNA	mg/L	NA	--
Total Alkalinity	DNA	mg/L	NA	--
Specific Conductivity	DNA	umhos/cm	NA	--
Turbidity	DNA	NTU	NA	--

Notes

Analyses conducted by Florida Analytical, Inc., Lakeland, Florida

Maximum Contaminant Level (MCL) per Rules 62-550.310 and 62-550.320, FAC.

Definitions/Qualifiers

mg/L = milligrams per Liter

pCi/L = Picocuries/Liter

ug/L = micrograms per Liter

TON: Threshold Odor Number

umhos/ cm = Micro-mhos per centimeter

NTU: Nephelometric Turbidity Units

NA = Denotes that analysis of the parameter was not performed by the lab.

DNA = Does not Apply

U = Analyte was not detected. Indicated concentration is method detection limit.

Y = The laboratory analysis was from an unpreserved or improperly preserved sample.

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

Q = Sample held beyond the accepted holding time

APPENDIX A.

**Technical Memorandum for Upper Floridan Monitor Well
(HH-MW1)**



An employee-owned company

TECHNICAL MEMORANDUM

**Holly Hill Lower Floridian Aquifer Deep Exploratory Well
Northeast Regional Utility Service Area, Polk County, Florida
Upper Floridian Monitor Well Construction
(HH-MW1)
Well Construction Permit No. 732922.01**

From: Craig Tolliver

Date: September 10, 2007

1.1 Background

Technical specifications on the construction and testing of HH-MW1 were prepared by PBS&J and submitted to Polk County Utilities for incorporation into contract documents used in soliciting bids from licensed drilling contractors. The contract for the construction and testing of HH-MW1 was awarded to RDC. After obtaining the required well construction permit from the Southwest Florida Water Management District (the District), RDC initiated drilling operations at HH-MW1 on January 10, 2006. A copy of the well construction permit that was issued by the District is presented in **Attachment A**.

Well Construction Permit (WCP) No. 732922.01 was issued to Rowe Drilling Company, Inc. of Polk City, Florida on January 18, 2006 by the District. The WCP authorized the construction of an Upper Floridian Aquifer Test\Monitor Well to be installed. The Upper Floridian aquifer monitor well, herein referred to as "HH-MW1" was completed in the Upper Floridian aquifer (UFA) in conjunction with the installation of Lower Floridian Aquifer Deep Exploratory Well.

1.2 HH-MW1 Location

As depicted on **Figure 1**, HH-MW1 is located within Section 13, Township 25 South, Range 26 East on property owned by Polk County, approximately 600 ft. north of Sand Mine Road and approximately 1,000 ft. east of U.S. Highway 27. The address as listed by the Polk County Property Appraisers website is 49585 U.S. Highway 27, Davenport, Florida, 33897-9507. HH-MW1 is geographically located at 28° 18' 49.1" North Latitude and 81° 39' 51.9" West Longitude.

Drilling of HH-MW1 was conducted initially with Garner-Denver 3000, trailer mounted drill rig and completed with a George E Failing 2500 A, trailer mounted drill rig both incorporating a Kelly drive rotary system with a turntable located approximately 5.0 ft. above land surface (als). A nominal 12-inch diameter drill bit was used for the well construction. The drill rods were 3.5-inch outside diameter (O.D.) and ranged from approximately 30 to 32 ft. in length.

Percussion and mud rotary drilling techniques, which are described below, were utilized in the construction of HH-MW1.

1.3 Percussion Drilling

Percussion drilling technique is used to advance a casing while providing hole stability in unconsolidated to poorly consolidated materials by driving the casing into the formation. Casing is suspended from the mast of the drill rig while a crane suspends the pneumatic hammer. The vibrating hammer is then lowered onto the top of the 12-inch casing which is then driven by a simultaneous hammer and vibrating action. The hammer mechanism is driven by pistons that are activated by air-pressure. As percussion drilling continues sections of casing are welded onto the casing string. Exterior friction from formation materials on the exterior of the casing string will prevent the casing from being driven any further. To reduce the friction on the exterior of the casing string formation materials are drilled out using the mud-rotary drilling method mentioned below and the bore hole is advanced 10 to 12 ft. beyond the bottom of the casing string. Once the pilot hole is drilled out from the casing the hammer is then reattached and the casing is once again advanced using the percussion drilling method. This procedure may be repeated many times until the casing advancement is refused at some point due to friction between the formation material and the casing can't be overcome by drilling in advance with the mud-rotary system or a change in lithology is encountered.

1.4 Mud Rotary Drilling

Mud rotary drilling is used to drill through unconsolidated or poorly consolidated deposits that generally are unstable, have a tendency to collapse into the borehole, and yield relatively low quantities of groundwater. The drilling mud stabilizes the borehole and removes the drill cuttings during drilling operations. The mud drilling operation at the site used bentonite-drilling mud as the drilling fluid which was mixed in an approximately 8,000-gallon dug pit, temporarily located on-site.

During mud rotary drilling, the drilling mud is pumped through the drill rods and exits out the drill bit. The viscous drilling fluid suspends the cuttings and circulates back up the borehole to land surface. The returning mud, laden with formation cuttings, is routed back into the open pit, which is tiered allowing the formation cuttings to settle out. The drilling fluids are collected in another tier and re-circulated back down the drill rod. Following completion of the well, the drill cuttings and excess drilling fluids were transported off-site for disposal as fill material.

1.5 12-inch Steel Casing Installation

The nominal 12-inch casing was installed to a depth of 441 ft.-bls utilizing the percussion and mud rotary drilling methods. The contact between unconsolidated sands and the top of the limestone Upper Floridian Aquifer was encountered at a depth of 295 ft.-bls. Beginning at 295 ft.-bls through 441 ft.-bls sand filled cavities were encountered that slowed the advancement of the casing and pilot hole. Once the cavities were penetrated unconsolidated sands or "heaving sands" would be forced into the casing due to the release of pressure of the sand filled cavity. These heaving sands would then have to be excavated from inside the casing and the pilot before the casing could be advanced further which slowed construction of HH-MW1. Advancement of the 12-inch casing was ceased at a depth of 441 ft.-bls when final refusal was met. After the nominal 12-inch hole was drilled to a depth of 466 ft.-bls, RDC installed the 6-inch casing and well screen to a depth of 460 ft.-bls. A description of the lithology encountered while drilling from land surface to 460 ft.-bls is included as **Attachment B**.

1.6 6-inch PVC Casing and Well Screen Installation

RDC installed the casing and well screen, which consisted of 440 ft. of nominal 6-inch diameter, ASTM 1785 Schedule D, Certa-Loc PVC pipe and 20 ft of 6-inch diameter, ASTM 2685 Schedule D, 0.010 slotted screen on August 29, 2006. Well Screen was utilized due to prevent unconsolidated sands from entering the well. In addition, a filter sock was also wrapped around the screened interval to further protect the well from unconsolidated sands.

After the bottom of the well screen was landed at 460 ft.-bls, the casing string was rotated by hand to demonstrate that it was hanging free and plumb in the borehole. Positioned at 0, 90, 180, and 270 degrees around the casing, steel centralizers were placed at the bottom of the casing, then at 140 ft.-bls and 90ft.-bls. Following casing installation 450 ft. of 2 in. pipe was temporarily installed outside the casing in the annulus in preparation for installation of the filter pack.

1.7 Filter Pack Installation

RDC installed the filter pack via 2-inch tremmie pipe using a total of 96 sacks of 6/20 course sand. RDC placed the filter pack from 361 ft.-bls to 466 ft.-bls.

1.8 Casing Grouting

RDC cemented the casing in place with one tremmie grout stage. Cement grout installed during the tremmie grout stage consisted of Portland Type I cement manufactured by Florida Rock and Aggregate, Inc. and 5.5 to 6 gallons of water per 94 pounds of cement.

The tremmie grouting was completed on August 30, 2007. Approximately 9.4 CY of cement grout were pumped into the annular space through a 2-inch diameter pipe set near the top of the tagged 6/20 filter pack at 361 ft.-bls. After the tremmie grouting, the top of cement was at land surface in the annulus. The as-built diagram for HH-MW1 is depicted on **Figure 2**.

1.9 Well Development

Development of the screened interval (440 to 460 ft. bls) at HH-MW1 was initiated on September 5, 2007. The screened interval of HH-MW1 was developed by airlifting which utilizes the drill rod as the air line and the casing as the educator pipe. After pumping the well for a period of 18 hours, the discharge water was clear and free from fine sediments. Pumping was resumed the following day for one hour during which the discharge water was clear.

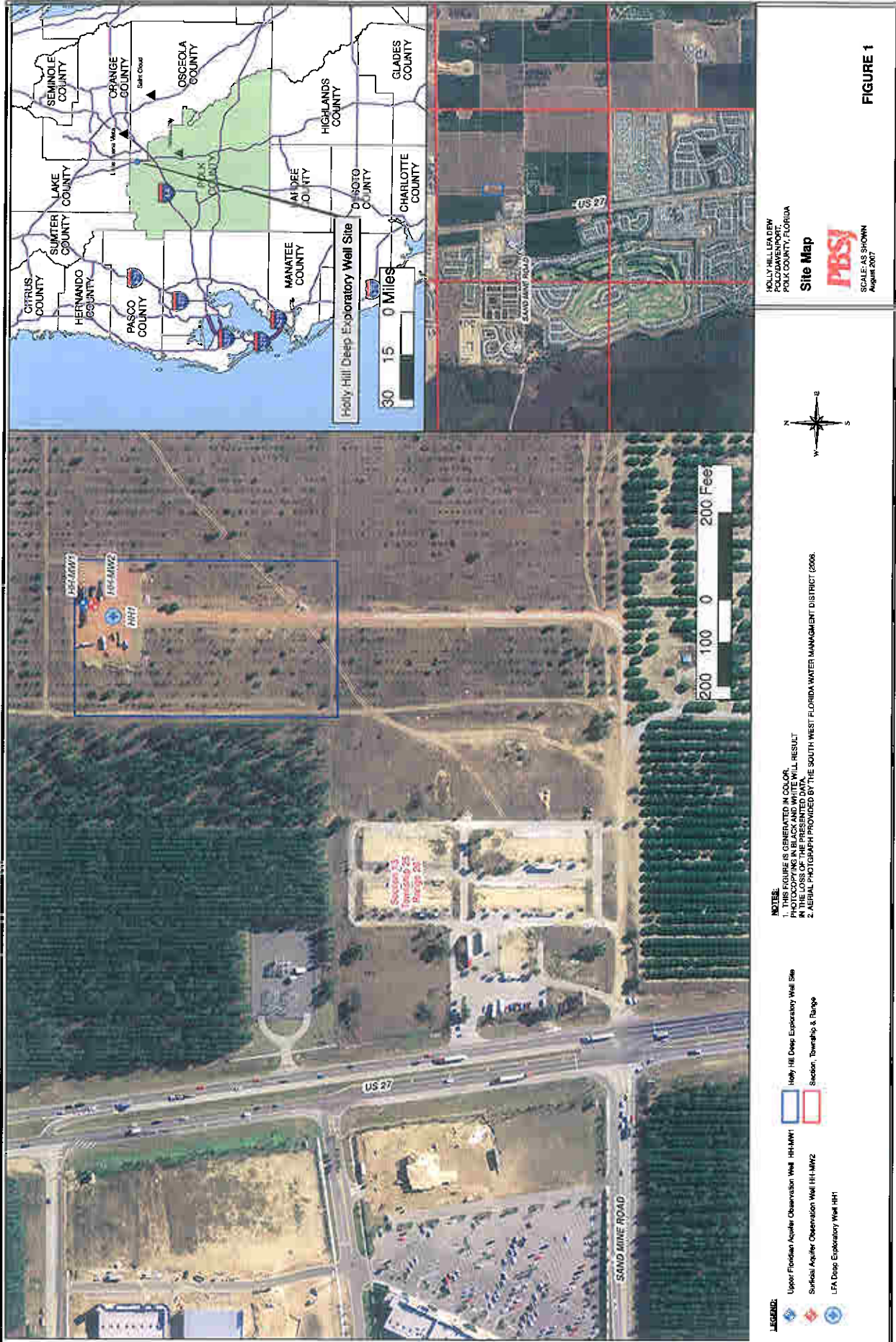
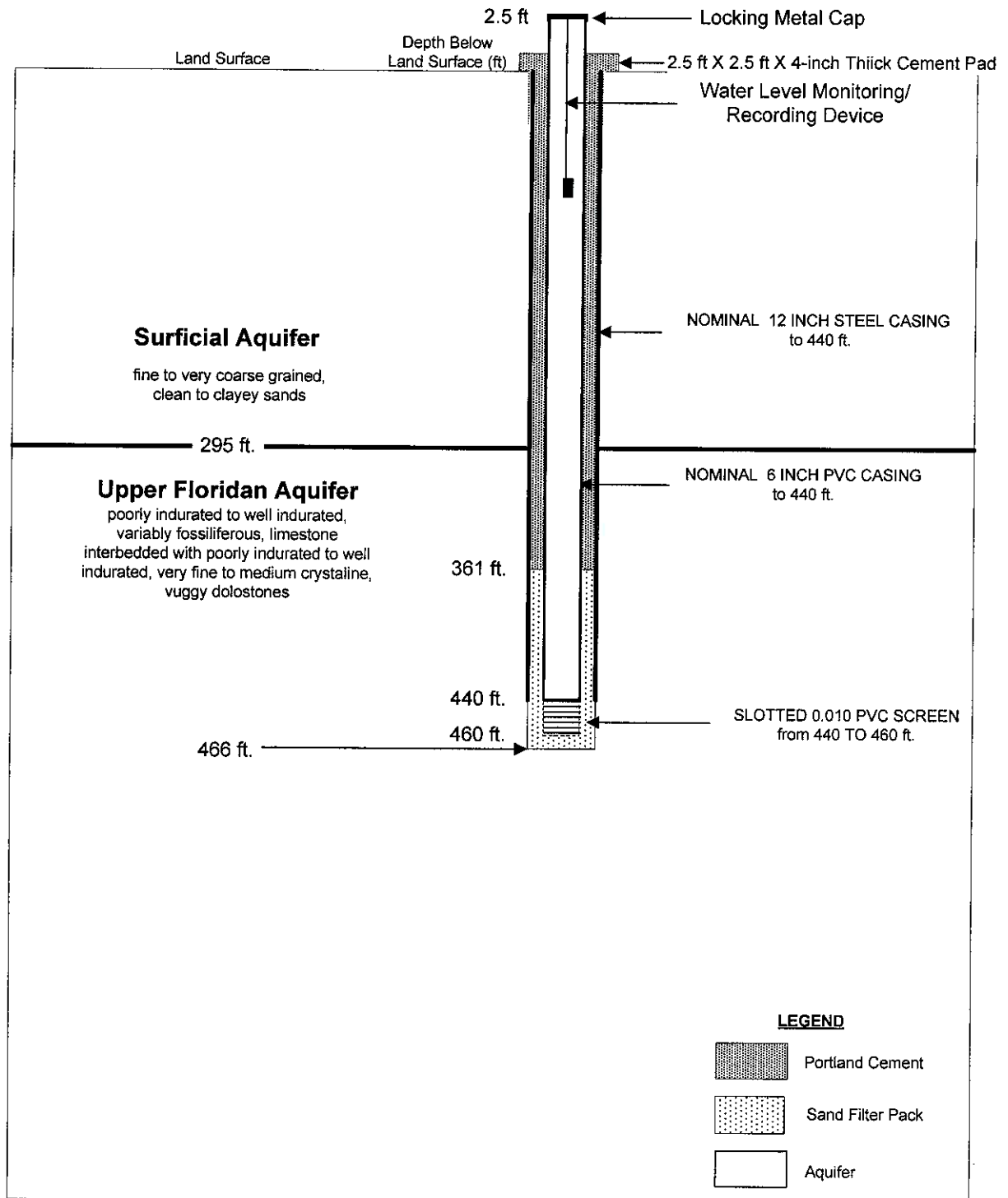


Figure 2. As-Built Drawing – Holly Hill, Upper Floridian Aquifer Monitor Well HH -MW1
Northeast Regional Utility Service Area, Polk County, Florida



Attachment A - Well Construction Permit



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

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

THIS FORM MUST BE FILLED OUT COMPLETELY.

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

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

Permit No. <u>732952.C1</u>
Florida Unique I.D. _____
Permit Stipulations Required (See attached) <u>39, 23</u>
62-524 well ☐
CUP/ WUP Application No. _____

ABOVE THIS LINE FOR OFFICIAL USE ONLY

1. Polk County 2470 Clower Lane Bartow, FL 33830 863-534-5610
 Owner, Legal Name of Entity if Corporation Address City Zip Telephone Number

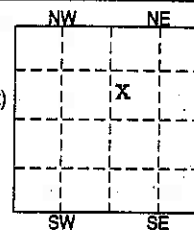
2. 1800' E of US 27, opposite Jacks Road
 Well Location Address, Road Name or Number, City

3. Rowe Drilling Company, Inc. 9027-Anderson 813-265-1413
 Well Drilling Contractor License No. Telephone No.

10014 N. Dale Mabry, Ste 205 SW 1/4 of NE 1/4 of Section 13
 Address (smallest) (biggest) (Indicate Well on Chart)

Tampa, FL 33618 25S 26E
 City State Zip Township Range

6. Polk _____
 County Subdivision Name Lot Block Unit



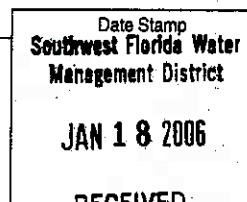
7. Number of proposed wells 1 Check the use of well: (See back of permit for additional choices) _____ Domestic _____ Monitor (type) Water
 _____ Irrigation (type) _____ Public Water Supply (type) _____ List Other _____
 (See Back) (See Back)

Distance from septic system 3,000' Description of facility Sanitary Sewer Estimated start of construction date 1/23/06

8. Application for: ☒ New Construction _____ Repair/Modify _____ Abandonment _____
 (Reason for Abandonment)

9. Estimated: Well Depth 600' Casing Depth 450' Screen Interval from: _____ to _____
 Casing Material: Blk-Steel / Gal / PVC Casing Diameter 6" Seal Material _____

10. If applicable: Proposed From 0 to 450 Seal Material Neat Cement
 Grouting Interval From _____ to _____ Seal Material _____
 From _____ to _____ Seal Material _____



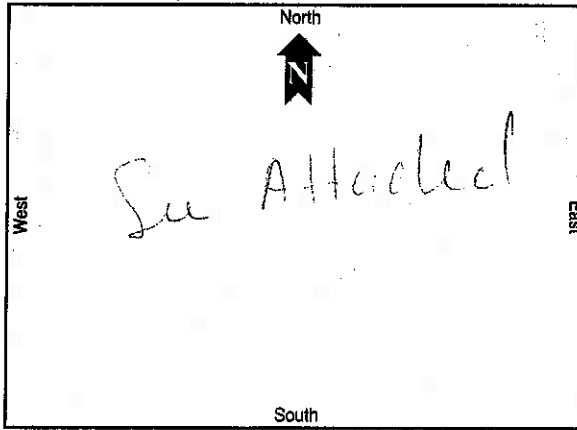
11. Telescope Casing _____ or Liner _____ (check one) Diameter _____
 Blk-Steel / Galvanized / PVC Other (specify: _____)

12. Method of Construction: ☒ Rotary _____ Cable Tool _____ Combination _____
 Auger _____ Other (specify: _____)

13. Indicate total No. of wells on site 0 List number of unused wells on site 0

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

Draw a map of well location and indicate well site with _____ known roads and landmarks; provide distances between well and landmarks.



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

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

[Signature] 9027 [Signature] 1/11/06
 Signature of Contractor License No. Owner's or Agent's Signature Date

DO NOT WRITE BELOW THIS LINE — FOR OFFICIAL USE ONLY

Approval Granted By: [Signature] Issue Date: 1/18/06 Hydrologist Approval _____
 Owner Number: 344700 Fee Received: \$ 50.00 Receipt No. 006-005931 Check No.: 1798

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

STIPULATION NUMBER 39 - WELL AND DRILLHOLE ABANDONMENT

It will be the **water well contractor's** responsibility to have any incomplete well or drillhole attempted under this permit properly abandoned.

Any incomplete or abandoned well or drillhole as described in 40D-3, Florida Administrative Code (F.A.C.), shall be abandoned as follows:

- A. The well shall be examined from land surface to the original depth of construction for debris or obstructions (any debris or obstruction shall be removed prior to abandonment).
- B. The well shall be plugged from bottom to top by an approved method of grouting with either Portland neat cement grout or an approved Bentonite product as specified in 40D-3.517 2. (b), F.A.C.

It will be the **owner's** responsibility to have any well completed under this permit, or any existing well on this property, which meets the definition of an abandoned well as defined in Chapter 40D-3.021(1), F.A.C., properly abandoned in accordance with Chapter 40D-3.531, F.A.C.

It will be the **owner's** responsibility to have any inactive well which does not meet the above criteria and is no threat to the water resource properly capped in an air and water tight manner with a threaded, welded or bolted cover or valve. If the pump and well seal are water tight, the pump may be left in place. If practical, a protective cover two (2) feet in height shall be placed around the well casing.

- A. Wells with a diameter of six (6) inches or more without pumping equipment shall have the well casing extended a minimum of two (2) feet above land surface.
- B. Wells with a diameter of less than six (6) inches without pumping equipment shall be securely set in a concrete slab and have either the well casing extended a minimum height of two (2) feet above land surface or a protective cover centered over the well casing. The concrete slab shall be a minimum of four (4) inches in thickness by two (2) feet by two (2) feet square. The protective cover shall be set in the concrete slab and extend a minimum of two (2) feet above land surface.

In flood prone areas all wells shall extend a minimum of one (1) foot above the 100 year flood elevation, if practical, in accordance with Chapter 40D-3.521(4), F.A.C.

Any plugging operations shall be permitted separately from this permit by the Southwest Florida Water Management District and be witnessed by a designated District representative. Arrangement for a District representative shall be made with the local District Field Services office a minimum of twenty four (24) hours in advance of these operations. A District representative will be available for assignment during normal working hours (8:00 AM - 4:30 PM), Monday through Friday. Travel time must be taken into consideration. Exemptions may be made for extenuating circumstances. For scheduling, please contact the Field Service Supervisor, Mark Alford, in our Bartow office at (800) 492-7862.

Approved by: Nicki Callihan 

Permit Number: 732922.01

Date: January 18, 2006

#39
(2/7/97)

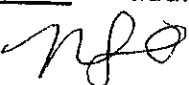
COPY TO OWNER

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

SERVICE OFFICE

STIPULATION # 23 - TEST/MONITOR WELL

1. This well is to be used as a test/monitor well. If it is to be converted into a production well, an additional permit shall be obtained.
- B. There shall be no injection of fluids into the monitor well without prior written approval from the Department of Environmental Protection or the District. This includes, but is not limited to treated ground water, or the introduction of microbes for In-Situ aquifer restoration.
- C. The well shall be constructed in such a manner to prevent the unauthorized interchange of water between different water bearing zones (i.e., breaching of confining beds, clays or hardpan intervals) as per Chapter 62-532.500 (2)(C), Florida Administrative Code (F.A.C.).
- D. Prior written approval from the District shall be required if the monitor well will be pumped for use in hydrodynamic control and/or contaminant plume management, if quantities reach or exceed requirement of a Water Use Permit.
- E. All monitor wells constructed at any facility which has been designated as a ground water contamination site, or a possible ground water contamination site, shall adhere to the construction standards set forth by The Department of Environmental Protection and other applicable rules.
- F. In the event the well needs to be abandoned, an abandonment permit shall be obtained prior to commencing with abandonment operations.
- G. An observer from our Regulation Department is required on all abandonments to ensure compliance with applicable 40D-3 regulations. Please contact Field Service Supervisor Mark Alford in our Bartow Office at (800) 492-7862 for additional information.

Approved by: Nicki Callihan 

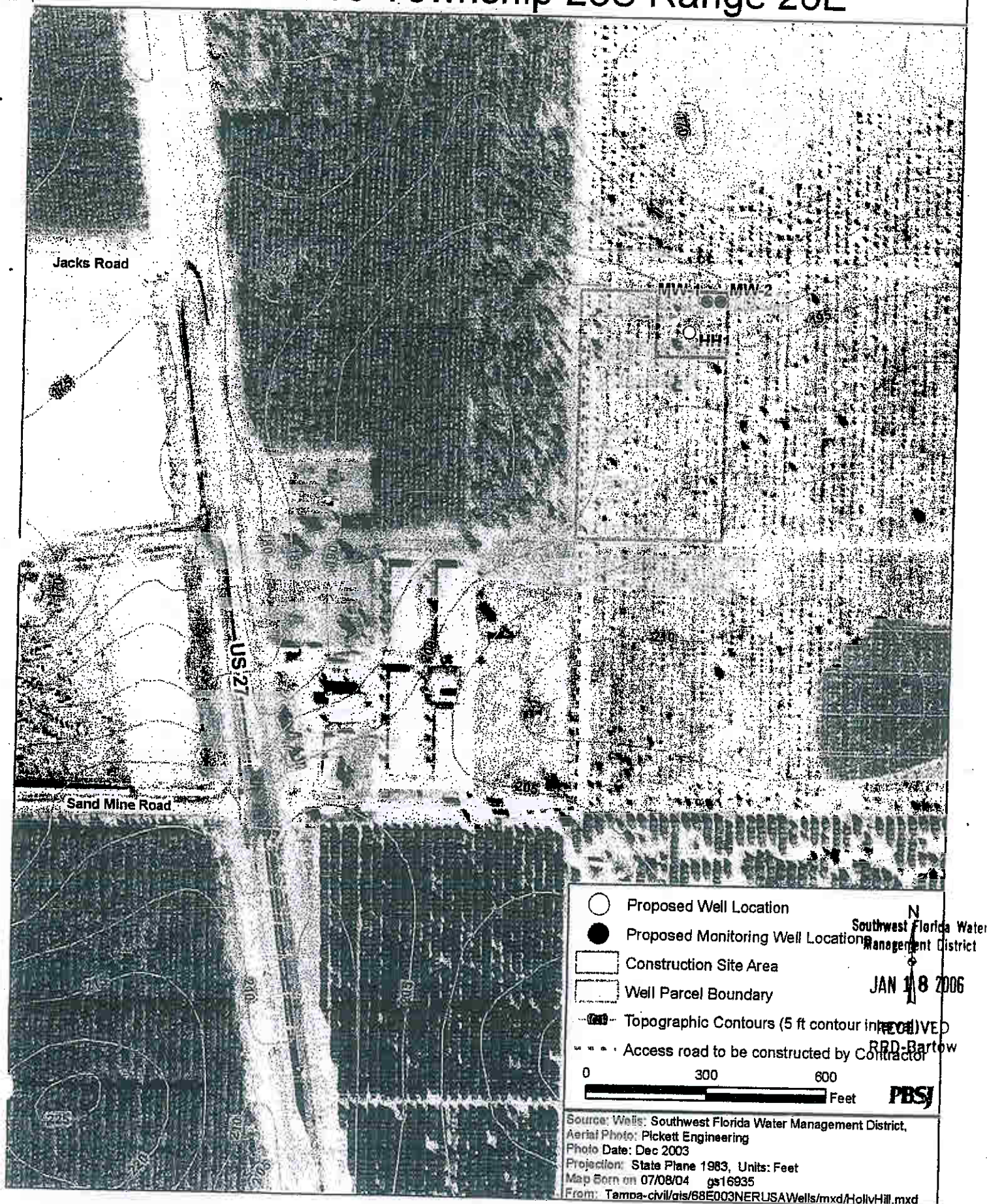
Permit: # 732922.01

Date: January 18, 2006

Stip #23
(10/01)

COPY TO OWNER

Drawing 1. Holly Hill Project Location Map Section 13 Township 25S Range 26E



Attachment B - Lithologic Log



LITHOLOGIC LOG

Location: Holly Hill, NERUSA, Polk County, FL Owner: B.O.C.C./ Polk County Utilities Date Constructed: January - July 2006 Casing Depth: 12-inch to 440 feet bls Total Depth: 460 feet Drilling Method: Mud rotary Drilling Contractor: Rowe Drilling, Inc, Tampa, FL Sampling Method: Grab Samples from drill cuttings			Holly Hill UFA Monitor Well HH-MW1
DEPTH INTERVAL		DESCRIPTION	BY
FROM	TO		
0	5	SAND, quartz, very fine to fine grained, sub-angular to subrounded, light reddish-brown.	KD
5	40	SAND, quartz, very fine to fine grain, sub-angular to subrounded, reddish-tan.	KD
40	45	SAND, quartz, very fine to fine grain, sub-angular to subrounded, light gray.	KD
45	85	SAND, quartz, very fine to fine grain, sub-angular to subrounded, reddish-tan.	KD
85	95	SAND, quartz, very fine to fine grained, sub-angular to subrounded, tan.	KD
95	100	SAND, quartz, very fine to fine grained, sub-angular to subrounded, light brown.	KD
100	220	SAND, quartz, very fine to fine grained, sub-angular to subrounded, light brown.	CT
220	230	SAND, quartz, fine to medium grain, sub-angular to subrounded, white.	CT
235	270	Sand, quartz, fine to medium grain sand, tan; trace of Clay.	KD
270	285	SAND, quartz, fine grain, sub-rounded to sub-angular; trace to little of soft reddish orange Clay.	KD
285	295	SAND, fine to medium grain, sub-rounded to sub-angular, light grey.	KD
295	345	LIMESTONE, moderately hard and friable, micritic with intraclasts (cemented limestone pieces, pellets and occasional fossil), pin point vugs, cream with orange stain.	KD
345	350	LIMESTONE, micritic, moderately hard to soft, cream to white with orange stain,	KD
350	355	SAND, quartz, fine grained, subangular to subrounded, reddish tan; trace of soft white clay.	KD
355	390	SAND, quartz, fine grained, subangular to subrounded light gray; trace of soft white clay.	KD
390	400	Sand, quartz, fine grained, sub-angular to sub-rounded; and soft gray Clay with orange mottling.	KD

400	410	No Sample	
410	420	SAND, quartz, fine grained, sub-rounded, light grey; little white, micritic limestone.	KD
420	425	Limestone, micritic, moderately hard, cream; and fine silica sand.	KD
425	437	No Sample	
437	443	LIMESTONE, micritic, moderately hard, tan; some greenish gray soft clay; trace of fine to medium grain quartz sand.	KD
443	460	DOLOMITIC LIMESTONE, micritic, hard, tan and cream.	KD

Notes:

- i) *Trace = 1-10%, Little = 10 – 20%, Some = 20-35%, Much = 35-50%*

APPENDIX B.

Technical Memorandum for Surficial Aquifer Monitor Well (HH-MW2)



An employee-owned company

TECHNICAL MEMORANDUM

**Holly Hill Lower Floridian Aquifer Deep Exploratory Well
Northeast Regional Utility Service Area, Polk County, Florida
Surficial Aquifer Monitor Well Construction
(HH-MW2)
Well Construction Permit No. 744018.01**

From: Craig Tolliver

Date: September 10, 2007

1.1. Background

Technical specifications on the construction and testing of HH-MW2 were prepared by PBS&J and submitted to Polk County Utilities for incorporation into contract documents used in soliciting bids from licensed drilling contractors. The contract for the construction and testing of HH-MW2 was awarded to Rowe Drilling Company, Inc. (RDC) of Polk City, Florida. After obtaining the required well construction permit from the Southwest Florida Water Management District (the District), RDC initiated drilling operations at HH-MW2 on July 12, 2006. A copy of the well construction permit that was issued by the District is presented in **Attachment A**.

Water Construction Permit (WCP) No. 744018.01 was issued to RDC, on July 11, 2006 by the District. The WCP authorized the construction of a Surficial Aquifer Test/Monitor Well to be installed. The surficial aquifer well, herein referred to as "HH-MW2", was completed in the surficial aquifer system in conjunction with the installation of the Lower Floridian aquifer Deep Exploratory Well.

1.2. HH-MW2 Location

As depicted on **Figure 1**, HH-MW2 is located within Section 13, Township 25 South, Range 26 East on property owned by Polk County, approximately 600 ft. north of Sand Mine Road and approximately 1,000 ft. east of U.S. Highway 27. The physical address as listed by the Polk County Property Appraisers website is 49585 U.S. Highway 27, Davenport, Florida, 33897-9507. HH-MW2 is geographically located at 28° 18' 48.9" North Latitude and 81° 39' 51.9" West Longitude.

Drilling of HH-MW2 was conducted with a George E Failing 2500 A, trailer mounted drill rig incorporating a Kelly drive rotary system with a turntable located approximately 5.0 ft. above land surface (als). A nominal 10-inch diameter drill bit was used for the well construction. The drill rods were 3.5-inch outside diameter (O.D.) and ranged from approximately 30 to 32 ft. in length.

Mud rotary drilling techniques, which are described below, were utilized in the construction of HH-MW2. Mud-rotary drilling was utilized to a depth of approximately 190 ft.-bls.

1.3. Mud Rotary Drilling

Mud rotary drilling is used to drill through unconsolidated or poorly consolidated deposits that generally are unstable, have a tendency to collapse into the borehole, and yield relatively low quantities of groundwater. The drilling mud stabilizes the borehole and removes the drill cuttings during drilling operations. The mud drilling operation at the site used bentonite-drilling mud as the drilling fluid which was mixed in an approximately 8,000-gallon dug pit, temporarily located on-site.

During mud rotary drilling, the drilling mud is pumped through the drill rods and exits out the drill bit. The viscous drilling fluid suspends the cuttings and circulates back up the borehole to land surface. The returning mud, laden with formation cuttings, is routed back into the open pit, which is tiered allowing the formation cuttings to settle out. The drilling fluids are collected in another tier and re-circulated back down the drill rod.

Mud-rotary drilling was utilized to drill a nominal 10-inch borehole to a depth of 190 ft.-bls. The entire formation encountered was comprised of loose unconsolidated sands.

1.4. Casing and Well Screen Installation

After the nominal 10-inch hole was drilled to the depth of 190 ft. bls on July 18, 2007, RDC installed the casing and well screen, which consisted of 92.5 ft. of nominal 6-inch diameter, ASTM 1785 Schedule D, Certa-Loc PVC pipe and 100 ft of 6-inch diameter, ASTM 2685 Schedule D, 0.020 slotted screen on July 19, 2006. After the bottom of the well screen was landed at 190 ft. bls, the casing string was rotated by hand to demonstrate that it was hanging free and plumb in the borehole. Positioned at 0, 90, 180, and 270 degrees around the casing, steel centralizers were placed at the bottom of the casing, then at 190 ft.-bls, 140ft.-bls and 90-ft.-bls. Following casing installation 180 ft. of 2-inch tremmie pipe was installed outside the casing in the annulus in preparation for installation of the filter pack.

1.5. Filter Pack Installation

RDC installed the filter pack, via 2-inch tremmie pipe and a bladder pump, using a total of 124 sacks of 6/20 course sand. RDC placed the filter pack from 12 ft.-bls to 190 ft.-bls. A fine sand seal was placed on top of the filter pack of 3 sacks.

1.6. Casing Grouting

RDC cemented the casing in place with one tremmie grout stage. Cement grout installed during the pressure grout stage and the final tremmie grout stage consisted of Portland Type I cement manufactured by Florida Rock and Aggregate, Inc. and 5.5 to 6 gallons of water per 94 pounds of cement.

