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-1included the surfical 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 silicicastic. 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 dolotomized. 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, foaminifera, 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 (ft^2/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-bls 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 ft^2/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

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.

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 in 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 in 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 in 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 in included in **Appendix E** of this report.

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 thee 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.

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-bls. 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

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 ad 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

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.

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.

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 visa-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 t 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

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

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

(Welenco, 1993). The specific conductivity log measures water conductivity in microsiemens per centimeter (μS/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 was 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.

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

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, porposity, 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 during pilot hole drilling of HH-1 to obtain hydraulic and 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

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 do 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 (1,083 feet bls)

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 µmhos/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

as the recovery data. The analyses for a leaky aquifer resulted in estimated transmissivities ranging between approximately 1,900 and 2,500 ft^2/day, while the analyses for a confined system resulted in a transmissivity estimate of 4,000 ft^2/day. These transmissivity values are approximately one order of magnitude less than the reported values of 14,200 to 30,700 ft^2/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 ft^2/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 feet bls)

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 $CaCO_3$ 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 feet bls)

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 Floridan 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

chloride concentration 15.0 mg/L, a dissolved calcium concentration of 77.9 mg/L, a specific conductance of 499 µmhos/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 feet bls)

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 µmhos/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.

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 (µS/cm) to 587 µS/cm and averaged 574 µS/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 Levelogger® 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 Levelogger® 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 Levelogger 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 Levelogger® 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 Levelogger® 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 (ft^2/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-1included the surfical 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 surfical 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-

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).

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.

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 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 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

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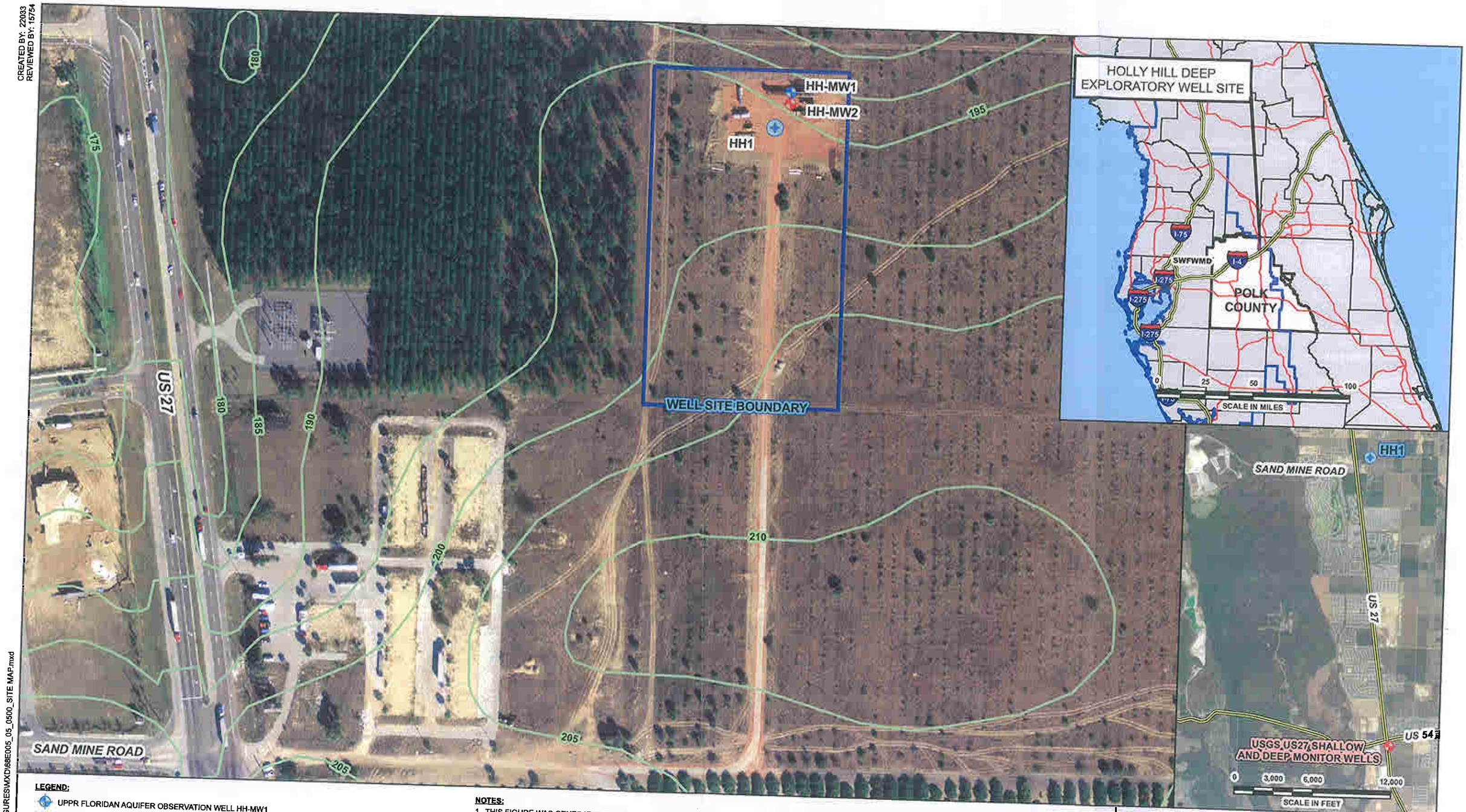
REVIEWED BY: 15754



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LEGEND:

- UPPR FLORIDAN AQUIFER OBSERVATION WELL HH-MW1
- SURFICIAL AQUIFER OBSERVATION WELL HH-MW2
- LOWER FLORIDAN AQUIFER DEEP EXPLORATORY WELL HH1

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3. AREAL PHOTOGRAPHY PROVIDED BY THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT (SWFWMD, 2006).
4. SHAPEFILES PROVIDED BY THE SWFWMD (2008).

N
W E
S

0 50 100 200
SCALE IN FEET

Polk County Utilities

HOLLY HILL UPPER FLORIDAN AQUIFER DEEP EXPLORATORY WELL
POLODAVENPORT, POLK COUNTY, FLORIDA

SITE MAP

SCALE: AS SHOWN
JULY 2008

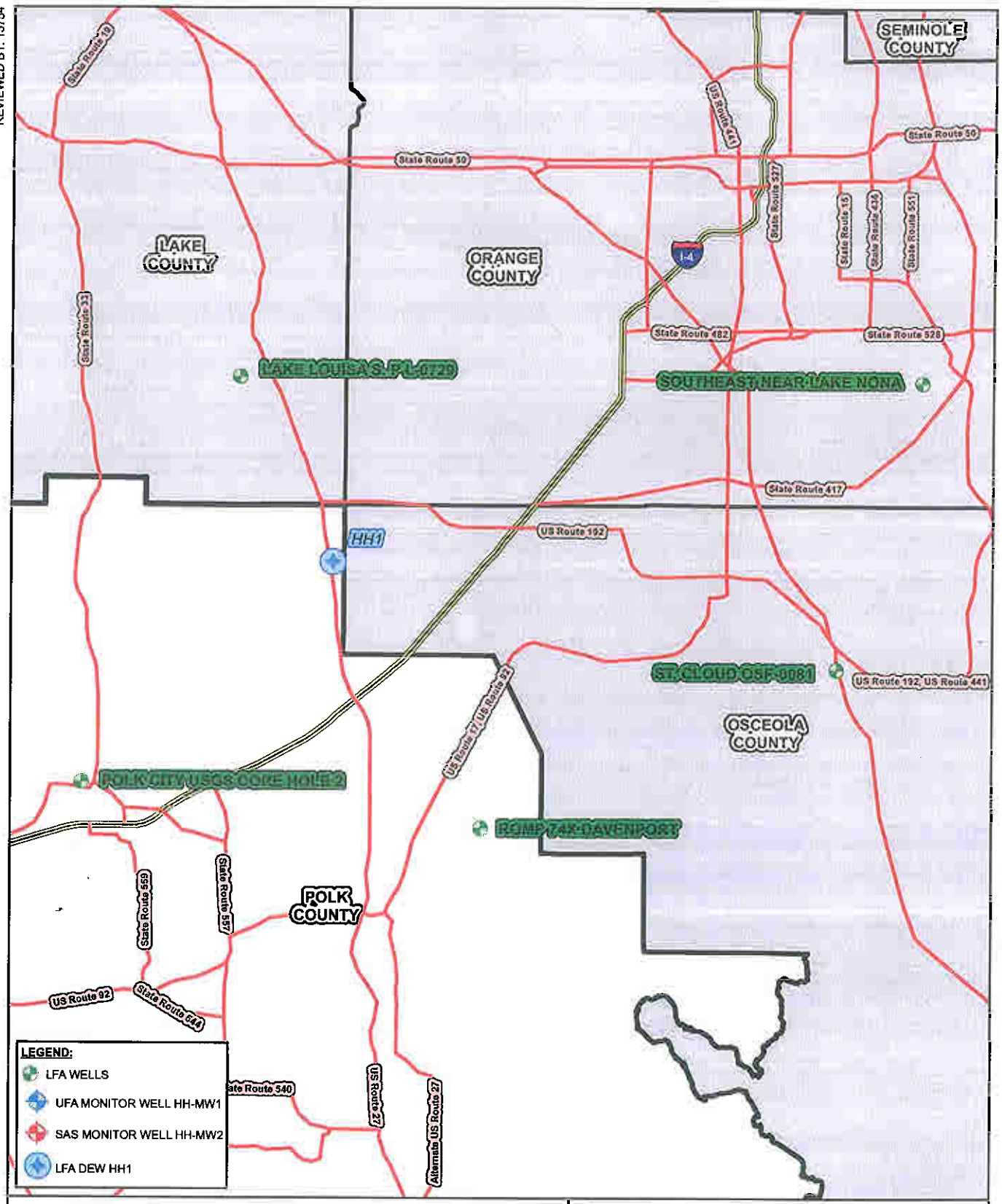
PBS&J

FIGURE 1-1

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, crystaline dolostone	Upper Floridan Aquifer Upper zone (200 to 350)
Middle Eocene/ Avon Park Formation	Upper part: predominantly hard, crystaline 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 crystaline 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 crystaline 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)



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REVIEWED BY: 15754

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3. SHAPEFILES PROVIDED BY THE SWFWMD (2008).

HOLLY HILL UPPER FLORIDAN AQUIFER DEEP EXPLORATORY WELL
POLODAVENPORT, POLK COUNTY, FLORIDA

LOCATIONS OF LOWER FLORIDAN AQUIFER WELLS IN THE VICINITY OF THE NERUSA

SCALE: AS SHOWN
AUGUST 2008

PBSJ

FIGURE 2-2

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

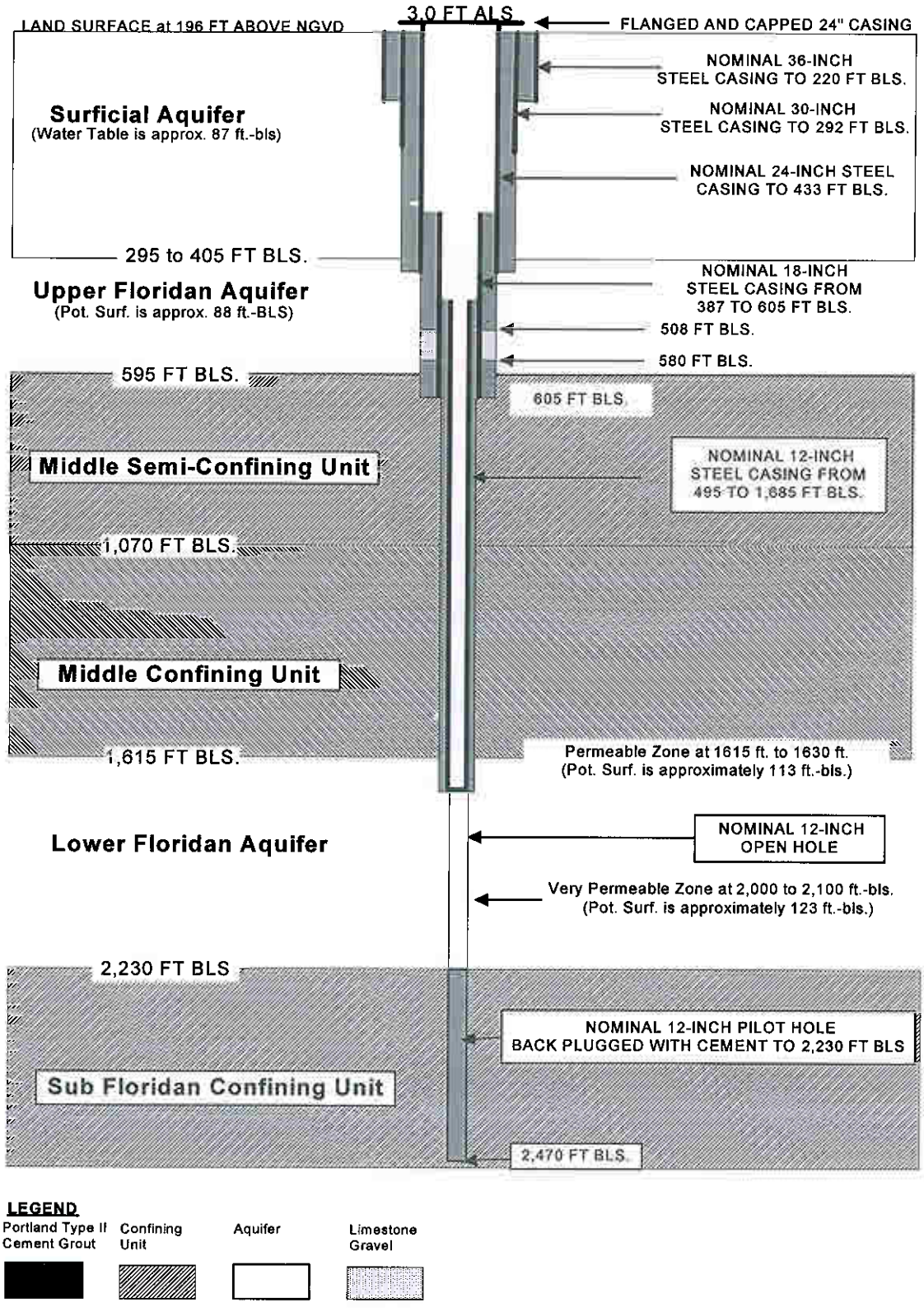

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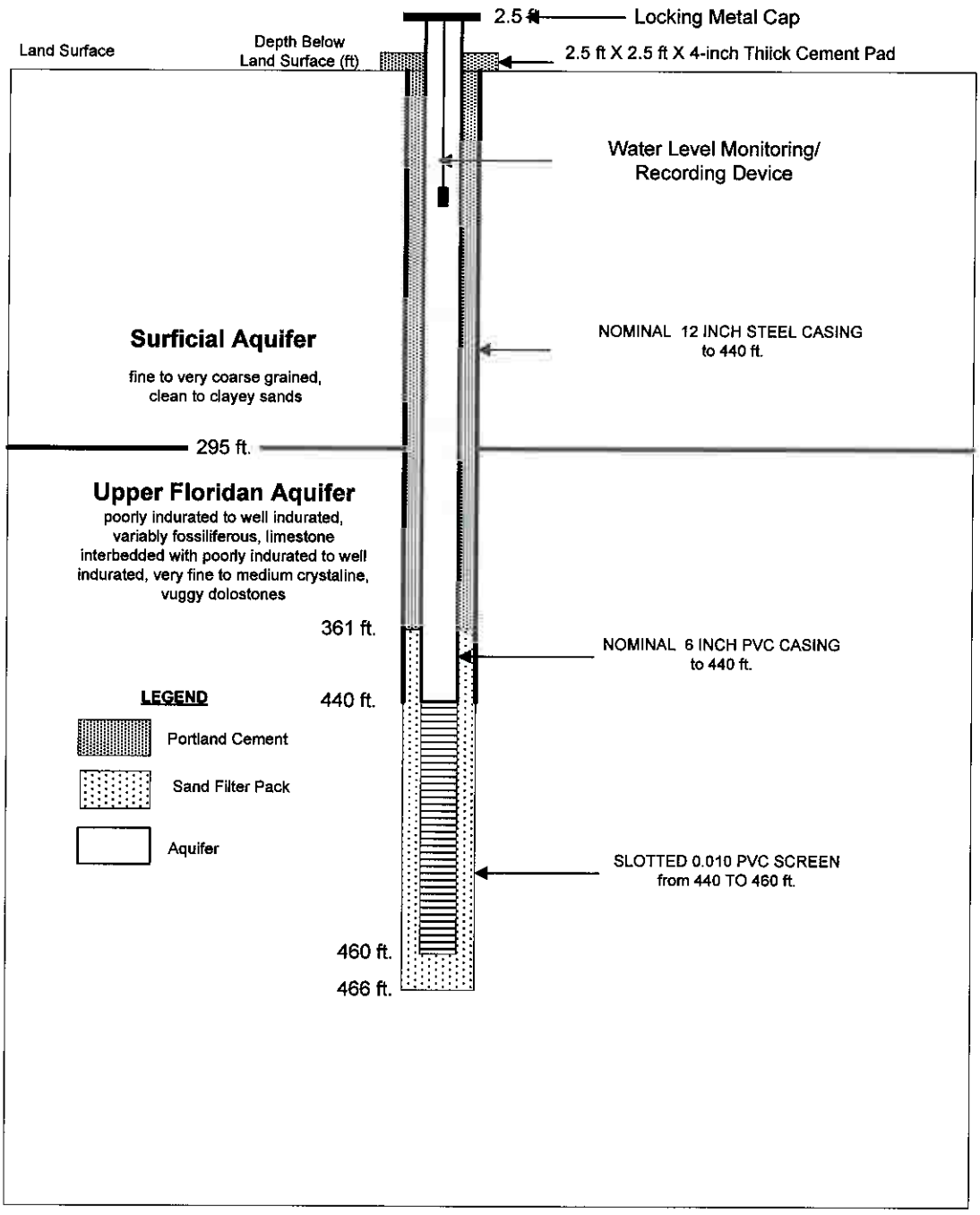
Figure 3-1

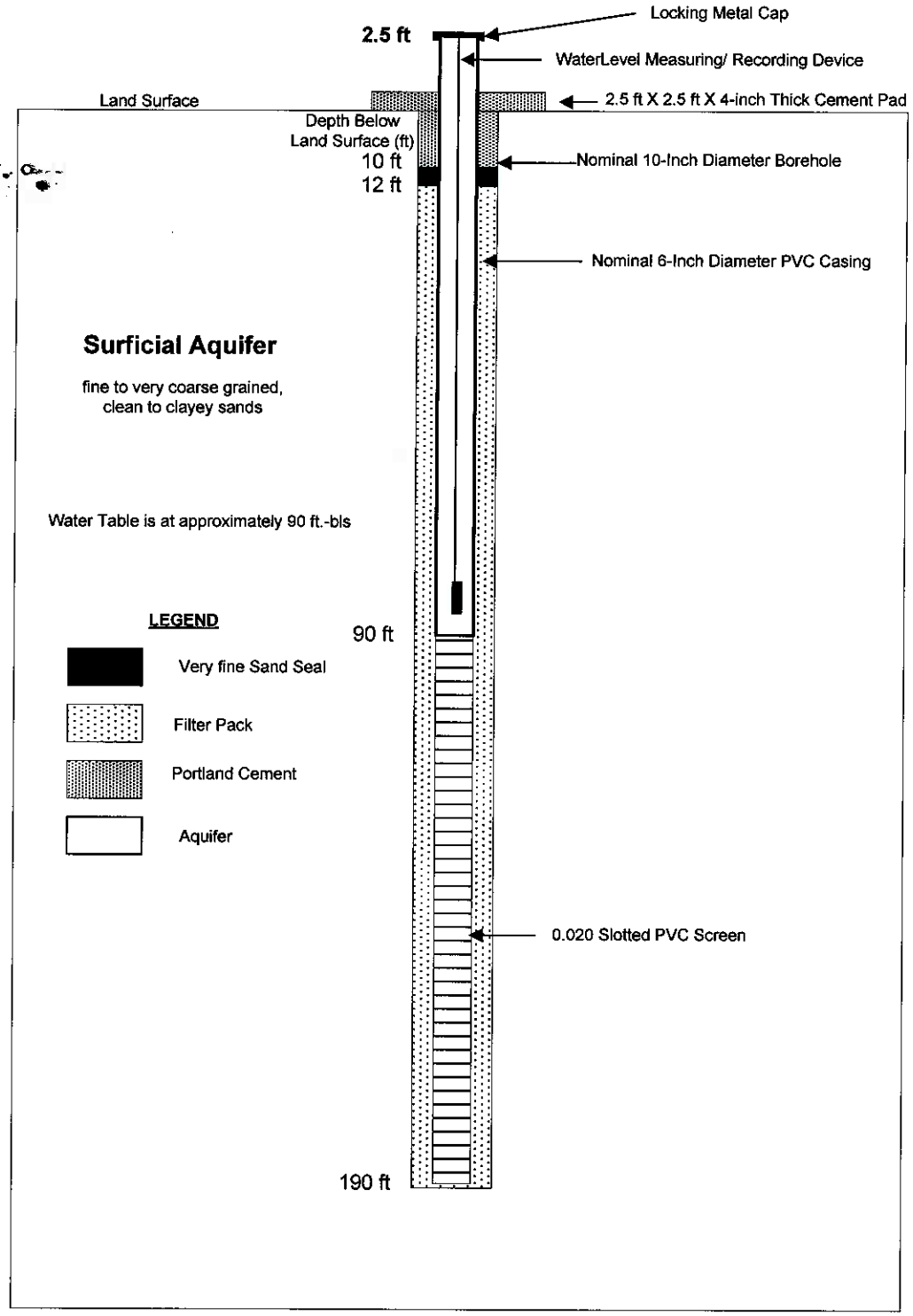
As Built Drawing – Holly Hill Upper Floridian Aquifer Monitor Well No. 1
Northeast Regional Utilities Service Area, Polk County Florida



PBSJ

Figure 3-2

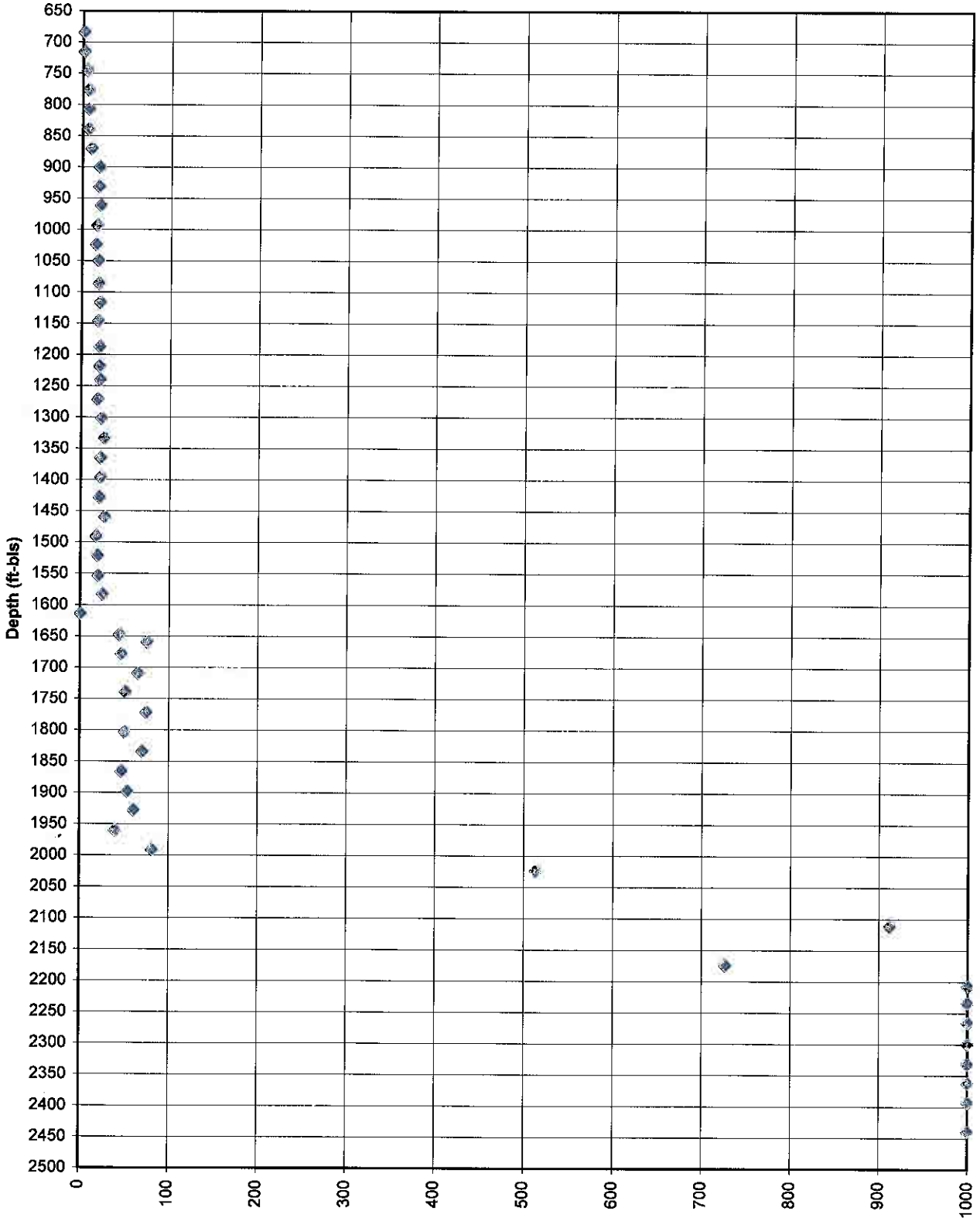
As Built Drawing – Holly Hill Surficial Aquifer Monitor Well No. 2
Northeast Regional Utilities Service Area, Polk County Florida



PBSJ

Figure 3-3

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

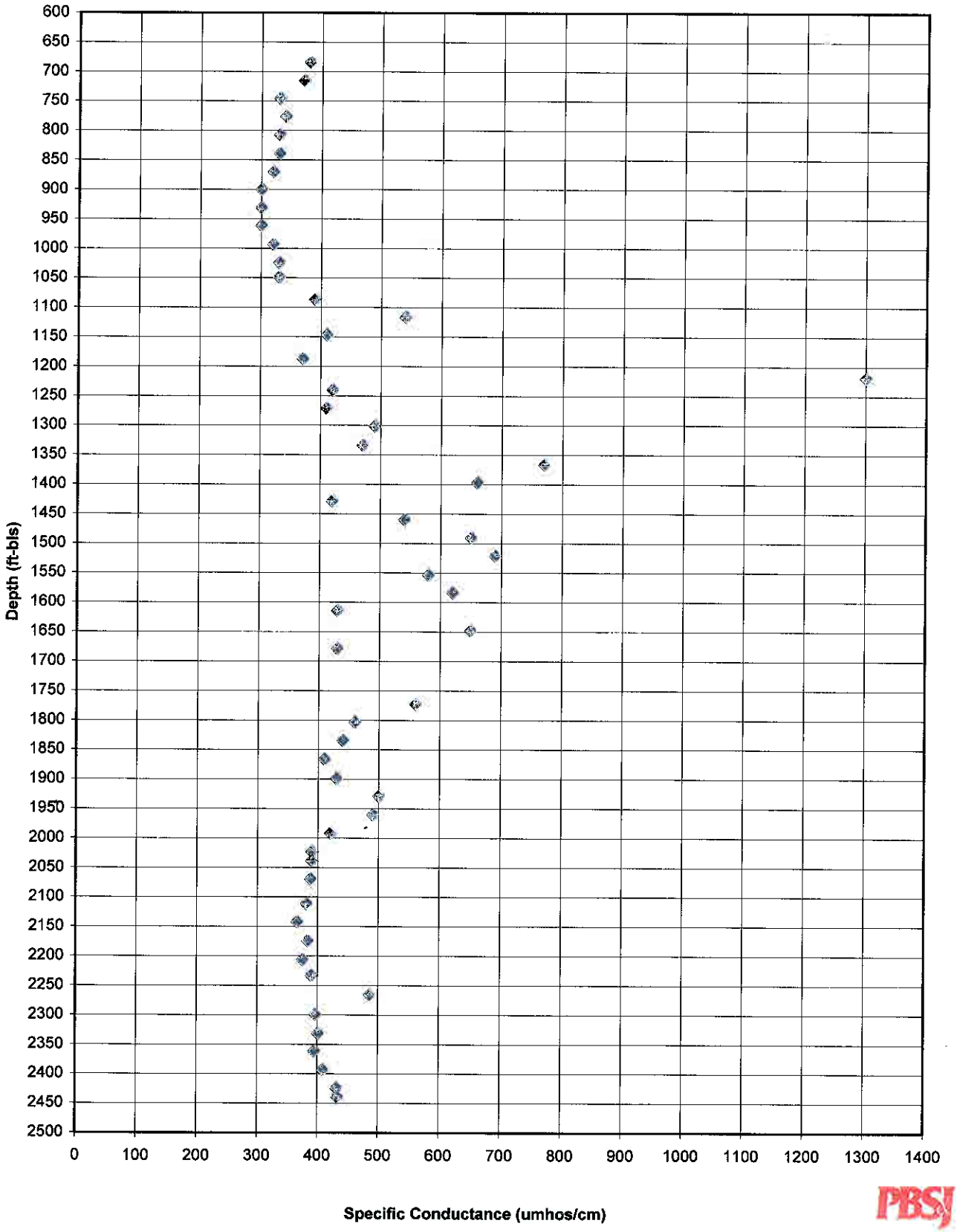


PBSJ

Table 3-2 & Figs 3-4 to 3-11 AIRLFT_results.XLS

Figure 3-4

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

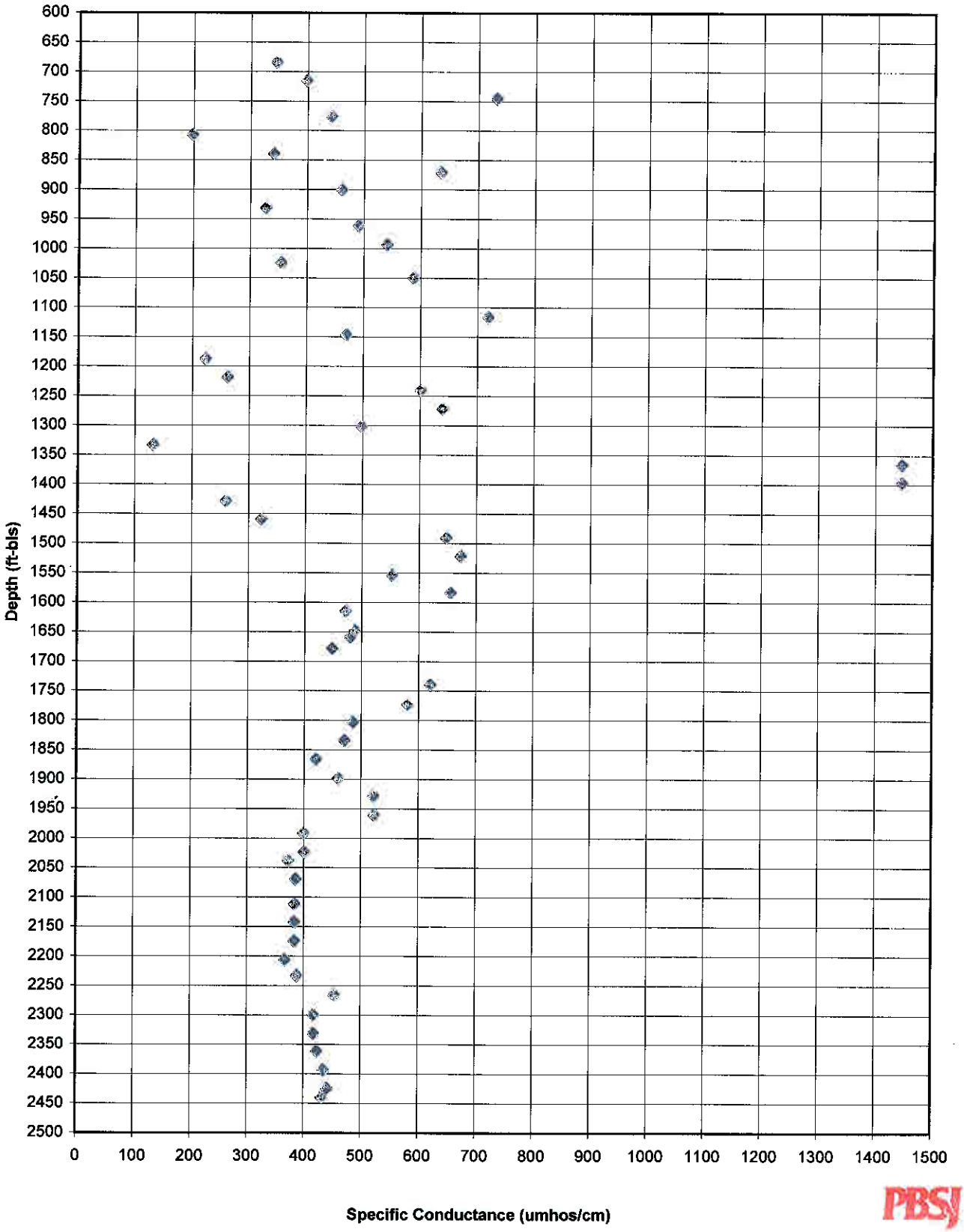


PBSJ

Table 3-2 & Figs 3-4 to 3-11 AIRLFT_results.XLS

Figure 3-5

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



PBSJ

Table 3-2 & Figs 3-4 to 3-11 AIRLFT_results.XLS

Figure 3-6

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

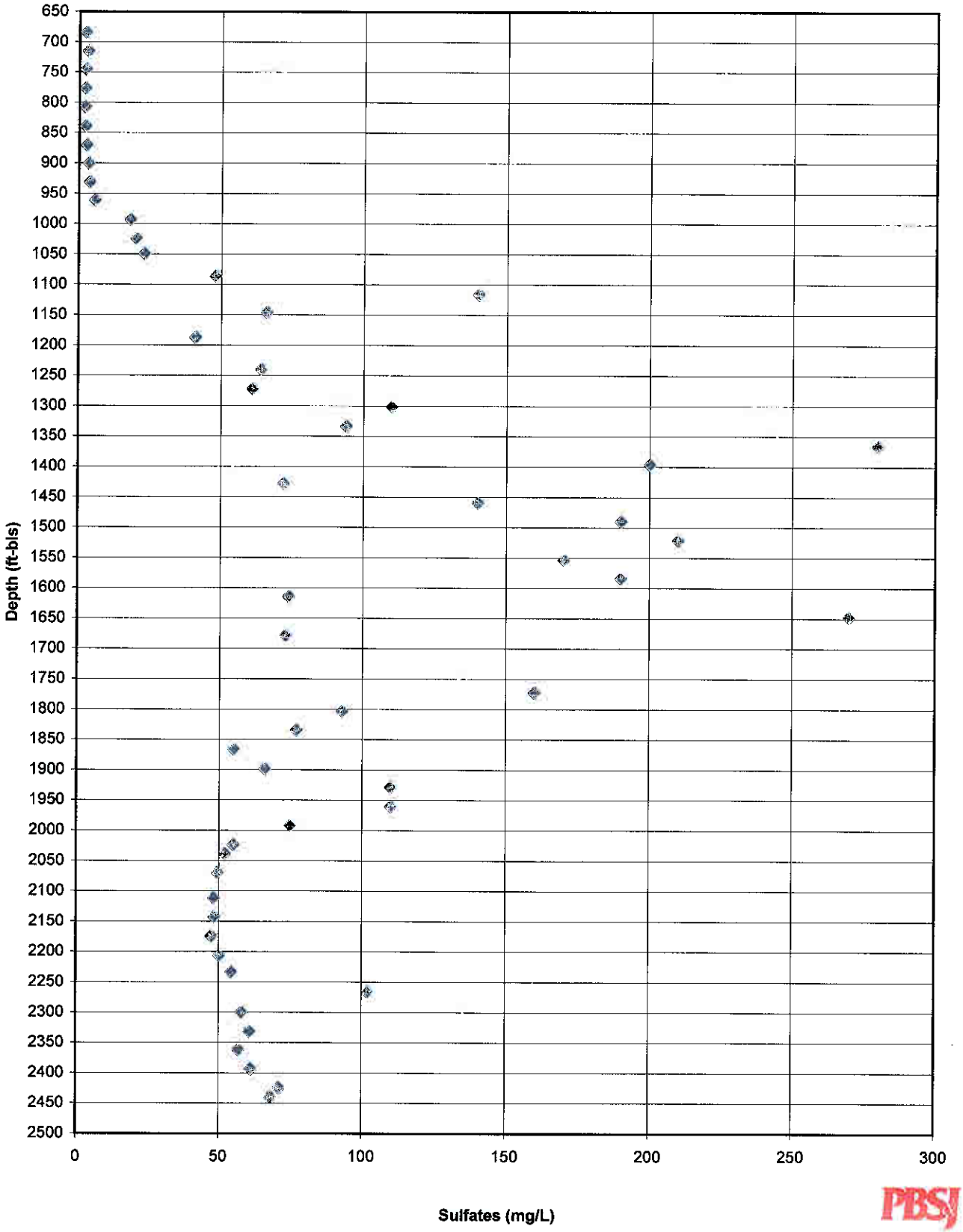


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Table 3-2 & Figs 3-4 to 3-11 AIRLFT_results.XLS

