Southwest Florida
Water Management District

# Hydrogeology, Water Quality, and Well Construction at the ROMP 132 - Blitch Plantation Well Site in Marion County, Florida

Southwest Florida Water Management District
Regional Observation and Monitor-well Program

June 2011

**Cover Photo:** Andrew Bowie and Barry Morley retrieve a rock core sample using the wire line on the UDR 200DLS core rig during exploratory coring at the ROMP 132 well site. Photo taken by Anna Janosik on August 3, 2010.

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By Anna Janosik

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# Southwest Florida Water Management District

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The hydrogeologic evaluations and interpretations contained in *Hydrogeology, Water Quality, and Well Construction at the ROMP 132 - Blitch Planation Well Site in Marion County, Florida* have been prepared by or approved by a licensed Professional Geologist in the State of Florida, in accordance with Chapter 492, Florida Statutes.


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Date: 6/27/2011

# Foreword

The Regional Observation and Monitor-well Program (ROMP) was started in 1974 in response to the need for hydrogeologic information by the Southwest Florida Water Management District (District). The focus of the ROMP is to quantify the flow characteristics and water quality of the groundwater systems which serve as the primary source of potable water within southwest Florida. The original design of the ROMP consisted of a ten-mile grid network containing 122 well sites and a coastal transect network containing 24 coastal monitor transects of two to three wells sites each. Since its inception, the ROMP has taken on many more data collection and well construction activities outside these original two well networks. The broad objectives at each well site are to determine the geology, hydrology, groundwater quality, and hydraulic properties, and install wells for long-term monitoring. The majority of these objectives are achieved by core drilling and testing, which provides data for the hydrogeologic characterization of the well site. The ROMP staff then uses this characterization to ensure the site's monitor wells are properly installed. The hydrologic data of each completed ROMP well site are presented in either a summary or report.

Each ROMP well site is given a unique number and a site name. The ten-mile grid network numbering starts in the southern District with ROMP No. 1 and generally increases northward. The coastal transect network numbering starts with ROMP TR 1 in the south and also increases northward.

Jerry Mallams
Manager

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# Conversion Factors and Datums

| Multiply | By | To obtain |
|---|---|---|
| | ***Length*** | |
| inch (in.) | 2.54 | centimeter (cm) |
| inch (in.) | 25.4 | millimeter (mm) |
| foot (ft) | 0.3048 | meter (m) |
| mile (mi) | 1.609 | kilometer (km) |
| | ***Volume*** | |
| gallon (gal) | 3.785 | liter (L) |
| gallon (gal) | 0.003785 | cubic meter ($m^3$) |
| | ***Flow rate*** | |
| gallon per minute (gal/min) | 0.06309 | liter per second (L/s) |
| | ***Mass*** | |
| ounce, avoirdupois (oz) | 28.35 | gram (g) |
| | ***Hydraulic conductivity*** | |
| foot per day (ft/d) | 0.3048 | meter per day (m/d) |
| | ***Transmissivity**** | |
| foot squared per day ($ft^2/d$) | 0.09290 | meter squared per day ($m^2/d$) |

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F=(1.8×°C)+32$$

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

$$°C=(°F-32)/1.8$$

Vertical coordinate information is referenced to the North American Vertical Datum of 1988 (NAVD 88) and the National Geodetic Vertical Datum of 1929 (NGVD 29).

Elevation, as used in this report, refers to distance above the vertical datum.

*Transmissivity: The standard unit for transmissivity is cubic foot per day per square foot times foot of aquifer thickness [($ft^3/d$)/$ft^2$]ft. In this report, the mathematically reduced form, foot squared per day ($ft^2/d$), is used for convenience.

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25 °C).

Concentrations of chemical constituents in water are given either in milligrams per liter (mg/L) or micrograms per liter (µg/L).

# Acronyms and Abbreviations

| | |
|---|---|
| µg/l | micrograms per liter |
| APT | aquifer performance test |
| bls | below land surface |
| btoc | below top of casing |
| CAL | caliper |
| CME | Central Mining Equipment |
| District | Southwest Florida Water Management District |
| ft | feet |
| ft/day | feet per day |
| GAM | gamma |
| gpm | gallons per minute |
| HQ | 3.5-inch temporary steel casing |
| HWT | 4-inch temporary steel casing |
| mg/l | milligrams per liter |
| PVC | polyvinyl chloride |
| RES | resistance geophysical log |
| RES (16N) | short normal resistivity |
| RES (64N) | long normal resistivity |
| ROMP | Regional Observation and Monitor-well Program |
| SID | District site identification number |
| T | transmissivity |
| UDR | Universal Drill Rigs |
| USEPA | United States Environmental Protection Agency |
| WMIS | Water Management Information System |

# Hydrogeology, Water Quality, and Well Construction at the ROMP 132 - Blitch Plantation Well Site in Marion County, Florida

By Anna Janosik

## Introduction

The Southwest Florida Water Management District's (District) investigation at the Regional Observation and Monitor-well Program (ROMP) 132 Blitch Plantation site was designed to provide detailed information about the geologic and hydrologic characteristics of the subsurface materials. Information of this type enables the District to make informed decisions central to its mission of balancing the water needs of current and future users while protecting and maintaining water and related natural resources. The site investigation will help define the boundaries of middle confining units I and II as defined by Miller (1986), and therefore the vertical and geographic extent of the Lower Floridan aquifer(s) beneath these units. Additionally, the data collected will assist to identify the vertical extent of potable groundwater in this location.

The ROMP 132 site was developed in four phases: shallow exploratory coring and testing, well construction, aquifer performance testing, and deep exploratory coring. Exploratory coring was conducted from land surface to 1,727 feet below land surface. Two wells were constructed in the Upper Floridan aquifer; one a temporary production well, the second a permanent monitor well. Finally, an aquifer performance test was conducted in the Upper Floridan aquifer. This report presents the data collected during the activities of each of these four phases, which began on June 2, 2008 and ended on September 16, 2010.

Hydrogeologic data collected at the ROMP 132 site can be downloaded from the District's website (http://www.swfwmd.state.fl.us/) using the Water Management Information System (WMIS). Data from the site is compiled under WMIS portfolio number 242. The data available for download include lithologic logs, groundwater quality parameters, groundwater levels, hydraulic test parameters, raw hydraulic test data, and geophysical logs. This report is also available for download from the system.

### Site Location

The ROMP 132 well site is located approximately 15 miles northwest of Ocala on private property owned by John Rudnianyn. The site lies within the eastern half of Section 28, Township 13 South, Range 20 East at Latitude 29° 19' 36" North, Longitude 82° 18' 35" West (figure 1). It can be reached by traveling approximately 6.4 miles west from Interstate 75 on County Road 326, turning north onto County Road 225, traveling 1.7 miles and turning west onto 110th Street, traveling 0.8 miles and turning north onto 110th Avenue, and finally finding the driveway on the west side of the road, after the fence line for Fogg Road Farm ends, that leads to the site.

The site is located within the Fairfield Hills physiographic region in the Central Highlands of the Mid-Peninsular zone of Florida (White, 1970). The region contains few lakes, but contains about a dozen small ponds and some wet prairie areas (Griffith et al., 1997). The topography of the area indicates the site is located within a valley-like feature (figure 2). Surface water may be draining into this small valley and traveling northeast into ponds. This process is most likely contributing to the enhanced erosion of surface sediments at the site. The thickness of the shallow subsurface sediments within the vicinity of the well site may vary significantly due to this erosion process. This report presents only the findings at the location of exploration, where shallow subsurface sediments may be thin in comparison to surrounding areas.

During the four data collection phases, the site consisted of a 10-foot by 30-foot permanent well site, 150-foot by 250-foot temporary construction area, and a 15-foot wide ingress/egress easement (figure 3). The temporary construction area was returned to John Rudnianyn after data collection was completed.

Two survey elevation control stations were installed at the site by a District crew on July 2, 2008. The survey crew also measured the elevation at the top of the 2-inch steel water supply well and the core hole measuring point on that date (table 1).

### Data Collection Methods

This section covers general data collection methods specific to the ROMP 132 site. Detailed descriptions of the data collection methods used by the ROMP are presented in Appendix A.

During exploratory coring and testing, the District's CME 85 core rig was used to advance the core hole and to collect lithologic core samples in 5-foot intervals through a wire line

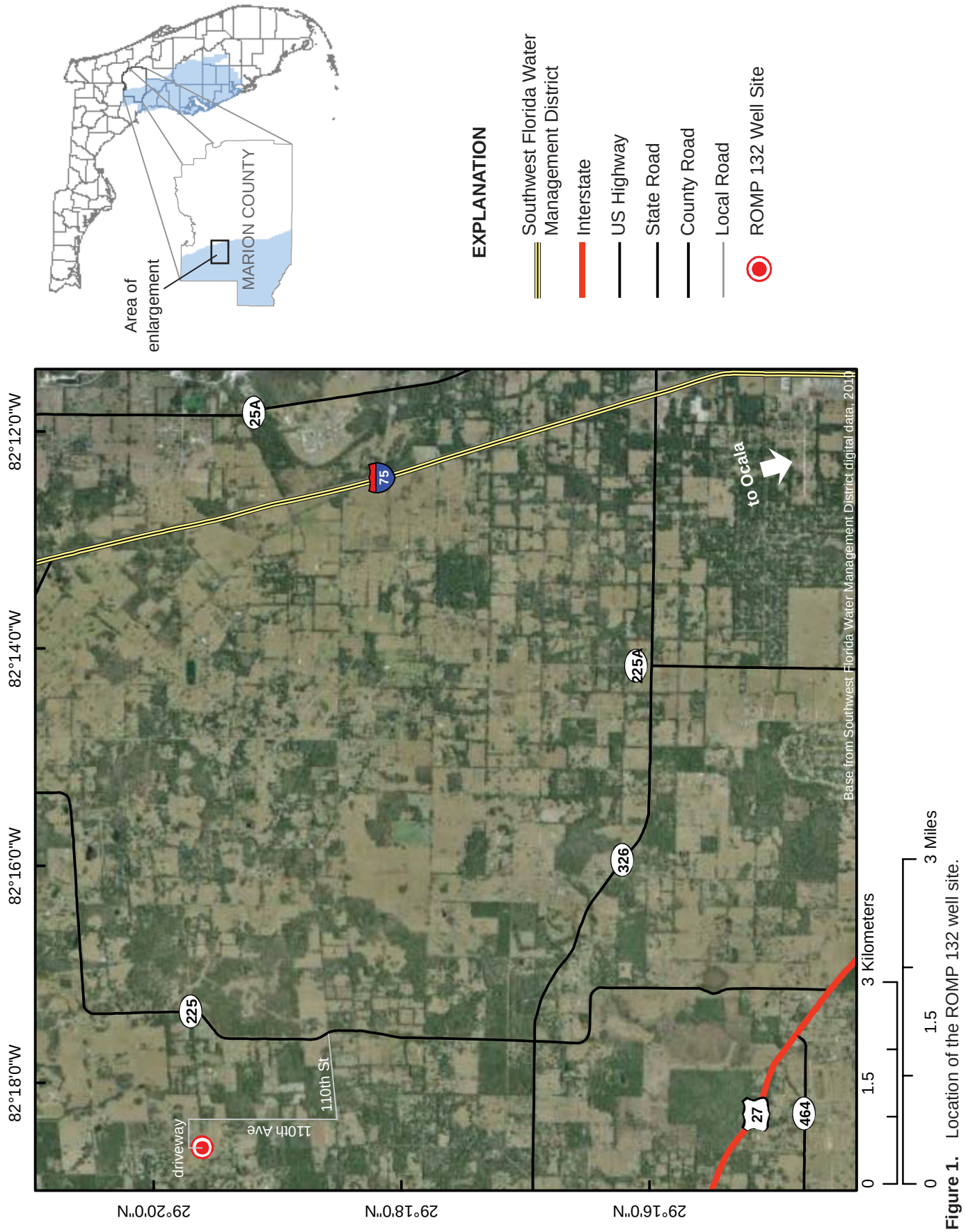



**Figure 1.** Location of the ROMP 132 well site.

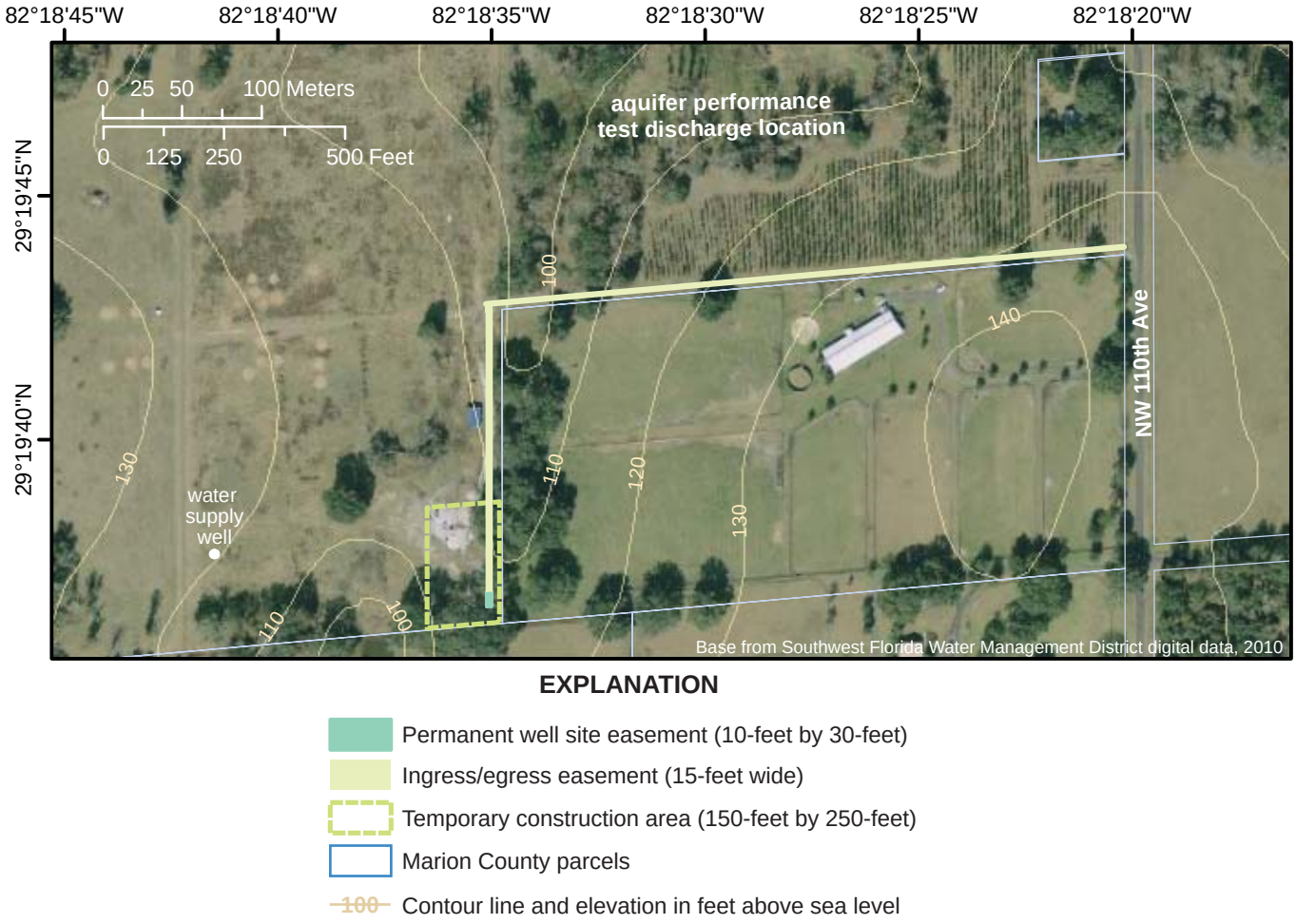



**Figure 2.** Easement configuration and general layout of the ROMP 132 well site in Marion County, Florida.

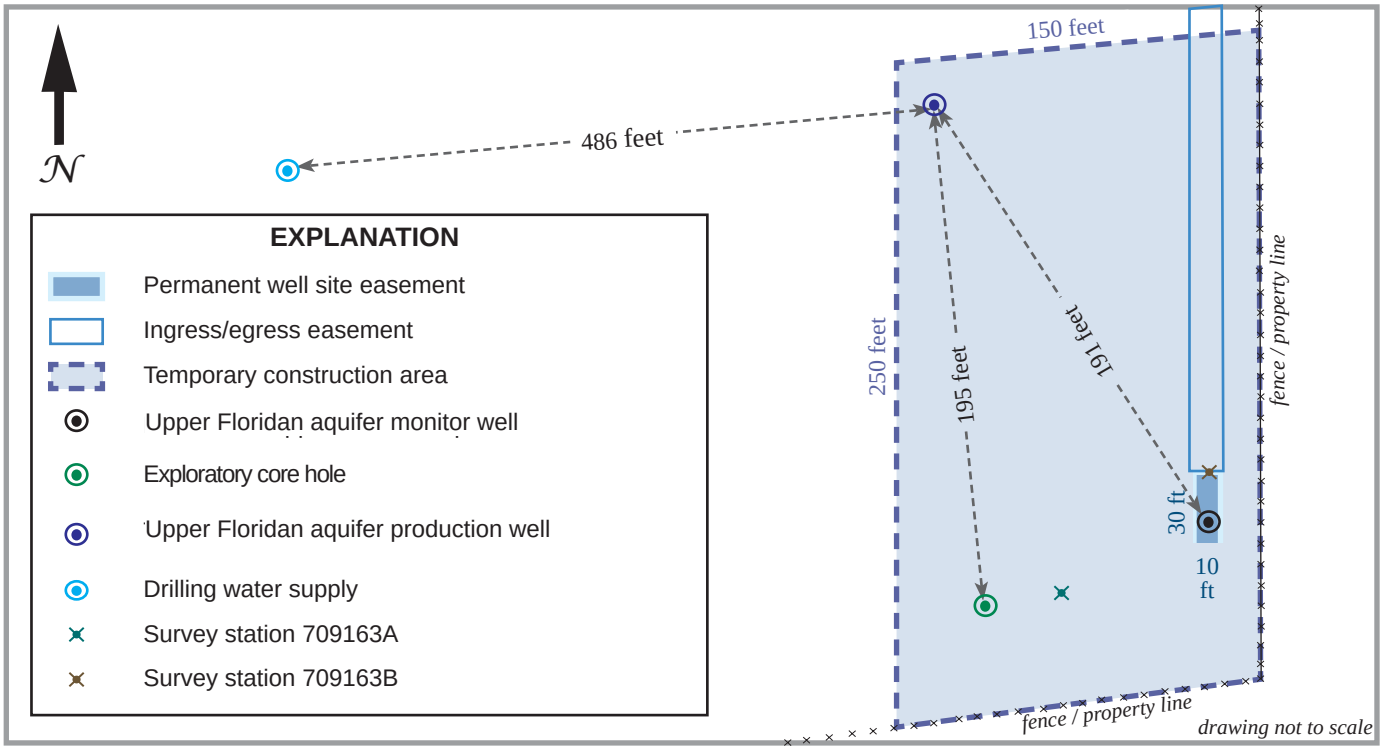



**Figure 3.** Configuration of wells at the ROMP 132 well site in Marion County, Florida. See tables 1 and 3 for well information.

recovery system from land surface to 1,500 feet below land surface. Later, the District's UDR 200 core rig was used to advance the same core hole and to collect lithologic core samples in 10-foot intervals through a wire line recovery system between 1,500 and 1,727 feet below land surface.

A packer assembly was used to isolate 21 discrete intervals for hydraulic and groundwater quality testing during the advancement of the core hole. Slug tests were conducted on, groundwater quality samples were collected from, and groundwater levels were measured in each of the 21 discrete intervals. All slug tests, except the last, were rising head tests initiated using a pneumatic slug. The last slug test was a falling head test, initiated with a physical slug. All groundwater quality samples, except the first and last, were collected at a land surface discharge point using the reverse air pumping method. The first groundwater quality sample was collected at land surface using a low flow Geotech SS Geosub pump. The last groundwater quality sample was collected using a nested bailer assembly that was attached to the packer. The composite groundwater level in the core hole (reflecting the entire open interval of the core hole) was measured every morning before coring commenced, and the pH, temperature, and specific conductivity of the drilling discharge was monitored after every 20 feet of core hole advancement.

Geophysical logs were collected at various stages of core hole construction, and during the construction of the Upper Floridan aquifer production and monitor wells (table 2 and appendix B). The core hole was logged four times. Two of these log suites were collected from inside the drill rods, which acted as casing, and allowed the logging tool to get much deeper than in would have in the uncased core hole. The slim line tool (which collects natural gamma logs), however, is the only tool owned by the District that can fit inside the drill rods.

The constant rate Upper Floridan aquifer performance test was conducted between December 28, 2009, and December 29, 2009. The Upper Floridan aquifer production well was pumped at 2,900 gallons per minute for 24 hours. The groundwater discharged from the well was transported approximately 1,000 feet north of the site into a surface depression. Pumping began after 12 days of background groundwater level data collection. Groundwater level data were also collected 6 days after pumping ceased. Groundwater levels were monitored in the core hole, the Upper Floridan aquifer monitor well, and the drilling water supply well.

# Well Construction

The exploratory core hole was created using well construction permit numbers 774845, 780048, and 806256. Coring commenced June 2, 2008 at land surface with the District's CME 85 coring rig. On June 4, 2008, 10-inch PVC casing was installed to 56 feet below land surface to stabilize the core hole. Temporary 4-inch (HWT) working casing was installed 71 feet below land surface; just below the groundwater surface. On June 24, 2008, 6-inch PVC casing was installed to 128 feet below land surface near the top of the Avon Park Formation. The temporary 4-inch HWT working casing was driven down to 132 feet below land surface. Coring was suspended on February 25, 2009, 1,500 feet below land surface, at the maximum safe coring depth for the CME 85 rig. The 4-inch HWT working casing was removed and groundwater level monitoring equipment was installed in the well. Groundwater level data were collected between March 18, 2009, and July 9, 2010. On July 20, 2010, the groundwater level monitoring equipment was removed, temporary 3.5-inch HQ working casing was installed to 133 feet below land surface, and coring resumed with the District's UDR 200 drill rig. Exploratory coring ended on August 3, 2010, at a depth of 1,727 feet below land surface. The core hole was abandoned by a District crew in March 2011 using well construction permits 806791 and 810557. A summary of well specifications for the core hole and the other wells constructed or monitored at the ROMP 132 site is presented in table 3.

The Upper Floridan aquifer production well, SID 750869, was constructed by Diversified Drilling Corporation under well construction permit number 786168 between August 10, 2009, and October 1, 2009. The well was completed with 16-inch steel casing extending from land surface to 129 feet below land surface, 14-inch steel casing extending from 129 to 150 feet below land surface, and a 12-inch open hole interval extending from 150 to 1,000 feet below land surface (figure C-2 in Appendix C). The well was originally designed with 16-inch steel casing extending to 150 feet below land surface; however, the 16-inch casing could not be advanced past a hard ledge encountered 132 feet below land surface. Telescoping the 14-inch casing out of the bottom of the 16-inch casing allowed passage around this ledge. The well was pumped during the Upper Floridan aquifer performance test and then properly abandoned under well construction permit number 801822.

The Upper Floridan aquifer monitor well, SID 750867, was also constructed by Diversified Drilling Corporation, under well construction permit number 787373, between October 8, 2009, and December 8, 2009. The well was completed with 4-inch Schedule 40 PVC casing extending 239 feet below land surface, and an open hole interval extending from 239 to 994 feet below land surface (figure C-1 in Appendix C). The well was originally designed with 6-inch PVC casing extending to 135 feet below land surface, however, a loose, cavernous interval was encountered approximately 225 feet below land surface while drilling the open hole interval. Because the integrity of the open hole was compromised, 8-inch steel casing was installed below the loose interval, to 239 feet below land surface. The rest of the open hole was then drilled, and lastly, the 4-inch PVC lining was installed with formation packers. The well was used for observation during the Upper Floridan aquifer performance test, and remains at the site to provide long term groundwater level and quality data for the District and other users.

**Table 1.** Surveyed elevation points at the ROMP 132 well site in Marion County, Florida. See figure 3 for survey station and well locations.

[NAVD 88, North American Vertical Datum of 1988; NGVD 29, National Geodetic Vertical Datum of 1929]

| Survey station or well name | Location | Elevation in feet NAVD 88 | Elevation in feet NGVD 29 |
|---|---|---|---|
| 709163A 2008 | Elevation control station inside the temporary construction area | 108.89 | 109.75 |
| 709163B 2008 | Elevation control station inside the permanent well site | 109.22 | 110.08 |
| Exploratory core hole | Top of 10-inch PVC casing (land surface) on July 2, 2008 | 107.64 | 108.50 |
| Drilling water supply | Top of 2-inch steel casing (1.43 feet above land surface) | 116.67 | 117.53 |

**Table 2.** Geophysical log suites collected at the ROMP 132 well site in Marion County, Florida. See Appendix B for well diagrams during logging and geophysical logs.

[all depths are in feet below land surface; -, no value; AQ, aquifer; CAL, caliper; CD, casing depth; D, diameter of the well in inches; FLDN, Floridan; GAM, gamma; MULTI, multifunction; ROMP, Regional Observation and Monitor-well Program; SLIM, slim line; TEMP, temporary; U, Upper]

| Date | Well Name | CD | D | Log Depth | Tool | | | Log location (figure number) in Appendix B |
|---|---|---|---|---|---|---|---|---|
| | | | | | CAL/ GAM | MULTI | SLIM | |
| 6/23/2008 | Exploratory core hole | 56 | 10 | 125 | - | x | - | B-2 |
| | | | | 125 | x | - | - | |
| 1/21/2009 | Exploratory core hole | 131 | 4 | 1,315 | - | x | - | B-3 |
| | | | | 1,299 | x | - | - | |
| 2/23/2009 | Exploratory core hole | 1,500 | 2.375 | 1,505 | - | - | x | B-4 |
| 9/15/2010 | Exploratory core hole | 1,734 | 2.375 | 1,734 | - | - | x | B-5 |
| 12/3/2009 | Upper Floridan aquifer monitor well | 239 | 8 | 993 | - | x | - | B-6 |
| | | | | 994 | x | - | - | |
| | Upper Floridan aquifer production well | 129 | 14 | 995 | - | x | - | B-7 |
| | | | | 994 | x | - | - | |
| 1/29/2010 | Upper Floridan aquifer monitor well | 239 | 4 | 989 | x | - | - | B-8 |

**Table 3.** Wells at the ROMP 132 well site in Marion County, Florida. See figure 3 for well locations and Appendix C for well diagrams..

[-, no value; AQ, aquifer; CD, casing depth in feet below land surface; D, diameter of the well in inches; FLDN, Floridan; PVC, polyvinyl chloride; R, radial distance to pumped well in feet; ROMP, Regional Observation and Monitor-well Program; SID, District site identification number; TD, total depth of well in feet below land surface; TEMP, temporary; U, Upper; WMIS, Water Management Information System; WCP, well construction permit number]

| Well name (and WMIS name) | SID | Latitude | Longitude | TD | CD | D | Material | R | WCP |
|---|---|---|---|---|---|---|---|---|---|
| Exploratory core hole (ROMP 132 COREHOLE) | 709163 | 29° 19' 36.53" | 82° 18' 35.64" | 1,727 | 128 | 6 | PVC | 195 | 774845, 780048, 806256, 806791 810557 |
| Upper Floridan aquifer monitor well (ROMP 132 U FLDN AQ MONITOR) | 750867 | 29° 19' 36.88" | 82° 18' 34.88" | 994 | 239 | 4 | PVC | 191 | 787373 |
| Upper Floridan aquifer production well (ROMP 132 U FLDN AQ PRODUCTION TEMP) | 750869 | 29° 19' 38.38" | 82° 18' 36.21" | 1,000 | 150 | 14 | Steel | 0 | 786168, 801822 |
| Drilling water supply (ROMP 132 U FLDN AQ DRILLING WATER SUPPLY) | 750886 | 29° 19' 38.34" | 82° 18' 41.81" | 139 | 86 | 4 | Steel | 486 | - |

# Geology

The characterization presented below was based on the lithology encountered during exploratory coring at the ROMP 132 site. The geologic units encountered included, in ascending order, the Cedar Keys Formation, Oldsmar Formation, Avon Park Formation, Ocala Limestone, undifferentiated Hawthorn Group sediments, and undifferentiated sand and clay (figure 4). The geology at the ROMP 132 well site generally consists of thick sequences of consolidated carbonates overlain by a relatively thin veneer of unconsolidated clastic sediments. The unconsolidated clastic sediments are most likely marine terrace deposits resulting from numerous high and low sea-level stands during glacial and interglacial periods (Faulkner, 1973). The area surrounding the site is a covered-karst terrain with appreciable dissolution and subsidence of the shallow limestone surface. Active karstification causes the surface of the carbonates to be highly weathered and irregular. The characterization that follows reflects the lithology encountered during exploratory coring, and is unique to the location of exploration. The geology of the surrounding area may vary slightly; most notably near the surface.

A log of lithologic descriptions is presented in Appendix D. The textural terms used to characterize carbonate rocks in this report are based on the classification system of Dunham (1962). Porosity percentages are given as estimates based on visual inspection of the materials, as opposed to laboratory tesing, and should be considered observable porosity. Color descriptions are based on the scale presented in the Rock-Color Chart published by the Geological Society of America (The Rock-Color Chart Committee, 1984).

The contact between the Cedar Keys and the Oldsmar Formation is gradational, suggesting conformity. The contact is 1,557 feet below land surface, where there is a very pale orange dolostone with abundant foram casts. These forams appear to be *Cribrospira bushnellensis* and/or *Borelis gunteri*; however, their diagnostic features have been too altered by the dolomitization process to positively identify.

The contact between the Avon Park Formation and the Oldsmar Formation is gradational suggesting conformity and is 900 feet below land surface. The contact is marked by a 0.5-foot layer with abundant accessory pyrite, and a grayish green material suspected to be glauconite. Additionally, a layer is present just below the contact which contains abundant fossil remains of the foram *Helicostigina gyralis*.

The contact between the Avon Park Formation and the Ocala Limestone is unconformable, and is 125 feet below land surface, at the top of a subhedral dolostone bed. The characteristic gamma peak caused by accessory organics often seen at this contact was not observed. An appreciable amount of weathering has eroded the contact, which may have removed the organics. A fine-grained carbonate sand layer is present between the overlying Ocala Limestone and the top of the Avon Park Formation.

The contact between the Ocala Limestone and the Hawthorn Group sediments is unconformable. The contact is 13 feet below land surface, at the top of a chert bed. The top of the Ocala Limestone is highly weathered, and the clays of the Hawthorn Group have migrated downward into voids. The top of the Ocala Limestone in the region is suspected to be highly variable and dependent on the amount of weathering at a given location.

The contact between the Hawthorn Group sediments and the undifferentiated sand and clay is gradational. It is marked by the first appearance of light olive colored clay 6 feet below land surface.

## Cedar Keys Formation (Paleocene)

The Paleocene age Cedar Keys Formation was the oldest and deepest formation encountered during exploratory coring and testing. The top of the formation is 1,557 feet below land surface. The bottom of the formation was not reached during exploration. Winston (1994) identified six distinct lithologic units within the Cedar Keys that he denoted A through F. Unit A was not distinguishable from Unit B at the ROMP 132 site. The top of the formation contains a relic grain structure that resembles what Winston describes as Unit B, however the presence of Unit A could not be confirmed or denied. The top of Unit C was observed 1,637 feet below land surface at the first occurrence of anhydrite.

Units A and B, between 1,557 and 1,637 feet below land surface, contain very pale orange, chiefly anhedral, cryptocrystalline (crystals not visible under x30 magnification) to fine grained, dolostone of moderate to good induration, with laminations and a relic grain structure. Observable porosity in this part of the formation is intercrystalline and pin point vugular, and is estimated to be between 15 and 25 percent. Altered foram casts, suspected to be *Cribrospira bushnellensis* and/or *Borelis gunteri*, are abundant at 1,557 feet below land surface and grade to less abundance with depth.