The tremmie grouting was completed on July 20, 2007. Approximately, 3 CY of cement grout were pumped into the annular space through a 2-inch diameter pipe set near the top of the fine sand seal at 10 ft. bls. Approximately eight hours after the tremmie grouting, the top of cement was at land surface in the annulus.

The as-built diagram for HH-MW2 is depicted on **Figure 2**.

1.7. Well Development

Development of the open borehole interval (90 to 190 ft. bls) at HH-MW2 was initiated on July 21, 2007. Formation material was removed from the well, by air-development. After pumping the well for a period of 18 hours, the discharge water was clear and free of drill cuttings. Pumping was resumed the following day for one hour during which the discharge water was also clear and free of cuttings as well as odor and noticeable taste.

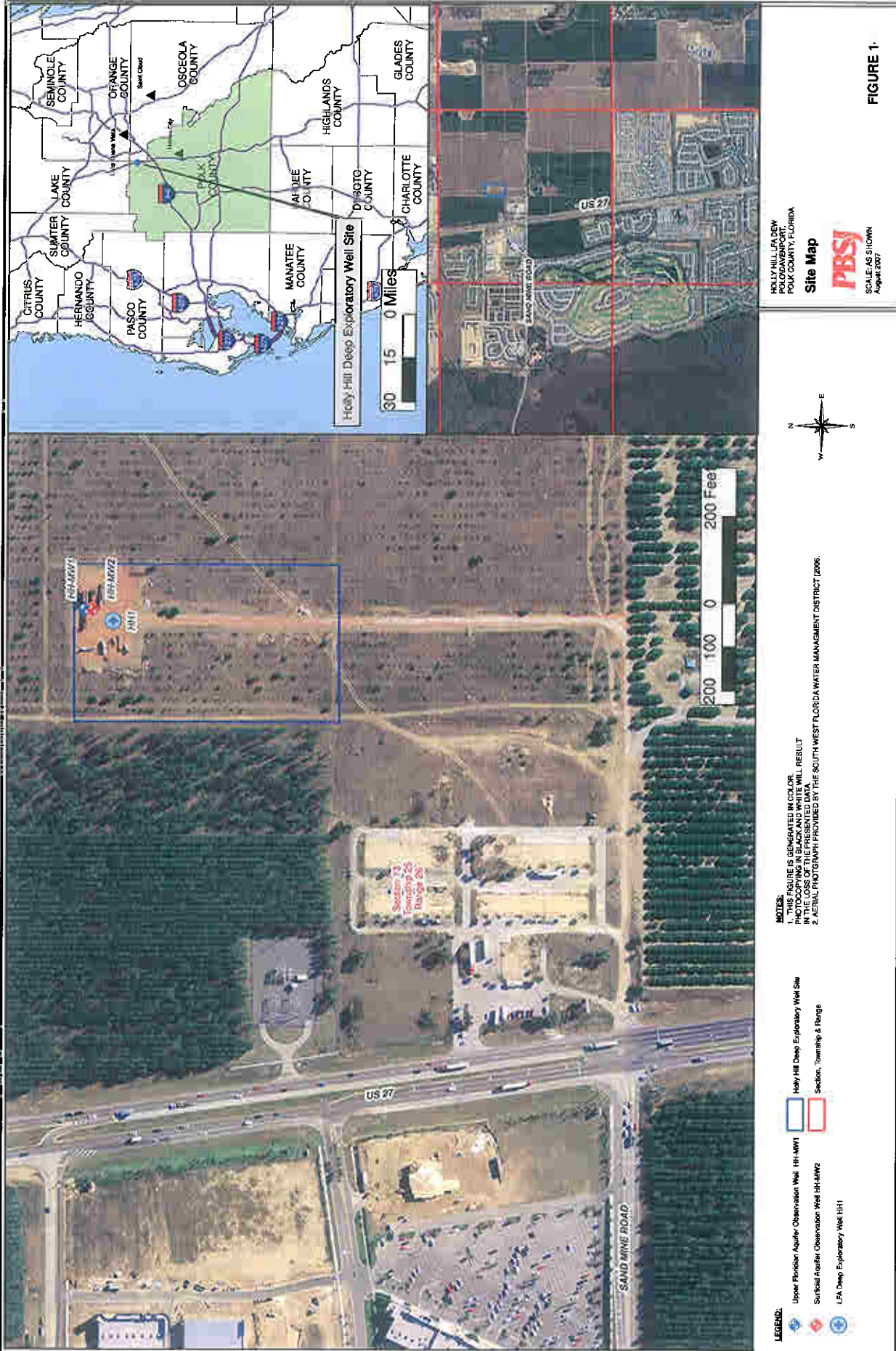
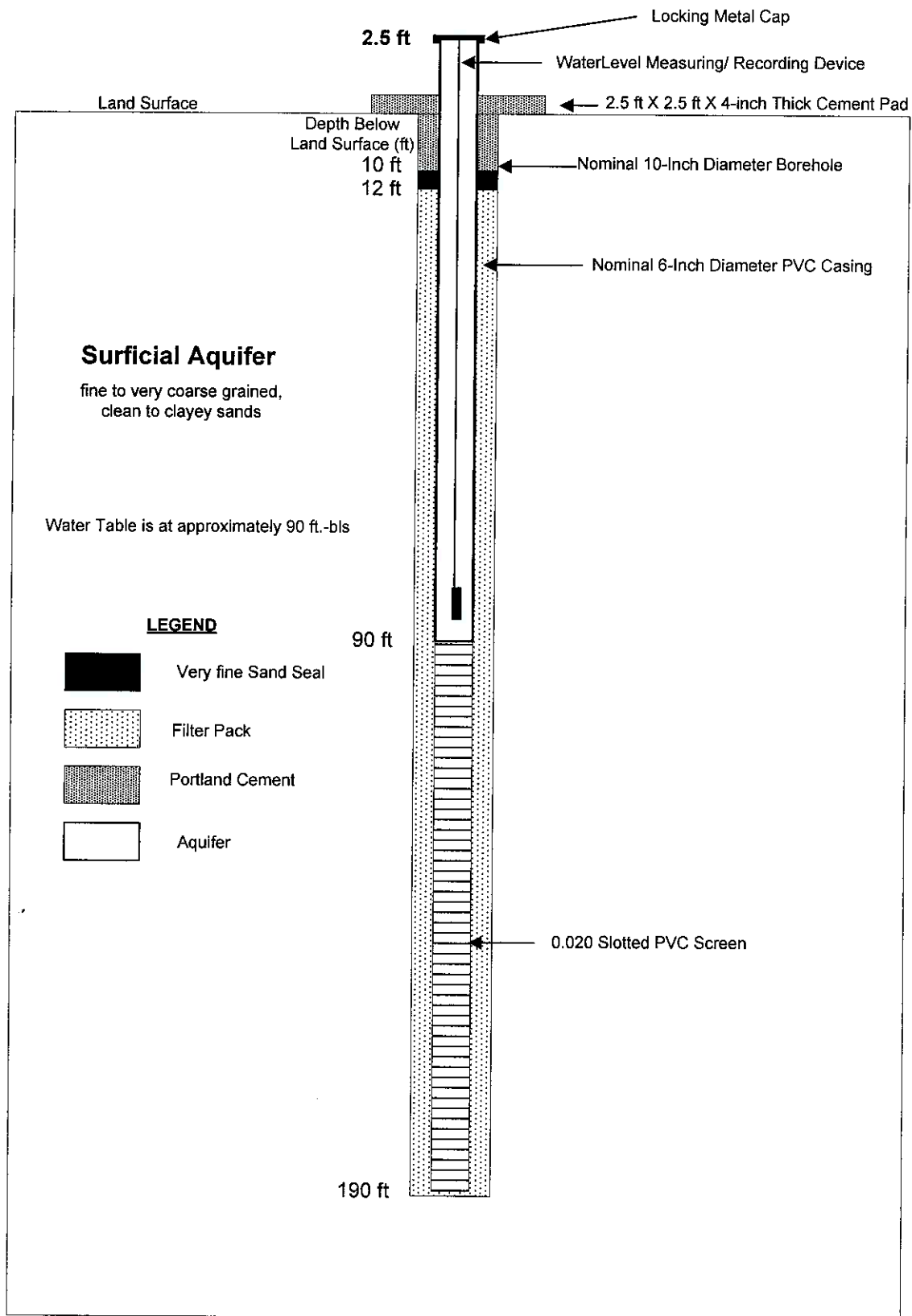


Figure 2. As-Built Drawing Holy Hill Surficial Aquifer Monitor Well HH-MW2
Northeast Regional Utility Service Area, Polk County, Florida



Attachment A - Well Construction Permit



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

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

THIS FORM MUST BE FILLED OUT COMPLETELY.

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

CHECK BOX FOR APPROPRIATE DISTRICT ADDRESS ON BACK OF PERMIT FORM

Permit No. **744018.01**

Florida Unique I.D.

Permit Stipulations Required (See attached)

23.39

62-524 Quad # _____ Delineation # _____

CUP/WUP Application No. _____

APPROVED FOR THE STATE OF FLORIDA

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

1. **Polk County** **2470 Clower Lane** **Bartow FL** **33830** **(863) 534-5610**
Owner, Legal Name of Entity if Corporation Address City Zip Telephone Number

2. **US 27, Clermont**
Well Location Address, Road Name or number, City
Parcel # (Pin)

3. **Stuart Anderson** **9027** **(813) 265-1413**
Well Drilling Contractor License No. Telephone No.

Post Office Box 272786

Address

Tampa

FL

33688-2786

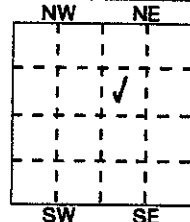
City

State

Zip

4. **3** 1/4 of **2** 1/4 of Section **13**
smallest largest (Indicate Well on Chart)

5. Township **25** Range **26**



6. **POLK**
County Subdivision Name Lot Block Unit

7. Number of proposed wells **1** Check the use of well: (See back of permit for additional choices) Domestic Monitor (type) ☒
(See Back) Irrigation (Type) Public Water Supply (type) List Other **Observation or monitor well**

Distance from septic system **3000** ft. Description of facility **Sanitary Sewer** Estimated start of construction date **7/17/2006**

8. Application for: ☒ New Construction ☐ Repair/Modify ☐ Abandonment
(Reason for Abandonment)

Date Stamp

9. Estimated: Well Depth **190** Casing Depth **90** Screen Interval from **90** to **190**
Casing Material: **2" / 3" / 4" / 6" / 8" / 10" / 12" / 14" / 16" / 18" / 20" / 22" / 24" / 26" / 28" / 30" / 32" / 34" / 36" / 38" / 40" / 42" / 44" / 46" / 48" / 50" / 52" / 54" / 56" / 58" / 60" / 62" / 64" / 66" / 68" / 70" / 72" / 74" / 76" / 78" / 80" / 82" / 84" / 86" / 88" / 90" / 92" / 94" / 96" / 98" / 100"** Casing Diameter **6** Seal Material **Cement**

10. If applicable: Proposed From **0** to **50** Seal Material **Cement** **SWFWMD Rec'd Date 07/11/2006**
Grouting Interval From _____ to _____ Seal Material _____
From _____ to _____ Seal Material _____

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

12. Method of Construction: ☒ Rotary _____ Cable Tool _____ Combination _____
Auger _____ Other (specify): _____

13. Indicate total No. of wells on site **0** List number of unused wells on site **0**

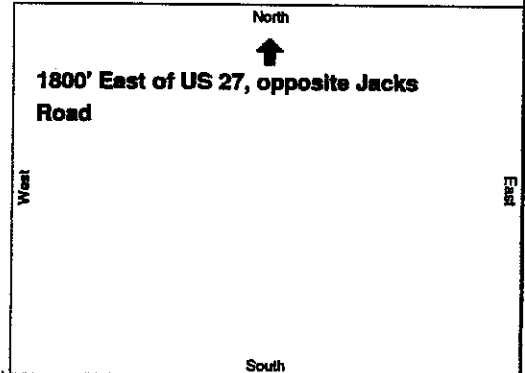
14. Is this well or any other well or water withdrawal on the owner's contiguous property covered
under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ☒ No ☐ Yes
(IF YES, COMPLETE THE FOLLOWING) CUP/WUP No. _____

District well I.D. No. _____

Latitude _____ Longitude _____

Data obtained from GPS _____ or map _____ or survey _____ (map datum NAD 27 NAD 83)

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



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

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

Digitally Signed

9027

Digitally Signed

7/11/2006

Signature of Contractor

License No.

Owner's or Agent's Signature

Date

DO NOT WRITE BELOW THIS LINE FOR OFFICIAL USE ONLY

Approval Granted By: **Tresa Snow** Issue Date: **07-11-06** Hydrologist Approval _____

Owner Number: **340884** Fee Received: \$ **50.00** Receipt No.: **1461769** Check No.: _____

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

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

STIPULATION NUMBER 39 - WELL AND DRILLHOLE ABANDONMENT

It will be the **water well contractor's** responsibility to have any incomplete well or drillhole attempted under this permit properly abandoned.

Any incomplete or abandoned well or drillhole as described in 40D-3, Florida Administrative Code (F.A.C.), shall be abandoned as follows:

- A. The well shall be examined from land surface to the original depth of construction for debris or obstructions (any debris or obstruction shall be removed prior to abandonment).
- B. The well shall be plugged from bottom to top by an approved method of grouting with either Portland neat cement grout or an approved Bentonite product as specified in 40D-3.517 2. (b), F.A.C.

It will be the **owner's** responsibility to have any well completed under this permit, or any existing well on this property, which meets the definition of an abandoned well as defined in Chapter 40D-3.021(1), F.A.C., properly abandoned in accordance with Chapter 40D-3.531, F.A.C.

It will be the **owner's** responsibility to have any inactive well, which does not meet the above criteria and is no threat to the water resource properly capped in an air and watertight manner with a threaded, welded or bolted cover or valve. If the pump and well seal are water tight, the pump may be left in place. If practical, a protective cover two (2) feet in height shall be placed around the well casing.

- A. Wells with a diameter of six (6) inches or more without pumping equipment shall have the well casing extended a minimum of two (2) feet above land surface.
- B. Wells with a diameter of less than six (6) inches without pumping equipment shall be securely set in a concrete slab and have either the well casing extended a minimum height of two (2) feet above land surface or a protective cover centered over the well casing. The concrete slab shall be a minimum of four (4) inches in thickness by two (2) feet by two (2) feet square. The protective cover shall be set in the concrete slab and extend a minimum of two (2) feet above land surface.

In flood prone areas all wells shall extend a minimum of one (1) foot above the 100 year flood elevation, if practical, in accordance with Chapter 40D-3.521(4), F.A.C.

Any plugging operations shall be permitted separately from this permit by the Southwest Florida Water Management District and be witnessed by a designated District representative. Arrangement for a District representative shall be made with the local District Field Services office a minimum of 24 hours in advance of these operations. A District representative will be available for assignment during normal working hours (8:00 AM - 4:30 PM), Monday through Friday. Travel time must be taken into consideration. Exemptions may be made for extenuating circumstances. For scheduling, please contact the Field Service Supervisor in the BARTOW office at (863)534-1448.

Permit Number: 744018

(11/03)

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

STIPULATION # 23 - TEST/MONITOR WELL

- A. This well is to be used as a test/monitor well. If it is to be converted into a production well, an additional permit shall be obtained.
- B. There shall be no injection of fluids into the monitor well without prior written approval from the Florida Department of Environmental Protection (DEP) or the District. This includes, but is not limited to treated ground water, or the introduction of microbes for in-situ aquifer restoration.
- C. The well shall be constructed in such a manner to prevent the unauthorized interchange of water between different water bearing zones (i.e., breaching of confining beds, clays or hardpan intervals) as per Chapter 62-532.500 (2)(C), Florida Administrative Code (F.A.C.).
- D. Prior written approval from the District shall be required if the monitor well will be pumped for use in hydrodynamic control and/or contaminant plume management, if quantities reach or exceed requirement of a Water Use Permit.
- E. All monitor wells constructed at any facility which has been designated as a ground water contamination site, or a possible ground water contamination site, shall adhere to the construction standards set forth by the DEP and other applicable rules.
- F. In the event the well needs to be abandoned, an abandonment permit shall be obtained prior to commencing with abandonment operations.
- G. An observer from our Regulation Department is required on all abandonments to ensure compliance with applicable 40D-3 regulations. Please contact the Field Service Supervisor in the BARTOW Office at (863)534-1448 for additional information.

Permit No. 744018

COPY TO OWNER TO BE PROVIDED BY CONTRACTOR

(11/03)

APPENDIX C.

Well Construction Permit for HH-1


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

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

THIS FORM MUST BE FILLED OUT COMPLETELY.

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

CHECK BOX FOR APPROPRIATE DISTRICT ADDRESS ON BACK OF PERMIT FORM

 Permit No. **759104**

Florida Unique I.D.

Permit Stipulations Required (See attached)

SS, 23

62-524 Quad # _____ Delineation # _____

CUP/WUP Application No. _____

A REVENUE LINE FROM PERMIT FEE ONLY

 1. **POLK COUNTY** **2470 CLOVER LANE** **BARTOW FL** **33830-0000** **(888) 534-5610**
 Owner, Legal Name of Entity if Corporation Address City Zip Telephone Number

 2. **45595 US HIGHWAY 27, DAVENPORT**
 Well Location Address, Road Name or number, City
 Parcel # (Pin) **262513000000032020**

 3. **THOMAS SALTER** **3206** **(850) 576-1271**
 Well Drilling Contractor License No. Telephone No.

PO DRAWER 1389

Address

TALLAHASSEE
FL
32302

City

State

Zip

 4. _____ 1/4 of _____ 1/4 of Section **13**

(Indicate Well on Chart)

 5. Township **25** Range **26**

 6. **POLK** _____
 County Subdivision Name Lot Block Unit

 7. Number of proposed wells **1** Check the use of well: (See back of permit for additional choices) _____ Domestic _____ Monitor (type) **✓**

(See Book)

Irrigation (Type) Public Water Supply (type) _____ List Other _____

 Distance from septic system **3000** ft. Description of facility **SANITARY SEWER** Estimated start of construction date **12/5/2007**

 8. Application for: **✓** New Construction _____ Repair/Modify _____ Abandonment _____
 (Reason for Abandonment)

Date Stamp

 9. Estimated: Well Depth **2450** Casing Depth **1685** Screen Interval from _____ to _____
 Casing Material: **Blk Steel / 40 / 40** Casing Diameter **18** Seal Material **Cement**

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

Received: Wednesday, December 05, 2007

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

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

 13. Indicate total No. of wells on site **0** List number of unused wells on site **0**

 14. Is this well or any other well or water withdrawal on the owner's contiguous property covered under a Consumptive Water Use Permit (CUP/WUP) or CUP/WUP Application? **✓** No **Yes**
 (If YES, COMPLETE THE FOLLOWING) CUP/WUP No. _____

District well I.D. No. _____

 Latitude **28° 18' 39.94"** Longitude **81° 40' 2.22"**

Data obtained from GPS _____ or map _____ or survey _____ (map datum NAD 27 _____ NAD 83 _____)

15. I hereby certify that I will comply with the applicable rules of Title 60, Florida Administrative Code and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided on this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable, I agree to provide a well completion report to the District within 30 days after drilling or the permit expiration, whichever occurs first.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 374, Florida Statutes, to maintain or properly abandon this well or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to personnel of the WMD or a representative access to the well site.

Digitally Signed

3206

Signature of Contractor

License No.

Digitally Signed

Owner's or Agent's Signature

Date

DO NOT WRITE BELOW THIS LINE FOR OFFICIAL USE ONLY

 Approval Granted By: **TRESA SNOW** STATUS: **ISSUED** Issue Date: **12/5/2007** Hydrologist Approval _____
 Owner Number: _____ Fee Received: \$ **50.00** Receipt No.: **BA000017A** Check No.: _____

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

APPENDIX D.

Photographic Log

Appendix D - Photograph Log

Photograph D-1- Gardner-Denver 3000 trailer mounted drill onsite at Holly Hill LFA Exploratory Well Drill Site.



Photograph D-2- 36-inch steel casing



Appendix D - Photograph Log

Photograph D-3- Vibrating 36-inch casing



Photograph D-4- Cementing Truck



Appendix D - Photograph Log

Photograph D-5- Cementing Operation



Photograph D-6- 24-inch casing



Appendix D - Photograph Log

Photograph D-7- Installing 24-inch casing



Photograph D-8 - Welding 24-inch casing



Appendix D - Photograph Log

Photograph D-9 - Mule Shoe for Cementing bottom of casing



Photograph D-10 - 18-inch steel casing



Appendix D - Photograph Log

Photograph D-11 - Welding 18-inch casing



Photograph D-12 - Left-hand back-off casing tool



Appendix D - Photograph Log

Photograph D-13 - Back-off tool connected to drill pipe



Photograph D-14 Pumping test set-up



Appendix D - Photograph Log

Photograph D-15 Pumping test flow meter



Photograph D-16 - Pumping test Rossum sand sampler



Appendix D - Photograph Log

Photograph D-17 - Pumping test discharge



Photograph D-18 - HH-1 Final Caliper Log



Appendix D - Photograph Log

Photograph D-19 - HH-1 Wellhead Completion



APPENDIX E.

Casing Mill Certificates

Polk County
Holly Hill LFA Deep Well

Submittal Number: 13
Steel casing 36" x .375"

☒ REVIEWED, NO COMMENTS
☐ REVIEWED, COMMENTS AS NOTED

☐ REJECTED; REVISE AND RESUBMIT
☐ NOT REVIEWED

REVIEW OF THIS SHOP DRAWING IS LIMITED TO GENERAL DESIGN CONCEPTS AND GENERAL COMPLIANCE WITH THE INFORMATION IN THE PROJECT PLANS AND SPECIFICATIONS ONLY AND IS NOT INTENDED TO BE A GUARANTEE OF THE MATERIAL REQUIRED OR THAT ALL ITEMS REQUIRED ARE SHOWN. REVIEW SHALL NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF DETAILS OF DESIGN, DIMENSIONS, AND CONDITIONS OF CONSTRUCTION MEANS AND METHODS, COORDINATION WITH OTHER TRADES, OR ANY OTHER REQUIREMENTS OF THE PLANS, SPECIFICATIONS, OR CONTRACT. ANY NOTATIONS ON THIS SHOP DRAWING MADE BY POST, BUCKLEY, SCHUH & JERNIGAN, INC. SHALL NOT BE CONSTRUED TO AUTHORIZE ADDITIONAL WORK OR COST.

REVIEW OF DESIGN CALCULATIONS AND DRAWINGS PREPARED BY SPECIALTY ENGINEERS IS LIMITED TO DESIGN INTENT AND DOES NOT CONSTITUTE A DETAILED CHECK OF CALCULATIONS, NOR DOES IT RELIEVE THE SPECIALTY ENGINEERS FROM THE RESPONSIBILITY OF THE DETAILING OF THE SPECIALTY COMPONENT OR SYSTEM.

POST, BUCKLEY, SCHUH & JERNIGAN, INC.

BY:
11/93

Kenn Dorsey

DATE: 5/1/06



CERTIFICADO DE QUALIDADE DE TUBOS
QUALITY CERTIFICATE OF PIPES
CERTIFICADO DE CALIDAD DE TUBERIAS

(INSPECTION CERTIFICATE ACCORDING TO: EN10204 3.1 - ISO 10474 3.1B)

Confab Industrial S/A
Av. Gasão Vidigal Neto, 475
(12414-900) Cidade Nova
Pindamonhangaba, SP, Brasil
(55) 12 3644 9040 tel
(55) 12 3644 9384 fax

PAIS DE ORIGEM
COUNTRY OF ORIGIN
PAIS DE DESTINO
DESTINATION

U.S.A.

UOE-SAWL

P.O. 55714

34690 06 001

7

DT- 34.690

EDGEN CARBON PRODUCTS GROUP L.L.C.

PRODUTO: TUBOS DE AÇO CARBONO FABRICADOS PELO PROCESSO
PRODUCT: CARBON STEEL PIPES MANUFACTURED BY THE PROCESS
PRODUTO: TUBERIAS DE ACERO AL CARBONO FABRICADOS POR EL PROCESO

CERTIFICAMOS QUE TODOS OS TUBOS FABRICADOS PARA A USINA
IT IS HEREBY CERTIFIED THAT ALL PIPES MADE TO THIS PRODUCTION NO.
CERTIFICAMOS QUE TODOS LOS TUBOS FABRICADOS PARA LA OBRA N°

COM O DIÂMETRO EXTERNO
WITH OUTSIDE DIAMETER
CON DIÁMETRO EXTERNO

ESPESSURA
WALL THICKNESS
ESPEUR

38.06 To 41.01 ft

PERMANECENDO UM TOTAL DE
IN A TOTAL OF
POR UM TOTAL DE

PEÇAS COM COMPRIMENTO TOTAL DE
PIECES WITH TOTAL LENGTH
UNIDADES PARA UMA LONGITUDE TOTAL DE

106,362 lb

FORAM FABRICADOS, INSPECIONADOS E APROVADOS CONFORME A ESPECIFICAÇÃO
WERE MANUFACTURED, INSPECTED AND APPROVED IN ACCORDANCE WITH THE SPECIFICATION
FUEBON FABRICADOS, INSPECCIONADOS Y APROBADOS DE ACUERDO CON LA ESPECIFICACION

API SPEC. 5L-2004 - GRADE X65 PSL2

ESPECIFICACOES SUPLEMENTARES
AND SUPPLEMENTARY SPECIFICATIONS
Y ESPECIFICACIONES SUPLEMENTARIAS

BEVELED 30° - 35° API SPEC. 5L

TESTES (S) NÃO DESTRUTIVOS (S)
NON DESTRUCTIVE TEST (S)
TEST (S) NO DESTRUCTIVO (S)

(MINIMUM) 1,220 psi

10

WELD SEAM: X-RAY 8 INCHES LONG ON EACH PIPE END; PENETRAMETER ISO 1561;
ULTRASONIC INSPECTION 100%; REFERENCE STANDARD DRILLED HOLE 1.6 mm AND NOTCH 1/8

TODOS OS TUBOS CERTIFICADOS POR ESTE DOCUMENTO
ASSIM COMO SEUS CÓDIGOS E COMPONENTES INDIVIDUAIS
ENCORRESPONDE RELACIONADOS NOS AUTOS DE LINHAÇÃO DE TUBOS DE Nº
ALL THE PIPES CERTIFIED BY THIS DOCUMENT, AS WELL AS THEIR
INDIVIDUAL CODES AND LENGTHS, ARE RECORDED ON THE
PIPE DELIVERY LISTS NO. /FACILITY LIST NO.

206 4 0129 1/1 Rev. 0

TODOS LOS TUBOS CERTIFICADOS POR ESTE DOCUMENTO
ASÍ COMO SUS CÓDIGOS Y LONGITUDES INDIVIDUALES
SE ENCUENTRAN RELACIONADOS EN LOS REPORTES DE LINERACIÓN DE TUBERIAS DE Nº

HTS 7305.11.10.60

CERTIFICADO Nº 0210/06	REVISÃO REVISION 0	DATA E LOCAL DE EMISSÃO DATE AND SITE FELHA Y LOCAL DE EMISION Pindamonhangaba, Feb 14, 2006	INSPEÇÃO - INSPECTION CONFAB	GERENTE DE CONTROLE DE QUALIDADE QUALITY CONTROL MANAGER GERENTE DE CONTROLE DE CALIDAD Eng. João Manoel Godoy - matrícula 7511-1
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DEPARTAMENTO DA QUALIDADE - INSPEÇÃO DE RECEBIMENTO/ QUALITY DEPARTMENT - RECEIVING INSPECTION
SUMÁRIO DE CERTIFICADO DE USINA/ SUMMARY OF STEEL MILL PLATE CERTIFICATE

[illegible]

END 4418	END 4419	END 4420	END 4421	END 4422	END 4423	END 4424	END 4425	END 4426	END 4427	END 4428	END 4429	END 4430	END 4431	END 4432	END 4433	END 4434	END 4435	END 4436	END 4437	END 4438	END 4439	END 4440	END 4441	END 4442	END 4443	END 4444	END 4445	END 4446	END 4447	END 4448	END 4449	END 4450	END 4451	END 4452	END 4453	END 4454	END 4455	END 4456	END 4457	END 4458	END 4459	END 4460	END 4461	END 4462	END 4463	END 4464	END 4465	END 4466	END 4467	END 4468	END 4469	END 4470	END 4471	END 4472	END 4473	END 4474	END 4475	END 4476	END 4477	END 4478	END 4479	END 4480	END 4481	END 4482	END 4483	END 4484	END 4485	END 4486	END 4487	END 4488	END 4489	END 4490	END 4491	END 4492	END 4493	END 4494	END 4495	END 4496	END 4497	END 4498	END 4499	END 4500	END 4501	END 4502	END 4503	END 4504	END 4505	END 4506	END 4507	END 4508	END 4509	END 4510	END 4511	END 4512	END 4513	END 4514	END 4515	END 4516	END 4517	END 4518	END 4519	END 4520	END 4521	END 4522	END 4523	END 4524	END 4525	END 4526	END 4527	END 4528	END 4529	END 4530	END 4531	END 4532	END 4533	END 4534	END 4535	END 4536	END 4537	END 4538	END 4539	END 4540	END 4541	END 4542	END 4543	END 4544	END 4545	END 4546	END 4547	END 4548	END 4549	END 4550	END 4551	END 4552	END 4553	END 4554	END 4555	END 4556	END 4557	END 4558	END 4559	END 4560	END 4561	END 4562	END 4563	END 4564	END 4565	END 4566	END 4567	END 4568	END 4569	END 4570	END 4571	END 4572	END 4573	END 4574	END 4575	END 4576	END 4577	END 4578	END 4579	END 4580	END 4581	END 4582	END 4583	END 4584	END 4585	END 4586	END 4587	END 4588	END 4589	END 4590	END 4591	END 4592	END 4593	END 4594	END 4595	END 4596	END 4597	END 4598	END 4599	END 4600	END 4601	END 4602	END 4603	END 4604	END 4605	END 4606	END 4607	END 4608	END 4609	END 4610	END 4611	END 4612	END 4613	END 4614	END 4615	END 4616	END 4617	END 4618	END 4619	END 4620	END 4621	END 4622	END 4623	END 4624	END 4625	END 4626	END 4627	END 4628	END 4629	END 4630	END 4631	END 4632	END 4633	END 4634	END 4635	END 4636	END 4637	END 4638	END 4639	END 4640	END 4641	END 4642	END 4643	END 4644	END 4645	END 4646	END 4647	END 4648	END 4649	END 4650	END 4651	END 4652	END 4653	END 4654	END 4655	END 4656	END 4657	END 4658	END 4659	END 4660	END 4661	END 4662	END 4663	END 4664	END 4665	END 4666	END 4667	END 4668	END 4669	END 4670	END 4671	END 4672	END 4673	END 4674	END 4675	END 4676	END 4677	END 4678	END 4679	END 4680	END 4681	END 4682	END 4683	END 4684	END 4685	END 4686	END 4687	END 4688	END 4689	END 4690	END 4691	END 4692	END 4693	END 4694	END 4695	END 4696	END 4697	END 4698	END 4699	END 4700	END 4701	END 4702	END 4703	END 4704	END 4705	END 4706	END 4707	END 4708	END 4709	END 4710	END 4711	END 4712	END 4713	END 4714	END 4715	END 4716	END 4717	END 4718	END 4719	END 4720	END 4721	END 4722	END 4723	END 4724	END 4725	END 4726	END 4727	END 4728	END 4729	END 4730	END 4731	END 4732	END 4733	END 4734	END 4735	END 4736	END 4737	END 4738	END 4739	END 4740	END 4741	END 4742	END 4743	END 4744	END 4745	END 4746	END 4747	END 4748	END 4749	END 4750	END 4751	END 4752	END 4753	END 4754	END 4755	END 4756	END 4757	END 475
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[illegible]

COMPOSIÇÃO QUÍMICA		CHEMICAL COMPOSITION (%)	
HARDNESS		50	
200°C	100	100	100
150°C	100	100	100
100°C	100	100	100
50°C	100	100	100
20°C	100	100	100
0°C	100	100	100
-50°C	100	100	100
-100°C	100	100	100
-150°C	100	100	100
-200°C	100	100	100
-250°C	100	100	100
-300°C	100	100	100
-350°C	100	100	100
-400°C	100	100	100
-450°C	100	100	100
-500°C	100	100	100
-550°C	100	100	100
-600°C	100	100	100
-650°C	100	100	100
-700°C	100	100	100
-750°C	100	100	100
-800°C	100	100	100
-850°C	100	100	100
-900°C	100	100	100
-950°C	100	100	100
-1000°C	100	100	100

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姓名	性别	年龄	籍贯	职业	文化程度	健康状况	婚姻状况	子女情况	其他
王德胜	男	45	山东	工人	小学	良好	已婚	2	
李秀英	女	38	河北	农民	初中	良好	已婚	1	
张国强	男	52	河南	干部	高中	良好	已婚	3	
刘小红	女	28	江苏	教师	大学	良好	未婚	0	
陈为民	男	60	浙江	退休	小学	一般	已婚	4	
赵大刚	男	35	四川	商人	高中	良好	已婚	2	
孙丽娟	女	42	湖南	护士	中专	良好	已婚	1	
周建民	男	55	湖北	工人	小学	一般	已婚	3	
吴小芳	女	30	广东	文员	初中	良好	未婚	0	
郑为民	男	48	安徽	农民	小学	一般	已婚	2	
马大刚	男	58	江西	干部	高中	良好	已婚	3	
徐小红	女	25	福建	学生	大学	良好	未婚	0	
黄为民	男	65	广西	退休	小学	一般	已婚	4	
周大刚	男	32	贵州	商人	高中	良好	已婚	2	
孙丽娟	女	40	云南	护士	中专	良好	已婚	1	
周建民	男	50	陕西	工人	小学	一般	已婚	3	
吴小芳	女	28	山西	文员	初中	良好	未婚	0	
郑为民	男	45	内蒙古	农民	小学	一般	已婚	2	
马大刚	男	55	吉林	干部	高中	良好	已婚	3	
徐小红	女	22	辽宁	学生	大学	良好	未婚	0	
黄为民	男	62	黑龙江	退休	小学	一般	已婚	4	
周大刚	男	30	山东	商人	高中	良好	已婚	2	
孙丽娟	女	38	河北	护士	中专	良好	已婚	1	
周建民	男	48	河南	工人	小学	一般	已婚	3	
吴小芳	女	25	江苏	文员	初中	良好	未婚	0	
郑为民	男	52	浙江	农民	小学	一般	已婚	2	
马大刚	男	60	安徽	干部	高中	良好	已婚	3	
徐小红	女	20	江西	学生	大学	良好	未婚	0	
黄为民	男	68	福建	退休	小学	一般	已婚	4	
周大刚	男	28	广西	商人	高中	良好	已婚	2	
孙丽娟	女	35	贵州	护士	中专	良好	已婚	1	
周建民	男	42	云南	工人	小学	一般	已婚	3	
吴小芳	女	22	山西	文员	初中	良好	未婚	0	
郑为民	男	48	内蒙古	农民	小学	一般	已婚	2	
马大刚	男	58	吉林	干部	高中	良好	已婚	3	
徐小红	女	18	辽宁	学生	大学	良好	未婚	0	
黄为民	男	70	黑龙江	退休	小学	一般	已婚	4	
周大刚	男	25	山东	商人	高中	良好	已婚	2	
孙丽娟	女	32	河北	护士	中专	良好	已婚	1	
周建民	男	40	河南	工人	小学	一般	已婚	3	
吴小芳	女	20	江苏	文员	初中	良好	未婚	0	
郑为民	男	50	浙江	农民	小学	一般	已婚	2	
马大刚	男	60	安徽	干部	高中	良好	已婚	3	
徐小红	女	15	江西	学生	大学	良好	未婚	0	
黄为民	男	72	福建	退休	小学	一般	已婚	4	
周大刚	男	22	广西	商人	高中	良好	已婚	2	
孙丽娟	女	30	贵州	护士	中专	良好	已婚	1	
周建民	男	38	云南	工人	小学	一般	已婚	3	
吴小芳	女	18	山西	文员	初中	良好	未婚	0	
郑为民	男	45	内蒙古	农民	小学	一般	已婚	2	
马大刚	男	55	吉林	干部	高中	良好	已婚	3	
徐小红	女	12	辽宁	学生					