Figure 3-7

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

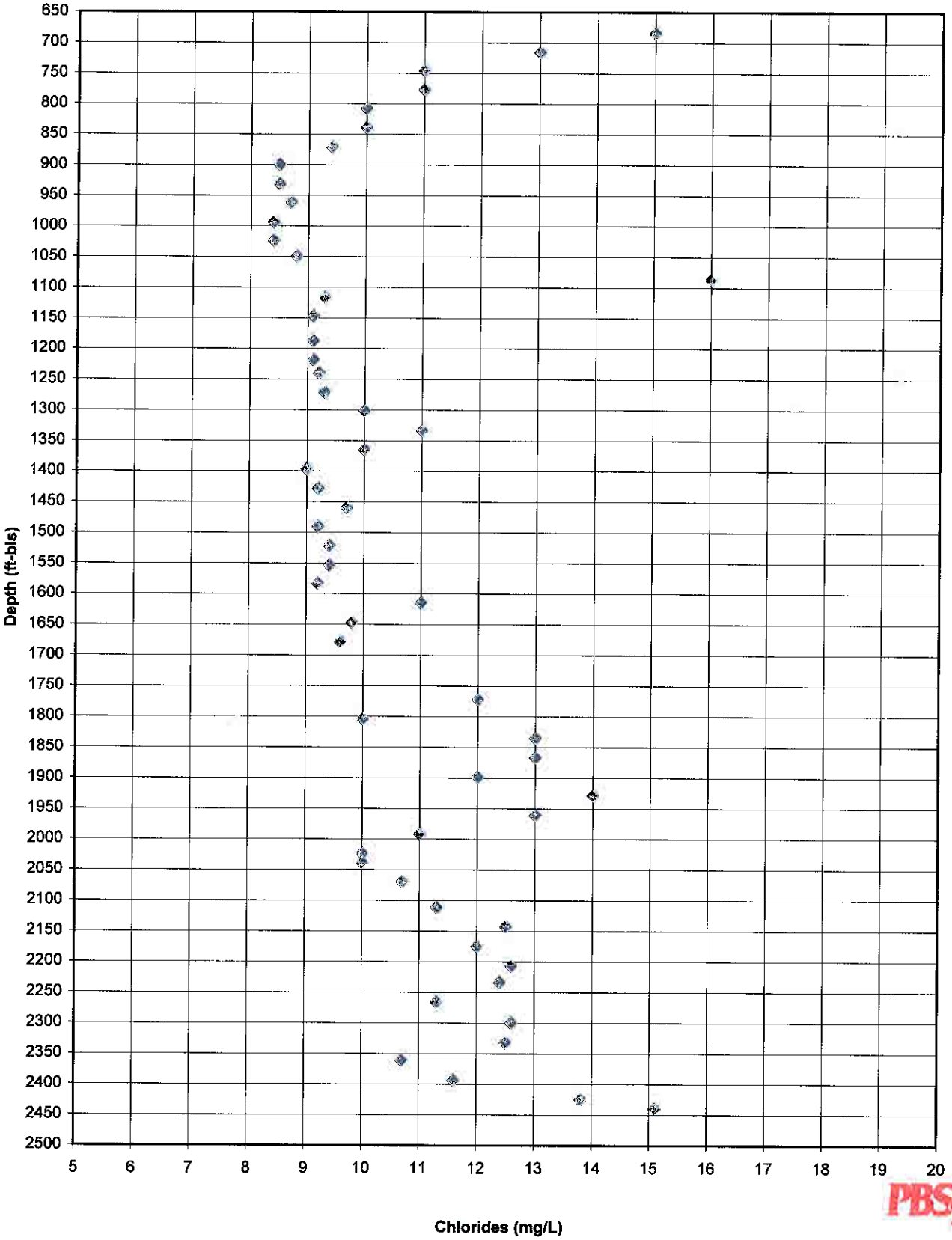

Table 3-2 & Figs 3-4 to 3-11 AIRLFT_results.XLS

Figure 3-8

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

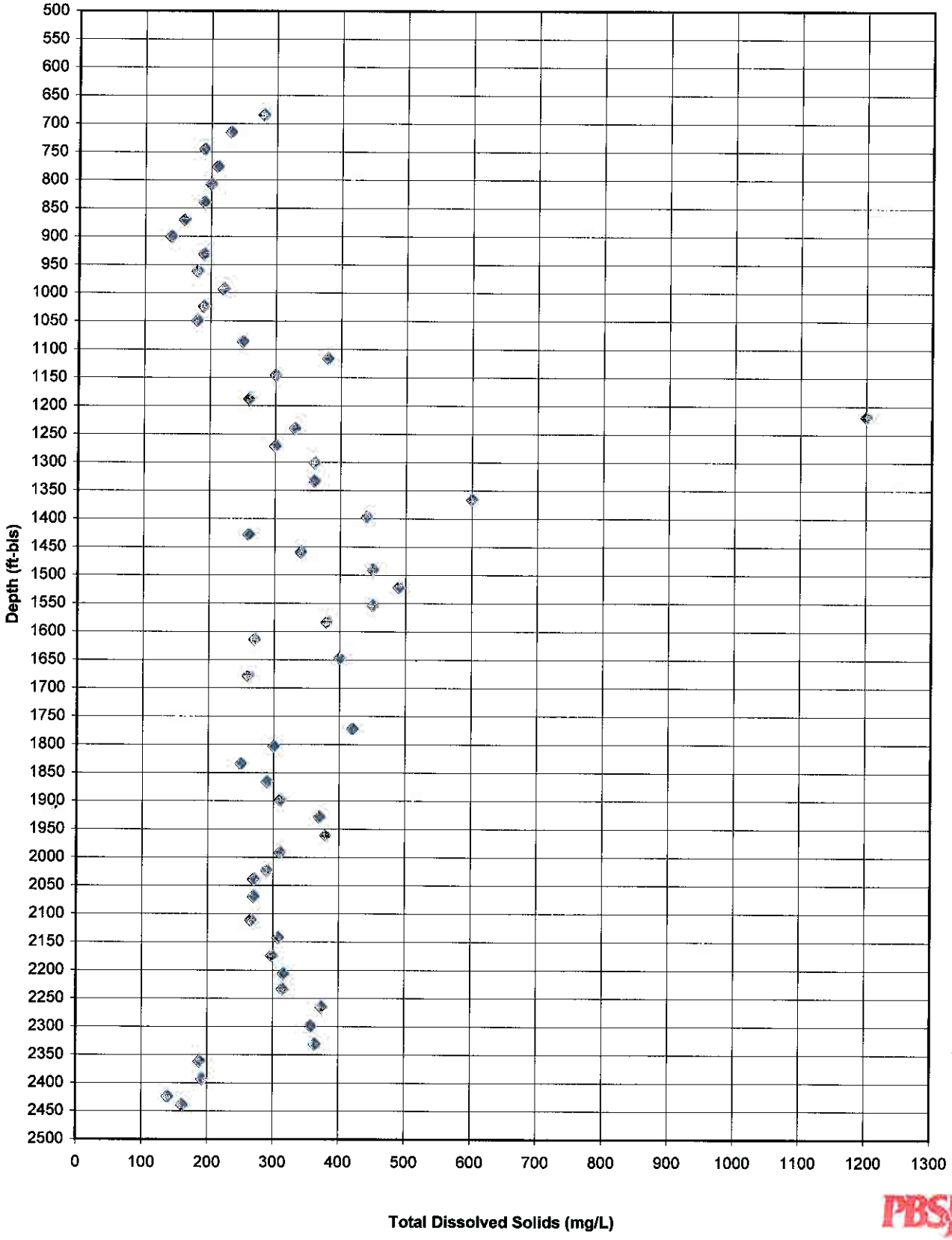

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Table 3-2 & Figs 3-4 to 3-11 AIRLFT_results.XLS

Figure 3-9

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

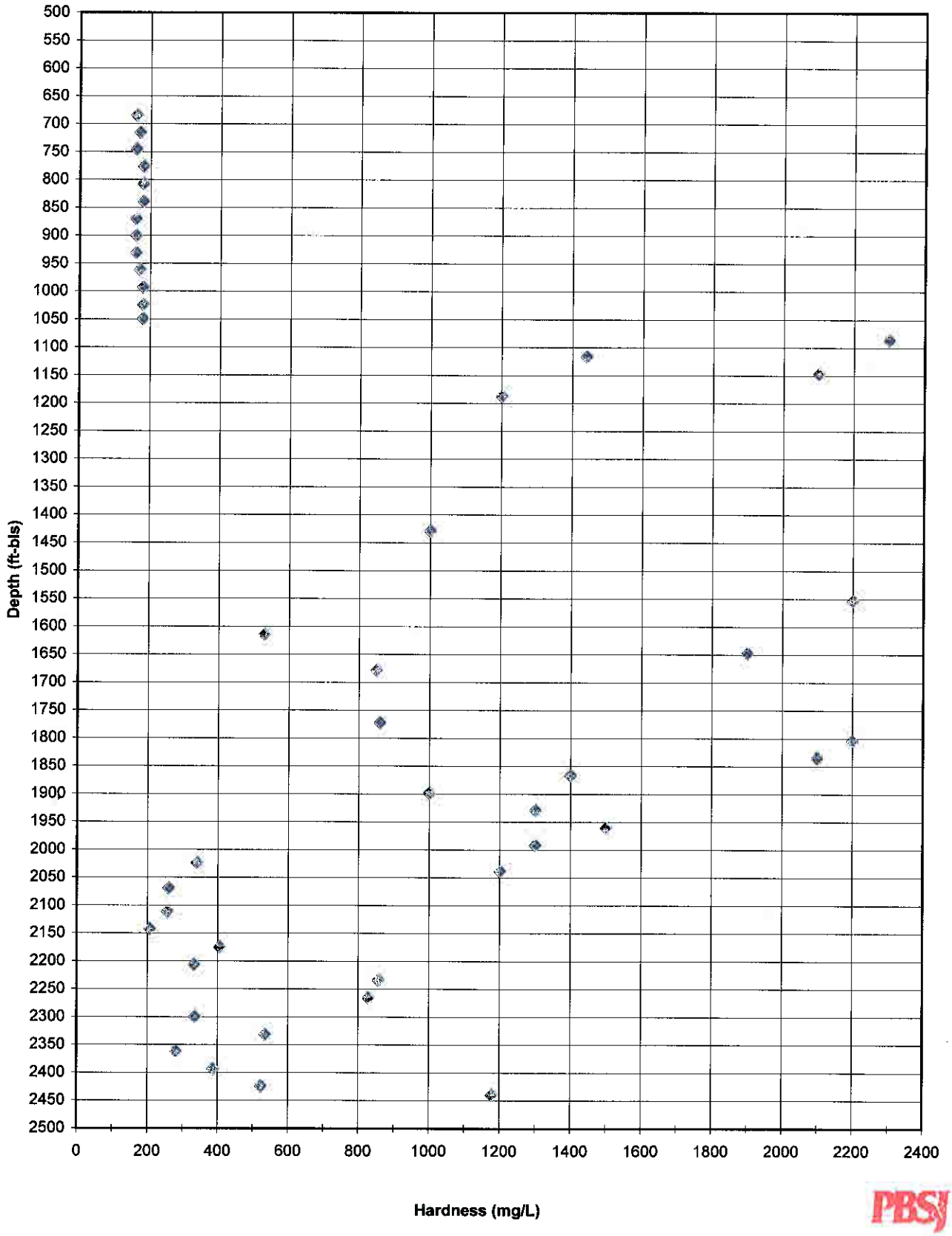

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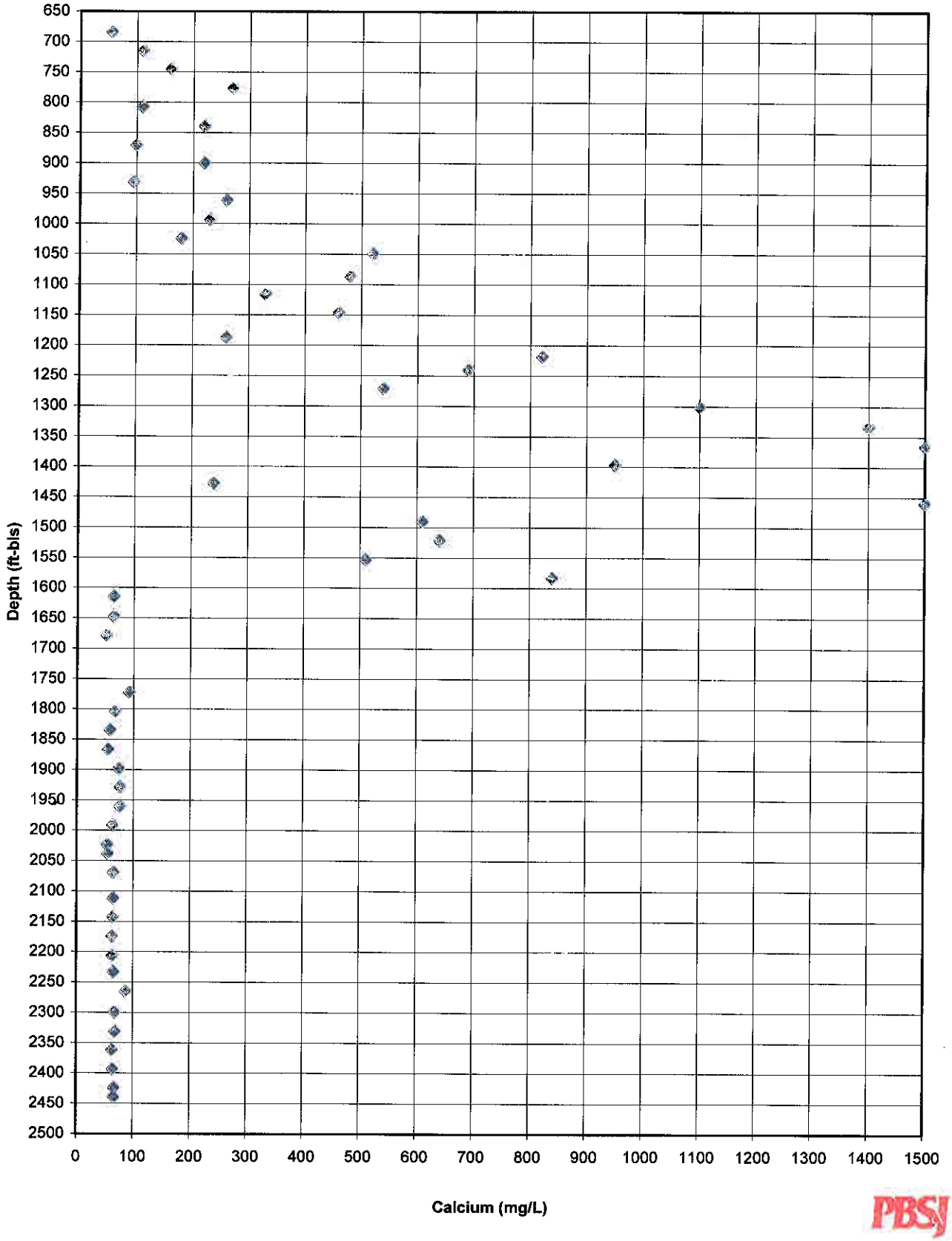
Table 3-2 & Figs 3-4 to 3-11 AIRLFT_results.XLS

Figure 3-10

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



PBSJ

Table 3-2 & Figs 3-4 to 3-11 AIRLFT_results.XLS

Figure 3-11

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

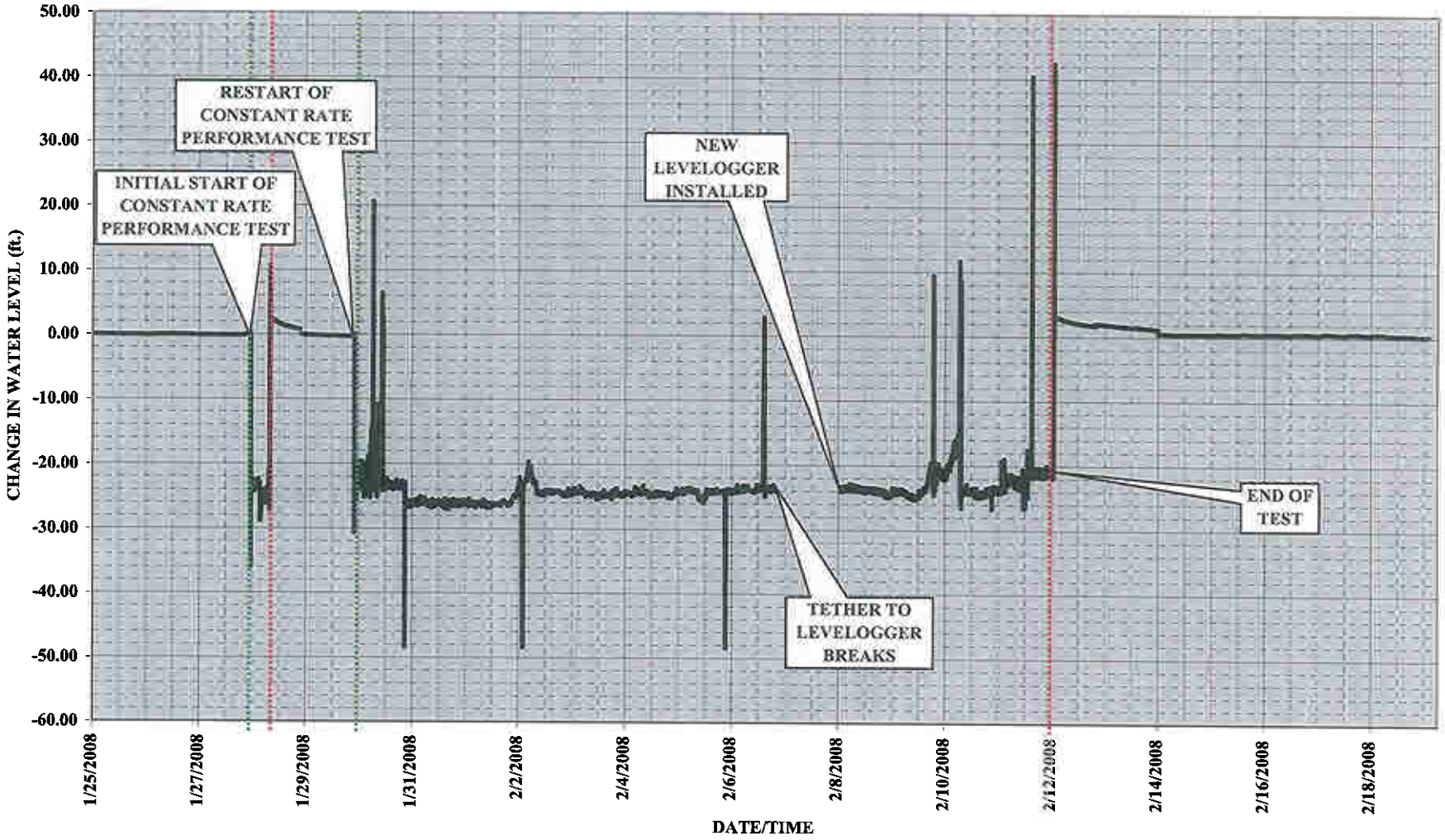


FIGURE 4-1

F:\Hydrogeological Program\Polk County\68E000.00 Master proj numbers\68E005.05 NERUSA Deep Expl Well\Pumping test\Reduced levelogger files\LFA DEW APT.xls

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

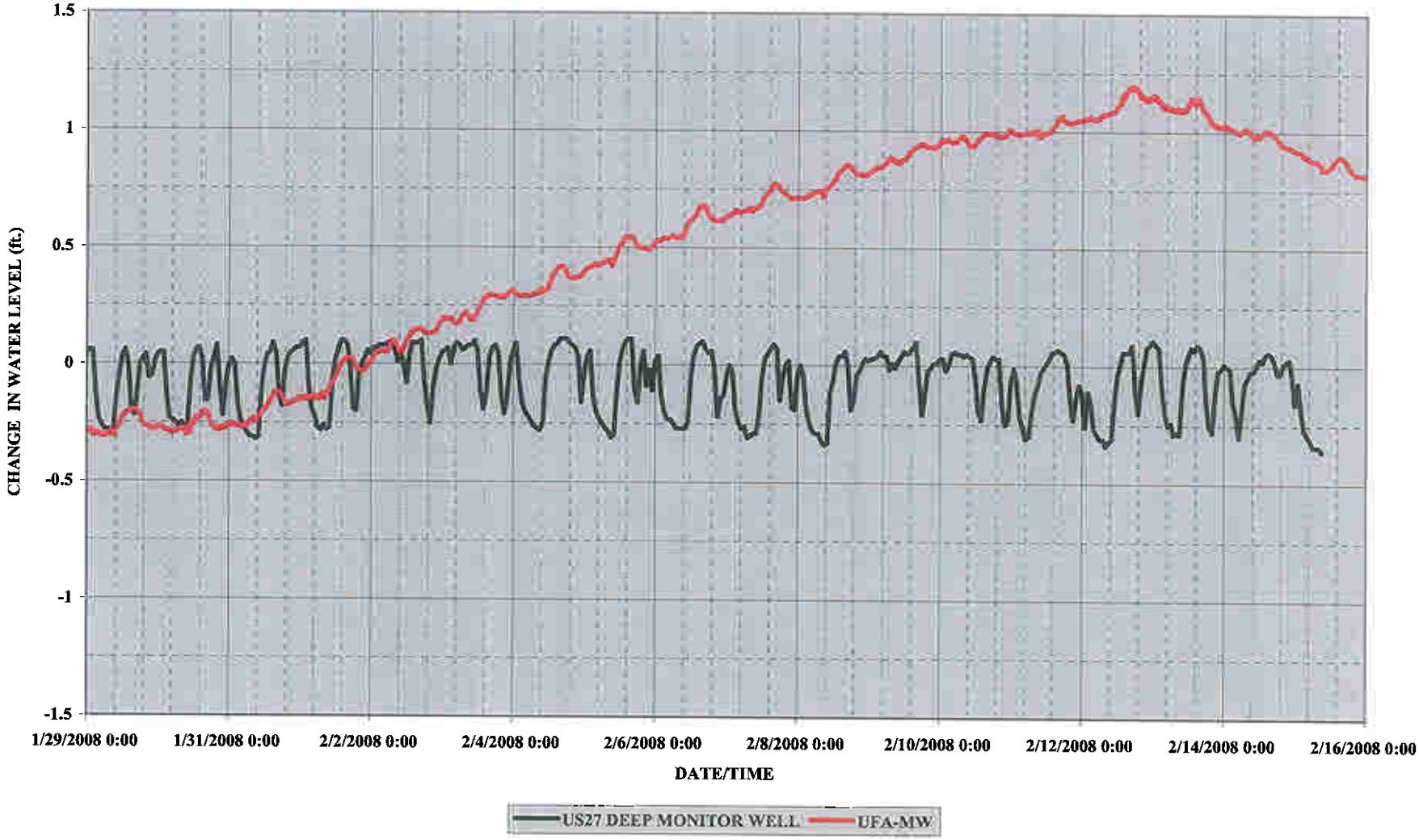


FIGURE 4-2

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

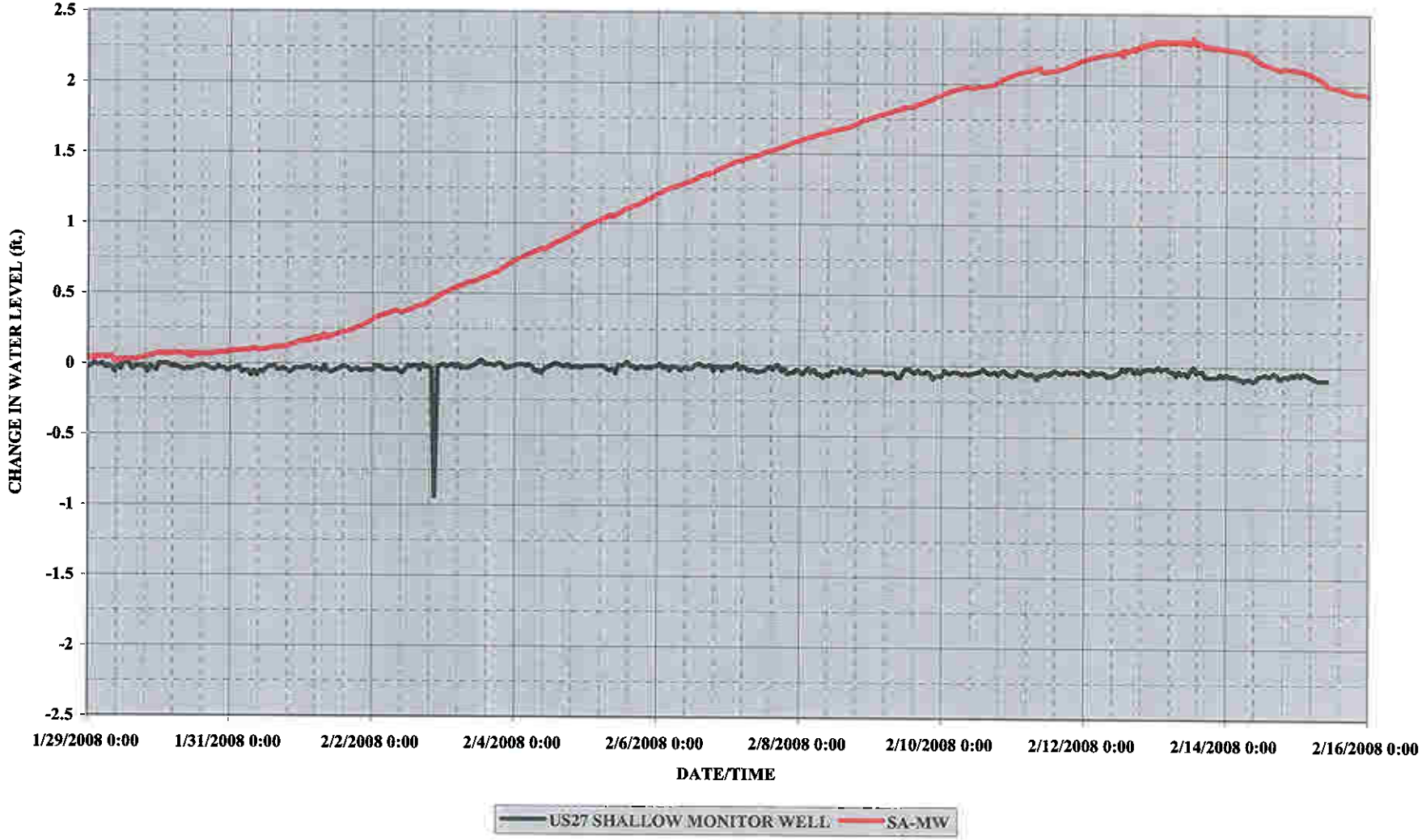

FIGURE 4-3

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

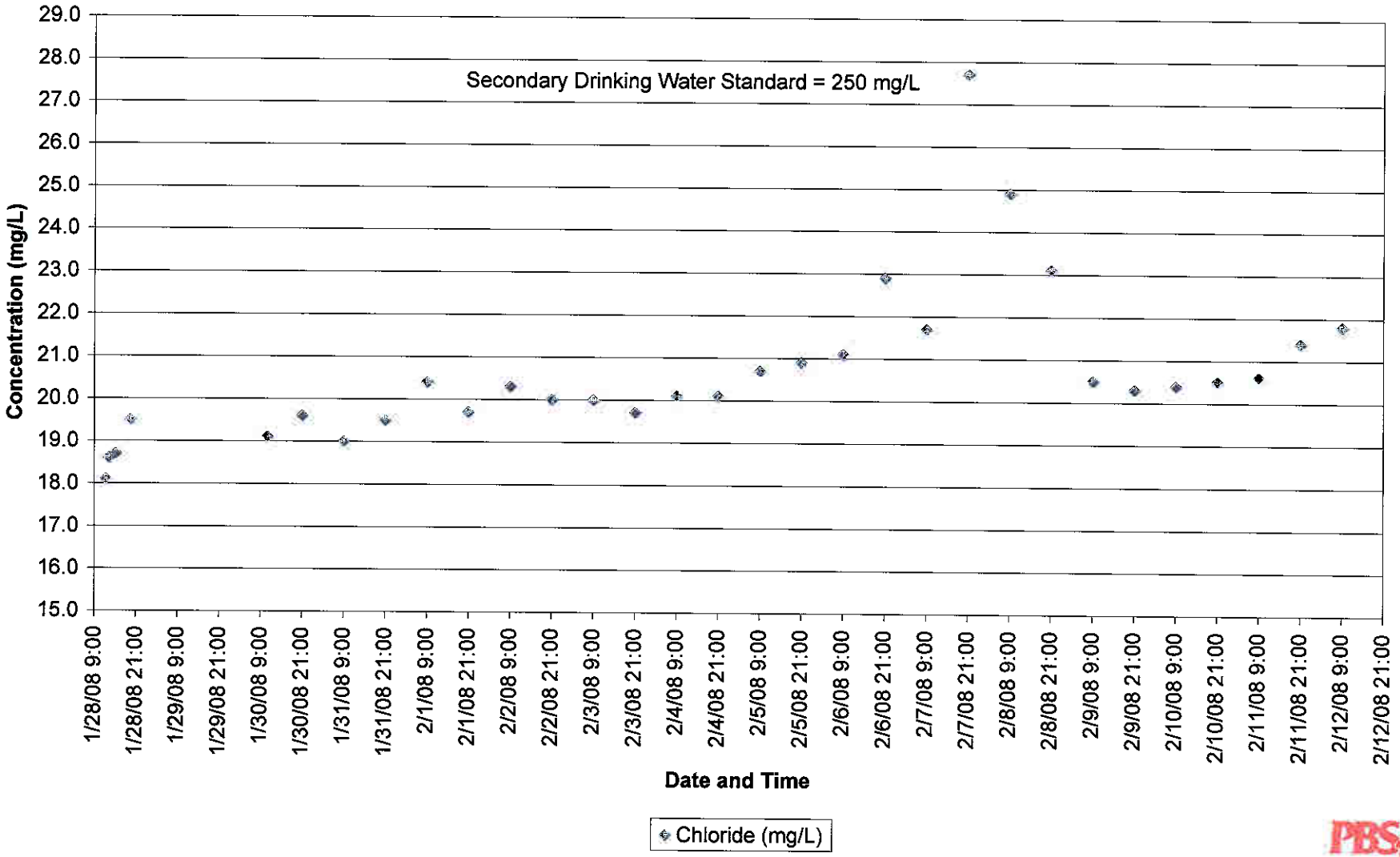

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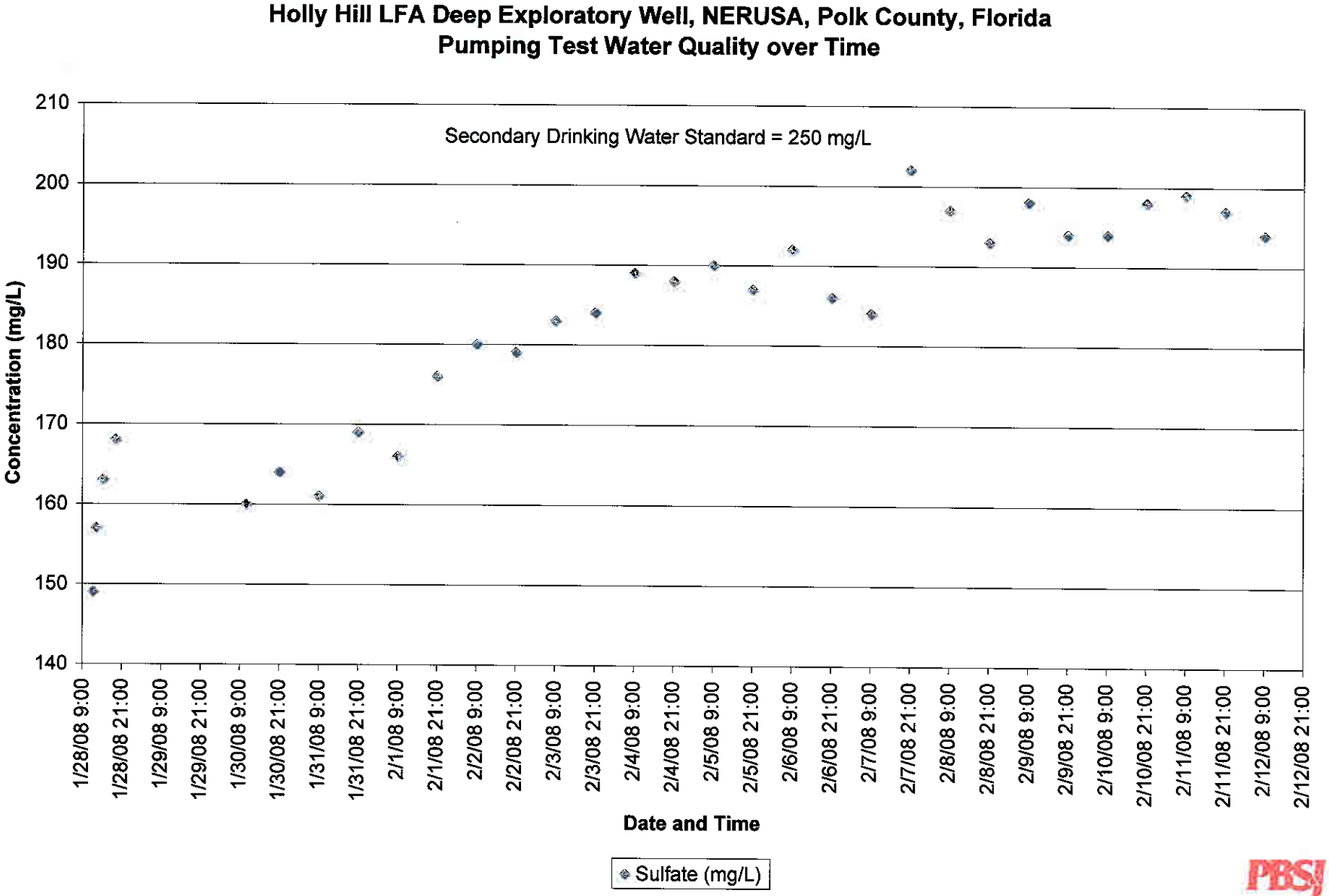
Figure 4-4


Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida
Pumping Test Water Quality over Time
Secondary Drinking Water Standard = 250 mg/L
Concentration (mg/L)
210
200
190
180
170
160
150
140
1/28/08 9:00
1/28/08 21:00
1/29/08 9:00
1/29/08 21:00
1/30/08 9:00
1/30/08 21:00
1/31/08 9:00
1/31/08 21:00
2/1/08 9:00
2/1/08 21:00
2/2/08 9:00
2/2/08 21:00
2/3/08 9:00
2/3/08 21:00
2/4/08 9:00
2/4/08 21:00
2/5/08 9:00
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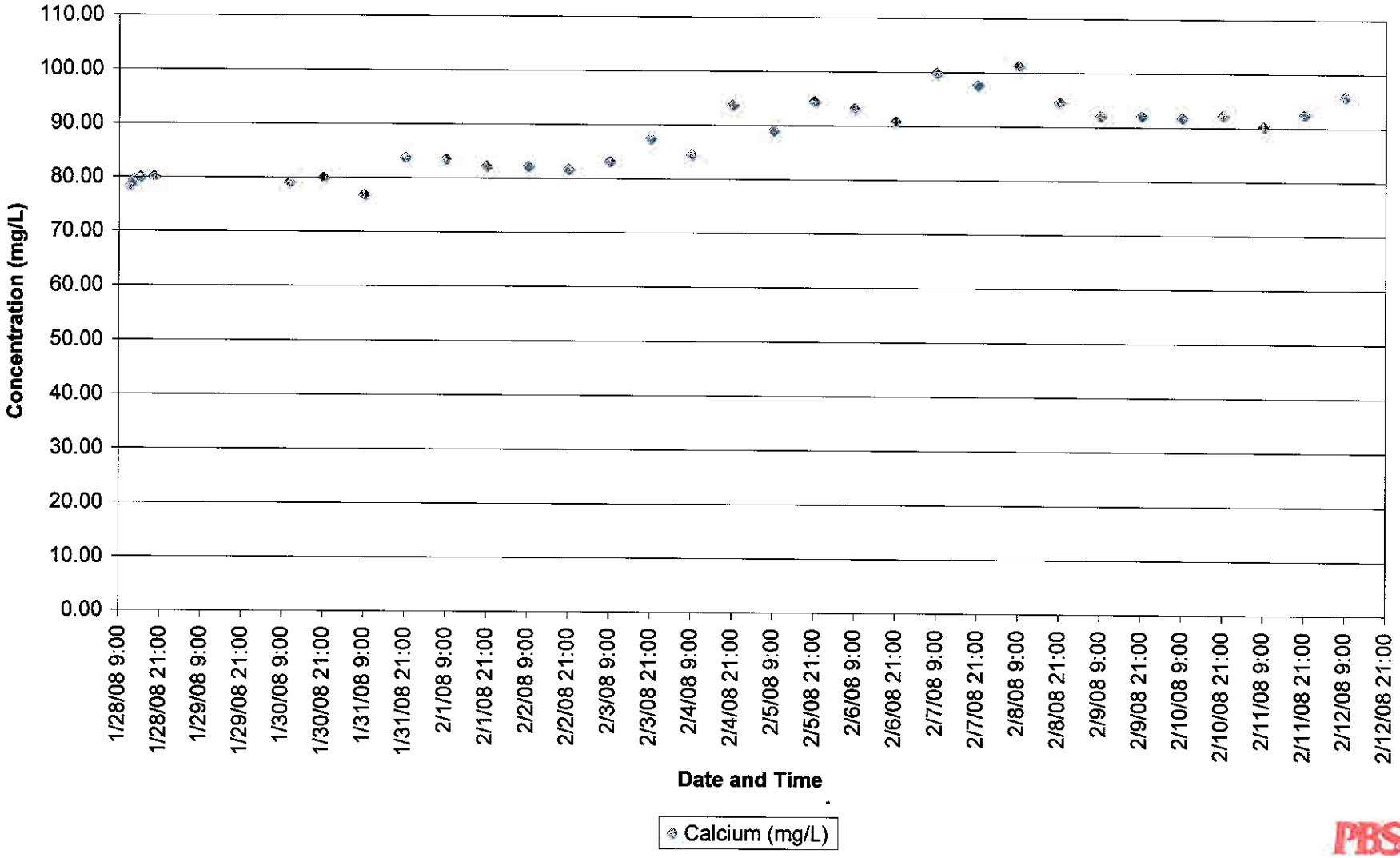
2/9/08 21:00
2/10/08 9:00
2/10/08 21:00
2/11/08 9:00
2/11/08 21:00
2/12/08 9:00
2/12/08 21:00
Date and Time
Sulfate (mg/L)

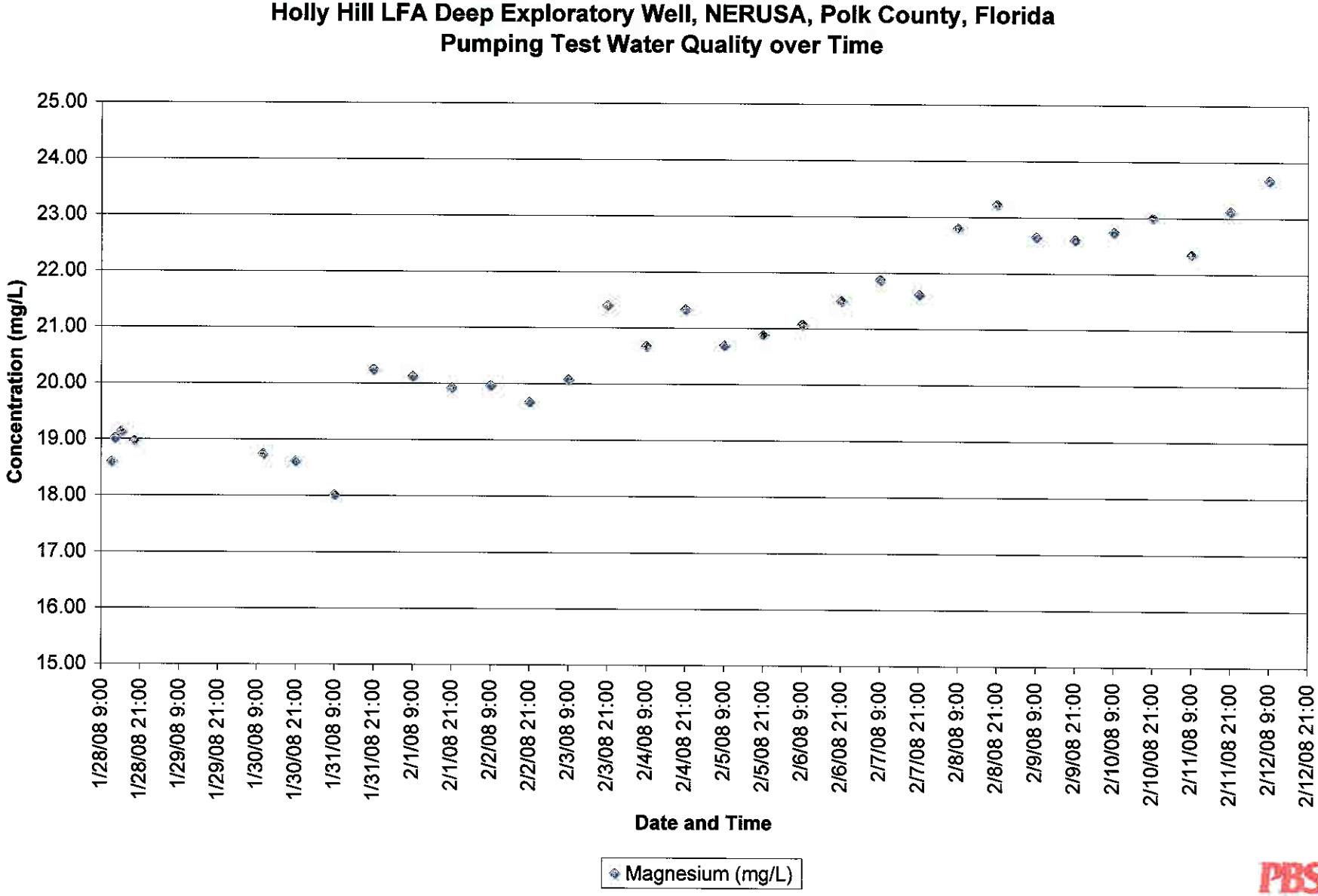
Figure 4-5

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
Concentration (mg/L)
25.00
24.00
23.00
22.00
21.00
20.00
19.00
18.00
17.00
16.00
15.00
1/28/08 9:00
1/28/08 21:00
1/29/08 9:00
1/29/08 21:00
1/30/08 9:00
1/30/08 21:00
1/31/08 9:00
1/31/08 21:00
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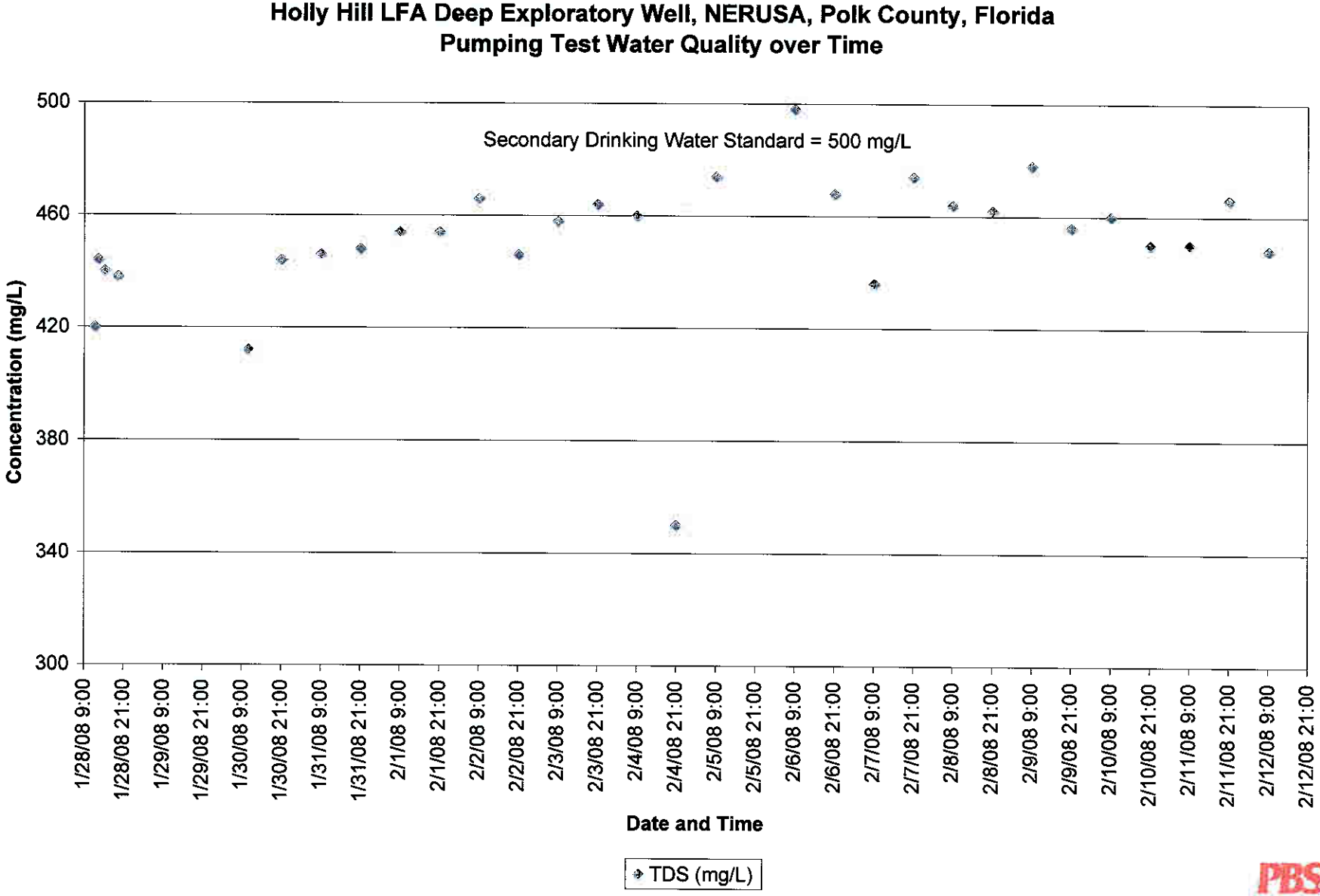
2/10/08 9:00
2/10/08 21:00
2/11/08 9:00
2/11/08 21:00
2/12/08 9:00
2/12/08 21:00
Date and Time
Magnesium (mg/L)

Figure 4-7


Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida
Pumping Test Water Quality over Time
Secondary Drinking Water Standard = 500 mg/L
Concentration (mg/L)
500
460
420
380
340
300
1/28/08 9:00
1/28/08 21:00
1/29/08 9:00
1/29/08 21:00
1/30/08 9:00
1/30/08 21:00
1/31/08 9:00
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2/10/08 9:00
2/10/08 21:00
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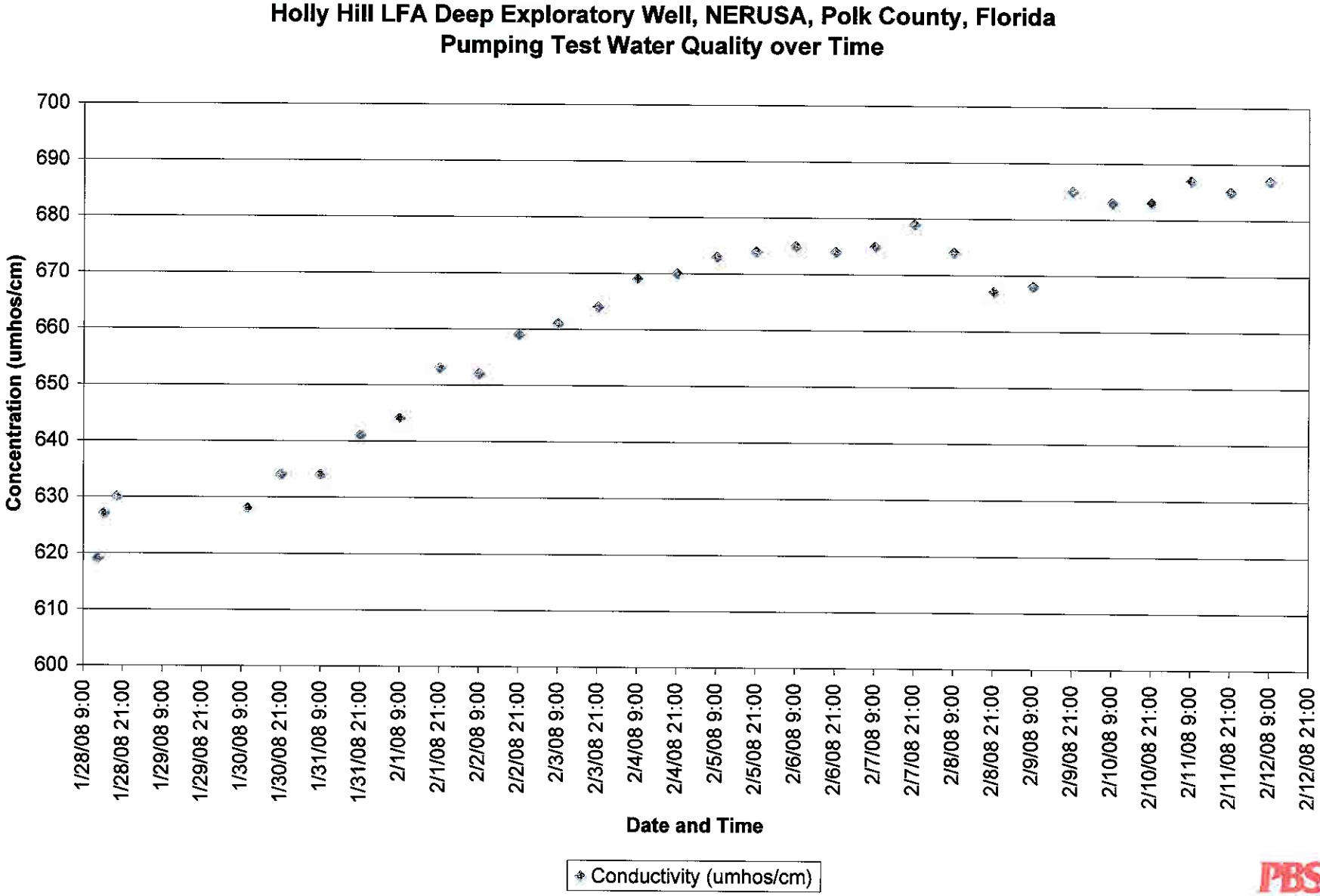
2/12/08 21:00
Date and Time
TDS (mg/L)

Figure 4-8


Holly Hill LFA Deep Exploratory Well, NERUSA, Polk County, Florida
Pumping Test Water Quality over Time
Concentration (umhos/cm)
700
690
680
670
660
650
640
630
620
610
600
1/28/08 9:00
1/28/08 21:00
1/29/08 9:00
1/29/08 21:00
1/30/08 9:00
1/30/08 21:00
1/31/08 9:00
1/31/08 21:00
2/1/08 9:00
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2/3/08 9:00
2/3/08 21:00
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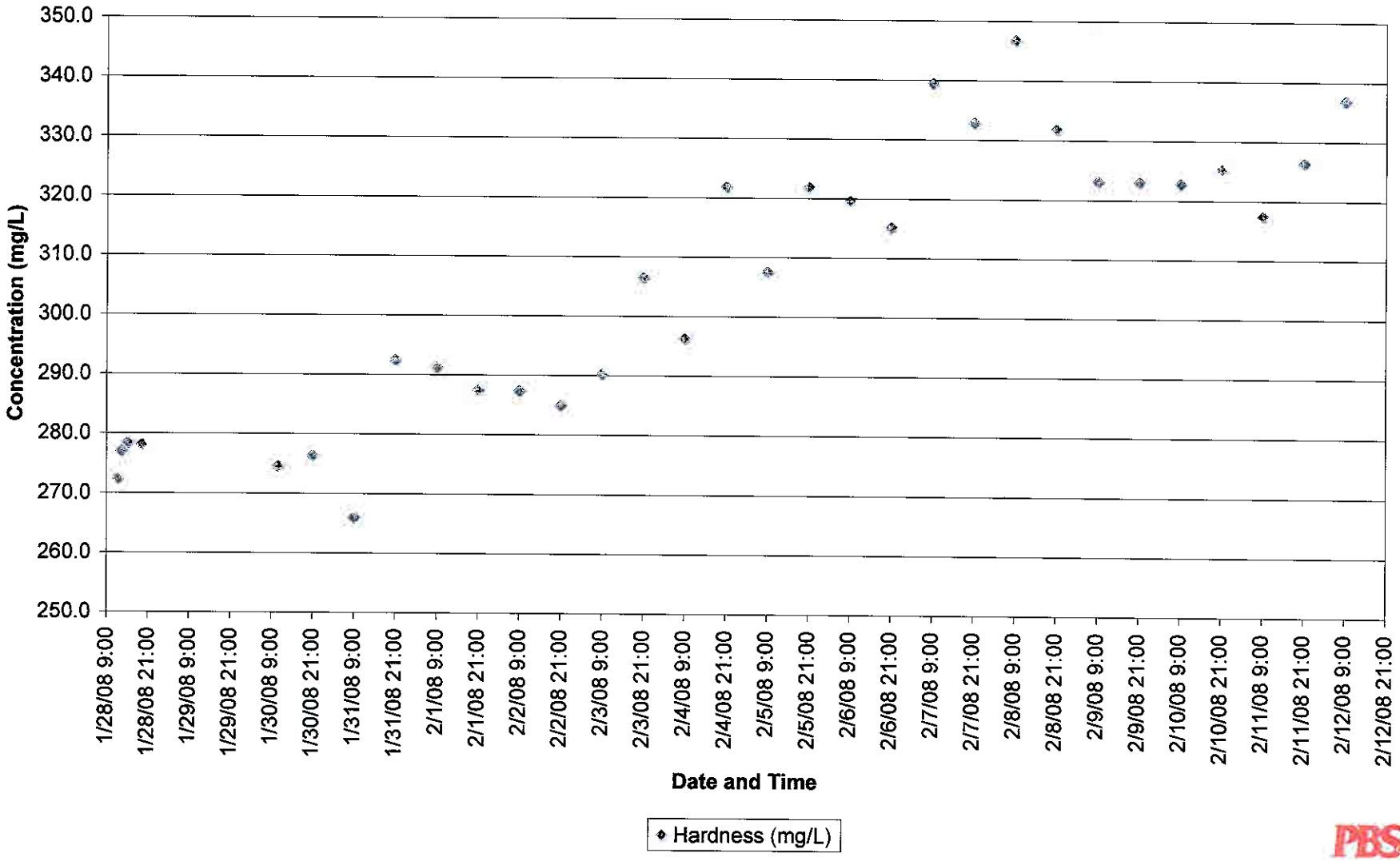
2/10/08 9:00
2/10/08 21:00
2/11/08 9:00
2/11/08 21:00
2/12/08 9:00
2/12/08 21:00
Date and Time
Conductivity (umhos/cm)

Figure 4-9

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



PBSJ

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)	Magne-sium (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	5/12/2003	27.0	792	615	7.89	--	10.7	129	24.8	4.82	1.20	7.05	7	320	--	84.8
	Davenport	5/21/2003	27.2	2,280	2,220	7.91	--	13.2	468	87.2	7.72	1.99	8.87	9	1,340	--	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 D/M/Y	Time Hr:Min	Depth (ft-bls)	Field Sp. Cond. (umhos/cm)	Lab Sp. Cond. (umhos/cm)	SO_4 (mg/L)	CL (mg/L)	TDS (mg/L)	Total Hardness (mg/L)	Ca (mg/L)	Static W.L. (ft-bls)	Air-Lift W.L. (ft-bls)	Pumping Rate (GPM)	Draw Down (feet)	Specific 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	6
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	461	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	95.5	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	6800	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	1000	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 D/M/Y	Time Hr:Min	Depth (ft-bls)	Field Sp. Cond. (umhos/cm)	Lab Sp. Cond. (umhos/cm)	SO_4 (mg/L)	CL (mg/L)	TDS (mg/L)	Total Hardness (mg/L)	Ca (mg/L)	Static W.L. (ft-bls)	Air-Lift W.L. (ft-bls)	Pumping Rate (GPM)	Draw Down (feet)	Specific 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
6/1/07	13:12	2112	384	381	48.2	11.3	266	257	65	123.00	123.1	91	0.10	912
6/5/07	0:00	2143	384	366	48.4	12.5	308	207	64.3	123.00	123.1	114	0.10	1136
6/6/07	13:55	2175	384	383	47.4	12	298	405	62.9	122.90	123.05	109	0.15	727
6/7/07	0:00	2207	367	375	50.1	12.6	316	333	63.1	123.10	123.1	112	< 0.01*	1000
6/7/07	1:00	2234	388	390	54.4	12.4	314	857	65.7	123.10	123.1	111	< 0.01*	1000
6/8/07	8:34	2266	454	486	102	11.3	374	829	87	123.10	123.2	108	0.10	1000
6/11/07	0:00	2300	418	396	58	12.6	358	335	67.8	123.05	123.05	111	< 0.01*	1000
6/12/07	0:00	2332	418	401	60.9	12.5	364	535	68.1	123.05	123.05	111	< 0.01*	1000
6/13/07	0:00	2362	424	395	57	10.7	188	281	63.4	123.00	123	113	< 0.01*	1000
6/13/07	0:00	2394	436	409	61.3	11.6	192	387	64.6	123.00	123	89	< 0.01*	1000
6/14/07	14:25	2425	442	432	71.2	13.8	140	523	67.1	122.85	123	113	0.20	1000
6/14/07	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 cemtimeter
3. mg/L = milligrams per Liter
4. SO_4 = sulfate, CL = Chlorides, TDS = Total Dissolved Solids, Ca = Calcium
5. ft-bls = 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 Cored	Begin	840	1,050	1,133	1,272	1,906	2,460
	End	850	1,060	1,143	1,282	1,916	2,470
Interval Analyzed	Begin	848	1,050	1,135	1,277	1,908	2,468
	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

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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/YR)	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

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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

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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				
Parameter	**MCL**	**Units**	**Analytical Results**	**Qualifier**
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				
Parameter	**MCL**	**Units**	**Analytical Results**	**Qualifier**
Total Coliform	Absent		**Present**	--
E Coli	Absent		Absent	--
Secondary Drinking Water Standards				
Parameter	**MCL**	**Units**	**Analytical Results**	**Qualifier**
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 Contaiminant Level (MCL) per Rules 62-550.310 and 62-550.320, FAC.

Definitions/ Qualifiers
mg/L = milligrams per Liter
pCi/L = Picocurries/Liter
ug/L = micrograms per Liter
TON: Threshhold 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)

PBS&J

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

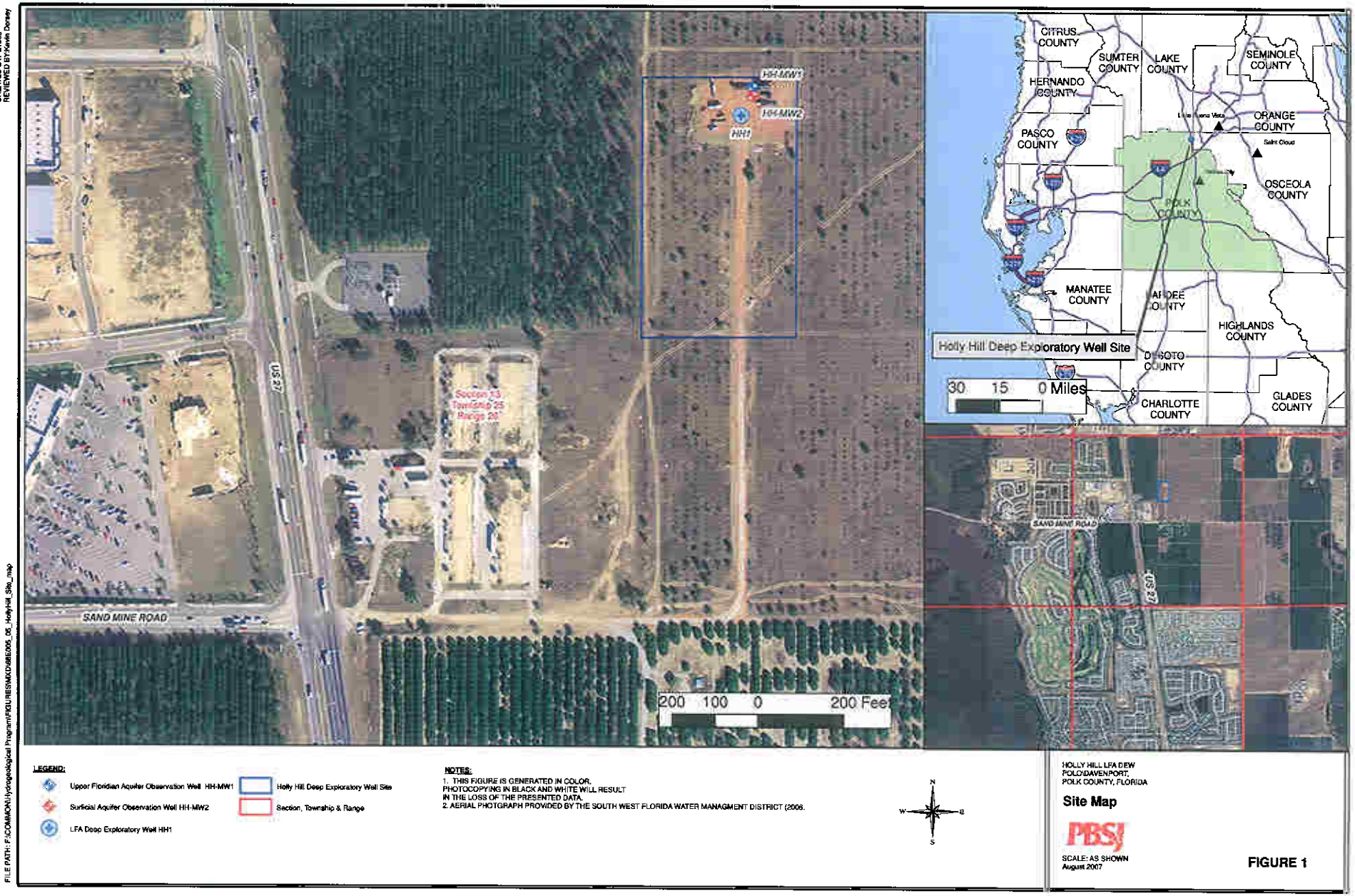
RDC cemented the casing in place with one tremmie grout stage. Cement grout installed during the tremmie grout stage consisted of Portland Type I cement manufactured by Florida Rock and Aggregate, Inc. and 5.5 to 6 gallons of water per 94 pounds of cement.

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.

CREATED BY: 21206
REVIEWED BY: Kevin Dorsey



LEGEND:

- Upper Floridian Aquifer Observation Well HH-MW1
- Surficial Aquifer Observation Well HH-MW2
- LFA Deep Exploratory Well HH1
- Holly Hill Deep Exploratory Well Site
- Section, Township & Range

NOTES:

1. THIS FIGURE IS GENERATED IN COLOR. PHOTOCOPYING IN BLACK AND WHITE WILL RESULT IN THE LOSS OF THE PRESENTED DATA.
2. AERIAL PHOTGRAPH PROVIDED BY THE SOUTH WEST FLORIDA WATER MANAGMENT DISTRICT (2006.