Unit C, between 1,637 feet and the total depth of exploration of 1,727 feet below land surface, is pinkish gray and dark yellowish brown, anhydrite and cryptocrystalline (crystals not visible under x30 magnification) dolostone mix, with good induration. Observable porosity in this part of the formation is intercrystalline, and extremely low (estimated to be between 0 and 1 percent). Dolosilt laminations are common.

## Oldsmar Formation (Early Eocene)

The early Eocene age Oldsmar Formation extends between 900 and 1,557 feet below land surface. The lithology consists generally of thickly interbedded, fractured dolostone, and fossiliferous packstone to wackestone. Generally, the lower half of the formation is more extensively dolomitized than the upper half. Intervals where the drill string moved downward without resistance, or “bit drops,” were common, and encountered between 985 and 987 feet, 998 and 999 feet, 1,266 and 1,268 feet, 1,389.0 and 1,389.1 feet, 1,400.7

and 1,401.0 feet, 1,467.0 and 1,467.4 feet, and 1,487.0 and 1,487.25 feet below land surface.

Between 900 and 1,026 feet below land surface are thickly interbedded, moderate yellowish brown dolostones, and very pale orange packstones. The dolostones of this interval are subhedral, cryptocrystalline (crystals not visible under x30 magnification) to medium grained, of good induration, and contain foram casts. The packstones of this interval are partially dolomitized, have interclast and skeletal cast grain types, and contain forams, mollusks, and oolites. Fossil remains of the foram *Helicostigina gyralis* are present between 900 and 946 feet below land surface. Observable porosity between 900 and 1,026 feet below land surface is intergranular, intercrystalline, and moldic, and ranged between 5 and 20 percent.

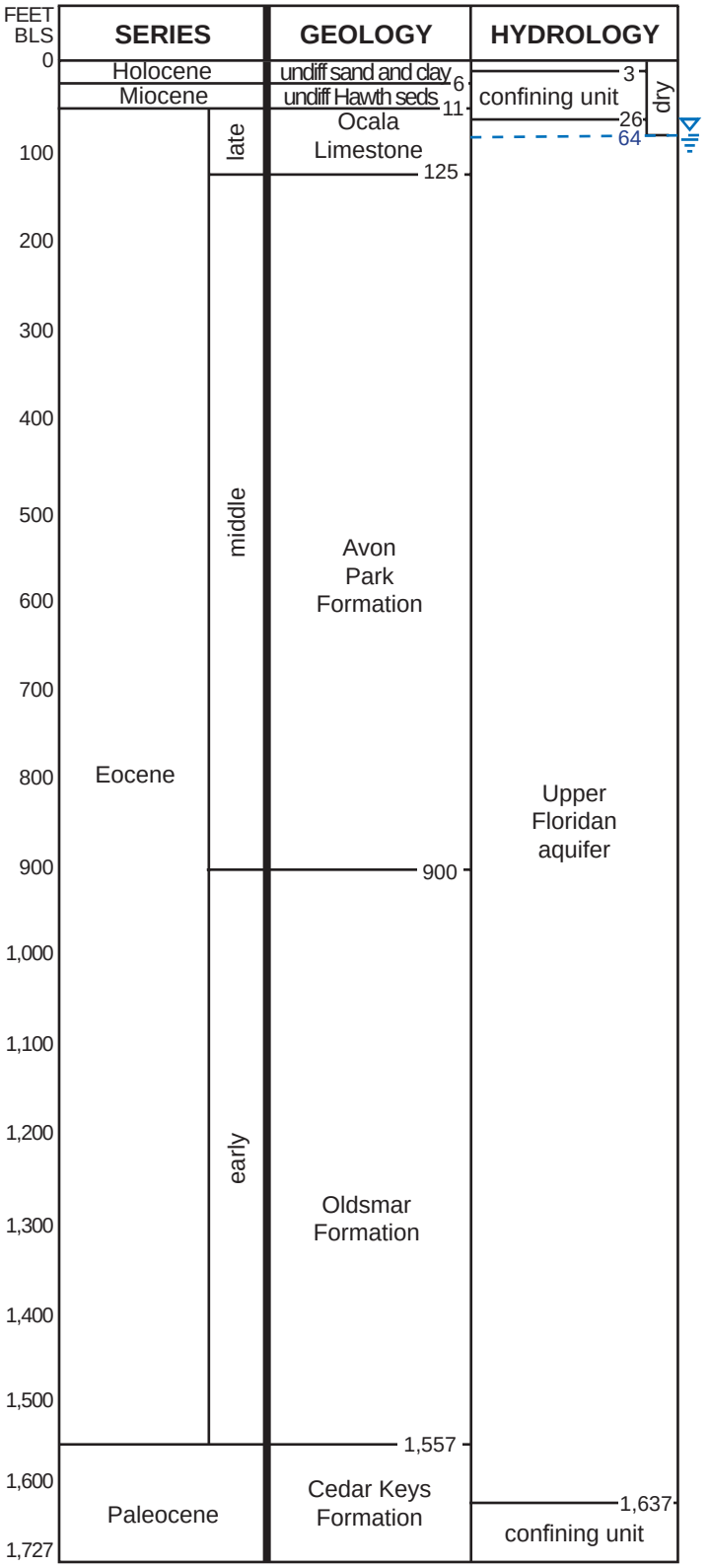
The lithology between 1,026 and 1,205 feet below land surface is extremely variable and contains interbedded dolostones, mudstones, packstones, wackestones, and grainstones. Vugs are commonly lined with white quartz clusters, referred to informally in the field as "snowballs." Fossil remains of forams and mollusks are most notable between 1,151 and 1,165 feet below land surface. Observable porosity between 1,026 and 1,205 feet below land surface is predominately intergranular and vugular and ranges between 10 and 20 percent.

The portion of the formation between 1,205 and 1,557 feet below land surface contains exclusively dolostone and is noticeably more dense, and crystalline, than the portion above. The dolostones range from subhedral to anhedral, have generally good induration, and contain few fossils. Secondary, fracture and vugular porosity, account for the majority of the observable porosity, which ranges between 5 and 25 percent. Rare organic laminae and clay were observed. Abundant gastropod molds were observed approximately 1,222 feet below land surface. Highly fractured dolostone beds exist between 1,200 and 1,220 feet, 1,250 and 1,321 feet, 1,425 and 1,468 feet, and 1,473 and 1,489 feet below land surface. Sample recovery in these intervals required multiple retrieval runs, and fragments fell from the core hole walls during drilling. Below 1,489 feet below land surface, the dolostone is predominately crypto- (crystals not visible under x30 magnification) to microcrystalline and the presence of fractures and vugs is much less than above.

## Avon Park Formation (Middle Eocene)

The middle Eocene age Avon Park Formation extends between 125 and 900 feet below land surface and contains thickly interbedded dolostones and variably dolomitized limestones. Massive organic beds and voids are common throughout the formation.

Between 125 and 276 feet below land surface the formation resistivity increases dramatically (figure B-3 in Appendix B) implying the carbonates of this layer are much more dense than the carbonates above and below it. Traces of organic




[Not to scale; Land surface elevation = 108 feet above the North American Vertical Datum of 1988; bls, below land surface; undiff, undifferentiated; undiff Hawth seds, undifferentiated Hawthorn Group sediments]

**Figure 4.** Stratigraphy at the ROMP 132 well site in Marion County, Florida.

material are common throughout the layer; however, the characteristic gamma peak associated with the top of the formation was not observed. Between 125 and 167 feet below land surface, the lithology consists of a grayish orange, slightly weathered, dolostone, with good induration, few fractures, and trace organics. The predominately very pale orange wackestones and packstones between 167 and 211 feet below land surface are of good induration, and are partially dolomitized in parts. The dolostone between 211 and 276 feet below land surface is grayish orange, predominately microcrystalline, with good induration, fossil molds, and iron staining along fractures and vugs. An unconsolidated, calcareous, iron stained, silt to silty-fine-sand layer was encountered between 225 and 230 feet below land surface causing an increase in core hole diameter (figure B-3 in Appendix B). Observable porosity between 125 and 276 feet below land surface was intergranular, pin point vugular, and moldic, and ranges between 5 and 25 percent.

Between 276 and 550 feet below land surface, the lithology consists of predominately very pale orange to white, weathered, subhedral dolostone, with variably dolomitized wackestones and packstones. Organic laminae are common. A possible void or fracture was encountered approximately 409 feet below land surface. It was first noticed during drilling when almost no water pressure was required to core this location. A large (approximately 5-inch wide), water-worn vug was observed in the core retrieved from this location; however, the caliper log shows no major change in core hole diameter. The peaks on the gamma log (figure B-3 in Appendix B) between 417 and 418 feet below land surface, and between 430 and 435 feet below land surface, were created by a black lignitic organic and greenish gray clay layer, and a dark yellowish brown clay layer, respectively. Casts of the foraminifera *Cushmania americana* (formerly *Dictyoconus americanus*) and various coral species are very common in the limestones between 470 and 550 feet below land surface. Observable porosity between 276 and 550 feet below land surface is intergranular, pin point vugular, and vugular, and ranges between 2 and 25 percent.

The carbonates between 550 and 710 feet below land surface are predominately pale yellowish brown to dark yellowish orange dolostones with moderate to high degrees of alteration, and good induration, interbedded with packstones and wackestones of variable dolomitization, and good induration. Fractures are not common, but are most notable between 630 and 647 feet below land surface. Vugs are commonly filled with uninhibited dolostone, scalenohedral (dogtooth) calcite, and/or quartz crystals. Massive organic layers and laminae are common. The thickest of these layers is present between 684 and 694 feet below land surface, and contains very dark brown to black, lignitic, flakey organics of moderate induration. This layer can be seen as a peak on the gamma log (figure B-3 in Appendix B) along with similar, less massive, layers between 557 and 559 feet below land surface, and 577 and 578 feet below land surface.

The base of the formation, between 710 and 900 feet below land surface, contains the fossiliferous limestone formerly referred to as the Lake City Limestone. The layer between 711 and 808 feet below land surface contains a very pale orange to grayish orange, microfossiliferous, packstone, of moderate to good induration, with calcite lined vugs. A green material, suspected to be glauconite fills the pore spaces between 712 and 715 feet below land surface. The layer between 808 and 900 feet below land surface contains a very pale orange to grayish orange, vuggy, wackestone, with good induration, macrofossils, and vugs lined with a mineral suspected to be glauconite. Fossils observed in this layer included large (from 2 to 10 millimeters in diameter) coral and mollusk casts. A weathered framework of limestone and a void filled with silty carbonate sand and fine organics was encountered between 851 and 874 feet below land surface.

## Ocala Limestone (Late Eocene)

The late Eocene age Ocala Limestone extends between 11 and 125 feet below land surface, and represents the shallowest occurrence of rock at the ROMP 132 well site. The upper most part of the formation, between 11 and 25 feet below land surface is highly altered; containing abundant chert and an infilling of post depositional clay. The rest of the formation contains predominately packstone. Fossil molds and casts, most notably those of the foram *Nummulities vanderstoki*, are present throughout the formation. Microfossils are most abundant between 46 feet and 60 feet below land surface, whereas macrofossils are most abundant between 95 feet and 115 feet below land surface.

A mixture of chert, limestone, and clay infilling is present between 11 and 46 feet below land surface. A quartz crystal lined vug was found 14 feet below land surface. Dark yellowish brown, soft, slightly silty clay infill, mixed with nodules of weathered chert, limestone, and sandstone, compose the majority of the layer. The clay caused an uncharacteristically high gamma response for the Ocala Limestone (figure B-2 in Appendix B). A massive chert layer is present between 11 and 25 feet below land surface. The chert ranges in color from white to light olive gray and contains what appear to be highly altered *Lepidocyclina ocalana* molds that indicate the parent material was likely Ocala limestone. Observable porosity of this layer is fractured, vugular, intergranular, and is approximately 30 percent.

Between 45 and 53 feet below land surface is a white, highly weathered, skeletal packstone with poor to good induration, iron staining and abundant *Nummulities vanderstoki* molds. Beds of dark yellowish brown clay are present between 45 and 46 feet below land surface, and 50.0 and 50.5 feet below land surface. Observable porosity in this interval is predominately intergranular, but is moldic and vugular in parts, and ranges between 15 to 20 percent.

Between 53 and 92 feet below land surface is a white to very pale orange, weathered, predominately grainstone, of moderate induration with abundant iron staining and few fossils. Fossil casts, such as those of *Nummulities vanderstoki*,

are common between 53 and 57 feet below land surface, but are rare throughout the rest of the interval. Observable porosity is 20 percent and intergranular.

Between 92 and 125 feet below land surface is a pale yellow, weathered, packstone of moderate to good induration with macrofossil molds and casts, abundant iron staining, and few calcite lined vugs. Iron stains are along most large pore spaces and flow paths and are most evident between 92 and 95 feet below land surface. Mollusk, echinoid, and *Eupatagus sp.* molds and casts are common throughout the layer. Weathering is most prominent between 115 and 125 feet below land surface, where there is a framework of the packstone, infilled with very pale brown, calcareous, fine grained, quartz sand. Much of the fine sand was removed or washed away during development of the core hole, causing an increase in core hole diameter (figure B-2 in Appendix B). Observable porosity is predominately intergranular, but moldic in parts, and ranges between 15 and 25 percent.

### Undifferentiated Hawthorn Group (Miocene)

The Miocene aged undifferentiated Hawthorn Group sediments are between 6 and 11 feet below land surface. This layer consists of light olive to brown, highly plastic, mottled, clay between 6 and 10 feet below land surface, which grades to a light greenish gray, highly plastic, heavily iron stained clay between 10 and 11 feet below land surface. Observable porosity is intergranular and ranges between 1 and 3 percent.

### Undifferentiated Sand and Clay (Pliocene)

A sand and clay layer is present between land surface and 6 feet below land surface. Sample recovery during coring was poor through this interval; therefore classification was conducted inside the drilling discharge pit, which bisected the layer. The layer contains a dark yellowish brown, slightly silty, fine grained, quartz sand with few organics between land surface and 0.8 feet below land surface; a light brown to moderate brown, slightly clayey, fine grained, quartz sand with some mottles between 0.8 and 3.8 feet below land surface; and a moderate gray to light brown, mottled, clay between 3.8 and 6 feet below land surface. Observable porosity in this layer is intergranular, ranges between 3 and 15 percent, and generally decreases with depth.

## Hydrology

The hydrogeologic units at the ROMP 132 well site include, in descending order, a confining unit, the Upper Floridan aquifer, and a confining unit (figure 4). The Upper Floridan aquifer is the only aquifer in the Floridan aquifer system at the ROMP 132 well site. Groundwater was first encountered 64 feet below land surface during exploration. A comparison of the nomenclature used in this report and previously published reports is presented in figure 5.

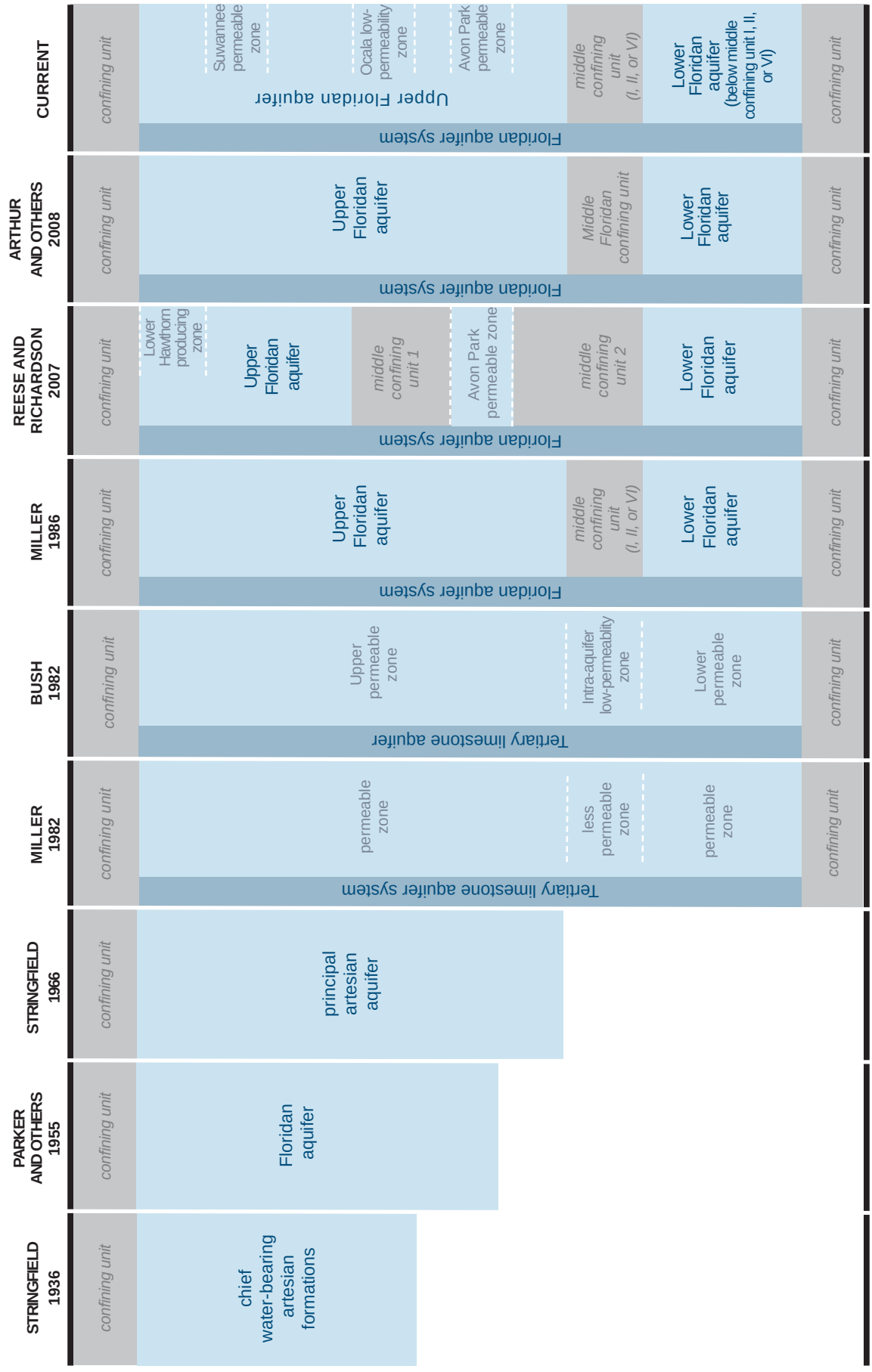
The delineation of the hydrogeologic units presented below is based primarily on the relative hydraulic conductivity estimates obtained from 21 slug tests conducted during exploratory coring and testing. Groundwater level data, groundwater quality data, lithologic descriptions, and geophysical logs are also used to aid in the delineation. The hydraulic conductivity values obtained from slug testing are not absolute because of the sources of error identified in Appendix A, however, they can be used to compare relative changes in hydraulic conductivity with depth. The hydraulic conductivity estimates derived from slug test analysis are shown in table 4. The hydraulic conductivity estimates in graphic form along with the groundwater level data collected from each tested interval are shown in figure 6. Slug test field notes are presented in Appendix E, and the analytical curve-match solution for hydraulic conductivity for each test are presented in Appendix F.

An aquifer performance test was conducted in the Upper Floridan aquifer. General details of the test were previously discussed in the Data Collection Methods section of this report. More specific methodologies and findings are given below. Aquifer performance test field notes are presented in Appendix G, and the analytical curve-match solutions for transmissivity are presented in Appendix H.

### Surficial Aquifer

The surficial aquifer is absent at the ROMP 132 well site. The quartz sand layer described in the undifferentiated sand and clay section was dry at the time of exploration, and is presumed to be dry year-round. As mentioned in the Introduction, the well site is located within a valley-like feature where enhanced erosion of the surface sediments likely results. This report presents only the findings at the location of exploration, where shallow sediments may be thin in comparison to surrounding areas.

Sand seams and karst features could be providing pathways for the drainage of surface water to the underlying Upper Floridan aquifer. In the location of the core hole, redoximorphic features were observed suggesting saturated periods. Soil mottles were first observed about 2 feet below land surface. During exploratory coring and testing, the low area to the north of the site filled with water during the rainy months, most notably when Tropical Storm Fay passed over the site in late August 2008, and was dry during the winter months. Drainage of surface water into the Upper Floridan aquifer is suspected to occur slowly; causing a temporary perched water table after significant rain events and allowing time for redoximorphic features to develop in the sediments.




[Terms shown are for hydrogeologic units present within the Southwest Florida Water Management District (District)]

**Figure 5.** Floridan aquifer system correlation chart.

**Table 4.** Slug test data collected at the ROMP 132 well site in Marion County, Florida. See figure 6 for hydraulic conductivity and water level plots and Appendices E and F for slug test field notes and curve match solutions.

[NAVD 88, North American Vertical Datum of 1988; KGS, Kansas Geological Survey]

| Slug test number | Date of test | Interval tested in feet below land surface | Lithologic description | Response damping | Analytical method | Groundwater elevation in feet NAVD 88 | Hydraulic conductivity in feet per day |
|---|---|---|---|---|---|---|---|
| 1 | 6/12/2008 | 71-110[a] | Ocala Limestone - fossiliferous packstone to grainstone | over | KGS Model (Hyder, 1994) | 43.47 | 56 |
| 2 | 7/9/2008 | 132-175[a] | Avon Park Formation - predominately dolostone with mudstone bed in bottom 8 feet of interval | critical | KGS Model (Hyder, 1994) | 43.20 | 11 |
| 3 | 7/10/2008 | 180-215 | Avon Park Formation - packstone with dense fractured dolostone in bottom 5 feet of interval | under | Butler (1998) | 43.10 | 130 |
| 4 | 7/22/2008 | 233-285 | Avon Park Formation- fractured dolostone and wackestone | under | Butler (1998) | 43.14 | 79 |
| 5 | 7/29/2008 | 303-360 | Avon Park Formation- dolostone with large vugs | under | Butler (1998) | 43.08 | 52 |
| 6 | 8/6/2008 | 381-440 | Avon Park Formation- dolostone with possible large fracture/ cavity | under | Butler (1998) | 43.09 | 60 |
| 7 | 8/13/2008 | 486-555 | Avon Park Formation- mudstone to wackestone with vuggy dolostone bed in bottom 7 feet of interval | under | Butler (1998) | 43.23 | 26 |
| 8 | 8/27/2008 | 587-630 | Avon Park Formation - dolostone with large vugs and some fractures | under | Butler (1998) | 44.44 | 71 |
| 9 | 9/9/2008 | 661-710 | Avon Park Formation- interbedded dolostone and packstone to grainstone with 10 foot bed of organics | under | Butler (1998) | 45.63 | 63 |
| 10 | 9/15/2008 | 751-810 | Avon Park Formation- packstone to wackestone | over | Butler (1998) | 45.92 | 2 |
| 11 | 9/22/2008 | 845-890 | Avon Park Formation - packstone to wackestone with large vugs and possible cavity | under | Butler (1998) | 46.05 | 110 |
| 12 | 9/29/2008 | 906-975 | Oldsmar Formation- interbedded dolostone and packstone to wackestone | over | Butler (1998) | 46.22 | 3 |
| 13 | 10/2/2008 | 981-1,045 | Oldsmar Formation- interbedded dolostone and packstone with cavity. | under | Butler (1998) | 46.18 | 63 |
| 14 | 10/13/2008 | 1,076-1,155 | Oldsmar Formation- interbedded dolostone and mudstone with weathered quartz | under | Butler (1998) | 46.12 | 72 |
| 15 | 10/22/2008 | 1,186-1,230 | Oldsmar Formation - dense fractured dolostone | under | Butler (1998) | 45.98 | 73 |
| 16 | 11/19/2008 | 1,246-1,310 | Oldsmar Formation- dense, fractured dolostone | under | Butler (1998) | 45.44 | 170 |
| 17 | 12/16/2008 | 1,346-1,390 | Oldsmar Formation- dolostone with some fractures and a possible void | under | Butler (1998) | 44.93 | 120 |
| 18 | 1/29/2009 | 1,421-1,460 | Oldsmar Formation- dense, fractured dolostone | under | Butler (1998) | 43.47 | 220 |
| 19 | 2/12/2009 | 1,466-1,500 | Oldsmar Formation - dense, fractured dolostone | under | Butler (1998) | 43.28 | 320 |
| 20 | 7/22/2010 | 1,557-1,607 | Cedar Keys Formation- dolostone, former packstone | critical | Butler (1998) | 44.57 | 6 |
| 21 | 7/28/2010 | 1,637-1,687 | Cedar Keys Formation- dense, non-porous anhydrite and dolostone | over | none | 42.20 | $< 10^{-5}$ |

[a] packer not used, interval was isolated with casing

## Confining Unit

A confining unit restricts the downward flow of water from land surface to the Upper Floridan aquifer. The clayey sediments composing the confining unit extend between 3 and 26 feet below land surface. The sediments are contained within the undifferentiated Hawthorn Group and the Ocala Limestone. Hydraulic testing and groundwater quality sampling were not conducted within the confining unit because it was dry at the time of exploration. Delineation of the unit was based on the lithologic character and observable porosity of the geologic materials.

Abundant redoximorphic features were observed throughout the confining unit suggesting it follows similar saturated and non-saturated cycles as the sand sediments above. Mottles covered 50 percent of the sample recovered from 3 feet below land surface, and 100 percent of the sample recovered from between 10 to 11 feet below land surface. Below this depth, mottles were still present, but covered between 15 and 30 percent of the samples recovered. The confining unit is suspected to be leaky, allowing surface water to enter the Upper Floridan aquifer through the pathways described above.

## Upper Floridan Aquifer

The Upper Floridan aquifer extends between 64 and 1,637 feet below land surface. The Upper Floridan aquifer is the only aquifer present in the Floridan aquifer system at the ROMP 132 well site.

The aquifer is contained within the permeable carbonates of the Ocala Limestone, Avon Park Formation, Oldsmar Formation, and Cedar Keys Formation. It is confined by clayey sediments above and dense anhydrite and dolostone below. Although the upper confining unit is suspected to be breached, the criteria to be considered unconfined is not met because the aquifer does not contain “continuous layers of materials of high intrinsic permeability extending the from land surface to the base of the aquifer” (Fetter, 2001).

The top of the aquifer, 64 feet below land surface, is the shallowest occurrence of groundwater at the ROMP 132 well site. During exploratory coring, loss of drilling circulation occurred 26 feet below land surface, indicating permeable sediments between 26 and 64 feet below land surface, however, these sediments were dry at the time of exploration and are therefore not considered part of the Upper Floridan aquifer. The top of the Upper Floridan aquifer is at the potentiometeric surface, which varies thoughout the year. The depth to the top of the aquifer presented in this report is the potentiometric surface as it was encountered during exploratory coring.

Upper Floridan aquifer groundwater levels responded to rainfall events, most notably after the passing of Tropical Storm Fay over the site on August 22, 2008, which dropped over 6 inches of rain. The storm caused an abrupt rise in groundwater level when the core hole was at a depth of 600 feet below land surface (figure 6).

A groundwater level recorder was installed in the core hole during a lull in coring activities. The core hole was 1,500 feet below land surface during this time. Upper Floridan aquifer groundwater level data were recorded between March 18, 2009, and July 6, 2010. Groundwater levels fluctuated 1.83 feet during this period. The fluctuation was consistent with the seasonal trend observed during exploratory coring and testing.

A total of 20 slug tests were conducted within the Upper Floridan aquifer during exploratory coring and testing (table 4 and figure 6). Hydraulic conductivity values varied throughout the aquifer; ranging between 2 and 320 feet per day. Many of the intervals with high hydraulic conductivity values contain fractured dolostone in which it is clear secondary porosity features are the main conduits for groundwater flow.

A constant rate aquifer performance test was conducted in the Upper Floridan aquifer for 24 hours between December 28, 2009, and December 29, 2009 (figure 7). Pumping at a rate of 2,900 gallons per minute began after 12 days of background groundwater level data collection. Groundwater level data were also collected 6 days after pumping ceased. Maximum drawdown in the Upper Floridan aquifer production well was approximately 4 feet, however the groundwater level data collected from this well was extremely noisy. The drawdown value of 4 feet was obtained from an average of data points collected during the pumping period. In addition to the production well, the three other wells open to the Upper Floridan aquifer were monitored during the test; the Upper Floridan aquifer monitor well, the exploratory core hole open to 1,500 feet below land surface, and the drilling water supply well. The Upper Floridan aquifer monitor well, exploratory core hole, and drilling water supply wells were 191 feet, 195 feet, and 486 feet away from the production well respectively (figure 3). All wells were partially penetrating. The maximum drawdown in both the exploratory core hole and the Upper Floridan aquifer monitor well was 1 foot. The maximum drawdown in the drilling water supply well was 0.3 feet. Field notes taken during the test are presented in Appendix G.

Groundwater discharged from the production well was transported by pipeline approximately 1,000 feet northeast of the site to a topographic depression. It was discovered that this low area contained a karst opening into the Upper Floridan aquifer. Discharge water reached this opening exactly 2 hours into the drawdown phase of the test. After 3 hours, the opening stopped taking water into the ground and a pool formed. No recharge effect was observed in the data. The flow rate of the discharge was measured with an impeller flow meter (which failed near the start of the test), and with a circular orifice weir. Orifice head pressure was measured and recorded digitally and used in the analysis of the drawdown data to correct for small variations in flow rate.

Analysis of the groundwater responses during pumping indicated that although the aquifer is considered confined based on the lithology encountered, it is not pressurized (it is non-artesian). The groundwater level was below the top of permeable sediments and dewatering of the limestone was

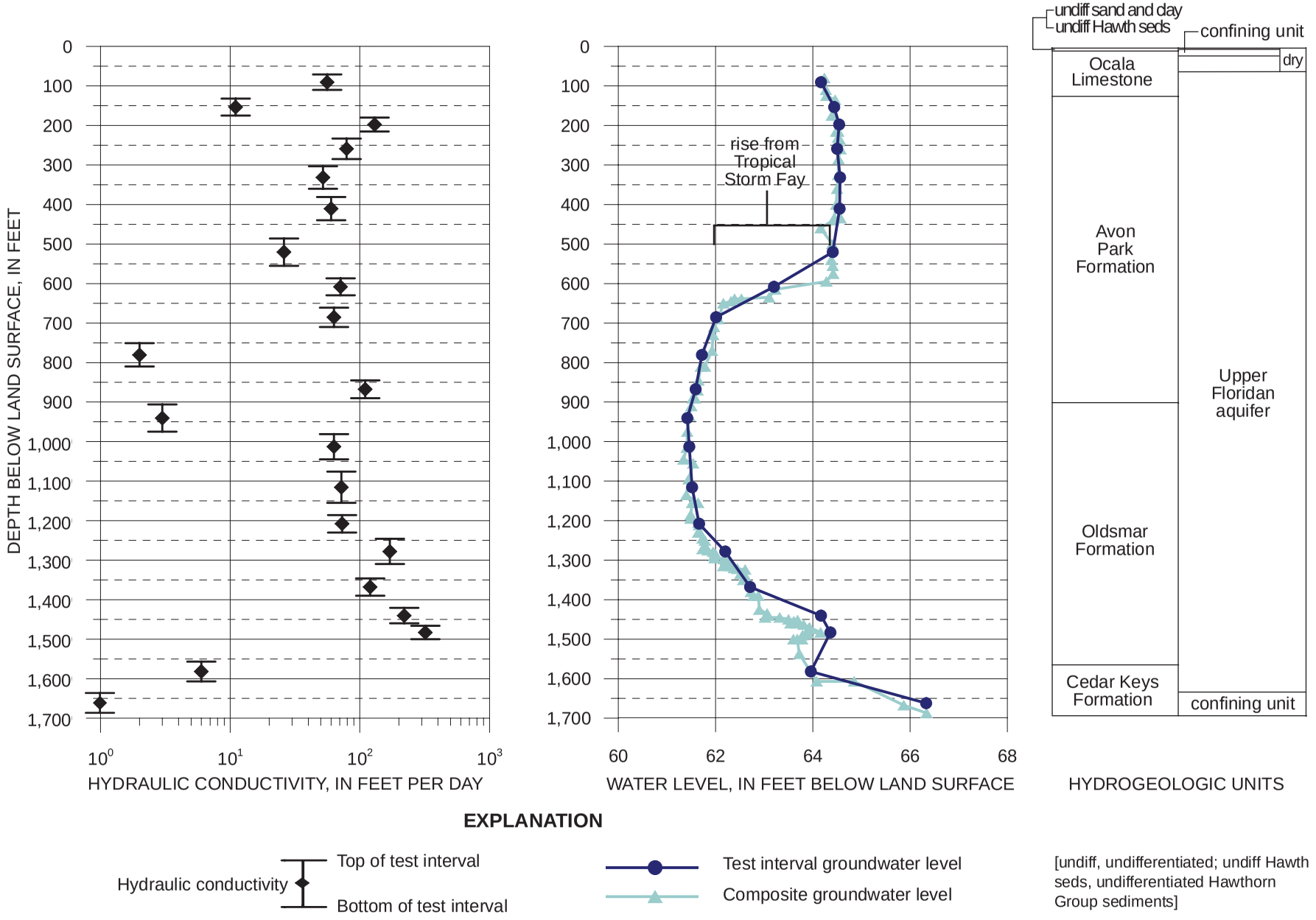



**Figure 6.** Hydraulic conductivity and groundwater level with depth during exploratory coring and testing at the ROMP 132 well site in Marion County, Florida. See table 4 for slug test and groundwater level data and Appendices E and F for slug test field notes and curve match solutions.

observed during the test. The effects of partial penetration were negligible in the Upper Floridan aquifer monitor well and the exploratory core hole; however, well bore storage at the start of the test was a factor in aquifer response. Oscillatory response of groundwater levels was observed in all wells except the drilling water supply well both when the pump was turned on and when the pump was turned off.