Project Name	Project Number	Project Date	Project Status	Project Location	Project Description	Project Budget	Project Progress	Project Completion	Project Evaluation
Project A	101	2023-01-01	Completed	Location A	Description A	Budget A	Progress A	Completion A	Evaluation A
Project B	102	2023-02-01	In Progress	Location B	Description B	Budget B	Progress B	Completion B	Evaluation B
Project C	103	2023-03-01	Not Started	Location C	Description C	Budget C	Progress C	Completion C	Evaluation C
Project D	104	2023-04-01	Completed	Location D	Description D	Budget D	Progress D	Completion D	Evaluation D
Project E	105	2023-05-01	In Progress	Location E	Description E	Budget E	Progress E	Completion E	Evaluation E
Project F	106	2023-06-01	Not Started	Location F	Description F	Budget F	Progress F	Completion F	Evaluation F
Project G	107	2023-07-01	Completed	Location G	Description G	Budget G	Progress G	Completion G	Evaluation G
Project H	108	2023-08-01	In Progress	Location H	Description H	Budget H	Progress H	Completion H	Evaluation H
Project I	109	2023-09-01	Not Started	Location I	Description I	Budget I	Progress I	Completion I	Evaluation I
Project J	110	2023-10-01	Completed	Location J	Description J	Budget J	Progress J	Completion J	Evaluation J
Project K	111	2023-11-01	In Progress	Location K	Description K	Budget K	Progress K	Completion K	Evaluation K
Project L	112	2023-12-01	Not Started	Location L	Description L	Budget L	Progress L	Completion L	Evaluation L
Project M	113	2024-01-01	Completed	Location M	Description M	Budget M	Progress M	Completion M	Evaluation M
Project N	114	2024-02-01	In Progress	Location N	Description N	Budget N	Progress N	Completion N	Evaluation N
Project O	115	2024-03-01	Not Started	Location O	Description O	Budget O	Progress O	Completion O	Evaluation O
Project P	116	2024-04-01	Completed	Location P	Description P	Budget P	Progress P	Completion P	Evaluation P
Project Q	117	2024-05-01	In Progress	Location Q	Description Q	Budget Q	Progress Q	Completion Q	Evaluation Q
Project R	118	2024-06-01	Not Started	Location R	Description R	Budget R	Progress R	Completion R	Evaluation R
Project S	119	2024-07-01	Completed	Location S	Description S	Budget S	Progress S	Completion S	Evaluation S
Project T	120	2024-08-01	In Progress	Location T	Description T	Budget T	Progress T	Completion T	Evaluation T
Project U	121	2024-09-01	Not Started	Location U	Description U	Budget U	Progress U	Completion U	Evaluation U
Project V	122	2024-10-01	Completed	Location V	Description V	Budget V	Progress V	Completion V	Evaluation V
Project W	123	2024-11-01	In Progress	Location W	Description W	Budget W	Progress W	Completion W	Evaluation W
Project X	124	2024-12-01	Not Started	Location X	Description X	Budget X	Progress X	Completion X	Evaluation X
Project Y	125	2025-01-01	Completed	Location Y	Description Y	Budget Y	Progress Y	Completion Y	Evaluation Y
Project Z	126	2025-02-01	In Progress	Location Z	Description Z	Budget Z	Progress Z	Completion Z	Evaluation Z
Project AA	127	2025-03-01	Not Started	Location AA	Description AA	Budget AA	Progress AA	Completion AA	Evaluation AA
Project AB	128	2025-04-01	Completed	Location AB	Description AB	Budget AB	Progress AB	Completion AB	Evaluation AB
Project AC	129	2025-05-01	In Progress	Location AC	Description AC	Budget AC	Progress AC	Completion AC	Evaluation AC
Project AD	130	2025-06-01	Not Started	Location AD	Description AD	Budget AD	Progress AD	Completion AD	Evaluation AD
Project AE	131	2025-07-01	Completed	Location AE	Description AE	Budget AE	Progress AE	Completion AE	Evaluation AE
Project AF	132	2025-08-01	In Progress	Location AF	Description AF	Budget AF	Progress AF	Completion AF	Evaluation AF
Project AG	133	2025-09-01	Not Started	Location AG	Description AG	Budget AG	Progress AG	Completion AG	Evaluation AG
Project AH	134	2025-10-01	Completed	Location AH	Description AH	Budget AH	Progress AH	Completion AH	Evaluation AH
Project AI	135	2025-11-01	In Progress	Location AI	Description AI	Budget AI	Progress AI	Completion AI	Evaluation AI
Project AJ	136	2025-12-01	Not Started	Location AJ	Description AJ	Budget AJ	Progress AJ	Completion AJ	Evaluation AJ
Project AK	137	2026-01-01	Completed	Location AK	Description AK	Budget AK	Progress AK	Completion AK	Evaluation AK
Project AL	138	2026-02-01	In Progress	Location AL	Description AL	Budget AL	Progress AL	Completion AL	Evaluation AL
Project AM	139	2026-03-01	Not Started	Location AM	Description AM	Budget AM	Progress AM	Completion AM	Evaluation AM
Project AN	140	2026-04-01	Completed	Location AN	Description AN	Budget AN	Progress AN	Completion AN	Evaluation AN
Project AO	141	2026-05-01	In Progress	Location AO	Description AO	Budget AO	Progress AO	Completion AO	Evaluation AO
Project AP	142	2026-06-01	Not Started	Location AP	Description AP	Budget AP	Progress AP	Completion AP	Evaluation AP
Project AQ	143	2026-07-0							

姓名	性别	年龄	籍贯	民族	文化程度	职业	住址	电话	备注
王德胜	男	45	山东	汉族	高中	工人	XX路XX号	XXXX	
李小红	女	32	河南	汉族	初中	教师	XX街XX号	XXXX	
张建国	男	58	河北	汉族	小学	农民	XX村XX组	XXXX	
刘玉华	女	28	湖北	汉族	大学	医生	XX医院	XXXX	
陈伟强	男	38	广东	汉族	高中	干部	XX局XX科	XXXX	
赵国强	男	62	山西	汉族	小学	工人	XX厂XX班	XXXX	
周丽娟	女	42	四川	汉族	初中	售货员	XX商店	XXXX	
吴大刚	男	52	浙江	汉族	高中	工程师	XX设计院	XXXX	
孙小芳	女	25	湖南	汉族	大学	学生	XX大学	XXXX	
郑为民	男	48	安徽	汉族	初中	工人	XX厂XX班	XXXX	
冯国强	男	35	江西	汉族	高中	干部	XX局XX科	XXXX	
马小红	女	30	广西	汉族	初中	售货员	XX商店	XXXX	
徐建国	男	55	福建	汉族	小学	农民	XX村XX组	XXXX	
黄玉华	女	27	贵州	汉族	大学	医生	XX医院	XXXX	
曹伟强	男	37	云南	汉族	高中	干部	XX局XX科	XXXX	
郭国强	男	61	陕西	汉族	小学	工人	XX厂XX班	XXXX	
周丽娟	女	41	甘肃	汉族	初中	售货员	XX商店	XXXX	
吴大刚	男	51	宁夏	汉族	高中	工程师	XX设计院	XXXX	
孙小芳	女	24	青海	汉族	大学	学生	XX大学	XXXX	
郑为民	男	47	新疆	汉族	初中	工人	XX厂XX班	XXXX	
冯国强	男	34	内蒙古	汉族	高中	干部	XX局XX科	XXXX	
马小红	女	29	吉林	汉族	初中	售货员	XX商店	XXXX	
徐建国	男	54	辽宁	汉族	小学	农民	XX村XX组	XXXX	
黄玉华	女	26	黑龙江	汉族	大学	医生	XX医院	XXXX	
曹伟强	男	36	河北	汉族	高中	干部	XX局XX科	XXXX	
郭国强	男	60	山西	汉族	小学	工人	XX厂XX班	XXXX	
周丽娟	女	40	山东	汉族	初中	售货员	XX商店	XXXX	
吴大刚	男	50	河南	汉族	高中	工程师	XX设计院	XXXX	
孙小芳	女	23	湖北	汉族	大学	学生	XX大学	XXXX	
郑为民	男	46	湖南	汉族	初中	工人	XX厂XX班	XXXX	
冯国强	男	33	广东	汉族	高中	干部	XX局XX科	XXXX	
马小红	女	28	广西	汉族	初中	售货员	XX商店	XXXX	
徐建国	男	53	福建	汉族	小学	农民	XX村XX组	XXXX	
黄玉华	女	25	贵州	汉族	大学	医生	XX医院	XXXX	
曹伟强	男	35	云南	汉族	高中	干部	XX局XX科	XXXX	
郭国强	男	59	陕西	汉族	小学	工人	XX厂XX班	XXXX	
周丽娟	女	39	甘肃	汉族	初中	售货员	XX商店	XXXX	
吴大刚	男	49	宁夏	汉族	高中	工程师	XX设计院	XXXX	
孙小芳	女	22	青海	汉族	大学	学生	XX大学	XXXX	
郑为民	男	45	新疆	汉族	初中	工人	XX厂XX班	XXXX	
冯国强	男	32	内蒙古	汉族	高中	干部	XX局XX科	XXXX	
马小红	女	27	吉林	汉族	初中	售货员	XX商店	XXXX	
徐建国	男	52	辽宁	汉族	小学	农民	XX村XX组	XXXX	
黄玉华	女	24	黑龙江	汉族	大学	医生	XX医院	XXXX	
曹伟强	男	34	河北	汉族	高中	干部	XX局XX科	XXXX	
郭国强	男	58	山西	汉族	小学	工人	XX厂XX班	XXXX	
周丽娟	女	38	山东	汉族	初中	售货员	XX商店	XXXX	
吴大刚	男	48	河南	汉族	高中	工程师	XX设计院	XXXX	
孙小芳	女	21	湖北	汉族	大学	学生	XX大学	XXXX	
郑为民	男	44	湖南	汉族	初中	工人	XX厂XX班	XXXX	
冯国强	男</								

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No.	Name	Age	Sex	Religion	Marital Status	Occupation	Education	Income	Assets	Liabilities	Net Worth	Assets		Liabilities		Net Worth	
												Real Estate	Personal	Real Estate	Personal	Real Estate	Personal
1	John Doe	45	M	Protestant	Married	Teacher	High School	\$12,000	\$5,000	\$2,000	\$3,000	\$10,000	\$3,000	\$7,000	\$2,000	\$5,000	
2	Jane Smith	38	F	Catholic	Single	Nurse	College	\$8,000	\$2,000	\$1,000	\$1,000	\$7,000	\$1,000	\$6,000	\$1,000	\$5,000	
3	Robert Johnson	52	M	Jewish	Married	Engineer	College	\$15,000	\$8,000	\$3,000	\$4,000	\$12,000	\$4,000	\$8,000	\$3,000	\$5,000	
4	Emily White	28	F	Muslim	Single	Student	College	\$3,000	\$1,000	\$500	\$500	\$2,500	\$500	\$2,000	\$500	\$1,500	
5	Michael Brown	60	M	Buddhist	Married	Retired	High School	\$10,000	\$4,000	\$1,500	\$2,500	\$8,500	\$1,500	\$7,000	\$1,500	\$5,500	

[illegible][illegible][illegible]

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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DATE	DESCRIPTION	AMOUNT	CHECK NO.	BANK	INITIALS
10/1/00	1000.00	1000.00			
10/2/00	1000.00	1000.00			
10/3/00	1000.00	1000.00			
10/4/00	1000.00	1000.00			
10/5/00	1000.00	1000.00			
10/6/00	1000.00	1000.00			
10/7/00	1000.00	1000.00			
10/8/00	1000.00	1000.00			
10/9/00	1000.00	1000.00			
10/10/00	1000.00	1000.00			
10/11/00	1000.00	1000.00			
10/12/00	1000.00	1000.00			
10/13/00	1000.00	1000.00			
10/14/00	1000.00	1000.00			
10/15/00	1000.00	1000.00			
10/16/00	1000.00	1000.00			
10/17/00	1000.00	1000.00			
10/18/00	1000.00	1000.00			
10/19/00	1000.00	1000.00			
10/20/00	1000.00	1000.00			
10/21/00	1000.00	1000.00			
10/22/00	1000.00	1000.00			
10/23/00	1000.00	1000.00			
10/24/00	1000.00	1000.00			
10/25/00	1000.00	1000.00			
10/26/00	1000.00	1000.00			
10/27/00	1000.00	1000.00			
10/28/00	1000.00	1000.00			
10/29/00	1000.00	1000.00			
10/30/00	1000.00	1000.00			
10/31/00	1000.00	1000.00			
TOTAL	30000.00	30000.00			

[illegible][illegible][illegible][illegible][illegible][illegible][illegible]

P **100%**

9 **100%**

8 **100%**

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4 **100%**

3 **100%**

2 **100%**

1 **100%**

From: EDGEN BARTON

Polk County
Holly Hill LFA Deep Well

Submittal Number: 14
Steel Casing 30" x .375"

☒ REVIEWED, NO COMMENTS
☐ REVIEWED, COMMENTS AS NOTED

☐ REJECTED; REVISE AND RESUBMIT
☐ NOT REVIEWED

REVIEW OF THIS SHOP DRAWING IS LIMITED TO GENERAL DESIGN CONCEPTS AND GENERAL COMPLIANCE WITH THE INFORMATION IN THE PROJECT PLANS AND SPECIFICATIONS ONLY, AND IS NOT INTENDED TO BE A VERIFICATION OF TOTAL MATERIAL REQUIRED OR THAT ALL ITEMS REQUIRED ARE SHOWN. REVIEW SHALL NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF DETAILS OF DESIGN, DIMENSIONS, JOB CONDITIONS, CONSTRUCTION MEANS AND METHODS, COORDINATION WITH OTHER TRADES, OR ANY OTHER REQUIREMENTS OF THE PLANS, SPECIFICATIONS OR CONTRACT. ANY NOTATIONS ON THIS SHOP DRAWING MADE BY POST, BUCKLEY, SCHUH & JERNIGAN, INC. SHALL NOT BE CONSTRUED TO AUTHORIZE ADDITIONAL WORK OR COST.

REVIEW OF DESIGN CALCULATIONS AND DRAWINGS PREPARED BY SPECIALTY ENGINEERS IS LIMITED TO DESIGN INTENT AND DOES NOT CONSTITUTE A DETAILED CHECK OF CALCULATIONS, NOR DOES IT RELIEVE THE SPECIALTY ENGINEERS FROM THE RESPONSIBILITY OF THE DETAILING OF THE SPECIALTY COMPONENT OR SYSTEM.

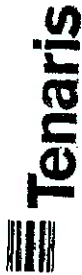
POST, BUCKLEY, SCHUH & JERNIGAN, INC.

BY:
11/83

Kenn Doney

DATE:

6/19/06



CERTIFICADO DE QUALIDADE DE TUBOS
QUALITY CERTIFICATE OF PIPES
CERTIFICADO DE CALIDAD DE TUBERIAS

(INSPECTION CERTIFICATE ACCORDING TO: EN10204 3.1 - ISO 10474 3.1B)

Confab Industrial S/A
Av. Gastão Vidigal Neto, 475
(12414-900) Cidade Nova
Pindamonhangaba, SP, Brasil
(55) 12 3644 9040 tel
(55) 12 3644 9384 fax

PAIS DE ORIGEM:
COUNTRY OF ORIGIN
PAIS DE DESTINO:
COUNTRY OF DESTINATION
U.S.A

PRODUTO: TUBOS DE AÇO CARBONO FABRICADOS PELO PROCESSO PRODUCT: CARBON STEEL PIPES MANUFACTURED BY THE PROCESS PRODUTO: TUBERIAS DE ACERO AL CARBONO FABRICADAS POR EL PROCESO		Série O Pedido Nº UNLESS THE ORDER NO SEGUN EL PEDIDO		P.O. 55714		APLICACAO APPLICATION		34690 02 001		ITEM 3	
CERTIFICAMOS QUE TODOS OS TUBOS FABRICADOS PARA A OBRA IT IS HEREBY CERTIFIED THAT ALL PIPES MADE TO MILL PRODUCTION NO CERTIFICAMOS QUE TODOS LOS TUBOS FABRICADOS PARA LA OBRA Nº		DT- 34.690		DESTINACAO A FOR THE PURCHASER DESTINADO(S) PARA		EDGEN CARBON PRODUCTS GROUP L.L.C.					
COM DIAMETRO EXTERNO WITH OUTSIDE DIAMETER COM DIAMETRO EXTERNO		30"		ESPESURA WALL THICKNESS EYESIN		0.375"		COMPRIMENTO INDIVIDUAL AND INDIVIDUAL LENGTH Y LONGITUD INDIVIDUAL		38.06 To 41.01 ft	
REBATENDO UM TOTAL DE IN A TOTAL OF POR UM TOTAL DE		122		PEÇAS COM COMPRIMENTO TOTAL DE PIECES WITH TOTAL LENGTH UNIDADES PARA UMA LONGITUD TOTAL DE		4,884, 14 ft		PESO TOTAL DE AND TOTAL WEIGHT Y PESO TOTAL DE		579,728 lb	
FORMA FABRICADOS, INSPECIONADOS E APROVADOS CONFORME A ESPECIFICACAO WERE MANUFACTURED, INSPECTED AND APPROVED IN ACCORDANCE WITH THE SPECIFICATION FUERON FABRICADOS, INSPECCIONADOS Y APROBADOS DE ACUERDO CON LA ESPECIFICACION		API SPEC. 5L-2004 - GRADE X70 PS12		E ESPECIFICACOES SUPLEMENTARES AND SUPPLEMENTARY SPECIFICATIONS Y ESPECIFICACIONES SUPLEMENTARIAS		*****					
COM EXTREMIDADES WITH PIPE ENDS COM EXTREMIDADES		BEVELED 30° - 35° API SPEC. 5L		E TESTADOS HIDROSTATICAMENTE A PRESSAO DE AND HYDROSTATICALLY TESTED AT Y CON PROVA HIDROSTATICA A LA PRESION DE		(MINIMUM) 1,580 psi		FOR DURANTE		10 SEGUNDOS SEGUNDOS	
TESTE(S) NÃO DESTRUTIVO(S) NON DESTRUCTIVE TEST(S) TEST(S) NO DESTRUTIVO(S)		WELD SEAM - X-RAY 8 INCHES LONG ON EACH PIPE END; PENETRAMETER ISO FE 10/1E; ULTRASONIC INSPECTION 100% REFERENCE STANDARD DRILLED HOLE 1.6 mm AND NOTCH N3									
TODOS OS TUBOS CERTIFICADOS POR ESTE DOCUMENTO, ASSIM COMO SEUS CODIGOS E COMPARTIMENTOS INDIVIDUAIS, ENCENTRAM-SE RELACIONADOS NOS AVISOS DE INSERCAO DE TUBOS DE Nº		206 4 0125 1/3 - 3/3 Rev. 0									
ALL THE PIPES CERTIFIED BY THIS DOCUMENT, AS WELL AS THEIR INDIVIDUAL CODES AND LENGTHS, ARE RECORDED ON THE PIPE DELIVERY LIST Nº / FACING LIST NO.											
TODOS LOS TUBOS CERTIFICADOS POR ESTE DOCUMENTO, ASI COMO SUS CODIGOS Y LONGITUDES INDIVIDUALES SE ENCUENTRAN RELACIONADOS EN LOS REPORTES DE UBICACION DE TUBOS DE Nº											

CERTIFICADO Nº CERTIFICATE Nº	REVISAO REVISION	DATA E LOCAL DE EMISSAO DATE AND SITE	UNISPECAO - INSPECTION - INSPECTION	CONFAB	GERENTE DE CONTROLE DE QUALIDADE QUALITY CONTROL MANAGER GERENTE DE CONTROLE DE CALIDAD Eng. Jose Mauricio GODOY 1311-1
0206/06	0	Pindamonhangaba, Feb 14, 2006			

Polk County

Holly Hill LFA Deep Well

Submittal Number: 15
Steel casing 24" x .375"

☒ REVIEWED, NO COMMENTS	REVISIONS AND RESUBMIT
☐ REVIEWED, COMMENTS AS NOTED	

REVIEW OF DRAWING IS LIMITED TO THE INFORMATION PROVIDED ON THE DRAWING. THE REVIEWER SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED BY THE SUBMITTER. THE REVIEWER SHALL NOT BE RESPONSIBLE FOR THE DESIGN OF THE SYSTEM OR THE PERFORMANCE OF THE SYSTEM. THE REVIEWER SHALL NOT BE RESPONSIBLE FOR THE DESIGN OF THE SYSTEM OR THE PERFORMANCE OF THE SYSTEM.

BY: H. Dorsey DATE: 6/19/06

11/03

POET, BUCKLEY, GORDON & SHERIDAN, INC.



HYUNDAI
HYSCO
* 본사 : 경성 : 울산광역시 북구 영포동 285번지 (052)287-8918
HEAD OFFICE #285, Yeonpo-dong, Buk-gu, Ulsan, Korea
(ULSAN PLANT) TEL: (052)280-0114 FAX: (052)287-8918
* 서울사무소 : 서울특별시 강남구 역삼동 837-38번지 (02)775-7095
SEOUL OFFICE 837-38, Yeoksam-dong, Gangnam-gu, Seoul, Korea
TEL: (02)2112-8114 FAX: (02)775-7095

검 사 증 명 서 (A)

MILL INSPECTION CERTIFICATE

검 사 증 명 서 : 859008
PAGE : 1
DATE OF ISSUE : SEP. 6, 2005. 84523102
CONTINUITY NO : 52035
COMMODITY : E.R.M. STEEL PIPE
SPECIFICATION : API 5L X42/AP1 5L X42/ASTM A53B

수 용 가
CUSTOMER:

관종 TYPE OF PIPE END	수 치 DIMENSION (OUTDIA. x THICK. x LENGTH)	수량 QUAN- TITY (PCS)	중량 WEIGHT (KG)	수용시험 HYDRO- STATIC TEST MPa PSI	도금시험 COATING TEST ZINC COAT G/M ²	금속 HARD- NESS HRC HV	인장시험 TENSILE STRENGTH YIELD STRENGTH ELONGATION PSI MPa %	화학 조성 CHEMICAL COMPOSITION C Si Mn P S Cu Ni Cr Mo V Nb Al Caq	검사 MARK
BYR 48 24"	610.0mm x 9.53mm x 6.401M	74	66,636	1180	6		34.0 50.6 52.1 38 4800 7200 74100	0.8 1.79 14.8 2.2 1.1 1r	
							35.7 50.3 52.2 39 4750 7150 7300	0.8 1.77 12.8 2.1 1.1 1r	
							34.8 51.0 53.0 39 4950 7200 75400	0.8 1.77 11.8 2.1 1.1 1r	
							32.3 48.8 51.5 37 4590 6940 7300	0.8 1.76 14.6 2.1 2.1 1r	
							32.6 49.6 51.6 38 4600 7050 73400		
TOTAL ->		74	66,636						

* RESIDUAL WORTHSK TEST : 6000

관종 TYPE OF PIPE END	수용시험 HYDRO- STATIC TEST MPa PSI	도금시험 COATING TEST ZINC COAT G/M ²	금속 HARD- NESS HRC HV	인장시험 TENSILE STRENGTH YIELD STRENGTH ELONGATION PSI MPa %	화학 조성 CHEMICAL COMPOSITION C Si Mn P S Cu Ni Cr Mo V Nb Al Caq	검사 MARK			
BYR 48 24"	610.0mm x 9.53mm x 6.401M	74	66,636	1180	6		34.0 50.6 52.1 38 4800 7200 74100	0.8 1.79 14.8 2.2 1.1 1r	
							35.7 50.3 52.2 39 4750 7150 7300	0.8 1.77 12.8 2.1 1.1 1r	
							34.8 51.0 53.0 39 4950 7200 75400	0.8 1.77 11.8 2.1 1.1 1r	
							32.3 48.8 51.5 37 4590 6940 7300	0.8 1.76 14.6 2.1 2.1 1r	
							32.6 49.6 51.6 38 4600 7050 73400		
TOTAL ->		74	66,636						

관종 TYPE OF PIPE END	수용시험 HYDRO- STATIC TEST MPa PSI	도금시험 COATING TEST ZINC COAT G/M ²	금속 HARD- NESS HRC HV	인장시험 TENSILE STRENGTH YIELD STRENGTH ELONGATION PSI MPa %	화학 조성 CHEMICAL COMPOSITION C Si Mn P S Cu Ni Cr Mo V Nb Al Caq	검사 MARK			
BYR 48 24"	610.0mm x 9.53mm x 6.401M	74	66,636	1180	6		34.0 50.6 52.1 38 4800 7200 74100	0.8 1.79 14.8 2.2 1.1 1r	
							35.7 50.3 52.2 39 4750 7150 7300	0.8 1.77 12.8 2.1 1.1 1r	
							34.8 51.0 53.0 39 4950 7200 75400	0.8 1.77 11.8 2.1 1.1 1r	
							32.3 48.8 51.5 37 4590 6940 7300	0.8 1.76 14.6 2.1 2.1 1r	
							32.6 49.6 51.6 38 4600 7050 73400		
TOTAL ->		74	66,636						

관종은 관의 규격에 합치되기를 보증합니다.
WE CERTIFY THAT THE DESCRIBED MATERIAL HAS HEREIN BEEN
ACCEPTED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER.
HYUNDAI HYSCO
SURVEYOR
HPS-B 201-831-B-011

H. J. KIM

QUALITY ASSURANCE TEAM GENERAL MGR
(250 x 200)

Polk County
Holly Hill LFA Deep Well

Submittal Number: 16
Steel casing 18" x .375"

☒ REVIEWED, NO COMMENTS	☐ REJECTED: REVISE AND RESUBMIT
☐ REVIEWED, COMMENTS AS NOTED	☐ NOT REVIEWED

REVIEW OF THIS SHOP DRAWING IS LIMITED TO GENERAL DESIGN CONCEPTS AND GENERAL COMPLIANCE WITH THE INFORMATION IN THE PROJECT PLANS AND SPECIFICATIONS ONLY, AND IS NOT INTENDED TO BE A VERIFICATION OF TOTAL MATERIAL REQUIRED OR THAT ALL ITEMS REQUIRED ARE SHOWN. REVIEW SHALL NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF DETAILS OF DESIGN, DIMENSIONS, JOB CONDITIONS, CONSTRUCTION MEANS AND METHODS, COORDINATION WITH OTHER TRADES, OR ANY OTHER REQUIREMENTS OF THE PLANS, SPECIFICATIONS OR CONTRACT. ANY NOTATIONS ON THIS SHOP DRAWING MADE BY POST, BUCKLEY, SCHUH & JERNIGAN, INC. SHALL NOT BE CONSTITUTED TO AUTHORIZE ADDITIONAL WORK OR COST.

REVIEW OF DESIGN CALCULATIONS AND DRAWINGS PREPARED BY SPECIALTY ENGINEERS IS LIMITED TO DESIGN INTENT AND DOES NOT CONSTITUTE A DETAILED CHECK OF CALCULATIONS, NOR DOES IT RELIEVE THE SPECIALTY ENGINEERS FROM THE RESPONSIBILITY OF THE DETAILING OF THE SPECIALTY COMPONENT OR SYSTEM.

POST, BUCKLEY, SCHUH & JERNIGAN, INC.

BY: *Karen Dorsey* DATE: 12-8-06

CERTIFICATE NO. : 6701059
 DATE OF ISSUE : 2006-07-13
 CONTRACT(P/O) NO. : 57867
 COMMODITY : E.R.W. STEEL PIPE
 SPECIFICATION : API 5L X42/ASME B31.3/ASTM A53B/ASME SA53B

1 of 1
 PAGE

검사 증명서(A) MILL INSPECTION CERTIFICATE

고객사 : 현대중공업
 CUSTOMER

200001053

HYUNDAI
HYSCO

현대하이스코주식회사
 HYUNDAI HYSOO

울산광역시 북구 영포동 269번지 889-040
 TEL: 92-52-280-014, FAX: 92-52-287-8918
 울산광역시 남구 역삼동 837-36번지 현대마크타워 135-080
 LANDMARK TOWER 837-36, YEONGSAM-DONG,
 GANGNAM-KU, SEOUL, KOREA
 TEL: 92-2-2112-8114, FAX: 92-2-775-7095

관공 TYPE OF PIPE END	외경 × 두께 × 길이 (OUTSIDE × THICK × LENGTH)	수량 QUANTITY (PCS)	중량 WEIGHT (KG)	수압시험 HYDRO- STATIC TEST	제조번호 HEAT NO.	화학 조성비(%) CHEMICAL COMPOSITION	인장시험 TENSILE TEST (Gage Length : 2 INCH)	충격시험 IMPACT TEST (°C)	도금시험 COATING TEST	비고 REMARK																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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NOTE 1: 1) Type of pipe End EB: End of Pipe, BE: Branch End, NB: Normal End 2) Heat Treatment G: Normalized, Q: Quenched, T: Tempered, TR: Transverse 3) Chemical Composition C: Carbon, Si: Silicon, Mn: Manganese, P: Phosphorus, S: Sulfur, Cu: Copper, Ni: Nickel, Cr: Chromium, Mo: Molybdenum, V: Vanadium, Ti: Titanium, Nb: Niobium, Al: Aluminum, CEQ: Carbon Equivalent	4) Unit: Inch (1 in = 25.4 mm) 5) Base Metal: A53B, W: Weld, P: Part, C: Coupling 6) CEQ: C + Mn/6 + (Ni + Cu)/15 + (Cr + Mo + V)/5 7) Flattening/Bend/Guided Bend Test: Flattening/Bend/Guided Bend Test 8) Flattening Test: Flattening Test 9) Flattening Test: Flattening Test 10) Flattening Test: Flattening Test 11) Flattening Test: Flattening Test 12) Flattening Test: Flattening Test 13) Flattening Test: Flattening Test 14) Flattening Test: Flattening Test 15) Flattening Test: Flattening Test 16) Flattening Test: Flattening Test 17) Flattening Test: Flattening Test 18) Flattening Test: Flattening Test 19) Flattening Test: Flattening Test 20) Flattening Test: Flattening Test 21) Flattening Test: Flattening Test 22) Flattening Test: Flattening Test 23) Flattening Test: Flattening Test 24) Flattening Test: Flattening Test 25) Flattening Test: Flattening Test 26) Flattening Test: Flattening Test 27) Flattening Test: Flattening Test 28) Flattening Test: Flattening Test 29) Flattening Test: Flattening Test 30) Flattening Test: Flattening Test 31) Flattening Test: Flattening Test 32) Flattening Test: Flattening Test 33) Flattening Test: Flattening Test 34) Flattening Test: Flattening Test 35) Flattening Test: Flattening Test 36) Flattening Test: Flattening Test 37) Flattening Test: Flattening Test 38) Flattening Test: Flattening Test 39) Flattening Test: Flattening Test 40) Flattening Test: Flattening Test 41) Flattening Test: Flattening Test 42) Flattening Test: Flattening Test 43) Flattening Test: Flattening Test 44) Flattening Test: Flattening Test 45) Flattening Test: Flattening Test 46) Flattening Test: Flattening Test 47) Flattening Test: Flattening Test 48) Flattening Test: Flattening Test 49) Flattening Test: Flattening Test 50) Flattening Test: Flattening Test 51) Flattening Test: Flattening Test 52) Flattening Test: Flattening Test 53) Flattening Test: Flattening Test 54) Flattening Test: Flattening Test 55) Flattening Test: Flattening Test 56) Flattening Test: Flattening Test 57) Flattening Test: Flattening Test 58) Flattening Test: Flattening Test 59) Flattening Test: Flattening Test 60) Flattening Test: Flattening Test 61) Flattening Test: Flattening Test 62) Flattening Test: Flattening Test 63) Flattening Test: Flattening Test 64) Flattening Test: Flattening Test 65) Flattening Test: Flattening Test 66) Flattening Test: Flattening Test 67) Flattening Test: Flattening Test 68) Flattening Test: Flattening Test 69) Flattening Test: Flattening Test 70) Flattening Test: Flattening Test 71) Flattening Test: Flattening Test 72) Flattening Test: Flattening Test 73) Flattening Test: Flattening Test 74) Flattening Test: Flattening Test 75) Flattening Test: Flattening Test 76) Flattening Test: Flattening Test 77) Flattening Test: Flattening Test 78) Flattening Test: Flattening Test 79) Flattening Test: Flattening Test 80) Flattening Test: Flattening Test 81) Flattening Test: Flattening Test 82) Flattening Test: Flattening Test 83) Flattening Test: Flattening Test 84) Flattening Test: Flattening Test 85) Flattening Test: Flattening Test 86) Flattening Test: Flattening Test 87) Flattening Test: Flattening Test 88) Flattening Test: Flattening Test 89) Flattening Test: Flattening Test 90) Flattening Test: Flattening Test 91) Flattening Test: Flattening Test 92) Flattening Test: Flattening Test 93) Flattening Test: Flattening Test 94) Flattening Test: Flattening Test 95) Flattening Test: Flattening Test 96) Flattening Test: Flattening Test 97) Flattening Test: Flattening Test 98) Flattening Test: Flattening Test 99) Flattening Test: Flattening Test 100) Flattening Test: Flattening Test
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HYUNDAI HYSOO
 INSPECTION MANAGER
 HYS - 8301 - 631 - 1 - Q1
 A4(210 X 297)

Field Copy

Polk County
Holly Hill LFA Deep Well

Submittal Number: 10
Steel casing 12" x .375"

(Previously listed as 10" x .375")

☒ REVIEWED, NO COMMENTS	☐ REJECTED; REVISE AND RESUBMIT
☐ REVIEWED, COMMENTS AS NOTED	☐ NOT REVIEWED

REVIEW OF THIS SHOP DRAWING IS LIMITED TO GENERAL DESIGN CONCEPTS AND GENERAL COMPLIANCE WITH THE INFORMATION IN THE PROJECT PLANS AND SPECIFICATIONS ONLY, AND IS NOT INTENDED TO BE A VERIFICATION OF TOTAL MATERIAL REQUIRED OR THAT ALL ITEMS REQUIRED ARE SHOWN. REVIEW SHALL NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF DETAILS OF DESIGN, DIMENSIONS, JOB CONDITIONS, CONSTRUCTION MEANS AND METHODS, COORDINATION WITH OTHER TRADES, OR ANY OTHER REQUIREMENTS OF THE PLANS, SPECIFICATIONS OR CONTRACT. ANY NOTATIONS ON THIS SHOP DRAWING MADE BY POST, BUCKLEY, SCHUH & JERNIGAN, INC. SHALL NOT BE CONSTRUED TO AUTHORIZE ADDITIONAL WORK OR COST.