HOLLY HILL LFA DEW
POLK/DAVENPORT,
POLK COUNTY, FLORIDA

Site Map

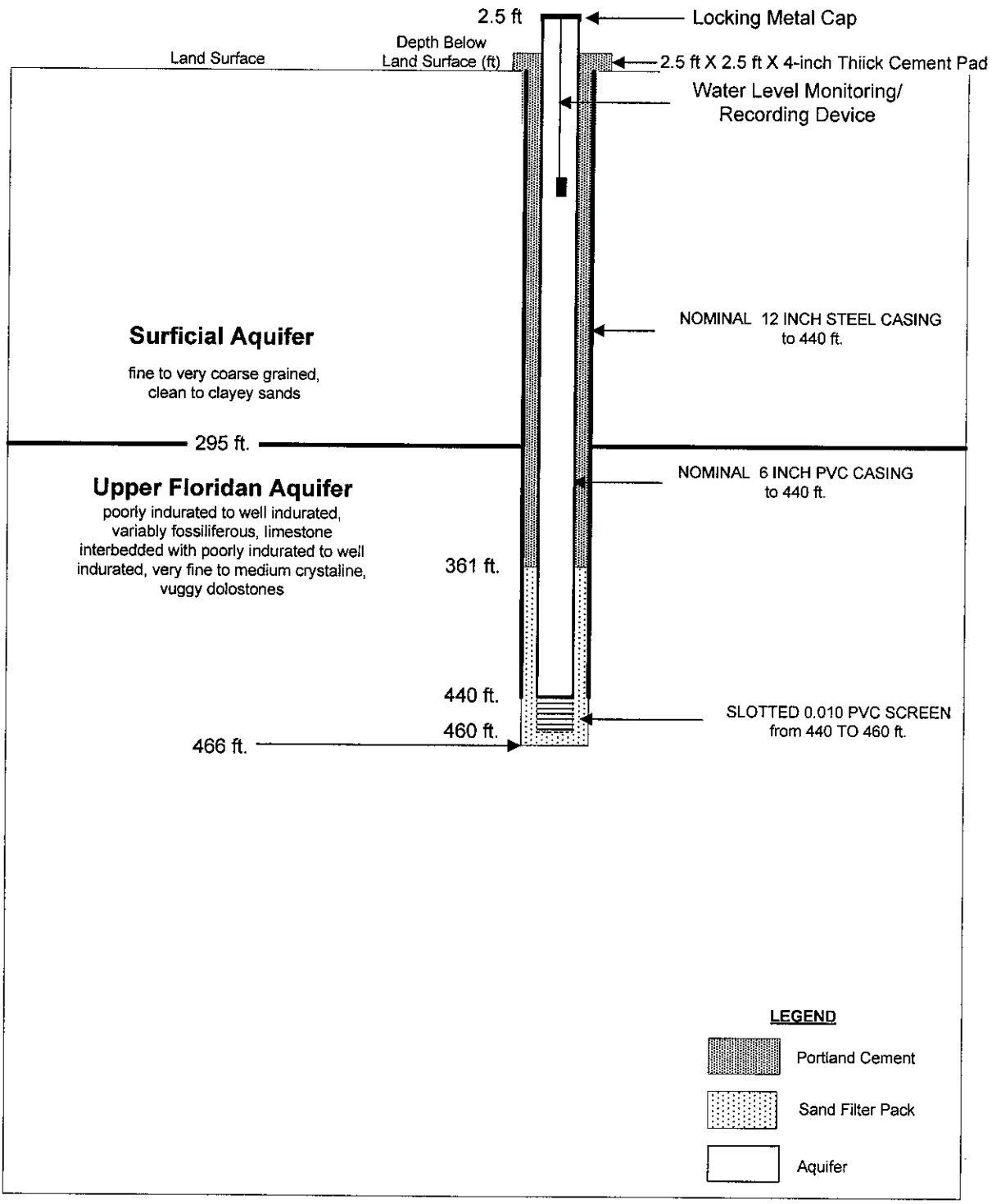
PBSJ

SCALE: AS SHOWN
August 2007

FIGURE 1

FILE PATH: F:\COMMON\Hydrogeological Program\FIGURES\MXD\0606005_06_HollyHill_Site_map

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 FLORID[A P]ERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, [OR] ABANDON A WELL

- [X] Southwest
- [ ] Northwest
- [ ] St. Johns River
- [ ] South Florida
- [ ] Suwannee River

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

THIS FORM *MUST* BE FILLED OUT COMPLETELY.

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

Permit No. 732952.01
Florida Unique I.D.
Permit Stipulations Required (See attached) 39, 23
62-524 well ☐
CUP/WUP Application No.

ABOVE THIS LINE FOR OFFICIAL USE ONLY

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

2. 1800'Eof 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
Address
Tampa, FL 33618
City — State — Zip

4. SW 1/4 of NE 1/4 of Section 13
(smallest) (biggest)
(Indicate Well on Chart) NW NE SW SE — x

5. Township 25S Range 26E

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) (See Back) Public Water Supply (type) ____ (See Back) List Other ____
Distance from septic system 3,000 ft. **Description of facility** Sanitary Swer **Estimated start of construction date** 1/23/06

8. **Application for:** X New Construction ____ Repair/Modify ____ Abandonment ____ (Reason for Abandonment)

Date Stamp
Southwest Florida Water Management District
JAN 18 2006
RECEIVED
RRD Bartow

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 Grouting Interval** From 0 to 450 Seal Material Neat Cement
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:** X 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?** X 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". Use known roads and landmarks; provide distances between well and landmarks.

North — West — East — South

See Attached

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

[signature] 9027
Signature of Contractor — License No.

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

[signature] 1/11/06
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 ____ initials
Owner Number: 344700 Fee Received: $50.00 Receipt No. D006-00593A 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.***

WHITE: ORIGINAL FILE
YELLOW: DRILLING CONTRACTOR
PINK: OWNER

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

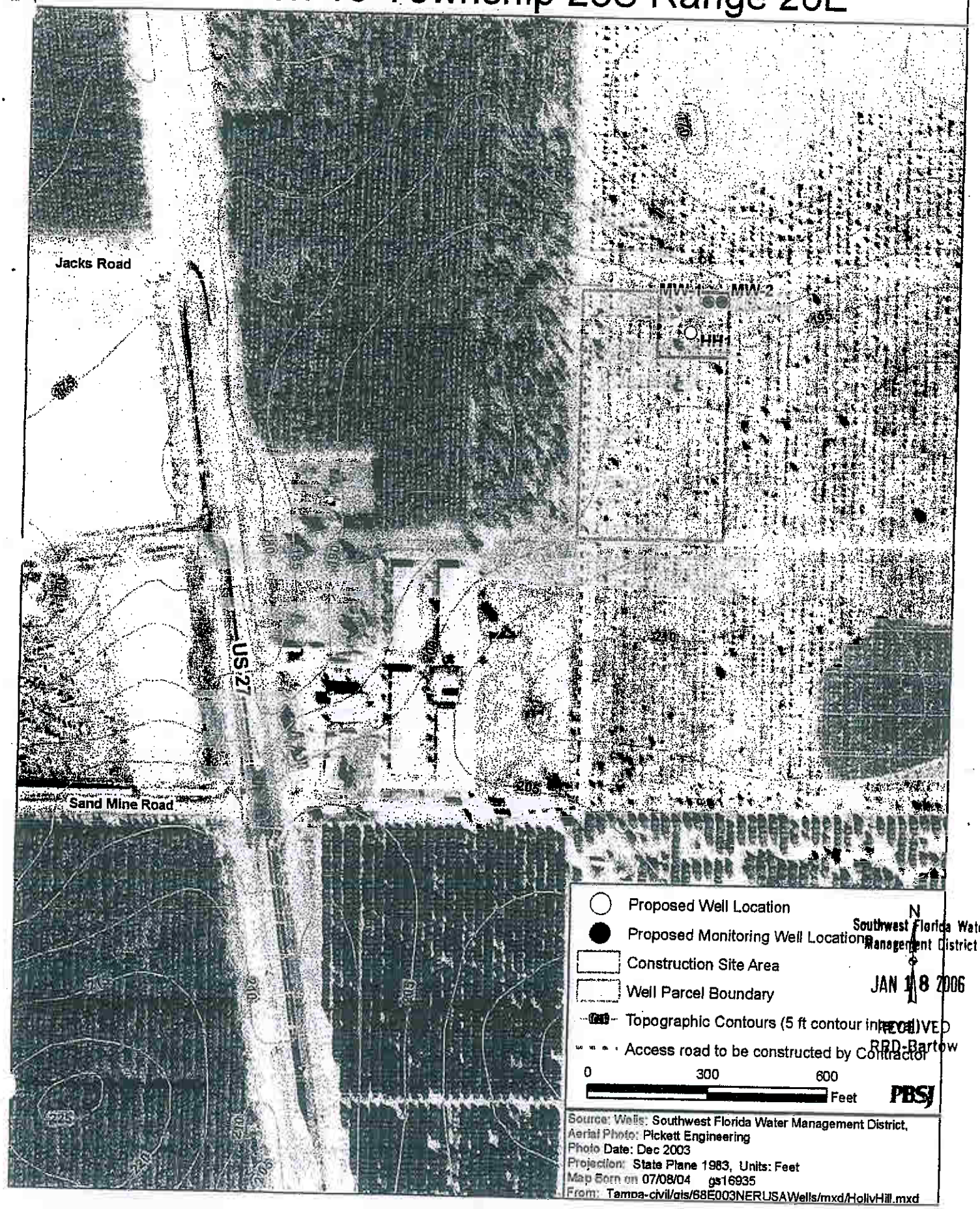
Permit: # 732922.01

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)

PBS&J

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.

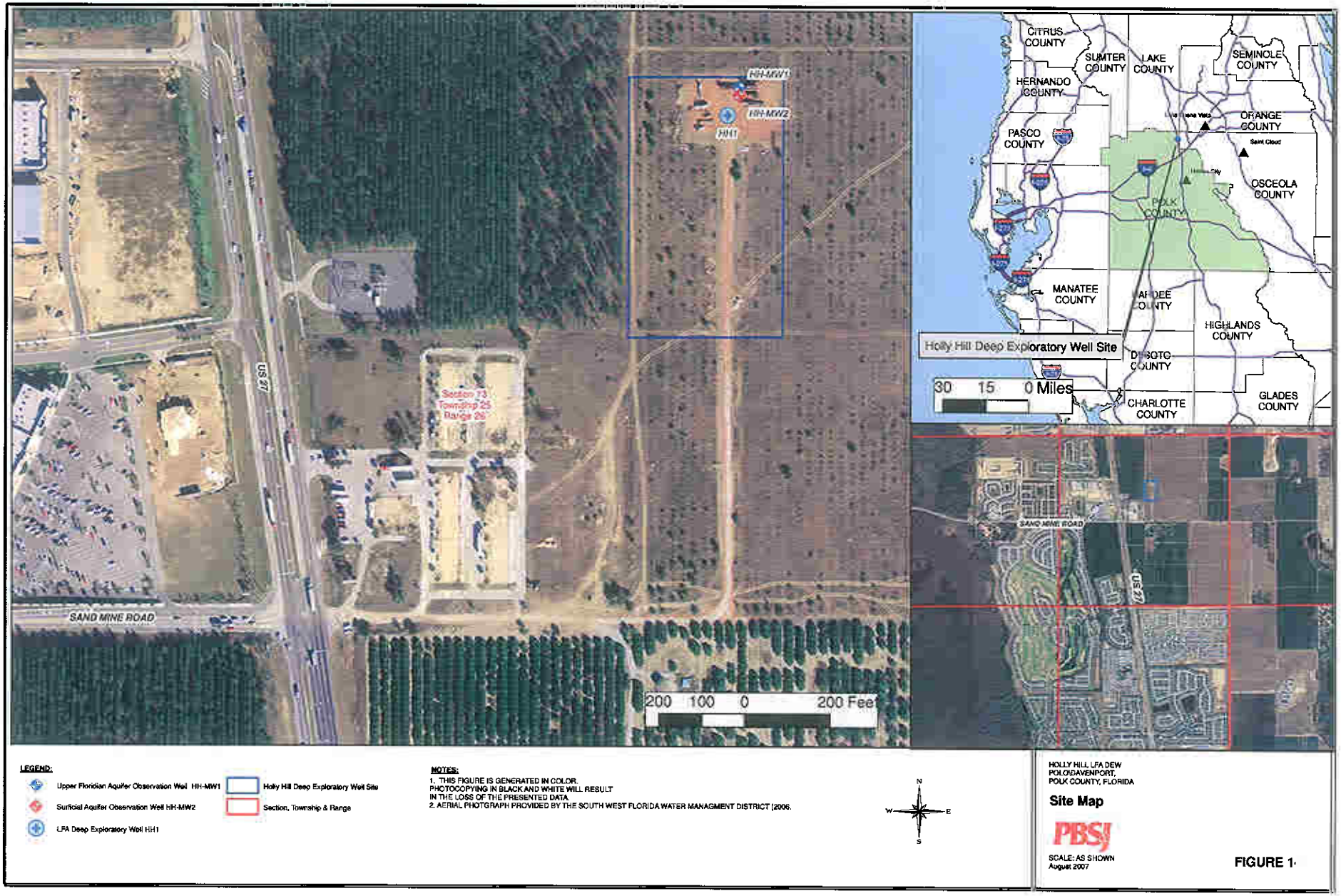
The as-built diagram for HH-MW2 is depicted on **Figure 2**.

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.

CREATED BY: 21206
REVIEWED BY: Kevin Dorsey

FILE PATH: F:\COMMON\Hydrogeological Program\FIGURES\MXD\site\EO05_05_HollyHill_Site_map



LEGEND:

- Upper Floridan Aquifer Observation Well HH-MW1
- Surficial Aquifer Observation Well HH-MW2
- LFA Deep Exploratory Well HH1
- Holly Hill Deep Exploratory Well Site
- Section, Township & Range

NOTES:

1. THIS FIGURE IS GENERATED IN COLOR. PHOTOCOPYING IN BLACK AND WHITE WILL RESULT IN THE LOSS OF THE PRESENTED DATA.
2. AERIAL PHOTGRAPH PROVIDED BY THE SOUTH WEST FLORIDA WATER MANAGMENT DISTRICT (2006.

N W E S

HOLLY HILL LFA DEW
POLK/DAVENPORT,
POLK COUNTY, FLORIDA

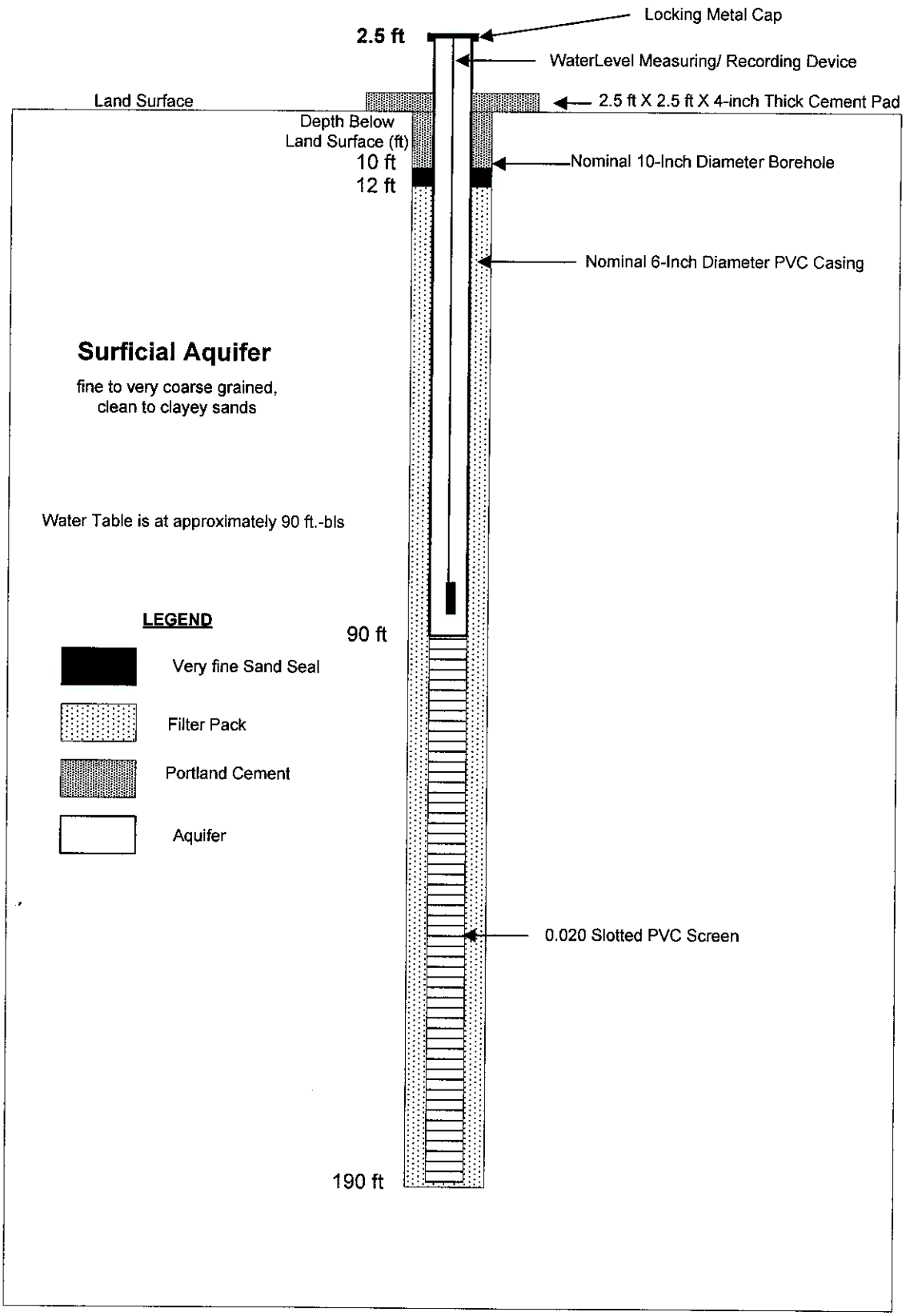
Site Map

PBSJ

SCALE: AS SHOWN
August 2007

FIGURE 1

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

CHECK BOX FOR APPROPRIATE DISTRICT ADDRESS ON BACK OF PERMIT FORM

THIS FORM MUST BE FILLED OUT COMPLETELY.

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

Permit No. **744018.01**
Florida Unique I.D.
Permit Stipulations Required (See attached) 23, 39
62-524 Quad # ____ Delineation # ____
CUP/WUP Application No.

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 Corportation | *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** (smallest) 1/4 of **2** (biggest) 1/4 of Section **13**
(Indicate Well on Chart)
5. Township **25** Range **26**

NW NE SW SE

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) ✓
____ Irrigation (Type) (See Back) Public Water Supply (type) ____ (See Back) 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

SWFWMD Rec'd Date 07/11/2006

9. Estimated: Well Depth **190** Casing Depth **90** Screen Interval from **90** to **190**
Casing Material: [illegible] / [illegible] / PVC Casing Diameter **6** (smallest) Seal Material **Cement**

10. If applicable: Proposed Grouting Interval From **0** to **50** Seal Material **Cement**
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 betwen well and landmarks.

North

1800' East of US 27, opposite Jacks Road

West East

South

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

Digitally Signed | **9027**
Signature of Contractor | License No.

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

Digitally Signed | **7/11/2006**
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 ____ (Initials)

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.*

FORM 41.10 - 410 (1) REV. 12/04

WHITE: ORIGINAL FILE
YELLOW: DRILLING CONTRACTOR
PINK: OWNER

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

CHECK BOX FOR APPROPRIATE DISTRICT ADDRESS ON BACK OF PERMIT FORM

THIS FORM MUST BE FILLED OUT COMPLETELY.

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

Permit No. 759104
Florida Unique I.D.
Permit Stipulations Required (See attached)
28, 23
62-524 Quad # Delineation #
CUP/WUP Application No.

AREA BELOW THIS LINE FOR OFFICIAL USE ONLY

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

1. POLK COUNTY — 2470 CLOWER LANE — BARTOW FL — 33830- 0000 — (863) 534-5610
Owner, Legal Name of Entity if Corporation — Address — City — Zip — Telephone Number

2. 46595 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
(smallest) (biggest)
(Indicate Well on Chart)

5. Township 25 Range 26

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

NW NE SW SE

7. Number of proposed wells 1 Check the use of well: (See back of permit for additional choices) ____ Domestic Monitor (type) ✓
____ Irrigation (Type) (See Back) Public Water Supply (type) ____ (See Back) 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 / ~~SCH~~ / ~~PVC~~ Casing Diameter 18 (inches) Seal Material Cement

10. If applicable: Proposed Grouting Interval From ____ to ____ Seal Material ____
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"
Date obtained from GPS ____ or map ____ or survey ____ *(map datum NAD 27 ____ NAD 83 ____)*

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

North

HWY 27 NORTH TO SAND MINE RD. WELLSITE JUST EAST OF 27, JUST NORTH OF SAND MINE.

West East

South

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

Digitally Signed
Signature of Contractor — 3206 License No.

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

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 ____ Initials

Owner Number: ____ Fee Received: $ 50.00 Receipt No.: BA08003126 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.*

FORM 41.10 - 410 (1) REV. 12/04

WHITE: ORIGINAL FILE
YELLOW: DRILLING CONTRACTOR
PINK: OWNER

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 COMPLETE OR TOTAL MATERIAL REQUIRED OR THAT ALL ITEMS REQUIRED ARE SHOWN. REVIEW SHALL NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF DETAILS OF DESIGN DIMENSIONS, FOR CONDITIONS CONSTRUCTION MEANS AND METHODS, COORDINATION WITH OTHER TRADES OR ANY OTHER MATTERS 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: Kevin Dorsey DATE: 5/1/06

11/93

Tenaris

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

PAÍS DE ORIGEM
COUNTRY OF ORIGIN BRASIL
PAIS DE ORIGEN
DESTINO U.S.A
DESTINATION

PRODUTO: TUBOS DE AÇO CARBONO FABRICADOS PELO PROCESSO UOE-SAWL SOB O PEDIDO Nº P.O. 55714 APLICAÇÃO 34690 06 001 ITEM 7
PRODUCT: CARBON STEEL PIPES MANUFACTURED BY THE PROCESS UNDER THE ORDER NO APLICATION
PRODUCTO: TUBERIAS DE ACERO AL CARBONO FABRICADOS POR EL PROCESO SEGÚN EL PEDIDO APLICACION

CERTIFICAMOS QUE TODOS OS TUBOS FABRICADOS PARA A OBRA DT- 34.690 DESTINADO(S) A EDGEN CARBON PRODUCTS GROUP L.L.C.
IT IS HEREBY CERTIFIED THAT ALL PIPES MADE TO MILL PRODUCTION NO. FOR THE PURCHASER
CERTIFICAMOS QUE TODOS LOS TUBOS FABRICADOS PARA LA OBRA Nº DESTINADO(S) PARA

COM DIÂMETRO EXTERNO 36" ESPESSURA 0.375" E COMPRIMENTO INDIVIDUAL 38.06 To 41.01 ft
WITH OUTSIDE DIAMETER WALL THICKNESS AND INDIVIDUAL LENGTH
CON DIAMETRO EXTERNO ESPESOR Y LONGITUD INDIVIDUAL

PERFAZENDO UM TOTAL DE 41 PEÇAS COM COMPRIMENTO TOTAL DE 1,642.18 ft E PESO TOTAL DE 106,362 lb
IN A TOTAL OF PIECES WITH TOTAL LENGTH AND TOTAL WEIGHT
POR UN TOTAL DE UNIDADES PARA UNA LONGITUD TOTAL DE Y PESO TOTAL DE

FORAM FABRICADOS, INSPECIONADOS E APROVADOS CONFORME A ESPECIFICAÇÃO API SPEC. 5L-2004 - GRADE X65 PSL2 E ESPECIFICAÇÕES SUPLEMENTARES *-*
WERE MANUFACTURED, INSPECTED AND APPROVED IN ACCORDANCE WITH THE SPECIFICATION AND SUPPLEMENTARY SPECIFICATIONS
FUERON FABRICADOS, INSPECCIONADOS Y APROBADOS DE ACUERDO CON LA ESPECIFICACIÓN Y ESPECIFICACIONES SUPLEMENTARIAS

COM EXTREMIDADES BEVELED 30° - 35° API SPEC. 5L E TESTADOS HIDROSTATICAMENTE A PRESSÃO DE (MINIMUM) 1,220 psi POR 10 SEGUNDOS
WITH PIPE ENDS AND HYDROSTATICALLY TESTED AT FOR SECONDS
CON EXTREMIDAD Y CON PRUEBA HIDROSTATICA A LA PRESIÓN DE DURANTE SEGUNDOS

TESTE (S) NÃO DESTRUTIVOS (S) WELD SEAM - X-RAY 8 INCHES LONG ON EACH PIPE END; PENETRAMETER ISO FE 10/16;
NON DESTRUCTIVE TEST (S) ULTRASONIC INSPECTION 100%; REFERENCE STANDARD DRILLED HOLE 1.6 mm AND NOTCH N5
TEST (S) NO DESTRUCTIVO (S)

- OS RESULTADOS DE ANÁLISES QUÍMICAS E ENSAIOS MECÂNICOS ENCONTRAM-SE REPORTADOS NOS REGISTROS DE Nº 541829 - R:00

- THE CHEMICAL ANALYSIS RESULTS AND THE MECHANICAL TEST RESULTS ARE RECORDED ON THE REPORTS NO.

- LOS RESULTADOS DE LOS ANALISIS QUÍMICOS Y LOS RESULTADOS DE PRUEBAS MECANICAS SE ENCUENTRAN REGISTRADOS EN LOS REPORTES Nº

TODOS OS TUBOS CERTIFICADOS POR ESTE DOCUMENTO
ASSIM COMO SEUS CÓDIGOS E COMPRIMENTOS INDIVIDUAIS.
ENCONTRAM-SE RELACIONADOS NOS AVISOS DE LIBERAÇÃO 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. / PACKING LIST NO. 206 4 0129 1/1 Rev. 0

TODOS LOS TUBOS CERTIFICADOS POR ESTE DOCUMENTO
ASI COMO SUS CODIGOS Y LONGITUDES INDIVIDUALES.
SE ENCUENTRAN RELACIONADOS EN LOS REPORTES DE LIBERACIÓN DE TUBERIAS DE Nº

HTS 7305.11.10.60

CERTIFICADO No. CERTIFICATE No.	REVISÃO REVISION REVISIÓN	DATA E LOCAL DE EMISSÃO DATE AND SITE FECHA Y LOCAL DE EMISIÓN	INSPEÇÃO - INSPECTION - INSPECCIÓN	GERENTE DE CONTROLE DE QUALIDADE QUALITY CONTROL MANAGER GERENTE DE CONTROL DE CALIDAD
0210/06	0	Pindamonhangaba, Feb 14 , 2006	CONFAB	Eng. João Mauricio Godoy - matrícula 7311-1

Tenaris

DEPARTAMENTO DA QUALIDADE - INSPEÇÃO DE RECEBIMENTO/ *QUALITY DEPARTMENT - RECEIVING INSPECTION*

SUMÁRIO DE CERTIFICADO DE USINA/ *SUMMARY OF STEEL MILL PLATE CERTIFICATE*

DIMENSÕES NOMINAIS/ NOMINAL DIMENSION: 9,53x1824x12000mm | DIAM.: 36" | ESPESSURA/ THICK: 0,375" | NORMA/ STANDARD: API SPEC. 5L-2004 X65 PSL2 | CLIENTE/ CLIENT: CS 34690 - EDGEN/USA | USINA/ STEEL MILL SUPPLIER: USIMINAS

PC/ESPECIFICAÇÃO/ *PO SPECIFICATION:*
P.C. 3500023636 / ESPEC. ENPR008 REV.3

REQUISITOS ADICIONAIS/ *EXTRA REQUIREMENTS :*
Relação Mn e C permitido, para até o máximo de 1,65% de Mn.
Relação Nb e C permitido teor de Nb até max 0,100%.
(1) Nb+V+Ti
Norma: USI USITUBOS LEVEL A
Teste TRAÇÃO - em C.P. co largura util 38,1mm e alongamento em L0=50,8mm
Constar no certificado a garantia de atendimento da NACE MR 0175

Pedido de Ensaio: IN 208/05

OBSERVAÇÕES /(REMARKS): *Results of this summary refers to the Steel mill plate certificates.*

Legenda / *Legend.* *NR - Not Required* *R - Required* Laudo - "A" Aprovado "R" Reprovado "P" Pendente
Unidades/Units. J=JOULE M=MPA K=kg/m *Info. - Somente informativo*

RESPONSÁVEL DO LANÇAMENTO DOS REQUISITOS ESPECIFICADOS (SIGLA/ MATRÍCULA/ VISTO): *RESPONSIBLE FROM SPECIFIED REQUIRIMENTS REGISTER(ABREVIATURE /REGISTER/SIGNATURE)* :ECO - 269794 APC - 219124

ENSAIOS MECÂNICOS / *MECHANICAL TESTS* — Tração (transversal) Temp. Ambiente; CHARPY (Transversal) Temperatura: -20°C, CP/ SPECIM: 10x7,5x55mm

Nº	CORRIDA/ HEAT #	LE/ YS (M)	LR/ UTS (M)	LE/LR/ YS/UTS (%)	AL/ EL (%)	1 (J)	1 %	2 (J)	2 %	3 (J)	3 %	MEDIA (J)	MEDIA %	DOBRAMENTO	DWTT (-)	DUREZA/ HARDNESS Unid./Unit HV10	TGF/ FGS
ESPECIF./ SPECIFICATION	MAX	598	651	93												Info.	
	MIN	488	541		27,0	20	60	20	60	20	60		80				8,0
1	520345	523	582	90	36,0	137	100	145	100	132	100	138	100			186	11,5
2	189239	556	614	91	30,0	67	100	66	100	68	100	67	100			202	12,0
3	410054	513	580	89	36,0	146	100	161	100	134	100	147	100			179	11,5

COMPOSIÇÃO QUÍMICA/ *CHEMICAL COMPOSITION (%)* — ANÁLISE DE PANELA - *LADLE ANALYSIS*

Nº	CORRIDA/ HEAT #	C (x10⁻²)	Si (x10⁻²)	Mn (x10⁻²)	P (x10⁻³)	S (x10⁻³)	Al (x10⁻³)	Cu (x10⁻²)	Nb (x10⁻³)	V (x10⁻³)	Ti (x10⁻³)	Cr (x10⁻²)	Ni (x10⁻²)	Mo (x10⁻²)	N (x10⁻⁴)	O (x10⁻⁴)	B (x10⁻⁴)	Ca (x10⁻⁴)	CE(IIW) (x10⁻²)	CE(Pcm) (x10⁻²)	(1) (x10⁻²)	LAUDO	DATA/ DATE
ESPECIF.	MAX	13	35	156	25	11	50	40	75	70	25	10	20	5	90	NR	10	50	42	25	15		
	MIN						6																
1	520345	8	23	151	14	4	40	1	34	27	19	2	2	0	63		1	25	34	16	8,0	A	07/12/2005
2	189239	9	22	152	21	7	42	1	39	38	17	4	2	1	38		3	21	36	18	9,4	A	07/12/2005
3	410054	9	18	147	12	4	37	3	38	40	15	2	2	1	60		3	19	35	17	9,3	A	13/12/2005
4																					0,0		
5																					0,0		
6																					0,0		
7																					0,0		
8																					0,0		
9																					0,0		
10																					0,0		
11																					0,0		
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16																					0,0		
17																					0,0		
18																					0,0		
19																					0,0		
20																					0,0		
21																					0,0		
22																					0,0		
23																					0,0		
24																					0,0		
25																					0,0		

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: Kevin Dorsey DATE: 6/19/06

11/93

Tenaris

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

PAÍS DE ORIGEM: / COUNTRY OF ORIGIN / PAÍS DE ORIGEN: BRASIL

DESTINO / DESTINATION: U.S.A

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

SOB O PEDIDO Nº / UNDER THE ORDER NO / SEGÚN EL PEDIDO: P.O. 55714

APLICAÇÃO / APLICATION / APLICACION: 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 / CERTICAMOS QUE TODOS LOS TUBOS FABRICADOS PARA LA OBRA Nº: DT- 34.690

DESTINADO(S) A / FOR THE PURCHASER / DESTINADO(S) PARA: EDGEN CARBON PRODUCTS GROUP L.L.C.