Analysis of the test data was conducted with AQTESOLV® for Windows software. The analytical curve-match solutions are shown in Appendix H. Drawdown phase and recovery phase data were plotted together for analysis. The pretest and post test groundwater level data were used to calculate and remove a downward regional slope from the test data. The slope was $-5x10^{-6}$ when time was plotted in minutes.

Initially, the Theis (1935)/Hantush (1961) solution was used to estimate transmissivity (T) and storativity (S) from groundwater level data collected in the Upper Floridan aquifer monitor well, exploratory core hole, and drilling water supply well. Each data set was analyzed individually. It was found the Upper Floridan aquifer monitor well and exploratory core hole were not far enough away from the production well and produced unrealistically low estimates of storativity. Additionally, the oscillatory response of the groundwater levels at the start and end of pumping created difficulty in the analysis. The drilling water supply well, which was much farther away from the production well, saw a relatively small amount of groundwater level change during pumping. As a result, the groundwater level data from this well was noisy and analysis was questionable, although a much more realistic estimate for storativity was seen. While each of the groundwater level responses from the three wells by themselves could not produce reliable estimations, when they were combined and analyzed together, the negative influences were muted. The Cooper Jacob (1946) straight line analysis of all three wells together produced a reliable transmissivity value and was not as influenced by the early and late time data noise as were other analysis methods. Transmissivity of the Upper Floridan aquifer was estimated at:

T = 380,000 square feet per day

A distance-drawdown analysis of all three groundwater level responses produced a similar transmissivity value, and the transmissivity values from the individual Theis (1935)/Hantush (1961) analyses were of the same order of magnitude.

It was not possible to pump the aquifer at a rate high enough rate to create a curve for the reliable estimation of storativity at this time. Additionally, the effect of dewatering of limestone on the estimation of storativity is not well understood, and therefore a value is not reported here. A leakance coefficient could not be estimated because the sediments above the Upper Floridan aquifer were dry.

## Confining Unit

The lower confining unit of the Upper Floridan aquifer was the deepest hydrogeologic unit encountered at the ROMP

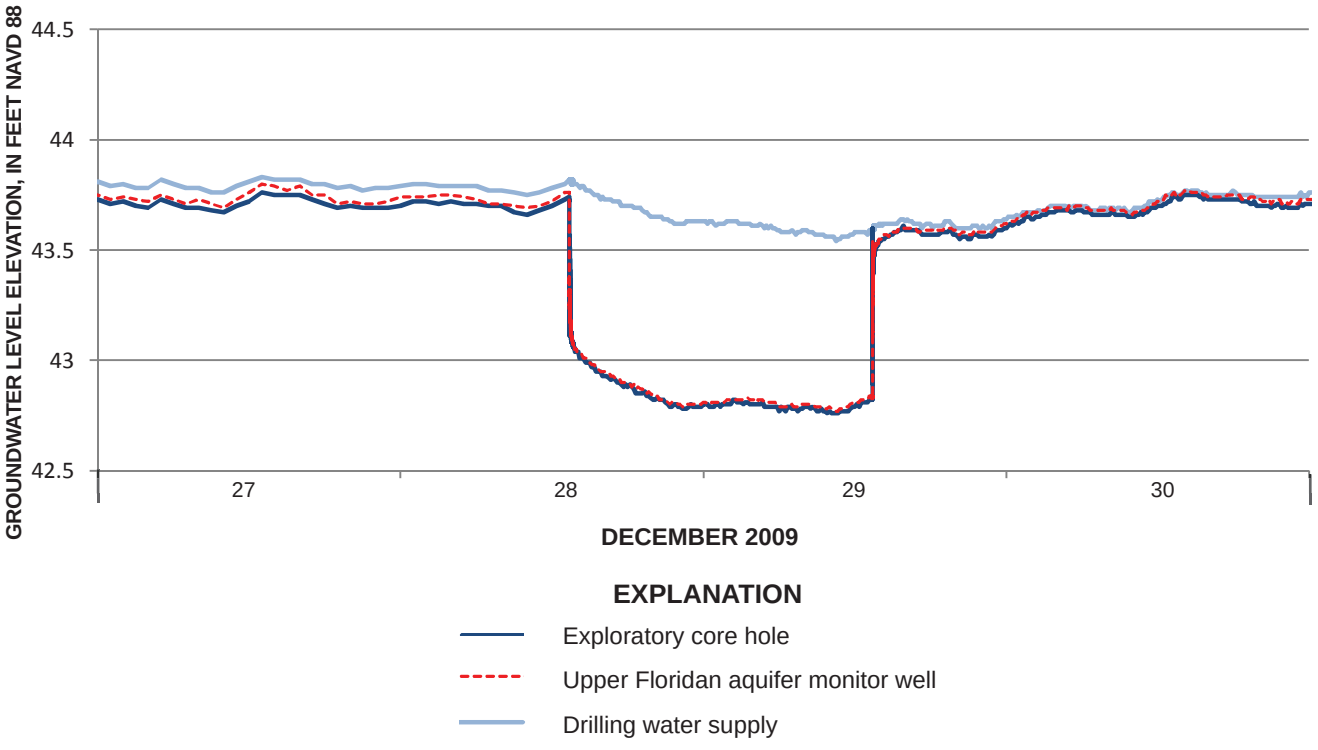



**Figure 7.** Hydrograph of groundwater levels in three wells before, during, and after the Upper Floridan aquifer performance test at the ROMP 132 well site in Marion County, Florida.

132 site. The top of the unit is 1,637 feet below land surface. The bottom of the unit was not reached during exploration. The unit is contained within the nonpermeable, anhydrite and cryptocrystalline (crystals not visible under x30 magnification) dolostone layers of the Cedar Keys Formation.

The groundwater level in the confining unit was 2.4 feet lower than the groundwater level in the Upper Floridan aquifer. Some of this level difference can be accounted for by the increase in total dissolved solids, which results in a higher groundwater density in this unit.

A slug test was attempted in the confining unit; however, the groundwater level response was so slow, the signal to noise ratio of the data rendered the test unusable (noise is created from temperature fluctuations throughout the day and night which change the resistance in the wires connecting the pressures transducer to the data logger). The test was initiated with a physical slug that displaced the groundwater level 1.6 feet above the static level. After 4 days, the groundwater level still had not returned to a static condition and the test was ended. The hydraulic conductivity is considered to be essentially zero.

## Groundwater Quality

Twenty-one groundwater samples were collected from discrete intervals in the ROMP 132 core hole. Twenty of the samples were from the Upper Floridan aquifer, and the last sample was from the confining unit below the Upper Floridan aquifer. These 21 discrete intervals correspond to the slug tested intervals of the same number. All samples were prepared and sent to the District laboratory after field testing. Field notes taken during the collection of each groundwater quality sample are presented in Appendix I. The results of the laboratory and field analyses are given in Appendix J. The laboratory values for alkalinity, chloride, total dissolved solids, sulfate, silica, pH, and conductivity, of sample numbers 6, 10, 11, 12, and 14, should be considered with caution as these samples were stored improperly prior to analysis.

Groundwater in the Upper Floridan aquifer at the ROMP 132 well site is fresh, meaning total dissolved solids are below 1,000 milligrams per liter (Freeze and Cherry, 1979). Additionally, all samples except the one collected between 1,557 and 1,607 feet below land surface, met the United States Environmental Protection Agency's (USEPA) National Secondary Drinking Water Regulation standards (U.S. Environmental Protection Agency, 2009) for the constituents tested. The major dissolved inorganic constituents, or constituents with concentrations greater than 1.0 milligram per liter, included chloride, sulfate, calcium, magnesium, and sodium. The minor dissolved inorganic constituents, or the constituents with concentrations less than 1.0 milligram per liter, for samples collected between 71 and 1,500 feet below land surface, included iron, potassium, and strontium. Other minor trace constituents may have been present in the samples, but tests were not conducted to identify them. The sample collected between 1,557 and 1,607 feet was from an interval close in proximity to the underlying confining unit, and therefore this sample contained elevated concentrations of all analyzed constituents. Major ion concentrations trends with depth are shown in figure 8. The charge balance between anions and cations for all but one of the samples (collected between 751 and 810 feet below land surface, and on which the analysis was conducted after improper sample storage) had errors below 5%. These errors indicate that all major, and most minor and trace dissolved constituents were accounted for during laboratory analysis. The water type for samples collected between 71 and 1,500 feet below land surface, was calcium bicarbonate, meaning the relative abundance of the dominant cation, calcium, was over 50%, and the relative abundance of the dominant anion, bicarbonate, was over 50%. A water type of calcium bicarbonate is typical for shallow carbonate aquifers such as the Upper Floridan aquifer. Groundwater of this type, where the total dissolved solids are low and the dominate anion is bicarbonate, is characterized by active flushing through relatively well-leached rocks (Freeze and Cherry, 1979). The water type for the sample collected between 1,557 and 1,607 feet below land surface was calcium sulfate. Groundwater of this type indicates an interval with less active circulation, as the groundwater composition evolves chemically toward deepwater (Freeze and Cherry, 1979). This chemical evolution also is shown in the Piper diagram (figure 9).

As with the slug test, groundwater quality sampling within the confining unit below the Upper Floridan aquifer was problematic. It is questionable how well the sample represents groundwater within the confining unit. A sample was collected from the interval between 1,637 and 1,687 feet below land surface using a nested bailer attached to the packer. The confining unit produced very little groundwater; therefore, the pump had to be turned on and off to keep it from overheating. To avoid equipment damage, only enough groundwater was pumped to fill the bailer once. This sampling is contrary to normal practice where the bailer would have been filled three times to ensure a representative sample was collected before returning to land surface. Field analysis of the groundwater sample produced a specific conductivity value that was lower than the specific conductivity value measured from the drilling discharge. It is possible the groundwater collected from the confining unit contained water pumped into the core hole during development. This pumped water could not flow out of the core hole once development ended. Laboratory analysis of the groundwater sample indicated elevated concentrations of all chemical constituents in comparison to the samples collected from the Upper Floridan aquifer. The sample does not meet the USEPA's National Secondary Drinking Water Regulation standards. The water type was calcium sulfate. The change to sulfate anion dominance, from bicarbonate anion dominance (seen in samples from the Upper Floridan aquifer), results from the rock-water interaction with evaporates in the confining unit.

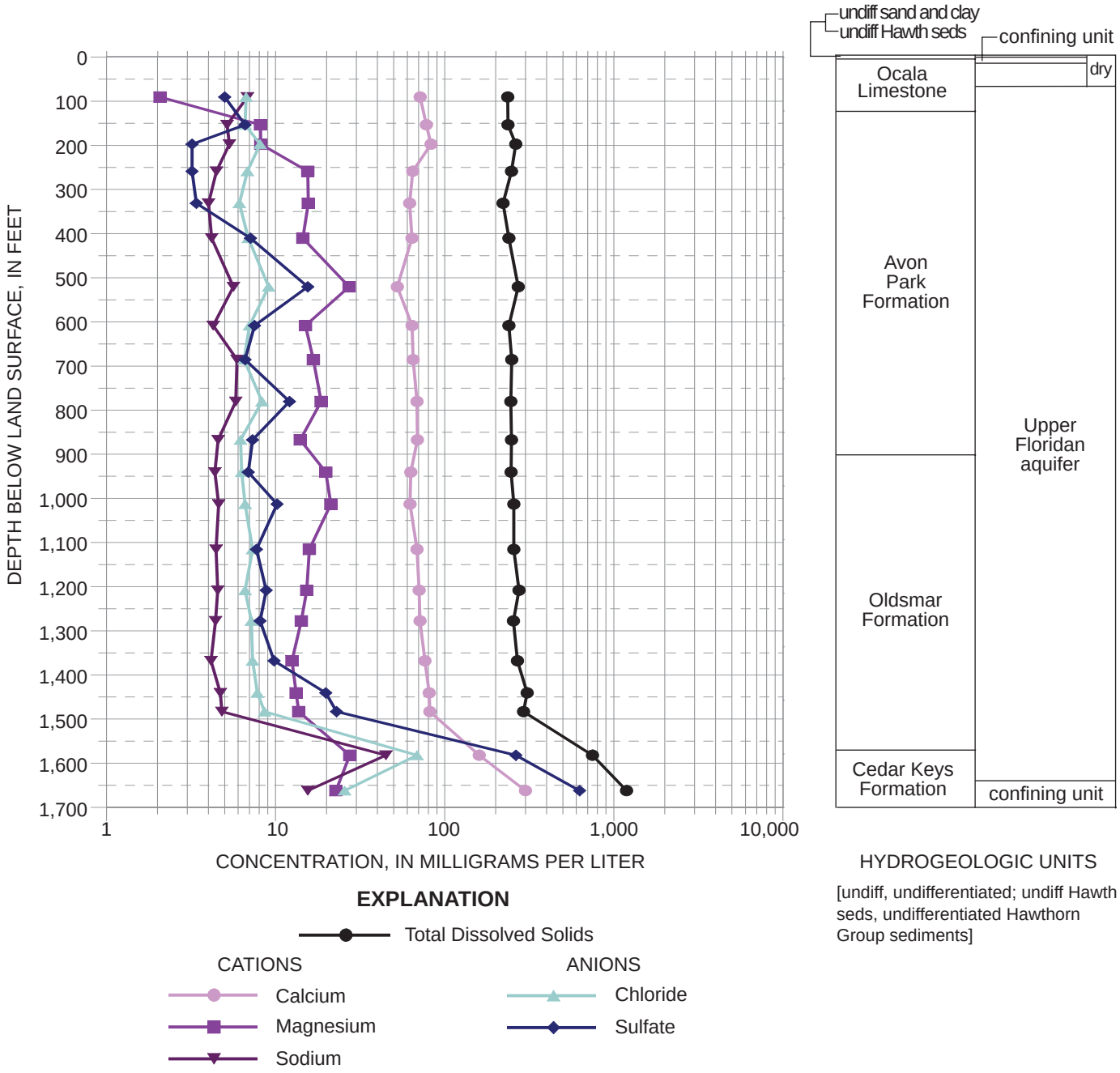



**Figure 8.** Major ion concentration with depth at the ROMP 132 well site in Marion County, Florida.

# Summary

The ROMP 132 – Blitch Plantation well site is located in west-central Marion County, and is part of the ROMP 10-mile grid network and the Northern District Water Resources Assessment Project. A major objective was to determine the geographic extent of middle confining units I and II and the Lower Floridan aquifer, none of which were present at this site. The Upper Floridan aquifer is the only aquifer in the Floridan aquifer system at the ROMP 132 well site.

Geohydrologic data were collected to characterize the geologic and hydrologic units at the site. This characterization included collecting lithologic core samples, hydraulic testing on isolated intervals, groundwater quality sampling, geophysical logging, and aquifer performance testing.

The ROMP 132 well site was developed in four phases: shallow exploratory coring and testing, well construction, aquifer performance testing, and deep exploratory coring and testing. Exploratory coring was conducted from land surface to 1,727 feet below land surface by two District crews. Two wells were constructed in the Upper Floridan aquifer by Diversified Drilling Corporation; the first a temporary production well, the second a permanent monitor well. Finally, an

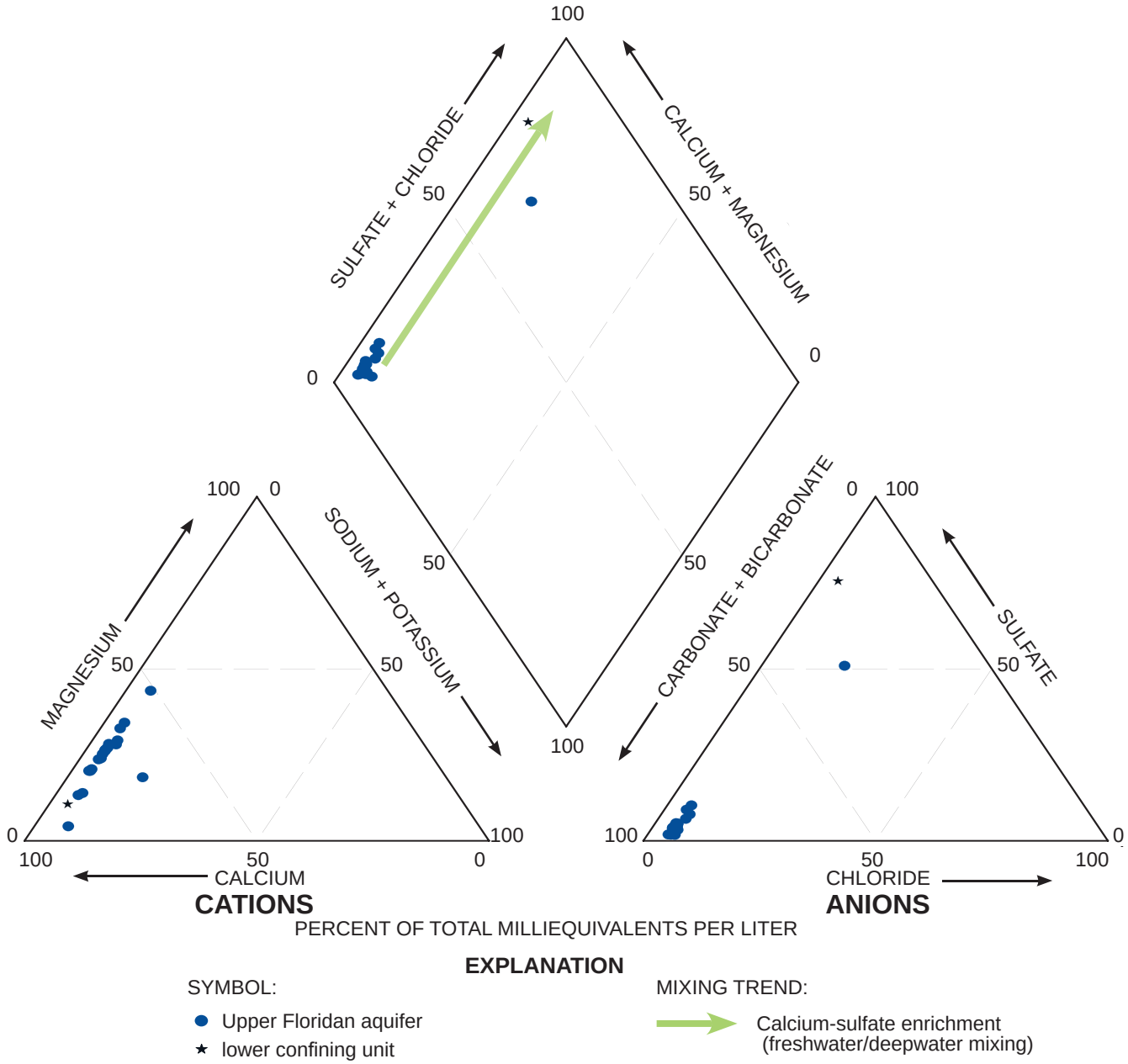



**Figure 9.** Piper diagram of groundwater quality samples collected at the ROMP 132 well site in Marion County, Florida.

aquifer performance test was conducted in the Upper Floridan aquifer.

The temporary production well was constructed with 16-inch steel casing extending from land surface to 129 feet below land surface, 14-inch steel casing extending from 129 to 150 feet below land surface, and a 12-inch open hole interval extending from 150 to 1,000 feet below land surface. The well was abandoned after aquifer performance testing. The Upper Floridan aquifer monitor well was completed with 4-inch Schedule 40 PVC casing extending 239 feet below land surface, and an open hole interval extending from 239 to 994 feet below land surface. This well remains at the site and will be used for long-term groundwater level and/or groundwater quality monitoring.

The geologic units encountered include, in ascending order, the Cedar Keys Formation, Oldsmar Formation, Avon Park Formation, Ocala Limestone, undifferentiated Hawthorn Group sediments, and undifferentiated sand and clay. The Cedar Keys Formation extends between 1,557 feet below land surface and the total depth of exploration of 1,727 feet below land surface. The bottom of the formation was not reached during exploration. The Oldsmar Formation extends between 900 and 1,557 feet below land surface. The Avon Park Formation extends between 125 and 900 feet below land surface. The Ocala Limestone extends between 11 and 125 feet below

land surface. The undifferentiated Hawthorn Group sediments extend between 6 and 11 feet below land surface. Finally, undifferentiated sand and clay sediments extend between land surface and 6 feet below land surface.

The hydrogeologic units encountered include, in descending order, a confining unit, the Upper Floridan aquifer, and a confining unit. Groundwater was first encountered 64 feet below land surface during exploration. A confining unit is present between 3 and 26 feet below land surface. The Upper Floridan aquifer extends between 64 and 1,637 feet below land surface. Finally, the lower confining unit of the Upper Floridan aquifer extends between 1,637 feet below land surface and the total depth of exploration of 1,727 feet below land surface. The bottom of this unit was not reached during exploration.

A constant rate aquifer performance test was conducted for 24 hours in the Upper Floridan aquifer. Transmissivity of the Upper Floridan aquifer was calculated at 380,000 square feet per day. Storativity could not be reliably estimated from the data. Leakance could not be estimated because the sediments above the Upper Floridan aquifer were dry.

The groundwater quality in the Upper Floridan aquifer meets the U.S. Environmental Protection Agency's National Secondary Drinking Water Regulation standards to a depth of 1,500 feet below land surface. Groundwater samples to this depth were of the calcium bicarbonate type as is typical for carbonate aquifers. Below 1,500 feet below land surface, the concentrations of all chemical constituents were elevated above drinking water standard concentrations. The water type of these samples was calcium sulfate; resulting from the rock-water interaction with the evaporates in the confining unit below the Upper Floridan aquifer.

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# Appendix A. Methods of the Regional Observation and Monitor-well Program

The Southwest Florida Water Management District (District) collects the majority of the hydrogeologic data during the exploratory core drilling phase of the project. Lithologic samples are collected during the core drilling process. Hydraulic and water quality data are collected primarily during packer tests as the core hole is advanced. Geophysical logging is conducted on the core hole providing additional hydrogeologic data. After well construction, an aquifer performance test (APT) is conducted on each of the major freshwater aquifers or producing zones encountered at the project site. These data are uploaded into the District's Water Management Information System (WMIS).

## Collection of Lithologic Samples

The District conducts hydraulic rotary core drilling, referred to as diamond drilling, with a Central Mining Equipment (CME) 85 core drilling rig and a Universal Drilling Rigs (UDR) 200D LS. The basic techniques involved in hydraulic rotary core drilling are the same as in hydraulic rotary drilling (Shuter and Teasdale, 1989). The District applies a combination of HW and NW gauge working casings along with NQ and NRQ core drilling rods, associated bits, and reaming shells from Boart Longyear®. The HW and NW working casings are set and advanced as necessary to maintain a competent core hole. The NQ and NRQ size core bits produce a nominal 3-inch hole. The HW and NW working casings and NQ coring rods are removed at the end of the project. Details on the core drilling activities are recorded on daily drilling logs completed by the District's drilling crew and hydrologists.

Recovery of the core samples is accomplished using a wireline recovery system (fig. A-1). The District's drilling crew uses the Boart Longyear® NQ wireline inner barrel assembly. This system allows a 1.87-inch by 5-foot section and a 1.99-inch by 10-foot section of core to be retrieved with the CME 85 rig and UDR 200D LS rig, respectively. The core is retrieved without having to remove the core rods from the core hole. Grab samples of core hole cuttings are collected and bagged where poor core recovery occurs because of drilling conditions or where the formation is unconsolidated or poorly indurated. The core samples are placed in core boxes, depths are marked, and recovery estimates are calculated. Core descriptions are made in the field using standard description procedures. Rock color names are taken from the "Rock-Color Chart" of the National Research Council (Goddard and others, 1948). The textural terms used to characterize carbonate rocks are based on the classification system of Dunham (1962). The core samples are shipped to the Florida Geological Survey for detailed lithologic descriptions of core, cuttings, and unconsolidated sediments. All lithologic samples are archived at the Florida Geological Survey in Tallahassee, Florida.

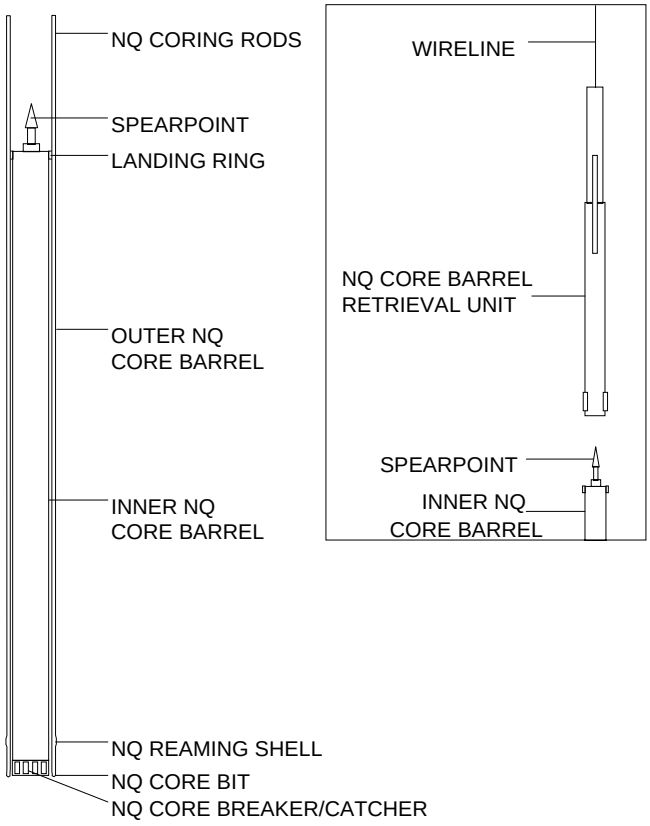



**Figure A-1.** Boart Longyear® NQ Wireline Coring Apparatus.

### Unconsolidated Coring

Various methods exist for obtaining core of unconsolidated material, which is extremely difficult as compared to rock coring (Shuter and Teasdale, 1989). To ensure maximum sample recovery, the District drilling crew utilizes a punch shoe adapter on the bottom of the inner barrel along with an unconsolidated core catcher. The punch shoe extends the inner barrel beyond the bit allowing collection of the sample prior to disturbance by the bit or drilling fluid. A variety of bottom-discharge bits are used during unconsolidated coring. A thin bentonite mud may be used to help stabilize the unconsolidated material.

## Rock Coring

During rock coring, the District drilling crew utilizes HW and NW working casings as well as permanent casings to stabilize the core hole. NQ core drilling rods and associated products are employed during the core drilling process. Core drilling is conducted by direct-circulation rotary methods using fresh water for drilling fluid. Direct water is not effective in removing the cuttings from the core hole, therefore, a reverse-air (air-lift) discharge method (fig. A-2) is used to develop the core hole every 20 feet or as necessary. The District typically uses face-discharge bits for well indurated rock core drilling.

# Formation Packer Testing

Formation (off-bottom) packer testing allows discrete testing of water levels, water quality, and hydraulic parameters. A competent core hole is necessary for packer testing, meaning unconsolidated sediments and weathered limestone cannot be tested using this technique. The packer assembly (fig. A-3) is utilized by raising the NQ coring rods to a predetermined point, lowering the packer to the bottom of the rods using a combination cable/air inflation line, and inflating the packer with nitrogen gas. This process isolates the test interval, which extends from the packer to the total depth of the core hole. Sometimes, the working casing may be used in place of the packer assembly. Test intervals are selected based on a regular routine of testing or at any distinct hydrogeologic change that warrants testing.

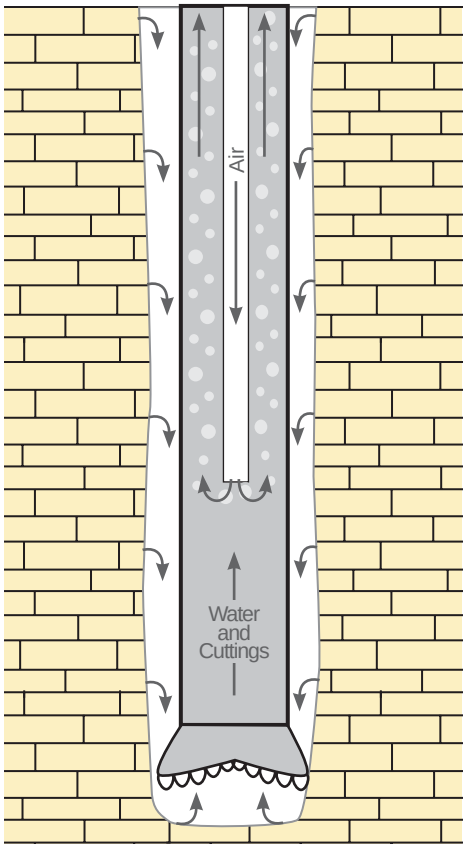
## Collection of Water Level Data

Water level data is collected daily before core drilling. Additionally, water levels are recorded during each formation packer test after the necessary equilibration time. Equilibration is determined when the change in water level per unit time is negligible. Water levels are measured using a Solinst® water level meter. The water level is measured relative to an arbitrary datum near land surface which is maintained throughout the project. These data provide a depiction of water level with core hole depth, although they are normally collected over several months and will include temporal variation.

## Collection of Water Quality Data

Water quality samples are collected during each formation packer test. Sampling methods are consistent with the "Standard Operating Procedures for the Collection of Water Quality Samples" (Water Quality Monitoring Program, 2009). The procedure involves isolating the test interval with the off-bottom packer (fig. A-3) and reverse-air pumping the water in the NQ coring rods. To ensure a representative sample is collected, three core hole volumes of water are removed and temperature, pH, and specific conductance are monitored for stabilization using a YSI® multi-parameter meter. Samples are collected either directly from the air-lift discharge point at land surrface, with a wireline retrievable stainless steel bailer (fig. A-4), or with a nested bailer. When sampling a poorly producing interval, the purge time may be substantial. The nested bailer is an alternative that is attached directly to the packer orifice thereby reducing the volume of water to be evacuated from the core hole because it collects water directly from the isolated interval.