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POST, BUCKLEY, SCHUH & JERNIGAN, INC.

BY: Kenn Doney DATE: 2/13/06

11/93

영리사 번호
 CERTIFICATE NO. : 7501894
 발행일자
 DATE OF ISSUE : 2007-05-28
 계약번호
 CONTRACT(P/O) NO. :
 품명
 COMMODITY : E.R.W. STEEL PIPE
 제품규격
 SPECIFICATION : API 5L X42/API 5L B PSL1/ASTM A53B/ASME SA53B

페이지
PAGE 1 of 2

검사 증명서(A)

MILL INSPECTION CERTIFICATE

고객사
CUSTOMER : 현대중공업사

20060925

현대하이스코주식회사
 HYUNDAI HYSCO

울산광역시 북구 영포동 265번지 683-040
 : #265 YUMPO-DONG, BUK-KU, ULSAN-KOREA
 TEL:82-52-280-014, FAX:82-52-287-8916
 서울특별시 강남구 역삼동 837-38번지 현대하이타워 135-1
 : LANDMARK TOWER 837-38, YEKSAM-DONG, GANGNAM-KU, SEOUL, KOREA
 TEL:82-2-2112-8114, FAX:82-2-775-7095

관형 TYPE OF PIPE END	외경 x 두께 x 길이 DIMENSION (OUTDIA x THICK x LENGTH)	수량 QUAN- TITY	중량 WEIGHT	수직시험 HYDRO- STATIC TEST	재질번호 HEAT NO.	화학 조성비율 CHEMICAL COMPOSITION														인장시험 TENSILE TEST (Gage Length : 2 INCH)				충격시험 IMPACT TEST (°C)		도금시험 COATING TEST																																																																																																																																																																																																																																																																																																																																																		
						C	SI	Mn	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	Al %0.05 이하	경도 HARD- NESS	충격시험 ABSOR- BED ENERGY	절단 SHEAR AREA	외경 중량 WEIGHT OF ZINC COAT	외경 중량 WEIGHT OF ZINC COAT																																																																																																																																																																																																																																																																																																																																																					
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NOTE 1: #1 Type of Pipe End 관종

EB:ERW Black End
 BE:ERW Black End
 NB:ERW Black End
 PS:ERW Plain End
 BE:ERW Bevel End
 TE:ERW Thread End
 SC:ERW Scaffolding

TC:Thread Coupling
 FG:Full Grooving
 VG:V-Grooving
 PC:Plain End + Coupled
 BE:Bevel End
 TE:Thread End

#2 NB-Normal Bore 外径, OD:Outside Diameter
 #3 Unit (mm, Inch)
 #4 Unit (mm, Inch)
 #5 G:GOOD
 #6 H:Heat(Ladle) Analysis 열원분석, P:Product Analysis 제품분석, W:Weld Product Analysis 용접부 제품분석
 #7 B:Base Metal 열원분석, T:Transverse 원주방향
 #8 C:Cr-Mn-Mo-V-Ni-Cu 15% (Cr+Mo+V)/5% (Cr+Mo+V) 용접부
 #9 CEQ=C-Mn/6+(Ni-Cu)/15+(Cr+Mo+V)/5 용접부
 #10 Heat Treatment 열처리
 #11 Visual & Dimension Test 육안 및 치수검사
 #12 Flaring Test 연삭시험
 #13 R-Flattening Test 반구시험
 #14 Flattening Test 평면시험
 #15 Visual & Dimension Test 육안 및 치수검사
 #16 Flaring Test 연삭시험
 #17 Crush Test 충격시험
 #18 Drift Test 휨시험
 #19 Flange Test 플랜지시험

NOTE 2: SPEC YEAR - APR 2004/ASTM 2004/ASME 2004

WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN ACCEPTED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER.
 * 본 검사증명서에 기재된 규격번호와 사양이 현행 규격에 맞는지 확인하십시오.

H. J. KIM

INSPECTION MANAGER

HYUNDAI HYSCO

HYV - 6301 - 631 - 1 - QLT

A4(210)

주요 사업 목표 H(A)

MILL INSPECTION CERTIFICATE

고객사 CUSTOMER : 현대중공업

200010001

HYUNDAI
HYSCO

현대하이스코주식회사
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 GANGNAM-KU, SEOUL, KOREA
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[illegible]

NOTE 2 • SPEC YEAR - API 2004/ASTM 2006/ASME 2004

본 제품을 전경 규격에 해당제품을 포함합니다.

WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HEREIN HAS BEEN RECEIVED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER.

본 제품은 정해진 규격에 해당제품을 포함합니다.

본 제품은 정해진 규격에 해당제품을 포함합니다.

H. J. KIM

INSPECTION MANAGER

HYS - B301 - 631 - 1 - QLT

HYUNDAI HYSDO

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APPENDIX F.

Lithology Logs



LITHOLOGIC LOG

Location: Holly Hill, NERUSA, Polk County, FL Owner: B.O.C.C./ Polk County Utilities Date Constructed: January - July 2006 Casing Depth: 12-inch to 440 feet bls Total Depth: 460 feet Drilling Method: Mud rotary Drilling Contractor: Rowe Drilling, Inc, Tampa, FL Sampling Method: Grab Samples from drill cuttings			Holly Hill UFA Monitor Well HH-MW1	
DEPTH INTERVAL		DESCRIPTION		
FROM	TO			BY
0	5	SAND, quartz, very fine to fine grained, sub-angular to subrounded, light reddish-brown.		KD
5	40	SAND, quartz, very fine to fine grain, sub-angular to subrounded, reddish-tan.		KD
40	45	SAND, quartz, very fine to fine grain, sub-angular to subrounded, light gray.		KD
45	85	SAND, quartz, very fine to fine grain, sub-angular to subrounded, reddish-tan.		KD
85	95	SAND, quartz, very fine to fine grained, sub-angular to subrounded, tan.		KD
95	100	SAND, quartz, very fine to fine grained, sub-angular to subrounded, light brown.		KD
100	220	SAND, quartz, very fine to fine grained, sub-angular to subrounded, light brown.		CT
220	230	SAND, quartz, fine to medium grain, sub-angular to subrounded, white.		CT
235	270	Sand, quartz, fine to medium grain sand, tan; trace of Clay.		KD
270	285	SAND, quartz, fine grain, sub-rounded to sub-angular; trace to little of soft reddish orange Clay.		KD
285	295	SAND, fine to medium grain, sub-rounded to sub-angular, light grey.		KD
295	345	LIMESTONE, moderately hard and friable, micritic with intraclasts (cemented limestone pieces, pellets and occasional fossil), pin point vugs, cream with orange stain.		KD
345	350	LIMESTONE, micritic, moderately hard to soft, cream to white with orange stain,		KD
350	355	SAND, quartz, fine grained, subangular to subrounded, reddish tan; trace of soft white clay.		KD
355	390	SAND, quartz, fine grained, subangular to subrounded light gray; trace of soft white clay.		KD
390	400	Sand, quartz, fine grained, sub-angular to sub-rounded; and soft gray Clay with orange mottling.		KD

400	410	No Sample	
410	420	SAND, quartz, fine grained, sub-rounded, light grey; little white, micritic limestone.	KD
420	425	Limestone, micritic, moderately hard, cream; and fine silica sand.	KD
425	437	No Sample	
437	443	LIMESTONE, micritic, moderately hard, tan; some greenish gray soft clay; trace of fine to medium grain quartz sand.	KD
443	460	DOLOMITIC LIMESTONE, micritic, hard, tan and cream.	KD

Notes:

- i) Trace = 1-10%, Little = 10 – 20%, Some = 20-35%, Much = 35-50%



LITHOLOGIC LOG

Location: Holly Hill, NERUSA, Polk County, FL Owner: B.O.C.C./ Polk County Utilities Date Drilled: May 2006 through February 2008 Drilling Method: Mud rotary/Reverse air Drilling Contractor: Rowe Drilling Company, Inc., Tampa Sampling Method: Grab samples from drill cuttings		HOLLY HILL Lower Floridan Aquifer Deep Exploratory Well	
DEPTH INTERVAL		DESCRIPTION	BY
FROM	TO		
0	30	SAND, quartz, unconsolidated, very fine, orange, well sorted, sub-rounded; trace organics.	CT
30	35	SAME AS ABOVE, except color orange becoming grayer.	CT
35	40	SAND, quartz, unconsolidated, very fine, well sorted, sub-rounded, light grey; trace organics.	CT
40	45	SAME AS ABOVE, except mottled light orange tint and grey color.	CT
45	50	SAND, quartz, unconsolidated, very fine, orange, well sorted, sub-rounded; trace organics.	CT
50	100	SAND, quartz, unconsolidated, very fine well sorted, sub-rounded, light grey; trace organics.	CT
100	110	SAND, quartz, very fine, well sorted, sub-rounded, dark grey; trace to little biotite flakes, very fine, black.	CT
110	120	SAND, fine grained, sub-rounded to sub-angular, dark grey; some biotite flakes, trace clay, soft, reddish orange.	CT
120	130	SAME AS ABOVE except decrease in clay content.	CT
130	190	SAND, quartz, very fine, well sorted, sub-rounded, light grey to white.	CT
190	220	SAND, quartz, well sorted, fine, white; trace biotite flakes, sub-rounded, black.	CT
220	240	SAND, quartz, well sorted, fine, white; trace biotite flakes.	CT
240	250	SAME AS ABOVE with trace shell.	CT
250	310	SAND, quartz, moderately well sorted, very fine to course, white; trace biotite flakes, sub-rounded, black; trace shell fragments (Molluska).	CT
310	320	SAME AS ABOVE with decrease in shell fragments.	CT
320	340	SAND, quartz, moderately well sorted, very fine to course, white; trace biotite flakes; shell fragments (Molluska).	CT
340	370	SAND, quartz, well sorted, fine, white; trace biotite flakes sub-rounded, black; shell fragments (Molluska).	CT
370	405	SAND, quartz, moderately well sorted, very fine to course, white; trace biotite flakes, sub-rounded, black; shell fragments (Molluska).	CT

405	410	LIMESTONE, buff, micritic, moderately indurated, and sand, quartz, well-sorted, coarse.	CT
410	420	LIMESTONE, buff, micritic, moderately indurated.	CT
420	440	SAME AS ABOVE	CT
440	502	NO SAMPLES AVAILABLE. NO RETURN WHILE DRILLING. Driller Reported bit drop and lost circulation at 460 ft bls Heaving sands and backfilling of borehole with sand to 436 feet followed.	CT
502	503	Limestone, micritic, poorly indurated, buff colored; trace limestone, micritic, well indurated, reddish-brown.	CT
503	525	NO SAMPLES AVAILABLE. NO RETURN WHILE DRILLING. Driller Reported sand entering borehole at 508 to 512 feet as indicated by infilling of borehole.	CT
525	530	LIMESTONE, buff, micritic, moderately indurated; trace Limestone, reddish-brown, micritic, moderately indurated.	CT
530	537	LIMESTONE, tan, micritic, poorly indurated and dolomitic limestone, dark brown, micritic, well indurated, trace Clay, blue-green, brittle.	CT
537	538	CLAY, limey, stiff, seen as a softball size of clay stuck in drill bit.	CT
538	545	DOLOMITIC LIMESTONE, dark brown, micritic, well indurated; trace limestone, buff, micritic, moderately indurated, trace calcite crystals; trace clay, blue-green, brittle.	CT
545	555	LIMESTONE, dark grey to tan, moderately indurated, micritic.	CT
555	560	DOLOSTONE, tan, micritic, well indurated; some dolomitic limestone, tan, micritic, moderately indurated.	CT
560	570	LIMESTONE, tan, micritic, well indurated; trace limestone, white, micritic, moderately indurated.	CT
570	575	DOLOMITIC LIMESTONE, tan, well indurated, micritic; trace limestone, white, moderately indurated.	CT
575	580	DOLOMITIC LIMESTONE, tan, well indurated, micritic; trace limestone, white, moderately indurated, micritic.	CT
580	595	NO SAMPLES AVAILABLE. NO RETURN WHILE DRILLING.	CT
595	600	LIMESTONE, white to mottled grey and white, soft to moderately indurated, micritic.	CT
600	605	SAME AS ABOVE, except some sparry limestone.	CT
605	610	LIMESTONE, white to mottled grey and white, soft to friable, micritic.	CT
610	615	LIMESTONE, brown, moderately indurated, micritic; with limestone, tan to white, soft to friable, micritic.	CT
615	620	LIMESTONE, white, soft to friable, bio-micritic.	CT
620	630	LIMESTONE, tan, micritic, moderately indurated, vuggy (pin sized); trace limestone, gray, moderately indurated, micritic.	CT

630	640	LIMESTONE, tan, moderately indurated, micritic.	CT
640	645	DOLOMITIC LIMESTONE, brown, micritic, moderately indurated; limestone, white, moderately indurated, micritic; limestone, tan, micritic, moderately indurated, vuggy (pin sized); trace limestone, gray, well indurated, micritic.	CT
645	690	LIMESTONE, tan, bio-micritic, moderately indurated, vuggy (pin sized); trace Limestone, grey.	CT
690	730	DOLOMITIC LIMESTONE, tan, micritic, moderately indurated, vuggy (pin sized); some limestone, white, moderately indurated, micritic.	CT
730	770	DOLOMITIC LIMESTONE, tan, bio-micritic well indurated and dolomitic limestone, white, moderately indurated micritic.	CT
770	790	DOLOMITIC LIMESTONE, tan, micritic, moderately indurated, vuggy (pin sized); trace Clay, tan & dark brown laminar bedding planes, stiff, limey (fizzes in acid).	CT
790	800	DOLOMITIC LIMESTONE, tan, micritic, moderately indurated, vuggy (pin sized); some Lignite, black, brittle; trace clay, tan & dark brown laminar bedding planes, stiff, limey (fizzes in acid).	CT
800	880	DOLOMITIC LIMESTONE, tan, micritic, well indurated; limestone, buff, micritic, moderately indurated, vuggy (pin sized); trace clay, tan & dark brown laminar bedding planes, stiff, limey (fizzes in acid).	CT
880	900	DOLOMITIC LIMESTONE, tan, micritic, well indurated; limestone, buff, micritic, moderately indurated, vuggy (pin sized).	CT
900	920	LIMESTONE, tannish-white, bio-micritic (cast of fossils observed), indurated; limestone, white, micritic, indurated.	CT
920	930	LIMESTONE, tan, bio-micritic (casts of fossils observed), well indurated; limestone, white, micritic, moderately indurated; trace Clay, dark brown, stiff, organic.	CT
930	960	DOLOMITIC LIMESTONE, tan, micritic, well indurated; limestone, white, micritic, moderately indurated; trace clay, tan & dark brown laminar bedding planes, stiff, limey (fizzes in acid).	CT
960	970	DOLOMITIC LIMESTONE, tan, micritic, well indurated.	CT
970	980	DOLOMITIC LIMESTONE, tan, micritic, well indurated; limestone, white, micritic, moderately indurated; trace clay, tan & dark brown laminar bedding planes, stiff, limey (fizzes in acid).	CT
980	990	DOLOMITIC LIMESTONE, white, micritic, well indurated; with clay, grayish to dark brown, brittle, limey (fizzes in acid).	CT

990	1,010	LIMESTONE, buff, micritic, moderately indurated, vuggy (pin sized); trace clay, tan, brittle; trace chert, dark brown.	CT
1,010	1,019	LIMESTONE, white, micritic, moderately indurated.	CT
1,019	1,020	CLAY, greenish-brown, soft; some limestone, white, micritic, poorly indurated.	CT
1,020	1,022	LIGNITE, black, brittle; with limestone, white, micritic, poorly indurated.	CT
1,022	1,024	LIMESTONE, white, micritic, moderately indurated; quartz, white to translucent.	CT
1,024	1,030	LIMESTONE, white, micritic, moderately indurated; limestone, grayish-brown, micritic, indurated.	CT
1,030	1,060	LIMESTONE, white, micritic, moderately indurated; some limestone, grayish-brown, micritic, well indurated; some lignite, fibrous, woody texture; trace clay, grayish-tan, soft.	CT
1,060	1,070	DOLOMITIC LIMESTONE, grayish-white, bio-micritic, moderately indurated; some chert, dark brown,; some quartz, white, conchoidal fractures; trace clay, grayish-tan, stiff.	CT
1,070	1,080	DOLOMITIC LIMESTONE, tan with black specs, micritic, moderately indurated; gypsum, white to clear, poorly indurated; trace chert, dark brown, massive; trace clay, grayish-tan, stiff.	CT
1,080	1,090	DOLOMITIC LIMESTONE, tan with black specs, micritic, moderately indurated; dolomitic limestone, grayish-white, micritic, moderately indurated; gypsum, white to clear, poorly indurated; trace clay, grayish-tan, stiff.	CT
1,090	1,110	SAA except with lignite, black, brittle.	CT
1,110	1,140	DOLOMITIC LIMESTONE, grayish-white, micritic, moderately indurated; with clay, tan & dark brown laminar bedding planes, stiff, limey (fizzes in acid); gypsum, white to clear, poorly indurated; some lignite, black, brittle.	CT
1,140	1,150	SAA except substantial decrease in LIGNITE.	CT
1,150	1,180	DOLOMITIC LIMESTONE, buff, micritic, moderately indurated; with clay, tan & dark brown laminar bedding planes, stiff, limey (fizzes in acid); gypsum, white to clear, friable.	CT
1,180	1,200	DOLOMITIC LIMESTONE, grayish-white, micritic, moderately indurated; gypsum, white to clear, friable; trace lignite, black, brittle; trace clay, grey, stiff; trace chert, dark brown.	CT
1,200	1,270	DOLOMITIC LIMESTONE, tan, micritic, well indurated; dolomitic limestone, buff, micritic, moderately indurated; some gypsum, white to clear, friable; trace clay, grey, stiff.	CT
1,270	1,340	DOLOMITIC LIMESTONE, brown, micritic, poorly indurated; some dolomitic limestone, buff, micritic, moderately indurated; trace gypsum, white to clear, friable.	CT

1,340	1,350	SAA except sharp increase in GYPSUM.	CT
1,350	1,360	DOLOSTONE, dark brown, micritic, well indurated; some gypsum, white to clear, friable; some dolomitic limestone, buff, micritic, moderately indurated.	CT
1,360	1,370	DOLOSTONE, dark brown, micritic, well indurated; with dolomitic limestone, buff, micritic, moderately indurated; some gypsum, white to clear, friable.	CT
1,370	1,380	LIMESTONE, tan with white specs, micritic, poorly indurated	CT
1,380	1,390	DOLOMITIC LIMESTONE, tan, micritic, well indurated; limestone, white, micritic, poorly indurated; gypsum, white to clear, friable.	CT
1,390	1,410	DOLOMITIC LIMESTONE, brown, micritic, poorly indurated; some dolomitic limestone, buff, micritic, moderately indurated; trace gypsum, white to clear, friable; trace chert, dark brown, massive, well indurated; trace clay, grayish tan, brittle; trace clay, blue-green, brittle.	CT
1,410	1,420	DOLOMITIC LIMESTONE, brown, micritic, poorly indurated; some gypsum, white to translucent, friable; trace dolomitic limestone, buff, micritic, moderately indurated; trace quartz, white to translucent.	CT
1,420	1,440	LIMESTONE, white, bio-micritic, poorly indurated; some dolomitic limestone, brown, micritic, poorly indurated; some gypsum, white to translucent, friable.	CT
1,440	1,460	LIMESTONE, white, bio-micritic, poorly indurated; lignite, black, brittle.	CT
1,460	1,470	LIMESTONE, white, bio-micritic, poorly indurated; trace dolomitic limestone, brown, micritic, poorly indurated; trace gypsum, white to translucent, friable.	CT
1,470	1,490	LIMESTONE, white, bio-micritic, (visible fossil casts), moderately indurated, LIMESTONE, grayish-white, micritic, grainy texture, poorly indurated; trace gypsum, white to translucent, friable.	CT
1,490	1,500	LIMESTONE, grayish-white, micritic, sandy texture, poorly indurated; trace gypsum, white to translucent, friable; trace limestone, white, bio-micritic, moderately indurated.	CT
1,500	1,560	LIMESTONE, grayish-white, micritic, grainy texture, poorly indurated; with limestone, grayish-white, bio-sparite (fossil casts within sparry matrix); with gypsum, white to clear, friable; some Clay, white, very soft; trace limestone, white, bio-micritic, moderately indurated; trace chert, black.	CT
1,560	1570	LIMESTONE, fossiliferous, micritic, grayish white, moderately indurated.	KD
1,570	1,580	Same as Above.	KD

1,580	1,590	DOLOMITIC LIMESTONE, micritic, well indurated, brown; little micritic, moderately indurated tan limestone; trace white anhydrite.	KD
1,590	1,600	LIMESTONE, micritic, moderately indurated, tan and light brown.	KD
1,600	1,610	DOLOMITIC LIMESTONE, micritic, well indurated, brown.	KD
1,610	1,620	DOLOSTONE, micritic, well indurated, dark brown; some tan to light brown moderately to well indurated, granular, vuggy, limestone.	KD
1,620	1,630	DOLOMITE, micritic, well indurated, dark brown; trace white anhydrite and gypsum.	KD
1,630	1,640	DOLOMITIC LIMESTONE, micritic, well indurated, brown; some white anhydrite and gypsum.	KD
1,640	1,650	DOLOMITIC LIMESTONE, micritic, well indurated, brown; trace white anhydrite and gypsum.	KD
1650	1660	DOLOMITIC LIMESTONE, micritic, well indurated, brown; trace white anhydrite and gypsum.	MR
1660	1670	DOLOMITIC LIMESTONE, micritic, well indurated, brown; some limestone, white, porous, poorly indurated; trace lignite, white anhydrite and gypsum.	MR
1670	1680	DOLOMITIC LIMESTONE, micritic, well indurated, brown; some gypsum, milky white to crystalline; trace clay, light tan to buff, firm.	MR
1680	1690	DOLOMITIC LIMESTONE, micritic, well indurated, brown; some gypsum, milky white to crystalline; trace clay, light tan to buff, firm.	MR
1690	1700	LIMESTONE, light tan, medium grained poorly indurated; some gypsum, milky white to translucent; some limey clay, tan, firm.	MR
1700	1710	Same as above.	MR
1710	1720	DOLOMITIC LIMESTONE, micritic, well indurated, brown; some limestone, light tan, porous, moderately indurated; trace gypsum.	MR
1720	1730	LIMESTONE, buff, micritic, poorly indurated; trace DOLOMITE, brown, micritic, well indurated.	MR
1730	1740	LIMESTONE, bio-micritic (casts of mollusca), poorly indurated.	MR
1740	1750	LIMESTONE, grey, micritic, poorly indurated; with LIMESTONE, buff, micritic, poorly indurated; trace anhydrite and gypsum.	CT
1750	1760	Same as above.	CT
1760	1770	LIMESTONE, buff, micritic, poorly indurated; some LIMESTONE, grey, micritic, moderately indurated; trace chert, quartz, and lignite.	CT
1770	1780	Same as above.	CT

1780	1790	LIMESTONE, grey, micritic, well indurated; with limestone, buff micritic, poorly indurated; some dolomitic limestone, tan, micritic, well indurated; trace anhydrite and gypsum.	CT
1790	1800	LIMESTONE, grey, micritic, well indurated; with limestone, buff micritic, poorly indurated.	CT
1800	1810	LIMESTONE, grey, micritic, well indurated; some limestone, mottled grey and black, micritic; trace limestone, tan, micritic, moderately indurated; trace gypsum and lignite.	CT
1810	1820	LIMESTONE, tan, micritic, moderately indurated; trace lignite.	CT
1820	1830	LIMESTONE, buff, micritic, poorly indurated to moderately indurated; some limestone, grey, micritic, moderately indurated; trace clay, white, brittle.	CT
1830	1840	Same as above.	CT
1840	1850	LIMESTONE, buff, vuggy (pin-hole sized), poorly indurated to moderately indurated; some dolomitic limestone, light tan, micritic, moderately indurated; limestone, grey, micritic, moderately indurated; trace anhydrite.	CT
1850	1860	LIMESTONE, buff, vuggy (pin-hole sized), poorly indurated to moderately indurated; some limestone, grey, micritic (mudstone), moderately indurated; trace dolomitic limestone, light tan, micritic (mudstone), moderately indurated; trace anhydrite and lignite.	CT
1860	1870	Same as above except decreasing amount of grey limestone, trace chert and no lignite.	CT
1870	1880	LIMESTONE, buff, micritic, poorly indurated to moderately indurated; some limestone, grey, micritic, moderately indurated, some clay, light tan to dark brown laminar beds visible in larger samples, limey (fizzes in acid); trace lignite and chert.	CT
1880	1890	Same as above except no clay.	CT
1890	1900	LIMESTONE, buff, micritic, poorly indurated to moderately indurated; some LIMESTONE, grey, micritic, moderately indurated.	CT
1900	1910	LIMESTONE, buff, micritic, poorly indurated to moderately indurated.	CT
1910	1920	LIMESTONE, buff, micritic, poorly indurated to moderately indurated; trace DOLOMITIC LIMESTONE, tan, micritic, indurated; trace quartz and lignite.	CT
1920	1930	LIMESTONE, buff, micritic, poorly indurated to moderately indurated; dolomitic limestone, tan, micritic, moderately indurated; trace quartz, chert and lignite.	CT
1930	1940	Same as above except no lignite or chert.	CT
1940	1950	LIMESTONE, buff, micritic, poorly indurated to moderately indurated; dolomitic limestone, tan, micritic, moderately indurated; trace quartz, chert and lignite.	CT

1950	1960	LIMESTONE, buff, micritic, poorly indurated to moderately indurated; dolomitic limestone, tan, micritic, moderately indurated; trace anhydrite, chert.	CT
1960	1970	DOLOMITIC LIMESTONE, tan, micritic, indurated; limestone, buff, micritic, poorly indurated to moderately indurated; trace anhydrite, chert.	CT
1970	1980	DOLOMITIC LIMESTONE, tan, micritic, indurated; limestone, buff, micritic, poorly indurated to moderately indurated; trace anhydrite, chert.	CT
1980	1990	Same as above.	CT
1990	2000	LIMESTONE, brown to dark brown, micritic, well indurated; trace of tan to white, moderately indurated, pelletal, micritic limestone (pelmicrite), trace of black lignite.	KD
2000	2010	LIMESTONE, tan to brown, micritic, moderately indurated.	KD
2010	2020	Same as above.	KD
2020	2030	DOLOSTONE, dark brown, micritic, well indurated.	KD
2030	2040	Dolostone and dolomitic limestone, dark brown to reddish brown, micritic, well indurated.	KD
2040	2050	Same as above.	KD
2050	2060	DOLOSTONE, dark brown, micritic, well indurated.	CT
2060	2065	Same as above.	CT
2065	2070	LIMESTONE, tan, micritic, moderately indurated.	CT
2070	2080	LIMESTONE, tan, micritic and dark brown, well indurated, micritic dolomitic limestone; trace of black lignite and anthracite; trace of white crystalline quartz, trace of black chert.	CT
2080	2090	DOLOMITIC LIMESTONE, dark brown, micritic, well indurated; some light brown, well indurated, micritic limestone; trace of black anthracite.	CT
2090	2100	DOLOMITIC LIMESTONE, dark brown, micritic, well indurated; some limestone, light brown, well indurated, micritic; trace of black anthracite and lignite; trace of white crystalline quartz.	CT
2100	2110	Same as above.	CT
2110	2120	LIMESTONE, light grey, micritic, moderately indurated; some dolomitic limestone, dark brown, micritic, well indurated; some limestone, light brown, well indurated, micritic; trace of white crystalline quartz.	CT
2120	2130	LIMESTONE, light grey, micritic, moderately indurated; some dolomitic limestone, dark brown, micritic, well indurated.	CT
2130	2140	LIMESTONE, light grey, micritic, moderately indurated; trace limestone, buff, micritic, moderately indurated trace dolomitic limestone, dark brown, micritic, well indurated.	CT
2140	2150	LIMESTONE, light grey, micritic, moderately indurated; some limestone, buff, micritic, poorly indurated.	CT

2150	2160	LIMESTONE, light grey, micritic, moderately indurated; limestone, buff, micritic, poorly indurated; trace amounts of lignite and quartz.	CT
2160	2170	LIMESTONE, light grey, micritic, moderately indurated; limestone, buff, micritic, poorly indurated.	CT
2170	2180	LIMESTONE, light grey, micritic, moderately indurated; some limestone, buff, micritic, poorly indurated; trace amounts of lignite.	CT
2180	2190	LIMESTONE, light grey, micritic, moderately indurated; some limestone, buff, micritic, poorly indurated; trace amounts of dolomitic limestone, light brown, micritic indurated and lignite.	CT
2190	2200	LIMESTONE, light grey, micritic, moderately indurated; some limestone, buff, micritic, poorly indurated; trace amounts of dolomitic limestone, light brown, micritic indurated and lignite.	CT
2200	2210	LIMESTONE, light grey, micritic, poorly indurated; some limestone, light grey, micritic, moderately indurated trace amounts of dolomitic limestone, light brown, micritic indurated and lignite.	CT
2210	2220	LIMESTONE, light grey, micritic, poorly indurated; some limestone, buff, micritic, moderately indurated trace amounts of dolomitic limestone, light brown, micritic indurated.	CT
2220	2230	LIMESTONE, light grey, micritic, poorly indurated; trace limestone, buff, micritic, moderately indurated.	CT
2230	2240	LIMESTONE, grey, micritic, poorly indurated; some limey clay, grey to dark grey, stiff; trace dolomitic limestone, brown, micritic, moderately indurated.	CT
2240	2250	LIMESTONE, grey, micritic, poorly indurated; some gypsum; some limey clay, grey to dark grey, stiff, indurated; trace dolomitic limestone, brown, micritic, moderately indurated.	CT
2250	2260	LIMESTONE, grey, micritic, poorly indurated to moderately indurated; some gypsum; some limey clay, grey to dark grey, stiff; trace dolomitic limestone, brown, micritic, moderately indurated.	CT
2260	2270	LIMESTONE, grey, micritic, poorly indurated; some gypsum; trace limestone, buff, micritic, moderately indurated; trace dolomitic limestone, brown, micritic, moderately indurated.	CT
2270	2280	LIMESTONE, grey, micritic, poorly indurated; some gypsum; trace limestone, buff, micritic, moderately indurated; trace dolomitic limestone, brown, micritic, moderately indurated.	CT

2280	2290	LIMESTONE, dark grey, micritic, poorly indurated; trace gypsum; trace limestone, buff, micritic, moderately indurated; trace dolomitic limestone, brown, micritic, moderately indurated; trace quartz.	CT
2290	2300	LIMESTONE, dark grey, micritic, poorly indurated; some gypsum; trace limestone, tan, vuggy (pin-hole sized), moderately indurated; trace dolomitic limestone, brown, micritic, moderately indurated.	CT
2300	2310	LIMESTONE, dark grey, micritic, poorly indurated; some gypsum; trace limestone, tan, micritic, moderately indurated.	CT
2310	2320	LIMESTONE, dark grey, micritic, poorly indurated; some gypsum; trace limestone, tan, micritic, indurated.	CT
2320	2330	LIMESTONE, dark grey, micritic, poorly indurated; with limestone, light grey, micritic, moderately indurated; trace limestone, tan, micritic, moderately indurated.	CT
2330	2340	LIMESTONE, dark grey, micritic, poorly indurated; with limestone, buff, micritic, moderately indurated; trace limestone, tan, micritic, indurated; trace gypsum.	CT
2340	2350	LIMESTONE, dark grey, micritic, poorly indurated; with limestone, buff, micritic, moderately indurated; trace limestone, tan, micritic, indurated; trace clay, dark grey, brittle; trace gypsum.	CT
2350	2360	LIMESTONE, light grey, micritic, poorly indurated; with Clay, grey, stiff; trace gypsum.	CT
2360	2370	LIMESTONE, grey, micritic, poorly indurated; with Clay, dark grey, stiff.	CT
2370	2380	LIMESTONE, grey, micritic, poorly indurated; trace limestone, buff, micritic, moderately indurated; trace Clay, dark grey, stiff; trace gypsum.	CT
2380	2390	LIMESTONE, grey, micritic, poorly indurated; some limestone, mottled grey and black, micritic, poorly indurated; trace Clay, white, soft, pliable; trace gypsum.	CT
2390	2400	Same as above.	CT
2400	2410	LIMESTONE, grey, micritic, poorly indurated; some limestone, light grey, micritic, poorly indurated; trace limestone, white, micritic, poorly indurated; trace gypsum.	CT
2410	2420	LIMESTONE, very light grey, mudstone, poorly indurated; some limestone, grey, micritic, poorly indurated; trace limestone, white, micritic, poorly indurated.	CT
2420	2430	LIMESTONE, clayey, very light grey, poorly indurated; some limestone, grey, micritic, poorly indurated; trace gypsum.	CT
2430	2440	LIMESTONE, clayey, very light grey, poorly indurated; some limestone, grey, micritic, poorly indurated; trace limestone, buff, micritic, poorly indurated; trace gypsum.	CT

2440	2450	LIMESTONE, clayey, very light grey, poorly indurated; some limestone, grey, micritic, poorly indurated; trace gypsum.	CT
2450	2470	LIMESTONE, clayey, very light grey, poorly indurated; some limestone, grey, micritic, poorly indurated; trace gypsum.	CT

Notes:

- i) Trace = 0-10%, Little=10-20%, Some =20-35%, and Much = 35-50%

APPENDIX G.

Geophysical Logs

APPENDIX H.

Video Survey

APPENDIX I.

Core Analysis Reports

CORE ANALYSIS REPORT
FOR
ROWE DRILLING COMPANY
NERUSA HOLLY HILL LFA DEEP WELL
POLK COUNTY, FLORIDA

These analyses, opinions or interpretations are based on observations and materials supplied by the client to whom; and for whose exclusive and confidential use; this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories (all errors and omissions excepted); but Core Laboratories and its officers and employees, assume no responsibility and make no warranty or representations, as to the productivity, proper operations, or profitableness of any oil, gas or other mineral well or formation in connection with which such report is used or relied upon.



Petroleum Services Division

2001 Commerce
Midland, Texas 79703
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www.corelab.com

May 10, 2007

ROWE DRILLING COMPANY, INC.
10014 N. Dale Mabry Hwy.
Suite 205
Tampa, Florida 33618

File No.: 57181-19307
Subject: Core Analysis
Nerusa Holly Hill LFA Deep Well
Undesignated Field
Polk County, Florida

Gentlemen:

The subject well was cored using diamond coring equipment and brine to obtain 4 inch diameter cores from 848 to 1278 feet from the undesignated formation.

Core analysis data is presented in tabular form for your convenience.

We trust these data will be useful in the evaluation of your property and thank you for the opportunity of serving you.

Very truly yours,
CORE LABORATORIES

John Sebian
Laboratory Supervisor

JS/ym

ROWE DRILLING COMPANY, INC.
Nerusa Holly Hill LFA Deep Well
File No. 57181-19307
Procedural Page

The cores were transported to Midland by Rowe Drilling Company, Inc. personnel.

Core analysis was made on selected intervals requested on full diameter samples.

Fluid removal was achieved using convection oven drying.