COM DIÂMETRO EXTERNO / WITH OUTSIDE DIAMETER / CON DIAMETRO EXTERNO: 30"

ESPESSURA / WALL THICKNESS / ESPESOR: 0.375"

E COMPRIMENTO INDIVIDUAL / AND INDIVIDUAL LENGTH / Y LONGITUD INDIVIDUAL: 38.06 To 41.01 ft

PERFAZENDO UM TOTAL DE / IN A TOTAL OF / POR UN TOTAL DE: 122

PEÇAS COM COMPRIMENTO TOTAL DE / PIECES WITH TOTAL LENGTH / UNIDADES PARA UNA LONGITUD TOTAL DE: 4,884.14 ft

E PESO TOTAL DE / AND TOTAL WEIGHT / Y PESO TOTAL DE: 579,728 lb

FORAM FABRICADOS, INSPECIONADOS E APROVADOS CONFORME A ESPECIFICAÇÃO / 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 PSL2

E ESPECIFICAÇÕES SUPLEMENTARES / AND SUPPLEMENTARY SPECIFICATIONS / Y ESPECIFICACIONES SUPLEMENTARIAS: *-*

COM EXTREMIDADES / WITH PIPE ENDS / CON EXTREMIDAD: BEVELED 30° - 35° API SPEC. 5L

E TESTADOS HIDROSTATICAMENTE À PRESSÃO DE / AND HYDROSTATICALLY TESTED AT / Y CON PRUEBA HIDROSTATICA A LA PRESIÓN DE: (MINIMUM) 1,580 psi

POR / FOR / DURANTE: 10 SEGUNDOS / SECONDS / SEGUNDOS

TESTE (S) NÃO DESTRUTIVOS (S) / NON DESTRUCTIVE TEST (S) / TEST (S) NO DESTRUCTIVO (S): WELD SEAM - X-RAY 8 INCHES LONG ON EACH PIPE END; PENETRAMETER ISO FE 10/16; ULTRASONIC INSPECTION 100%; REFERENCE STANDARD DRILLED HOLE 1.6 mm AND NOTCH N5

TODOS OS TUBOS CERTIFICADOS POR ESTE DOCUMENTO, ASSIM COMO SEUS CÓDIGOS E COMPRIMENTOS INDIVIDUAIS, ENCONTRAM-SE RELACIONADOS NOS AVISOS DE LIBERAÇÃO 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 / PACKING LIST NO.

206 4 0125 1/3 - 3/3 Rev. 0

TODOS LOS TUBOS CERTIFICADOS POR ESTE DOCUMENTO, ASI COMO SUS CODIGOS Y LONGITUDES INDIVIDUALES SE ENCUENTRAN RELACIONADOS EN LOS REPORTES DE LIBERACIÓN DE TUBERIAS DE Nº

- OS RESULTADOS DE ANÁLISES QUÍMICAS E ENSAIOS MECÂNICOS ENCONTRAM-SE REPORTADOS NOS REGISTROS DE Nº 541846 - R:00

- THE CHEMICAL ANALYSIS RESULTS AND THE MECHANICAL TEST RESULTS ARE RECORDED ON THE REPORTS NO.

- LOS RESULTADOS DE LOS ANALISIS QUÍMICOS Y LOS RESULTADOS DE PRUEBAS MECANICAS SE ENCUENTRAN REGISTRADOS EN LOS REPORTES Nº

HTS 7305.11.10.60

CERTIFICADO No / CERTIFICATE No.	REVISÃO / REVISION / REVISIÓN	DATA E LOCAL DE EMISSÃO / DATE AND SITE / FECHA Y LOCAL DE EMISIÓN	INSPEÇÃO - INSPECTION - INSPECCION	GERENTE DE CONTROLE DE QUALIDADE / QUALITY CONTROL MANAGER / GERENTE DE CONTROL DE CALIDAD
0206/06	0	Pindamonhangaba, Feb 14, 2006	CONFAB	Eng. João Maurício Godoy - matrícula: 1311-1

Tenaris

DEPARTAMENTO DA QUALIDADE - INSPEÇÃO DE RECEBIMENTO/ *QUALITY DEPARTMENT - RECEIVING INSPECTION*

SUMÁRIO DE CERTIFICADO DE USINA/ *SUMMARY OF STEEL MILL PLATE CERTIFICATE*

DIMENSÕES NOMINAIS/ NOMINAL DIMENSION: 9,53x2,357x11,440mm | DIAM: 30" | ESPESSURA/THICK: 0,375" | NORMA/STANDARD: API SPEC. 5L-2004 X70 PSL2 | CLIENTE/CLIENT: CS 34690 - EDGEN/USA | USINA/STEEL MILL SUPPLIER: USIMINAS

PC/ESPECIFICAÇÃO/ *PO SPECIFICATION:*
P.C. 3500023636 / ESPEC. ENPR008 REV.3

REQUISITOS ADICIONAIS/ *EXTRA REQUIREMENTS :*
Relação Mn e C permitido, para até o maximo de 2,00% de Mn.
Relação Nb e C permitido teor de Nb até max 0,100%.
(1) Nb+V+Ti

Norma: USI USTTUBOS LEVEL A
Teste TRAÇÃO - em C.P. co largura util 38,1mm e alongamento em L0=50,8mm

Pedido de Ensaio: IR 201/05

OBSERVAÇÕES /(*REMARKS*): *Results of this summary refers to the Steel mill plate certificates.*

Legenda / Legend: NR - *Not Required* R - *Required*
Unidades/Units: J=JOULE M=MPA K=kgf/in²
Laudo - "A" Aprovado "R" Reprovado "P" Pendente
Info. - Somente Informativo

RESPONSÁVEL DO LANÇAMENTO DOS REQUISITOS ESPECIFICADOS (SIGLA/ MATRÍCULA/ VISTO): *RESPONSIBLE FROM SPECIFIED REQUIREMENTS REGISTER(ABREVIATURE /REGISTER/SIGNATURE)* :ECD - 269794 ... 27812-9

ENSAIOS MECÂNICOS / *MECHANICAL TESTS* — Tração (transversal) Temp. Ambiente; CHARPY (Transversal) Temperatura: -20ºC, CP/ SPECIM: 10x7,5x55mm

Seq.	CORRIDA/ HEAT #	LE/ YS (M)	LR/ UTS (M)	LE/LR/ YS/UTS (%)	AL/ EL (%)	Charpy 1 (J)	1 %	2 (J)	2 %	3 (J)	3 %	Mínimo (J)	Mínimo %	DOBRAMENTO/ BEND	DWTT (+)	DUREZA/ HARDNESS Unid./Unit HV10	TGF/ FGS
ESPECIF. MAX		633	665	93													
SPECIFIED MIN		523	575		26,0	20	60	20	60	20	80		80			Info.	8,0
1	389917	590	641	92	34,0	96	100	91	100	98	100	95	100			201	12,0
2	188198	582	641	91	30,0	95	100	101	100	101	100	99	100			200	11,5
3	287872	596	667	89	34,0	89	100	86	100	87	100	87	100			200	12,0
4	188199	568	632	90	32,0	95	100	88	100	90	100	91	100			193	12,0
5	389919	586	655	89	32,0	114	100	103	100	98	100	105	100			201	12,0

COMPOSIÇÃO QUÍMICA/ *CHEMICAL COMPOSITION (%)* — ANÁLISE DE PANELA - *LADLE ANALYSIS*

Seq.	C (x10⁻²)	Si (x10⁻²)	Mn (x10⁻²)	P (x10⁻³)	S (x10⁻³)	Al (x10⁻³)	Cu (x10⁻²)	Nb (x10⁻³)	V (x10⁻³)	Ti (x10⁻³)	Cr (x10⁻²)	Ni (x10⁻²)	Mo (x10⁻²)	N (x10⁻⁴)	O (x10⁻⁴)	B (x10⁻⁴)	Ca (x10⁻⁴)	CE(IIW) (x10⁻²)	CE(Pcm) (x10⁻²)	(1) (x10⁻³)	LAUDO	DATA/ DATE
SPECIF.	13	35	170	25	11	60 / 8	40	75	70	25	10	20	5	90	NR	10	50	43	25	15		
1	9	21	160	17	5	26	1	52	41	17	3	1	1	45		3	23	37	18	11,0	A	06/12/2005
2	9	18	163	15	4	26	1	55	37	18	2	1	1	69		3	21	38	18	10,8	A	09/12/2005
3	9	25	168	24	4	29	1	58	39	18	3	2	1	86		3	23	39	19	11,3	A	09/12/2005
4	9	21	164	19	3	26	1	60	37	16	4	1	1	66		3	26	38	18	11,3	A	10/12/2005
5	9	21	166	22	4	32	1	60	42	16	4	1	1	77		3	21	39	18	11,8	A	10/12/2005
6																				0,0		
7																				0,0		
8																				0,0		
9																				0,0		
10																				0,0		
11																				0,0		
12																				0,0		
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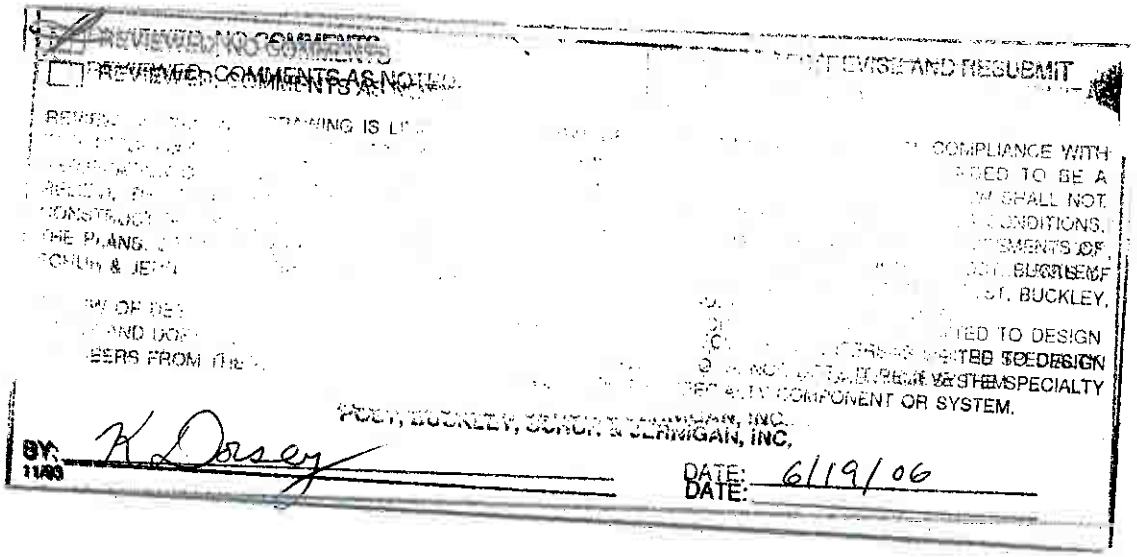
18																				0,0		
19																				0,0		
20																				0,0		
21																				0,0		
22																				0,0		
23																				0,0		
24																				0,0		
25																				0,0		

Polk County

Holly Hill LFA Deep Well

Submittal Number: 15

Steel casing 24" x .375"



검 사 증 명 서 (A)

MILL INSPECTION CERTIFICATE

HYUNDAI **HYSCO**

*본사 · 공장 : 울산광역시 북구 염포동 265번지
HEAD OFFICE #265, Yeompo-dong, Buk-gu, Ulsan, Korea
(ULSAN PLANT) TEL:(052)280-0114 FAX:(052)287-8918
*서울사무소 : 서울특별시 강남구 역삼동 837-36번지
SEOUL OFFICE 837-36, Yeoksam-dong, Gangnam-gu, Seoul, Korea
TEL:(02)2112-8114 FAX:(02)775-7095

성적서번호 CERTIFICATE NO : B59008   페이지 PAGE : 1
발행일자 DATE OF ISSUE : SEP. 6. 2005.   84523102
계약번호 CONTRACT(P/O) NO : 53035
품명 COMMODITY : E.R.W. STEEL PIPE
제품규격 SPECIFICATION : API 5L X42/API 5LB PSL1/ASTM A53B
수요가 CUSTOMER :

관종 TYPE OF PIPE END (※1)	치수 DIMENSION 외경×두께×길이 (OUTDIA. × THICK. × LENGTH) (※2, ※3, ※4)	수량 QUANTITY (PCS)	중량 WEIGHT (KG)	수압시험 HYDROSTATIC TEST kg f/㎠ PSI	※5 ※6 ※7 ※8 ※9 ※10 ※11 ※12 ※13 ※14 (G:GOOD)	도막시험 COATING TEST	경도 HARDNESS HRB/HV	제강번호 HEAT NO.	항복강도 YIELD STRENGTH ksi / PSI	인장강도 TENSILE STRENGTH S ※16	W ※16	연신율 ELONGATION %	C	Si	Mn (×100)	P	S (×1000)	Cu	Ni	Cr	Mo	V (×100)	Nb	Al	Ceq (×1000)	충격시험 IMPACT JOULE	%
BVBE NB	24" x .375" x21.000'	74	66,636	83	G G G G G G		\	SP29077	34.0	50.6	52.1	38	18	1	79	14	8	2	2	1	1	Tr					
	(610.0mm x 9.53mm x 6.401M)			1180					48400	72000	74100																
								SP29080	33.7	50.3	52.7	39	19	1	76	12	9	2	2	1	1	Tr					
									47900	71500	75000																
								SP29083	34.8	51.0	53.0	39	18	1	77	12	8	2	1	1	1	Tr					
									49500	72500	75400																
								SP29086	32.3	48.8	51.5	37	18	1	77	11	8	2	2	1	1	Tr					
									45900	69400	73300																
								SP30196.	32.6	49.6	51.6	38	18	1	76	14	6	2	1	2	1	Tr					
									46400	70500	73400																
	TOTAL ->	74	66.636																								

비고 REMARK: * RESIDUAL MAGNETISM TEST : GOOD

비고 NOTES:

※1 Type of pipe End 관종
X: B:Black, D:Galvanized, E:Enameled
X: V:Varnish, R:Removal Varnish, O:Oiling Coating, F:PE Coating, C:Coaltar Coating, A:Asphalt Coating
XX: PE:Plain End, BE:Bevel End, TE:Thread End, TC:Thread Coupling, BL:Bell End, SE:Swaging End, VJ:Victaulic Joint

※2 NB:Nominal Bore 호칭경, OD:Outside Diameter
※3 Unit 단위 (M:mm, I:Inch)
※4 Unit 단위 (M:mm, F:Feet, I:Inch)
※5 G:Good
※6 Visual & Dimension Test 육안 및 치수검사
※7 Flattening or Bending Test 편평 또는 굽힘시험
※8 Weld Ductility Test 용접부 연성시험
※9 Nondestructive Test 비파괴검사 (
※10 Drift Test 확관시험
※11 Flaring Test 압확시험
※12 Crush Test 충압시험
※13 Reverse Flattening Test 전개시험
※14 Heat Treatment 열처리
※15 B:Base Metal 모재부
※16 W:Weld Part 용접부
※17 H:Heat(Ladle)Analysis 용강분석, P:Product Analysis 제품분석

본 제품은 관련규격에 합격되었음을 보증합니다.
WE CERTIFY THAT THE DESCRIBED MATERIAL HAS HEREIN BEEN ACCEPTED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER.

SURVEYOR

H. J. KIM
QUALITY ASSURANCE TEAM GENERAL MGR.

HPS-B 301-631-0-QLT   HYUNDAI HYSCO   (350×260)

검 사 증 명 서 (A)

MILL INSPECTION CERTIFICATE

HYUNDAI HYSCO

*본사 · 공장 : 울산광역시 북구 염포동 265번지 ▮▮▮▮-▮▮▮▮
HEAD OFFICE #265, Yeompo-dong, Buk-gu, Ulsan, Korea
(ULSAN PLANT) TEL:(052)280-0114 FAX:(052)287-8916

*서울사무소 : 서울특별시 강남구 역삼동 837-36번지 ▮▮▮▮-▮▮▮▮
SEOUL OFFICE 837-36, Yeoksam-dong, Gangnam-gu, Seoul, Korea
TEL:(02)2112-8114 FAX:(02)775-7095

성적서번호 CERTIFICATE NO : B57043 페이지 PAGE :1
발행일 DATE OF ISSUE : JUL. 11. 2005. B4511902
계약번호 CONTRACT(P/O) NO :
품명 COMMODITY : E.R.W. STEEL PIPE
제품규격 SPECIFICATION : API 5LB PSL1/ASTM A53B/ASME SA53B
수요가 CUSTOMER:

관종 TYPE OF PIPE END ※1	치수 DIMENSION 외경 × 두께 × 길이 (OUTDIA. × THICK. × LENGTH) ※2 ※3 ※4	수량 QUANTITY (PCS)	중량 WEIGHT (KG)	수압시험 KYDRO-STATIC TEST MPa kg f/㎠ PSI	※6 VISUAL & DIMENSION TEST	※7 FLATTENING TEST	※8 WELD DUCTILITY TEST	※9 NDT	※10 DRIFT TEST	※11 FLARING TEST	※12 CRUSH TEST	※13 R-FLATTENING TEST	※14 HEAT TREATMENT	도막시험 COATING TEST 외관 / 부착력 / WEIGHT OF ZINC COAT g/㎡ OZ/FT²	연속성 DIP TEST TIMES	연속성 W	경도 HARDNESS HRB / HV	제강번호 HEAT NO.	인장시험 TENSILE TEST 항복강도 YIELD STRENGTH PSI	인장강도 TENSILE STRENGTH B ※15 kg f/㎟ N/㎟	W ※16	연신율 ELONGATION %	화학성분 (%) CHEMICAL COMPOSITION ※17 C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Al	Ceq	충격시험 IMPACK 흡수에너지 ABSORBED ENERGY JOULE	전단면적 SHEAR AREA %
BEVEL	NB 24" x .250" x42.000'	58	70,741	31	G	G	G	G					G					0429044	37.2	49.5	51.0	40	17	2	81	13	10	2	1	2	1	Tr					
	610.0mm x 6.35mm x 12.802M)			440															52900	70400	72500																
																		0523372	30.6	46.4	48.0	36	18	1	80	15	13	1	1	1	1	Tr					
																			43500	66000	69100																
																		0523374	32.1	44.9	47.4	38	15	1	74	16	13	2	1	1	1	Tr					
																			45700	63900	67400																
																		0523748	33.2	48.5	50.1	37	15	2	78	20	10	2	2	1	1	Tr					
																			47200	69000	71900																
																		0530115	30.6	48.5	50.9	39	17	2	76	18	11	2	2	1	1	Tr					
																			43500	69000	72400																
																		0530116	32.1	49.0	51.0	37	18	2	76	12	11	1	2	1	1	Tr					
																			45700	69700	72500																
→ BEVEL	NB 24" x .375" x42.000'	110	198,106	47	G	G	G	G	G				G					0523371	31.1	46.4	48.5	37	17	1	77	18	15	2	1	1	1	Tr					
	610.0mm x 9.53mm x 12.802M)			670															44200	64000	69000																
																		0523372	30.6	46.4	48.0	37	18	1	80	15	13	2	1	1	1	Tr					

O:GOLD

비고 REMARK: * RESIDUAL MAGNETISM TEST : GOOD

참고 NOTES:

※1 Type of pipe End 관종
- X: B:Black, O:Galvanized, E:Enameled
- X: V:Varnish, R:Removal Varnish, O:Oiling Coating, F:PE Coating, C:Coater Coating, A:Asphalt Coating
- XX: PE:Plain End, BE:Bevel End, TE:Thread End, TC:Thread Coupling, BL:Bell End, SE:Swaging End, VJ:Victaulic Joint

※2 NB:Nominal Bore 호칭경, OD:Outside Diameter
※3 Unit 단위 (M:mm, I:Inch)
※4 Unit 단위 (M:mm, F:Feet, I:Inch)
※5 O:Good
※6 visual & Dimension Test 육안 및 치수검사
※7 Flattening or Bending Test 편평 또는 굽힘시험
※8 Weld Ductility Test 용접부 연성시험
※9 Nondestructive Test 비파괴검사 ( )
※10 Drift Test 관통시험
※11 Flaring Test 압축시험
※12 Crush Test 평압시험
※13 Reverse Flattening Test 전개시험
※14 Heat Treatment 열처리
※15 B:Base Metal 모재부
※16 W:Weld Part 용접부
※17 H:Heat(Ladle)Analysis 열연분석, P:Product Analysis 제품분석

본 제품은 관련규격에 합격되었음을 보증합니다.
WE CERTIFY THAT THE DESCRIBED MATERIAL HAS HEREIN BEEN ACCEPTED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER.

SURVEYOR

H. J. KIM
QUALITY ASSURANCE TEAM GENERAL MGR.

HPS-B 301-631-0-QLT

HYUNDAI HYSCO

(350×280)

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

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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: Kevin Dorsey DATE: 12-8-06

성적서 번호
CERTIFICATE NO. : 6701059
발행일자
DATE OF ISSUE. : 2006-07-13
계약번호
CONTRACT(P/O) NO. : 57867
품명
COMMODITY : E.R.W. STEEL PIPE
제품규격
SPECIFICATION : API 5L X42/API 5LB PSL1/ASTM A53B/ASME SA53B

페이지
PAGE 1 of 1

검 사 증 명 서(A)

MILL INSPECTION CERTIFICATE

200001053

고 객 사
CUSTOMER : 현대종합상사

HYUNDAI HYSCO 현대하이스코주식회사 HYUNDAI HYSCO

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

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

관종 TYPE OF PIPE END ※1	치수 DIMENSION 외경 × 두께 × 길이 (OUTDIA × THICK × LENGTH) ※2 ※3 ※4	수량 QUAN-TITY (PCS)	중량 WEIGHT (KG)	수압시험 HYDRO-STATIC TEST PSI	※5	제품번호 HEAT NO.	인장시험 TENSILE TEST (Gage Length : 2 INCH) 항복강도 YIELD STRENGTH ※6 Mpa/PSI	인장강도 TENSILE STRENGTH ※7 B Mpa/PSI	※7 W Mpa/PSI	연신율 E.L %	※6	C ×100	Si ×100	Mn ×100	P ×1000	S ×1000	Cu ×100	Ni ×100	Cr ×100	Mo ×100	V ×100	Ti ×100	Nb ×100	Al ×1000	CEQ ※9 ×1000	경도 HARD-NESS Hv	충격시험 IMPACT TEST (℃) 흡수에너지 ABSORBED ENERGY JOULE	전단파면율 SHEAR AREA %	도막시험 COATING TEST 아연부착량 WEIGHT OF ZINC COAT g/㎡	굽힘성 DIP TEST TIMES	※5	비고 REMARK
EB BE	NB 18" X .375" X 21.000'	2	1,342	1,490	G	H04488	357	495	483	37		6	2	79	10	4	2	1	1	1	TR	TR	TR								
		1	672	1,490	G	SP40874	308	480	480	37		17	1	78	17	8	2	2	1	1	TR	TR	TR								
		19	12,752	1,490	G	SP54379	309	476	466	37		19	1	83	15	9	2	2	1	1	TR	TR	TR								
EB BE	NB 18" X .375" X 42.000'	29	38,927	1,490	G	SP54379	309	476	466	36		19	1	83	15	9	2	2	1	1	TR	TR	TR								
EB BE	NB 20" X .375" X 21.000'	2	1,495	1,420	G	C622715	340	485	486	37		17	1	78	20	9	2	2	1	1	TR	TR	TR								
		1	747	1,420	G	C622721	310	474	497	37		15	1	80	18	6	2	1	2	1	TR	TR	TR								
EB BE	NB 24" X .375" X 21.000'	1	901	1,180	G	C622699	315	450	474	36		17	1	75	11	10	2	2	1	1	TR	TR	TR								
		1	900	1,180	G	C622699	345	480	500	37		16	2	78	18	7	2	2	1	1	TR	TR	TR								
	TOTAL →	56	57,736																												

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

NOTE) ※1 Type of pipe End 관종

EB:ERW특관(절단)	RB:SAW특관(절단)	TC:Thread Coupling
EA:ERW특소둔관	RG:SAW특종(절단)	RG:Roll Grooving
EG:ERW특관(절단)	RS:SAW스파이럴관	VG:Victaulic Grooving
EC:ERW특니사관	PE:Plain End	PC:Plain End + Coupled
ED:ERW벼니사관	BE:Bevel End	PB:Plain End + Bevel End
EN:ERW베단정비계	TE:Thread End	BD:Bell End

※2 NB:Norminal Bore 호칭경, OD:Outside Diameter
※3 Unit 단위(M:mm, I:inch)
※4 Unit 단위(M:Meter, F:Feet, I:Inch)
※5 G:GOOD
※6 H:Heat(Ladle) Analysis 용탕분석, P:Product Analysis 제품분석, WP:Weld Product Analysis 용접부 제품분석
※7 B:Base Metal 모재부, W:Weld Part 용접부
※8 L:Longitudinal 압연방향, T:Transverse 횡주방향
※9 CEQ=C+Mn/6+(Ni+Cu)/15+(Cr+Mo+V)/5 용가탄소량
※10 Heat Treatment 열처리
※11 Visual & Dimension Test 육안 및 치수검사
※12 Flattening/Bend/Guided Bend Test 편평/벤드/굽힘시험
※13 Reverse Flattening Test 역개시험
※14 Flaring Test 압확시험
※15 Nondestructive Test 비파괴검사
※16 Residual Magnetism Test 잔류자장시험 ※17 Crush Test 압압시험
※18 Drift Test 관통시험
※19 Flange Test 플레지시험

NOTE 2 • SPEC YEAR – API 2004/ASTM 2004/ASME 2004

SURVEYOR

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• 본 검사증명서에 명기된 규격등도의 사용시 인려상 문제가 발생할 수 있으며, 검사증명서 위,변조시 사용시 법적으로 불이익을 당하실 수 있습니다.

H. J. KIM
INSPECTION MANAGER

HYS – B301 – 631 – 1 – QLT

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
☐ REVIEWED, COMMENTS AS NOTED
☐ REJECTED; REVISE AND RESUBMIT
☐ NOT REVIEWED

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POST, BUCKLEY, SCHUH & JERNIGAN, INC.

BY: Kevin Dorsey DATE: 2/13/06

11/93

성적서 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 5LB PSL1/ASTM A53B/ASME SA53B

검 사 증 명 서(A)

MILL INSPECTION CERTIFICATE

200009925

고 객 사 CUSTOMER : 현대종합상사

HYUNDAI HYSCO 현대하이스코주식회사 HYUNDAI HYSCO

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

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

관통 TYPE OF PIPE END ※1	치수 DIMENSION 외경 × 두께 × 길이 (OUTDIA × THICK × LENGTH) ※2 ※3 ※4		수량 QUAN-TITY (PCS)	중량 WEIGHT (KG)	수압시험 HYDRO-STATIC TEST PSI	※5	제강번호 HEAT NO.	인장시험 TENSILE TEST (Gage Length : 2 INCH) 항복강도 YIELD STRENGTH ※6 Mpa/PSI	인장강도 TENSILE STRENGTH ※7 B Mpa/PSI	※7 W Mpa/PSI	연신율 E.L %	화학성분(%) CHEMICAL COMPOSITION ※8	C ×100	Si	Mn	P ×1000	S	Cu ×100	Ni	Cr	Mo	V	Ti	Nb		Al	CEQ ※9 ×1000	경도 HARD-NESS HV	충격시험 IMPACT TEST (℃) 흡수에너지 ABSORBED ENERGY JOULE	전단파면율 SHEAR AREA %	도막시험 COATING TEST 아연부착량 WEIGHT OF ZINC COAT g/㎡	균일성 DIP TEST TIMES	※5
EB BE	NB	12-3/4" X .375" X 21.000'	1	471	2,100	G	H11417		433	509	525	36		6	15	99	9	3	2	2	1	1	TR	TR	TR							
									62,500	73,900	76,600																					
			50	23,573	2,100	G	J03425		341	439	463	35		6	3	78	11	4	2	2	1	1	TR	TR	TR							
									49,700	64,000	68,800																					
			34	16,029	2,100	G	J03427		354	432	460	35		5	2	79	9	5	2	2	1	1	TR	TR	TR							
									51,300	62,500	66,600																					
			4	1,886	2,100	G	J03553		417	491	513	37		6	16	99	9	4	2	1	2	1	TR	TR	TR							
									61,100	71,100	73,900																					
			2	943	2,100	G	J03554		416	490	516	36		6	17	99	10	4	2	1	2	1	TR	TR	TR							
									60,700	71,100	75,300																					
EB BE	NB	12-3/4" X .375" X 42.000'	8	7,543	2,100	G	J03425		341	439	451	37		6	3	78	11	4	2	2	1	1	TR	TR	TR							
									49,700	64,000	66,650																					
			38	35,830	2,100	G	J03426		346	434	452	36		5	2	78	13	4	2	2	1	1	TR	TR	TR							

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

NOTE 1 ※1 Type of pipe End 관종

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

※2 NB:Nominal Bore 호칭경, OD:Outside Diameter
※3 Unit 단위(M:mm, I:Inch)
※4 Unit 단위(M:Meter, F:Feet, I:Inch)
※5 G:GOOD
※6 L:Longitudinal 압연방향, T:Transverse 압직방향
※7 B:Base Metal 모재부, W:Weld Part 용접부
※6 H:Heat(Ladle) Analysis 열연분석, P:Product Analysis 제품분석, WP:Weld Product Analysis 용접부 제품분석
※8 C+Mn/6+(Ni+Cu)/15+(Cr+Mo+V)/5 탄가환소량
※10:Heat Treatment 열처리
※11 Visual & Dimension Test 육안 및 치수검사
※12 Flattening/Bend/Guided Bend Test 편평/밴드/굽힘시
※13:Reverse Flattening Test 전개시험
※14 Flaring Test 확관시험
※15 Nondestructive Test 비파괴검사
※16:Residual Magnetism Test 잔류자장시험 ※17:Crush Test 충압시험
※18:Drift Test 관통시험
※19:Flange Test 플랜지시험

NOTE 2 * SPEC YEAR = API 2004/ASTM 2004/ASME 2004

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* 본 검사증명서에 명기된 규격승도외 사용시 안전상 문제가 발생할 수 있으며, 검사증명서 위,변조시 사로서 위조로 불이익을 당하실 수 있습니다.

SURVEYOR

H. J. KIM
INSPECTION MANAGER

성적서 번호
CERTIFICATE NO. : 7600354
발행일자
DATE OF ISSUE. : 2007-06-07
계약번호
CONTRACT(P/O) NO. :
품명
COMMODITY : E.R.W. STEEL PIPE
제품규격
SPECIFICATION : API 5L X42/API 5LB PSL1/ASTM A53B/ASME SA53B

검 사 증 명 서(A)

MILL INSPECTION CERTIFICATE

200010001

고 객 사
CUSTOMER : 현대종합상사

HYUNDAI HYSCO 현대하이스코주식회사 HYUNDAI HYSCO

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

서울사무소 (SEOUL OFFICE) : 서울시 강남구 역삼동 837-36번지 랜드마크타워 135-LANDMARK TOWER 837-36, YEOKSAM-DONG, GANGNAM-KU, SEOUL, KOREA TEL:82-2-2112-6114, FAX:82-2-775-7095

관종 TYPE OF PIPE END	치수 DIMENSION 외경 × 두께 × 길이 (OUTDIA × THICK × LENGTH)		수량 QUAN-TITY	중량 WEIGHT	수압시험 HYDRO-STATIC TEST		제강번호 HEAT NO.	인장시험 TENSILE TEST (Gage Length : 2 INCH)				화학성분(%) CHEMICAL COMPOSITION																경도 HARD-NESS	충격시험 IMPACT TEST (℃)		도막시험 COATING TEST		
					PSI	※5		항복강도 YIELD STRENGTH	인장강도 TENSILE STRENGTH ※7 B	인장강도 TENSILE STRENGTH ※7 W	연신율 E.L		C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb			Al	CEQ ※9		흡수에너지 ABSORBED ENERGY	전단파면율 SHEAR AREA	아연부착량 WEIGHT OF ZINC COAT	균일성 DIP TEST	
※1	※2	※3 ※4	(PCS)	(KG)				※6 Mpa/PSI			%	※8	×100			×1000		×100									×1000		HV	JOULE	%	g/㎡	TIMES	※5
EB BE	NB	12-3/4" X .375" X 42.000'	21	19,801	2,100	G	H11162		370	441	467	36		6	2	78	11	4	2	2	1	1	TR	TR	TR								
									54,000	64,000	68,200																					
			21	19,801	2,100	G	H11256		341	436	466	36		6	1	79	6	5	2	2	1	1	TR	TR	TR								
									49,700	64,000	68,300																					
			20	18,858	2,100	G	J03426		346	434	453	34		5	2	76	13	4	2	2	1	1	TR	TR	TR								
									48,700	62,500	65,400																					
		TOTAL →	62	58,460																													

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

NOTE 1 ※1 Type of pipe End 관종

EB:ERW Black End	RB:SAW Black	TC:Thread Coupling
EA:ERW Annealing	RG:SAW Galvanizing	RG:Roll Grooving
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※2 NB:Norminal Bore 호칭경, OD:Outside Diameter
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※4 Unit 단위(M:Meter, F:Feet, I:Inch)
※5 G:GOOD
※6 L:Longitudinal 인장방향, T:Transverse 원주방향
※7 B:Base Metal 모재부, W:Weld Part 용접부
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※9 CEQ=C+Mn/6+(Ni+Cu)/15+(Cr+Mo+V)/5 용가탄소량
※10:Heat Treatment 열처리
※11 Visual & Diemension Test 육안 및 치수검사
※12 Flattening/Bend/Guided Bend Test 편평/밴드/굽힘시
※13:Reverse Flattening Test 전계시험
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※15 Nondestructive Test 비파괴검사
※16:Residual Magnetism Test 잔류자장시험 ※17:Crush Test 충압시험
※18:Drift Test 관통시험
※19:Flange Test 플랜지시험

NOTE 2 • SPEC YEAR – API 2004/ASTM 2005/ASME 2004

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

SURVEYOR

H. J. KIM
INSPECTION MANAGER

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	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%

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

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
2001 Commerce
Midland, Texas 79703
Tel: (432) 694-7761
Fax: (432) 694-3191
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

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

Field :
Formation :
Coring Fluid :
Elevation :

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

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH ft	PERMEABILITY (MAXIMUM) Kair md	PERMEABILITY (90 DEG) Kair md	PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	GRAIN DENSITY gm/cc	DESCRIPTION
1	848.0- 49.0	6.33	3.98	0.59	18.7	2.83	Dolo, pp, foss, mineral flu no cut
1A	1050.0- 51.0	43.4	39.8	3.81	46.5	2.78	Dolo, vug, foss, 0% flu no cut
2	1135.0- 36.0	9.66	9.46	5.32	28.7	2.84	Dolo, sl vug, foss, mineral flu no cut
3	1277.0- 78.0	66.9	1.76	0.16	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
cbl	= Cobble
CEC	= Cation exchange capacity
cem	= Cemented
cgl	= Conglomerate
cht	= Chert
coal	= Coal/Coal Inclusion
dol	= Dolomite
f	= Fine
fest	= Ironstone
foss	= Fossil (iferous)
frac	= Fracture
fri	= Friable
glauc	= Glauconite (ic)
grnl	= Granule
gyp	= Gypsum
hfrac	= Horizontal fracture
hal	= Halite (Salt)
i	= Intergranular
incl	= Inclusions
lam	= Laminae (Laminated)
lmy	= Limy
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
pbl	= Pebble
PET	= Removed for petrographic analysis
POA	= Portion removed for oil analysis
ppv	= Pinpoint Vug
PSA	= Particle size analysis
pyr	= Pyrite (ic)
pyrbit	= Pyrobitumen
SA	= Sieve Analysis
SCAL	= Removed for special core analysis
sdy	= Sandy
SEM	= Scanning electron microscope analysis
sh	= Shale
shy	= Moderately shaly (20-40%)
sltst	= Siltstone
slty	= Silty
SP	= Small plug
ss	= Sandstone
sshy	= 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

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
2001 Commerce
Midland, Texas 79703
Tel: (432) 694-7761
Fax: (432) 694-3191
www.corelab.com

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

CORE ANALYSIS RESULTS

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

DISTRIBUTION OF FINAL REPORTS

1 COPY

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

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
2001 Commerce
Midland, Texas 79703
Tel: (432) 694-7761
Fax: (432) 694-3191
www.corelab.com

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 (MAXIMUM) Kair md	PERMEABILITY (90 DEG) Kair md	PERMEABILITY (VERTICAL) Kair md	POROSITY (HELIUM) %	GRAIN DENSITY gm/cc	DESCRIPTION
c	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
anhy = Anhydrite
AST = Appears similar to
bk = Break
bldr = Boulder
c = Coarse
calc = Calcite (areous)
carb = Carbonaceous
cbl = Cobble
CEC = Cation exchange capacity
cem = Cemented
cgl = Conglomerate
cht = Chert
coal = Coal/Coal Inclusion
dol = Dolomite
f = Fine
fest = Ironstone
foss = Fossil (iferous)
frac = Fracture
fri = Friable
glauc = Glauconite (ic)
grnl = Granule
gyp = Gypsum
hfrac = Horizontal fracture
hal = Halite (Salt)

i = Intergranular
incl = Inclusions
lam = Laminae (Laminated)
lmy = Limy
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
pbl = Pebble
PET = Removed for petrographic analysis
POA = Portion removed for oil analysis
ppv = Pinpoint Vug
PSA = Particle size analysis
pyr = Pyrite (ic)
pyrbit = Pyrobitumen
SA = Sieve Analysis

SCAL = Removed for special core analysis
sdy = Sandy
SEM = Scanning electron microscope analysis
sh = Shale
shy = Moderately shaly (20-40%)
sltst = Siltstone
slty = Silty
SP = Small plug
ss = Sandstone
sshy = 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

APPENDIX J.