The water quality sample is collected using a clean polypropylene beaker. A portion of the sample is bottled according to standard District procedure for laboratory analysis (SWFWMD, 2009). Two bottles, one 250 milliliter and one 500 milliliter, are filled with water filtered through a 0.45-micron filter. Another 500 milliliter bottle is filled with unfiltered water. A Masterflex® console pump is used to dispense the water into the bottles. The sample in the 250 milliliter bottle is acidi-




**Reverse-air pumping**

Reverse-air pumping allows cuttings to be removed without the introduction of man-made drilling fluids. As air bubbles leave the airline and move up inside the rods, they expand and draw water with them, creating suction at the bit. Groundwater comes from up-hole permeable zones and is natural formation water. Suction at the bit draws water and drill cuttings up the rods to be discharged at the surface.

**Figure A-2.** Reverse-air pumping

fied with nitric acid to a pH of 2 in order to preserve metals for analysis. The remainder of the sample is used to measure field parameters including specific conductance, temperature, pH, and chloride and sulfate concentrations. Temperature and specific conductance are measured using a YSI® multi-parameter handheld meter. Chloride and sulfate concentrations, and pH are analyzed with a YSI® 9000 photometer. The samples are delivered to the District's environmental chemistry laboratory for additional analysis. A "Standard Complete" analysis that includes pH, calcium, chloride, ion balance, iron, magnesium, potassium, silica, sodium, strontium, specific conductance, sulfate, total dissolved solids (TDS), and total alkalinity is performed on each set of samples (SWFWMD, 2009). Chain of Custody forms are used to track the samples.

The analysis of the water quality data includes the evaluation of relative ion abundance and ion or molar ratios, and the determination of water type(s). The laboratory data are used to calculate milliequivalents per liter (meq/L) and percent meq/L. Using the criteria of 50 percent or greater of relative abundance of cations and anions, the water type for each sample is determined (Hem, 1985). The data is plotted on a Piper diagram to give a graphical depiction of the relative abundance of ions in an individual sample (Domenico and Schwartz, 1998) as well as how the individual samples compare to each other. Select ion ratios are calculated for each sample to further evaluate chemical similarities or differences among waters and to help explain why certain ions change with depth. Field pH is used in analyses because it is more likely to represent the actual conditions in the water since pH is sensitive to environmental changes (Driscolll, 1986; Fetter, 2001). Additionally, total alkalinity is used as bicarbonate concentration because hydroxyl ions generally are insignificant in natural groundwater and carbonate ions typically are not present in groundwater with a pH less than 8.3 (Fetter, 2001).

## Collection of Slug Test Data

Hydraulic conductivity is estimated by conducting slug tests. During slug testing, the static water level in the test interval is suddenly displaced, either up or down, and the water level response is recorded as it returns to a static state. Typically, the slug tests are conducted using the off-bottom packer assembly to isolate test intervals as the core hole is advanced. KPSI® pressure transducers are used to measure the water level changes in the test interval and the annulus between the HW casing and the NQ coring rods. The annulus pressure transducer is used as a quality control device to detect water level changes indicative of a poorly seated packer or physical connection (i.e. fractures or very permeable rocks) within the formation. A third pressure transducer is used to measure air pressure during pneumatic slug testing. All pressure transducer output is recorded on a Campbell Scientific, Inc CR800 datalogger. Prior to all slug tests, the test interval is thoroughly developed.

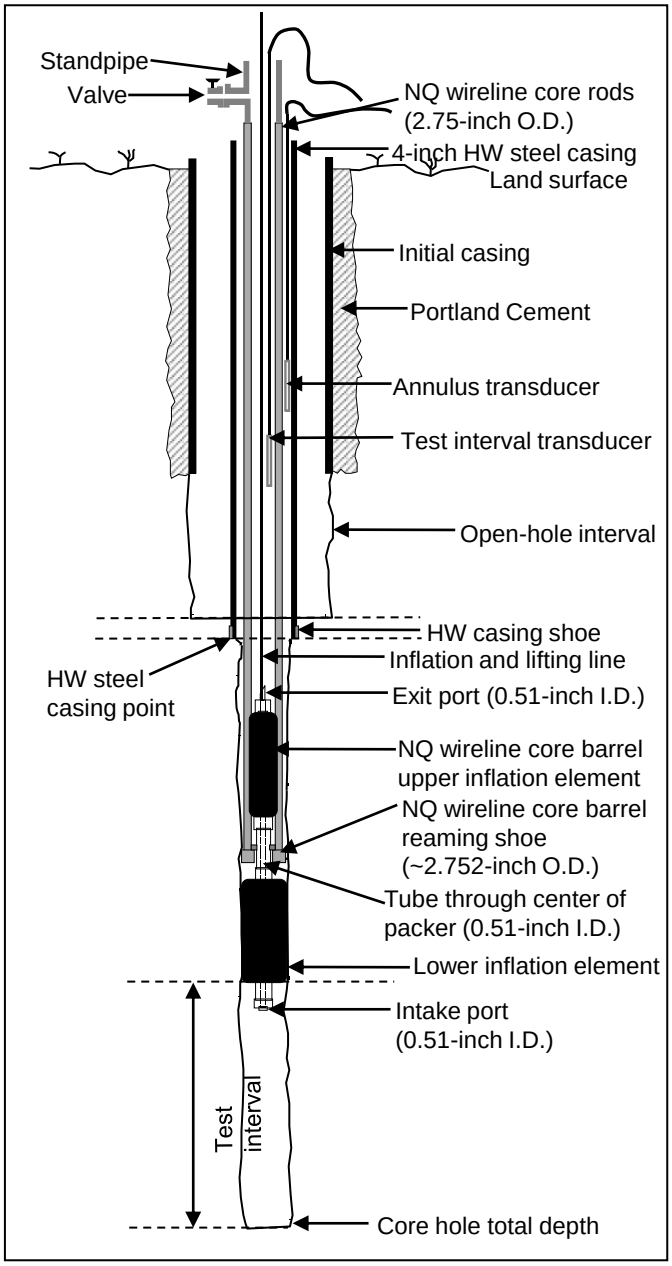



**Figure A-3.** Formation (off-bottom) packer assembly deployed in the core hole.

Slug tests can be initiated several ways. The primary methods used by the District are the pneumatic slug method and the drop slug method. Core hole conditions and apparent formation properties dictate which method is used. The pneumatic slug method is used for moderate to high hydraulic conductivity formations because it provides near instantaneous slug initiation. The pneumatic slug method uses a NQ rod modified to include a pressure gauge and regulator, and an electronic or manual valve. The opening is sealed with compression fittings. Air pressure is used to depress the static water level. The water level is monitored for equilibration. Once it returns to the initial static water level the test is initiated. The electronic or manual valve is opened to release the air pressure causing the water level to rise (rising head test).

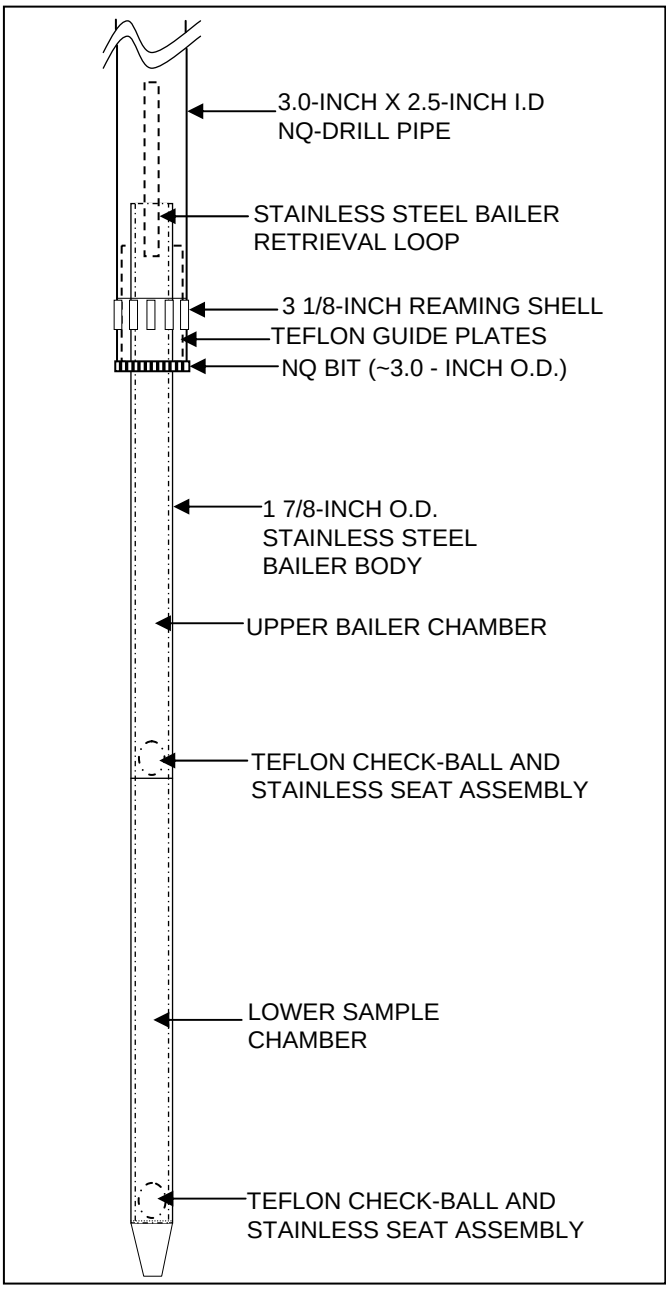



**Figure A-4.** Diagram of the wireline retrievable bailer.

The water level is recorded until it returns to the initial static water level. The drop slug method is used for low hydraulic conductivity formations. This test initiation method is slower than the pneumatic method because the slug has to travel down the core hole before reaching the test interval. The drop slug method involves adding a predetermined volume of water into the NQ rods raising the static water level. A specially designed PVC funnel fitted with a ball valve placed over the NQ rods is used to deliver the water. The water level is recorded until the raised level falls (falling head test) back to the static level.

Several quality assurance tests are conducted in the field in order to identify any potential sources of error in the slug test data. The quality assurance tests include evaluation of the discrepancy between the expected and observed initial displacements (Butler, 1998), evaluation of the normalized plots for head dependence and evolving skin effects, and the evaluation of the annulus water level for movement. Lastly, an estimate of the hydraulic conductivity value is made using AQTESOLVE® (Duffield, 2007) software by applying the appropriate analytical solution to the data.

Slug tests in which the formation packer assembly is used have a source of error resulting from the orifice restriction (fig. A-3). During the slug test, water must move through the NQ coring rods that have an inner diameter of 2.38-inches, then through the orifice on the packer assembly that has an inner diameter of 0.75-inch, and finally through the core hole that has a diameter of approximately 3-inches. The error associated with the orifice restriction is manifested as head dependence in the response data. It can be seen when multiple tests are conducted on the same test interval with varying initial displacements. The error associated with the orifice restriction results in an underestimation of the hydraulic conductivity values. In order to reduce the error associated with the orifice restriction, a spacer in introduced into the zone of water level fluctuation thereby reducing the effective casing radius from 1.19 inches to 0.81 inch. A second technique used to minimize the effects caused by the orifice restriction is the use of initial displacements (slugs) of less than 1.5-feet in height. Also, if the working casing is used instead of the packer, the error is eliminated.

# Geophysical Logging

Geophysical logs are useful in determining subsurface geologic and groundwater characteristics (Fetter, 2001). Geophysical logs provide three major types of information from water wells: hydrologic (water quality, porosity, and flow zone detection), geologic (lithology, formation delineation), and physical characteristics (depth, diameter, casing depth, texture of well bore, and integrity of well construction).

Geophysical logging entails lowering the geophysical tool into the core hole or monitor well on a wireline, and measuring the tool's response to the formation and water quality as the tool is moved up the hole. Core hole geophysical logs are run during various stages of core drilling. When feasible, geophysical logs are run prior to casing advancements, while the core hole is still open to the formation.

The District uses Century® geophysical logging equipment. The three types of geophysical probes used are the caliper/gamma, induction, and multifunction. The multifunction tool measures natural gamma-radiation [GAM (NAT)], spontaneous potential (SP), single-point resistivity (RES), short [RES(16N)], long [RES(64N)] normal resistivity, fluid temperature (TEMP) and fluid specific conductance (SP COND). Each log type is explained below.

### Caliper (CAL)

The caliper tool is used to measure the diameter of the borehole and can identify deviation from the nominal borehole diameter and, in turn, locate cavities, washouts, and build-up. This log is useful for determining casing placement depths because competent, well indurated, layers can be located. The caliper log also aids in volumetric calculations of material such as cement, gravel, sand, and bentonite needed during well construction and abandonment when installing casing and filling open hole intervals.

### Gamma (GAM[NAT])

The gamma log records the amount of natural gamma radiation emitted by the materials surrounding the borehole. Natural gamma radiation is emitted from decaying radioisotopes from certain geologic materials. Some of these materials include low permeability clays that trap radioactive potassium isotopes as they migrate with groundwater, organic deposits, and phosphates. Gamma radiation can be measured through PVC and steel casing, although steel casing does appreciably attenuate the signal. Comparing gamma profiles from distant wells often allows stratigraphic units to be correlated over considerable distances because the materials that generate gamma radiation are often deposited over large geographic areas.

### Spontaneous Potential (SP)

Spontaneous potential logs measure the electrical potential (millivolts) that result from chemical and physical changes at the contacts between different types of geological materials (Driscoll, 1986). They must be run in fluid-filled, uncased boreholes, and function best when the fluid in the borehole is different from that in the formation (such as mud versus water, or saltwater versus freshwater). Spontanteous potential logs are useful in identifying contacts between different lithologies and stratigraphic correlation.

### Single-Point Resistance (RES)

Single-point resistance logs measure the electrical resistance, in ohms, of rocks and fluids using an in-hole electrode and a surface electrode. The log must be run in a fluid-filled, uncased borehole, and is used for geologic correlation, such as determining bed boundaries, changes in lithology, and identification of fractures in resistive rocks (Keys and MacCary, 1971).

### Short-Normal (RES [16N]) and Long-Normal (RES [64N])

Short-normal and long-normal resistivity logs measure the electrical resistivity of the surrounding rocks and water by using two electrodes. The 16 and 64 refers to the space, in inches, between the potential electrodes on the logging probe. The short-normal curve indicates the resistivity of the zone close to the borehole and the long-normal has more spacing between the electrodes, therefore measures the resistivity of materials farther away from the borehole (Fetter, 2001). Short-normal and long-normal logs are useful in locating highly resistive geologic materials such as limestone, dolostone, and pure, homogenous sand and low resistivity materials like clay or clayey, silty sand. Also, the logs indicate water quality changes because fresh water has high resistivity whereas poor quality water has low resistivity. Resistivity logs must be run in fluid-filled, open boreholes.

### Temperature (TEMP)

Temperature logs record the water temperature in the borehole. Temperature variations may indicate water entering or exiting the borehole from different aquifers or zones. Thus, the log is useful in locating permeable zones. The log must be run in fluid-filled boreholes.

### Specific Conductance (SP COND)

Specific Conductance logs measure the capacity of borehole fluid to conduct an electrical current with depth. The log indicates the total dissolved solids concentration of the borehole fluid. The specific conductance log may be useful in determining permeable zones because zones of increased inflow or outflow may show a change in water quality.

## Aquifer Performance Tests

An APT is a controlled field experiment conducted to determine the hydraulic properties of water-bearing units (Stallman, 1976). APTs can be either single-well or multi-well and may partially or fully penetrate the aquifer. An APT involves pumping the aquifer at a known rate and monitoring the water level response. The general procedure, applied by the District, for conducting an APT involves design, field observation, and data analysis. Test design is based on the geologic and hydraulic setting of the site, such the aquifer thickness, probable range in transmissivity and storage, the presence of uncontrolled boundaries (sources/sinks), and any practical limitations imposed by equipment. Field observations of the discharge and water levels are recorded. The District measures the discharge rate using an impeller meter and circular orifice weir. The District measures water levels using

pressure transducers and an electric tape. All the recording devices are calibrated and traceable to the National Institute of Standards and Technology. Data analysis includes first making estimates of drawdown observed during the test and then using analytical and numerical methods to estimate hydraulic properties of the aquifer and adjacent confining units.

## Single-Well Aquifer Pumping Test

Single-well APTs are conducted on one well within the production zone which is used for both pumping and monitoring the water level response. Background water level in the test well is collected for a time period twice as long as the pumping period (Stallman, 1976). Background water level data collection may not be necessary if the duration of the single-well test is short and the on-site hydrogeologist does not consider background data necessary. During pumping, the discharge rate is monitored and controlled to less than 10 percent fluctuation to ensure a constant rate test. The water level is recorded in the test well during the drawdown (pumping) and recovery phases. Other wells outside of the production zone may be monitored in order to provide additional information on the flow system. The response data are analyzed using analytical methods to estimate the hydraulic properties of the aquifer and adjacent confining units. Typically, response data is analyzed using AQTESOLVE® (Duffield, 2007) software by applying the appropriate analytical solution.

## Multi-Well Aquifer Pumping Test

Multi-well APTs are conducted with a pumped well and at least one observation well for monitoring the water level response in the production zone. Background water level data is collected for a time period at least twice the pumping period (Stallman, 1976). During pumping, the discharge rate is monitored and controlled to less than 10 percent fluctuation. The water level response is recorded in both the test well and the observation well(s) during the drawdown (pumping) and recovery phases. Other wells outside of the production zone may be monitored in order to provide additional information on the flow system. The response data are analyzed using analytical or numerical methods to estimate the hydraulic properties of the aquifer and adjacent confining units. Typically, response data is analyzed using AQTESOLVE® (Duffield, 2007) software by applying the appropriate analytical solution.

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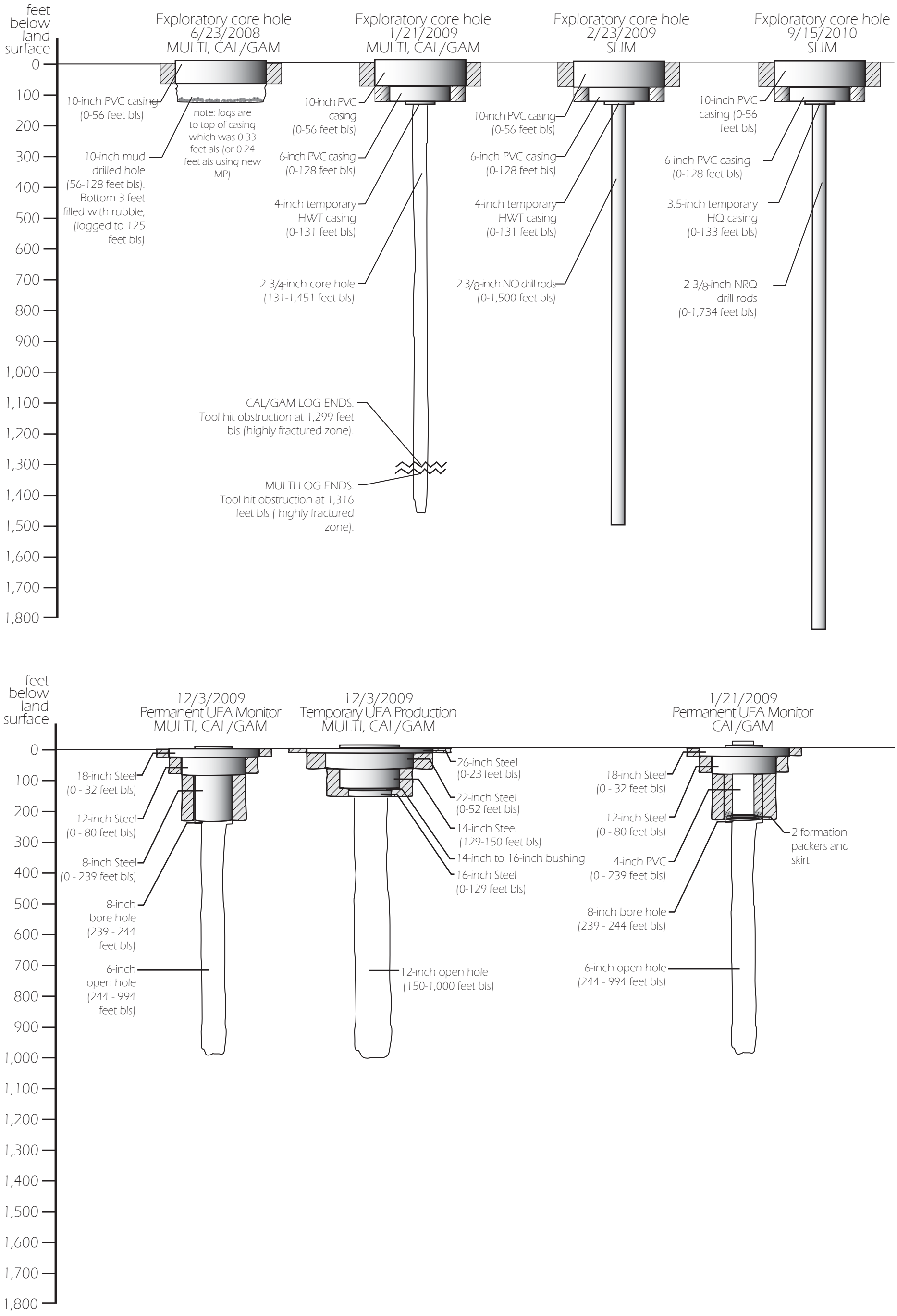



[Logs are to land surface unless otherwise noted; bls, below land surface; PVC, polyvinyl chloride; als, above land surface; MP, measuring point; ft, feet; HWT, temporary 4-inch steel casing; NQ, 2 3/8-inch steel drill rods; HQ, 3.5-inch temporary steel casing; NRQ, 2 3/8-inch steel drill rods; MULTI, multi -probe; CAL, caliper; GAM, gamma; SLIM, slim-line probe; UFA, Upper Floridan aquifer]

**Figure B-1.** Well configurations during geophysical logging at the ROMP 132 well site in Marion County, Florida.

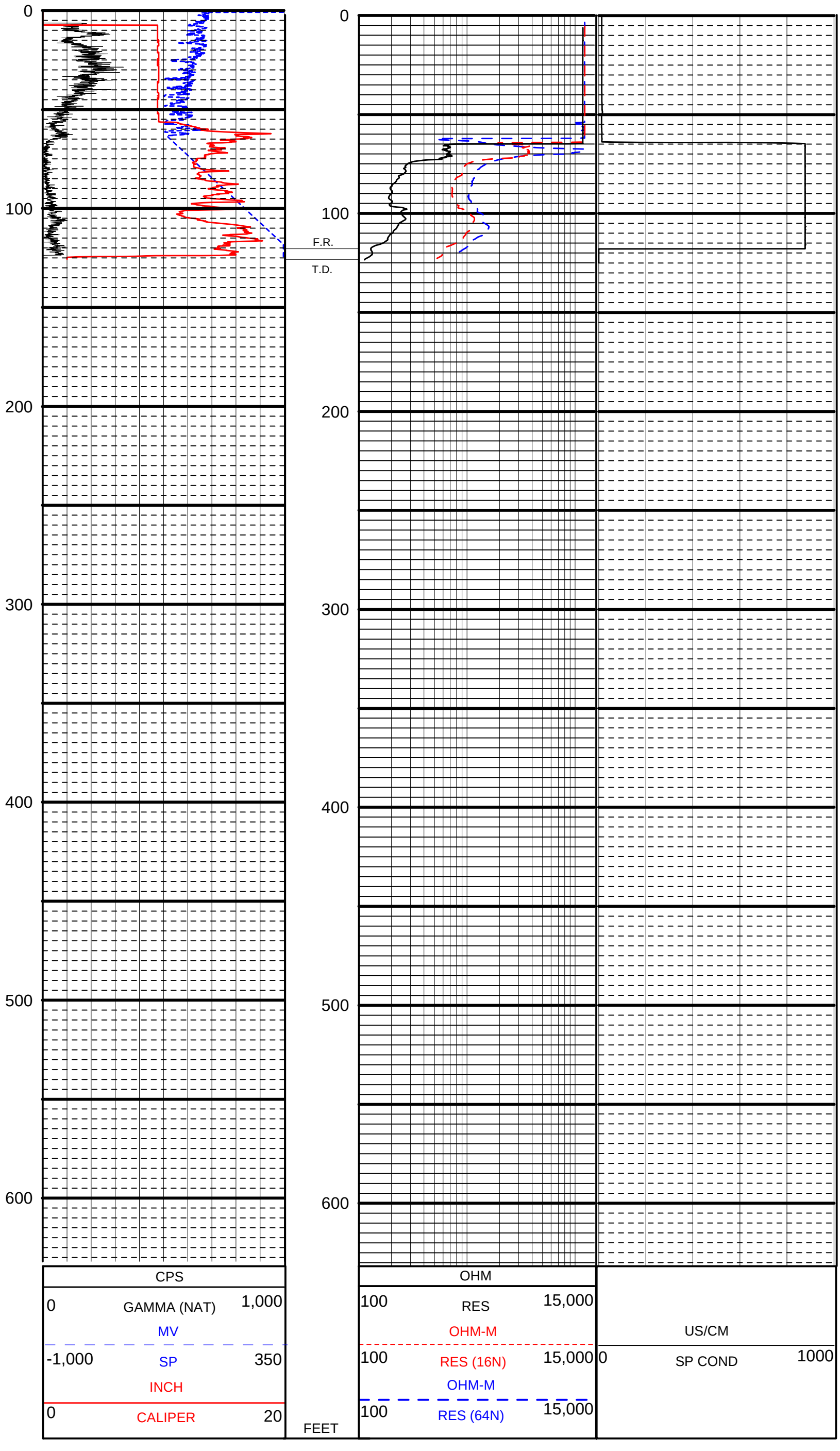



**Figure B-2.** Geophysical log suite collected in the exploratory core hole, between land surface and 125 feet below land surface, during exploratory coring at the ROMP 132 well site in Marion County, Florida. The logs were collected on 6/23/2008 using tools 9074C (caliper/gamma) and 8044C (multi-tool). The casing depth at the time of logging was 56 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet. The horizontal tracks on the left and right are linearly scaled and the middle track is logarithmically scaled.

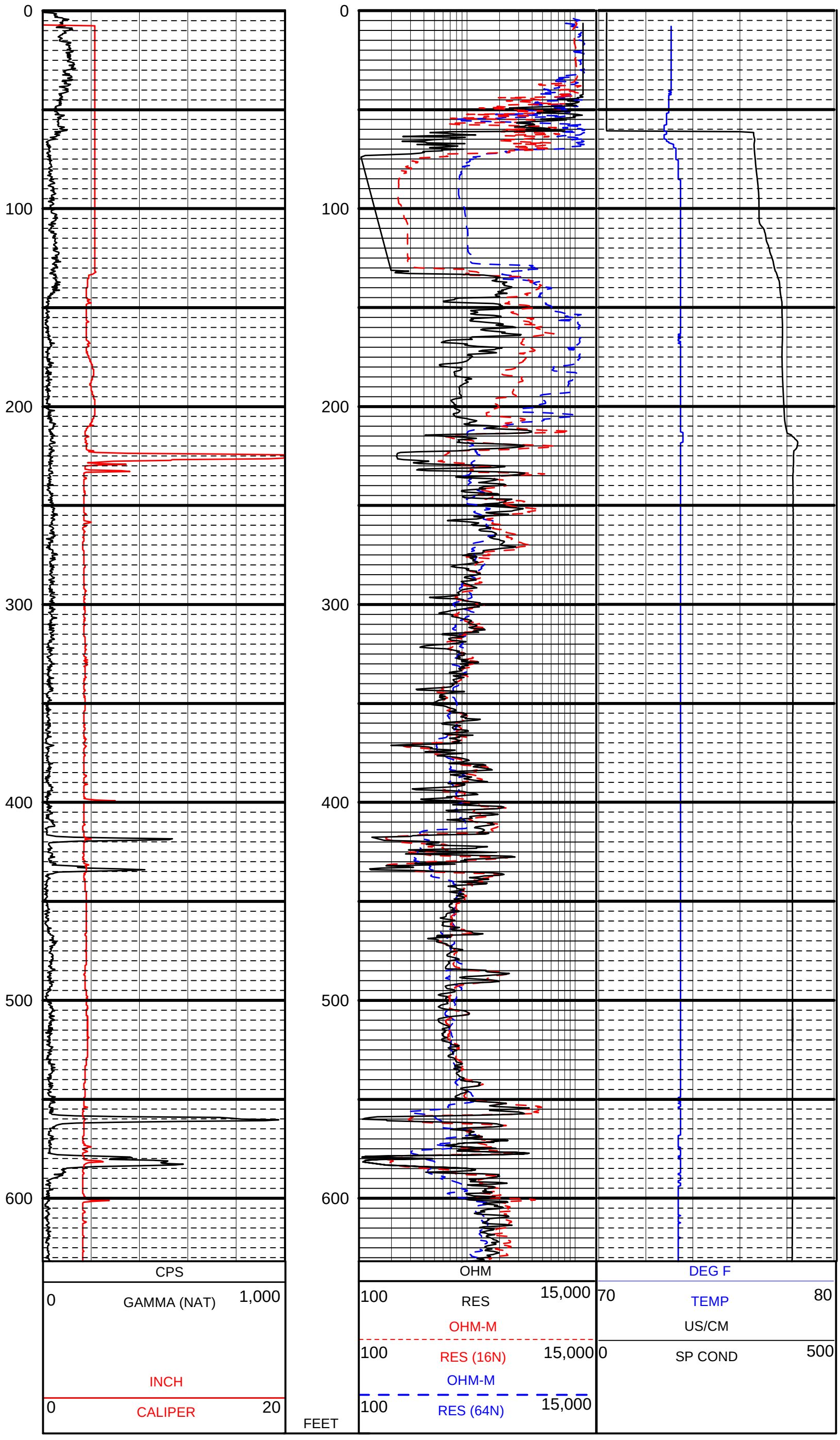



**Figure B-3.** Geophysical log suite collected in the exploratory core hole, between land surface and 1,315 feet below land surface, during exploratory coring at the ROMP 132 well site in Marion County, Florida. The logs were collected on 1/21/2009 using tools 9165C (caliper/gamma) and 8044C (multi-tool). The casing depth at the time of logging was 131 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet. The horizontal tracks on the left and right are linearly scaled and the middle track is logarithmically scaled.