Full diameter porosity was determined by direct pore volume measurement using Boyle's law helium expansion. Bulk volume was measured by Archimedes Principles. Grain density was calculated from dry weight, bulk volume and pore volume measurements.

$$\text{Grain Density} = \frac{\text{Dry Weight}}{\text{Bulk Vol.} - \text{Pore Vol.}}$$

Steady State Air Permeability was measured in two horizontal directions and vertically while the core was confined in a Hassler rubber sleeve at 400 psi confining stress.

The core was boxed after analysis.

The core will be returned to Rowe Drilling Company, Inc. upon completion of analysis.

CORE LABORATORIES

File No.: 57181-19307
 Date : 5/9/07
 API No. :
 Analysts: FULLINWIDER

Field :
 Formation :
 Coring Fluid :
 Elevation :

Company : ROWE DRILLING COMPANY
 Well : NERUSA HOLLY HILL LFA DEEP WELL
 Location :
 Co,State : POLK COUNTY, FLORIDA

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY		POROSITY (HELIUM) %	GRAIN DENSITY gm/cc	DESCRIPTION
		(MAXIMUM) Kair md	(90 DEG) Kair md			
1	848.0- 49.0	6.33	3.98	18.7	2.83	Dolo, pp, foss, mineral flu no cut
1A	1050.0- 51.0	43.4	39.8	46.5	2.78	Dolo, vug, foss, 0% flu no cut
2	1135.0- 36.0	9.66	9.46	28.7	2.84	Dolo, sl vug, foss, mineral flu no cut
3	1277.0- 78.0	66.9	1.76	17.7	2.83	Dolo, vug, foss, 0% flu no cut

CORE LABORATORIES

CODE KEY - DESCRIPTIONS

a	= Plug from full diameter sample		
anhy	= Anhydrite		
AST	= Appears similar to		
bk	= Break		
bldr	= Boulder		
c	= Coarse		
calc	= Calcite (areous)		
carb	= Carbonaceous		
cbt	= Cobble		
CEC	= Cation exchange capacity		
cem	= Cemented		
cg	= Conglomerate		
cht	= Chert		
coal	= Coal/Coal Inclusion		
dol	= Dolomite		
f	= Fine		
fest	= Ironstone		
foss	= Fossil (iferous)		
frac	= Fracture		
fri	= Friable		
glau	= Glauconite (ic)		
grn	= Granule		
gyp	= Gypsum		
hfrac	= Horizontal fracture		
hal	= Halite (Salt)		
inc	= Intergranular		
lam	= Inclusions		
lmy	= Laminar (Laminated)		
ls	= Limestone		
lv	= Large vug		
m	= Medium		
mi	= Mud invaded		
mic	= Micaceous		
mshy	= Moderately shaly (20-40%)		
mv	= Medium vug		
NA	= Not analysed by request		
NP	= No permeability measurement		
NR	= Not received		
ool	= Oolitic		
OB	= Overburden		
p	= Preserved for future studies		
pb	= Pebble		
PET	= Removed for petrographic analysis		
POA	= Portion removed for oil analysis		
ppv	= Pinpoint Vug		
PSA	= Particle size analysis		
pyr	= Pyrite (ic)		
pyrbt	= Pyrobitumen		
SA	= Sieve Analysis		
sd	= Sand		
SEM	= Scanning electron microscope analysis		
sh	= Shale		
shy	= Moderately shaly (20-40%)		
silt	= Siltstone		
sily	= Silty		
SP	= Small plug		
ss	= Sandstone		
shy	= Slightly Shaly (<20%)		
sty	= Stylolite (ic)		
sulf	= Sulphur		
sv	= Small vug		
tr	= Trace		
TS	= Thin section		
uncons	= Unconsolidated		
vfrac	= Vertical fracture		
vf	= Very fine		
VOB	= Vertical overburden sample		
vshy	= Very shaly (>40%)		
VSP	= Vertical small plug		
vug	= Vuggy (ular)		
ws	= Water sand		
XRD	= X-ray diffraction		

CORE ANALYSIS REPORT
FOR
ROWE DRILLING COMPANY, INC.
NERUSA HOLLY HILL LFA DEEP
POLK COUNTY, FLORIDA

These analyses, opinions or interpretations are based on observations and materials supplied by the client to whom; and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories (all errors and omissions excepted); but Core Laboratories and its officers and employees, assume no responsibility and make no warranty or representations, as to the productivity, proper operations, or profitableness of any oil, gas or other mineral well or formation in connection with which such report is used or relied upon.



Petroleum Services Division

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June 15, 2007

ROWE DRILLING COMPANY, INC.
225 N. Commonwealth A
Polk City, Florida 33868

File No.: 57181-19307
Subject: Core Analysis
Nerusa Holly Hill LFA Deep Well
Undesignated Field
Polk County, Florida

Gentlemen:

The subject well was cored using diamond coring equipment and brine to obtain 4 inch diameter cores from 1906 to 1916 feet from the undesignated formation.

Core analysis data is presented in tabular form for your convenience.

We trust these data will be useful in the evaluation of your property and thank you for the opportunity of serving you.

Very truly yours,
CORE LABORATORIES

Dean Fullinwider
Project Coordinator

DF/ym

ROWE DRILLING COMPANY, INC.
Nerusa Holly Hill LFA Deep Well
File No. 57181-19307
Procedural Page

The cores were transported to Midland by Rowe Drilling Company, Inc. personnel.

Core analysis was made on selected intervals requested on full diameter samples.

Fluid removal was achieved using convection oven drying.

Full diameter porosity was determined by direct pore volume measurement using Boyle's law helium expansion. Bulk volume was measured by Archimedes Principles. Grain density was calculated from dry weight, bulk volume and pore volume measurements.

$$\text{Grain Density} = \frac{\text{Dry Weight}}{\text{Bulk Vol.} - \text{Pore Vol.}}$$

Steady State Air Permeability was measured in two horizontal directions and vertically while the core was confined in a Hassler rubber sleeve at 400 psi confining stress.

The core was boxed after analysis.

The core will be returned to Rowe Drilling Company, Inc. upon completion of analysis.

CORE LABORATORIES

Company : ROWE DRILLING COMPANY, INC.
 Well : NERUSA HOLLY HILL LFA DEEP
 Location :
 Co. State : POLK COUNTY, FLORIDA

Field :
 Formation :
 Coring Fluid :
 Elevation :

File No.: 57181-19307
 Date : 6/15/07
 API No. :
 Analysts: FULLINWIDER

C O R E A N A L Y S I S R E S U L T S

SAMPLE NUMBER	DEPTH ft	PERMEABILITY			POROSITY (HELIUM) %	GRAIN DENSITY gm/cc	DESCRIPTION
		(MAXIMUM) K _{air} md	(90 DEG) K _{air} md	(VERTICAL) K _{air} md			
5	1906.0- 16.0	1.06	0.98	0.92	7.8	2.83	Dolo, vug, moldic, 0% flu

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ROWE DRILLING COMPANY, INC.
ATTN: TRICIA CROSSLEY
225 N. COMMONWEALTH A
POLK CITY FL 33868

CORE ANALYSIS REPORT
FOR
ROWE DRILLING COMPANY, INC.
NERUSA HOLLY HILL LFA DEEP
UNDESIGNATED FIELD
POLK COUNTY, FLORIDA

These analyses, opinions or interpretations are based on observations and materials supplied by the client to whom; and for whose exclusive and confidential use; this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories (all errors and omissions excepted); but Core Laboratories and its officers and employees, assume no responsibility and make no warranty or representations, as to the productivity, proper operations, or profitableness of any oil, gas or other mineral well or formation in connection with which such report is used or relied upon.



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September 6, 2007

ROWE DRILLING COMPANY, INC.
225 N. Commonwealth A
Polk City, Florida 33868

File No.: 57181-19307
Subject: Core Analysis
Nerusa Holly Hill LFA Deep Well
Undesignated Field
Polk County, Florida

Gentlemen:

The subject well was cored using diamond coring equipment and brine to obtain 4 inch diameter core from 2468.5 feet from the undesignated formation.

Core analysis data is presented in tabular form for your convenience.

We trust these data will be useful in the evaluation of your property and thank you for the opportunity of serving you.

Very truly yours,
CORE LABORATORIES

John Sebian
Laboratory Supervisor

JS/ym

ROWE DRILLING COMPANY, INC.
Nerusa Holly Hill LFA Deep Well
File No. 57181-19307
Procedural Page

The cores were transported to Midland by Rowe Drilling Company, Inc. personnel.

Core analysis was made on selected intervals requested on full diameter samples.

Fluid removal was achieved using convection oven drying.

Full diameter porosity was determined by direct pore volume measurement using Boyle's law helium expansion. Bulk volume was measured by Archimedes Principles. Grain density was calculated from dry weight, bulk volume and pore volume measurements.

$$\text{Grain Density} = \frac{\text{Dry Weight}}{\text{Bulk Vol.} - \text{Pore Vol.}}$$

Steady State Air Permeability was measured in two horizontal directions and vertically while the core was confined in a Hassler rubber sleeve at 400 psi confining stress.

The core was boxed after analysis.

The core will be returned to Rowe Drilling Company, Inc. upon completion of analysis.

CORE LABORATORIES

Company : ROWE DRILLING COMPANY, INC.
 Well : NERUSA HOLLY HILL LFA DEEP
 Location :
 Co, State : POLK COUNTY, FLORIDA

Field : UNDESIGNATED FIELD
 Formation :
 Coring Fluid :
 Elevation :

File No.: 57181-19307
 Date : 9/6/07
 API No. :
 Analysts: SEBIAN

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY		POROSITY (HELIUM) %	GRAIN DENSITY gm/cc	DESCRIPTION
		(MAXIMUM) K_{air} md	(90 DEG) K_{air} md (VERTICAL) K_{air} md			
6	2468.5- 68.8	8.18	7.92	5.86	25.8	2.76 Lim, dol, lam

CORE LABORATORIES

CODE KEY - DESCRIPTIONS

a	= Plug from full diameter sample	i	= Intergranular	SCAL	= Removed for special core analysis
anhy	= Anhydrite	inc	= Inclusions	sdv	= Sandy
AST	= Appears similar to	lam	= Laminar (Laminated)	SEM	= Scanning electron microscope analysis
bk	= Break	lmy	= Limestone	sh	= Shale
bldr	= Boulder	lv	= Large vug	shy	= Moderately shaly (20-40%)
c	= Coarse	m	= Medium	siltst	= Siltstone
calc	= Calcite (areous)	mi	= Mud invaded	slty	= Silty
carb	= Carbonaceous	mic	= Micaceous	SP	= Small plug
cb	= Cobble	mshy	= Moderately shaly (20-40%)	ss	= Sandstone
CCC	= Cation exchange capacity	mv	= Medium vug	sshy	= Slightly shaly (<20%)
cem	= Cemented	NA	= Not analyzed by request	sty	= Styrolite (ic)
cg	= Conglomerate	NP	= No permeability measurement	sulf	= Sulphur
cht	= Chert	NR	= Not received	sv	= Small vug
coa	= Coal/Coal Inclusion	ool	= Oolitic	tr	= Trace
dol	= Dolomite	OB	= Overburden	TS	= Thin section
f	= Fine	P	= Preserved for future studies	Uncons	= Unconsolidated
fest	= Ironstone	pbl	= Pebble	vfrac	= Vertical fracture
foss	= Fossil (iferous)	PET	= Removed for petrographic analysis	vf	= Very fine
frac	= Fracture	POA	= Portion removed for oil analysis	VOB	= Vertical overburden sample
fr	= Friable	ppv	= Pinpoint vug	vshy	= Very shaly (>40%)
glauc	= Glaucinite (ic)	PSA	= Particle size analysis	VSP	= Vertical small plug
grn	= Granule	pyr	= Pyrite (ic)	vug	= Vuggy (ular)
gyp	= Gypsum	pyrbt	= Pyrobitumen	ws	= Water sand
hfrac	= Horizontal fracture	SA	= Sieve Analysis	XRD	= X-ray diffraction
hal	= Halite (Salt)				

APPENDIX J.

Packer Test Field

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida

Table of Field Measurements 1,083 Packer							
Time	Totalizer (gal)	Totalizer Pump Rate (gpm)	Packer (psi)	CONDUCTIVITY (μ S/cm)	TDS (mg/L)	TEMP (°C)	H ₂ S (mg/L)
12:14	2428940		360				
12:26	2434140	433		338	169	27.6	0.0
12:52			360	322	162	27.6	0.3
13:17	2452720	364					
14:32	2479940	363	340	347	173	27.3	0.3
15:36	2503446	367	340	350	175	26.7	0.5
16:15	2517667	365	340	349	175	26.1	0.5

NA = not available

TDS is total dissolved solids

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida

Table of Field Measurements 1,605 Packer							
Time	Totalizer (gal)	Totalizer Pump Rate (gpm)	Packer (psi)	CONDUCTIVITY (μ S/cm)	TDS (mg/L)	TEMP (°C)	H ₂ S (mg/L)
9:35	2313605		400				
9:49	2317170	255	400	561	281	29.7	1.5
10:44				541	271	30.8	
11:07	2337700	267	400	538	269	33.0	0.9
11:33				541	270	32.9	0.9
12:00	2351540	261	400	544	272	32.4	0.9
12:43	2362900	264	400	544	272	32.9	0.9
13:00			400	545	273	32.8	0.8
14:00	2383100	262	400	538	269	33.4	0.7
15:00	2398790	262	400	556	278	31.8	0.7
15:30	2406750	265	400	558	279	31.1	0.7
16:00	2414640	263	400	550	275	32.3	0.7
16:30	2422450	260	400	553	277	32.0	0.7

NA = not available

TDS is total dissolved solids

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida

Table of Field Measurements 1,951 Packer							
Time	Totalizer (gal)	Totalizer Pump Rate (gpm)	Packer (psi)	CONDUCTIVITY (μ S/cm)	TDS (mg/L)	TEMP ($^{\circ}$ C)	H ₂ S (mg/L)
9:26			400	490	245	29.2	0.5
9:27	2242340		400				
9:59	2245450	97	400	539	270	28.6	2.0
10:28	2248364	100					
10:30							
10:31	2248775	137					
10:49	2251285	139	400	543	272	28.9	1.0
11:07	2254001	151	400	542	271	28.9	1.0
11:25	2256640	147	400	554	277	29.3	1.5
11:43	2259285	147	400	533	266	30.1	1.5
12:08	2262965	147	400	539	270	29.8	1.5
12:40	2267655	147	400	534	269	29.0	1.5
12:57	2270750	182	400	536	268	30.0	2.0
13:30	2277295	198	400	530	265	30.1	2.0
14:15	2286120	196	400	540	270	29.1	1.5
14:50	2293305	205	400	537	269	29.9	1.5
15:40	2302930	160	400	527	264	31.5	1.0
16:40	2313610	178	400	547	274	34.7	1.0

NA = not available

TDS is total dissolved solids

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida

Table of Field Measurements 2,260 Packer						
Time	Totalizer (gal)	Totalizer Pump Rate (gpm)	Packer (psi)	CONDUCTIVITY (μ S/cm)	TDS (mg/L)	TEMP (°C)
9:30	2517675		300			
9:39	2517938	29	295	500	250	28.5
10:03	2518610	28				
10:20	2519940	78	290	402	201	27.9
10:40	2521482	77				
11:00	2523720	112	295	415	208	28.0
11:33	2527320	109	305	419	210	28.2
12:17			305	423	212	28.9
12:51	2536956	124	305	427	213	28.7
13:26			305	420	210	30.1
13:54	2544490	120	300	426	213	29.4
14:23			300	439	219	29.6
14:52	2551344	111	300	446	223	28.5
15:12			300	445	223	28.4
15:40			300	448	224	29.5
16:00	2557180	86	300	457	228	28.8
16:30			300	448	224	30.6

NA = not available

TDS is total dissolved solids

APPENDIX K.

Packer Test Laboratory Analytical Reports

Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida

Packer Tests - Laboratory Analytical Results									
Test	Interval	Date Sampled	Time	Total Chlorides mg/L	Dissolved Calcium as Ca (mg/L)	Conductivity μ S/cm	Sulfate (SO4) mg/L	Total Dissolved Solids mg/L	Total Hardness as CaCO ₃ (mg/l)
1	Above 1,083 ft.-bls	7/23/2007	16:30	10.5	56.2	350.0	19.9	160.0	177.0
2	Below 1,605 ft.-bls	7/16/2007	16:30	15.6	79.5	530.0	127.0	428.0	288.0
3	Below 1,951 ft.-bls	7/11/2007	16:30	15.0	77.9	499.0	112.0	366.0	272.0
4	Below 2,263 ft.-bls	7/26/2007	17:00	15.0	65.8	418.0	72.1	306.0	214.0

Florida Analytical Inc.

4320 Old Highway 37, Lakeland, FL 33813

Tel. (863) 646-8526 Fax (863) 646-1042



PO #:

CASE NARRATIVE

SENT TO: ROWE DRILLING
JOHNNY WILLS
P.O. BOX 1098
POLK CITY, FL 33868
863-984-3100
CLIENT CODE: ROWE

REPORT ID : 0707000536
PROJECT NO. :
PELA CONTACT :
RECEIVED DATE : 07/24/07
REPORTED DATE : 08/03/07

Report Summary:

Sampling, handling, and holding time criteria were met for all samples, unless otherwise noted.

Qualifier Key

- B Result based on colony counts outside the acceptable range. (microbiology)
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit
- J Estimated value, value is not accurate; to be used when:
 - 1. Surrogate recovery limits have been exceeded
 - 2. No known quality control criterion exists
 - 3. Report value failed to meet established QC criteria
 - 4. Sample matrix interference precludes accurate determination
 - 5. Data is questionable due to improper lab or field protocols
- Q Sample held beyond the accepted holding time
- U Compound was analyzed for but not detected
- Y Laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate
- Z Too many colonies were present (TNTC); the numeric value represents the filtration volume

LAB NUMBER:

KH13286


William D. Snyder
SIGNATORY AUTHORITY

CERTIFICATE OF RESULTS

Sample integrity certified prior to analysis. Samples collected by Florida Analytical Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004). Uncertainties in test results are available upon request. Test results meet all requirements of the NELAP Standards, except as noted in the Case Narrative. This report may not be reproduced in part, results relate only to items tested. This report includes a case narrative, report of analysis, attachments, and chain of custody.

Florida Analytical Inc.

4320 Old Highway 37, Lakeland, FL 33813

Tel. (863) 646-8526 Fax (863) 646-1042

**REPORT OF ANALYSIS****Report ID:** 0707000536

CLIENT NAME : ROWE DRILLING
IDENTIFICATION : 1083 P HOLLY HILL
SITE : HOLLY HILL
TYPE : WATER

COLLECTION DATE : 07/23/07
COLLECTION TIME : 16:30
DATE RECEIVED IN LAB: 07/24/07

PARAMETER	METHOD	DETECTION LIMITS	RESULTS	UNITS	ANALYST	TIME/DATE STARTED
INORGANICS						
<u>KH13286-02I</u> CHLORIDE	EPA 300.0	0.25	<u>10.5</u>	mg/L	KER	1:30 07/25/07
<u>KH13286-01P</u> DISSOLVED CALCIUM AS CA	EPA 200.7	0.02	<u>56.2</u>	mg/L	SMW	11:29 08/01/07
<u>KH13286-03R</u> LAB SPECIFIC CONDUCTANCE	EPA 120.1	1	<u>350</u>	umhos/cm	BGM	15:00 07/25/07
<u>KH13286-02I</u> SULFATE	EPA 300.0	0.21	<u>19.9</u>	mg/L	KER	1:30 07/25/07
<u>KH13286-01Q</u> TOTAL DISSOLVED SOLIDS	EPA 160.1	1	<u>160</u>	mg/L	BGM	15:00 07/26/07
<u>KH13286-01P</u> TOTAL HARDNESS AS CaCO ₃	SM 2340 B	1	<u>177</u>	mg/L	SMW	11:32 08/01/07

DETECTION LIMITS REPORTED ARE METHOD DETECTION LIMITS WHICH MAY VARY WITH MATRIX AND CONCENTRATION.

Field Parameters if Reported :

Specific Conductance (Micromhos): N/A
pH (std units): N/A
Water Temp (Degrees C): N/A
Dissolved Oxygen (mg/L): N/A
Water Level (Ft): N/A
Well Elev (Ft NGVD): N/A
Field Turbidity (NTU): N/A
Field Color (PCU): N/A
Facility GWS #:

IDENTIFICATION : 1083 P HOLLY HILL

Florida Analytical Inc.

4320 Old Highway 37, Lakeland, FL 33813

Tel. (863) 646-8526 Fax (863) 646-1042



PO #:

CASE NARRATIVE

SENT TO: ROWE DRILLING
JOHNNY WILLS
P.O. BOX 1098
POLK CITY, FL 33868
863-984-3100
CLIENT CODE: ROWE

REPORT ID : 0707000536
PROJECT NO. :
PELA CONTACT :
RECEIVED DATE : 07/24/07
REPORTED DATE : 08/03/07

Report Summary:

Sampling, handling, and holding time criteria were met for all samples, unless otherwise noted.

Qualifier Key

- B Result based on colony counts outside the acceptable range, (microbiology)
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit
- J Estimated value, value is not accurate; to be used when:
 - 1. Surrogate recovery limits have been exceeded
 - 2. No known quality control criterion exists
 - 3. Report value failed to meet established QC criteria
 - 4. Sample matrix interference precludes accurate determination
 - 5. Data is questionable due to improper lab or field protocols
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected
- Y Laboratory analysis was from an unpreserved or improperly preserved sample
- The data may not be accurate
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

LAB NUMBER:

KH13286


William D. Snyder
SIGNATORY AUTHORITY

CERTIFICATE OF RESULTS

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Florida Analytical Inc.

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PO #:

CASE NARRATIVE

SENT TO: ROWE DRILLING
JOHNNY WILLS
P.O. BOX 1098
POLK CITY, FL 33868
863-984-3100
CLIENT CODE: ROWE

REPORT ID : 0707000535
PROJECT NO. :
PELA CONTACT :
RECEIVED DATE : 07/17/07
REPORTED DATE : 07/27/07

Report Summary:

Sampling, handling, and holding time criteria were met for all samples, unless otherwise noted.

Qualifier Key:

B Result based on colony counts outside the acceptable range, (microbiology)
I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

J Estimated value, value is not accurate; to be used when:

1. Surrogate recovery limits have been exceeded
2. No known quality control criterion exists
3. Report value failed to meet established QC criteria
4. Sample matrix interference precludes accurate determination
5. Data is questionable due to improper lab or field protocols.

Q Sample held beyond the accepted holding time

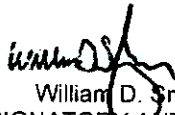
U Compound was analyzed for but not detected

Y Laboratory analysis was from an unpreserved or improperly preserved sample
The data may not be accurate

Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

LAB NUMBER:

KH12777


William D. Snyder
SIGNATORY AUTHORITY

CERTIFICATE OF RESULTS

Sample integrity certified prior to analysis. Samples collected by Florida Analytical Inc. are in accordance to DEP-SOP-001/01 (Revised February 1, 2004). Uncertainties in test results are available upon request. Test results meet all requirements of the NELAC Standards, except as noted in the Case Narrative. This report may not be reproduced in part, results relate only to items tested. This report includes a case narrative, report of analysis, attachments, and chain of custody.

Florida Analytical Inc.

4320 Old Highway 37, Lakeland, FL 33813

Tel. (863) 646-8526 Fax (863) 646-1042

**REPORT OF ANALYSIS****Report ID:** 0707000535

CLIENT NAME : ROWE DRILLING
IDENTIFICATION : 1605P-HH1
SITE : HOLLY HILL LFA DEW
TYPE : WATER

COLLECTION DATE : 07/16/07
COLLECTION TIME : 16:30
DATE RECEIVED IN LAB: 07/17/07

PARAMETER	METHOD	DETECTION LIMITS	RESULTS	UNITS	ANALYST	TIME/DATE STARTED
INORGANICS						
<u>KH12777-02I</u> CHLORIDE	EPA 300.0	0.25	<u>15.6</u>	mg/L	KER	15:00 07/21/07
<u>KH12777-01P</u> DISSOLVED CALCIUM AS CA	EPA 200.7	0.02	<u>79.5</u>	mg/L	SMW	10:54 07/24/07
<u>KH12777-03R</u> LAB SPECIFIC CONDUCTANCE	EPA 120.1	1	<u>530</u>	umhos/cm	BGM	9:30 07/19/07
<u>KH12777-02I</u> SULFATE	EPA 300.0	0.21	<u>127</u>	mg/L	KER	17:46 07/24/07
<u>KH12777-01Q</u> TOTAL DISSOLVED SOLIDS	EPA 160.1	1	<u>428</u>	mg/L	BGM	10:00 07/23/07
<u>KH12777-01P</u> TOTAL HARDNESS AS CaCO ₃	SM 2340 B	1	<u>288</u>	mg/L	SMW	10:50 07/24/07

DETECTION LIMITS REPORTED ARE METHOD DETECTION LIMITS WHICH MAY VARY WITH MATRIX AND CONCENTRATION.

Field Parameters if Reported :

Specific Conductance (Micromhos): N/A
pH (std units): N/A
Water Temp (Degrees C): N/A
Dissolved Oxygen (mg/L): N/A
Water Level (Ft): N/A
Well Elev (Ft NGVD): N/A
Field Turbidity (NTU): N/A
Field Color (PCU): N/A
Facility GWS #: N/A

IDENTIFICATION : 1605P-HH1

PCL XL error

Warning: IllegalMediaSource

Florida Analytical Inc.

4320 Old Highway 37, Lakeland, FL 33813

Tel. (863) 646-8526 Fax (863) 646-1042



PO #:

CASE NARRATIVE

SENT TO: ROWE DRILLING
JOHNNY WILLS
P.O. BOX 1098
POLK CITY, FL 33868
863-984-3100
CLIENT CODE: ROWE

REPORT ID : 0707000534
PROJECT NO. :
PELA CONTACT :
RECEIVED DATE : 07/12/07
REPORTED DATE : 07/20/07

Report Summary:

Sampling, handling, and holding time criteria were met for all samples, unless otherwise noted.

Qualifier Key

- B Result based on colony counts outside the acceptable range, (microbiology)
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit
- J Estimated value, value is not accurate, to be used when
 - 1 Surrogate recovery limits have been exceeded
 - 2 No known quality control criterion exists
 - 3 Report value failed to meet established QC criteria
 - 4 Sample matrix interference precludes accurate determination
 - 5 Data is questionable due to improper lab or field protocols
- Q Sample held beyond the accepted holding time
- U Compound was analyzed for but not detected
- Y Laboratory analysis was from an unpreserved or improperly preserved sample
- The data may not be accurate
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume

LAB NUMBER:

KH12551

Keith Rice for us
William D. Snyder
SIGNATORY AUTHORITY

CERTIFICATE OF RESULTS

Sample integrity certified prior to analysis. Samples collected by Florida Analytical Inc. are in accordance to DEP-SOP-001/01 (Revised February 1, 2004). Uncertainties in test results are available upon request. Test results meet all requirements of the NELAC Standards, except as noted in the Case Narrative. This report may not be reproduced in part, results relate only to items tested. This report includes a case narrative, report of analysis, attachments, and chain of custody.

Florida Analytical Inc.

4320 Old Highway 37, Lakeland, FL 33813

Tel. (863) 646-8526 Fax (863) 646-1042

**REPORT OF ANALYSIS****Report ID:** 0707000534

CLIENT NAME : ROWE DRILLING
IDENTIFICATION : 1951P HH1
SITE : HOLLY HILL LFA DEW
TYPE : WATER

COLLECTION DATE : 07/11/07
COLLECTION TIME : 16:30
DATE RECEIVED IN LAB: 07/12/07

PARAMETER	METHOD	DETECTION LIMITS	RESULTS	UNITS	ANALYST	TIME/DATE STARTED
INORGANICS						
<u>KH12551-02I</u> CHLORIDE	EPA 300.0	0.25	<u>15.0</u>	mg/L	KER	22:19 07/13/07
<u>KH12551-01P</u> DISSOLVED CALCIUM AS CA	EPA 200.7	0.02	<u>77.9</u>	mg/L	SMW	12:14 07/16/07
<u>KH12551-03R</u> LAB SPECIFIC CONDUCTANCE	EPA 120.1	1	<u>499</u>	umhos/cm	BGM	9:30 07/19/07
<u>KH12551-02I</u> SULFATE	EPA 300.0	0.21	<u>112</u>	mg/L	KER	19:22 07/16/07
<u>KH12551-01Q</u> TOTAL DISSOLVED SOLIDS	EPA 160.1	1	<u>366</u>	mg/L	BGM	10:00 07/18/07
<u>KH12551-01P</u> TOTAL HARDNESS AS CaCO ₃	SM 2340 B	1	<u>272</u>	mg/L	SMW	12:11 07/16/07

DETECTION LIMITS REPORTED ARE METHOD DETECTION LIMITS WHICH MAY VARY WITH MATRIX AND CONCENTRATION.

Field Parameters if Reported :

Specific Conductance (Micromhos): N/A
pH (std units): N/A
Water Temp (Degrees C): N/A
Dissolved Oxygen (mg/L): N/A
Water Level (Ft): N/A
Well Elev (Ft NGVD): N/A
Field Turbidity (NTU): N/A
Field Color (PCU): N/A
Facility GWS #:

IDENTIFICATION : 1951P HH1

Florida Analytical Inc.

4320 Old Highway 37, Lakeland, FL 33813

Tel. (863) 646-8526 Fax (863) 646-1042



PO #:

CASE NARRATIVE

SENT TO: ROWE DRILLING
JOHNNY WILLS
P.O. BOX 1098
POLK CITY, FL 33868
863-984-3100
CLIENT CODE: ROWE

REPORT ID : 0707000537
PROJECT NO. :
PELA CONTACT :
RECEIVED DATE : 07/27/07
REPORTED DATE : 08/08/07

Report Summary:

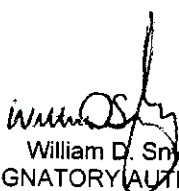
Sampling, handling, and holding time criteria were met for all samples, unless otherwise noted.

Qualifier Key:

- B Result based on colony counts outside the acceptable range, (microbiology)
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit
- J Estimated value, value is not accurate, to be used when:
 - 1. Surrogate recovery limits have been exceeded
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume

LAB NUMBER:

KH13570


William D. Snyder
SIGNATORY AUTHORITY

CERTIFICATE OF RESULTS

Sample integrity certified prior to analysis. Samples collected by Florida Analytical Inc. are in accordance to DEP-SOP-001/01 (Revised February 1, 2004). Uncertainties in test results are available upon request. Test results meet all requirements of the NELAC Standards, except as noted in the Case Narrative. This report may not be reproduced in part, results relate only to items tested. This report includes a case narrative, report of analysis, attachments, and chain of custody.

Florida Analytical Inc.

4320 Old Highway 37, Lakeland, FL 33813

Tel. (863) 646-8526 Fax (863) 646-1042

**REPORT OF ANALYSIS****Report ID:** 0707000537

CLIENT NAME : ROWE DRILLING
IDENTIFICATION : 2260 P
SITE : HOLLY HILL
TYPE : WATER

COLLECTION DATE : 07/26/07
COLLECTION TIME : 0:00
DATE RECEIVED IN LAB : 07/27/07

PARAMETER	METHOD	DETECTION LIMITS	RESULTS	UNITS	ANALYST	TIME/DATE STARTED
INORGANICS						
<u>KH13570-02I</u> CHLORIDE	EPA 300.0	0.25	<u>15.0</u>	mg/L	KER	4:30 07/28/07
<u>KH13570-01P</u> DISSOLVED CALCIUM AS CA	EPA 200.7	0.02	<u>65.8</u>	mg/L	SMW	12:51 08/01/07
<u>KH13570-03R</u> LAB SPECIFIC CONDUCTANCE	EPA 120.1	1	<u>418</u>	umhos/cm	BGM	15:00 07/30/07
<u>KH13570-02I</u> SULFATE	EPA 300.0	0.21	<u>72.1</u>	mg/L	KER	4:30 07/28/07
<u>KH13570-01Q</u> TOTAL DISSOLVED SOLIDS	EPA 160.1	1	<u>306</u>	mg/L	BGM	10:00 07/31/07
<u>KH13570-01P</u> TOTAL HARDNESS AS CaCO ₃	SM 2340 B	1	<u>214</u>	mg/L	SMW	12:54 08/01/07

DETECTION LIMITS REPORTED ARE METHOD DETECTION LIMITS WHICH MAY VARY WITH MATRIX AND CONCENTRATION.

Field Parameters if Reported :

Specific Conductance (Micromhos): N/A
pH (std units): N/A
Water Temp (Degrees C): N/A
Dissolved Oxygen (mg/L): N/A
Water Level (Ft): N/A
Well Elev (Ft NGVD): N/A
Field Turbidity (NTU): N/A
Field Color (PCU): N/A
Facility GWS #: N/A

IDENTIFICATION : 2260 P

APPENDIX L.

Packer Test MSCU Transmissivity Estimates

1083 PACKER SHALLOW PUMPING

Prepared By:

Prepared For:

PBS&J

NERUSA/SWFWM

Project:

Location:

68E005.05

HOLLY HILL LFA DEW

Data Set: F:\...1083 shallow pumping-NW.aqt
Date: 08/26/08 Time: 16:16:19

SOLUTION

Aquifer Model: Leaky
Solution Method: Neuman-Witherspoon

T = 1922. ft²/day
S = 1.205
r/B = 0.1498
B = 0.0165
T' = 2276. ft²/day
S' = 1.

AQUIFER DATA

Saturated Thickness: 475. ft
Anisotropy Ratio (Kz/Kr): 1.