Packer Test Field

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

Table of Field Measurements 1,083 Packer							
Time	Totalizer (gal)	Totalizer Pump Rate (gpm)	Packer (psi)	CONDUCTIVITY (µS/cm)	TDS (mg/L)	TEMP (˚C)	H_2S (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, Forida

Table of Field Measurements 1,605 Packer							
Time	Totalizer (gal)	Totalizer Pump Rate (gpm)	Packer (psi)	CONDUCTIVITY (µS/cm)	TDS (mg/L)	TEMP (˚C)	H_2S (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, Forida

Table of Field Measurements 1,951 Packer							
Time	Totalizer (gal)	Totalizer Pump Rate (gpm)	Packer (psi)	CONDUCTIVITY (µS/cm)	TDS (mg/L)	TEMP (˚C)	H_2S (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, Forida

Table of Field Measurements 2,260 Packer							
Time	Totalizer (gal)	Totalizer Pump Rate (gpm)	Packer (psi)	CONDUCTIVITY (µS/cm)	TDS (mg/L)	TEMP (˚C)	H_2S (mg/L)
9:30	2517675		300				
9:39	2517938	29	295	500	250	28.5	0.0
10:03	2518610	28					
10:20	2519940	78	290	402	201	27.9	0.5
10:40	2521482	77					
11:00	2523720	112	295	415	208	28.0	0.5
11:33	2527320	109	305	419	210	28.2	0.5
12:17			305	423	212	28.9	0.3
12:51	2536956	124	305	427	213	28.7	0.3
13:26			305	420	210	30.1	0.3
13:54	2544490	120	300	426	213	29.4	0.3
14:23			300	439	219	29.6	0.3
14:52	2551344	111	300	446	223	28.5	0.3
15:12			300	445	223	28.4	0.3
15:40			300	448	224	29.5	0.3
16:00	2557180	86	300	457	228	28.8	0.3
16:30			300	448	224	30.6	0.3

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 µS/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

CASE NARRATIVE

PO #:

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 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: 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						
KH13286-02I CHLORIDE	EPA 300.0	0.25	10.5	mg/L	KER	1:30 07/25/07
KH13286-01P DISSOLVED CALCIUM AS CA	EPA 200.7	0.02	56.2	mg/L	SMW	11:29 08/01/07
KH13286-03R LAB SPECIFIC CONDUCTANCE	EPA 120.1	1	350	umhos/cm	BGM	15:00 07/25/07
KH13286-02I SULFATE	EPA 300.0	0.21	19.9	mg/L	KER	1:30 07/25/07
KH13286-01Q TOTAL DISSOLVED SOLIDS	EPA 160.1	1	160	mg/L	BGM	15:00 07/26/07
KH13286-01P TOTAL HARDNESS AS CACO3	SM 2340 B	1	177	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

CERTIFICATIONS: Florida #E84098, Alabama #40120, Kentucky #90013, Tennessee #02958, EPA Laboratory Certification FL00108.

Methods: Standard of Methods for the Examination of Water and Wastewater, Latest Edition, APHA, AWWA, and WEF and/or other EPA-approved methods which meet FL DEP or other state protocol, unless otherwise designated.

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 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.

0707

PELA Chain of Custody Record

Page _ of _

Chain of Custody Number (for lab use only) № 000536 L

Project/ Client Name:	Project/ Site Location:	Client Contact Name:
Rowe Drilling Co.	Holly Hill	Johnny Wills
PWS Number:	Project Manager:	Phone Number:
		863 984-3100
Report Mailing Address:	Invoice Address:	Fax Number:
P.O. Box 1098	Same	863 984-3110
Report Mailing City, State, ZIP:	Invoice City, State, ZIP:	e-mail Address:
Polk City, FL 33868		jwills@rowedrilling.com

Matrix Key		(II) Container Size Key		(III) Sample Preservative Key	
GW	Ground Water	A	40 mL	I	4°C (On Ice)
SW	Surface Water	B	100 mL (~4 ounce)	N	Nitric Acid (HNO_3)
DW	Drinking Water	C	8 ounce	H	Hydrochloric Acid (HCl)
WW	Wastewater	D	16 ounce	S	Sulfuric Acid (H_2SO_4)
SL	Soil	E	32 ounce	L	Sodium Hydroxide (NaOH)
SD	Solid	F	1 Gallon	O	None
ST	Sediment	Other:		Z	Other:
NL	Nonaqueous Liquid	(II) Container Type Key			
SG	Sludge	P	Plastic		
Other:		G	Glass		
		Other:			

Purchase Order Number:

P. E. LaMoreaux and Associates, Inc. (PELA)
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.pelalab.com

Required Analysis: THD; SO4, Cl, TDS, SPC; DCA

Field Parameters: Specific Conductance (micromhos/cm); pH (SU); Temperature (°C); Dissolved Oxygen (mg/L); Total Chlorine Residual (mg/L); Turbidity (NTU)

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Date:	Time:	Sample Identification:	Matrix	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	PELA Laboratory Sample Identification Number (for laboratory use only)
7/24/07	4:30PM	1083 P	GW	1	P	N	1	P	I	1	P	I							13286

For Laboratory Use Only:

Sample Kit Prepared by: | Date: | Time: | PELA Cooler No. | Cooler Returned ( )Yes ( )No

Sampled by: (PRINT): Johnny Wills

Client Code:

Laboratory Remarks:

Sampled by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Johnny Wills					
Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Johnny Wills	7/24/07	1:25			
Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Relinquished by: (SIGNATURE)	Date:	Time:	Received @ PELA by: (SIGNATURE)	Date:	Time:
				7/24/07	1325

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	: 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						
KH12777-02I CHLORIDE	EPA 300.0	0.25	15.6	mg/L	KER	15:00 07/21/07
KH12777-01P DISSOLVED CALCIUM AS CA	EPA 200.7	0.02	79.5	mg/L	SMW	10:54 07/24/07
KH12777-03R LAB SPECIFIC CONDUCTANCE	EPA 120.1	1	530	umhos/cm	BGM	9:30 07/19/07
KH12777-02I SULFATE	EPA 300.0	0.21	127	mg/L	KER	17:46 07/24/07
KH12777-01Q TOTAL DISSOLVED SOLIDS	EPA 160.1	1	428	mg/L	BGM	10:00 07/23/07
KH12777-01P TOTAL HARDNESS AS CACO3	SM 2340 B	1	288	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 #:

IDENTIFICATION : 1605P-HH1

6707

PELA Chain of Custody Record

Page _ of _

Chain of Custody Number (for lab use only) Nº 000535 L

Project/ Client Name:	Project/ Site Location:	Client Contact Name:
Rowe Drilling	Holly Hill LFG DEW	Tricia Crossley
PWS Number	**Project Manager**	**Phone Number:**
		863-683100
Report Mailing Address:	**Invoice Address:**	**Fax Number:**
225 Commonwealth Ave		
Report Mailing City, State, ZIP:	**Invoice City, State, ZIP:**	**e-mail Address:**
Polk City, FL 33868		

Matrix Key		(II) Container Size Key		(III) Sample Preservative Key	
GW	Ground Water	A	40 mL	I	4°C (On ice)
SW	Surface Water	B	100 mL (~4 ounce)	N	Nitric Acid (HNO_3)
DW	Drinking Water	C	8 ounce	H	Hydrochloric Acid (HCl)
WW	Wastewater	D	16 ounce	S	Sulfuric Acid (H_2SO_4)
SL	Soil	E	32 ounce	L	Sodium Hydroxide (NaOH)
SD	Solid	F	1 Gallon	O	None
ST	Sediment	Other:		Z	Other:
NL	Nonaqueous Liquid	(II) Container Type Key			
SG	Sludge	P	Plastic		
Other:		G	Glass		
		Other:			

Purchase Order Number:

P. E. LaMoreaux and Associates, Inc. (PELA)
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.pelalab.com

Required Analysis: SO4, Cl, TDS, SPC | DCA | THM

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Field Parameters: Specific Conductance (micromhos/cm) | pH (SU) | Temperature (°C) | Dissolved Oxygen (mg/L) | Total Chlorine Residual (mg/L) | Turbidity (NTU)

Date:	Time:	Sample Identification:	Matrix	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	PELA Laboratory Sample Identification Number (for laboratory use only)
7/16/01	1630	1605P-H41	GW	1	E	P	1	E	P	1	E	P	1	N									KH 1277

For Laboratory Use Only:

Sample Kit Prepared by:	PELA Cooler No.	Sampled by: (PRINT):	Sampled by: (SIGNATURE):	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
		LuAnn Fortune	LuAnn Fortune	7/17/01				
Date:	Time:	Client Code:	Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
			LuAnn Fortune	12:50P.				
Cooler Returned ( )Yes ( )No			Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Laboratory Remarks: Joe			Relinquished by: (SIGNATURE)	Date:	Time:	Received at PELA by: (SIGNATURE)	Date:	Time:
							7/19/01	1250

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

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						
KH12551-02I						
CHLORIDE	EPA 300.0	0.25	15.0	mg/L	KER	22:19 07/13/07
KH12551-01P						
DISSOLVED CALCIUM AS CA	EPA 200.7	0.02	77.9	mg/L	SMW	12:14 07/16/07
KH12551-03R						
LAB SPECIFIC CONDUCTANCE	EPA 120.1	1	499	umhos/cm	BGM	9:30 07/19/07
KH12551-02I						
SULFATE	EPA 300.0	0.21	112	mg/L	KER	19:22 07/16/07
KH12551-01Q						
TOTAL DISSOLVED SOLIDS	EPA 160.1	1	366	mg/L	BGM	10:00 07/18/07
KH12551-01P						
TOTAL HARDNESS AS CACO3	SM 2340 B	1	272	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

CERTIFICATIONS: Florida #E84098, Alabama #40120, Kentucky #90013, Tennessee #02958, EPA Laboratory Certification FL00108.

Methods: Standard of Methods for the Examination of Water and Wastewater, Latest Edition, APHA, AWWA, and WEF and/or other EPA-approved methods which meet FL DEP or other state protocol, unless otherwise designated.

0707

PELA Chain of Custody Record

Page 1 of 1

Chain of Custody Number (for lab use only) № 000534 L

Project/ Client Name:	Project/ Site Location:	Client Contact Name:
Rowe Drilling Co.	Holly Hill LF & DE	
PWS Number	Project Manager	Phone Number:
Report Mailing Address:	Invoice Address:	Fax Number:
Report Mailing City, State, ZIP:	Invoice City, State, ZIP:	e-mail Address:

Matrix Key	
GW	Ground Water
SW	Surface Water
DW	Drinking Water
WW	Wastewater
SL	Soil
SD	Solid
ST	Sediment
NL	Nonaqueous Liquid
SG	Sludge
Other:	

(II) Container Size Key	
A	40 mL
B	100 mL (~4 ounce)
C	8 ounce
D	16 ounce
E	32 ounce
F	1 Gallon
Other:	

(II) Container Type Key	
P	Plastic
G	Glass
Other:	

(III) Sample Preservative Key	
I	≤6°C (On Ice)
N	Nitric Acid (HNO_3)
H	Hydrochloric Acid (HCl)
S	Sulfuric Acid (H_2SO_4)
L	Sodium Hydroxide (NaOH)
O	None
Z	Other:

Purchase Order Number:

P. E. LaMoreaux and Associates, Inc. (PELA)
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.pelalab.com

Required Analysis: SO4, Cl, DCA, THD, TDS + SPC

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Field Parameters: Specific Conductance (mhos/cm), pH (SU), Temperature (°C), Dissolved Oxygen (mg/L), Total Chlorine Residual (mg/L), Turbidity (NTU)

Date:	Time:	Sample Identification:	Matrix	(I)	(II)	(III)	PELA Laboratory Sample Identification Number (for laboratory use only)
7/11/07	16:30	1951P-HH	GW	1	EP	1	12551
				1	DP	1	
				1	DP	1	

For Laboratory Use Only:

Sample Kit Prepared by:	PELA Cooler No.	Sampled by: (PRINT): Craig Tellijer
Date: / Time:	Cooler Returned ( )Yes ( )No	Client Code:

Laboratory Remarks: 27°C

Sampled by: (SIGNATURE)	Date: 7/11/07	Time: 16:30	Received by: (SIGNATURE)	Date:	Time:
Relinquished by: (SIGNATURE)	Date: 7/12/07	Time: 3:55	Received by: (SIGNATURE)	Date:	Time:
Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Relinquished by: (SIGNATURE)	Date:	Time:	Received @ PELA by: (SIGNATURE)	Date: 7/12/07	Time: 1550

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). Uncertanties 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						
KH13570-02I CHLORIDE	EPA 300.0	0.25	15.0	mg/L	KER	4:30 07/28/07
KH13570-01P DISSOLVED CALCIUM AS CA	EPA 200.7	0.02	65.8	mg/L	SMW	12:51 08/01/07
KH13570-03R LAB SPECIFIC CONDUCTANCE	EPA 120.1	1	418	umhos/cm	BGM	15:00 07/30/07
KH13570-02I SULFATE	EPA 300.0	0.21	72.1	mg/L	KER	4:30 07/28/07
KH13570-01Q TOTAL DISSOLVED SOLIDS	EPA 160.1	1	306	mg/L	BGM	10:00 07/31/07
KH13570-01P TOTAL HARDNESS AS CACO3	SM 2340 B	1	214	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 #:

IDENTIFICATION : 2260 P

0707

PELA Chain of Custody Record

Page _ of _

Chain of Custody Number (for lab use only) Nº 000537 L

Project/ Client Name:	Project/ Site Location:	Client Contact Name:
Rowe Drilling Co.	Holly Hill	Johnny Wills
PWS Number:	Project Manager	Phone Number:
		(863) 984-3100
Report Mailing Address:	Invoice Address:	Fax Number:
		(863) 984-3110
Report Mailing City, State, ZIP:	Invoice City, State, ZIP:	e-mail Address:
		jwills@rowedrilling.com

Matrix Key		(I) Container Size Key		(III) Sample Preservative Key	
GW	Ground Water	A	40 mL	I	4°C (On Ice)
SW	Surface Water	B	100 mL (~4 ounce)	N	Nitric Acid (HNO_3)
DW	Drinking Water	C	8 ounce	H	Hydrochloric Acid (HCl)
WW	Wastewater	D	16 ounce	S	Sulfuric Acid (H_2SO_4)
SL	Soil	E	32 ounce	L	Sodium Hydroxide (NaOH)
SD	Solid	F	1 Gallon	O	None
ST	Sediment	Other		Z	Other:
NL	Nonaqueous Liquid	(II) Container Type Key			
SG	Sludge	P	Plastic		
Other:		G	Glass		
		Other:			

Purchase Order Number:

P. E. LaMoreaux and Associates, Inc. (PELA)
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.pelalab.com

Required Analysis:

SO_4, Cl, TDS, SPC	DCA	THD			

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Field Parameters:

Date:	Time:	Sample Identification:	Matrix	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	Specific Conductance (micromhos/cm)	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Total Chlorine Residual (mg/L)	Turbidity (NTU)	PELA Laboratory Sample Identification Number (for laboratory use only)
7/26/07		2260 P	GW	1	E/P	1	1	D/P	1	1	D/P	1N																13570

For Laboratory Use Only:

Sample Kit Prepared by:	PELA Cooler No.	Sampled by: (PRINT):	Sampled by: (SIGNATURE):	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Date: / Time:	Cooler Returned ( )Yes ( )No	Johnny Wills	Johnny Wills					
		Client Code:	Relinquished by: (SIGNATURE): Johnny Wills	Date: 7-27-07	Time: 1330	Received by: (SIGNATURE)	Date:	Time:
			Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
			Relinquished by: (SIGNATURE)	Date:	Time:	Received @ PELA by: (SIGNATURE)	Date: 7/27/07	Time: 1330

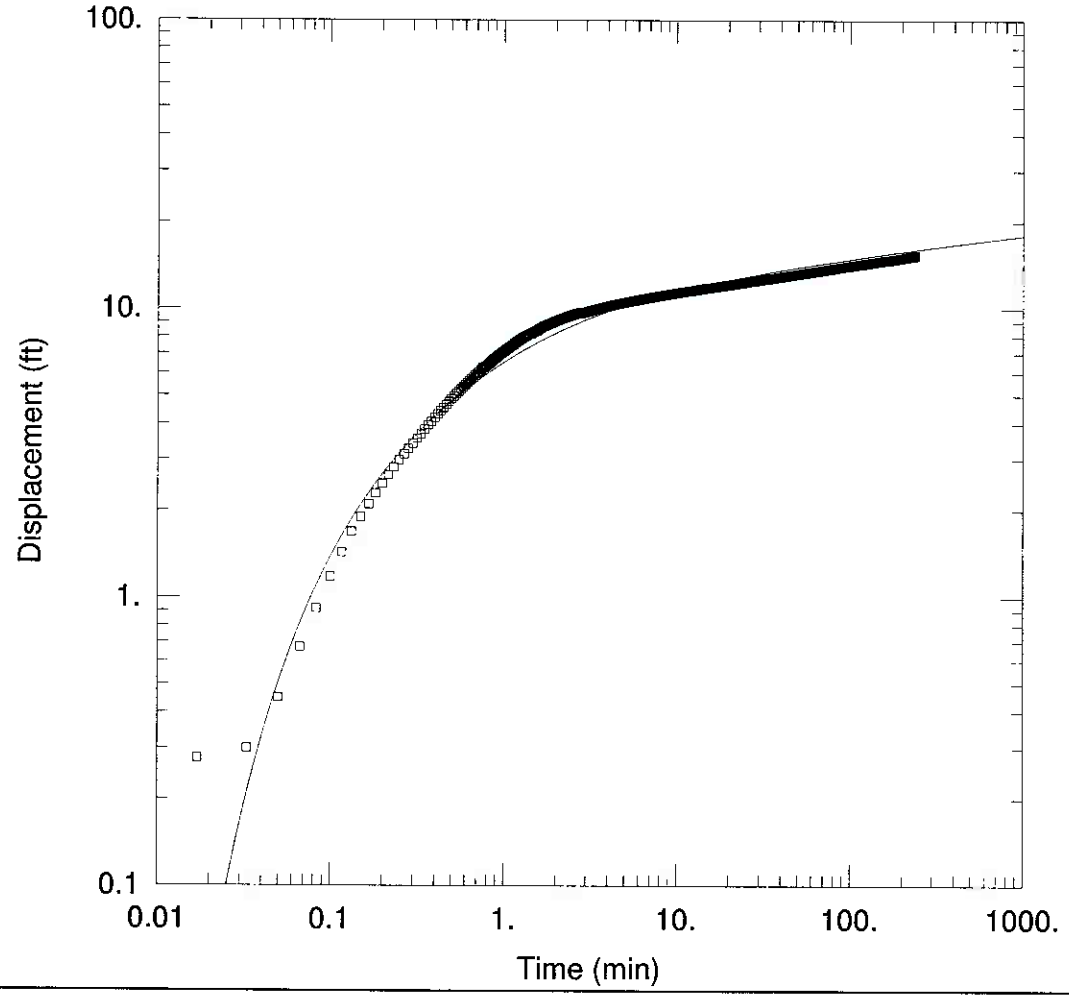
Laboratory Remarks:

APPENDIX L.

Packer Test MSCU Transmissivity Estimates

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-NW.aqt
Date: 08/26/08 Time: 16:16:19

SOLUTION

Aquifer Model: Leaky
Solution Method: Neuman-Witherspoon

T = 1922. ft^2/day
S = 1.205
r/B = 0.1498
ß = 0.0165
T' = 2276. ft^2/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

PBSJ

1083 PACKER SHALLOW PUMPING

Prepared By:

PBS&J

Prepared For:

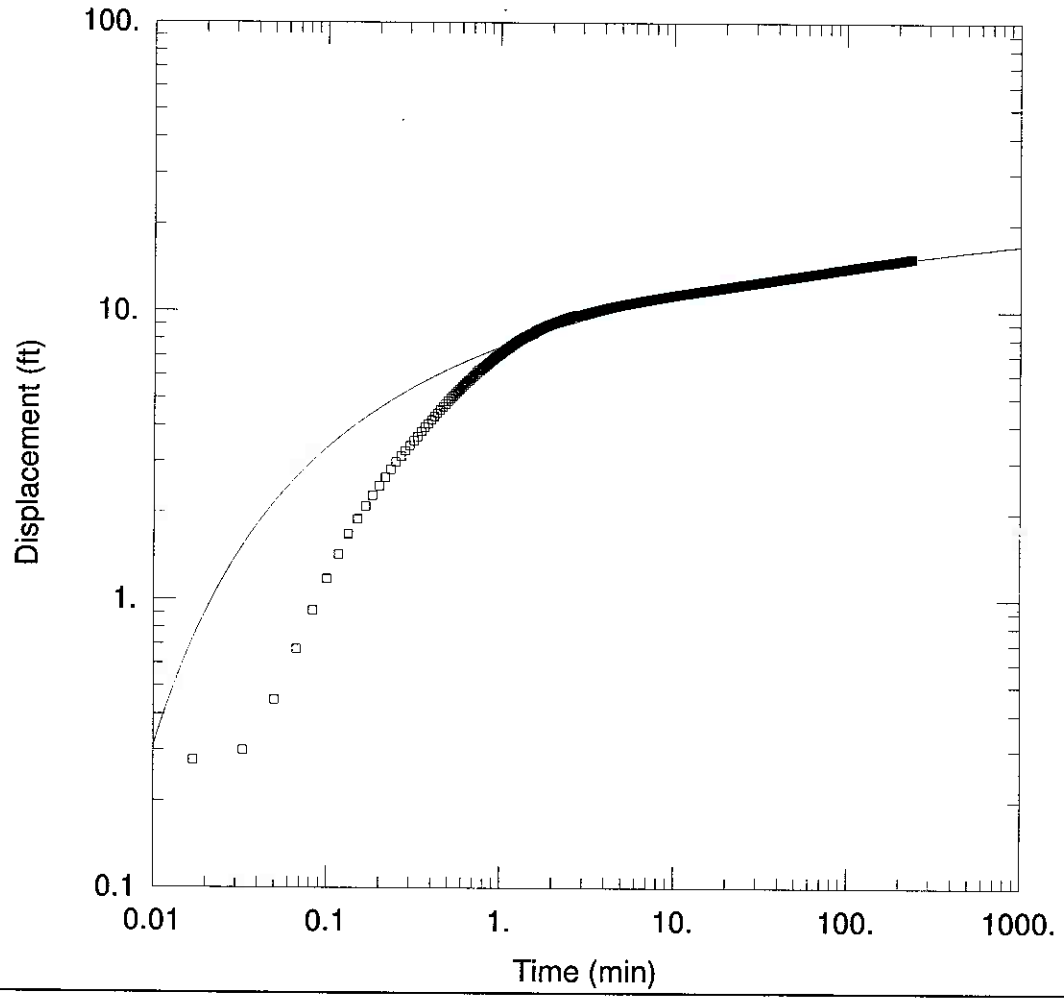
NERUSA\SWFWMD

Project:

68E005.05

Location:

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 ft^2/day
S = 0.3423
ß = 0.0355
Kz/Kr = 1.
b = 475. ft

WELL DATA

Pumping Wells

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

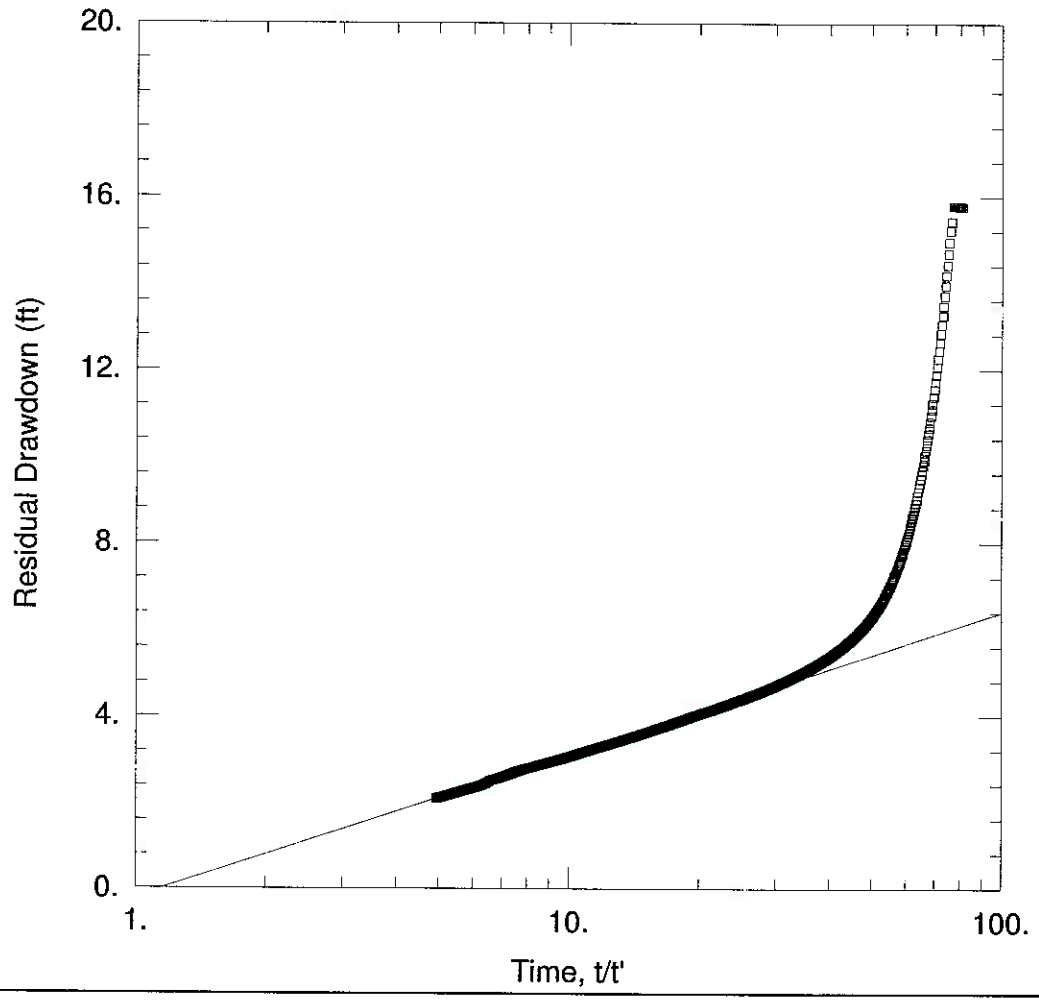
Observation Wells

Well Name	X (ft)	Y (ft)
▫ HH-1	0	0

PBSJ

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 ft^2/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

PBSJ

1083 PACKER SHALLOW PUMPING

Prepared By:

PBS&J

Prepared For:

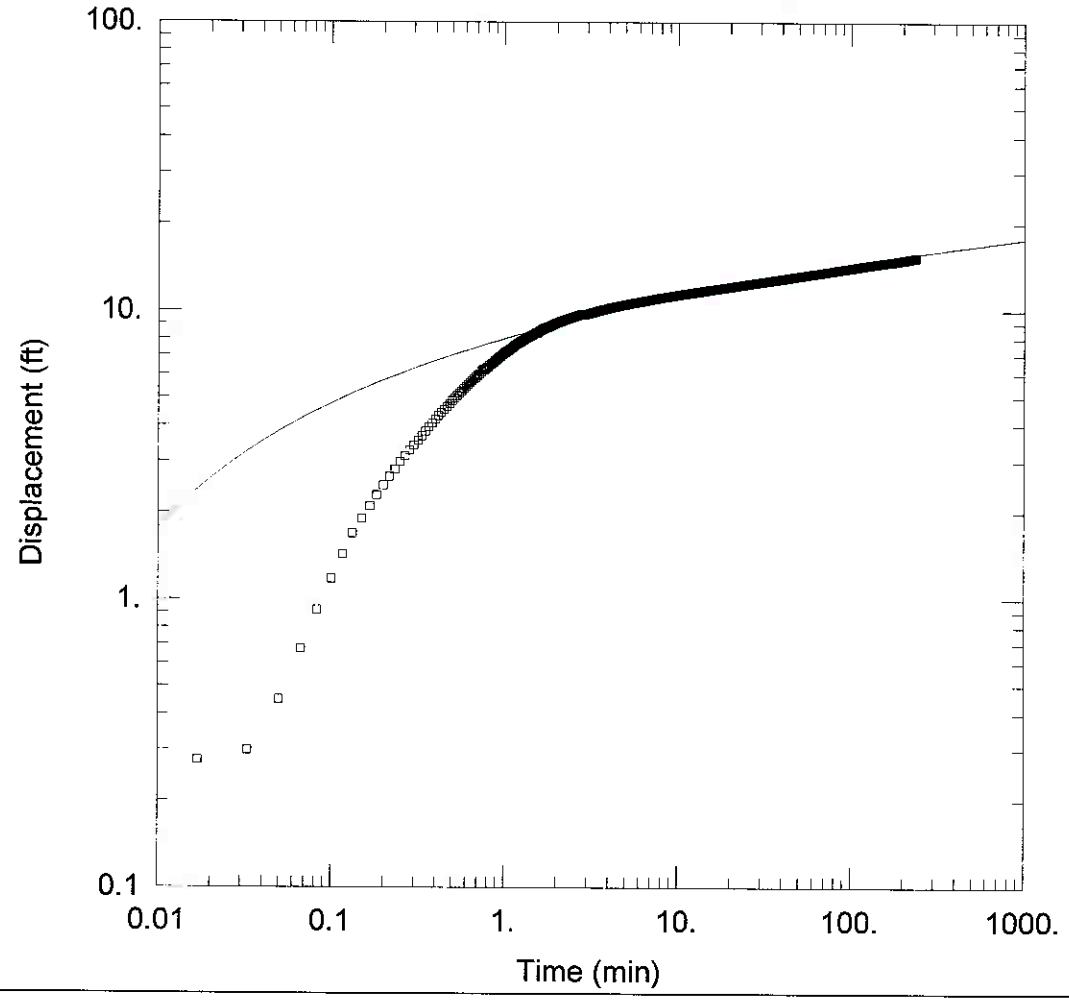
NERUSA\SWFWMD

Project:

68E005.05

Location:

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 ft^2/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

WELL COMPLETION REPORT (Please complete in black ink or type.)

PERMIT #: 769104 CUP/WUP#: _____ DID#: _____

Indicate the number of wells drilled/abandoned for this report: _____

Indicate the number of wells permitted but not drilled/abandoned that are being cancelled: _____

WATER WELL CONTRACTOR'S SIGNATURE: Tom Salter License # 3206

I certify that the information provided in this report is accurate and true.