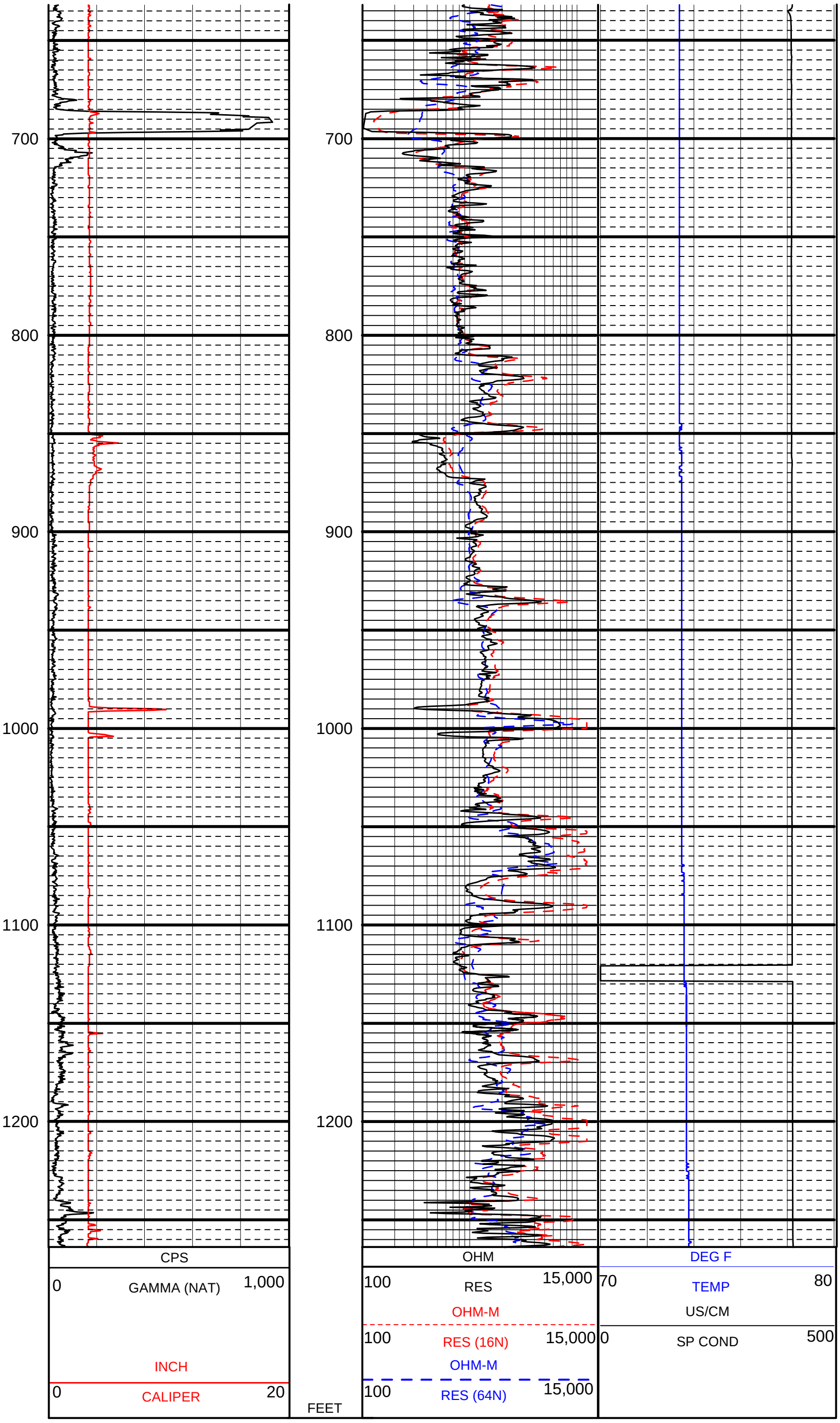



**Figure B-3 (continued).** Geophysical log suite collected in the exploratory core hole, between land surface and 1,315 feet below land surface, during exploratory coring at the ROMP 132 well site in Marion County, Florida. The logs were collected on 1/21/2009 using tools 9165C (caliper/gamma) and 8044C (multi-tool). The casing depth at the time of logging was 131 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet. The horizontal tracks on the left and right are linearly scaled and the middle track is logarithmically scaled.

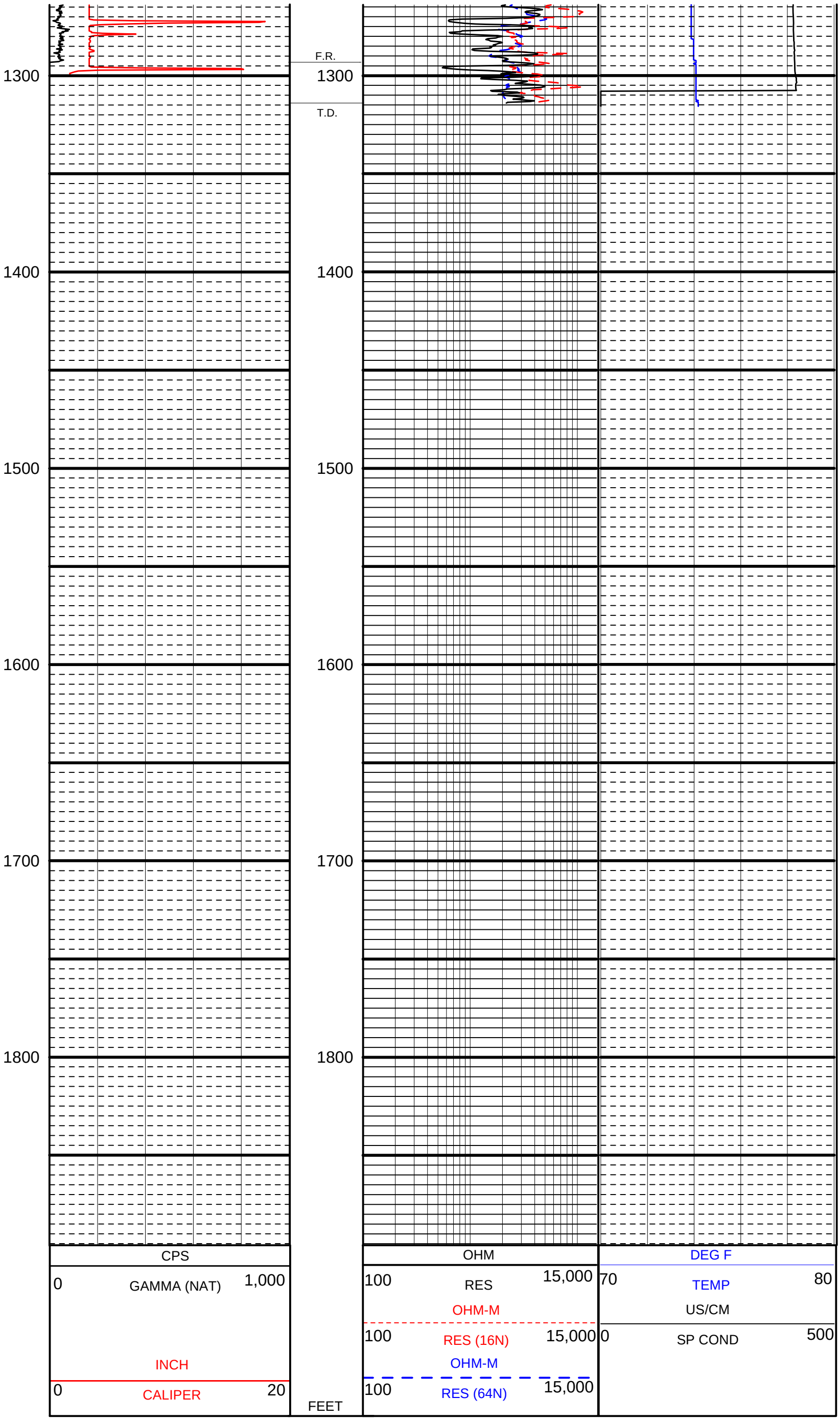



**Figure B-3 (continued).** Geophysical log suite collected in the exploratory core hole, between land surface and 1,315 feet below land surface, during exploratory coring at the ROMP 132 well site in Marion County, Florida. The logs were collected on 1/21/2009 using tools 9165C (caliper/gamma) and 8044C (multi-tool). The casing depth at the time of logging was 131 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet. The horizontal tracks on the left and right are linearly scaled and the middle track is logarithmically scaled.

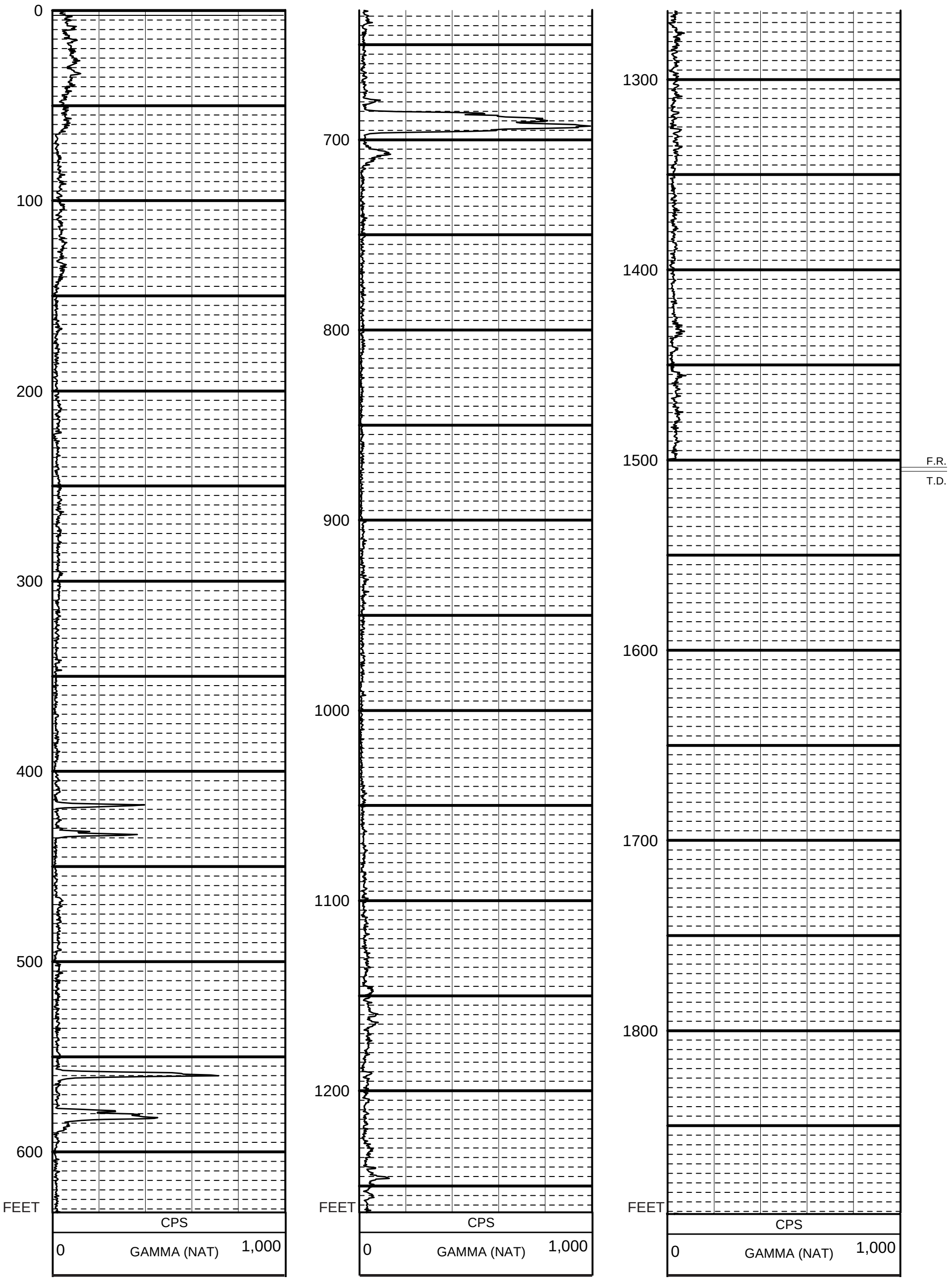



**Figure B-4.** Geophysical log collected in the exploratory core hole, between land surface and 1,505 feet below land surface, during exploratory coring at the ROMP 132 well site in Marion County, Florida. The logs were collected on 1/21/2009 using tool 9165C (caliper/gamma). The casing depth at the time of logging was 1,500 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet.

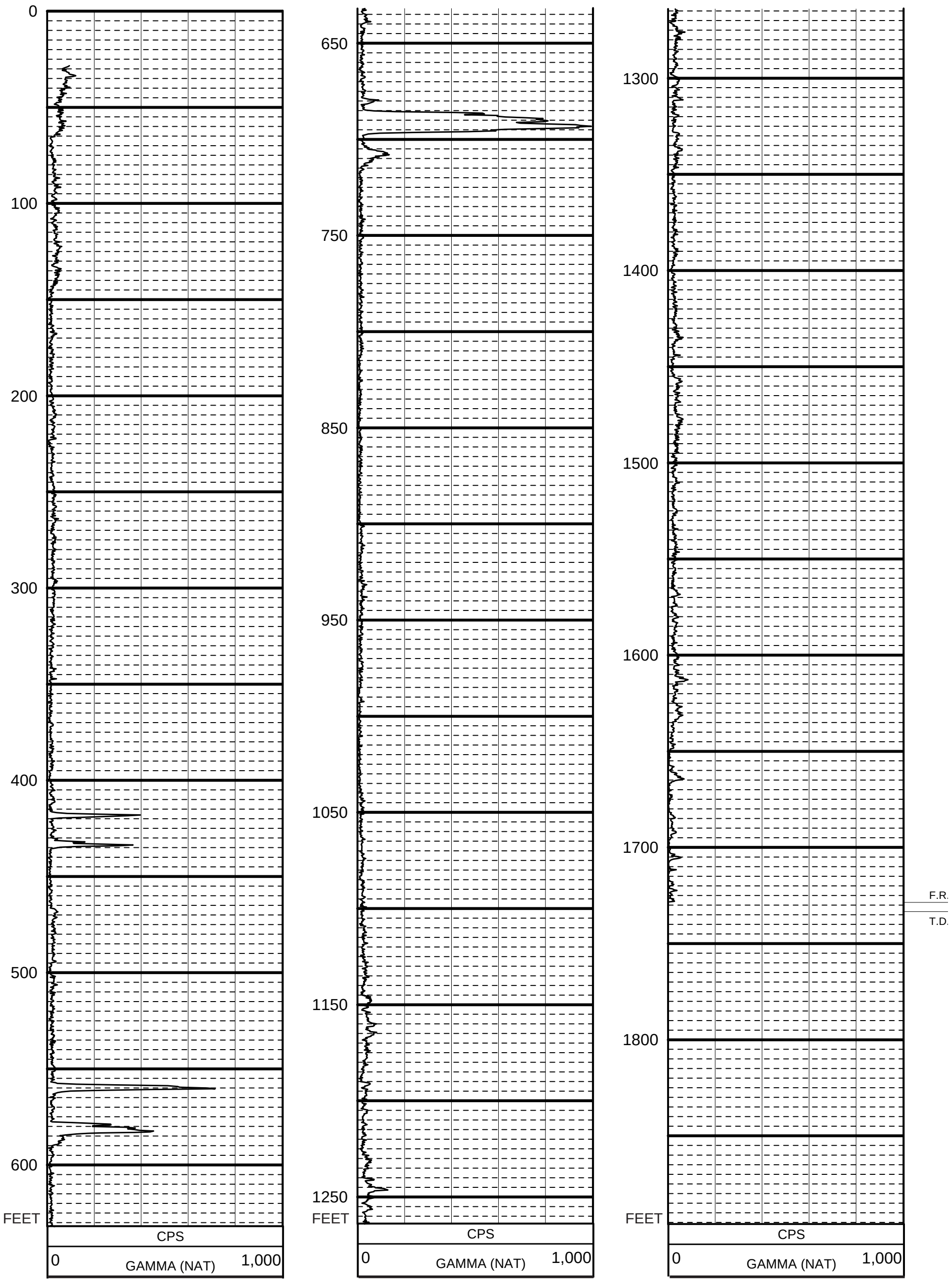



**Figure B-5.** Geophysical log collected in the exploratory core hole, between land surface and 1,734 feet below land surface, during exploratory coring at the ROMP 132 well site in Marion County, Florida. The logs were collected on 9/15/2010 using tool 9165C (caliper/gamma). The casing depth at the time of logging was 1,734 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet.

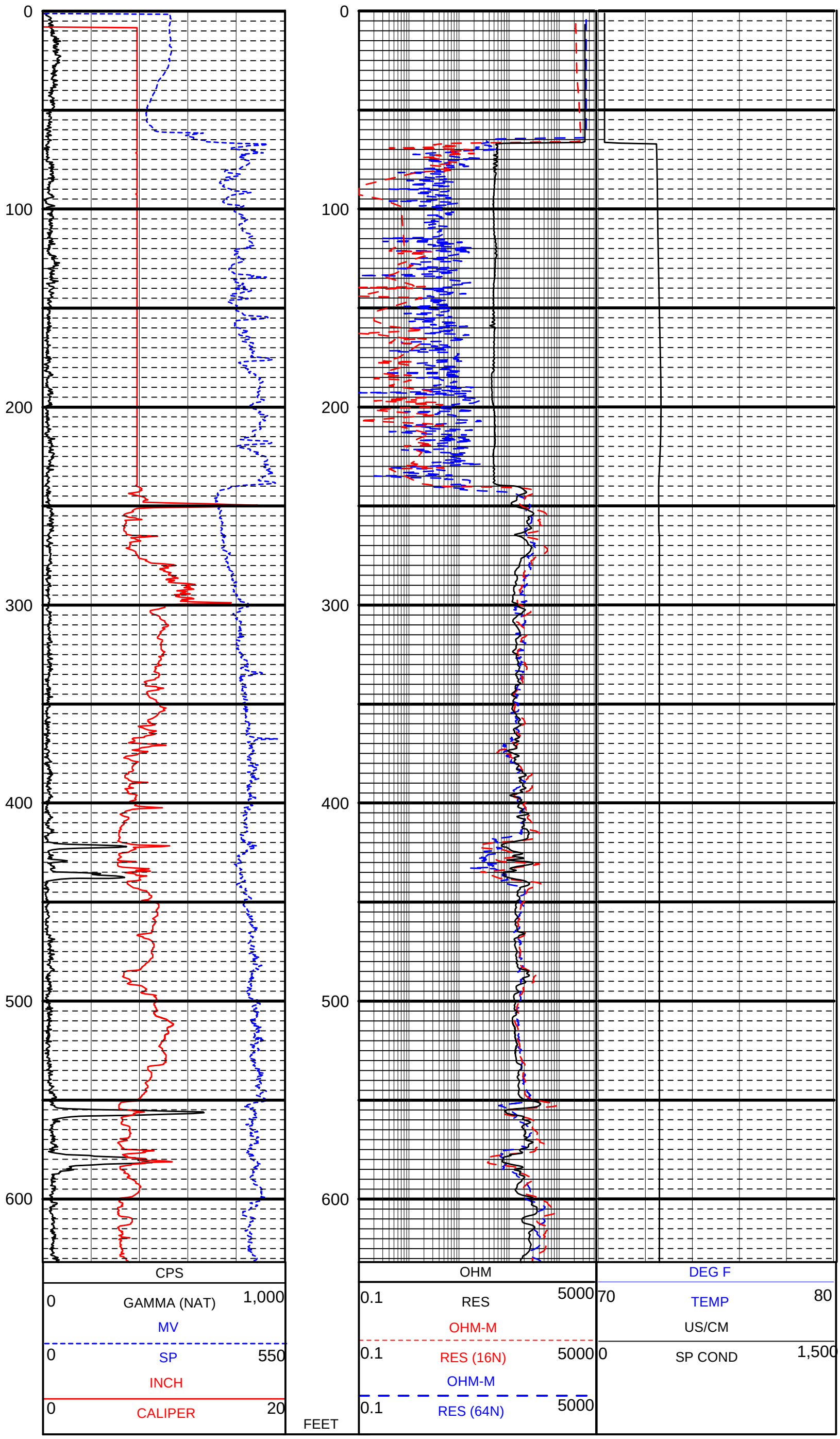



**Figure B-6.** Geophysical log suite collected in the permanent Upper Floridan aquifer monitor well, between land surface and 993 feet below land surface, during well construction at the ROMP 132 well site in Marion County, Florida. The logs were collected on 12/3/2009 using tools 9074C (caliper/gamma) and 8044C (multi-tool). The casing depth at the time of logging was 239 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet. The horizontal tracks on the left and right are linearly scaled and the middle track is logarithmically scaled.

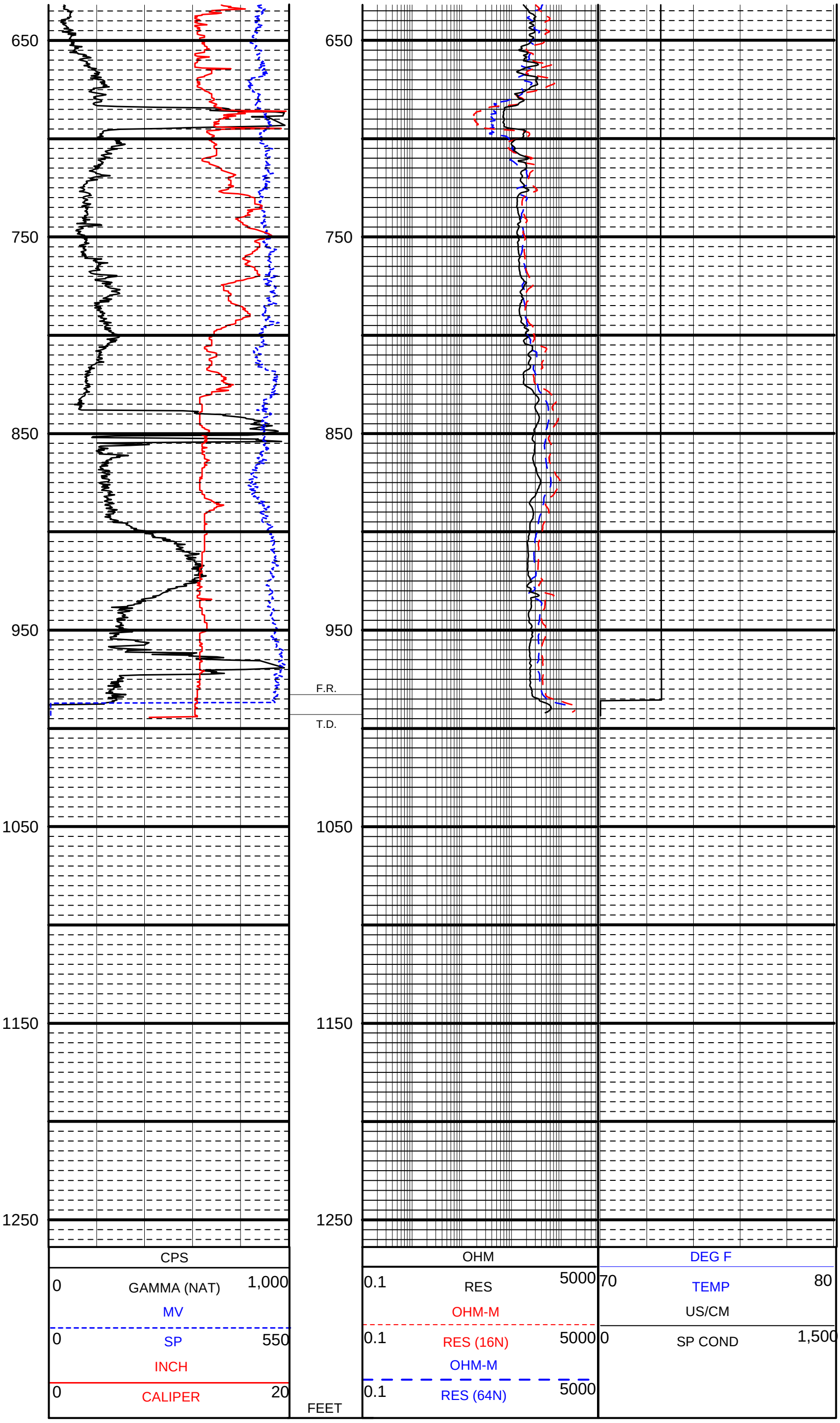



**Figure B-6 (continued).** Geophysical log suite collected in the permanent Upper Floridan aquifer monitor well, between land surface and 993 feet below land surface, during well construction at the ROMP 132 well site in Marion County, Florida. The logs were collected on 12/3/2009 using tools 9074C (caliper/gamma) and 8044C (multi-tool). The casing depth at the time of logging was 239 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet. The horizontal tracks on the left and right are linearly scaled and the middle track is logarithmically scaled.

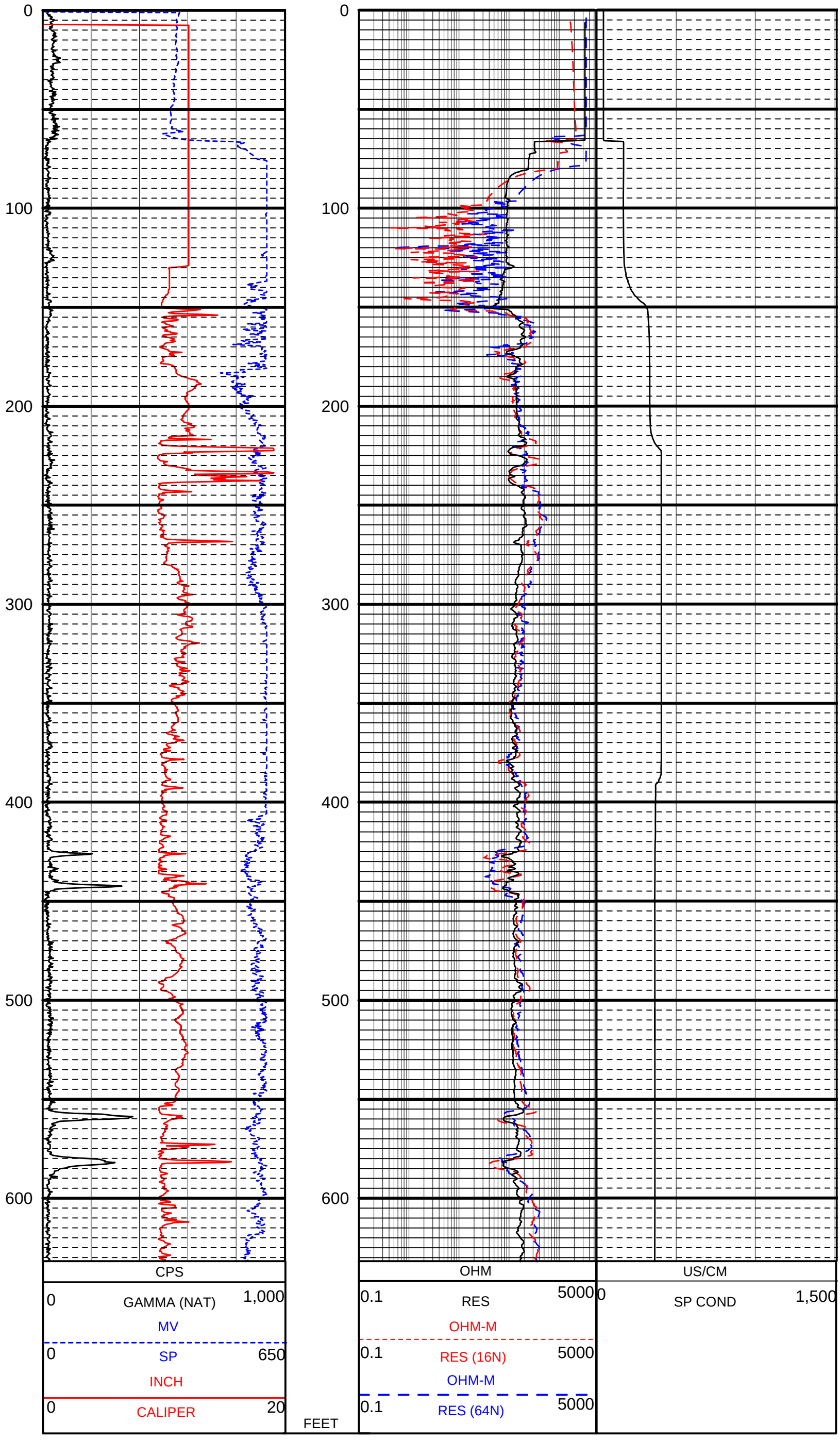



**Figure B-7.** Geophysical log suite collected in the temporary Upper Floridan aquifer production well, between land surface and 994 feet below land surface, after well construction at the ROMP 132 well site in Marion County, Florida. The logs were collected on 12/3/2009 using tools 9074C (caliper/gamma) and 8044C (multi-tool). The casing depth at the time of logging was 129 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet. The horizontal tracks on the left and right are linearly scaled and the middle track is logarithmically scaled.

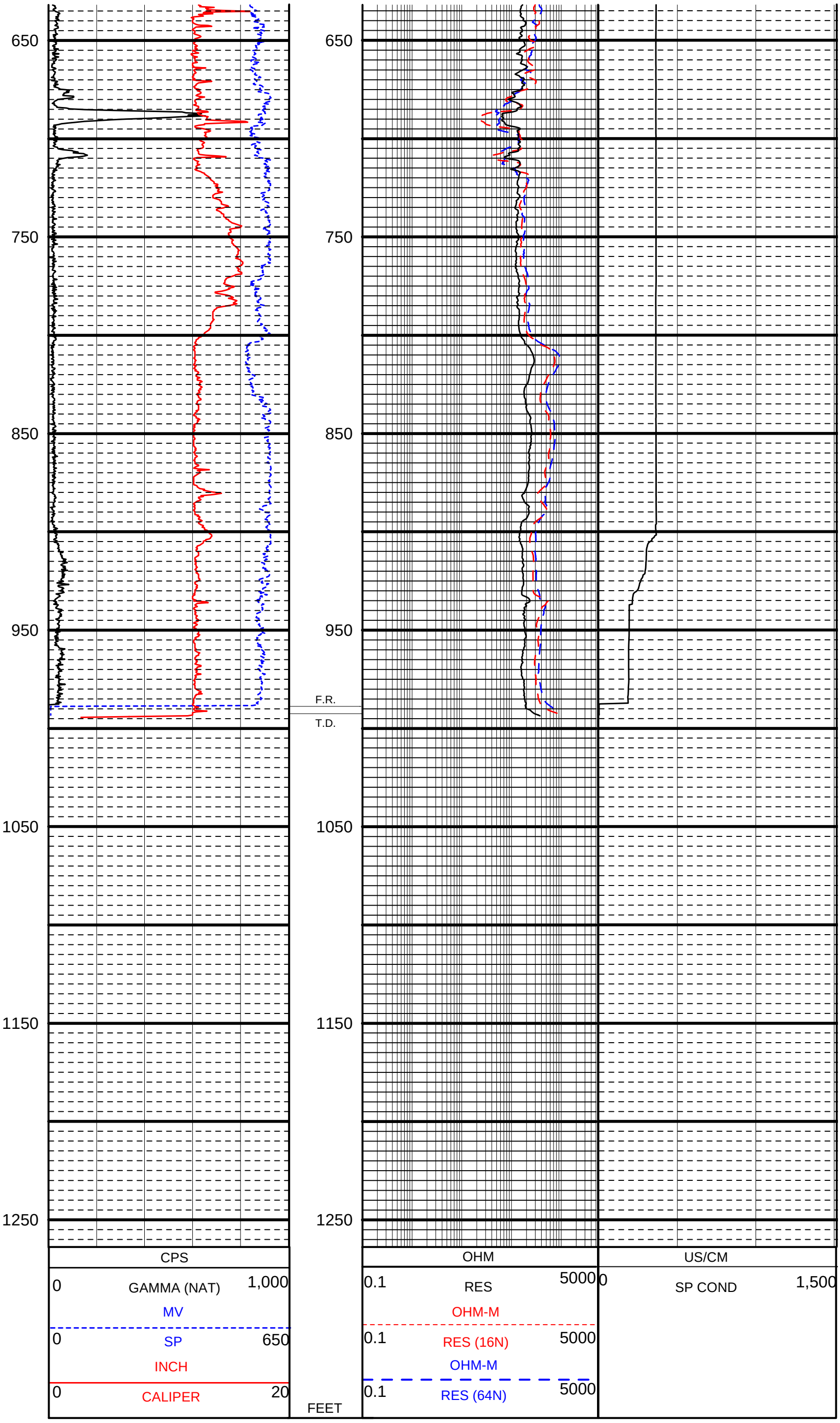



**Figure B-7 (continued).** Geophysical log suite collected in the temporary Upper Floridan aquifer production well, between land surface and 994 feet below land surface, after well construction at the ROMP 132 well site in Marion County, Florida. The logs were collected on 12/3/2009 using tools 9074C (caliper/gamma) and 8044C (multi-tool). The casing depth at the time of logging was 129 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet. The horizontal tracks on the left and right are linearly scaled and the middle track is logarithmically scaled.