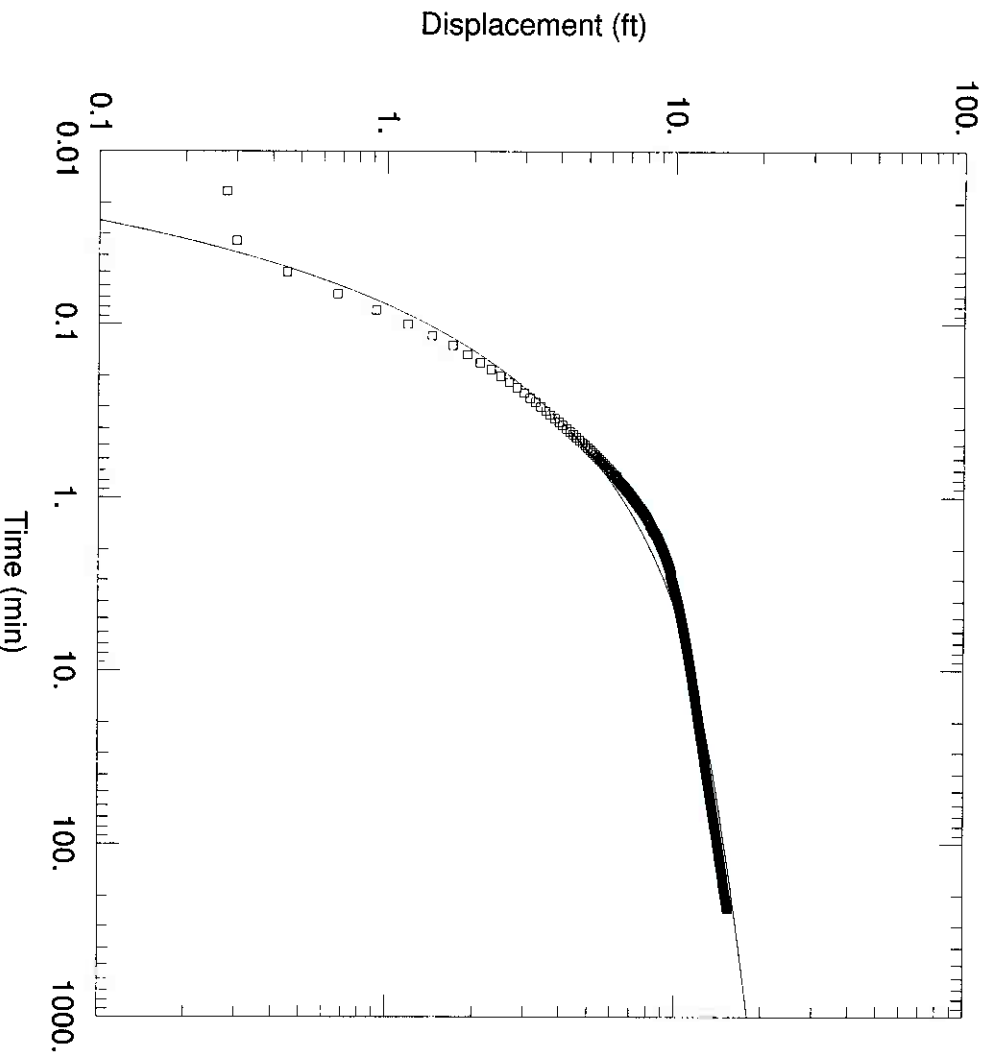
WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
HH-1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
HH-1	0	0



1083 PACKER SHALLOW PUMPING

Prepared By:

Prepared For:

PBS&J

NERUSA\SWFWMD

Project:

Location:

68E005.05

HOLLY HILL LFA DEW

Data Set: F:\...\1083 shallow pumping-HANTUSH.aqt
Date: 08/26/08 Time: 16:14:42

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 2462.3 ft²/day
S = 0.3423
B = 0.0355
Kz/Kr = 1.
b = 475. ft

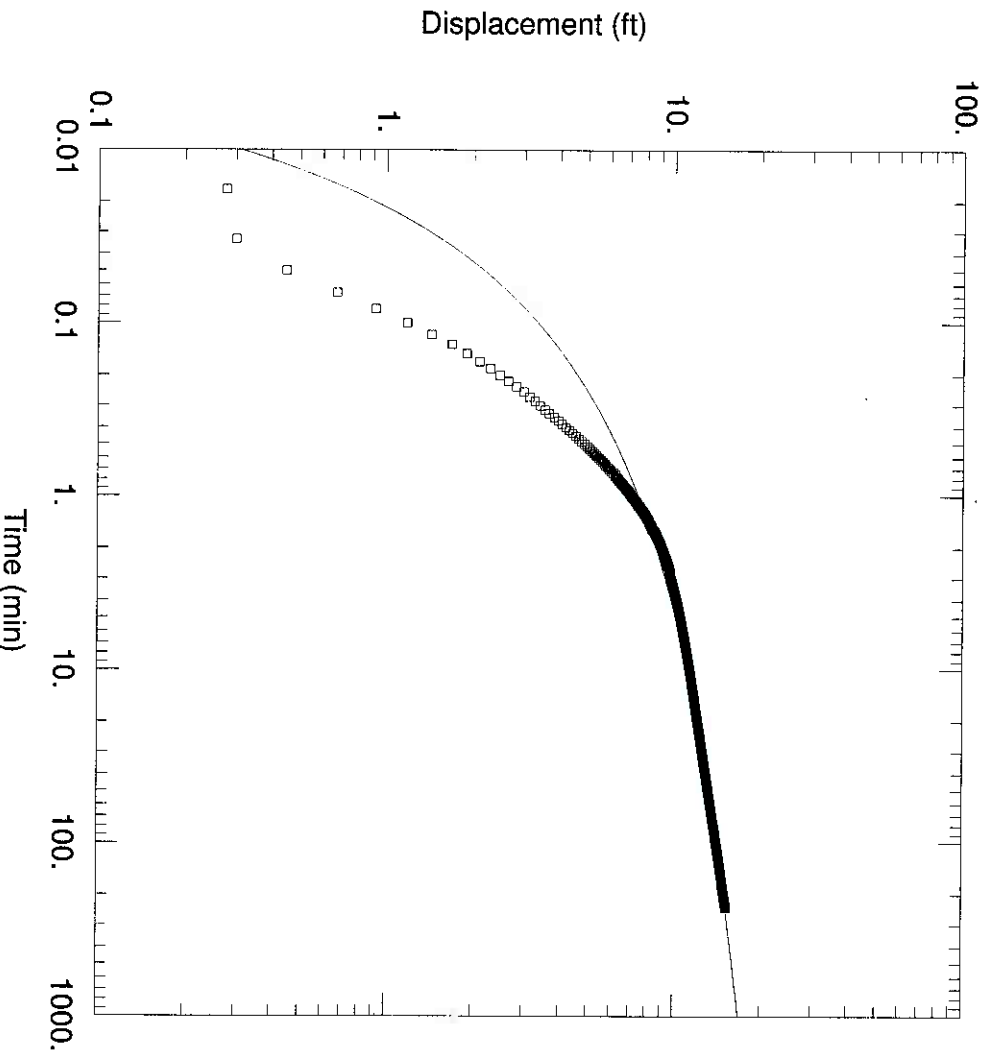
WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
HH-1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ HH-1	0	0



1083 PACKER SHALLOW RECOVERY

Prepared By:

Prepared For:

PBS&J

NERUSA\SWFWMD

Project:

Location:

68E005.05

HOLLY HILL LFA DEW

Data Set: F:\...\1083 shallow pumping.aqt
Date: 08/26/08 Time: 16:29:56

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 3923.6 ft²/day
S/S' = 1.158

AQUIFER DATA

Saturated Thickness: 475. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

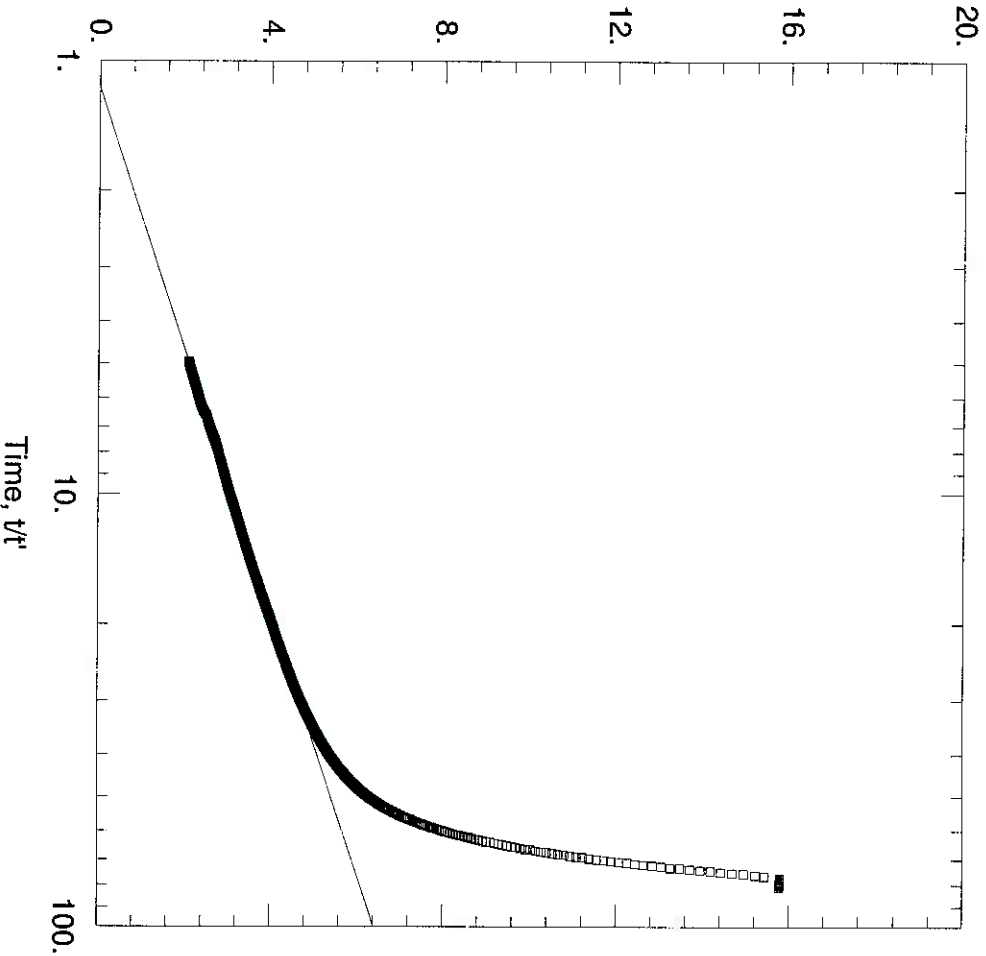
Pumping Wells

Well Name	X (ft)	Y (ft)
HH-1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
☐ HH-1	0	0

Residual Drawdown (ft)



Time, t/t'

PBS&J

1083 PACKER SHALLOW PUMPING

Prepared By:

Prepared For:

PBS&J

NERUSAISWFWMD

Project:

Location:

68E005.05

HOLLY HILL LFA DEW

Data Set: F:\...\1083 shallow pumping-THEIS.aqt
Date: 08/26/08 Time: 16:05:22

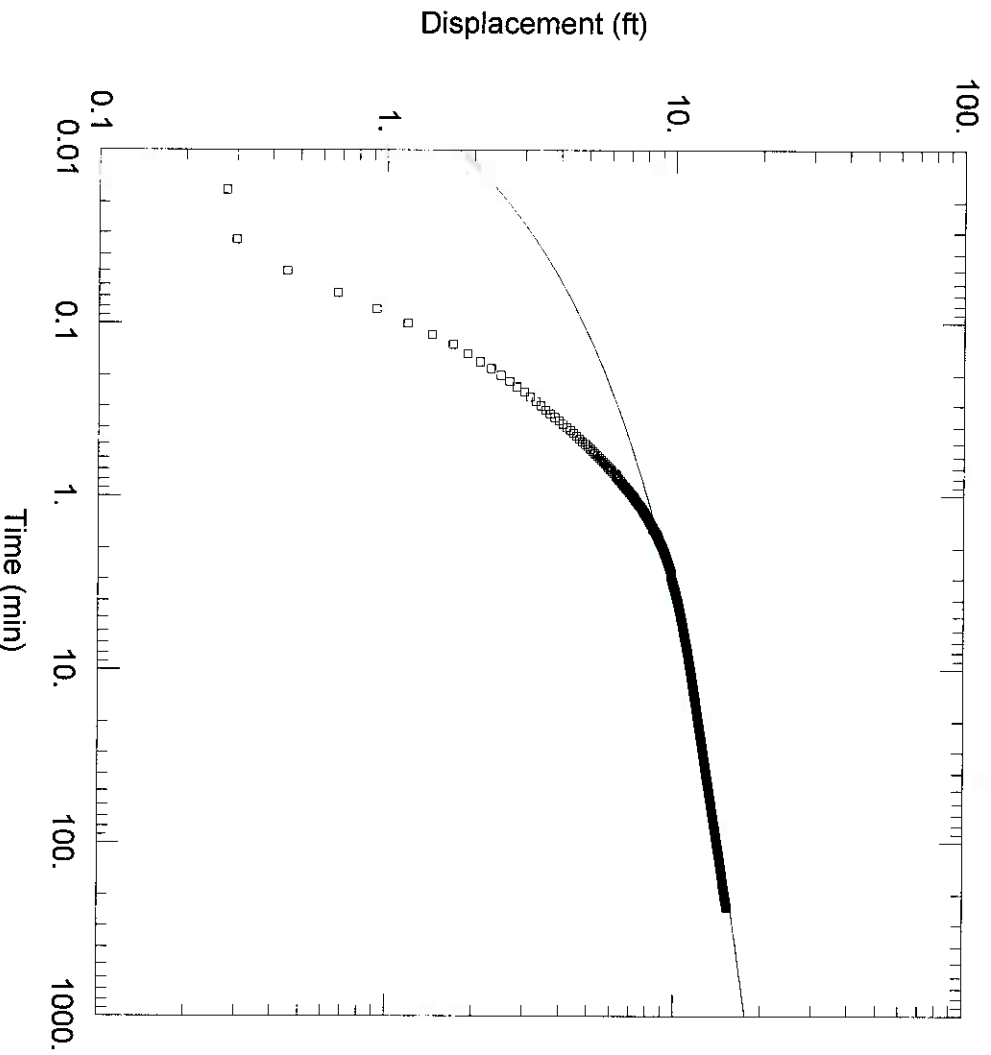
SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 3997.9 ft²/day
S = 0.08607
Kz/Kr = 1.
b = 475. ft

WELL DATA

Pumping Wells		
Well Name	X (ft)	Y (ft)
HH-1	0	0
Observation Wells		
Well Name	X (ft)	Y (ft)
☐ HH-1	0	0



APPENDIX M.

Well Completion Reports

APPENDIX N.

Flow Meter Calibration Sheet



METER TEST RECORD

20051446-12

SERIAL NUMBER

08 - 30 - 07

DATE

SOLD TO

ROWE DRILLING COMPANY, INC.

SHIP TO SAME

FINAL TOTALIZER READING

WE CERTIFY THAT THE TEST RESULTS SHOWN IN THIS REPORT ARE CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF. OUR TEST FACILITY IS CERTIFIED REGULARLY TO AN ACCURACY OF 0.2% AND IS TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY.

WATER SPECIALTIES

BY:

FLOW RATE G.P.M.	TESTED ACCURACY			FLOW RATE G.P.M.	NEW ACCURACY		
	% ACCURACY	GEARS	INDEX		% ACCURACY	GEARS	INDEX
3058	101.0	40B+/24W	0.8706				
1506	100.2		"				
364	99.9	"	"				

TESTED AVERAGE		TESTED INDEX
DESIRED AVERAGE		NEW INDEX
SPEC. PIPE I.D.	$\left(\left(\frac{\text{SPEC. I.D.}^1}{\text{STD. I.D.}^2 - 4.285} \right) \times \text{STD. INDEX} \right) = \text{NEW INDEX}$	
STD. PIPE I.D.		

CUSTOMER PIPE SIZE _____ O.D. 12.200 I.D. _____ % AS GEARED

	SPECIFICATION	INDEX	METER CHANGE GEARS
METER SIZE/MODEL NO.	12" MODEL ML - 04		A/B=
TOTALIZER DIAL			
INDICATOR DIAL TOTALIZER GEARING	256/1		GEAR RATIO

PROP. SIZE _____ TYPE _____ BEARINGS _____

ACCESSORIES _____

BUILT BY _____ DATE BUILT _____

INV. DATE _____ INV. NO. _____ CKD. BY _____

APPENDIX O.

Pumping Test Water Level Data

APPENDIX P.

Pumping Test Field data Sheets

Table 2. Depth to H₂O Measurements

HH WL measurements.xls

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
 Table 2. Depth to H₂O Measurements

Well ID	Date	Clock Time	Depth to H ₂ O Below M.P. (ft)	Comments
LFA Dew	2-8-08	10:00	146.90	
LFA Dew	2-8-08	11:00	146.50	
LFA Dew	2-8-08	12:02	146.52	
LFA Dew	2-8-08	13:03	146.20	
LFA Dew	2-8-08	14:00	146.30	
LFA Dew	2-8-08	15:02	146.25	
LFA Dew	2-8-08	16:03	146.35	
LFA Dew	2-8-08	17:02	146.40	
LFA Dew	2-8-08	18:03	146.50	
LFA Dew	2-8-08	19:02	146.47	
LFA Dew	2-8-08	20:03	146.52	
LFA Dew	2-8-08	21:02	146.38	
LFA Dew	2-8-08	22:04	146.27	
LFA Dew	2-8-08	23:00	146.43	
LFA Dew	2-8-08	0:00	146.50	
LFA Dew	2-9-08	1:03	146.28	
LFA Dew	2-9-08	2:00	146.40	
LFA Dew	2-9-08	3:00	146.18	
LFA Dew	2-9-08	4:00	146.30	
LFA Dew	2-9-08	5:00	146.43	
LFA Dew	2-9-08	6:02	146.33	
LFA Dew	2-9-08	7:02	146.27	
LFA Dew	2-9-08	8:03	146.20	
LFA Dew	2-9-08	9:03	146.25	
LFA Dew	2-9-08	010:02	146.20	
LFA Dew	2-9-08	011:03	146.21	
LFA Dew	2-9-08	012:02	146.25	
LFA Dew	2-9-08	13:02	146.28	
LFA Dew	2-9-08	14:03	146.25	
LFA Dew	2-9-08	15:02	146.23	
LFA Dew	2-9-08	16:03	146.27	
LFA Dew	2-9-08	17:04	146.32	
LFA Dew	2-9-08	18:02	146.10	
LFA Dew	2-9-08	19:03	146.05	
LFA Dew	2-9-08	20:02	146.02	
LFA Dew	2-9-08	21:01	146.05	
LFA Dew	2-9-08	22:03	146.12	
LFA Dew	2-9-08	23:02	146.20	
LFA Dew	2-9-08	23:58	146.10	

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
 Table 1. Master Flow Meter Readings

Date	Time	Instantaneous Meter Reading (gpm)	Totalizer Meter Reading (gal)	Comments
2-10-08				
2-10-08	01:03	3200		
2-10-08	02:00	3200	198,176,000	
2-10-08	03:04	3200	198,342,000	
2-10-08	04:00	3200	198,510,000	
2-10-08	05:00	3200	198,712,000	
2-10-08	06:00	3200	198,889,000	
2-10-08	07:00	3200	199,054,000	SWL 146.60
2-10-08	08:00	3100	199,193,000	Strated up at 07:05
2-10-08	09:00	3100	199,362,000	Shut Motor down ^{Change} Filter
2-10-08	10:00	3,000	199,531,000	SWL 124.80 07:00
2-10-08	11:00	3,000	199,704,000	Took Samplers
2-10-08	12:00	3,000	199,872,000	
2-10-08	13:00	3,000	200,046,000	
2-10-08	14:00	3,000	200,215,000	
2-10-08	15:00	3,000	200,387,000	
2-10-08	16:00	3,000	200,558,000	
2-10-08	17:00	3,000	200,717,000	
2-10-08	18:00	28050	200,860,000	
2-10-08	19:00	3600	201,021,000	
2-10-08	20:00	3200	201,113,000	AT 18:35 Shut Motor
2-10-08	21:01	3200	201,287,000	down Have to change
2-10-08	22:00	3200	201,472,000	Filters on Motor
2-10-08	23:03	3200	201,653,000	Strated backup at 18:45
2-10-08	00:00	3200	201,888,000	
2-11-08	01:00	3200	202,022	Shut ^{down} at 19:06 To
2-11-08	02:00	3200	202,198,000	change Filter on
2-11-08	03:03	3200	202,383,000	Jan K usmin. Strated
2-11-08	04:00	3200	202,564,000	back up at 19:17
2-11-08	05:00	3200	202,753,000	
2-11-08	06:01	3200	202,929,000	
2-11-08	07:03	3200	203,120,000	
2-11-08	08:00	3200	203,300,000	
2-11-08	09:00	3200	203,475,000	
2-11-08	10:00	3200	203,661,000	

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
Table 1. Master Flow Meter Readings

Date	Time	Instantaneous Meter Reading (gpm)	Totalizer Meter Reading (gal)	Comments
2-8-08	10:02 AM	3200	191,095,000	
2-8-08	11:00 AM	3200	191,252,000	
2-8-08	12:00 PM	3200	191,412,000	
2-8-08	13:00 PM	3200	191,621,000	191,439,000
2-8-08	14:02 PM	3200	191,789,000	
2-8-08	15:00 PM	3200	191,972,000	
2-8-08	16:00 PM	3200	192,158,000	
2-8-08	17:00 PM	3200	192,333,000	
2-8-08	18:00 PM	3200	192,513,000	
2-8-08	19:00 PM	3200	192,694,000	
2-8-08	20:00 PM	3200	192,873,000	
2-8-08	21:00 PM	3200	193,056,000	
2-8-08	22:00 PM	3200	193,242,000	Took Samplers
2-8-08	23:02 PM	3200	193,422,000	
2-8-08	02:00 PM	3200	193,598,000	
2-9-08	1:02 AM	3200	193,787,000	
2-9-08	2:03 AM	3200	193,978,000	
2-9-08	3:03 AM	3200	194,154,000	
2-9-08	4:02 AM	3200	194,327,000	
2-9-08	5:01	3200	194,508,000	
2-9-08	6:00	3200	194,688,000	
2-9-08	7:00	3200	194,867,000	
2-9-08	8:00	3200	195,051,000	
2-9-08	9:01	3200	195,240,000	
2-9-08	10:00	3200	195,427,000	Took Samplers
2-9-08	11:00	3200	195,615,000	
2-9-08	12:00	3200	195,786,000	
2-9-08	13:00	3200	195,968,000	
2-9-08	14:00	3200	196,154,000	
2-9-08	15:00	3200	196,331,000	
2-9-08	16:00	3200	196,515,000	
2-9-08	17:00	3200	196,695,000	
2-9-08	18:00	3200	196,885,000	
2-9-08	19:00	3200	197,060,000	
2-9-08	20:00	3200	197,244,000	0.60
2-9-08	21:00	3200	197,434,000	Took Sam
2-9-08	22:00	3200	197,623,000	
2-9-08	23:00	3200	197,801,000	
2-9-08	12:00	3200	197,993,000	

Polk County Utilities

Table 2. Depth to H₂O Measurements[illegible]

Table 1. Master Flow Meter Readings

177900

Table 2. Depth to H₂O Measurements

PUMP DOWN HALF HOUR 2:15-2:45
FILTER SWAP AND BATTERY 0100

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
 Table 1. Master Flow Meter Readings

Date	Time	Instantaneous Meter Reading (gpm)	Totalizer Meter Reading (gal)	Comments
2-06-08	0900 AM	3,200	182,417,000	Took Sampler
2-06-08	10:00 AM	3,200	182,597,000	
2-6-08	11:00 AM	3,200	182,774,000	
2-6-08	12:00 PM	3,200	182,953,000	
2-6-08	13:00 PM	3,200	183,132,000	
2-6-08	14:00 PM	3,200	183,311,000	
2-6-08	15:00 PM	3,200	183,486,000	
2-6-08	16:00 PM	3,200	183,662,000	
2-6-08	17:00 PM	3,200	183,841,000	
2-6-08	18:00 PM	3,200	184,019,000	
2-6-08	19:00 PM	3,200	184,203,000	
2-6-08	20:00 PM	3,200	184,374,000	
2-6-08	21:00 PM	3,200	184,552,000	Took Sampler
2-6-08	22:00 PM	3,200	184,730,000	
2-6-08	23:02 PM	3,200	184,914,000	
2-6-08	0:00 PM	3,200	185,088,000	
2-7-08	1:00 AM	3,200	185,262,000	
2-7-08	2:00 AM	3,200	185,438,000	
2-7-08	3:00 AM	3,200	185,535,000	
2-7-08	4:02 AM	3,200	185,720,000	
2-7-08	5:00 AM	3,200	185,893,000	
2-7-08	6:00 AM	3,200	186,064,000	
2-7-08	7:02 AM	3,200	186,254,000	
2-7-08	8:02 AM	3,200	186,434,000	
Totalizer on 2/21/08 147,774,650				
Since start of development ~ 40,000,000 gals pumped				
Estimated slow down pilot hole to LFA @ 2,000 ft = start on 5/15/07 - pilot hole at 2,000 ft				
stop on 12/15/07 12" casing grouted above 1600 ft				
2.15 day $81440 \text{ m}^3/\text{day} \times 500 \text{ gpm} = 154,800,000 \text{ gpm}$				

Table 2. Depth to H₂O Measurements

HH WL measurements.xls

Polk County Utilities

Table 1. Master Flow Meter Readings

HH LFA Flow Meter Readings.xls

Polk County Utilities

Table 2. Depth to H₂O Measurements

HH WL measurements.xls

Polk County Utilities

Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008

Table 1. Master Flow Meter Readings

151580,000

HH LFA Flow Meter Readings.xls

Table 2. Depth to H₂O MeasurementsHH WL measurements.xls

Polk County Utilities

Table 2. Depth to H₂O Measurements

HH WL measurements.xls

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
 Table 2. Depth to H₂O Measurements

Well ID	Date	Clock Time	Depth to H ₂ O Below M.P. (ft)	Comments
LFA Dew	02-02-08	13:00	146.57	started using new test well instrument with meter at 13:00 reading. Reading on old meter was 148.508 US 146.57' for new meter for difference of 1.95 ft
LFA Dew	02-02-08	13:57	146.50	
LFA Dew	02-02-08	14:58	145.80	
LFA Dew	02-02-08	16:02	144.50	
LFA Dew	02-02-08	17:07	142.20	
LFA Dew	02-02-08	18:05	143.00	
LFA Dew	02-02-08	19:04	145.40	
LFA Dew	02-02-08	20:01	145.30	
LFA Dew	02-02-08	21:00	145.24	
LFA Dew	02-02-08	22:00	145.20	
LFA Dew	02-02-08	23:00	145.10	
LFA Dew	02-02-08	23:59	146.20	
LFA Dew	02-02-08	01:03	146.30	
LFA Dew	02-03-08	02:00	145.80	
LFA Dew	02-03-08	03:04	146.10	
LFA Dew	02-03-08	04:04	146.20	
LFA Dew	02-03-08	05:05	146.25	
LFA Dew	02-03-08	05:59	146.30	
LFA Dew	02-03-08	07:05	146.50	
LFA Dew	02-03-08	08:06	146.50	
LFA Dew	02-03-08	09:05	146.48	
LFA Dew	02-03-08	09:58	146.65	
LFA Dew	02-03-08	10:07	146.68	
LFA Dew	02-03-08	11:58	146.57	
LFA Dew	02-03-08	13:00	146.50	
LFA Dew	02-03-08	13:58	146.53	
LFA Dew	02-03-08	14:57	146.50	
LFA Dew	02-03-08	15:58	146.52	
LFA Dew	02-03-08	16:59	146.50	
LFA Dew	02-03-08	18:02	146.51	
LFA Dew	02-03-08	19:01	146.50	
LFA Dew	02-03-08	20:03	146.53	
LFA Dew	02-03-08	21:00	146.52	
LFA Dew	02-03-08	22:00	146.45	
LFA Dew	02-03-08	23:00	146.54	
LFA Dew	02-03-08	0:03	146.15	
LFA Dew	02-04-08	1:04	146.35	
LFA Dew	02-04-08	2:05	146.60	
LFA Dew	02-04-08	3:10	146.50	

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
 Table 2. Depth to H₂O Measurements

Well ID	Date	Clock Time	Depth to H ₂ O Below M.P. (ft)	Comments	
LFA 220	2-1-08	08:00	148.50	PUMPING AT	3000 GPM
LFA Dew	2-1-08	09:00	148.38	" "	3000 GPM
LFA Dew	2-1-08	10:00	148.62	" "	3000 GPM
LFA Dew	2-1-08	11:00	149.05	" "	3000 GPM
LFA Dew	2-1-08	12:00	148.87	" "	3000 GPM
LFA Dew	2-1-08	13:00	148.97	" "	3000 GPM
LFA Dew	2-1-08	14:00	149.50	" "	3000 GPM
LFA Dew	2-1-08	15:00	148.95	" "	3000 GPM
LFA Dew	2-1-08	16:00	148.90	" "	3000 GPM
LFA Dew	2-1-08	17:00	148.87	" "	3000 GPM
LFA Dew	2-1-08	18:00	148.78	" "	3000 GPM
LFA Dew	2-1-08	19:00	148.78	" "	3000 GPM
LFA Dew	2-1-08	20:00	148.50	" "	3000 GPM
LFA Dew	2-1-08	21:00	148.10	" "	3000 GPM
LFA Dew	2-1-08	22:00	148.25	" "	3000 GPM
LFA Dew	2-1-08	23:00	148.50	" "	3000 GPM
LFA Dew	2-1-08	24:00	148.80	" "	3000 GPM
LFA Dew	2-2-08	01:00	148.73	" "	3000 GPM
LFA Dew	2-2-08	02:00	148.00	" "	3000 GPM
LFA Dew	2-2-08	03:00	148.60	" "	3000 GPM
LFA Dew	2-2-08	04:00	148.80	" "	3000 GPM
LFA Dew	2-2-08	05:00	148.70	" "	3000 GPM
LFA Dew	2-2-08	06:00	149.00	" "	3000 GPM
LFA Dew	2-2-08	07:00	148.05	" "	3000 GPM
LFA Dew	2-2-08	08:00	148.15	" "	3000 GPM
LFA Dew	2-2-08	09:00	148.30	" "	3000 GPM
LFA Dew	2-2-08	10:00	148.90	" "	3000 GPM
LFA Dew	2-2-08	11:00	148.85	" "	3000 GPM
LFA Dew	2-2-08	12:00	148.61	" "	3000 GPM
LFA Dew	2-2-08	13:00	146.57	" new meter 13000 GPM	148.562' 3000 GPM
LFA Dew	2-2-08	14:00		" new meter 146.5300 GPM	3000 GPM
LFA Dew	2-2-08	15:00		" "	3000 GPM
LFA Dew	2-2-08	16:00		" "	3000 GPM
LFA Dew	2-2-08	17:00		" "	3000 GPM
LFA Dew	2-2-08	18:00		" "	3000 GPM
LFA Dew	2-2-08	19:00		" "	3000 GPM
LFA Dew	2-2-08	20:00		" "	3000 GPM
LFA Dew	2-2-08	21:00		" "	3000 GPM
LFA Dew	2-2-08	22:00		" "	3000 GPM

Table 1. Master Flow Meter Readings

HH LFA Flow Meter Readings.xls

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
 Table 1. Master Flow Meter Readings

Date	Time	Instantaneous Meter Reading (gpm)	Totalizer Meter Reading (gal)	Comments
2-2-08	13:03	~ 3,200	165,966,000	
2-2-08	14:01	3,200	166,139,000	Increased flow rate from 2,905 to 3,000 gpm at 13:10
2-2-08	15:00	3,100	166,309,000	
2-2-08	16:03	3,100	166,491,000	
2-2-08	17:02	3,000	166,652,000	
2-2-08	18:00	2,800	166,812,000	Shut down Motor 18:05 Change Filter Started back 4/18:10
2-2-08	19:00	3,100	166,963,000	
2-2-08	20:58	3,100	167,132,000	
2-2-08	21:05	3,100	167,323,000	
2-2-08	22:02	3,200	167,498,000	
2-2-08	23:03	3,200	167,686,000	
2-2-08	0:00	3,200	167,859,000	
2-3-08	01:01	3,200	168,041,000	
2-3-08	02:05	3,200	168,224,000	
2-3-08	03:01	3,200	168,401,000	
2-3-08	04:01	3,200	168,581,000	
2-3-08	05:02	3,200	168,763,000	
2-3-08	06:01	3,200	168,941,000	
2-3-08	07:01	3,200	169,123,000	
2-3-08	08:09	3,200	169,330,000	
2-3-08	09:10	3,200	169,534,000	
2-3-08	10:00	3,200	169,661,000	
2-3-08	11:10	3,200	169,874,000	
2-3-08	12:00	3,200	170,020,000	
2-3-08	13:02	3,200	170,206,000	
2-3-08	14:00	3,100	170,379,000	
2-3-08	15:00	3,200	170,556,000	
2-3-08	16:00	3,200	170,735,000	
2-3-08	17:00	3,200	170,913,000	
2-3-08	18:00	3,200	171,092,000	
2-3-08	19:00	3,200	171,272,000	
2-3-08	20:00	3,200	171,452,000	
2-3-08	21:03	3,200	171,644,000	
2-3-08	22:01	3,200	171,818,000	
2-3-08	23:02	3,200	171,993,000	
2-3-08	0:00	3,200	172,177,000	
2-4-08	1:00	3,200	172,358,000	
2-4-08	2:02	3,200	172,543,000	
2-4-08	3:15	3,200	172,764,000	

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
 Table 1. Master Flow Meter Readings

Date	Time	Instantaneous Meter Reading (gpm)	Totalizer Meter Reading (gal)	Comments
2-1-08	08:00	3,000	160598	3000 GPM
2-1-08	09:00	3,000	160773	3000 GPM
2-1-08	10:00	3,000	160948	3000 GPM
2-1-08	11:00	3,000	161123	3000 GPM
2-1-08	12:00	3,000	161298	3000 GPM
2-1-08	13:00	3,000	161473	3000 GPM
2-1-08	14:00	3,000	161648	3000 GPM
2-1-08	15:00	3,000	161823	3000 GPM
2-1-08	16:00	3,000	161998	3000 GPM
2-1-08	17:00	3,000	162173	3000 GPM
2-1-08	18:00	3,000	162348	3000 GPM
2-1-08	19:00	3,000	162523	3000 GPM
2-1-08	20:00	3,000	162698	3000 GPM
2-1-08	21:00	3,000	162873	3000 GPM
2-1-08	22:00	3,000	163048	3000 GPM
2-1-08	23:00	3,000	163223	3000 GPM
2-1-08	24:00	3,000	163398	3000 GPM
2-2-08	01:00	3,000	163573	3000 GPM
2-2-08	02:00	3,000	163748	3000 GPM
2-2-08	03:00	3,000	163923	3000 GPM
2-2-08	04:00	3,000	164098	3000 GPM
2-2-08	05:00	3,000	164273	3000 GPM
2-2-08	06:00	3,000	164448	3000 GPM
2-2-08	07:00	3,000	164623	3000 GPM
2-2-08	08:00	3,000	164798	3000 GPM
2-2-08	09:00	3,000	165055	3000 GPM
2-2-08	10:00	3,000	165242	3000 GPM
2-2-08	11:00	3,000	165423	3000 GPM
2-2-08	12:00	3,000	165609	3000 GPM
2-2-08	13:00	3,000	165783	3000 GPM
2-2-08	14:00	3,000	165966	3000 GPM
2-2-08	15:00	3,000		3000 GPM
2-2-08	16:00	3,000		3000 GPM
2-2-08	17:00	3,000		3000 GPM
2-2-08	18:00	3,000		3000 GPM
2-2-08	19:00	3,000		3000 GPM
2-2-08	20:00	3,000		3000 GPM
2-2-08	21:00	3,000		3000 GPM
2-2-08	22:00	3,000		3000 GPM