Grout	No. of Bags	From (ft.)	To (ft.)
Neat Cement:	24" 522	0	433
Bentonite: Neat Cement	18" 420	357	605
(Other) Neat Cement	12" 2265	485	1685

WELL LOCATION: County _____

_____ 1/4 of _____ 1/4 of Section 13 Township 25 Range 26

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

DATE STAMP

Official Use Only

Sketch of well location on property

Give distances from septic tank and house, or other reference points

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: ____ppm Sulfate: ____ppm

Chlorides: ____ ppm TDS ____ mg/l

Conductivity _____ umhos/cm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [ ] Submersible [ ] Turbine

Horsepower: _____ Capacity: _____ GPM: _____

Pump Depth: _____ft. Intake Depth: _____ft.

FORM LEG-R.005.00(10/05)

OWNER'S NAME: Polk County

COMPLETION DATE: 1-11-08 Florida Unique I.D.: ___

Parcel # (Pin): _____

WELL USE:

[ ] Public Supply [ ] Irrigation [ ] Domestic [ ] Monitor

[ ] Injection [X] Other

DRILL METHOD:

[X] Rotary [ ] Cable Tool [ ] Combination

[ ] Jet [ ] Auger [ ] Other _____

Measured Static Water Level: _____ Measured Pumping Water Level: _____

After ____Hours at ____GPM. Measuring Pt. (Describe): _____

Which is ____ft. [ ] above [ ] below land surface

Casing: [ ] Black Steel [ ] Galvanized [ ] PVC [ ] Other: _____

[ ] Open Hole
[ ] Screen

Casing Diameter and Depth (ft.)	Depth (feet) From	Depth (feet) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color | Grain Size | Type of Material
Diameter: 24" From: 0 To: 433			
Diameter: 18" From: 357 To: 605			See Attached
Liner [ ] or Casing [X] Diameter: 12" From: 485 To: 1685			

Driller's Name (print or type): Tom Toy

APPENDIX N.

Flow Meter Calibration Sheet

WATER SPECIALTIES
PROPELLER METER

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. _____ / STD. PIPE I.D. _____ ((SPEC. I.D.² _____ -4.285 / STD. I.D.² -4.285 _____) * STD. INDEX _____) =NEW INDEX _____

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 _____

FORM 111-G-1200

APPENDIX O.

Pumping Test Water Level Data

APPENDIX P.

Pumping Test Field data Sheets

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA Dew	2-10-08	1:00	146.80	
LFA Dew	2-10-08	2:00	146.55	
LFA Dew	2-10-08	3:00	146.43	
LFA Dew	2-10-08	4:00	146.10	
LFA Dew	2-10-08	5:00	146.27	
LFA Dew	2-10-08	6:00	146.18	
LFA Dew	2-10-08	07:00	124.80	Started backup AT 07:05
LFA Dew	2-10-08	7:804	146.60	Shut Motor down. change Filter 8:00
LFA Dew	2-10-08	09:03	146.63	
LFA Dew	2-10-08	010:02	146.65	
LFA Dew	2-10-08	011:03	146.63	
LFA Dew	2-10-08	012:02	146.60	
LFA Dew	2-10-08	13:03	146.65	
LFA Dew	2-10-08	14:00	145.80	
LFA Dew	2-10-08	15:02	145.42	
LFA Dew	2-10-08	16:03	143.50	
LFA Dew	2-10-08	17:02	143.40	
LFA Dew	2-10-08	18:03	143.10	
LFA Dew	2-10-08	19:[redacted]20	146.40	started back up
LFA Dew	2-10-08	20:00	146.38	
LFA Dew	2-10-08	21:04	146.12	
LFA Dew	2-10-08	22:02	146.60	
LFA Dew	2-10-08	23.00	146.65	
LFA Dew	2-10-08	23:59	146.58	
LFA Dew	2-11-08	01:02	146.80	
LFA Dew	2-11-08	02.03	146.75	
LFA Dew	2-11-08	03:00	146.75	
LFA Dew	2-11-08	04:02	146.65	
LFA Dew	2-11-08	05:02	146.80	
LFA Dew	2-11-08	06:00	146.72	
LFA Dew	2-11-08	07:06	146.63	
LFA Dew	2-11-08	8:03	146.60	
LFA Dew	2-11-08	09:02	146.65	
LFA Dew	2-11-08	010:02		

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	2-8-08	10:00	146.90	
LFA Dew	2-9-07	11:00	146.50	
LFADew	2-8-08	12:02	146.52	
LFA Dew	2-8-08	13.03	146.20	
LFADew	2-8-08	14:00	146.30	
LFADew	2-8-08	15:02	146.25	
LFADew	2-8-08	16:03	146.35	
LFADew	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	10:02	146.20	
LFA Dew	2-9-08	11:03	146.21	
LFA Dew	2-9-08	12:02	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	146.28	
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
[redacted]				
2-10-08	01:03	3200	198,176,000	
2-10-08	02:00	3200	198,347,000	
2-10-08	03:04	3200	198,570,000	
2-10-08	04:00	3200	198,712,000	
2-10-08	05:00	3200	198,889,000	
2-10-08	06:00	3200	199,054,000	SWL. 146.60
2-10-08	07:00	3200	199,193,000	Started up AT 07:05
2-10-08	08:00	3100	199,362,000	Shut Motor down. Change Filter
2-10-08	09:00	3100	199,531,000	SWL 124.80 07:00
2-10-08	10:00	3,000	199,704,000	Took Samplers
2-10-08	11:00	3,000	199,872,000	
2-10-08	12:00	3,000	200,046,000	
2-10-08	13:00	3,000	200,215,000	
2-10-08	14:00	3,000	200,387,000	
2-10-08	15:00	3,000	200,558,000	
2-10-08	16:00	3,000	200,727,000	
2-10-08	17:00	3,000	200,867,000	
2-10-08	18:00	2950	201,021,000	
2-10-08	19:00	3,000	201,113,000	AT 18:35 Shut Motor
2-10-08	20:00	3200	201,287,000	down Have To change
2-10-08	21:01	3200	201,472,000	Filters on Motor
2-10-08	22:00	3200	201,657,000	Started backup AT 18:45
2-10-08	23:03	3200	201,888,000	
2-10-08	00:00	3200	202,022	down
2-11-08	01:00	3200	202,198,000	Shut AT 19:06 To
2-11-08	02:00	3206	202,303,000	change Filter on
2-11-08	03:03	3200	202,564,000	Transmission. Started
2-11-08	04:00	3200	202,753,000	back up AT 19:17
2-11-08	05:00	3200	202,929,000	
2-11-08	06:01	3200	203,120,000	
2-11-08	07:03	3200	203,300,000	
2-11-08	08:00	3200	203,475,000	
2-11-08	09:00	3200	203,661,000	
2-11-08	10:00	3200		

393,847

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	32000	191,095,000	
2-8-08	11:00 AM	3200	191,252,00	
2-8-08	12:00 AM	3200	191,[illegible]	196,439,000
2-8-08	13:00 PM	3200	191,621000	
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	Took Samplers
2-8-08	22:00 PM	3200	193,242,000	
2-8-08	23:02 PM	3200	193,422,000	
2-8-08	0.00 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	195,246,000	Took Samplers
2-9-08	10:00	3200	195,422,000	
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	197060,000	
2-9-08	20:00	3200	197,244,000	
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

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA Dew	2-7-08	9:00 PM	145.60	
LFA Dew	2-7-08	10:00 AM	146.60	
LFA Dew	2-7-08	11:02 AM	146.62	
LFA Dew	2-7-08	12:02	146.30	
LFA Dew	2-7-08	13:03	146.50	
LFA Dew	2-7-08	14:02	146.57	
LFA Dew	2-7-08	15:03	146.53	
LFA Dew	2-7-08	16:00	146.56	
LFA Dew	2-7-08	17:00	146.48	
LFA Dew	2-7-08	18:02	146.45	
LFA Dew	2-7-08	19:01	146.47	
LFA Dew	2-7-08	20:00	146.20	
LFA Dew	2-7-08	21:00	146.65	
LFA Dew	2-7-08	22:00	146.60	
LFA Dew	2-7-08	23:00	146.50	
LFA Dew	2-7-08	23:59	146.45	
LFA Dew	2-8-08	1:00	146.60	
LFA Dew	2-8-08	2:00	146.40	
LFA Dew	2-8-08	3:00	146.15	
LFA Dew	2-8-08	4:02	145.80	
LFA Dew	2-8-08	5:03	146.48	
LFA Dew	2-8-08	6:02	146.42	
LFA Dew	2-8-08	7:03	146.37	
LFA Dew	2-8-08	8:02	146.42	
LFA Dew	2-8-08	9:00	146.40	
LFA Dew	2-8-08	10:00	146.40	

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
2-7-08	9:02 AM	3200	186,434,000	Took Sampler
2-7-08	09:58	3200	186,778,000	
2-7-08	011:00	3200	186,960,000	
2-2-08	012:00	3200	187,132,000	
2-7-08	13:00	3200	187,311,000	
2-7-08	14:00	3200	187,484,000	
2-7-08	15:00	3200	187,658,000	
2-7-08	16:04	3200	187,853,000	
2-7-08	17:02	3200	188,017,000	
2-7-08	18:00	3200	188,199,000	
2-7-08	19:00	3200	188,377,000	
2-7-08	20:01	3200	188,560,000	
2-7-08	21:00	3200	188,737,000	
2-7-08	22:05	3200	188,940,000	Took Sampler
2-7-08	23:02	3200	189,102,000	
2-8-08	0:00	3200	189,276,000	
2-8-08	1:01	3200	189,458,000	
2-8-08	2:02	3200	189,643,000	
2-8-08	3:01	3200	189,816,000	
2-8-08	4:00	3200	190,000,000	
2-8-08	5:00	3200	190,170,000	
2-8-08	6:00	3200	190,349,000	
2-8-08	7:00	3200	190,529,000	
2-8-08	8:01 AM	3200	190,707,000	
2-8-08	9:03 AM	3200	190,900,000	
2-9-08	10:02 AM	3,200	191,095,000	

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	2-06-08	9:03 AM	146.30	
LFA Dew	2-06-08	010:02 AM	146.50	
LFA Dew	2-6-08	011:03 AM	146.65	
LFA Dew	2-6-08	012:00 AM	146.60	
LFA Dew	2-6-08	13:00 PM	146.00	
LFA Dew	2-6-08	14:02 PM	146.90	
LFA Dew	2-6-08	15:00 PM	146.95	
LFA Dew	2-6-08	16:02 PM	146.97	
LFA Dew	2-6-08	17:03 PM	146.60	
LFA Dew	2-6-08	18:02 PM	146.55	
LFA Dew	2-6-08	19:03 PM	146.57	
LFA Dew	2-6-08	20:02 PM	146.54	
LFA Dew	2-6-08	21:02 PM	146.05	
LFA Dew	2-6-08	22:03 PM	145.94	
LFA Dew	2-6-08	23.00 PM	146.0	
LFA Dew	2-6-08	0:00 PM	145.80	
LFA Dew	2-7-08	1:02 AM	145.93	
LFA Dew	2-7-08	2:03 AM	146.20	PUMP DOWN HALF HOUR 2:15 - 2:45 FILTER SWAP AND BATTERY CHGD
LFA Dew	2-7-08	3:02 AM	145.80	
LFA Dew	2-7-08	4:00 AM	146.00	
LFA Dew	2-7-08	5:02 AM	146.30	
LFA Dew	2-7-08	6:03 AM	144.30	
LFA Dew	2-7-08	7:00 AM	144.90	
LFA Dew	2-7-08	8:00 AM	145.60	

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 AM	3,200	182,953,000	
2-6-08	13:00 PM	3,200	183,132,000	
26-08	14:00 PM	3,200	183,311,000	
2-6-08	15:00 PM	32,00	183,486,000	
2-6-08	16:00 PM	32,00	183,662,000	
2-6-08	17:00 PM	32,00	183,841,000	
2-6-08	18:00 PM	3200	184,019,000	
2-6-08	19:00 PM	3200	184,203,000	
2-6-08	20:00 PM	3200	184,374,000	
2-6-08	21:00 PM	3200	184,552,000	Took Sampler
2-6-08	22:00 PM	3200	184,736,000	
2-6-08	23:02 PM	3200	184,914,000	
2-6-08	0:00 PM	3200	185,088,000	
2-7-08	1:00 AM	3200	185,262,000	
2-7-08	2:00 AM	3200	185,438,000	
2-7-08	3:00 AM	3200	185,535,000	
2-7-08	4:02 AM	3200	185,720,000	
2-7-08	5:00 AM	3200	185,893,000	
2-7-08	6:00 AM	3200	186,064,000	
2-7-08	7:02 AM	3200	186,254,000	
2-7-08	8:02 AM	3200	186,434,000	

Totalizer on 8/21/08 147,774,650
So ~ 40,000,000 gals pumped
Since start of development

Estimated flow down pilot hole to LFA @ 2000 ft = start on 5/15/07 - pilot hole at 2,000 ft
stop on 12/15/07 | 12" casing grouted above 1600 ft

215 day & 1440 min/day × 500 gpm =
154,800,000 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
2-5-08	0900 AM	3200	178,114,000	Took Samplers 07:00
2-5-08	010:00 AM	3200	178,294,000	
2-5-08	011:00 AM	3200	178,474,000	
2-5-08	012:00 AM	3200	178,654,000	
2-5-08	13:00 PM	3200	178,834,000	
2-5-08	14:00 PM	3200	179,014,000	
2-5-08	15:01 PM	3200	179,192,000	
2-5-08	16:00 PM	3200	179,375,000	
2-5-08	17:00 PM	3200	179,546,000	
2-5-08	18:00 PM	3200	179,726,000	
2-5-08	19:00 PM	3200	179,902,000	
2-5-08	20:02 PM	3200	180,087,000	
2-5-08	21:01 PM	3200	180,259,000	Took Samplers 21:00
2-5-08	22:00 PM	3200	180,439,000	
2-5-08	23:01 PM	3200	180,622,000	
2-5-08	0:00 PM	3200	180,806,000	
2-6-08	1:00 AM	3200	180,897,000	
2-6-08	2:01 AM	3200	181,169,000	
2-6-08	3:01 AM	3200	181,347,000	
2-6-08	4:01 AM	3200	181,525,000	
2-6-08	5:01 AM	3200	181,703,000	
2-6-08	6:00 AM	3200	181,879,000	
2-6-08	7:00 AM	3200	182,059,000	
2-6-08	8:00 AM	3200	182,237,000	
2-6-08	9:00 AM	3200	182,417,000	

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	2-5-08	8:58 AM	146.25	
LFA Dew	2-5-08	9:59 AM	146.50	
LFA Dew	2-5-08	10:58 AM	146.65	
LFA Dew	2-5-08	12:02 PM	146.61	
LFA Dew	2-5-08	13:01 PM	146.57	
LFA Dew	2-5-08	14:02 PM	146.70	
LFA Dew	2-5-08	15:00 PM	146.10	
LFA Dew	2-5-08	16:03 PM	146.20	
LFA Dew	2-5-08	12:02 PM	146.65	
LFA Dew	2-5-08	18:03 PM	146.63	
LFA Dew	2-5-08	19:02 PM	146.66	
LFA Dew	2-5-08	20:00 PM	146.20	
LFA Dew	2-5-08	21:01 PM	146.60	
LFA Dew	2-5-08	22:01 PM	146.45	
LFA Dew	2-5-08	23:00 PM	146.30	
LFA Dew	2-5-08	0:00 PM	146.68	
LFA Dew	2-6-08	1:02 AM	146.63	
LFA Dew	2-6-08	2:00 AM	146.05	
LFA Dew	2-6-08	3:01 AM	146.35	
LFA Dew	2-6-08	4:04 AM	145.90	
LFA Dew	2-6-08	5:00 AM	146.05	
LFA Dew	2-6-08	5:58 AM	145.83	
LFA Dew	2-6-08	7:02 AM	145.93	
LFA Dew	2-6-08	8:02 AM	145.96	
LFA Dew	2-6-08	9:03 AM	146.30	

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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
2-4-08	9:00 AM	3260	173,796,000	Took Samplers At 9:00
2-4-08	10:07 AM	3200	174,013,000	
2-4-08	11:01 AM	3200	174,164,000	
2-4-08	12:00 AM	3200	174,340,000	
2-4-08	1:00 PM	3200	174,526,000	
2-4-08	2:00 PM	3200	174,698,000	
2-4-08	3:02 PM	3200	174,878,000	
2-4-08	4:00 PM	3200	175,058,000	
2-4-08	5:00 PM	3200	175,236,000	
2-4-08	6:02 PM	3200	175,422,000	
2-4-08	7:00 PM	3200	175,595,000	
2-4-08	8:00 PM	3200	175,772,000	
2-4-08	9:01 PM	3200	175,953,000	
2-4-08	10:00 PM	3200	176,134,000	Took Samplers At 9:00 PM
2-4-08	11:03 PM	3200	176,312,000	
2-4-08	12:00 PM	3200	176,497,000	
2-5-08	1:02 AM	3200	176,678,000	
2-5-08	2:01 AM	3200	176,854,000	
2-5-08	3:00 AM	3200	177,031,000	
2-5-08	4:00 AM	3200	177,214,000	
2-5-08	5:01	3200	177,391,000	
2-5-08	6:00 AM	3200	177,567,000	
2-5-08	7:00 AM	3200	177,752,000	
2-5-08	8:00 AM	3200	177,934,000	
2-5-08	9:00 AM	3200	178,114,000	

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	2-4-08	8:57 AM	146.10	
LFA Dew	2-4-08	10:04 AM	146.80	
LFA Dew	2-4-08	10:59 AM	146.70	
LFA Dew	2-4-08	11:58 AM	146.60	
LFA Dew	2-4-08	1:00 PM	146.65	
LFA Dew	2-4-08	2:02 PM	146.70	
LFA Dew	2-4-08	3:02 PM	146.58	
LFA Dew	2-4-08	4:02 PM	146.50	
LFA Dew	2-4-08	4:58 PM	146.55	
LFA Dew	2-4-08	6:00 PM	146.50	
LFA Dew	2-4-08	6:58 PM	146.52	
LFA Dew	2-4-08	8:04 PM	146.15	
LFA Dew	2-4-08	8:59 PM	146.25	
LFA Dew	2-4-08	10:03 PM	146.15	
LFA Dew	2-4-08	10:00 PM	146.30	
LFA Dew	2-5-08	12:02 AM	146.50	
LFA Dew	2-5-08	1:01 AM	146.60	
LFA Dew	2-5-08	2:00 AM	146.20	
LFA Dew	2-5-08	3:03 AM	146.40	
LFA Dew	2-5-08	4:02 AM	146.55	
LFA Dew	2-5-08	5:00 AM	146.60	
LFA Dew	2-5-08	6:07 AM	146.65	
LFA Dew	2-5-08	7:03 AM	146.25	
LFA Dew	2-5-08	8:02 AM	146.20	
LFA Dew	2-5-08	8:58 AM	146.65	

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

1-28-08 15:00 151580,000

Table 1. Master Flow Meter Readings

Date	Time	Instantaneous Meter Reading (gpm)	Totalizer Meter Reading (gal)	Comments
1-28-08	15:30	3000	151668,000	Q = 2,748 gpm
1-28-08	16:00	-	151,764,000	Increased pumping rate
1-28-08	16:30	3000	151,860,000	Q = 3,200 gpm
1-28-08	17:30	3000	152,096 000	reduced pumping rate
1-28-08	18:30	3000	152,242 000	Q = 3200 GPM
1-28-08	19:30	3000	152,401,000	Q = 3200 GPM

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA - DEW	1-28-08	15:30	145.77	
LFA-Dew	1-29-08	16:30	147.80	
LFA-Dew	1-28-08	17:30	137.70	
LFA-Dew	1-28-08	18:30	144.33	
LFA - Dew	1-28-08	19:30	144.50	

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA Dew	02-04-08	3:59	146.55	
LFA Dew	02-04-08	5:10	146.50	
LFA Dew	02-04-08	6:02	146.65	
LFA Dew	02-04-08	7:01	146.58	
LFA Dew	02-04-08	8:01	146.20	
LFA Dew	02-04-08	8:57	146.10	

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	02-02-08	13:00	146.57	started using new test well instrument W.L. meter at 13:00 reading. Reading on old meter was 148.30 ft US 146.57' for new meter for difference of 1.85 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	145.10	
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	02-03-08	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	[illegible]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	16:58	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	

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	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	010:00	148.62	" " 3000 GPM
LFA DEW	2-1-08	011:00	149.05	" " 3000 GPM
LFA DEW	2-1-08	012:00	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	2-1-09	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	148.00	" " 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	149.30	" " 3000 GPM
LFA DEW	2-2-08	010:00	148.90	" " 3000 GPM
LFA DEW	2-2-08	011:00	148.85	" " 3000 GPM
LFA DEW	2-2-08	012:00	148.61	" " 3000 GPM
LFA DEW	2-2-08	13:00	146.57	" " 13000 GPM
LFA DEW	2-2-08	14:00		" new meter tested well instrument fails
LFA DEW	2-2-08	15:00		" old meter read 148.50' 3000 GPM
LFA DEW	2-2-08	16:00		" new = 146.57 3000 GPM
LFA DEW	2-2-08	17:00		" " 3000 GPM
LFA DEW	2-2-08	19:00		" " 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

Instruments WL meter at 13:00. New meter read 146.57' started using new test well

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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
2-4-08	4:00	3200	172,897,000	
2-4-08	5:13	3200	173,120,000	
2-4-08	6:00	3200	173,260,000	
2-4-08	7:00	3200	173,443,000	
2-4-08	8:00	3200	173,623,000	
2-4-08	9:00	3200	173,796,000	

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
2-2-08	13:03	~3,200	165,966,000	Increased flow rate from 2,805 to 3,000 gpm at 13:10
2-2-08	14:01	3,200	166,139,000	
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	2,8000	166 812,000	Shut down Motor 18:05 Change Filter started back up 18:10
2-2-08	19:00	3,100	166 963,000	
2-2-08	19:58	3,100	167,132,000	
2-2-08	21:05	3100	167 323,000	
2-2-08	22:02	3200	167, 498,000	
2-2-08	23:03	3200	167, 686,000	
2-2-08	0:06	3200	167, 859,000	
2-3-08	01:01	3200	168, 041,000	
2-3-08	02:05	3200	168, 224,000	
2-3-08	03:01	3200	168, 401,000	
2-3-08	04:01	3200	168, 581,000	
2-3-08	05:02	3200	168, 763,000	
2-3-08	06:01	3200	168, 941,000	
2-3-08	07:01	3200	169, 127,000	
2-3-08	08:09	3200	169, 330,000	
2-3-08	09:10	3200	169, 534,000	
2-3-08	010:00	3200	169661,000	
2-3-08	011:10	3200	169, 874,000	
2-3-08	012:00	3200	170020,000	
2-3-08	13:02	3200	170, 206,000	
2-3-08	14:00	3100	170, 378,000	
2-3-08	15:00	3200	170,556,000	
2-3-08	16:00	3200	170, 735,000	
2-3-08	17:00	3200	170,913,000	
2-3-08	18:00	3200	171, 092,000	
2-3-08	19:00	3200	171, 272,000	
2-3-08	20:00	3200	171, 452,000	
2-3-08	21:03	3200	171, 644,000	
2-3-08	22:01	3200	171, 816,000	
2-3-08	23:02	3200	171, 997,000	
2-3-08	0:00	3200	172, 177,000	
2-4-08	1:00	3200	172, 358,000	
2-4-08	2:02	3200	172, 543,000	
2-4-08	3:15	3200	172, 764,000	

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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 1000 GAL	3000 GPM
2-1-08	09:00	3,000	160773	3,000 GPM
2-1-08	010:00	3,000	160 [redacted] 962	3,000 GPM
2-1-08	011:00	3,000	161 [redacted] 150	3,000 GPM
2-1-08	012:00	3,000	161356	3,000 GPM
2-1-08	13:00	3,000	161524	3,000 GPM
2-1-08	14:00	3,000	161707	3,000 GPM
2-1-08	15:00	3,000	161898	3,000 GPM
2-1-08	16:00	3,000	162082	3,000 GPM
2-1-08	17:00	3,000	162270	3,000 GPM
2-1-08	18:00	3,000	162460	3,000 GPM
2-1-08	19:00	3,000	162 [redacted] 644	3,000 GPM
2-1-08	20:00	3,000	162829	3,000 GPM
2-1-08	21:00	3,000	163017	3,000 GPM
2-1-08	22:00	3,000	163204	3,000 GPM
2-1-08	23.00	3,000	163387	3,000 GPM
2-1-08	24:00	3,000	163558	3,000 GPM
2-2-08	01:00	3,000	163772	3,000 GPM
2-2-08	02:00	3,000	163952	3,000 GPM
2-2-08	03:00	3,000	164102	3,000 GPM
2-2-08	04:00	3,000	164312	3,000 GPM
2-2-08	05:00	3,000	164508	3,000 GPM
2-2-08	06:00	3,000	164695	3,000 GPM
2-2-08	07:00	3,000	164869	3,000 GPM
2-2-08	0:800	3,000	165055	3,000 GPM
2-2-08	09:00	3,000	165242	3,000 GPM
2-2-08	010:00	3,000	165423	3,000 GPM
2-2-08	011:00	3,000	165609	3,000 GPM
2-2-08	012:00	3,000	165783	3,000 GPM
2-2-08	13:00	3,000	165966	3,000 GPM
2-2-08	14:00	3,000	|	3,000 GPM
2-2-08	15:00	3,000		3,000 GPM
2-2-08	16:00	3,000		3,000 GPM
2-2-08	17:00	3,000		3,000 GPM
2-2-08	18:00	3,000		3,000 GPM
2-2-08	19:00	3,000		3,000 GPM
2-2-08	20:00	3,000		3,000 GPM
2-2-08	21:00	3,000		3,000 GPM
2-2-08	22:00	3,000		3,000 GPM

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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
1-31-08	08:00	3,000	156153	3,000 gpm
1-31-09	010:00	3,000	156507	3,000 GPM
1-31-08	011:00	3,000	156697	3,000GPM
1-31-08	012:00	3,000	156878	3,000GPM
1-31-09	13:00	3,000	157066	3,000GPM
1-31-08	14:00	3,000	157252	3,000GPM
1-31-08	15:00	3,000	157446	3,000GPM
1-31-08	16:00	3,000	157634	3,000GPM
1-31-08	17:00	3,000	157804	3,000GPM
1-31-08	18:00	3,000	157993	3,000GPM
1-31-08	17:00	3,000	158167	3,000GPM
1-31-08	20:00	3,000	158377	3,000 GPM
1-31-08	21:00	3,000	158548	3,000 GPM
1-31-08	22:00	3,000	158736	3,000 GPM
1-31-08	23:00	3,000	158923	3,000 GPM
1-1-08	0:00	3,000	159110	3,000 GPM
2-1-08	01:00	3,000	159294	3,000 GPM
2-1-08	02:00	3,000	159486	3,000 GPM
2-1-08	03:00	3,000	159665	3,000 GPM
2-1-08	04:00	3,000	159850	3,000 GPM
2-1-08	05:00	3,000	160037	3,000 GPM
2-1-08	06:00	3,000	160232	3,000 GPM
2-1-08	07:00	3,000	160409	3,000 GPM
2-1-08	08:00	3,000	160598	3,000 GPM

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	1-31-08	0800	195.90	PUMPING AT 3000 GPM
LFA DEW	1-31-08	010:00	149.20	" " 3000 GPM
LFA DEW	1-31-08	011:00	146.90	" " 3000 GPM
LFA DEW	1-31-08	012:00	146.54	" " 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	Pre-pumping
	10:04	3,000	152,508 (1000 gals)	Pump on AT 10:00
	10:10	3,000	↓	
	10:15	3,000	152,522 (1000 gals)	3,000 GPM
	10:20	3,000	152,537 (1000 gals)	5,000 GPM
	10:25	3,000	152,552 (1000 gals)	3,000 GPM
	10:35	3,000	152,582 (1000 gals)	3,000 GPM
	10:45	3,000	152,618 (1000 gals)	3,000 GPM
	11:00	3,000	152,657	
	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	3000, GPM
	18:00	3,000	153,852	3000, GPM
	19:00	3,000	154,006	3000, GPM
	20:00	3,000	154,162	3000 GPM
	21:00	3,000	154,322	3000 GPM
	22:00	3,000	154,467	3,000
1-30-08	23:00	3,000	154,660	3,000
1-31-08	24:00	3,000	154,840	3,000 #
1-31-08	01:00	3,000	154,920	3000
1-31-08	02:00	3,000	155,080	3,000
1-31-08	03:00	3,000	155,253	3,000
1-31-08	04:00	3,000	155,436	3,000
1-31-08	05:00	3,000	155,621	3000
1-31-08	06:00	3,000	155,797	3,000
1-31-08	07:00	3,000	155967	3,000 GPM
1-31-08	08:00	3,000	156153	3,000 GPM

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	1-30-08	11:04	146.34	pumping at 3,000 gpm
LFA Dew	1-30-08	12:00	146.30	" " 3,000 GPM
LFA DEW	1-30-08	13:00	146.50	" " 3,000 GPM
LFA Dew	1-30-08	14:00	145.60	" " 3000 GPM
LFA DEW	1-30-08	15:00	145.70	" " 3,000 GPM
LFA DEW	1-30-08	16:00	145.40	" " 3,000 GPM
LFA DEW	1-30-08	17:00	145.50	
LFA DEW	1-30-08	18:00	144.80	" " 3,000 GPM
LFA DEW	1-30-08	19:00	145.20	" " 3000 GPM
LFA Dew	1-30-08	20:00	145.30	" " 3,000 GPM
LFA Dew	1-30-08	21:00	144.95	" " 3,000 GPM
LFA Dew	1-30-08	22:00	143.30	" " 3,000 GPM
LFA Dew	1-30-08	23:00	142.15	" " 3,000 GPM
LFA DEW	1-31-08	24:00	143.70	" " 3,000 GPM
LFA Dew	1-31-08	01:00	144.45	" " 3,000 GPM
LFA Dew	1-31-08	02:00	144.40	" " 3,000 GPM
LFA Dew	1-31-08	03:00	149.30	" " 3,000 GPM
LFA Dew	1-31-08	04:00	146.40	" " 3,000 GPM
LFA Dew	1-31-08	05:00	145.50	" " 3,000 GPM
LFA Dew	1-31-08	06:00	143.90	" " 3,000 GPM
LFA Dew	1-31-08	07:00	145.80	" " 3,000 GPM
LFA Dew	1-31-08	08:00	145.90	" " 3,000 GPM

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	1-30-08	9:25	121.98	static pre pumping
SAMW	1-30-08	9:29	88.35	" "
UFA MW	1-30-08	9:32	87.80	" "
LFA DEW	1-30-08	9:45	121.99	" "
—	1-30-08	10:00	—	at 10:00:07
LFA DEW	1-30-08			pump on Q = 3,000gpm @ 10:02:00
UFA MW	1-30-08	10:09:30	87.79	
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 PBSJ's 200's geotech 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 @ 10:15 = 152,522,000
				" " 11:00 = 152,[illegible]2,000

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
LFA DEW	1-28-08	11:07:00	122.35	static
				pump on at 11:15:00
				Took 1 minute + 15 sec to
LFA DEW	1-28-08	11:32:00	146.42	set at 3,000 gpm
				Difficult getting readings
LFA DEW	1-28-08	11:48	146.14	with W.L. indicator
LFA DEW	1-28-08	13:00	146.00	
LFA DEW	1-28-08	14:40	145.59	

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
SAMW	1-28-08	09:00	88.29	STATIC - TOP OF LEVELOGGER COUPLING
UFA MW	1-28-08	09:02	87.62	STATIC - TOP OF LEVELOGGER COUPLING
LFA DEW	1-28-8	09:05	122.41	static
UFA MW	1-28-08	09:39	87.86	STATIC - TOC
SAMW	1-28-08	09:40	88.41	STATIC - TOC
LFA DEW	1-28-08	09:44	122.32	STATIC - TOC - ROWE'S METER
SAMW	1-28-08	10:39	88.41	STATIC - TOC
UFA MW	1-28-08	10:43	87.85	STATIC - TOC
LFA DEW	1-28-08	10:07	122.35	STATIC - TOC
UFA MW	1-28-08	11:30	87.82	PUMP ON @ 11:15
SAMW	1-28-08	11:32	88.41	PUMP ON @ 11:15
SAMW	1-28-08	12:41	88.41	
UFA MW	1-28-08	12:43	87.82	
LFA DEW	1-28-08	15:25	145.77	
SAMW	1-28-08	15:27	88.41	
UFA MW	1-28-08	15:30	87.82	

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
1-28-08	8:48	0	150,918,675	pre pumping
"	10:20	3000	150935 1000 GAL	START PUMPING AT 11:15
"	11:25	3000	150952 1000 GAL	PUMP HOLDING NEEDLE @ 3150 GPM
"	11:34	3000	150977 1000 GAL	
"	11:47	3000	151015 1000 GAL	
"	12:15	3000	151097 1000 GAL	START SAND% TEST
"	12:26	3000	151129 1000 GAL	
"	12:44	3000	151183 1000 GAL	END SAND% TEST 0.15 mL
"	13:00	3000	151232 1000 GAL	
1-28-08	13:15	3000	151271 1000 GAL	
"	13:30	3000	151314 1000 Gal	
"	13:45	3000	151360 1000 Gal	
"	14:00	3000	151405 1000 Gal	
"	14:15	3000	151449 1000 Gal	
"	14:30	3000	151492 1000 gal	
"	14:50	3000	1.	Increased pumping rate
"	15:00		151589,000	

Polk County Utilities

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

Table 2. Depth to H_20 Measurements

Well ID	Date	Clock Time	Depth to H_20 Below M.P. (ft)	Comments
~~LFA Dew~~	2-11-08	07:02	146.45	
LFA Dew	2-11-08	310:03	146.50	
LFA Dew	2-11-08	011:02	146.60	
LFA Dew	2-11-08	012-03	146.61	
LFA Dew	2-11-08	13:02	146.50	
LFA Dew	2-11-08	14:02	146.46	
LFA Dew	2-11-08	15:02	146.45	
LFA Dew	2-11-08	16:02	146.50	
LFA Dew	2-11-08	17:03	146.47	
LFA Dew	2-11-08	1803	146.45	
LFA Dew	2-11-08	19:02	146.40	
LFA Dew	2-11 08	20:02	146.35	
LFA Dew	2-11-08	21:02	146.48	
LFA Dew	2-11-08	22:00	146.40	
LFA Dew	2-11-08	23:03	146.60	
LFA Dew	2-11-08	00:00	146.58	
LFA Dew	2-12-08	01:00	146-65	
LFA Dew	2-12-08	02:04	146.65	
LFA Dew	2-12-08	03:02	146.45	
LFA Dew	2-12-08	04:00	146.05	
LFA Dew	2-12-08	05:02	146.60	
LFA Dew	2-12-08	06:02	146.58	
LFA Dew	2-12-08	07:00	146.20	
LFA Dew	2-12-08	08:02	146.30	
LFA Dew	2-12-08	09:02	146.48	
LFA Dew	2-12-08	010:02	146.75	
LFA Dew	2-12-08	011:03	146.80	

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
2-11-08	09:00	3200	203,661,000	Took Sampler.
2-11-08	010:00	3200	203,837,000	
2-11-08	011:00	3200	204,050,000	
2-11-08	012:00	3200	204,209,000	
2-11-08	13:00	3200	204,380,000	
2-11-08	14:00	3200	204,553,000	
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	205,072,000	
2-11-08	18:01	3,100	205,241,000	
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	
2-12-08	00:00	3,100	206,320,000	
2-12-08	01:00	3,100	206,[illegible]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,[illegible]842,000	Took Samplers
2-12-08	010:00	3,000	208,015,000	
2-12-08	011:00	3,000	208,193,000	

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 Drilliing
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

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 : 2/11/2008

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

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: **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 CaCO3(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 (SO4)	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 CaCO3(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 (SO4)	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**
Sample ID: **# 5**

Matrix: **Aqueous**
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 CaCO3(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 (SO4)	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 Drilliing**
Report Number: **08-030-0226**

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

FLORIDA ANALYTICAL, INC. **Chain of Custody Record** Page _ of _

Chain of Custody Number (for lab use only) **8151**

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

08-030-0226
00258
Jan 30 2008
4:27PM
Rowe Drilling
Holly Hill

(II) Container Size Key: NL Nonaqueous Liquid; SG Sludge; Other; P Plastic; G Glass; Other

(III) Sample Preservative: ... Nitric Acid (HNO_3); Hydrochloric Acid (HCl); Sulfuric Acid (H_2SO_4); Sodium Hydroxide (NaOH); None; Other

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.floridaanalytical.com

Required Analysis: Hardness; SO_4, Ca, Cl, TDS, Conduct.