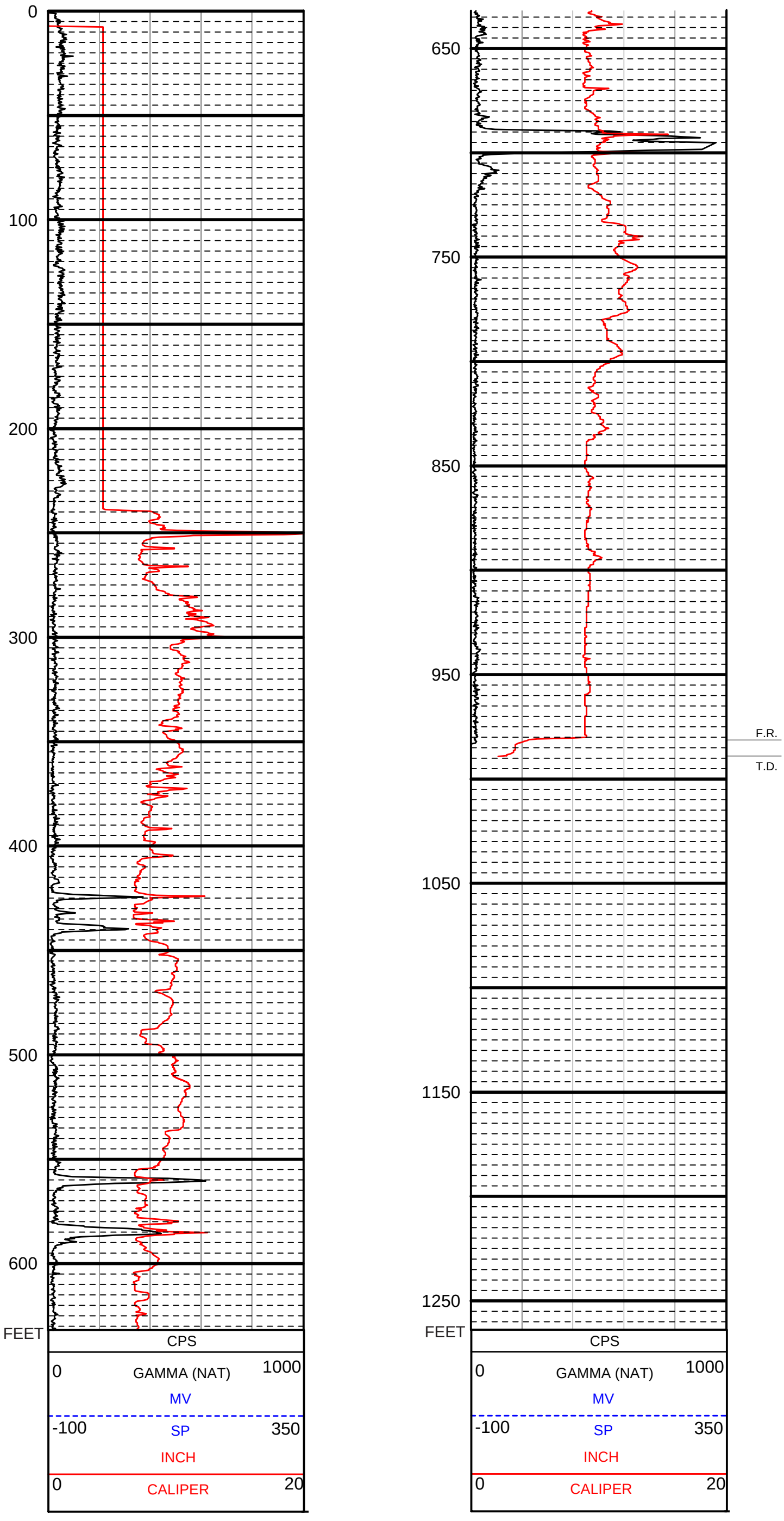
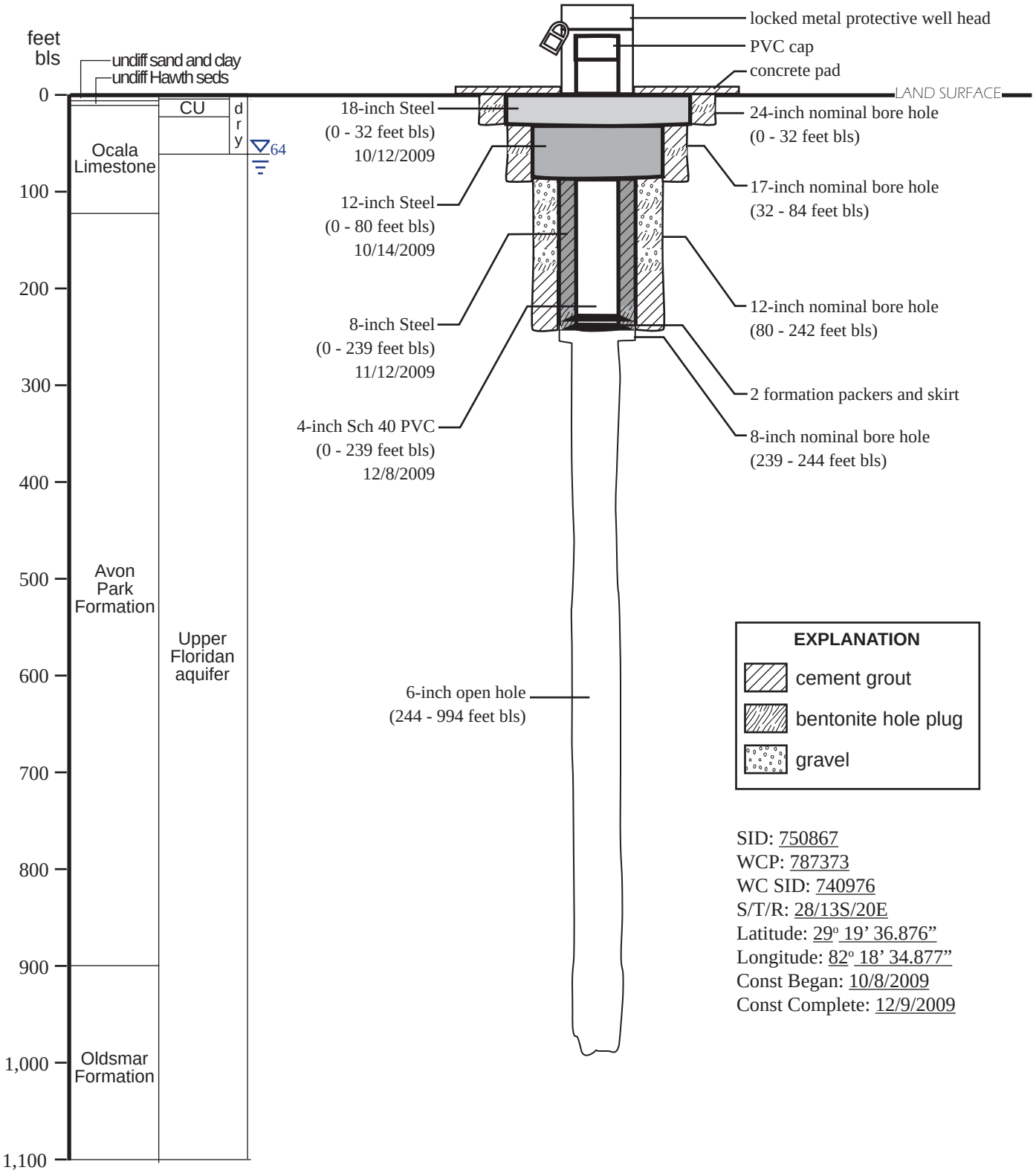
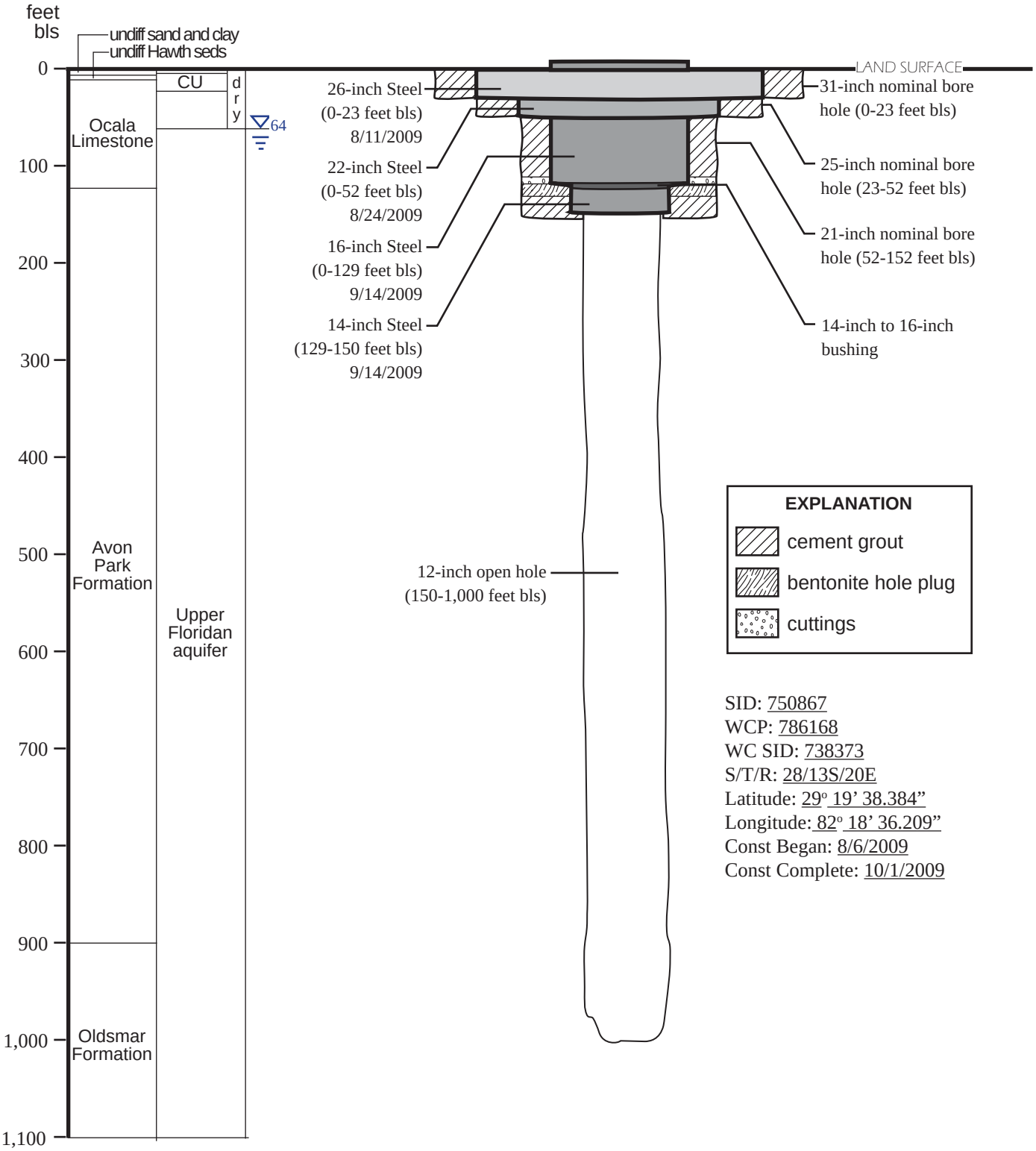



**Figure B-8.** Geophysical log suite collected in the permanent Upper Floridan aquifer monitor well, between land surface and 989 feet below land surface, after well construction at the ROMP 132 well site in Marion County, Florida. The logs were collected on 1/29/2010 using tool 9165C (caliper/gamma). The casing depth at the time of logging was 239 feet below land surface (see figure B-1). The vertical log scale is 2 inches per 100 feet.




bls, below land surface; Const, construction; CU, confining unit; E, east; PVC, polyvinyl chloride; S, south; Sch, Schedule; undiff, undifferentiated; SID, District site identification number; S/T/R, Section/Township/Range undiff Hawth sed, undifferentiated Hawthorn Group sediments; WCP, well construction permit number; WC SID, District well construction site identification number

**Figure C-1.** As-built diagram of the Upper Floridan aquifer monitor well at the ROMP 132 well site.




bls, below land surface; Const, construction; CU, confining unit; E, east; PVC, polyvinyl chloride; S, south; Sch, Schedule; undiff, undifferentiated; SID, District site identification number; S/T/R, Section/Township/Range undiff Hawth sed, undifferentiated Hawthorn Group sediments; WCP, well construction permit number; WC SID, District well construction site identification number

**Figure C-2.** As-built diagram of the Upper Floridan aquifer production well at the ROMP 132 well site.

LITHOLOGIC WELL LOG PRINTOUT SOURCE - FGS

WELL NUMBER: W-19249 COUNTY - MARION
TOTAL DEPTH: 1687 FT. LOCATION: T.13S R.20E S.28
SAMPLES - NONE LAT = 29D 19M 36S
LON = 82D 18M 36S
COMPLETION DATE: 27/07/10 ELEVATION: 108 FT

OTHER TYPES OF LOGS AVAILABLE - CALIPER

OWNER/DRILLER:SWFWMD; ROMP 132; TIM LOHNER & DALE JORDAN & ANDREW BOWIE & BAR

WORKED BY:ANNA JANOSIK; CORE HOLE DRILLED IN TWO PHASES; PHASE 1 OCCURRED 06/ TO 02/11/2009 FROM LAND SURFACE TO 1500 FEET BELOW LAND SURFACE. PHASE 2 OCCURRED 07/20/2010 TO 07/27/2010 FROM 1500 TO 1687 FEET BELOW LAND SURFACE. CORE QUALITY IS EXCELLENT.

| | | |
|---|---|---|
| 0. - 6. | 090UDSC | UNDIFFERENTIATED SAND AND CLAY |
| 6. - 11. | 122HTRN | HAWTHORN GROUP |
| 11. - 125. | 124OCAL | OCALA GROUP |
| 125. - 900. | 124AVPK | AVON PARK FM. |
| 900. - 1557. | 124OLDM | OLDSMAR LIMESTONE |
| 1557. - TD. | 125CDRK | CEDAR KEYS LIMESTONE |

0 - 0.8 SAND; DARK YELLOWISH BROWN
15% POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: FINE TO MEDIUM
ROUNDNESS: ANGULAR TO SUB-ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: SILT-05%

0.8 - 3.8 SAND; LIGHT BROWN TO MODERATE BROWN
05% POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN SIZE: FINE; RANGE: FINE TO MEDIUM
ROUNDNESS: ANGULAR TO SUB-ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
SEDIMENTARY STRUCTURES: MOTTLED
ACCESSORY MINERALS: CLAY-20%, IRON STAIN-05%

3.8 - 6 CLAY; MODERATE GRAY TO LIGHT BROWN
03% POROSITY: INTERGRANULAR, LOW PERMEABILITY
UNCONSOLIDATED
SEDIMENTARY STRUCTURES: MOTTLED
ACCESSORY MINERALS: IRON STAIN-35%, ORGANICS-01%

6 - 10 CLAY; LIGHT OLIVE TO LIGHT BROWN
01% POROSITY: INTERGRANULAR, LOW PERMEABILITY
UNCONSOLIDATED

SEDIMENTARY STRUCTURES: MOTTLED
ACCESSORY MINERALS: IRON STAIN-35%

10 - 11 CLAY; DARK YELLOWISH ORANGE TO LIGHT OLIVE
02% POROSITY: INTERGRANULAR, LOW PERMEABILITY
UNCONSOLIDATED
SEDIMENTARY STRUCTURES: MOTTLED
ACCESSORY MINERALS: IRON STAIN-65%

11 - 25 CHERT; WHITE TO LIGHT OLIVE GRAY
30% POROSITY: FRACTURE, INTERGRANULAR; GOOD INDURATION
ACCESSORY MINERALS: CALCILUTITE-02%
OTHER FEATURES: POOR SAMPLE

25 - 39 NO SAMPLES

39 - 41 PACKSTONE; VERY LIGHT ORANGE
15% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR
GRAIN TYPE: OOLITE, SKELETAL, CALCILUTITE
GRAIN SIZE: FINE; RANGE: VERY FINE TO COARSE
GOOD INDURATION
ACCESSORY MINERALS: IRON STAIN-05%
OTHER FEATURES: WEATHERED
FOSSILS: MOLLUSKS

41 - 44 CLAY; DARK YELLOWISH BROWN
05% POROSITY: INTERGRANULAR; UNCONSOLIDATED
SEDIMENTARY STRUCTURES: INTERBEDDED
ACCESSORY MINERALS: LIMESTONE-15%, IRON STAIN-05%
OTHER FEATURES: POOR SAMPLE

44 - 45 PACKSTONE; VERY LIGHT ORANGE
15% POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, OOLITE, SKELETAL
GRAIN SIZE: FINE; RANGE: VERY FINE TO COARSE
POOR INDURATION
SEDIMENTARY STRUCTURES: INTERBEDDED
ACCESSORY MINERALS: IRON STAIN-03%
OTHER FEATURES: WEATHERED, POOR SAMPLE

45 - 46 CLAY; DARK YELLOWISH BROWN
05% POROSITY: INTERGRANULAR; UNCONSOLIDATED
SEDIMENTARY STRUCTURES: INTERBEDDED
ACCESSORY MINERALS: LIMESTONE-15%, IRON STAIN-05%
ORGANICS-02%

46 - 49.5 NO SAMPLES

49.5 - 50 PACKSTONE; WHITE
15% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR
GRAIN TYPE: SKELETAL, CALCILUTITE, OOLITE
GRAIN SIZE: FINE; RANGE: FINE TO VERY COARSE
GOOD INDURATION
SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED
ACCESSORY MINERALS: IRON STAIN-03%
OTHER FEATURES: WEATHERED
FOSSILS: MOLLUSKS, BRYOZOA, BENTHIC FORAMINIFERA

50 - 50.5 CLAY; DARK YELLOWISH BROWN
03% POROSITY: INTERGRANULAR; UNCONSOLIDATED
SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED
ACCESSORY MINERALS: LIMESTONE-20%
NUMMULITIES

50.5 - 52.5 PACKSTONE; LIGHT YELLOWISH ORANGE TO WHITE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, OOLITE, CALCILUTITE
GRAIN SIZE: MEDIUM; RANGE: FINE TO VERY COARSE
MODERATE INDURATION
OTHER FEATURES: WEATHERED, FOSSILIFEROUS
FOSSILS: BENTHIC FORAMINIFERA, OOLITES
NUMMULITIES

52.5 - 57.4 GRAINSTONE; WHITE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, OOLITE
GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE
MODERATE INDURATION
OTHER FEATURES: WEATHERED
FOSSILS: BENTHIC FORAMINIFERA, OOLITES
NUMMULITIES

57.4 - 70 PACKSTONE; WHITE TO VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, SKELETAL, OOLITE
GRAIN SIZE: MEDIUM; RANGE: FINE TO VERY COARSE
MODERATE INDURATION
OTHER FEATURES: WEATHERED
FOSSILS: BENTHIC FORAMINIFERA, OOLITES

70 - 85 GRAINSTONE; WHITE TO VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, OOLITE
GRAIN SIZE: FINE; RANGE: FINE TO MEDIUM
MODERATE INDURATION
OTHER FEATURES: WEATHERED

| | |
|---|---|
| | FOSSILS: OOLITES |
| 85 - 92.5 | GRAINSTONE; WHITE TO VERY LIGHT ORANGE<br>20% POROSITY: INTERGRANULAR<br>GRAIN TYPE: CALCILUTITE, OOLITE<br>GRAIN SIZE: FINE; RANGE: FINE TO MEDIUM<br>MODERATE INDURATION<br>OTHER FEATURES: WEATHERED, POOR SAMPLE<br>FOSSILS: OOLITES |
| 92.5 - 124.5 | PACKSTONE; WHITE TO VERY LIGHT ORANGE<br>25% POROSITY: INTERGRANULAR, MOLDIC<br>GRAIN TYPE: CALCILUTITE, SKELETAL, OOLITE<br>GRAIN SIZE: FINE; RANGE: FINE TO MEDIUM; GOOD INDURATION<br>OTHER FEATURES: WEATHERED<br>FOSSILS: MOLLUSKS, OOLITES, ECHINOID |
| 124.5 - 125 | SAND; LIGHT YELLOWISH ORANGE<br>15% POROSITY: INTERGRANULAR<br>GRAIN SIZE: FINE; RANGE: VERY FINE TO FINE<br>ROUNDNESS: ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY<br>UNCONSOLIDATED<br>OTHER FEATURES: CALCAREOUS |
| 125 - 137 | DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE<br>25% POROSITY: MOLDIC, PIN POINT VUGS, INTERCRYSTALLINE<br>90-100% ALTERED; SUBHEDRAL<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION<br>ACCESSORY MINERALS: ORGANICS-01%<br>FOSSILS: ECHINOID |
| 137 - 144.3 | DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE<br>15% POROSITY: MOLDIC, PIN POINT VUGS, INTERCRYSTALLINE<br>90-100% ALTERED; SUBHEDRAL<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION<br>ACCESSORY MINERALS: ORGANICS-01% |
| 144.3 - 153.2 | DOLOSTONE; DARK YELLOWISH ORANGE TO GRAYISH ORANGE<br>25% POROSITY: MOLDIC, PIN POINT VUGS, INTERCRYSTALLINE<br>90-100% ALTERED; SUBHEDRAL<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION |
| 153.2 - 162.3 | DOLOSTONE; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN<br>25% POROSITY: MOLDIC, PIN POINT VUGS, VUGULAR<br>90-100% ALTERED; SUBHEDRAL |

GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
OTHER FEATURES: WEATHERED
FOSSILS: ECHINOID

162.3 - 165 DOLOSTONE; GRAYISH ORANGE TO DARK YELLOWISH ORANGE
10% POROSITY: PIN POINT VUGS, INTERGRANULAR
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MEDIUM TO FINE
GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-01%

165 - 166.4 DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH ORANGE
25% POROSITY: PIN POINT VUGS, INTERGRANULAR
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
OTHER FEATURES: WEATHERED

166.4 - 167.4 NO SAMPLES

167.4 - 169.1 MUDSTONE; VERY LIGHT ORANGE
GRAIN TYPE: CALCILUTITE
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: DOLOMITE-02%, ORGANICS-01%
OTHER FEATURES: CHALKY

169.1 - 169.4 SILT; GRAYISH ORANGE TO GRAYISH BROWN
05% POROSITY: INTERGRANULAR, LOW PERMEABILITY
GOOD INDURATION
SEDIMENTARY STRUCTURES: INTERBEDDED
ACCESSORY MINERALS: CLAY-15%, LIMESTONE-10%
OTHER FEATURES: POOR SAMPLE, CALCAREOUS

169.4 - 179 WACKESTONE; VERY LIGHT ORANGE
10% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: CALCILUTITE
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-01%
OTHER FEATURES: CHALKY

179 - 180.7 MUDSTONE; VERY LIGHT ORANGE
05% POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN TYPE: CALCILUTITE
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION

SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-15%
OTHER FEATURES: CHALKY, DOLOMITIC

180.7 - 200.6 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: PIN POINT VUGS, INTERGRANULAR, MOLDIC
GRAIN TYPE: CRYSTALS, PELLET, CALCILUTITE
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: DOLOMITIC
FOSSILS: MOLLUSKS, BRYOZOA, ECHINOID

200.6 - 203.8 WACKESTONE; VERY LIGHT ORANGE
15% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: PELLET, CRYSTALS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: BEDDED

203.8 - 209.4 PACKSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: OOLITE, PELLET, CRYSTALS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
ACCESSORY MINERALS: CHERT-02%, CALCITE-01%
OTHER FEATURES: WEATHERED, FOSSILIFEROUS
FOSSILS: OOLITES, MOLLUSKS, ECHINOID, CORAL

209.4 - 211.2 DOLOSTONE; GRAYISH ORANGE
15% POROSITY: MOLDIC, PIN POINT VUGS, INTERGRANULAR
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: INTERBEDDED
ACCESSORY MINERALS: LIMESTONE-15%
OTHER FEATURES: CALCAREOUS
FOSSILS: MOLLUSKS, ECHINOID

211.2 - 214.2 DOLOSTONE; GRAYISH ORANGE
05% POROSITY: MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE
GOOD INDURATION
FOSSILS: MOLLUSKS

214.2 - 225 DOLOSTONE; VERY LIGHT ORANGE
10% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE

50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: IRON STAIN-10%

225 - 225.9 MUDSTONE; VERY LIGHT ORANGE
05% POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: CALCILUTITE
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: IRON STAIN-10%

225.9 - 230 NO SAMPLES

230 - 232.2 WACKESTONE; VERY LIGHT ORANGE
05% POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: CALCILUTITE, OOLITE
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: IRON STAIN-10%, CALCITE-10%
FOSSILS: MOLLUSKS, CORAL

232.2 - 235 DOLOSTONE; GRAYISH ORANGE
10% POROSITY: PIN POINT VUGS, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: IRON STAIN-05%
FOSSILS: MOLLUSKS, ECHINOID

235 - 242.6 DOLOSTONE; GRAYISH ORANGE
10% POROSITY: PIN POINT VUGS, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION

242.6 - 245 DOLOSTONE; VERY LIGHT ORANGE
02% POROSITY: FRACTURE, INTERGRANULAR; 50-90% ALTERED
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION
OTHER FEATURES: POOR SAMPLE

245 - 251 DOLOSTONE; GRAYISH ORANGE
15% POROSITY: PIN POINT VUGS, INTERGRANULAR, MOLDIC
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
OTHER FEATURES: WEATHERED
FOSSILS: MOLLUSKS

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| 251 - 258.5 | DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE<br>10% POROSITY: PIN POINT VUGS, INTERGRANULAR<br>50-90% ALTERED; SUBHEDRAL<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION |
| 258.5 - 272.6 | DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE<br>15% POROSITY: PIN POINT VUGS, INTERGRANULAR<br>50-90% ALTERED; SUBHEDRAL<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION<br>OTHER FEATURES: WEATHERED<br>FOSSILS: MOLLUSKS, ECHINOID |
| 272.6 - 275.6 | DOLOSTONE; VERY LIGHT ORANGE<br>15% POROSITY: INTERGRANULAR, PIN POINT VUGS<br>50-90% ALTERED; ANHEDRAL<br>GRAIN SIZE: CRYPTOCRYSTALLINE<br>RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE<br>GOOD INDURATION<br>SEDIMENTARY STRUCTURES: LAMINATED<br>ACCESSORY MINERALS: ORGANICS-20% |
| 275.6 - 277.6 | DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE<br>25% POROSITY: INTERGRANULAR, PIN POINT VUGS<br>50-90% ALTERED; SUBHEDRAL<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: CRYPTOCRYSTALLINE TO VERY COARSE; GOOD INDURATION<br>OTHER FEATURES: WEATHERED, FOSSILIFEROUS<br>FOSSILS: OOLITES, ECHINOID, FOSSIL FRAGMENTS |
| 277.6 - 292 | DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE<br>25% POROSITY: INTERGRANULAR, PIN POINT VUGS<br>10-50% ALTERED; SUBHEDRAL<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION<br>OTHER FEATURES: CALCAREOUS<br>FOSSILS: MOLLUSKS, ECHINOID |
| 292 - 297.2 | DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE<br>15% POROSITY: INTERGRANULAR, PIN POINT VUGS<br>10-50% ALTERED; SUBHEDRAL<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION<br>SEDIMENTARY STRUCTURES: LAMINATED<br>ACCESSORY MINERALS: SILT-SIZE DOLOMITE-20%, ORGANICS-05%<br>OTHER FEATURES: CALCAREOUS |

297.2 - 300.8 DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE
25% POROSITY: INTERGRANULAR, PIN POINT VUGS
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION
FOSSILS: MOLLUSKS

300.8 - 307 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
15% POROSITY: INTERGRANULAR, PIN POINT VUGS
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-20%, ORGANICS-05%

307 - 312.2 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: INTERGRANULAR, PIN POINT VUGS
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: WEATHERED
FOSSILS: MOLLUSKS

312.2 - 325 DOLOSTONE; VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR, PIN POINT VUGS
10-50% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-30%, ORGANICS-05%
OTHER FEATURES: CALCAREOUS, WEATHERED
FOSSILS: MOLLUSKS

325 - 326 DOLOSTONE; LIGHT OLIVE GRAY
20% POROSITY: PIN POINT VUGS, MOLDIC; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION
FOSSILS: MOLLUSKS

326 - 330.6 DOLOSTONE; VERY LIGHT ORANGE
20% POROSITY: MOLDIC, VUGULAR, PIN POINT VUGS
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
ACCESSORY MINERALS: IRON STAIN-15%
OTHER FEATURES: POOR SAMPLE, CALCAREOUS

330.6 - 354.6 DOLOSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY
15% POROSITY: PIN POINT VUGS, VUGULAR, MOLDIC
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-30%
OTHER FEATURES: WEATHERED, PLATY
FOSSILS: MOLLUSKS

354.6 - 359.5 DOLOSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY
25% POROSITY: VUGULAR, PIN POINT VUGS, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: PLATY
FOSSILS: MOLLUSKS

359.5 - 370.4 DOLOSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY
20% POROSITY: PIN POINT VUGS, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-30%
OTHER FEATURES: PLATY

370.4 - 370.6 CLAY; LIGHT OLIVE GRAY
02% POROSITY: INTERGRANULAR
OTHER FEATURES: PLATY

370.6 - 376.2 DOLOSTONE; VERY LIGHT ORANGE
10% POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-30%
OTHER FEATURES: PLATY

376.2 - 378.3 DOLOSTONE; VERY LIGHT ORANGE
20% POROSITY: PIN POINT VUGS, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: PLATY
FOSSILS: MOLLUSKS

378.3 - 379.7 DOLOSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY
15% POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED
SUBHEDRAL

GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: MOTTLED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-30%
OTHER FEATURES: PLATY
FOSSILS: MOLLUSKS

379.7 - 380 DOLOSTONE; VERY LIGHT ORANGE
15% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-30%, ORGANICS-20%
OTHER FEATURES: PLATY

380 - 392 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: PIN POINT VUGS, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-20%
OTHER FEATURES: PLATY
FOSSILS: MOLLUSKS, ECHINOID

392 - 393.3 DOLOSTONE; VERY LIGHT ORANGE
10% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-40%, ORGANICS-20%
OTHER FEATURES: CHALKY, PLATY

393.3 - 400.6 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: PIN POINT VUGS, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: PLATY
FOSSILS: MOLLUSKS, BRYOZOA, ECHINOID

400.6 - 400.9 DOLOSTONE; VERY LIGHT ORANGE
10% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-40%, ORGANICS-20%
OTHER FEATURES: CHALKY, PLATY

400.9 - 403.2 DOLOSTONE; VERY LIGHT ORANGE
20% POROSITY: MOLDIC, PIN POINT VUGS, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: PLATY
FOSSILS: MOLLUSKS

403.2 - 404.4 DOLOSTONE; VERY LIGHT ORANGE
10% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-30%, ORGANICS-10%
OTHER FEATURES: CHALKY, PLATY

404.4 - 408 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: MOLDIC, PIN POINT VUGS, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: PLATY
FOSSILS: MOLLUSKS

408 - 409.6 DOLOSTONE; VERY LIGHT ORANGE
10% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-30%, ORGANICS-05%
OTHER FEATURES: CHALKY, PLATY

409.6 - 414.8 DOLOSTONE; VERY LIGHT ORANGE
15% POROSITY: MOLDIC, PIN POINT VUGS, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: PLATY
FOSSILS: MOLLUSKS, CORAL

414.8 - 416.9 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
07% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; MODERATE INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-50%, ORGANICS-05%
OTHER FEATURES: CHALKY, PLATY

416.9 - 418.5 PEAT; BLACK
05% POROSITY: INTERGRANULAR; UNCONSOLIDATED
SEDIMENTARY STRUCTURES: FISSILE

418.5 - 425.1 DOLOSTONE; VERY LIGHT ORANGE
07% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-50%, ORGANICS-05%
OTHER FEATURES: CHALKY, PLATY

425.1 - 425.3 PEAT; BLACK
05% POROSITY: INTERGRANULAR; UNCONSOLIDATED
SEDIMENTARY STRUCTURES: FISSILE

425.3 - 426.1 DOLOSTONE; GRAYISH ORANGE
20% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-04%
OTHER FEATURES: SUCROSIC

426.1 - 430 DOLOSTONE; GRAYISH ORANGE
10% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: MOTTLED
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-30%, ORGANICS-05%
OTHER FEATURES: CALCAREOUS

430 - 435.3 DOLOSTONE; MODERATE BROWN
ACCESSORY MINERALS: CHERT- %
OTHER FEATURES: POOR SAMPLE

435.3 - 465.3 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
25% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: OOLITE, INTRACLASTS, SKELETAL
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: WEATHERED
FOSSILS: OOLITES, FOSSIL FRAGMENTS, BRYOZOA, MOLLUSKS

465.3 - 470.7 WACKESTONE; GRAYISH ORANGE
15% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: INTRACLASTS, CALCILUTITE, SKELTAL CAST

GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: ORGANICS-10%
OTHER FEATURES: WEATHERED, CHALKY
FOSSILS: BENTHIC FORAMINIFERA
CUSHMANIA SP ORGANIC LAMINATIONS THROUGHOUT; CHALKY IN PARTS

470.7 - 483.3 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
GRAIN TYPE: INTRACLASTS, CALCILUTITE, SKELTAL CAST
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: WEATHERED
FOSSILS: BENTHIC FORAMINIFERA, CORAL
CUSHMANIA SP.