Table 1. Master Flow Meter Readings

HH LFA Flow Meter Readings.xls

Polk County Utilities

Table 2. Depth to H₂O Measurements

Well ID	Date	Clock Time	Depth to H ₂ O Below M.P. (ft)	Comments
LFA Dew	1-31-08	0800	175.90	
LFA Dew	1-31-08	010100	149.20	PUMPING AT 3000 GPM
LFA Dew	1-31-08	011:00	146.90	" " 3000 GPM
LFA Dew	1-31-08	012:00	146.56	" " 3000 GPM
LFA Dew	1-31-08	13:00	146.60	" " 3000 GPM
LFA Dew	1-31-08	14:00	145.50	" " 3000 GPM
LFA Dew	1-31-08	15:00	146.22	" " 3000 GPM
LFA Dew	1-31-08	16:00	146.38	" " 3000 GPM
LFA Dew	1-31-08	17:00	146.20	" " 3000 GPM
LFA Dew	1-31-08	18:00	146.35	" " 3000 GPM
LFA Dew	1-31-08	19:00	146.30	" " 3000 GPM
LFA Dew	1-31-08	20:00	146.90	" " 3000 GPM
LFA Dew	1-31-08	21:00	146.80	" " 3000 GPM
LFA Dew	1-31-08	22:00	147.90	" " 3000 GPM
LFA Dew	1-31-08	23:00	147.30	" " 3000 GPM
LFA Dew	2-1-08	0:00	147.70	" " 3000 GPM
LFA Dew	2-1-08	01:00	147.95	" " 3000 GPM
LFA Dew	2-1-08	02:00	148.00	" " 3000 GPM
LFA Dew	2-1-08	03:00	147.90	" " 3000 GPM
LFA Dew	2-1-08	04:00	147.80	" " 3000 GPM
LFA Dew	2-1-08	05:00	147.50	" " 3000 GPM
LFA Dew	2-1-08	06:00	145.45	" " 3000 GPM
LFA Dew	2-1-08	07:00	145.70	" " 3000 GPM
LFA Dew	2-1-08	08:00	148.50	" " 3000 GPM
LFA Dew	2-1-08	09:00		" " 3000 GPM

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
 Table 1. Master Flow Meter Readings

Date	Time	Instantaneous Meter Reading (gpm)	Totalizer Meter Reading (gal)	Comments
1-30-08	9:22	—	152,479,700	
	10:04	3,000	152,508	pre-pumping
	10:10	3,000		PUMP ON AT 10:00
	10:15	3,000	152,522	
	10:20	3,000	152,537	3,000 gpm
	10:25	3,000	152,552	3,000 gpm
	10:35	3,000	152,582	3,000 gpm
	10:45	3,000	152,612	3,000 gpm
	11:00	3,000	152,657	3,000 gpm
	12:00	3,000	152,845	3,000 GPM
1-30-08	13:00	3,000	153,002	3,000 GPM
	14:00	3,000	153,172	3,000 GPM
	15:00	3,000	153,347	3,000 GPM
	16:00	3,000	153,519	3,000 GPM
1-30-08	17:00	3,000	153,692	3,000 GPM
	18:00	3,000	153,852	3,000 GPM
	19:00	3,000	154,006	3,000 GPM
	20:00	3,000	154,162	3,000 GPM
	21:00	3,000	154,322	3,000
	22:00	3,000	154,467	3,000
1-30-08	23:00	3,000	154,560	3,000
1-31-08	00:00	3,000	154,740	3,000
1-31-08	01:00	3,000	154,920	3,000
1-31-08	02:00	3,000	155,080	3,000
1-31-08	03:00	3,000	155,258	3,000
1-31-08	04:00	3,000	155,436	3,000
1-31-08	05:00	3,000	155,627	3,000
1-31-08	06:00	3,000	155,797	3,000
1-31-08	07:00	3,000	155,967	3,000 GPM
1-31-08	08:00	3,000	156,153	3,000 GPM

Polk County Utilities

Table 2. Depth to H₂O Measurements

HH WL measurements.xls

Polk County Utilities
Holly Hill Lower Floridan Aquifer Deep Exploratory Well Pumping Test - Jan/ Feb 2008
 Table 2. Depth to H₂O Measurements

Well ID	Date	Clock Time	Depth to H ₂ O Below M.P. (ft)	Comments
LFA DEW	1-30-08	9:25	121.98	static prepumping
SAMW	1-30-08	9:29	88.35	
UFAMW	1-30-08	9:32	87.80	
LFA DEW	1-30-08	9:45	121.99	
	1-30-08	10:00	—	" "
LFA DEW	1-30-08			at 10:00:00
UFAMW	1-30-08	10:09:30	87.79	pump on Q = 3,000 gpm @ 10:02:00
SAMW	1-30-08	10:14:00	88.34	
SAMW	1-30-08	10:29	88.34	
LFA DEW	1-30-08	10:33	147.08	used PBSS's 200's geotek w. L meter
LFA DEW	1-30-08	10:46	146.62	
LFA DEW	1-30-08	11:04	146.34	
SAMW	1-30-08	11:06	88.34	
UFAMW	1-30-08	11:08	87.78	
				Totalizer @ 10:16 = 152,522.000
				u u 11:00 = 152,000.000

Table 2. Depth to H₂O MeasurementsHH WL measurements.xls

Table 2. Depth to H₂O MeasurementsHH WL measurements.xls

Table 1. Master Flow Meter Readings

HH LFA Flow Meter Readings.xls

Table 2. Depth to H₂O Measurements[illegible]

Polk County Utilities

Table 1. Master Flow Meter Readings

Date	Time	Instantaneous Meter Reading (gpm)	Totalizer Meter Reading (gal)	Comments
2-11-08	09:00	3200	203,661,000	Took Sampler.
2-11-08	010:00	3200	203,837,000	
2-11-08	011:00	3200	204,080,000	
2-11-08	012:00	3200	204,207,000	
2-11-08	13:00	3200	204,380,000	
2-11-08	14:00	3200	204,653,000	
2-11-08	15:00	3,000	204,724,000	
2-11-08	16:00	3,000	204,886,000	
2-11-08	17:00	3,100	205,073,000	
2-11-08	18:01	3,100	205,247,000	
2-11-08	19:00	3,100	205,426,000	
2-11-08	20:00	3,100	205,598,000	
2-11-08	21:00	3,100	205,773,000	Took Sampler
2-11-08	22:01	3,100	205,956,000	
2-11-08	23:00	3,100	206,122,000	
2-11-08	00:00	2,100	206,320,000	
2-12-08	01:00	3,100	206,518,000	
2-12-08	02:00	3,000	206,674,000	
2-12-08	03:00	2,800	206,839,000	Shut Motor down at
2-12-08	04:01	3,000	206,991,000	03:05 started back up
2-12-08	05:00	3,000	207,160,000	03:18. SWL 138.60
2-12-08	06:00	3,000	207,341,000	
2-12-08	07:01	3,000	207,503,000	
2-12-08	08:00	3,000	207,672,000	
2-12-08	09:00	3,000	207,842,000	Took Samplers
2-12-08	010:00	3,000	208,015,000	
2-12-08	011:00	3,000	208,173,000	

APPENDIX Q.

Pumping Test Laboratory Analytical Report Bi-Daily Samples

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

2/7/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-030-0226
Project Description: Holly Hill

Florida Analytical, Inc. received 5 sample(s) on 1/30/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

- B Result based on colony counts outside the acceptable range, (microbiology).
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J Estimated value, value is not accurate: to be used when:
 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Keith Rice
Signatory Authority

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Willis
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/11/2008

Report Number: **08-030-0226**

REPORT OF ANALYSIS

Received : 1/30/2008

Lab No: **51538**

Matrix: **Aqueous**

Sample ID: **# 1**

Sampled: **1/28/2008 12:15**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	18.1	mg/L	2.5	01/31/08 19:00	KR	EPA-300.0
Conductivity	2210	µmhos/cm	1.5	02/08/08 16:40	DP	SM-2510B
Hardness as CaCO3(SM-2340B)	272.3	mg/L	6.118	02/05/08 10:56	SW	EPA-200.7
Total Calcium	78.40	mg/L	0.02	02/05/08 10:56	SW	EPA-200.7
Total Dissolved Solids	420	mg/L	20	02/05/08 15:00	CVS	SM-2540C
Total Magnesium	18.59	mg/L	0.005	02/05/08 10:56	SW	EPA-200.7
Total Sulfate (SO4)	149	mg/L	0.023	01/31/08 19:00	KR	EPA-300.0

Lab No: **51539**

Matrix: **Aqueous**

Sample ID: **# 2**

Sampled: **1/28/2008 13:15**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	18.6	mg/L	2.5	01/31/08 19:00	KR	EPA-300.0
Conductivity	619	µmhos/cm	1.5	02/08/08 16:40	DP	SM-2510B
Hardness as CaCO3(SM-2340B)	276.9	mg/L	6.118	02/05/08 10:56	SW	EPA-200.7
Total Calcium	79.56	mg/L	0.02	02/05/08 10:56	SW	EPA-200.7
Total Dissolved Solids	444	mg/L	20	02/05/08 15:00	CVS	SM-2540C
Total Magnesium	19.01	mg/L	0.005	02/05/08 10:56	SW	EPA-200.7
Total Sulfate (SO4)	157	mg/L	0.023	01/31/08 19:00	KR	EPA-300.0

Qualifiers/ Definitions

MDL Method Detection Limit

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/11/2008

Report Number: **08-030-0226**

REPORT OF ANALYSIS

Received : 1/30/2008

Lab No: **51540**

Matrix: **Aqueous**

Sample ID: **# 3**

Sampled: **1/28/2008 15:15**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	18.7	mg/L	2.5	01/31/08 19:00	KR	EPA-300.0
Conductivity	627	µmhos/cm	1.5	02/08/08 16:40	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	278.4	mg/L	6.118	02/05/08 10:56	SW	EPA-200.7
Total Calcium	79.95	mg/L	0.02	02/05/08 10:56	SW	EPA-200.7
Total Dissolved Solids	440	mg/L	20	02/05/08 15:00	CVS	SM-2540C
Total Magnesium	19.13	mg/L	0.005	02/05/08 10:56	SW	EPA-200.7
Total Sulfate (SO ₄)	163	mg/L	0.023	01/31/08 19:00	KR	EPA-300.0

Lab No: **51541**

Matrix: **Aqueous**

Sample ID: **# 4**

Sampled: **1/28/2008 19:15**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	19.5	mg/L	2.5	01/31/08 19:00	KR	EPA-300.0
Conductivity	630	µmhos/cm	1.5	02/08/08 16:40	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	278.1	mg/L	6.118	02/05/08 10:56	SW	EPA-200.7
Total Calcium	80.09	mg/L	0.02	02/05/08 10:56	SW	EPA-200.7
Total Dissolved Solids	438	mg/L	20	02/05/08 15:00	CVS	SM-2540C
Total Magnesium	18.96	mg/L	0.005	02/05/08 10:56	SW	EPA-200.7
Total Sulfate (SO ₄)	168	mg/L	0.023	01/31/08 19:00	KR	EPA-300.0

Qualifiers/ Definitions

MDL Method Detection Limit

Sample results are reported 'as received' and are not moisture corrected unless noted.

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/11/2008

Report Number: **08-030-0226**

REPORT OF ANALYSIS

Received : 1/30/2008

Lab No: **51542**

Matrix: **Aqueous**

Sample ID: **# 5**

Sampled: **1/30/2008 11:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	19.1	mg/L	2.5	01/31/08 19:00	KR	EPA-300.0
Conductivity	628	µmhos/cm	1.5	02/08/08 16:40	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	274.5	mg/L	6.118	02/05/08 10:56	SW	EPA-200.7
Total Calcium	79.04	mg/L	0.02	02/05/08 10:56	SW	EPA-200.7
Total Dissolved Solids	412	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	18.74	mg/L	0.005	02/05/08 10:56	SW	EPA-200.7
Total Sulfate (SO ₄)	160	mg/L	0.023	01/31/08 19:00	KR	EPA-300.0

Qualifiers/ Definitions

MDL

Method Detection Limit

Sample results are reported 'as received' and are not moisture corrected unless noted.

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

08-030-0226

Report Number: **08-030-0226**

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☒ Client ☐ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☐ Yes	☐ No	☒ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Azi Zahedi

Date & Time: 01-30-2008 13:50

Project/City Name: Revere Drilling 5000 Revere	Project Site Location: Holly Hill Holly Hill, FL 32008	Client Contact Name: Johnny Wilks 863-984-3100	Container Size Key: 5000	Sample Preservation: 08-030-0226 00258 Jan 30 2008 4:27PM
Project/City Name: Revere Drilling 5000 Revere	Project Site Location: Holly Hill Holly Hill, FL 32008	Client Contact Name: Johnny Wilks 863-984-3100	Container Size Key: 5000	Sample Preservation: 08-030-0226 00258 Jan 30 2008 4:27PM

Project/City Name: Revere Drilling 5000 Revere	Project Site Location: Holly Hill Holly Hill, FL 32008	Client Contact Name: Johnny Wilks 863-984-3100	Container Size Key: 5000	Sample Preservation: 08-030-0226 00258 Jan 30 2008 4:27PM
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Florida Analytical, Inc. 4320 Old Highway 37 Lakeland, Florida 33813 (863) 846-8528 (phone) (863) 644-1043 (fax) www.floridanalytical.com		Field Parameters: Specific Conductance (microhm/cm) Dissolved Oxygen (mg/L) Total Dissolved Solids (mg/L) Turbidity (NTU)	
(I) # of Containers (II) Container Size/Container Type (III) Sample Preservative (See keys upper right)	504, Ca, Cl, TDS, Conduct.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

For Laboratory Use Only: Date: 1-28-08 Time: 12:15 Sample Identification: #1	Date: 1-28-08 Time: 13:50 Sample Identification: #2	Date: 1-28-08 Time: 15:15 Sample Identification: #3	Date: 1-28-08 Time: 19:15 Sample Identification: #4	Date: 1-30-08 Time: 11:00 Sample Identification: #5
Date: 1-28-08 Time: 13:50 Sample Identification: #2	Date: 1-30-08 Time: 13:50 Sample Identification: #3	Date: 1-30-08 Time: 13:50 Sample Identification: #4	Date: 1-30-08 Time: 13:50 Sample Identification: #5	Date: 1-30-08 Time: 13:50 Sample Identification: #6

Date: 1-28-08 Time: 13:50 Sample Identification: #2	Date: 1-30-08 Time: 13:50 Sample Identification: #3	Date: 1-30-08 Time: 13:50 Sample Identification: #4	Date: 1-30-08 Time: 13:50 Sample Identification: #5	Date: 1-30-08 Time: 13:50 Sample Identification: #6
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Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 846-8526 Fax: (863) 846-1042

"A Laboratory Management Partner"

2/14/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-032-0219
Project Description: Analysis

Florida Analytical, Inc. received 4 sample(s) on 2/1/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

- B Result based on colony counts outside the acceptable range, (microbiology).
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J Estimated value, value is not accurate: to be used when:
 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Keith Rice
Signatory Authority

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Analysis

Report Date : 2/14/2008

Report Number: **08-032-0219**

REPORT OF ANALYSIS

Received : 2/1/2008

Lab No: **51669**

Matrix: **Aqueous**

Sample ID: **# 6**

Sampled: **1/30/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	19.6	mg/L	2.5	02/01/08 17:00	KR	EPA-300.0
Conductivity	634	µmhos/cm	1.5	02/08/08 16:40	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	276.3	mg/L	6.118	02/05/08 10:56	SW	EPA-200.7
Total Calcium	79.96	mg/L	0.02	02/05/08 10:56	SW	EPA-200.7
Total Dissolved Solids	444	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	18.61	mg/L	0.005	02/05/08 10:56	SW	EPA-200.7
Total Sulfate (SO ₄)	164	mg/L	0.023	02/01/08 17:00	KR	EPA-300.0

Lab No: **51670**

Matrix: **Aqueous**

Sample ID: **#7**

Sampled: **1/31/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	19.0	mg/L	2.5	02/01/08 17:00	KR	EPA-300.0
Conductivity	634	µmhos/cm	1.5	02/08/08 16:40	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	265.9	mg/L	6.118	02/05/08 10:56	SW	EPA-200.7
Total Calcium	76.78	mg/L	0.02	02/05/08 10:56	SW	EPA-200.7
Total Dissolved Solids	446	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	18.01	mg/L	0.005	02/05/08 10:56	SW	EPA-200.7
Total Sulfate (SO ₄)	161	mg/L	0.023	02/01/08 17:00	KR	EPA-300.0

Qualifiers/ Definitions

MDL Method Detection Limit

Sample results are reported 'as received' and are not moisture corrected unless noted.

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Analysis

Report Date : 2/14/2008

Report Number: **08-032-0219**

REPORT OF ANALYSIS

Received : 2/1/2008

Lab No: **51671**

Matrix: **Aqueous**

Sample ID: **#8**

Sampled: **1/31/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	19.5	mg/L	2.5	02/01/08 17:00	KR	EPA-300.0
Conductivity	641	µmhos/cm	1.5	02/08/08 16:40	DP	SM-2510B
Hardness as CaCO3(SM-2340B)	292.4	mg/L	1	02/06/08 12:45	SW	EPA-200.7
Total Calcium	83.73	mg/L	0.02	02/06/08 12:45	SW	EPA-200.7
Total Dissolved Solids	448	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	20.24	mg/L	0.05	02/06/08 12:45	SW	EPA-200.7
Total Sulfate (SO4)	169	mg/L	0.023	02/01/08 17:00	KR	EPA-300.0

Lab No: **51672**

Matrix: **Aqueous**

Sample ID: **#9**

Sampled: **2/1/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	20.4	mg/L	0.023	02/01/08 21:34	KR	EPA-300.0
Conductivity	644	µmhos/cm	1.5	02/08/08 16:40	DP	SM-2510B
Hardness as CaCO3(SM-2340B)	291.2	mg/L	1	02/06/08 12:45	SW	EPA-200.7
Total Calcium	83.45	mg/L	0.02	02/06/08 12:45	SW	EPA-200.7
Total Dissolved Solids	454	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	20.12	mg/L	0.05	02/06/08 12:45	SW	EPA-200.7
Total Sulfate (SO4)	166	mg/L	0.23	02/01/08 21:34	KR	EPA-300.0

Qualifiers/ Definitions

MDL Method Detection Limit

Sample results are reported 'as received' and are not moisture corrected unless noted.

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

08-032-0219

Report Number: **08-032-0219**

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☐ Client ☒ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☐ Yes	☐ No	☒ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Stephanie Richards

Date & Time: 02-01-2008 13:35

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8528 Fax: (863) 646-1042
"A Laboratory Management Partner"

2/14/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-035-0227
Project Description: Holly Hills

Florida Analytical, Inc. received 6 sample(s) on 2/4/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

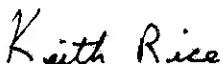
The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

- B Result based on colony counts outside the acceptable range, (microbiology).
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J Estimated value, value is not accurate: to be used when:
 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Keith Rice
Signatory Authority

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hills

Report Date : 2/14/2008

Report Number: **08-035-0227**

REPORT OF ANALYSIS

Received : 2/4/2008

Lab No: **51732**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/1/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	19.7	mg/L	2.5	02/05/08 17:00	KR	EPA-300.0
Conductivity	653	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	287.4	mg/L	1	02/06/08 12:45	SW	EPA-200.7
Total Calcium	82.26	mg/L	0.02	02/06/08 12:45	SW	EPA-200.7
Total Dissolved Solids	454	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	19.92	mg/L	0.05	02/06/08 12:45	SW	EPA-200.7
Total Sulfate (SO ₄)	176	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Lab No: **51733**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/2/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	20.3	mg/L	2.5	02/05/08 17:00	KR	EPA-300.0
Conductivity	652	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	287.3	mg/L	1	02/06/08 12:45	SW	EPA-200.7
Total Calcium	82.14	mg/L	0.02	02/06/08 12:45	SW	EPA-200.7
Total Dissolved Solids	466	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	19.96	mg/L	0.05	02/06/08 12:45	SW	EPA-200.7
Total Sulfate (SO ₄)	180	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Qualifiers/ Definitions

MDL Method Detection Limit

Sample results are reported 'as received' and are not moisture corrected unless noted.

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hills

Report Date : 2/14/2008

Report Number: **08-035-0227**

REPORT OF ANALYSIS

Received : 2/4/2008

Lab No: **51734**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/2/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	20.0	mg/L	2.5	02/05/08 17:00	KR	EPA-300.0
Conductivity	659	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	284.9	mg/L	1	02/06/08 12:45	SW	EPA-200.7
Total Calcium	81.69	mg/L	0.02	02/06/08 12:45	SW	EPA-200.7
Total Dissolved Solids	446	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	19.67	mg/L	0.05	02/06/08 12:45	SW	EPA-200.7
Total Sulfate (SO ₄)	179	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Lab No: **51735**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/3/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	20	mg/L	2.5	02/05/08 17:00	KR	EPA-300.0
Conductivity	661	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	290.2	mg/L	1	02/06/08 12:45	SW	EPA-200.7
Total Calcium	83.12	mg/L	0.02	02/06/08 12:45	SW	EPA-200.7
Total Dissolved Solids	458	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	20.07	mg/L	0.05	02/06/08 12:45	SW	EPA-200.7
Total Sulfate (SO ₄)	183	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Qualifiers/ MDL Method Detection Limit
Definitions

Sample results are reported 'as received' and are not moisture corrected unless noted.

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hills

Report Date : 2/14/2008

Report Number: **08-035-0227**

REPORT OF ANALYSIS

Received : 2/4/2008

Lab No: **51736**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/3/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	19.7	mg/L	2.5	02/05/08 17:00	KR	EPA-300.0
Conductivity	664	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	306.4	mg/L	1	02/06/08 12:45	SW	EPA-200.7
Total Calcium	87.44	mg/L	0.02	02/06/08 12:45	SW	EPA-200.7
Total Dissolved Solids	464	mg/L	20	02/06/08 16:00	CVS	SM-2540C
Total Magnesium	21.40	mg/L	0.05	02/06/08 12:45	SW	EPA-200.7
Total Sulfate (SO ₄)	184	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Lab No: **51737**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/4/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	20.1	mg/L	2.5	02/05/08 17:00	KR	EPA-300.0
Conductivity	669	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	296.2	mg/L	1	02/06/08 12:45	SW	EPA-200.7
Total Calcium	84.52	mg/L	0.02	02/06/08 12:45	SW	EPA-200.7
Total Dissolved Solids	460	mg/L	20	02/08/08 08:30	CVS	SM-2540C
Total Magnesium	20.67	mg/L	0.05	02/06/08 12:45	SW	EPA-200.7
Total Sulfate (SO ₄)	189	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Qualifiers/
Definitions MDL Method Detection Limit

Sample results are reported 'as received' and are not moisture corrected unless noted.

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (853) 646-8526 Fax: (853) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

Report Number: **08-035-0227**

08-035-0227

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☐ Client ☒ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☐ Yes	☐ No	☒ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Stephanie Cox

Date & Time: 02-04-2008 12:10

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (883) 646-8526 Fax: (883) 646-1042

"A Laboratory Management Partner"

2/14/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-037-0200
Project Description: Holly Hills

Florida Analytical, Inc. received 2 sample(s) on 2/5/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

- B Result based on colony counts outside the acceptable range, (microbiology).
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J Estimated value, value is not accurate: to be used when:
 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Keith Rice

Keith Rice
Signatory Authority

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hills

Report Date : 2/14/2008

Report Number: **08-037-0200**

REPORT OF ANALYSIS

Received : 2/5/2008

Lab No: **51799**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/4/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	20.1	mg/L	2.5	02/05/08 17:00	KR	EPA-300.0
Conductivity	670	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	321.8	mg/L	1	02/11/08 10:50	SW	EPA-200.7
Total Calcium	93.69	mg/L	0.04	02/11/08 10:50	SW	EPA-200.7
Total Dissolved Solids	350	mg/L	20	02/08/08 08:30	CVS	SM-2540C
Total Magnesium	21.33	mg/L	0.05	02/11/08 10:50	SW	EPA-200.7
Total Sulfate (SO ₄)	188	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Lab No: **51800**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/5/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	20.7	mg/L	2.5	02/05/08 17:00	KR	EPA-300.0
Conductivity	673	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	307.5	mg/L	1	02/11/08 10:50	SW	EPA-200.7
Total Calcium	89.01	mg/L	0.04	02/11/08 10:50	SW	EPA-200.7
Total Dissolved Solids	474	mg/L	20	02/08/08 08:30	CVS	SM-2540C
Total Magnesium	20.69	mg/L	0.05	02/11/08 10:50	SW	EPA-200.7
Total Sulfate (SO ₄)	190	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Qualifiers/
Definitions MDL Method Detection Limit

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

08-037-0200

Report Number: **08-037-0200**

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☒ Client ☐ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☐ Yes	☐ No	☒ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Stephanie Cox

Date & Time: 02-05-2008 17:08

PELA Chain of Custody Record

Page 1 of 1

Chain of Custody Number (for lab use only) **N 000967**

Project/Client Name: Rowe Drilling		Project Site Location: Holly Hill		Client Contact Name: Johnny Wells	
PWS Number: PO Box 1098		Project Manager: Johnny Wells		Phone Number: 863-984-3100	
Report Mailing Address: PO Box 1098		Invoice Address: PO Box 1098		Fax Number: 863-984-3110	
Report Mailing City, State, ZIP: Polk City FL 33868		Invoice City, State, ZIP: Polk City FL 33868		e-mail Address: jwells@rowedrilling.com	
Purchase Order Number: 863-984-3100					

P. E. LaMoreaux and Associates, Inc. (PELA)
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-0526 (phone)
(863) 646-1042 (fax)
www.pelalab.com



Date:	Time:	Sample Identification:
2/4/08	2100	LFADEW
2/5/08	0900	LFADEW

Field Parameters:		PELA Laboratory Sample Identification Number (for laboratory use only)	
Specific Conductance (microhm/cm)	PH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)
Total Chlorine Residual (mg/L)	Turbidity (NTU)		

For Laboratory Use Only:		Sampled by: (SIGNATURE)		Date:		Time:	
Sample Kit Prepared by:	PELA Code No	Signature: <i>Johnny Wells</i>		Date: 2-5-08		Time: 17:08	
Date:	Time:	Client Code:		Date:		Time:	
		Laboratory Remarks:		Date:		Time:	

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 846-8526 Fax: (863) 846-1042

"A Laboratory Management Partner"

2/14/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-037-0206
Project Description: Holly Hill

Florida Analytical, Inc. received 2 sample(s) on 2/6/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

- B Result based on colony counts outside the acceptable range, (microbiology).
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J Estimated value, value is not accurate: to be used when:
 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Keith Rice

Keith Rice
Signatory Authority

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/14/2008

Report Number: **08-037-0206**

REPORT OF ANALYSIS

Received : 2/6/2008

Lab No: **51813**
Sample ID: **LFADEW**

Matrix: **Aqueous**
Sampled: **2/5/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	20.9	mg/L	2.5	02/06/08 17:00	KR	EPA-300.0
Conductivity	674	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO3(SM-2340B)	321.8	mg/L	1	02/11/08 10:50	SW	EPA-200.7
Total Calcium	94.47	mg/L	0.04	02/11/08 10:50	SW	EPA-200.7
Total Dissolved Solids	504	mg/L	5	02/08/08 10:00	CVs	SM-2540C
Total Magnesium	20.88	mg/L	0.05	02/11/08 10:50	SW	EPA-200.7
Total Sulfate (SO4)	187	mg/L	0.23	02/06/08 17:00	KR	EPA-300.0

Lab No: **51814**
Sample ID: **LFADEW**

Matrix: **Aqueous**
Sampled: **2/6/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	21.1	mg/L	2.5	02/06/08 17:00	KR	EPA-300.0
Conductivity	675	µmhos/cm	1.5	02/14/08 09:45	DP	SM-2510B
Hardness as CaCO3(SM-2340B)	319.5	mg/L	1	02/11/08 10:50	SW	EPA-200.7
Total Calcium	93.21	mg/L	0.04	02/11/08 10:50	SW	EPA-200.7
Total Dissolved Solids	498	mg/L	5	02/08/08 10:00	CVs	SM-2540C
Total Magnesium	21.07	mg/L	0.05	02/11/08 10:50	SW	EPA-200.7
Total Sulfate (SO4)	192	mg/L	0.23	02/06/08 17:00	KR	EPA-300.0

Qualifiers/ MDL Method Detection Limit
Definitions

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

Report Number: **08-037-0206**

08-037-0206

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☒ Client ☐ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☐ Yes	☐ No	☒ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Leslie McNeight

Date & Time: 02-06-2008 13:05

Project Client Name:
Rome Drilling

Project Site Location:
Holly Hill

Client Contact Name:
Johnny

Phone Number:
863-984-3100

Project Manager:
John

Report Mailing Address:

PO Box 1098

Invoice Address:

same

Post Office:

863-984 3110

Invoice Address:

same

Report Mailing City, State, ZIP:

Holly Hill, FL 33888

Invoice Address:

same

Report Mailing City, State, ZIP:

Holly Hill, FL 33888

Purchase Order Number:

same

Required Analysis:

hardness

Field Parameters:

hardness

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(883) 846-8826 (phone)
(883) 846-1042 (fax)
www.floridanalytical.com

Florida Analytical
Laboratory Sample
Identification Number
(for laboratory use only)

Date:	Time:	Sample Identification:
2-5	21:00	LFA DEW
2-6	09:00	LFA DEW

(i) # of Containers	(ii) Container Size/Container Type	(iii) Sample Preservative
1	1 P V	1 P V
1	1 P V	1 P V

Temperature (°C)	Specific Gravity	Residual Chlorine (mg/L)	Total Chlorine (mg/L)	Residual Chlorine (mg/L)

Temperature (°C)	Specific Gravity	Residual Chlorine (mg/L)	Total Chlorine (mg/L)	Residual Chlorine (mg/L)

For Laboratory Use Only:

Sample No	Prepared by:	TA	Client Code:

Sampled by: (PRINT)

John

Sampled by: (SIGNATURE)

John

Date:

2-6-08

Time:

13:05

Date:

2-6-08

Time:

13:18

Laboratory Remarks:

same

Sampled by: (SIGNATURE)

John

Date:

2-6-08

Time:

13:05

Date:

2-6-08

Time:

13:18

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 846-8526 Fax: (863) 846-1042

"A Laboratory Management Partner"

2/14/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-039-0207
Project Description: Holly Hill

Florida Analytical, Inc. received 2 sample(s) on 2/7/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

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- J Estimated value, value is not accurate: to be used when:
 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Keith Rice
Signatory Authority

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/14/2008

Report Number: 08-039-0207

REPORT OF ANALYSIS

Received : 2/7/2008

Lab No: 51975
Sample ID: LFADEW

Matrix: Aqueous
Sampled: 2/6/2008 21:00

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	22.9	mg/L	2.5	02/07/08 17:00	KR	EPA-300.0
Conductivity	674	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	315.1	mg/L	1	02/11/08 10:50	SW	EPA-200.7
Total Calcium	90.75	mg/L	0.04	02/11/08 10:50	SW	EPA-200.7
Total Dissolved Solids	468	mg/L	5	02/12/08 16:00	CVS	SM-2540C
Total Magnesium	21.49	mg/L	0.05	02/11/08 10:50	SW	EPA-200.7
Total Sulfate (SO ₄)	186	mg/L	0.23	02/07/08 17:00	KR	EPA-300.0

Lab No: 51976
Sample ID: LFADEW

Matrix: Aqueous
Sampled: 2/7/2008 9:00

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	21.7	mg/L	2.5	02/07/08 17:00	KR	EPA-300.0
Conductivity	675	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	339.4	mg/L	1	02/11/08 10:50	SW	EPA-200.7
Total Calcium	99.88	mg/L	0.04	02/11/08 10:50	SW	EPA-200.7
Total Dissolved Solids	436	mg/L	5	02/12/08 16:00	CVS	SM-2540C
Total Magnesium	21.87	mg/L	0.05	02/11/08 10:50	SW	EPA-200.7
Total Sulfate (SO ₄)	184	mg/L	0.23	02/07/08 17:00	KR	EPA-300.0

Qualifiers/ Definitions

MDL Method Detection Limit

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8826 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

08-039-0207

Report Number: **08-039-0207**

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☒ Client ☐ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☐ Yes	☐ No	☒ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Stephanie Cox

Date & Time: 02-07-2008 16:13

Project Client Name: Rowe Drilling FMS Hunter	Project Site Location: Holly Hill Project Manager: Jonny Williams	Client Contact Name: Jonny Williams Phone Number: 863-984 8100	Matrix Key: GW Groundwater SW Surface Water DW Drilling (in place) WFA Waterfall SL Soil SD Sand ET Erosion NL Nuisance/Living SG Storage Other:
Report Mailing Address: PO Box 10918	Invoice Address: Same	Per Number: 863-984 3110	Container type key P Plastic G Glass Other:
Report Mailing City, State, Zip: Fort Lauderdale, FL 33308	Invoice City, State, Zip: Fort Lauderdale, FL 33308	E-mail Address: jwillis@rowedrilling.com	Driver:

[illegible]

For Laboratory Use Only:				Laboratory Remarks:			
Serious Ill Persons by:		FA Case #	Sampled by: (PRINT)	Received by: (SIGNATURE)		Date:	Time:
Date	Time	Cooler Returned	Client Code	Received by: (SIGNATURE)		Date:	Time:
		YES <u>NO</u>		[Signature]			
				[Signature]		2-7-08	16:13
				[Signature]			
				[Signature]			

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8528 Fax: (863) 646-1042

"A Laboratory Management Partner"

2/14/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-039-0227
Project Description: Holly Hill

Florida Analytical, Inc. received 2 sample(s) on 2/8/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

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- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Keith Rice
Signatory Authority

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/14/2008

Report Number: **08-039-0227**

REPORT OF ANALYSIS

Received : 2/8/2008

Lab No: **52013**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/7/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	27.7	mg/L	2.5	02/08/08 17:00	KR	EPA-300.0
Conductivity	679	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	332.8	mg/L	1	02/11/08 10:50	SW	EPA-200.7
Total Calcium	97.65	mg/L	0.04	02/11/08 10:50	SW	EPA-200.7
Total Dissolved Solids	474	mg/L	5	02/12/08 16:00	CVS	SM-2540C
Total Magnesium	21.61	mg/L	0.05	02/11/08 10:50	SW	EPA-200.7
Total Sulfate (SO ₄)	202	mg/L	0.23	02/08/08 17:00	KR	EPA-300.0

Lab No: **52014**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/8/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	24.9	mg/L	2.5	02/08/08 17:00	KR	EPA-300.0
Conductivity	674	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	346.7	mg/L	1	02/11/08 10:50	SW	EPA-200.7
Total Calcium	101.2	mg/L	0.04	02/11/08 10:50	SW	EPA-200.7
Total Dissolved Solids	464	mg/L	5	02/12/08 16:00	CVS	SM-2540C
Total Magnesium	22.80	mg/L	0.05	02/11/08 10:50	SW	EPA-200.7
Total Sulfate (SO ₄)	197	mg/L	0.23	02/08/08 17:00	KR	EPA-300.0

Qualifiers/ MDL Method Detection Limit
Definitions

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

08-039-0227

Report Number: **08-039-0227**

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☒ Client ☐ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☐ Yes	☐ No	☒ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Stephanie Cox

Date & Time: 02-08-2008 14:45

Project Client Name: Rowe Drilling P.O. Box 1098		Project Site Location: Holly Hill Project Manager: Same		Client Contact Name: Johnny Wells Phone Number: 863-984-3100 Fax Number: 863-984-3110		Matrix Key: G: Ground Water S: Surface Water D: Drinking Water V: Wastewater E: Soil ST: Sediment L: Nonaqueous Liquid SG: Sludge C: Gas	
Report Mailing Address: P.O. Box 1098 Report Mailing City, State, ZIP: Palatka City FL 33869		Business Address: Same Invoice City, State, ZIP: Palatka City FL 33869		Container Type Key: P: Plastic G: Glass Other: Other		Laboratory Sample Identification Number: 8152	