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Field Parameters: Specific Conductance (micromhos/cm); pH (SU); Temperature (°C); Dissolved Oxygen (mg/L); Total Chlorine Residual (mg/L); Turbidity (NTU)

Date	Time	Sample Identification	Matrix	Hardness I	Hardness II	Hardness III	SO_4, Ca, Cl, TDS, Conduct. I	II	III
1-28	12:15	#1	GW	1	P	N	1	P	O
1-28	13:15	#2	GW	1	P	N	1	P	O
1-28	15:15	#3	GW	1	P	N	1	P	O
1-28	19:15	#4	GW	1	P	N	1	P	O
1-30	11:00	#5	GW	1	P	N	1	P	O

For Laboratory Use Only:
Sample Kit Prepared by: | FA Cooler #: | Sampled by: (PRINT)
Date | Time | Cooler Returned ☐Yes ☐No | Client Code:
Laboratory Remarks:

Signature	Date	Time	Received by: (SIGNATURE)	Date
Sampled by: (SIGNATURE) Johnny Wills	1-28/30-08			
Relinquished by: (SIGNATURE) Johnny Wills	1-30-08	13:50		
Relinquished by: (SIGNATURE)				
Relinquished by: (SIGNATURE)			Received in Lab by: (SIGNATURE) [signature]	1/30/08

Florida Analytical, Inc.
4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 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: 08-032-0219
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

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**
Sample ID: **# 6**

Matrix: **Aqueous**
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 CaCO3(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 (SO4)	164	mg/L	0.023	02/01/08 17:00	KR	EPA-300.0

Lab No: **51670**
Sample ID: **#7**

Matrix: **Aqueous**
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 CaCO3(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 (SO4)	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.

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"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**
Sample ID: **#8**

Matrix: **Aqueous**
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**
Sample ID: **#9**

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

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. Chain of Custody Record Page _ of _

Chain of Custody Number (for lab use only) 8096

08-032-0219
00259
Feb 1 2008
2:34PM
Rowe Drilling
Analysis

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

Matrix key: NL Nonaqueous Liquid; SG Sludge; Other

(II) Container Type Key: P Plastic; G Glass; Other:

Sample Preservative key: Ice Only; Nitric Acid (HNO_3); Hydrochloric Acid (HCl); Sulfuric Acid (H_2SO_4); Sodium Hydroxide; None; Other

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.floridaanalytical.com

Required Analysis: Hardness | Cl, Ca, SO4, TDS, Conduct, Hardness

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Field Parameters: Specific Conductance (umhos/cm); pH (SU); Temperature (°C); Dissolved Oxygen (mg/L); Total Chlorine Residual (mg/L); Turbidity (NTU)

Date:	Time:	Sample Identification:	Matrix	Hardness I	II	III	Cl, Ca, SO4, TDS, Conduct, Hardness I	II	III
1/30	21:00	#6	GW	~~1~~	~~P~~	N	1	P	1
1/31	09:00	#7	GW	~~1~~	~~P~~	N	1	P	1
1/31	21:00	#8	GW				1	P	1
2/1	09:00	#9	GW				1	P	1

For Laboratory Use Only:
Sample Kit Prepared by: | FA Cooler No:
Date | Time | Cooler Returned ( )Yes ( )No
Laboratory Remarks:

Sampled by: (PRINT)
Client Code:

Sampled by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:
Johnny Wills				
Relinquished by: (SIGNATURE) Johnny Wills	2-1-08	13:35	Received by: (SIGNATURE)	
Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:
Relinquished by: (SIGNATURE)	Date:	Time:	Received @ FA by: (SIGNATURE)	2/1/08 13:

Florida Analytical

SAFEGUARD Form No. 811-2/L07OS000754 7/07

Florida Analytical, Inc.
4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 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

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: **LFADEW**

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 CaCO3(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 (SO4)	176	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Lab No: **51733**
Sample ID: **LFADEW**

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 CaCO3(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 (SO4)	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: **LFADEW**

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 CaCO3(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 (SO4)	179	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Lab No: **51735**
Sample ID: **LFADEW**

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 CaCO3(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 (SO4)	183	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: **51736**
Sample ID: **LFADEW**

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 CaCO3(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 (SO4)	184	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Lab No: **51737**
Sample ID: **LFADEW**

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 CaCO3(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 (SO4)	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 (863) 646-8526 Fax: (863) 646-1042
"A Laboratory Management Partner"

Cooler Receipt Form

Customer Number: **00259**
Customer Name: **Rowe Drilliing**
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. — Chain of Custody Record

Page _ of _

Chain of Custody Number (for lab use only): 12991

Project/Client Name	Project Site Location	Client Contact Name
Rowe Drilling Co.	Holly Hill	Johnny Wills
PWS Number:	Project Manager:	Phone Number: 863 984-3160
Report Mailing Address: P.O. Box 1098	Invoice Address: Same	Fax Number: 863-984-3110
Report Mailing City, State, ZIP: Polk City, FL 33868	Invoice City, State, ZIP:	e-mail Address: jwills@rowedrilling.com

Matrix Key: GW Ground Water; SW Surface Water; DW Drinking Water; WW Wastewater; SL Soil; SD Solid; ST Sediment; NL Nonaqueous Liquid; SG Sludge; Other:

(II) Container Type Key: P Plastic; G Glass; Other:

Rowe Drilling
Holly Hills
08-035-00259
Feb 4 2
12 32PM

Purchase Order Number:

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.floridaanalytical.com

NELAP

Required Analysis: Hardness; SO4, Cl, Ca, TDS, Spec. Cond.

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Field Parameters: Specific Conductance (micromhos/cm); pH (SU); Temperature (°C); Dissolved Oxygen (mg/L); Total Chlorine Residual (mg/L); Turbidity (NTU)

Date:	Time:	Sample Identification:	Matrix	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	Florida Analytical
2-1	21:00	LFADEW	GW	1	P	N	1	P	1													5
2-2	09:00	" "	GW	1	P	N	1	P	1													5
2-2	21:00	" "	GW	1	P	N	1	P	1													5
2-3	09:00	" "	GW	1	P	N	1	P	1													5
2-3	21:00	" "	GW	1	P	N	1	P	1													5
2-4	09:00	" "	GW	1	P	N	1	P	1													5

For Laboratory Use Only:

Sample Kit Prepared by:	FA Cooler No:	Sampled by: (PRINT):	Sampled by: (SIGNATURE):	Date:	Time:	Received by: (SIGNATURE)	Date:
Date:	Time:	Cooler Returned: ( )Yes ( )No	Client Code:	Relinquished by: (SIGNATURE): Johnny Wills	Date: 12:10 PM	Time:	Received by: (SIGNATURE): Stephanie Cox
Laboratory Remarks:				Relinquished by: (SIGNATURE): Johnny Wills	Date:	Time:	Received by: (SIGNATURE)
				Relinquished by: (SIGNATURE)	Date:	Time:	Received @ FA by: (SIGNATURE)

Date: 2-4-08

Page 6 of 6

Florida Analytical, Inc.
4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 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: 08-037-0200
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: **LFADEW**

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 CaCO3(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 (SO4)	188	mg/L	0.23	02/05/08 17:00	KR	EPA-300.0

Lab No: **51800**
Sample ID: **LFADEW**

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 CaCO3(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 (SO4)	190	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"

Cooler Receipt Form

Customer Number: **00259**
Customer Name: **Rowe Drilling**
Report Number: **08-037-0200**

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 _ of _

Chain of Custody Number (for lab use only) Nº 000967

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

Matrix Key: GW Ground Water; SW Surface Water; DW Drinking Water; WW Wastewater; SL Soil; SD Solid; ST Sediment; NL Non-aqueous Liquid; SG Sludge; Other:

(III) Container Type Key: P Plastic; G Glass; Other:

08-037-0200 00259 Feb 6 2008 10:54AM
Rowe Drilling
Holly Hills

P. E. LaMoreaux and Associates, Inc. (PELA)
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8525 (phone)
(863) 646-1042 (fax)
www.pelalab.com

Required Analysis:

Date:	Time:	Sample Identification:	Matrix	(I) # of Containers	(II) Container Size	(III) Sample Preservative	Hardness	SO4, Ca, Cl, TDS, Conduct					Specific Conductance (micromho/cm)	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Total Chlorine Residual (mg/L)	Turbidity (NTU)	PELA Laboratory Sample Identification Number (for laboratory use only)
2/4/08	2100	LFADEW	GW	1	P	N	1	P											
2/5/08	0900	LFADEW	GW	1	P	N	1	P											

Field Parameters:

For Laboratory Use Only:

Sample Kit Prepared by: | Date: | Time: | PELA Cooler No: | Cooler Returned: ☐Yes ☐No

Sampled by: (PRINT): | Client Code:

Laboratory Remarks:

Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Sampled by: (SIGNATURE) Johnny Wills					
Relinquished by: (SIGNATURE) Johnny Wills	2-5-08	17:08	Received by: (SIGNATURE) Stephanie Cox	2-5-08	1708
Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Relinquished by: (SIGNATURE)	Date:	Time:	Received @ PELA by: (SIGNATURE)	Date:	Time

Florida Analytical, Inc.
4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 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: 08-037-0206
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/ 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**
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

Florida Analytical, Inc. Chain of Custody Record Page _ of _

Chain of Custody Number (for lab use only): 8095

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

Matrix Key: GW Groundwater; SW Surface Water; DW Drinking Water; WW Wastewater; SL Soil; SD Sludge; ST Sediment; NL Non-Aqueous Liquid; SG Sludge; Other

(II) Container type key: P Plastic; G Glass; Other

Rowe Drilling
Holly Hill
08-037-0206
00259
Feb 6 2008
1:30PM

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.floridaanalytical.com

nelac

Required Analysis: hardness; Ca, Cl, TDS, SO4, Conduct

Field Parameters:

Date:	Time:	Sample Identification:	Matrix	(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)	Specific Conductance (mmhos/cm)	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Free Chlorine Residual (mg/L)	Turbidity (NTU)	Florida Analytical Laboratory Sample ID Identification Number (for laboratory use only)
2-5	21:00	LFA DEW	GW	1 P V / 1 P 1							
2-6	09:00	LFA DEW	GW	1 P V / 1 P 1							

For Laboratory Use Only:

Sample Kit Prepared by:	FA Cooler No:	Sampled by: (PRINT)	Sampled by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Date:	Time:	Cooler Returned: (_)Yes (_)No	Client Code:	Relinquished by: (SIGNATURE) Johnny Wells	Date: 2-6-08	Time: 13:05	Received by: (SIGNATURE)	Date:	Time:
Laboratory Remarks:				Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
				Relinquished by: (SIGNATURE)	Date:	Time:	Received @ FA by: (SIGNATURE)	Date:	Time:

Florida Analytical, Inc.
4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 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: 08-039-0207
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

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** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	186	mg/L	0.23	02/07/08 17:00	KR	EPA-300.0

Lab No: **51976** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	184	mg/L	0.23	02/07/08 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"

Cooler Receipt Form

Customer Number: **00259**
Customer Name: **Rowe Drilling**
Report Number: **08-039-0207**

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

Florida Analytical, Inc. Chain of Custody Record Page _ of _

Chain of Custody Number (for lab use only): 8092

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

Purchase Order Number:

Florida Analytical, Inc.
4328 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.floridaanalytical.com

nelac

Matrix Key

GW	Ground Water
SW	Surface Water
DW	Drinking Water
WW	Wastewater
SL	Soil
SD	Solid
ST	Stockpile
NL	Nonaqueous Liquid
SG	Sludge
Other:	

08-039-0207
00259
Feb 8 2008
10:34AM
Rowe Drilling
Holly Hill

(II) Container Type Key

P	Plastic
G	Glass
Other:	

Required Analysis: Hardness; SO4, Ca, Cl, TDS, Conduct

Field Parameters: Specific Conductance (micromhos/cm); pH (SU); Temperature (C); Dissolved Oxygen (mg/L); Total Chlorine Residual (mg/L); Turbidity (NTUs)

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Date:	Time:	Sample Identification:	Matrix	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	Florida Analytical Laboratory Sample Identification Number (for laboratory use only)
2-6	21:00	LFA DEW	GW	1	P	N	1	P	1													
2-7	09:00	LFA DEW	GW	1	P	N	1	P	1													

For Laboratory Use Only:

Shipping Kit Prepared by:	FA Courier No.	Sampled by: (PRINT):	Sampled by: (SIGNATURE):	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Date:	Time:	Cooler Returned: ( )Yes ( )No	Client Code:	Relinquished by: (SIGNATURE):	Date: 2-7-08	Time: 16:13	Received by: (SIGNATURE)	Date:	Time:
				Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
				Relinquished by: (SIGNATURE)	Date:	Time:	Received at FA by: (SIGNATURE): Stephanie Kay	Date: 2-7-08	Time: 1601

Laboratory Remarks:

Florida Analytical, Inc.
4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 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:

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: **08-039-0227**

REPORT OF ANALYSIS

Received : 2/8/2008

Lab No: **52013** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	202	mg/L	0.23	02/08/08 17:00	KR	EPA-300.0

Lab No: **52014** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	197	mg/L	0.23	02/08/08 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"

Cooler Receipt Form

Customer Number: **00259**
Customer Name: **Rowe Drilling**
Report Number: **08-039-0227**

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

Florida Analytical, Inc. Chain of Custody Record Page _ of _

Chain of Custody Number (for lab use only): 8152

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

Matrix Key

GW	Ground Water
SW	Surface Water
DW	Drinking Water
WW	Wastewater
SL	Soil
SD	Solid
ST	Sediment
NL	Nonaqueous Liquid
SG	Sludge
Other:	

(II) Container Type Key

P	Plastic
G	Glass
Other:	

08-039-0227
00259
Feb 8 2008
4:40PM
Rowe Drilling
Holly Hill

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1642 (fax)
www.floridaanalytical.com

Required Analysis:

Hardness	SO4, Ca, Cl, TDS, Conduct				

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Field Parameters:

Date:	Time:	Sample Identification:	Matrix	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	Specific Conductance (micromhos/cm)	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Total Chlorine Residual (mg/L)	Turbidity (NTU)	Florida Analytical Laboratory Sample Identification Number (for laboratory use only)
2-7	21:00	LFA DEW	GW	1	P	N	1	P	1																
2-8	09:00	LFA DEW	GW	1	P	N	1	P	1																

For Laboratory Use Only:

Sample Kit Prepared by:	FA Cooler No:	Sampled by: (PRINT):	Sampled by: (SIGNATURE):	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Date: Time:	Cooler Returned: ( )Yes ( )No	Client Code:	Relinquished by: (SIGNATURE): Johnny Wills	2-8-08	14:45	Transmitted by: (SIGNATURE)	Date:	Time:
			Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Laboratory Remarks:			Relinquished by: (SIGNATURE)	Date:	Time:	Received at FA by: (SIGNATURE): Stephanie Cox	Date: 2-8-08	Time: 1445

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: 08-043-0222
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:

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: **08-043-0222**

REPORT OF ANALYSIS

Received : 2/12/2008

Lab No: **52192** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	**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** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	**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**
Report Number: **08-043-0222**

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. Chain of Custody Record Page _ of _

Chain of Custody Number (for lab use only): 8094

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

Purchase Order Number:

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8525 (phone)
(863) 648-1042 (fax)
www.floridaanalytical.com

nelac

Matrix Key: GW Groundwater; SW Surface Water; DW Drinking Water; WW Wastewater; SL Sludge; SO Soil; RT Rinsate; NL Nonaqueous Liquid; SG Sludge; Other

(II) Container Type Key: P Plastic; G Glass; Other

08-043-0222
00259
Feb 12 2008
3:11PM
Rowe Drilling
Holly Hill

Date:	Time:	Sample Identification:	Matrix	Required Analysis:	(I) # of Containers, (II) Container Size/Container Type (III) Sample Preservative (See keys upper right)	Field Parameters:	Florida Analytical Laboratory Sample Identification Number (for laboratory use only)
					I II III		
2-11	21:00	LEA DEW	GW	Hardness, SO4, Ca, Cl, TDS, conduct.	1 P N / 1 P 1	Specific Conductance (micromhos/cm); pH (SU); Temperature (C); Dissolved Oxygen (mg/L); Total Chlorine Residual (mg/L); Turbidity (NTU)	
2-12	09:00	LEA DEW	GW		1 P N / 1 P 1		

For Laboratory Use Only:

Sample Kit Prepared by:	FA Cooler ID:	Sampled by: (PRINT):	Sampled by: (SIGNATURE):	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Date:	Time:	Cooler Returned: ☐Yes ☐No	Client Code:	Relinquished by: (SIGNATURE): Johnny Wills	Date: 2-12-08	Time: 15:09	Received by: (SIGNATURE)	Date:	Time:
Laboratory Remarks:				Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
				Relinquished by: (SIGNATURE)	Date:	Time:	Received by FA by: (SIGNATURE): Stephanie Coy	Date: 2-12-08	Time: 1509

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** Matrix: **Aqueous**

Sample ID: **LFADEW** 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** Matrix: **Aqueous**

Sample ID: **LFADEW** 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** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	**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** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	**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** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	**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** Matrix: **Aqueous**

Sample ID: **LFADEW** 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 CaCO3(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 (SO4)	**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/ 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**
Report Number: **08-042-0235**

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

Florida Analytical, Inc. Chain of Custody Record Page _ of _

Chain of Custody Number (for lab use only): 8093

Project/Client Name:	Project Site Location:	Client Contact Name:
Rowe Drilling	Holly Hill	Johnny Wills
PWS Number	Project Manager	Phone Number: 863-984-3100
Report Mailing Address: PO Box 1097	Invoice Address: Same	Fax Number: 863-984-3110
Report Mailing City, State, ZIP: Polk City, FL 33868	Invoice City, State, ZIP:	e-mail Address: jwills@rowedrilling.com

Matrix Key

GW	Ground Water	A
SW	Surface Water	B
DW	Drinking Water	C
WW	Wastewater	D
SL	Soil	E
SD	Solid	F
ST	Sediment	Other
NL	Non-aqueous Liquid	
SG	Sludge	
Other:		

(II) Container Type Key

P	Plastic
G	Glass
Other:	

Rowe Drilling
Holly Hill
08-042-0235
00259
Feb 11 2008
4:33PM

Purchase Order Number:

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.floridaanalytical.com

Required Analysis:

Hardness	SO4, Ca Cl, TDS Conduct				

(I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Field Parameters:

Date:	Time:	Sample Identification:	Matrix	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	Specific Conductance (micromhos/cm)	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Total Chlorine Residual (mg/L)	Turbidity (NTU)	Florida Analytical Laboratory Sample Identification Number (For laboratory use only)
2/8	21:00	LFA DEW	GW	1	P	N	1	P	1																			
2/9	09:00	LFA DEW	GW	1	P	N	1	P	1																			
2/9	21:00	LFA DEW	GW	1	P	N	1	P	1																			
2/10	09:00	LFA DEW	GW	1	P	N	1	P	1																			
2/10	21:00	LFA DEW	GW	1	P	N	1	P	1																			
2/11	09:00	LFA DEW	GW	1	P	N	1	P	1																			

For Laboratory Use Only:

Sample Kit Prepared by:	FA Courier No.	Submitted by: (PRINT)	Shipped by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Date:	Time:	Courier Returned: ☐Yes ☐No	Client Codes:	Relinquished by: (SIGNATURE)	Date: 2-11-08	Time: 16:18	Received by: (SIGNATURE)	Date:	Time:
Laboratory Remarks:			Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
			Relinquished by: (SIGNATURE)	Date:	Time:	Received @ FA by: (SIGNATURE) Stephanie Coy	Date: 2-11-08	Time: 1602

APPENDIX R.

Pumping Test Laboratory Analytical Report

Select Primary & Secondary DW Standards

Florida Analytical, Inc.
4320 Old Hwy. 37 Lakeland, FL 33813 (863) 646-8526 Fax: (863) 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**
Sample ID : **LFA DEW-P&S WQ**

Matrix: **Aqueous**
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**
Sample ID : **LFA DEW-P&S WQ**

Matrix: **Aqueous**
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:

Sample Number	Sample Description	Date & Time Collected		Date & Time Received	
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	Endothall	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		02/18/08	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		02/20/08	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		02/20/08	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 — Analyte was undetected. Indicated concentration is method detection limit.

U,Y — 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**
Report Number: **08-043-0223**

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. Chain of Custody Record

Page 1 of _

Chain of Custody Number (for lab use only): 8083

Project Client Name:	Project Site Location:	Client Contact Name:
Rowe Drilling	Holly Hill, NERUSA	Johnny Wills
PWS Number	Project Manager	Phone Number
Report Mailing Address:	Invoice Address:	Fax Number:
Report Mailing City, State, ZIP:	Invoice City, State, ZIP:	e-mail Address:

Purchase Order Number:

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.floridaanalytical.com

nelac

Matrix Key

GW	Ground Water
SW	Surface Water
DW	Drinking Water
WW	Wastewater
SL	Soil
SD	Solid
ST	Sediment
NL	Nonaqueous Liquid
SG	Sludge
Other	

(II) Container Type Key

P	Plastic
G	Glass
Other:	

08-043-0223
00259
Feb 12 2008
3:24PM
Rowe Drilling
Holly Hills, Nerusa

Required Analysis:

Date:	Time:	Sample Identification:	Matrix	Acid/Base/Neutral	VOCs	MBAS Filtered/Unfiltered	Gross Alpha Rad 226 + 228	Cyanide	PCU ODR PHL	Field Parameters: Specific Conductance (micromhos/cm)	pH (Std Units)	Temperature (°C)	Dissolved Oxygen (mg/L)	Total Chlorine Residual (mg/L)	Turbidity (NTU)	Florida Analytical Laboratory Sample Identification Number (For laboratory use only)
		(i) # of Containers, (ii) Container Size, (iii) Container Type, (iii) Sample Preservative (See keys upper right)		I II III	I II III	I II III	I II III	I II III	I II III							
2/12	12:22	LFA DEW-PWS WQ		2 E G Z												
2/12	12:16	" " " "		" "	3 A G H											
2/12	12:23	" " " "				3 E P I										
2/12	12:25	" " " "					1 F P N									
2/12	12:27	" " " "						1 E P L								
2/12	12:28	" " " "							1 D G E							

For Laboratory Use Only:

Sample Kit Prepared by:	FA Courier No.	Sampled by: (PRINT):	Sampled by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Date:	Time:	Kevin Dorsey	Kevin Dorsey	2-12-08	12:40			
	Cooler Returned: (_)Yes (_)No	Client Code:	Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
			Johnny Wills	2-12-08	15:11			
			Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
			Relinquished by: (SIGNATURE)	Date:	Time:	Received by FA by: (SIGNATURE) Stephanie Cox	Date: 2-12-08	Time: 1511

Laboratory Remarks:

× PBS-3

Florida Analytical, Inc. — Chain of Custody Record

Page _ of _

Chain of Custody Number (for lab use only): 8084

Project/Client Name:	Project/Site Location:	Client Contact Name:
Rowe Drilling Co	Holly Hill Nerusa	Johnny Wills
PWS Number:	Project Manager:	Phone Number:
Report Mailing Address:	Invoice Address:	Fax Number:
Report Mailing City, State, ZIP:	Invoice City, State, ZIP:	e-mail Address:

Matrix Key: GW Ground Water; SW Surface Water; DW Drinking Water; WW Wastewater; SL Soil; SO Solid; ST Sediment; NL Nonaqueous Liquid; SG Sludge; Other

(II) Container Type Key: P Plastic; G Glass; Other

08-043-0223
00259
Feb 12 2008
3:24PM
Rowe Drilling
Holly Hills, Nerusa

Purchase Order Number:

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.floridaanalytical.com

Required Analysis: (I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Date:	Time:	Sample Identification:	Matrix	EDB Glyphosphate	Pest/PCB Herb	ALD	TCBDW	Diquat	Metals
2-12	12:19	LFA DEW PVS WQ		6 A G Z	2 G Z				
2-12	12:29	" " " "			2 E G Z				
2-12	12:30	" " " "				3 A G			
2-12	12:31	" " " "					1 E P Z		
2-12	12:32	" " " "						1 E P Z	
2-12	12:33	" " " "							1 E P N

Field Parameters: Specific Conductance (micromhos/cm); pH (SU); Temperature (°C); Dissolved Oxygen (mg/L); Total Dissolved Solids (mg/L); Turbidity (NTU)

Florida Analytical Laboratory Sample Identification Number (for laboratory use only)

For Laboratory Use Only:

Sample Kit Prepared by: | FA Cooler No: | Date: | Time: | Cooler Returned ( )Yes ( )No

Laboratory Remarks:

Sampled by: (PRINT)	Sampled by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Kevin Dotsey*	Kevin Dotsey (KD)	2-12-08	12:40			
Client Code:	Relinquished by: (SIGNATURE) Johnny Wills	2-12-08	15:11	Received by: (SIGNATURE)		
	Relinquished by: (SIGNATURE)			Received by: (SIGNATURE)		
	Relinquished by: (SIGNATURE)			Received at FA by: (SIGNATURE) Stephanie Coy	2-12-08	1511

× PBS+J

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) 646-8526 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**
Sample ID : **LFA DEW-P&S WQ**

Matrix: **Aqueous**
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**
Report Number: **08-043-0223**

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. Chain of Custody Record

Page 1 of _

Chain of Custody Number (for lab use only): 8083

Project/Client Name:	Project/Site Location:	Client Contact Name:
Rowe Drilling	Holly Hill, NERUSA	Johnny Wills
PWS Number:	Project Manager:	Phone number:
Report Mailing Address:	Invoice Address:	Fax Number:
Report Mailing City, State, ZIP:	Invoice City, State, ZIP:	E-mail Address:

Purchase Order Number:

Matrix Key

GW	Ground Water
SW	Surface Water
DW	Drinking Water
WW	Wastewater
SL	Soil
SD	Solid
ST	Sediment
NL	Nonaqueous Liquid
SG	Sludge
Other	

(II) Container Type Key

P	Plastic
G	Glass
Other	

08-043-0223
00259
Feb 12 2008
3:24PM
Rowe Drilling
Holly Hills, Nerusa

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 646-8526 (phone)
(863) 646-1042 (fax)
www.floridaanalytical.com

nelac

Required Analysis: (I) # of Containers, (II) Container Size/Container Type, (III) Sample Preservative (See keys upper right)

Field Parameters: Specific Conductance (micromhos/cm); pH (SU); Temperature (°C); Dissolved Oxygen (mg/L); Total Chlorine Residual (mg/L); Turbidity (NTU)

Florida Analytical Laboratory Sample Identification Number (for laboratory use only)

Date	Time	Sample Identification	Matrix	Endothal / Base Neutral (I / II / III)	VOCs (I / II / III)	MBAS / Fluoride/Nitrate/Nitrite / TDS / Alum (I / II / III)	Gross Alpha / Rad 226 + 228 (I / II / III)	Cyanide (I / II / III)	PCU / ODR / PHL (I / II / III)	Field Parameters	Lab Sample ID
2/12	12:22	LFA DEW-P+S WQ		2 / EG / Z							
2/12	12:16	" " " "		[illegible] / A	3 / AG / H						
2/12	12:23	" " " "				3 / EP / I					
2/12	12:25	" " " "					1 / FP / N				
2/12	12:27	" " " "						1 / EP / L			
2/12	12:18	" " " "							1 / DG / I		

For Laboratory Use Only:

Sample Kit Prepared by: | FA Cooler No.: | Date: | Time: | Cooler Returned ☐Yes ☐No

Laboratory Remarks:

Sampled by: (PRINT)	Sampled by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
Kevin Dorsey	[signature] Dorsey, CXD	2-12-08	12:40			
Client Code:	Relinquished by: (SIGNATURE) Johnny Wills	2-12-08	15:11	Received by: (SIGNATURE)		
	Relinquished by: (SIGNATURE)			Received by: (SIGNATURE)		
	Relinquished by: (SIGNATURE)			Received at FA by: (SIGNATURE) Stephanie Cox	2-12-08	1511

× PBS+J

Florida Analytical, Inc. Chain of Custody Record Page _ of _

Chain of Custody Number (for lab use only) 8084

Project/ Client Name:	Project/Site Location:	Client Contact Name:
Rowe Drilling C	Holly Hill NERUSA	Johnny Wills
PWS Number	Project Manager	Phone Number:
Report Mailing Address:	Invoice Address:	Fax Number:
Report Mailing City, State, ZIP:	Invoice City, State, ZIP:	Email Address:

Matrix Key: GW Ground Water; SW Surface Water; DW Drinking Water; WW Wastewater; SL Soil; SD Solid; ST Sediment; NL Nonaqueous Liquid; SG Sludge; Other

(II) Container Type Key: P Plastic; G Glass; Other

08-043-0223
00259
Feb 12 2008
3:24PM
Rowe Drilling
Holly Hills, Nerusa

Purchase Order Number:

Florida Analytical, Inc.
4320 Old Highway 37
Lakeland, Florida 33813
(863) 648-8526 (phone)
(863) 648-1042 (fax)
www.floridaanalytical.com

nelac

Required Analysis: (I) # of Containers. (II) Container Size/Container Type. (III) Sample Preservative (See keys upper right)

Date:	Time:	Sample Identification:	Matrix	EDB Glyphosphate I	II	III	Pest/PCB Herb I	II	III	ALD I	II	III	TCBDW I	II	III	Diquat I	II	III	Metals I	II	III	Specific Conductance (micromhos/cm)	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Total Dissolved Petroleum (mg/L)	Turbidity (NTU)	Florida Analytical Laboratory Sample Identification Number (for laboratory use only)
2-12	12:19	LFA DEW P+S WQ		6	A G			E G																				
2-12	12:29	" " " "					2	E G	Z																			
2-12	12:30	" " " "								3	A G																	
2-12	12:31	" " " "											1	B P	I													
2-12	12:32	" " " "														1	E P	Z										
2-12	12:33	" " " "																	1	E P	N							

For Laboratory Use Only:

Sample All Preserved by:	FA Cooler No	Sampled by: (PRINT)	Sampled by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
		Kevin Dorsey*	[signature]	2-12-08	12:40			
Date / Time	Cooler Returned ( )Yes ( )No	Client Code:	Relinquished by: (SIGNATURE) Johnny Wills	2-12-08	15:11	Received by: (SIGNATURE)	Date:	Time:
Laboratory Remarks:			Relinquished by: (SIGNATURE)	Date:	Time:	Received by: (SIGNATURE)	Date:	Time:
			Relinquished by: (SIGNATURE)	Date:	Time:	Received @ FA by: (SIGNATURE) Stephanie Cox	2-12-08	1511

× PBS+J

SAFEGUARD. LITHO USA Form No. 811-2/L07CS000754 7/07