483.3 - 487.6 MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
10% POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE
GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-01%

487.6 - 493.3 WACKESTONE; GRAYISH ORANGE TO GRAYISH BROWN
15% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
GRAIN TYPE: CRYSTALS, INTRACLASTS, SKELTAL CAST
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS-01%
OTHER FEATURES: WEATHERED
FOSSILS: BENTHIC FORAMINIFERA
CUSHMANIA SP. INCREASED WEATHERING WITH DEPTH

493.3 - 500.7 MUDSTONE; VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS, SKELTAL CAST
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-02%
OTHER FEATURES: WEATHERED
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS
CUSHMANIA SP. DOLOMITE CRYSTAL LINED VUGS AT BOTTOM OF

| INTERVAL | |
|---|---|
| 500.7 - 530.5 | WACKESTONE; GRAYISH ORANGE<br>20% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC<br>GRAIN TYPE: INTRACLASTS, CALCILUTITE, OOLITE<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION<br>CEMENT TYPE(S): CALCILUTITE MATRIX<br>ACCESSORY MINERALS: ORGANICS-02%<br>FOSSILS: BENTHIC FORAMINIFERA, OOLITES, MOLLUSKS, BRYOZOA<br>CUSHMANIA SP. VARIABLE INDURATION THROUGHOUT, RANGING FROM POOR TO GOOD |
| 530.5 - 531.9 | PACKSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE<br>20% POROSITY: VUGULAR, PIN POINT VUGS, INTERGRANULAR<br>GRAIN TYPE: CRYSTALS, OOLITE, INTRACLASTS<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION<br>CEMENT TYPE(S): DOLOMITE CEMENT<br>ACCESSORY MINERALS: DOLOMITE-50%, LIMONITE-05%<br>FOSSILS: OSTRACODS, BENTHIC FORAMINIFERA, BRYOZOA MOLLUSKS<br>CUSHMANIA SP. PARTIALLY DOLOMITIZED; EXTREMELY REACTIVE TO HCL |
| 531.9 - 539.7 | WACKESTONE; VERY LIGHT ORANGE<br>15% POROSITY: INTERGRANULAR, PIN POINT VUGS<br>GRAIN TYPE: INTRACLASTS, CALCILUTITE, OOLITE<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION<br>CEMENT TYPE(S): CALCILUTITE MATRIX<br>ACCESSORY MINERALS: ORGANICS-02%, DOLOMITE-15%<br>FOSSILS: BENTHIC FORAMINIFERA, OOLITES<br>CUSHMANIA SP. PARTIALLY DOLOMITIZED; EXTREMELY REACTIVE TO HCL |
| 539.7 - 544.6 | PACKSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE<br>20% POROSITY: MOLDIC, PIN POINT VUGS, INTERGRANULAR<br>GRAIN TYPE: INTRACLASTS, CRYSTALS, SKELTAL CAST<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION<br>CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT<br>SEDIMENTARY STRUCTURES: GRADED BEDDING<br>ACCESSORY MINERALS: DOLOMITE-30%, LIMONITE-02%<br>FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA, OSTRACODS MOLLUSKS<br>CUSHMANIA SP. PARTIALLY DOLOMITIZED; EXTREMELY REACTIVE TO HCL; GRADING TO LESS DOLOMITIZATION |

544.6 - 546.4 WACKESTONE; VERY LIGHT ORANGE
25% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: INTRACLASTS, SKELTAL CAST, CALCILUTITE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMONITE-02%
OTHER FEATURES: WEATHERED
FOSSILS: BENTHIC FORAMINIFERA, OSTRACODS, MOLLUSKS
CUSHMANIA SP.

546.4 - 550 WACKESTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE
20% POROSITY: PIN POINT VUGS, INTERGRANULAR, MOLDIC
GRAIN TYPE: CRYSTALS, INTRACLASTS, SKELTAL CAST
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
SEDIMENTARY STRUCTURES: GRADED BEDDING
ACCESSORY MINERALS: DOLOMITE-50%, LIMONITE-02%
FOSSILS: BENTHIC FORAMINIFERA
CUSHMANIA SP. PARTIALLY DOLOMITIZED; REACTIVE TO HCL
GRADES TO INCREASED DOLOMITIZATION

550 - 556.2 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
20% POROSITY: VUGULAR, PIN POINT VUGS, INTERCRYSTALLINE
90-100% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
ACCESSORY MINERALS: CALCITE-01%
OTHER FEATURES:

556.2 - 557.1 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
20% POROSITY: MOLDIC, VUGULAR, PIN POINT VUGS
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
ACCESSORY MINERALS: CALCITE-01%, ORGANICS-05%
FOSSILS: BRYOZOA

557.1 - 559.3 PEAT; BLACK
05% POROSITY: INTERGRANULAR, LOW PERMEABILITY
POOR INDURATION
CEMENT TYPE(S): ORGANIC MATRIX

559.3 - 569.1 PACKSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: INTRACLASTS, OOLITE CLAST, SKELTAL CAST
GRAIN SIZE: MICROCRYSTALLINE

RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
FOSSILS: OOLITES, BRYOZOA

569.1 - 576.2 DOLOSTONE; MODERATE YELLOWISH BROWN
20% POROSITY: VUGULAR, PIN POINT VUGS, INTERCRYSTALLINE
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-10%
OTHER FEATURES: HIGH RECRYSTALLIZATION

576.2 - 577 PACKSTONE; GRAYISH BROWN
05% POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN TYPE: INTRACLASTS, OOLITE CLAST
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-50%, ORGANICS-30%
OTHER FEATURES: CALCAREOUS
PARTIALLY DOLOMITIZED; REACTIVE TO HCL

577 - 578 PEAT; BLACK
05% POROSITY: INTERGRANULAR, LOW PERMEABILITY
POOR INDURATION
CEMENT TYPE(S): ORGANIC MATRIX
SEDIMENTARY STRUCTURES: INTERBEDDED

578 - 578.9 PACKSTONE; GRAYISH BROWN
05% POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN TYPE: INTRACLASTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
SEDIMENTARY STRUCTURES: INTERBEDDED
ACCESSORY MINERALS: ORGANICS-10%
OTHER FEATURES: CALCAREOUS
FOSSILS: BRYOZOA

578.9 - 580.6 PEAT; BLACK
05% POROSITY: INTERGRANULAR, LOW PERMEABILITY
POOR INDURATION
CEMENT TYPE(S): ORGANIC MATRIX

580.6 - 585 WACKESTONE; GRAYISH BROWN
15% POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS
GRAIN SIZE: MICROCRYSTALLINE

RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
SEDIMENTARY STRUCTURES: INTERBEDDED, LAMINATED
ACCESSORY MINERALS: ORGANICS-30%
FOSSIL REMNANTS THROUGHOUT (POSSIBLY BRYOZOA); DOLOMITE
CRYSTAL LINED FRACTURE AT 584.4 FT

585 - 585.1 PEAT; BLACK
05% POROSITY: INTERGRANULAR, LOW PERMEABILITY
POOR INDURATION
CEMENT TYPE(S): ORGANIC MATRIX

585.1 - 593.6 WACKESTONE; GRAYISH BROWN
15% POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
SEDIMENTARY STRUCTURES: INTERBEDDED, LAMINATED
ACCESSORY MINERALS: ORGANICS-20%
FOSSILS: BRYOZOA, OSTRACODS, BENTHIC FORAMINIFERA
LAST 2 FEET GRADE TO INCREASED DOLOMITIZATION

593.6 - 596.1 DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN
25% POROSITY: INTERCRYSTALLINE, INTERGRANULAR
PIN POINT VUGS; 50-90% ALTERED; EUHEDRAL
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
ACCESSORY MINERALS: CALCARENITE- %
OTHER FEATURES: CALCAREOUS
CALCARENITE CONTENT ~40% IN UPPER 2 FT OF INTERVAL, THEN
GRADES TO ~5% AT BOTTOM OF INTERVAL

596.1 - 600.6 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
15% POROSITY: VUGULAR; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION

600.6 - 601.3 DOLOSTONE; GRAYISH ORANGE
25% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM
GOOD INDURATION
OTHER FEATURES: WEATHERED

601.3 - 605.5 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
20% POROSITY: VUGULAR, PIN POINT VUGS; 90-100% ALTERED
SUBHEDRAL

GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM
GOOD INDURATION

605.5 - 610.5 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
20% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS, VUGULAR
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM
GOOD INDURATION
OTHER FEATURES: WEATHERED, SUCROSIC

610.5 - 630 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
25% POROSITY: INTERCRYSTALLINE, VUGULAR, PIN POINT VUGS
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: MEDIUM; RANGE: CRYPTOCRYSTALLINE TO COARSE
GOOD INDURATION
SHELL FRAGMENTS, TOO ALTERED TO IDENTIFY

630 - 645.7 DOLOSTONE; MODERATE YELLOWISH BROWN
15% POROSITY: FRACTURE, PIN POINT VUGS; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION
OTHER FEATURES: POOR SAMPLE
POOR SAMPLE RECOVERY AND ACQUIRED SAMPLE HAS BEEN HIGHLY DISTURBED FROM THE CORING PROCESS; VERY DENSE; DOLOSILT OBSERVED IN CORING DISCHARGE

645.7 - 647.1 DOLOSTONE; MODERATE ORANGE PINK
25% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS, VUGULAR
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; MODERATE INDURATION
OTHER FEATURES: WEATHERED, SUCROSIC

647.1 - 651.8 DOLOSTONE; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN
25% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE
90-100% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-02%, QUARTZ-02%
FOSSILS: PLANT REMAINS, MOLLUSKS, ECHINOID
VUGS LINED WITH QUARTZ “SNOWBALLS” AT 651 FT BLS

651.8 - 652.2 SILT-SIZE DOLOMITE; GRAYISH ORANGE TO DARK YELLOWISH BROWN
07% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: ORGANICS-25%

652.2 - 654.8 SILT-SIZE DOLOMITE; GRAYISH ORANGE TO DARK YELLOWISH BROWN
07% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
GOOD INDURATION

654.8 - 657.9 DOLOSTONE; GRAYISH ORANGE
07% POROSITY: PIN POINT VUGS, LOW PERMEABILITY
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE
GOOD INDURATION

657.9 - 660.1 SILT-SIZE DOLOMITE; GRAYISH ORANGE TO DARK YELLOWISH BROWN
07% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED

660.1 - 664.4 DOLOSTONE; GRAYISH ORANGE
10% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
LOW PERMEABILITY; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE
GOOD INDURATION
ACCESSORY MINERALS: QUARTZ-02%
FOSSILS ARE TOO ALTERED TO IDENTIFY; VUGS LINED WITH
WEATHERED QUARTZ CRYSTALS

664.4 - 667 SILT-SIZE DOLOMITE; GRAYISH ORANGE TO DARK YELLOWISH BROWN
10% POROSITY: INTERCRYSTALLINE; GOOD INDURATION
FOSSILS: MOLLUSKS

667 - 673.5 DOLOSTONE; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN
15% POROSITY: PIN POINT VUGS, MOLDIC, VUGULAR
90-100% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO COARSE; GOOD INDURATION
FOSSILS: MOLLUSKS, ECHINOID

673.5 - 673.9 DOLOSTONE; VERY LIGHT ORANGE
05% POROSITY: LOW PERMEABILITY; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE; GOOD INDURATION
ACCESSORY MINERALS: CALCILUTITE-30%
OTHER FEATURES: CALCAREOUS

673.9 - 677.2 DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE
20% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE
50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION

ACCESSORY MINERALS: CALCILUTITE-40%
OTHER FEATURES: CALCAREOUS
FOSSILS: BENTHIC FORAMINIFERA
CUSHMANIA SP. ABUNDANT DICTYOCONUS SP

677.2 - 680.2 SILT-SIZE DOLOMITE; VERY LIGHT ORANGE TO GRAYISH BROWN
15% POROSITY: INTERCRYSTALLINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: ORGANICS-20%, CHERT-05%
CALCARENITE-20%
OTHER FEATURES: CALCAREOUS, WEATHERED
INTERSTITIAL CHERT; ORGANIC LAMINAE MOST ABUNDANT IN FIRST
2 FEET OF INTERVAL

680.2 - 683.7 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
15% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: INTRACLASTS, OOLITE
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: SILT-SIZE DOLOMITE-15%, ORGANICS-10%
FOSSILS: BENTHIC FORAMINIFERA, OOLITES

683.7 - 694.2 PEAT; DARK BROWN
05% POROSITY: LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): ORGANIC MATRIX
SEDIMENTARY STRUCTURES: FISSILE

694.2 - 703.2 PACKSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE
15% POROSITY: PIN POINT VUGS, INTERGRANULAR
GRAIN TYPE: CRYSTALS, INTRACLASTS
GRAIN SIZE: MEDIUM; RANGE: CRYPTOCRYSTALLINE TO COARSE
GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-02%
INDURATION RANGES FROM MODERATE TO GOOD

703.2 - 710.2 AS ABOVE
INTERSTITIAL ORGANICS AND ORGANIC LAMINAE

710.2 - 776.7 PACKSTONE; GRAYISH ORANGE
20% POROSITY: INTERGRANULAR, PIN POINT VUGS
GRAIN TYPE: INTRACLASTS, OOLITE, SKELTAL CAST
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
FOSSILS: OOLITES, BENTHIC FORAMINIFERA, MOLLUSKS, ECHINOID

776.7 - 778.4 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE

| | |
|---|---|
| | 20% POROSITY: INTERGRANULAR, VUGULAR, PIN POINT VUGS<br>GRAIN TYPE: INTRACLASTS, CRYSTALS<br>GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM<br>GOOD INDURATION<br>CEMENT TYPE(S): CALCILUTITE MATRIX<br>ACCESSORY MINERALS: CALCITE-10%<br>FOSSILS: CORAL, MOLLUSKS, OOLITES<br>DOG TOOTH CALCITE LINED VUGS |
| 778.4 - 808 | PACKSTONE; GRAYISH ORANGE<br>20% POROSITY: INTERGRANULAR, PIN POINT VUGS<br>GRAIN TYPE: INTRACLASTS, OOLITE, SKELTAL CAST<br>GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE<br>GOOD INDURATION<br>CEMENT TYPE(S): CALCILUTITE MATRIX<br>FOSSILS: OOLITES, BENTHIC FORAMINIFERA, ECHINOID, MOLLUSKS |
| 808 - 855 | WACKESTONE; VERY LIGHT ORANGE<br>25% POROSITY: MOLDIC, VUGULAR<br>GRAIN TYPE: CALCILUTITE, SKELTAL CAST<br>GRAIN SIZE: CRYPTOCRYSTALLINE<br>RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION<br>CEMENT TYPE(S): CALCILUTITE MATRIX<br>OTHER FEATURES: REEFAL, WEATHERED<br>FOSSILS: CORAL, MOLLUSKS<br>ABUNDANT CORAL CASTS; VARIABLE DENSITY THROUGHOUT THE INTERVAL |
| 855 - 869.5 | NO SAMPLES<br>CARBONATE SAND AND SILT ALONG WITH ORGANIC MATERIAL WERE OBSERVED IN THE DRILLING DISCHARGE |
| 869.5 - 897.4 | WACKESTONE; VERY LIGHT ORANGE<br>25% POROSITY: MOLDIC, VUGULAR<br>GRAIN TYPE: CALCILUTITE, SKELTAL CAST<br>GRAIN SIZE: CRYPTOCRYSTALLINE<br>RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION<br>CEMENT TYPE(S): CALCILUTITE MATRIX<br>OTHER FEATURES: REEFAL, WEATHERED<br>FOSSILS: CORAL, MOLLUSKS<br>ABUNDANT CORAL CASTS |
| 897.4 - 900.4 | WACKESTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE<br>15% POROSITY: INTERGRANULAR<br>GRAIN TYPE: INTRACLASTS<br>GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM<br>GOOD INDURATION<br>CEMENT TYPE(S): CALCILUTITE MATRIX |

SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: PYRITE-25%

900.4 - 902.8 AS ABOVE
NO PYRITE

902.8 - 923.2 PACKSTONE; GRAYISH ORANGE TO GRAYISH BROWN
15% POROSITY: INTERGRANULAR
GRAIN TYPE: SKELTAL CAST, INTRACLASTS, OOLITE
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-15%
OTHER FEATURES: DOLOMITIC, FOSSILIFEROUS, PLATY
FOSSILS: BENTHIC FORAMINIFERA, OSTRACODS, RUDISTIDS
HELICOSTIGINA GYRALIS DOLOMITIZATION INCREASES WITH DEPTH

923.2 - 930.5 DOLOSTONE; DARK YELLOWISH BROWN TO LIGHT YELLOWISH ORANGE
15% POROSITY: MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
OTHER FEATURES: WEATHERED
FOSSILS: BENTHIC FORAMINIFERA
HELICOSTIGINA GYRALIS POROSITY DECREASES WITH DEPTH
SUCROSIC IN PARTS; FOSSILS APPEAR TO BE DOLOMITIZED
VERSIONS OF THE SPECIES IN THE ABOVE LAYER, BUT ARE TOO
ALTERED TO ID

930.5 - 935.1 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
10% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
FOSSILS: BENTHIC FORAMINIFERA
HELICOSTIGINA GYRALIS VERY DENSE

935.1 - 946.2 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
15% POROSITY: INTERGRANULAR, MOLDIC
GRAIN TYPE: INTRACLASTS, SKELTAL CAST, OOLITE
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-10%
FOSSILS: BENTHIC FORAMINIFERA, BRYOZOA

946.2 - 961.6 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR

GRAIN TYPE: INTRACLASTS, SKELTAL CAST
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-10%
FOSSILS: MOLLUSKS, OSTRACODS, BRYOZOA

961.6 - 967.4 PACKSTONE; GRAYISH ORANGE
15% POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CRYSTALS
GRAIN SIZE: COARSE; RANGE: CRYPTOCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-50%
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS

967.4 - 971 DOLOSTONE; MODERATE YELLOWISH BROWN
20% POROSITY: INTERCRYSTALLINE, MOLDIC; 90-100% ALTERED
EUHEDRAL
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
OTHER FEATURES: SUCROSIC
FOSSILS: BENTHIC FORAMINIFERA

971 - 985 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: INTERGRANULAR, MOLDIC
GRAIN TYPE: INTRACLASTS, OOLITE
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-15%
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, OSTRACODS

985 - 988.3 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
15% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
FOSSILS: BENTHIC FORAMINIFERA

988.3 - 999.8 DOLOSTONE; DARK YELLOWISH BROWN
05% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION

999.8 - 1001.9 DOLOSTONE; GRAYISH ORANGE
10% POROSITY: INTERCRYSTALLINE, MOLDIC; 90-100% ALTERED
SUBHEDRAL

GRAIN SIZE: MEDIUM; RANGE: CRYPTOCRYSTALLINE TO COARSE
GOOD INDURATION
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS

1001.9 - 1026 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: INTERGRANULAR, MOLDIC
GRAIN TYPE: INTRACLASTS, CRYSTALS, OOLITE
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS

1026 - 1039.4 DOLOSTONE; GRAYISH ORANGE
15% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
MODERATE INDURATION
OTHER FEATURES: WEATHERED
VARIABLE INDURATION THROUGHOUT, RANGING FROM MODERATE TO GOOD; SUCROSIC IN PARTS; FOSSILS TOO WEATHERED TO ID

1039.4 - 1068.6 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
20% POROSITY: VUGULAR, INTERCRYSTALLINE; 90-100% ALTERED SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION
ACCESSORY MINERALS: QUARTZ-02%
FOSSILS: BENTHIC FORAMINIFERA
ROUNDED QUARTZ CLUSTERS LINING SOME VUGS

1068.6 - 1071.4 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
15% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
OTHER FEATURES: WEATHERED

1071.4 - 1083.8 MUDSTONE; VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: CRYSTALS, INTRACLASTS
GRAIN SIZE: MICROCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
SEDIMENTARY STRUCTURES: LAMINATED, INTERBEDDED
ACCESSORY MINERALS: DOLOMITE-05%

1083.8 - 1090 DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN
10% POROSITY: VUGULAR; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION

SEDIMENTARY STRUCTURES: INTERBEDDED
ACCESSORY MINERALS: QUARTZ-02%
ROUNDED QUARTZ CLUSTER LINED VUGS

1090 - 1102.2 MUDSTONE; VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: CRYSTALS, INTRACLASTS
GRAIN SIZE: MICROCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
SEDIMENTARY STRUCTURES: LAMINATED, INTERBEDDED
ACCESSORY MINERALS: DOLOMITE-05%

1102.2 - 1104.6 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
10% POROSITY: VUGULAR; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: INTERBEDDED
ACCESSORY MINERALS: QUARTZ-05%

1104.6 - 1117.2 MUDSTONE; VERY LIGHT ORANGE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: CRYSTALS, INTRACLASTS
GRAIN SIZE: MICROCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
SEDIMENTARY STRUCTURES: LAMINATED, INTERBEDDED
ACCESSORY MINERALS: DOLOMITE-05%

1117.2 - 1138.3 MUDSTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN
20% POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: CRYSTALS, INTRACLASTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
SEDIMENTARY STRUCTURES: LAMINATED, INTERBEDDED
ACCESSORY MINERALS: DOLOMITE-50%, QUARTZ-05%
ALTERNATING LAYERS OF THE LIMESTONE AND DOLOSTONE DESCRIBED ABOVE; QUARTZ LINED VUGS

1138.3 - 1151.4 DOLOSTONE; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN
10% POROSITY: MOLDIC, VUGULAR, INTERCRYSTALLINE
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO COARSE; GOOD INDURATION
ACCESSORY MINERALS: QUARTZ-02%
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS
QUARTZ CLUSTER LINED VUGS AND MOLDS

1151.4 - 1161.4 PACKSTONE; VERY LIGHT ORANGE

20% POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ-05%
FOSSILS: MOLLUSKS
GREEN MINERAL, POSSIBLY GLAUCONITE

1161.4 - 1165.5 DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN
10% POROSITY: INTERCRYSTALLINE, MOLDIC, VUGULAR
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: QUARTZ-02%
FOSSILS: BENTHIC FORAMINIFERA

1165.5 - 1172.5 WACKESTONE; VERY LIGHT ORANGE
15% POROSITY: INTERGRANULAR
GRAIN TYPE: CRYSTALS, INTRACLASTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
ACCESSORY MINERALS: DOLOMITE-10%, QUARTZ-02%

1172.5 - 1186 GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR
GRAIN TYPE: INTRACLASTS, OOLITE
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: DOLOMITE-20%
INTERSTITIAL DOLOSTONE NODULES AND DOLOSTONE LAMINAE

1186 - 1205.8 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
05% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE
GOOD INDURATION
EXTREMELY DENSE (SOUNDS LIKE GLASS WHEN PIECES TAPPED TOGETHER)

1205.8 - 1218 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH ORANGE
15% POROSITY: VUGULAR, FRACTURE; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
DIFFICULT CORING. FRACTURED APPEARANCE (UNCLEAR HOW MUCH

IS DUE TO THE CORING PROCESS).

1218 - 1235.7 DOLOSTONE; GRAYISH ORANGE
10% POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: CALCILUTITE-20%, ORGANICS-02%
OTHER FEATURES: CALCAREOUS
BECOMES MORE CALCAREOUS WITH DEPTH

1235.7 - 1236.4 CLAY; DARK YELLOWISH BROWN TO GRAYISH BROWN
05% POROSITY: INTERGRANULAR
ACCESSORY MINERALS: ORGANICS-20%

1236.4 - 1241.1 DOLOSTONE; MODERATE YELLOWISH BROWN TO MODERATE BROWN
10% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-25%

1241.1 - 1241.5 AS ABOVE

1241.5 - 1241.8 DOLOSTONE; MODERATE YELLOWISH BROWN
10% POROSITY: VUGULAR, INTERCRYSTALLINE; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: QUARTZ-45%
OTHER FEATURES: SUCROSIC, WEATHERED
INTERSTITIAL QUARTZ

1241.8 - 1249.8 DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH ORANGE
05% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY, VUGULAR
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: MOTTLED
ACCESSORY MINERALS: ORGANICS-05%, QUARTZ-02%
VERY FEW VUGS, BUT THOSE PRESENT ARE LINED WITH QUARTZ
CRYSTALS

1249.8 - 1250 DOLOSTONE; GRAYISH ORANGE
20% POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO FINE
GOOD INDURATION
OTHER FEATURES: WEATHERED

FOSSILS: MOLLUSKS

1250 - 1321 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
25% POROSITY: VUGULAR, FRACTURE; 90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: IRON STAIN-02%
EXTREMELY DENSE. DIFFICULT CORING WITH POSSIBLE BIT DROPS THROUGHOUT. SECONDARY POROSITY ACCOUNTS FOR NEARLY ALL POROSITY OBSERVED. IRON STAINED VUGS 1270-1282.

1321 - 1336 DOLOSTONE; GRAYISH ORANGE
05% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION

1336 - 1344.7 AS ABOVE

1344.7 - 1346.4 DOLOSTONE; VERY LIGHT ORANGE
15% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION

1346.4 - 1348.8 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
15% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
FOSSILS: MOLLUSKS
SUCROSIC IN PARTS. IRON STAINED VUG AT 1347.6.

1348.8 - 1354.7 DOLOSTONE; VERY LIGHT ORANGE
20% POROSITY: INTERCRYSTALLINE, VUGULAR; 90-100% ALTERED ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
OTHER FEATURES: CHALKY

1354.7 - 1380 DOLOSTONE; GRAYISH ORANGE
20% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: MEDIUM; RANGE: CRYPTOCRYSTALLINE TO MEDIUM
GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: ORGANICS-05%
OTHER FEATURES: WEATHERED
SUCROSIC IN PARTS. ORGANIC AND SILT SIZE DOLOSTONE LAMINAE THROUGHOUT.

1380 - 1387.8 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
15% POROSITY: INTERCRYSTALLINE, VUGULAR; 90-100% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
ACCESSORY MINERALS: ORGANICS-02%
FOSSILS: MOLLUSKS

1387.8 - 1402.4 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
15% POROSITY: VUGULAR, PIN POINT VUGS; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
FOSSILS: MOLLUSKS

1402.4 - 1409.7 DOLOSTONE; VERY LIGHT ORANGE
20% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION
OTHER FEATURES: CHALKY

1409.7 - 1418 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
20% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
FOSSILS: MOLLUSKS
SUCROSIC IN PARTS. GRADES FROM ANHEDRAL TO SUBHEDRAL WITH
DEPTH.

1418 - 1425.7 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
10% POROSITY: INTERCRYSTALLINE, VUGULAR; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
EUHEDRAL IN PARTS. VUGS DON'T APPEAR CONNECTED.