Florida Analytical, Inc. 4320 Old Highway 37 Lakeland, Florida 33813 (863) 646-8828 (phone) (863) 646-1642 (fax) www.floridanalytical.com		Field Parameters: Specific Conductance (micro-mhos/cm) Temperature (°C) Dissolved Oxygen (mg/L) Total Chl. a (mg/L) Total Chl. b (mg/L)	
Requiring Analysis: (I) # of Containers, (II) Container Size, (III) Container Type, (IV) Sample Preservative (See keys upper right)		Field Parameters: Specific Conductance (micro-mhos/cm) Temperature (°C) Dissolved Oxygen (mg/L) Total Chl. a (mg/L) Total Chl. b (mg/L)	

For Laboratory Use Only:		Sampled by: (PRINT):		Received by: (SIGNATURE)		Date:	
Date:	Time:	Date:	Time:	Date:	Time:	Date:	Time:
2-7	21:00	2-8-08	14:45	2-8-08	14:45	2-8-08	14:45
Client Name:		Client Name:		Client Name:		Client Name:	
Client Name:		Client Name:		Client Name:		Client Name:	
Client Name:		Client Name:		Client Name:		Client Name:	

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 846-8528 Fax: (863) 846-1042
"A Laboratory Management Partner"

2/20/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-043-0222
Project Description: Holly Hill

Florida Analytical, Inc. received 2 sample(s) on 2/12/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

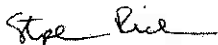
The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

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 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Stephanie Richards
Laboratory Manager

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/20/2008

Report Number: **08-043-0222**

REPORT OF ANALYSIS

Received : 2/12/2008

Lab No: **52192**
Sample ID: **LFADEW**

Matrix: **Aqueous**
Sampled: **2/11/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Calcium	92.54	mg/L	0.02	02/14/08 11:10	SW	EPA-200.7
Chloride	21.4	mg/L	2.5	02/13/08 17:00	KR	EPA-300.0
Conductivity	685	µmhos/cm	1.5	02/14/08 00:00	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	326.3	mg/L	1	02/14/08 11:10	SW	EPA-200.7
Total Magnesium	23.12	mg/L	0.05	02/14/08 11:10	SW	EPA-200.7
Total Sulfate (SO ₄)	197	mg/L	0.23	02/13/08 17:00	KR	EPA-300.0
Total Dissolved Solids	466	mg/L	5	02/14/08 09:30	CVS	SM-2540C

Lab No: **52193**
Sample ID: **LFADEW**

Matrix: **Aqueous**
Sampled: **2/12/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Calcium	95.85	mg/L	0.02	02/14/08 11:10	SW	EPA-200.7
Chloride	21.8	mg/L	2.5	02/13/08 17:00	KR	EPA-300.0
Conductivity	687	µmhos/cm	1.5	02/14/08 00:00	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	336.8	mg/L	1	02/14/08 11:10	SW	EPA-200.7
Total Magnesium	23.67	mg/L	0.05	02/14/08 11:10	SW	EPA-200.7
Total Sulfate (SO ₄)	194	mg/L	0.23	02/13/08 17:00	KR	EPA-300.0
Total Dissolved Solids	448	mg/L	5	02/14/08 09:30	CVS	SM-2540C

Qualifiers/ Definitions

MDL Method Detection Limit

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

08-043-0222

Report Number: **08-043-0222**

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☒ Client ☐ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☐ Yes	☐ No	☒ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Stephanie Cox

Date & Time: 02-12-2008 15:09

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

2/20/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-042-0235
Project Description: Holly Hill

Florida Analytical, Inc. received 6 sample(s) on 2/11/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

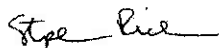
The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

- B Result based on colony counts outside the acceptable range, (microbiology).
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J Estimated value, value is not accurate; to be used when:
 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Stephanie Richards
Laboratory Manager

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042
"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/20/2008

Report Number: **08-042-0235**

REPORT OF ANALYSIS

Received : 2/11/2008

Lab No: **52138**
Sample ID: **LFADEW**

Matrix: **Aqueous**
Sampled: **2/8/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Calcium	94.58	mg/L	0.02	02/14/08 11:10	SW	EPA-200.7
Chloride	23.1	mg/L	2.5	02/12/08 17:00	KR	EPA-300.0
Conductivity	667	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO3(SM-2340B)	331.8	mg/L	1	02/14/08 11:10	SW	EPA-200.7
Total Magnesium	23.22	mg/L	0.05	02/14/08 11:10	SW	EPA-200.7
Total Sulfate (SO4)	193	mg/L	0.23	02/12/08 17:00	KR	EPA-300.0
Total Dissolved Solids	462	mg/L	5	02/12/08 16:00	CVS	SM-2540C

Lab No: **52139**
Sample ID: **LFADEW**

Matrix: **Aqueous**
Sampled: **2/9/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Calcium	92.05	mg/L	0.02	02/14/08 11:10	SW	EPA-200.7
Chloride	20.5	mg/L	2.5	02/12/08 17:00	KR	EPA-300.0
Conductivity	668	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO3(SM-2340B)	323.1	mg/L	1	02/14/08 11:10	SW	EPA-200.7
Total Magnesium	22.65	mg/L	0.05	02/14/08 11:10	SW	EPA-200.7
Total Sulfate (SO4)	198	mg/L	0.23	02/12/08 17:00	KR	EPA-300.0
Total Dissolved Solids	478	mg/L	5	02/12/08 16:00	CVS	SM-2540C

Qualifiers/ Definitions

MDL Method Detection Limit

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/20/2008

Report Number: **08-042-0235**

REPORT OF ANALYSIS

Received : 2/11/2008

Lab No: **52140**
Sample ID: **LFADEW**

Matrix: **Aqueous**
Sampled: **2/9/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Calcium	92.10	mg/L	0.02	02/14/08 11:10	SW	EPA-200.7
Chloride	20.3	mg/L	2.5	02/12/08 17:00	KR	EPA-300.0
Conductivity	685	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	323.0	mg/L	1	02/14/08 11:10	SW	EPA-200.7
Total Magnesium	22.60	mg/L	0.05	02/14/08 11:10	SW	EPA-200.7
Total Sulfate (SO ₄)	194	mg/L	0.23	02/12/08 17:00	KR	EPA-300.0
Total Dissolved Solids	456	mg/L	5	02/12/08 16:00	CVS	SM-2540C

Lab No: **52141**
Sample ID: **LFADEW**

Matrix: **Aqueous**
Sampled: **2/10/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Calcium	91.78	mg/L	0.02	02/14/08 11:10	SW	EPA-200.7
Chloride	20.4	mg/L	2.5	02/12/08 17:00	KR	EPA-300.0
Conductivity	683	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	322.8	mg/L	1	02/14/08 11:10	SW	EPA-200.7
Total Magnesium	22.74	mg/L	0.05	02/14/08 11:10	SW	EPA-200.7
Total Sulfate (SO ₄)	194	mg/L	0.23	02/12/08 17:00	KR	EPA-300.0
Total Dissolved Solids	460	mg/L	5	02/12/08 16:00	CVS	SM-2540C

Qualifiers/ Definitions

MDL Method Detection Limit

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hill

Report Date : 2/20/2008

Report Number: **08-042-0235**

REPORT OF ANALYSIS

Received : 2/11/2008

Lab No: **52142**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/10/2008 21:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Calcium	92.30	mg/L	0.02	02/14/08 11:10	SW	EPA-200.7
Chloride	20.5	mg/L	2.5	02/12/08 17:00	KR	EPA-300.0
Conductivity	683	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	325.2	mg/L	1	02/14/08 11:10	SW	EPA-200.7
Total Magnesium	23.00	mg/L	0.05	02/14/08 11:10	SW	EPA-200.7
Total Sulfate (SO ₄)	198	mg/L	0.23	02/12/08 17:00	KR	EPA-300.0
Total Dissolved Solids	450	mg/L	5	02/12/08 16:00	CVS	SM-2540C

Lab No: **52143**
Sample ID: **LFADW**

Matrix: **Aqueous**
Sampled: **2/11/2008 9:00**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Calcium	90.25	mg/L	0.02	02/14/08 11:10	SW	EPA-200.7
Chloride	20.6	mg/L	2.5	02/12/08 17:00	KR	EPA-300.0
Conductivity	687	µmhos/cm	1.5	02/14/08 10:30	DP	SM-2510B
Hardness as CaCO ₃ (SM-2340B)	317.4	mg/L	1	02/14/08 11:10	SW	EPA-200.7
Total Magnesium	22.34	mg/L	0.05	02/14/08 11:10	SW	EPA-200.7
Total Sulfate (SO ₄)	199	mg/L	0.23	02/12/08 17:00	KR	EPA-300.0
Total Dissolved Solids	450	mg/L	5	02/12/08 16:00	CVS	SM-2540C

Qualifiers/ MDL Method Detection Limit
Definitions

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

08-042-0235

Report Number: **08-042-0235**

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☒ Client ☐ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☐ Yes	☐ No	☒ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Stephanie Cox

Date & Time: 02-11-2008 16:08

Project Client Name: Rowe Drilling P.O. Box 1000	Project Site Location: Holly Hill Owner Manager	Client Contact Name: Johnny [Signature] Phone Number: 863-984-3100	Matrix Key: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA AB AC AD AE AF AG AH AI AJ AK AL AM AN AO AP AQ AR AS AT AU AV AW AX AY AZ BA BB BC BD BE BF BG BH BI BJ BK BL BM BN BO BP BQ BR BS BT BU BV BW BX BY BZ CA CB CC CD CE CF CG CH CI CJ CK CL CM CN CO CP CQ CR CS CT CU CV CW CX CY CZ DA DB DC DD DE DF DG DH DI DJ DK DL DM DN DO DP DQ DR DS DT DU DV DW DX DY DZ EA EB EC ED EE EF EG EH EI EJ EK EL EM EN EO EP EQ ER ES ET EU EV EW EX EY EZ FA FB FC FD FE FF FG FH FI FJ FK FL FM FN FO FP FQ FR FS FT FU FV FW FX FY FZ GA GB GC GD GE GF GG GH GI GJ GK GL GM GN GO GP GQ GR GS GT GU GV GW GX GY GZ HA HB HC HD HE HF HG HH HI HJ HK HL HM HN HO HP HQ HR HS HT HU HV HW HX HY HZ IA IB IC ID IE IF IG IH II IJ IK IL IM IN IO IP IQ IR IS IT IU IV IW IX IY IZ JA JB JC JD JE JF JG JH JI JJ JK JL JM JN JO JP JQ JR JS JT JU JV JW JX JY JZ KA KB KC KD KE KF KG KH KI KJ KK KL KM KN KO KP KQ KR KS KT KU KV KW KX KY KZ LA LB LC LD LE LF LG LH LI LJ LK LL LM LN LO LP LQ LR LS LT LU LV LW LX LY LZ MA MB MC MD ME MF MG MH MI MJ MK ML MN MO MP MQ MR MS MT MU MV MW MX MY MZ NA NB NC ND NE NF NG NH NI NJ NK NL NM NO NP NQ NR NS NT NU NV NW NX NY NZ OA OB OC OD OE OF OG OH OI OJ OK OL OM ON OO OP OQ OR OS OT OU OV OW OX OY OZ PA PB PC PD PE PF PG PH PI PJ PK PL PM PN PO PP PQ PR PS PT PU PV PW PX PY PZ QA QB QC QD QE QF QG QH QI QJ QK QL QM QN QO QP QQ QR QS QT QU QV QW QX QY QZ RA RB RC RD RE RF RG RH RI RJ RK RL RM RN RO RP RQ RR RS RT RU RV RW RX RY RZ SA SB SC SD SE SF SG SH SI SJ SK SL SM SN SO SP SQ SR SS ST SU SV SW SX SY SZ TA TB TC TD TE TF TG TH TI TJ TK TL TM TN TO TP TQ TR TS TT TU TV TW TX TY TZ UA UB UC UD UE UF UG UH UI UJ UK UL UM UN UO UP UQ UR US UT UU UV UW UX UY UZ VA VB VC VD VE VF VG VH VI VJ VK VL VM VN VO VP VQ VR VS VT VU VV VW VX VY VZ WA WB WC WD WE WF WG WH WI WJ WK WL WM WN WO WP WQ WR WS WT WU WV WW WX WY WZ XA XB XC XD XE XF XG XH XI XJ XK XL XM XN XO XP XQ XR XS XT XU XV XW XX XY XZ YA YB YC YD YE YF YG YH YI YJ YK YL YM YN YO YP YQ YR YS YT YU YV YW YX YY YZ ZA ZB ZC ZD ZE ZF ZG ZH ZI ZJ ZK ZL ZM ZN ZO ZP ZQ ZR ZS ZT ZU ZV ZW ZX ZY ZZ
Report Mailing Address: P.O. Box 1000	Report Mailing City, State, ZIP: Holly Hill, NC 27536	Report Mailing Name: Rowe Drilling	Report Mailing Phone Number: 863-984-3100
Report Mailing Address: P.O. Box 1000	Report Mailing City, State, ZIP: Holly Hill, NC 27536	Report Mailing Name: Rowe Drilling	Report Mailing Phone Number: 863-984-3100

[illegible]

For Laboratory Use Only:			Submitted by: (PRINT)				Submitted by: (SIGNATURE)				Received by: (SIGNATURE)				Time	
Sample Kit Prepared by:			FA Code (1-4)				Client Code(s)				Date				Time	
Date	Time	Code Received (YES/NO)	Laboratory Remarks:				Date				Time				Date	
							Submitted by: (SIGNATURE) <i>J. Wells</i>									
							Submitted by: (SIGNATURE) <i>Johnny Wells</i>				Date 2-11-08				Time 16:08	
							Submitted by: (SIGNATURE)				Date				Time	
							Submitted by: (SIGNATURE)				Date				Time	
							Submitted by: (SIGNATURE)				Date				Time	

APPENDIX R.

Pumping Test Laboratory Analytical Report Select Primary & Secondary DW Standards

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (883) 646-8526 Fax: (883) 646-1042

"A Laboratory Management Partner"

3/6/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-043-0223
Project Description: Holly Hills, Nerusa

Florida Analytical, Inc. received 1 sample(s) on 2/12/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA, NELAC, and USACE, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

- B Result based on colony counts outside the acceptable range, (microbiology).
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J Estimated value, value is not accurate: to be used when:
 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Stephanie Richards
Laboratory Manager

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL 33868

Project ID :
Description : Holly Hills, Nerusa

Report Date : 3/6/2008

Report Number : 08-043-0223

REPORT OF ANALYSIS

Received : 2/12/2008

Lab No : 52194

Matrix: Aqueous

Sample ID : LFA DEW-P&S WQ

Sampled: 2/12/2008 12:33

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	18.3	mg/L	0.25	02/13/08 17:00	KR	EPA-300.0
Color	1 U	pt-co	1	02/13/08 09:45	DP	SM-2120B
E. coli	Absent			02/12/08 13:25	DP	SM-9223B
Fluoride (w/o distillation)	0.38	mg/L	0.01	02/21/08 10:00	DP	SM-4500-F-C
Gross Alpha	6.23 +/- 8.03	pCi/L	1	02/18/08 06:54	SAR	EPA-600/4-75-008 P1
MBAS (LAS MW=340)	0.01 U	mg/L	0.01	02/21/08 16:00	KR	SM-5540C
Nitrate as N	0.086 I	mg/L	0.026	02/13/08 17:00	KR	EPA-300.0
Nitrite + Nitrate (as N)	0.381	mg/L	0.025	02/13/08 17:00	KR	EPA-300.0
Nitrite as N	0.025 U	mg/L	0.025	02/13/08 17:00	KR	EPA-300.0
Odor	1 U	T.O.N.	1	02/13/08 10:15	DP	SM-2150B
pH	7.69 Q	s.u.		02/13/08 10:35	SC	SM-4500H+B
Radium - 226	1.5 +/- 0.1	pCi/L	0.1	02/15/08 16:49	SAR	EPA-903.1
Radium - 228	0.78 U +/- 0.3 J4	pCi/L	0.78	02/13/08 16:16	SAR	EPA-RA-05
Total Aluminum	0.0323 I	mg/L	0.013	02/13/08 12:30	SW	EPA-200.7
Total Antimony	0.002 U	mg/L	0.002	02/13/08 14:05	SW	SM-3113B
Total Arsenic	0.0007 U	mg/L	0.0007	02/13/08 14:05	SW	SM-3113B
Total Barium	0.0223 I	mg/L	0.002	02/13/08 12:30	SW	EPA-200.7
Total Beryllium	0.00020 U	mg/L	0.0002	02/13/08 14:05	SW	SM-3113B
Total Cadmium	0.001 U	mg/L	0.001	02/13/08 12:30	SW	EPA-200.7
Total Chromium	0.0016 I	mg/L	0.001	02/13/08 12:30	SW	EPA-200.7
Total Coliform	Present			02/12/08 13:25	DP	SM-9223B
Total Copper	0.001 U	mg/L	0.001	02/13/08 12:30	SW	EPA-200.7
Total Cyanide	0.002 U	mg/L	0.002	02/19/08 09:30	SUB 1	SM-4500CNE
Total Dissolved Solids	438	mg/L	5	02/14/08 09:30	CVS	SM-2540C
Total Iron	0.0735 I	mg/L	0.015	02/13/08 12:30	SW	EPA-200.7
Total Lead	0.00050 U	mg/L	0.0005	02/13/08 14:05	SW	SM-3113B

Qualifiers/ Definitions

MDL Method Detection Limit

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling

Mr. Johnny Wills

P.O. Box 1098

Polk City, FL 33868

Project ID :

Description : Holly Hills, Nerusa

Report Date : 3/6/2008

Report Number : **08-043-0223**

REPORT OF ANALYSIS

Received : 2/12/2008

Lab No : **52194**

Matrix: **Aqueous**

Sample ID : **LFA DEW-P&S WQ**

Sampled: **2/12/2008 12:33**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Manganese	0.0016 I	mg/L	0.001	02/13/08 12:30	SW	EPA-200.7
Total Mercury	0.00004 U	mg/L	0	02/21/08 16:11	SW	EPA-245.1
Total Nickel	0.002 U	mg/L	0.002	02/13/08 12:30	SW	EPA-200.7
Total Selenium	0.00200 U	mg/L	0.002	02/13/08 14:05	SW	SM-3113B
Total Silver	0.003 U	mg/L	0.003	02/14/08 14:55	SW	EPA-200.7
Total Sodium	11.19	mg/L	0.14	02/13/08 12:30	SW	EPA-200.7
Total Sulfate (SO4)	191	mg/L		02/14/08 17:00	KR	EPA-300.0
Total Zinc	0.0257 I	mg/L	0.007	02/13/08 12:30	SW	EPA-200.7

Qualifiers/ Definitions

MDL

Method Detection Limit

SOUTHERN ANALYTICAL LABORATORIES, INC.

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

Florida Analytical Inc.
Stephanie Richards
4320 Old Highway 37
Lakeland, FL 33813-

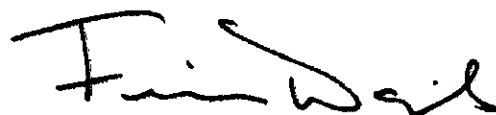
February 27, 2008
Project No: 79586

Laboratory Report

FDEP Report form attached for the following samples:

<u>Sample Number</u>	<u>Sample Description</u>	<u>Date & Time Collected</u>	<u>Date & Time Received</u>
79586.06	08-043-0223	02/12/08 12:16	02/14/08 11:20

Test results presented in this report meet all the requirements of the NELAC standards.



FDOH Laboratory No. E84129
NELAP Accredited

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

SOUTHERN ANALYTICAL LABORATORIES, INC.

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



Florida Analytical Inc.

08-043-0200, 0214, 0215, 0218, 0219, 0223

Sample ID: 08-043-0223

February 27, 2008

Sample No.: 79586.06

PWS ID:

Volatile Organics 62-550.310(4)(a)

Contaminant ID	Contaminant Name	MCL	Units	Analysis Result	Qualifier*	Analytical Method	Lab MDL	RDL **	Analysis Date	Analysis Time	DOH Lab Certification #
2378	1,2,4 Trichlorobenzene	70	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2380	cis-1,2-Dichloroethylene	70	µg/L	0.2	U	EPA 502.2	0.2	0.5	02/15/08	07:13	E84129
2955	Xylenes (total)	10,000	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2964	Dichloromethane	5	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2968	o-Dichlorobenzene	600	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2969	para-Dichlorobenzene	75	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2976	Vinyl Chloride	1	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2977	1,1-Dichloroethylene	7	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2979	trans-1,2-Dichloroethylene	100	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2980	1,2-Dichloroethane	3	µg/L	0.2	U	EPA 502.2	0.2	0.5	02/15/08	07:13	E84129
2981	1,1,1-Trichloroethane	200	µg/L	0.3	U	EPA 502.2	0.3	0.5	02/15/08	07:13	E84129
2982	Carbon tetrachloride	3	µg/L	0.3	U	EPA 502.2	0.3	0.5	02/15/08	07:13	E84129
2983	1,2-Dichloropropane	5	µg/L	0.3	U	EPA 502.2	0.3	0.5	02/15/08	07:13	E84129
2984	Trichloroethylene	3	µg/L	0.2	U	EPA 502.2	0.2	0.5	02/15/08	07:13	E84129
2985	1,1,2-Trichloroethane	5	µg/L	0.3	U	EPA 502.2	0.3	0.5	02/15/08	07:13	E84129
2987	Tetrachloroethylene	3	µg/L	0.2	U	EPA 502.2	0.2	0.5	02/15/08	07:13	E84129
2989	Monochlorobenzene	100	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2990	Benzene	1	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2991	Toluene	1,000	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2992	Ethylbenzene	700	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129
2996	Styrene	100	µg/L	0.5	U	EPA 502.2	0.5	0.5	02/15/08	07:13	E84129

* Qualifiers:

U

Analyte was undetected. Indicated concentration is method detection limit

** Non-detects with a reported lab MDL <50% of the MCL are acceptable for compliance with 62-550.310(4)(b).

SOUTHERN ANALYTICAL LABORATORIES, INC.

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



Florida Analytical Inc.

08-043-0200, 0214, 0215, 0218, 0219, 0223

Sample ID: 08-043-0223

February 27, 2008

Sample No.: 79586.06

PWS ID:

Synthetic Organics

62-550.310(4)(b)

Contaminant ID	Contaminant Name	MCL Units	Analysis Result	Qualifier*	Analytical Method	Lab MDL	RDL **	Extraction Date	Analysis Date	Analysis Time	DOH Lab Certification#
2005	Endrin	2 µg/L	0.1	U	EPA 525.2	0.1	0.01	02/14/08	02/15/08	07:58	E84129
2010	Lindane	0.2 µg/L	0.06	U	EPA 525.2	0.06	0.02	02/14/08	02/15/08	07:58	E84129
2015	Methoxychlor	40 µg/L	0.05	U	EPA 525.2	0.05	0.1	02/14/08	02/15/08	07:58	E84129
2020	Toxaphene	3 µg/L	0.5	U	EPA 508.1	0.5	1	02/14/08	02/15/08	23:22	E84129
2031	Dalapon	200 µg/L	1	U	EPA 515.3	1	1	02/18/08	02/19/08	03:42	E84129
2032	Diquat	20 µg/L	1	U	EPA 549.2	1	0.4	02/15/08	02/19/08	16:40	E84129
2033	Endothal	100 µg/L	20	U	EPA 548.1	20	9	02/15/08	02/18/08	21:13	E84129
2034	Glyphosate	700 µg/L	10	U	EPA 547	10	6	02/14/08	02/15/08	19:54	E84129
2035	Di(2-ethylhexyl)adipate	400 µg/L	0.3	U	EPA 525.2	0.3	0.6	02/14/08	02/15/08	07:58	E84129
2036	Oxamyl (Vydate)	200 µg/L	0.5	U,Y	EPA 531.1	0.5	2	02/14/08	02/20/08	07:18	E84129
2037	Simazine	4 µg/L	0.07	U	EPA 525.2	0.07	0.07	02/14/08	02/15/08	07:58	E84129
2039	Di(2-ethylhexyl)phthalate	6 µg/L	1.0	U	EPA 525.2	1.0	0.6	02/14/08	02/15/08	07:58	E84129
2040	Picloram	500 µg/L	0.75	U	EPA 515.3	0.75	0.1	02/18/08	02/19/08	03:42	E84129
2041	Dinoseb	7 µg/L	0.5	U	EPA 515.3	0.5	0.2	02/18/08	02/19/08	03:42	E84129
2042	Hexachlorocyclopentadiene	50 µg/L	0.2	U	EPA 525.2	0.2	0.1	02/14/08	02/15/08	07:58	E84129
2046	Carbofuran	40 µg/L	0.5	U,Y	EPA 531.1	0.5	0.9	02/14/08	02/20/08	07:18	E84129
2050	Atrazine	3 µg/L	0.06	U	EPA 525.2	0.06	0.1	02/14/08	02/15/08	07:58	E84129
2051	Alachlor	2 µg/L	0.2	U	EPA 525.2	0.2	0.2	02/14/08	02/15/08	07:58	E84129
2065	Heptachlor	0.4 µg/L	0.08	U	EPA 525.2	0.08	0.04	02/14/08	02/15/08	07:58	E84129
2067	Heptachlor Epoxide	0.2 µg/L	0.1	U	EPA 525.2	0.1	0.02	02/14/08	02/15/08	07:58	E84129
2105	2,4-D	70 µg/L	1	U	EPA 515.3	1	0.1	02/18/08	02/19/08	03:42	E84129
2110	2,4,5-TP (Silvex)	50 µg/L	0.25	U	EPA 515.3	0.25	0.2	02/18/08	02/19/08	03:42	E84129
2274	Hexachlorobenzene	1 µg/L	0.05	U	EPA 525.2	0.05	0.1	02/14/08	02/15/08	07:58	E84129
2306	Benzo(a)pyrene	0.2 µg/L	0.1	U	EPA 525.2	0.1	0.02	02/14/08	02/15/08	07:58	E84129
2326	Pentachlorophenol	1 µg/L	0.1	U	EPA 515.3	0.1	0.04	02/18/08	02/19/08	03:42	E84129
2383	(PCBs)	0.5 µg/L	0.2	U	EPA 508.1	0.2	0.1	02/14/08	02/15/08	23:22	E84129
2931	Dibromochloropropane	0.2 µg/L	0.005	U	EPA 504.1	0.005	0.02	02/20/08	02/20/08	20:30	E84129
2946	Ethylene Dibromide (EDB)	0.02 µg/L	0.005	U	EPA 504.1	0.005	0.01	02/20/08	02/20/08	20:30	E84129
2959	Chlordane	2 µg/L	0.05	U	EPA 508.1	0.05	0.2	02/14/08	02/15/08	23:22	E84129

* Qualifiers:

U
U,Y

Analyte was undetected. Indicated concentration is method detection limit.

Analyte was not detected; indicated concentration is method detection limit. The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate.

** Non-detects with a reported lab MDL < 50% of the MCL are acceptable for compliance with 62-550.310(4)(b).

SOUTHERN ANALYTICAL LABORATORIES, INC.

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



Florida Analytical Inc.

08-043-0200, 0214, 0215, 0218, 0219, 0223

Sample ID: 08-043-0223

February 27, 2008

Sample: 79586.06

PWS ID: _____

Other Contaminants

Contaminant ID	Contaminant Name	MCL	Units	Analysis Result	Qualifier*	Analytical Method	Lab MDL	Analysis Date	Analysis Time	DOH Lab Certification #
	Paraquat		ug/l	1	U	EPA 549.2	1	02/20/08	13:27	E84129

* Qualifiers:

U

Analyte was undetected. Indicated concentration is method detection limit.

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

08-043-0223

Report Number: **08-043-0223**

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☒ Client ☐ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☒ Yes	☐ No	☐ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Stephanie Cox

Date & Time: 02-12-2008 15:11

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042
"A Laboratory Management Partner"

5/5/2008

Rowe Drilling
Mr. Johnny Wills
P.O. Box 1098
Polk City, FL, 33868

Ref: Analytical Testing
Report Number: 08-043-9223
Project Description: Holly Hills, Nerusa

Florida Analytical, Inc. received 1 sample(s) on 2/12/2008 for the analyses presented in the following report. Samples collected by Florida Analytical, Inc. are in accordance with DEP-SOP-001/01 (Revised February 1, 2004).

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The EPA requires that water samples analyzed for pH, dissolved oxygen and total residual chlorine be analyzed in the field. Analyses and results reported which do not indicate "Field" for these parameters were analyzed outside the holding time as specified in Table II of 40 CFR Part 136.3.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Test results meet all requirements of USEPA and NELAC, unless otherwise noted in this report. Uncertainties in test results are available upon request. This report may not be reproduced in part and results relate only to the samples tested. Qualifiers shown on the data report are defined as follows:

- B Result based on colony counts outside the acceptable range, (microbiology).
- I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J Estimated value, value is not accurate: to be used when:
 - 1. Surrogate recovery limits have been exceeded.
 - 2. No known quality control criterion exists.
 - 3. Report value failed to meet established QC criteria.
 - 4. Sample matrix interference precludes accurate determination.
 - 5. Data is questionable due to improper lab or field protocols.
- Q Sample held beyond the accepted holding time.
- U Compound was analyzed for but not detected.
- Y Laboratory analysis was from an unpreserved or improperly preserved sample.
The data may not be accurate.
- Z Too many colonies were present (TNTC), the numeric value represents the filtration volume.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Stephanie Richards
Laboratory Manager

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling

Mr. Johnny Wills

P.O. Box 1098

Polk City, FL 33868

Project ID :

Description : Holly Hills, Nerusa

Revised Report Date : 5/5/2008

Report Number : 08-043-9223

REPORT OF ANALYSIS

Received : 2/12/2008

Lab No : 52194

Matrix: Aqueous

Sample ID : LFA DEW-P&S WQ

Sampled: 2/12/2008 12:33

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Chloride	18.3	mg/L	0.25	02/13/08 17:00	KR	EPA-300.0
Color	1 U	pt-co	1	02/13/08 09:45	DP	SM-2120B
E. coli	Absent			02/12/08 13:25	DP	SM-9223B
Fluoride (w/o distillation)	0.38	mg/L	0.01	02/21/08 10:00	DP	SM-4500-F-C
Gross Alpha	6.23 +/- 8.03	pCi/L	1	02/18/08 06:54	SAR	EPA-600/4-75-008 P1
MBAS (LAS MW=340)	0.01 U	mg/L	0.01	02/21/08 16:00	KR	SM-5540C
Nitrate as N	0.086 I	mg/L	0.026	02/13/08 17:00	KR	EPA-300.0
Nitrite + Nitrate (as N)	0.381	mg/L	0.025	02/13/08 17:00	KR	EPA-300.0
Nitrite as N	0.025 U	mg/L	0.025	02/13/08 17:00	KR	EPA-300.0
Odor at 60C	1 U	T.O.N.	1	02/13/08 10:15	DP	SM-2150B
pH	7.69 Q	s.u.		02/13/08 10:35	SC	SM-4500H+B
Radium - 226	1.5 +/- 0.1	pCi/L	0.1	02/15/08 16:49	SAR	EPA-903.1
Radium - 228	0.78 U +/- 0.3 J4	pCi/L	0.78	02/13/08 16:16	SAR	EPA-RA-05
Total Aluminum	0.0323 I	mg/L	0.013	02/13/08 12:30	SW	EPA-200.7
Total Antimony	0.002 U	mg/L	0.002	02/13/08 14:05	SW	SM-3113B
Total Arsenic	0.0007 U	mg/L	0.0007	02/13/08 14:05	SW	SM-3113B
Total Barium	0.0223 I	mg/L	0.002	02/13/08 12:30	SW	EPA-200.7
Total Beryllium	0.00020 U	mg/L	0.0002	02/13/08 14:05	SW	SM-3113B
Total Cadmium	0.001 U	mg/L	0.001	02/13/08 12:30	SW	EPA-200.7
Total Calcium	108	mg/L	0.02	05/02/08 12:14	SW	EPA-200.7
Total Chromium	0.0016 I	mg/L	0.001	02/13/08 12:30	SW	EPA-200.7
Total Coliform	Present			02/12/08 13:25	DP	SM-9223B
Total Copper	0.001 U	mg/L	0.001	02/13/08 12:30	SW	EPA-200.7
Total Cyanide	0.002 U	mg/L	0.002	02/19/08 09:30	SUB 1	SM-4500CNE
Total Dissolved Solids	438	mg/L	5	02/14/08 09:30	CVS	SM-2540C
Total Iron	0.0735 I	mg/L	0.015	02/13/08 12:30	SW	EPA-200.7

Qualifiers/ Definitions

MDL

Method Detection Limit

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8525 Fax: (863) 646-1042

"A Laboratory Management Partner"

00259

Rowe Drilling

Mr. Johnny Wills

P.O. Box 1098

Polk City, FL 33868

Project ID :

Description : Holly Hills, Nerusa

Revised Report Date : 5/5/2008

Report Number : **08-043-9223**

REPORT OF ANALYSIS

Received : 2/12/2008

Lab No : **52194**

Matrix: **Aqueous**

Sample ID : **LFA DEW-P&S WQ**

Sampled: **2/12/2008 12:33**

Test	Results	Units	MDL	Date / Time Analyzed	By	Analytical Method
Total Lead	0.00050 U	mg/L	0.0005	02/13/08 14:05	SW	SM-3113B
Total Magnesium	26.9	mg/L	0.05	05/02/08 12:14	SW	EPA-200.7
Total Manganese	0.0016 I	mg/L	0.001	02/13/08 12:30	SW	EPA-200.7
Total Mercury	0.00004 U	mg/L	0	02/21/08 16:11	SW	EPA-245.1
Total Nickel	0.002 U	mg/L	0.002	02/13/08 12:30	SW	EPA-200.7
Total Selenium	0.00200 U	mg/L	0.002	02/13/08 14:05	SW	SM-3113B
Total Silver	0.003 U	mg/L	0.003	02/14/08 14:55	SW	EPA-200.7
Total Sodium	11.19	mg/L	0.14	02/13/08 12:30	SW	EPA-200.7
Total Sulfate (SO4)	191	mg/L		02/14/08 17:00	KR	EPA-300.0
Total Thallium	0.0006 U	mg/L	0.0006	02/14/08 11:12	SW	EPA-200.9
Total Zinc	0.0257 I	mg/L	0.007	02/13/08 12:30	SW	EPA-200.7

Qualifiers/ Definitions

MDL

Method Detection Limit

Florida Analytical, Inc.

4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 646-1042

"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**

Customer Name: **Rowe Drilling**

08-043-0223

Report Number: **08-043-0223**

Shipping Method

☐ FedEx ☐ UPS ☐ US Postal ☒ Client ☐ LMP ☐ Courier ☐ Other:

Shipping container/cooler uncompromised?	☒ Yes	☐ No	☐ Not Present
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No	☒ Not Required
Custody seals intact on sample bottles?	☐ Yes	☐ No	☒ Not Required
Chain of Custody present?	☒ Yes	☐ No	
COC agrees with sample labels?	☒ Yes	☐ No	
Samples in proper containers?	☒ Yes	☐ No	
Sample containers intact?	☒ Yes	☐ No	
Sufficient sample volume for indicated tests?	☒ Yes	☐ No	
All samples received within holding time?	☒ Yes	☐ No	
Container temperature in compliance?	☒ Yes	☐ No	
Water - VOA vials free of headspace?	☒ Yes	☐ No	☐ N/A
Water - Preservation acceptable upon receipt?	☒ Yes	☐ No	☐ N/A
Samples screened for radioactivity (COE only)?	☐ Yes	☐ No	☒ N/A
Special precautions or instructions included?	☐ Yes	☒ No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Stephanie Cox

Date & Time: 02-12-2008 15:11