1425.7 - 1443 DOLOSTONE; BLACK TO MODERATE YELLOWISH BROWN
25% POROSITY: VUGULAR, FRACTURE; 90-100% ALTERED; EUHEDRAL
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO FINE
GOOD INDURATION
OTHER FEATURES: SUCROSIC

1443 - 1446.2 DOLOSTONE; VERY LIGHT ORANGE TO MODERATE ORANGE PINK
15% POROSITY: PIN POINT VUGS, FRACTURE; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION

1446.2 - 1463.4 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN
25% POROSITY: VUGULAR, FRACTURE; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO FINE
GOOD INDURATION

1463.4 - 1473.6 DOLOSTONE; DARK YELLOWISH BROWN
15% POROSITY: VUGULAR; 90-100% ALTERED; EUHEDRAL
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO FINE
GOOD INDURATION

1473.6 - 1489 DOLOSTONE; MODERATE BROWN TO LIGHT OLIVE GRAY
20% POROSITY: VUGULAR, FRACTURE; 90-100% ALTERED
SUBHEDRAL
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO FINE
GOOD INDURATION
OTHER FEATURES: SUCROSIC, WEATHERED

1489 - 1495 DOLOSTONE; LIGHT OLIVE GRAY TO DARK YELLOWISH BROWN
10% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO FINE
GOOD INDURATION

1495 - 1498 AS ABOVE

1498 - 1500.3 AS ABOVE

1500.3 - 1503.6 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE GRAY
15% POROSITY: VUGULAR; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO FINE
GOOD INDURATION

1503.6 - 1512.1 DOLOSTONE; VERY LIGHT ORANGE
10% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
OTHER FEATURES: CHALKY
FORMER MUDSTONE

1512.1 - 1512.7 DOLOSTONE; DARK YELLOWISH BROWN
15% POROSITY: VUGULAR; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE
GOOD INDURATION

1512.7 - 1515.4 DOLOSTONE; VERY LIGHT ORANGE

10% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
OTHER FEATURES: CHALKY

1515.4 - 1517.3 DOLOSTONE; DARK YELLOWISH BROWN
15% POROSITY: VUGULAR; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE
GOOD INDURATION

1517.3 - 1529.6 DOLOSTONE; VERY LIGHT ORANGE
10% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
OTHER FEATURES: CHALKY

1529.6 - 1532.2 DOLOSTONE; GRAYISH ORANGE TO DARK YELLOWISH BROWN
15% POROSITY: FRACTURE, INTERCRYSTALLINE; 90-100% ALTERED
ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION

1532.2 - 1532.9 DOLOSTONE; MODERATE GRAY TO MODERATE BROWN
20% POROSITY: VUGULAR; 90-100% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: WEATHERED

1532.9 - 1534.7 DOLOSTONE; GRAYISH ORANGE TO DARK YELLOWISH BROWN
15% POROSITY: FRACTURE, INTERCRYSTALLINE; 90-100% ALTERED
ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION

1534.7 - 1535.1 DOLOSTONE; MODERATE GRAY TO MODERATE BROWN
20% POROSITY: VUGULAR; 90-100% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION

1535.1 - 1538.3 DOLOSTONE; GRAYISH ORANGE
15% POROSITY: FRACTURE; 90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE

GOOD INDURATION

1538.3 - 1549.5 DOLOSTONE; MODERATE GRAY TO MODERATE BROWN
25% POROSITY: VUGULAR; 90-100% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION
OTHER FEATURES: WEATHERED
SUCROSIC IN PARTS

1549.5 - 1551.3 DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY
10% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED

1551.3 - 1552.2 DOLOSTONE; LIGHT OLIVE GRAY TO MODERATE LIGHT GRAY
15% POROSITY: VUGULAR; 90-100% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION

1552.2 - 1555.7 DOLOSTONE; GRAYISH ORANGE TO MODERATE GRAY
10% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
LOW PERMEABILITY; 90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION

1555.7 - 1557 DOLOSTONE; VERY LIGHT ORANGE
20% POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; MODERATE INDURATION
OTHER FEATURES: WEATHERED

1557 - 1570.6 DOLOSTONE; VERY LIGHT ORANGE
25% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; MODERATE INDURATION
ACCESSORY MINERALS: CLAY-02%
FOSSILS: BENTHIC FORAMINIFERA
CHALKY IN PARTS

1570.6 - 1577 NO SAMPLES

1577 - 1618 DOLOSTONE; VERY LIGHT ORANGE
25% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; MODERATE INDURATION
ACCESSORY MINERALS: CLAY-02%

FOSSILS: BENTHIC FORAMINIFERA

1618 - 1624.1 DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY
15% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
OTHER FEATURES: VARIEGATED

1624.1 - 1630.9 DOLOSTONE; PINKISH GRAY TO VERY LIGHT ORANGE
20% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE
GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED

1630.9 - 1637 DOLOSTONE; VERY LIGHT ORANGE
25% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
MODERATE INDURATION
OTHER FEATURES: WEATHERED

1637 - 1640.2 DOLOSTONE; PINKISH GRAY TO LIGHT GRAY
05% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: ANHYDRITE-45%
ANHYDRITE CONTENT INCREASES WITH DEPTH

1640.2 - 1649.1 ANHYDRITE; PINKISH GRAY TO DARK YELLOWISH BROWN
01% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
GOOD INDURATION

1649.1 - 1657.6 DOLOSTONE; VERY LIGHT ORANGE TO MODERATE DARK GRAY
01% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
90-100% ALTERED; ANHEDRAL
GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: ANHYDRITE-50%

1657.6 - 1673 ANHYDRITE; DARK YELLOWISH BROWN TO PINKISH GRAY
01% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
GOOD INDURATION
ACCESSORY MINERALS: DOLOMITE-10%, ORGANICS-02%

| | | |
|---|---|---|
| 1673 - 1675.2 | ANHYDRITE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE<br>01% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY<br>GOOD INDURATION<br>ACCESSORY MINERALS: DOLOMITE-40% |
| 1675.2 - 1677.2 | DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN<br>01% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY<br>90-100% ALTERED; ANHEDRAL<br>GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION<br>ACCESSORY MINERALS: ANHYDRITE-30% |
| 1677.2 - 1681.1 | DOLOSTONE; VERY LIGHT ORANGE<br>01% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY<br>90-100% ALTERED; ANHEDRAL<br>GRAIN SIZE: MICROCRYSTALLINE<br>RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION<br>SEDIMENTARY STRUCTURES: LAMINATED<br>ACCESSORY MINERALS: ANHYDRITE-10%<br>FOSSILS: OOLITES<br>ANHYDRITE FILLED MOLDS AND PIN POINT VUGS |
| 1681.1 - 1685.3 | DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN<br>01% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY<br>90-100% ALTERED; ANHEDRAL<br>GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION<br>SEDIMENTARY STRUCTURES: BIOTURBATED |
| 1685.3 - 1687 | ANHYDRITE; VERY LIGHT GRAY TO MODERATE DARK GRAY<br>01% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY<br>GOOD INDURATION<br>ACCESSORY MINERALS: DOLOMITE-10% |
| 1687 | TOTAL DEPTH |

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 1

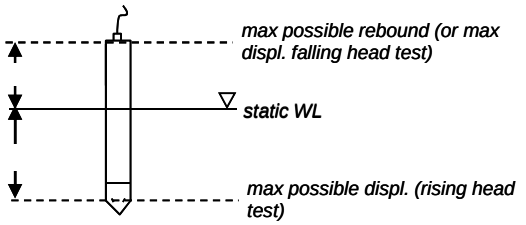
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 6/12/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 110 | Test Interval (ft - ft bls) | 71 - 110 |
| Test Casing Height (ft als) | 4.04 | Date of Last Development | 6/11/2008 |
| Test Casing Diameter (in) | 4 | Initial Static WL (ft btoc) | 68.21 |
| Test Casing Type | HW | Final Static WL (ft btoc) | 68.23 |
| Test Interval Length (ft) | 39 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | none | Initial Annulus WL (ft btoc) | none |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 0603300 | test casing | 78.00 | 0.06 | 9.79 / 9.84 |
| Transducer #2 | - | | annulus | - | - | - |
| Transducer #3 | 15 | 0603325 | pressure | | -0.01 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: not used
Spacer OD.: not used
Comments: tested through HW casing with no packer




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.5 | 0.75 | 0.25 | 1.5 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 9.84 | 9.84 | 9.84 | 9.84 |
| Pre-test XD #2 | - | - | - | - |
| Expected Displacement (ft) | 1.051 | 0.884 | 0.319 | 1.421 |
| Observed Displacement (ft) | 0.739 | 0.710 | 0.225 | 1.232 |
| Slug Discrepancy (%) | 30% | 20% | 29% | 13% |
| Max Rebound above Static | none | none | none | none |
| Post-test XD #1 | 9.84 | 9.84 | 9.84 | 9.84 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST1a_71-110 | ROMP132_ST1b_71-110 | ROMP132_ST1c_71-110 | ROMP132_ST1d_71-100 |
| Specific Conductance (uS) | 382.7 | 382.7 | 382.7 | 382.7 |
| Temperature (C) | 23.9 | 23.9 | 23.9 | 23.9 |
| Lithology | Ocala Limestone - fossiliferous packstone to wackestone | | | |
| $K_h$ (ft/day) | 55.96 | 53.99 | 88.46 | 65.29 |
| Other | | | | |
| Comments | Used KGS Model (1994) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-1.** Field sheet for the slug test conducted between 71 and 110 feet below land surface (slug test 1) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 2

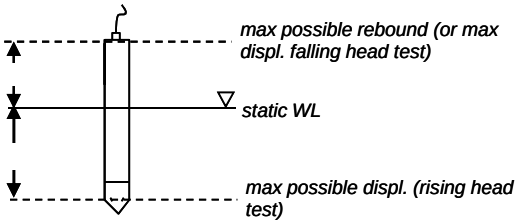
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/9/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 175 | Test Interval (ft - ft bls) | 132-175 |
| Test Casing Height (ft als) | 3.66 | Date of Last Development | 7/8/2008 |
| Test Casing Diameter (in) | 4 | Initial Static WL (ft btoc) | 68.10 |
| Test Casing Type | HW | Final Static WL (ft btoc) | 68.09 |
| Test Interval Length (ft) | 43 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | none | Initial Annulus WL (ft btoc) | none |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 0603300 | test casing | 78.00 | 0.07 | 9.90 / 9.98 |
| Transducer #2 | - | | annulus | - | - | - |
| Transducer #3 | 15 | 0603325 | pressure | | 0.00 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: not used
Spacer OD.: not used
Comments: tested through HW casing with no packer




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.5 | 0.75 | 0.25 | 1.5 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 9.98 | 9.98 | 9.98 | 9.98 |
| Pre-test XD #2 | - | - | - | - |
| Expected Displacement (ft) | 1.342 | 0.798 | 0.290 | 1.450 |
| Observed Displacement (ft) | 1.487 | 0.747 | 0.308 | 1.487 |
| Slug Discrepancy (%) | 11% | 6% | 6% | 3% |
| Max Rebound above Static | none | none | none | none |
| Post-test XD #1 | 9.98 | 9.98 | 9.98 | 9.98 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST2a_132-175 | ROMP132_ST2b_132-175 | ROMP132_ST2c_132-175 | ROMP132_ST2d_132-175 |
| Specific Conductance (uS) | 407.9 | 407.9 | 407.9 | 407.9 |
| Temperature (C) | 22.9 | 22.9 | 22.9 | 22.9 |
| Lithology | Top of Avon Park - Mostly dolostone w/ mudstone bed in bottom 10-ft | | | |
| $K_h$ (ft/day) | 8.289 | 11.76 | 10.51 | 8.375 |
| Other | | | | |
| Comments | Used KGS Model (1994) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-2.** Field sheet for the slug test conducted between 132 and 175 feet below land surface (slug test 2) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 3

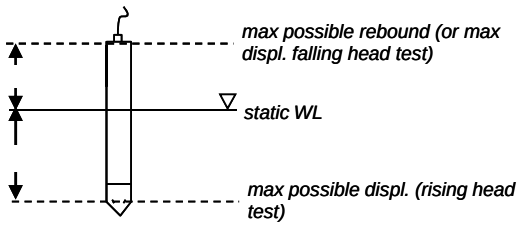
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/10/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 215 | Test Interval (ft - ft bls) | 180-215 |
| Test Casing Height (ft als) | 4.85 | Date of Last Development | 7/10/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 69.39 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 69.35 |
| Test Interval Length (ft) | 35 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0 | Initial Annulus WL (ft btoc) | 64.53 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 69.00 | 0.06 | 2.61 / 2.68 |
| Transducer #2 | 15 | 0603300 | annulus | 78.00 | 0.06 | 13.47 / 13.51 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.01 | |

| | |
|---|---|
| Data Logger | Splinter (CR800 - SN 3573) |
| Spacer Length | 5-feet |
| Spacer OD. | 1.625-inches |
| Comments: | |




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.5 | 0.75 | 0.25 | 0.10 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 2.69 | 2.69 | 2.69 | 2.69 |
| Pre-test XD #2 | 13.51 | 13.51 | 13.51 | 13.51 |
| Expected Displacement (ft) | 1.523 | 0.783 | 0.283 | 0.116 |
| Observed Displacement (ft) | 2.183 | 1.189 | 0.428 | 0.174 |
| Slug Discrepancy (%) | 43% | 52% | 51% | 50% |
| Max Rebound above Static | 0.624 | 0.450 | 0.196 | 0.087 |
| Post-test XD #1 | 2.69 | 2.69 | 2.69 | 2.69 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST3a_180-215 | ROMP132_ST3b_180-215 | ROMP132_ST3c_180-215 | ROMP132_ST3d_180-215 |
| Specific Conductance (uS) | 427.2 | 427.2 | 427.2 | 427.2 |
| Temperature (C) | 22.5 | 22.5 | 22.5 | 22.5 |
| Lithology | Avon Park - packstone w/ bottom 5-ft of dense, possibly fractured dolostone | | | |
| $K_h$ (ft/day) | 130 | 145.4 | 154.4 | 150 |
| Other | | | | |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-3.** Field sheet for the slug test conducted between 180 and 215 feet below land surface (slug test 3) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 3 cont.

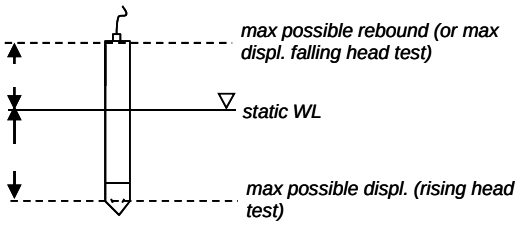
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/10/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 215 | Test Interval (ft - ft bls) | 180-215 |
| Test Casing Height (ft als) | 4.85 | Date of Last Development | 7/10/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 69.39 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 69.35 |
| Test Interval Length (ft) | 35 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0 | Initial Annulus WL (ft btoc) | 64.53 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 69.00 | 0.06 | 2.61 / 2.68 |
| Transducer #2 | 15 | 0603300 | annulus | 78.00 | 0.06 | 13.47 / 13.51 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.01 | |

| | |
|---|---|
| Data Logger | Splinter (CR800 - SN 3573) |
| Spacer Length | 5-feet |
| Spacer OD. | 1.625-inches |
| Comments: | |




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test E | Test F | Test G | Test H |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.75 | | | |
| Initiation method | pneumatic | | | |
| Rising/Falling head | rising | | | |
| Pre-test XD #1 | 2.69 | | | |
| Pre-test XD #2 | 13.51 | | | |
| Expected Displacement (ft) | 1.660 | | | |
| Observed Displacement (ft) | 2.331 | | | |
| Slug Discrepancy (%) | 40% | | | |
| Max Rebound above Static | 0.667 | | | |
| Post-test XD #1 | 2.69 | | | |
| Residual Dev. from $H_o$ (%) | 0% | | | |
| Data Logger File Name | ROMP132_ST3e_180-215 | | | |
| Specific Conductance (uS) | 427.2 | | | |
| Temperature (C) | 22.5 | | | |
| Lithology | Avon Park - packstone w/ bottom 5-ft of dense, possibly fractured dolostone | | | |
| $K_h$ (ft/day) | 135.5 | | | |
| Other | | | | |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-4.** Field sheet for the slug test conducted between 180 and 215 feet below land surface (slug test 3) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 4

### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/22/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 285 | Test Interval (ft - ft bls) | 233-285 |
| Test Casing Height (ft als) | 4.08 | Date of Last Development | 7/22/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 68.58 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 68.56 |
| Test Interval Length (ft) | 52 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 64.67 |

### Set-up Information

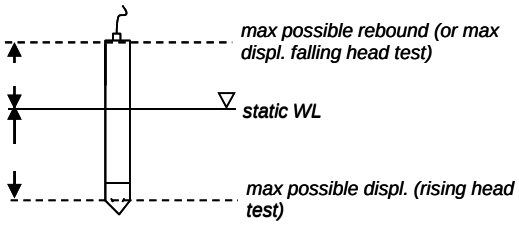
| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 68.60 | 0.02 | 3.02 / 2.97 |
| Transducer #2 | 15 | 0603300 | annulus | 78.00 | 0.02 | 13.33 / 13.43 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.07 | |

Data Logger: Splinter (CR800 - SN 3573)

Spacer Length: 5-feet

Spacer OD.: 1.625-inches

Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.0 | 0.5 | 0.25 | 1.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 2.97 | 2.97 | 2.98 | 2.98 |
| Pre-test XD #2 | 13.42 | 13.44 | 13.44 | 13.44 |
| Expected Displacement (ft) | 1.029 | 0.536 | 0.239 | 1.022 |
| Observed Displacement (ft) | 1.530 | 0.819 | 0.377 | 1.486 |
| Slug Discrepancy (%) | 49% | 53% | 58% | 45% |
| Max Rebound above Static | 0.536 | 0.333 | 0.167 | 0.536 |
| Post-test XD #1 | 2.97 | 2.98 | 2.98 | 2.98 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST4a_233-285 | ROMP132_ST4b_233-285 | ROMP132_ST4c_233-285 | ROMP132_ST4d_2333-285 |
| Specific Conductance (uS) | 426.0 | 426.0 | 426.0 | 426.0 |
| Temperature (C) | 22.09 | 22.09 | 22.09 | 22.09 |
| Lithology | Avon Park - fractured dolostone and packstone | | | |
| $K_h$ (ft/day) | 78.83 | 89.79 | 100.1 | 84.48 |
| Other | | | | |

Comments: Used Butler (1998) solution, and translation method during analysis.

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-5.** Field sheet for the slug test conducted between 233 and 285 feet below land surface (slug test 4) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 5

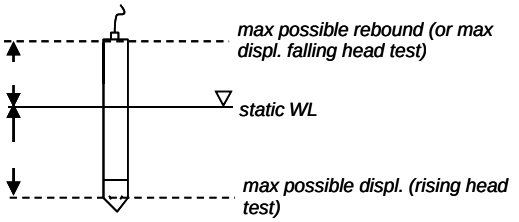
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/29/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 360 | Test Interval (ft - ft bls) | 303-360 |
| Test Casing Height (ft als) | 4.17 | Date of Last Development | 7/29/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 68.73 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 68.70 |
| Test Interval Length (ft) | 57 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 64.66 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 68.7 | 0.06 | 2.97 / 3.07 |
| Transducer #2 | 15 | 0603300 | annulus | 78.00 | 0.06 | 13.34 / 13.48 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.02 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.0 | 0.5 | 0.25 | 1.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.08 | 3.08 | 3.08 | 3.08 |
| Pre-test XD #2 | 13.48 | 13.48 | 13.48 | 13.48 |
| Expected Displacement (ft) | 1.008 | 0.551 | 0.261 | 0.906 |
| Observed Displacement (ft) | 1.537 | 0.877 | 0.457 | 1.559 |
| Slug Discrepancy (%) | 52% | 59% | 75% | 72% |
| Max Rebound above Static | 0.500 | 0.312 | 0.160 | 0.500 |
| Post-test XD #1 | 3.08 | 3.08 | 3.08 | 3.08 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST5a_303-360 | ROMP132_ST5b_303-360 | ROMP132_ST5c_303-360 | ROMP132_ST5d_303-360 |
| Specific Conductance (uS) | 411.7 | 411.7 | 411.7 | 411.7 |
| Temperature (C) | 22.5 | 22.5 | 22.5 | 22.5 |
| Lithology | Avon Park - interbedded limestone and dolostone; large vugs | | | |
| $K_h$ (ft/day) | 52.74 | 52.11 | 54.3 | 51.42 |
| Other | | | | |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-6.** Field sheet for the slug test conducted between 303 and 360 feet below land surface (slug test 5) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 6

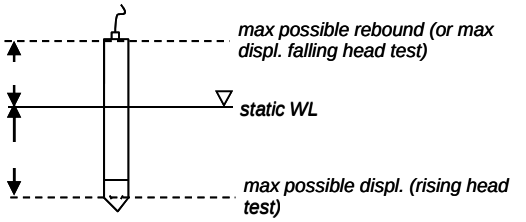
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/6/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 440 | Test Interval (ft - ft bls) | 381-440 |
| Test Casing Height (ft als) | 4.36 | Date of Last Development | 8/6/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 69.05 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 68.91 |
| Test Interval Length (ft) | 59 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 64.52 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 69 | 0.03 | 2.95 / 3.04 |
| Transducer #2 | 15 | 0603300 | annulus | 78 | 0.02 | 13.48 / 13.47 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.04 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments: **Manual Ball Valve (2"?)** --smaller inner diameter than solenoid valve




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.0 | 0.5 | 0.25 | 1.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.05 | 3.07 | 3.08 | 3.08 |
| Pre-test XD #2 | 13.47 | 13.47 | 13.48 | 13.47 |
| Expected Displacement (ft) | 1.058 | 0.515 | 0.254 | 1.000 |
| Observed Displacement (ft) | 1.725 | 0.906 | 0.471 | 1.704 |
| Slug Discrepancy (%) | 63% | 76% | 85% | 70% |
| Max Rebound above Static | 0.616 | 0.362 | 0.188 | 0.587 |
| Post-test XD #1 | 3.07 | 3.08 | 3.08 | 3.09 |
| Residual Dev. from $H_o$ (%) | 1% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST6a_380-440 | ROMP132_ST6b_380-440 | ROMP132_ST6c_380-440 | ROMP132_ST6d_380-440 |
| Specific Conductance (uS) | 426 | 426 | 426 | 426 |
| Temperature (C) | 22.2 | 22.2 | 22.2 | 22.2 |
| Lithology | Avon Park - interbedded dolostone and mud - wackestone w/ possible large fracture/cavity | | | |
| $K_h$ (ft/day) | 68.11 | 70.08 | 71.40 | 63.83 |
| Other | Used Butler (1998) solution, and translation method during analysis. | | | |
| Comments | Test initiation was done using a 2" (smaller than solenoid) ball valve as an experiment to see if slug discrepancy/ test initiation was affected by valve size | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-7.** Field sheet for the slug test conducted between 381 and 440 feet below land surface (slug test 6) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 6

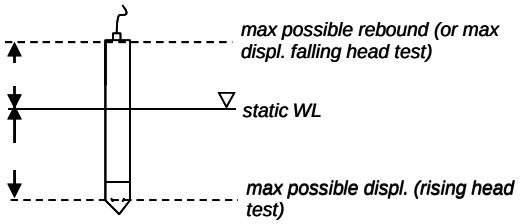
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/6/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 440 | Test Interval (ft - ft bls) | 381-440 |
| Test Casing Height (ft als) | 4.36 | Date of Last Development | 8/6/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 69.05 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 68.91 |
| Test Interval Length (ft) | 59 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 64.52 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 69 | 0.03 | 2.95 / 3.04 |
| Transducer #2 | 15 | 0603300 | annulus | 78 | 0.02 | 13.48 / 13.47 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.04 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments: **Solenoid Valve** --larger inner diameter than ball valve but still restirction on NQ




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.0 | 0.5 | 0.25 | 1.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.10 | 3.11 | 3.12 | 3.12 |
| Pre-test XD #2 | 13.48 | 13.48 | 13.49 | 13.49 |
| Expected Displacement (ft) | 1.051 | 0.529 | 0.290 | 1.066 |
| Observed Displacement (ft) | 1.537 | 0.841 | 0.486 | 1.515 |
| Slug Discrepancy (%) | 46% | 59% | 68% | 42% |
| Max Rebound above Static | 0.602 | 0.341 | 0.210 | 0.602 |
| Post-test XD #1 | 3.11 | 3.12 | 3.12 | 3.12 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST6a_380-440_sol | ROMP132_ST6b_380-440_sol | ROMP132_ST6c_380-440_sol | ROMP132_ST6d_380-440_sol |
| Specific Conductance (uS) | 426 | 426 | 426 | 426 |
| Temperature (C) | 22.2 | 22.2 | 22.2 | 22.2 |
| Lithology | Avon Park - interbedded dolostone and mud - wackestone w/ possible large fracture/cavity | | | |
| $K_h$ (ft/day) | 65.05 | 60.15 | 69.01 | 66.76 |
| Other | Used Butler (1998) solution, and translation method dur | | annulus transducer unplugged at start of test | |
| Comments | Test was repeated using solenoid ball valve (larger than inner diameter) as an experiment to see if slug discrepancy/ test initiation was affected by valve size | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-8.** Field sheet for the slug test conducted between 587 and 440 feet below land surface (slug test 6) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 7

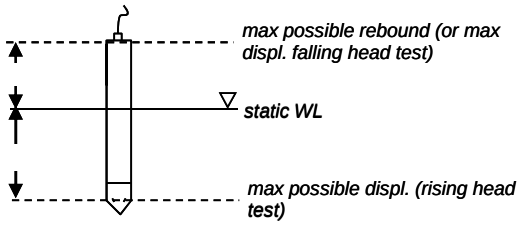
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/13/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 555 | Test Interval (ft - ft bls) | 486-555 |
| Test Casing Height (ft als) | 4.24 | Date of Last Development | 8/13/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 68.60 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 68.65 |
| Test Interval Length (ft) | 69 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 64.46 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 68.60 | 0.03 | 3.00 / 3.00 |
| Transducer #2 | 15 | 0603300 | annulus | 78 | 0.04 | 13.54 / 13.66 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.04 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.0 | 0.5 | 0.25 | 1.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.00 | 2.99 | 2.99 | 2.99 |
| Pre-test XD #2 | 13.66 | 13.66 | 13.66 | 13.66 |
| Expected Displacement (ft) | 0.965 | 0.486 | 0.508 | 0.994 |
| Observed Displacement (ft) | 1.726 | 0.805 | 0.979 | 1.639 |
| Slug Discrepancy (%) | 79% | 66% | 93% | 65% |
| Max Rebound above Static | 0.370 | 0.218 | 0.218 | 0.384 |
| Post-test XD #1 | 2.99 | 2.99 | 2.99 | 2.99 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST7a_485-555 | ROMP132_ST7b_485-555 | ROMP132_ST7c_485-555 | ROMP132_ST7d_485-555 |
| Specific Conductance (uS) | 465 | 465 | 465 | 465 |
| Temperature (C) | 21.8 | 21.8 | 21.8 | 21.8 |
| Lithology | Avon Park - wackestone to packstone with vuggy dolostone bed in bottom 7-ft | | | |
| $K_h$ (ft/day) | 24.9 | 25.77 | 27.62 | 25.85 |
| Other | really bad curve match | really bad curve match | | |
| Comments | FIRST TIME USING 3" BALL VALVE FOR INITIATION | | | |
| | Bad Test- curve matching off - seem to be between perm. units? - see daily log 8/13/08 | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-9.** Field sheet for the slug test conducted between 486 and 555 feet below land surface (slug test 7) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 7 cont.

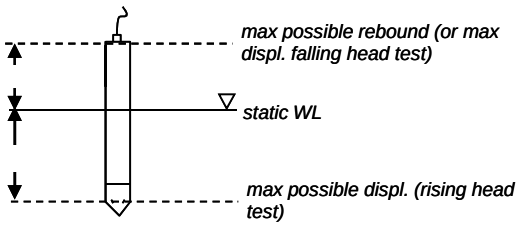
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/13/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 555 | Test Interval (ft - ft bls) | 486-555 |
| Test Casing Height (ft als) | 4.24 | Date of Last Development | 8/13/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 68.60 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 68.65 |
| Test Interval Length (ft) | 69 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 64.46 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 68.60 | 0.03 | 3.00 / 3.00 |
| Transducer #2 | 15 | 0603300 | annulus | 78 | 0.04 | 13.54 / 13.66 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.04 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test E | Test F | Test G | Test H |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.0 | 1.0 | 0.5 | 0.25 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 2.99 | 2.99 | 2.99 | 2.99 |
| Pre-test XD #2 | 13.66 | 13.66 | 13.66 | 13.66 |
| Expected Displacement (ft) | 0.986 | 0.972 | 0.486 | 0.276 |
| Observed Displacement (ft) | 1.539 | 0.965 | 0.493 | 0.305 |
| Slug Discrepancy (%) | 56% | 1% | 1% | 11% |
| Max Rebound above Static | 0.384 | 0.377 | 0.218 | 0.123 |
| Post-test XD #1 | 2.99 | 2.99 | 2.99 | 2.99 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST7e_485-555 | ROMP132_ST7f_485-555 | ROMP132_ST7g_485-555 | ROMP132_ST7h_485-555 |
| Specific Conductance (uS) | 465 | 465 | 465 | 465 |
| Temperature (C) | 21.8 | 21.8 | 21.8 | 21.8 |
| Lithology | Avon Park - wackestone to packstone with vuggy dolostone bed in bottom 7-ft | | | |
| $K_h$ (ft/day) | 26.02 | 26.11 | 28.19 | 28.98 |
| Other | really bad curve match | valve opend slowly (~ 2 sec) | valve opend slowly (~ 2 sec) | valve opend slowly (~ 2 sec) |
| Comments | FIRST TIME USING 3" BALL VALVE FOR INITIATION | | | |
| | Bad Test- curve matching off - seem to be between perm. units? - see daily log 8/13/08 | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-10.** Field sheet for the slug test conducted between 486 and 555 feet below land surface (slug test 7) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 7 cont.

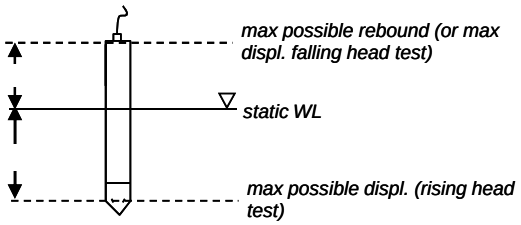
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/13/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 555 | Test Interval (ft - ft bls) | 486-555 |
| Test Casing Height (ft als) | 4.24 | Date of Last Development | 8/13/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 68.60 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 68.65 |
| Test Interval Length (ft) | 69 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 64.46 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 68.60 | 0.03 | 3.00 / 3.00 |
| Transducer #2 | 15 | 0603300 | annulus | 78 | 0.04 | 13.54 / 13.66 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.04 | |

| | |
|---|---|
| Data Logger | Splinter (CR800 - SN 3573) |
| Spacer Length | 5-feet |
| Spacer OD. | 1.625-inches |
| Comments: | |




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test I | Test J | Test K | Test L |
|---|---|---|---|---|
| Target Diplacement (ft) | 1.0 | | | |
| Initiation method | pneumatic | | | |
| Rising/Falling head | rising | | | |
| Pre-test XD #1 | 2.99 | | | |
| Pre-test XD #2 | 13.64 | | | |
| Expected Displacement (ft) | 0.994 | | | |
| Observed Displacement (ft) | 0.979 | | | |
| Slug Discrepancy (%) | 2% | | | |
| Max Rebound above Static | 0.384 | | | |
| Post-test XD #1 | 2.97 | | | |
| Residual Dev. from $H_o$ (%) | 1% | | | |
| Data Logger File Name | ROMP132_ST7i_485-555 | | | |
| Specific Conductance (uS) | 465 | | | |
| Temperature (C) | 21.8 | | | |
| Lithology | Avon Park - wackestone to packstone with vuggy dolostone bed in bottom 7-ft | | | |
| $K_h$ (ft/day) | 25.52 | | | |
| Other | valve opend slowly (~ 2 sec) | | | |
| Comments | FIRST TIME USING 3" BALL VALVE FOR INITIATION | | | |
| | Bad Test- curve matching off - seem to be between perm. units? - see daily log 8/13/08 | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-11.** Field sheet for the slug test conducted between 486 and 555 feet below land surface (slug test 7) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 8

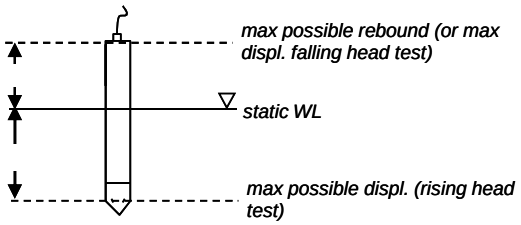
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/27/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 635 | Test Interval (ft - ft bls) | 587-630 |
| Test Casing Height (ft als) | 4.08 | Date of Last Development | 8/27/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 67.28 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 67.22 |
| Test Interval Length (ft) | 43 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 62.98 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 67.28 | 0.02 | 3.00 / 3.09 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.02 | 10.02 / 10.06 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.08 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 0.5 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.09 | 3.10 | 3.10 | 3.12 |
| Pre-test XD #2 | 10.06 | 10.05 | 10.06 | 10.07 |
| Expected Displacement (ft) | 2.059 | 1.124 | 0.587 | 2.015 |
| Observed Displacement (ft) | 2.900 | 1.762 | 1.015 | 2.646 |
| Slug Discrepancy (%) | 41% | 57% | 73% | 31% |
| Max Rebound above Static | 1.044 | 0.667 | 0.391 | 1.029 |
| Post-test XD #1 | 3.10 | 3.10 | 3.11 | 3.13 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST8a_587-630 | ROMP132_ST8b_587-630 | ROMP132_ST8c_587-630 | ROMP132_ST8d_587-630 |
| Specific Conductance (uS) | 422 | 422 | 422 | 422 |
| Temperature (C) | 22.2 | 22.2 | 22.2 | 22.2 |
| Lithology | Avon Park - dolostone with large vugs and some fractures | | | |
| $K_h$ (ft/day) | 70.51 | 71.59 | 75.37 | 71.11 |
| Other | | | | |
| Comments | The 3" ball valve was used in this test (and all tests after). | | | |
| | Opened valve slowly during trials E & F, which improved slug discrepancy values | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-12.** Field sheet for the slug test conducted between 587 and 630 feet below land surface (slug test 8) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 8 cont.

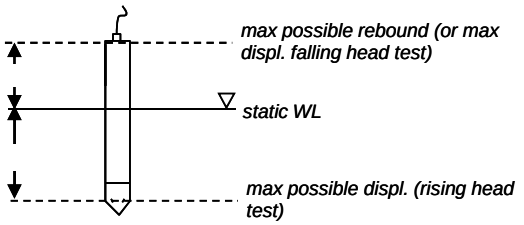
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/27/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 635 | Test Interval (ft - ft bls) | 587-630 |
| Test Casing Height (ft als) | 4.08 | Date of Last Development | 8/27/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 67.28 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 67.22 |
| Test Interval Length (ft) | 43 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 62.98 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 67.28 | 0.02 | 3.00 / 3.09 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.02 | 10.02 / 10.06 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.08 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test E | Test F | Test G | Test H |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | | |
| Initiation method | pneumatic | pneumatic | | |
| Rising/Falling head | rising | rising | | |
| Pre-test XD #1 | 3.13 | 3.14 | | |
| Pre-test XD #2 | 10.08 | 10.08 | | |
| Expected Displacement (ft) | 2.001 | 1.051 | | |
| Observed Displacement (ft) | 1.921 | 1.037 | | |
| Slug Discrepancy (%) | 4% | 1% | | |
| Max Rebound above Static | 1.022 | 0.652 | | |
| Post-test XD #1 | 3.13 | 3.15 | | |
| Residual Dev. from $H_o$ (%) | 0% | 0% | | |
| Data Logger File Name | ROMP132_ST8e_587-630 | ROMP132_ST8f_587-630 | | |
| Specific Conductance (uS) | 422 | 422 | | |
| Temperature (C) | 22.2 | 22.2 | | |
| Lithology | Avon Park - dolostone with large vugs and some fractures | | | |
| $K_h$ (ft/day) | 70.98 | 76.73 | | |
| Other | | | | |
| Comments | The 3" ball valve was used in this test (and all tests after). | | | |
| | Opened valve slowly during trials E & F, which improved slug discrepancy values | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-13.** Field sheet for the slug test conducted between 587 and 630 feet below land surface (slug test 8) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 9

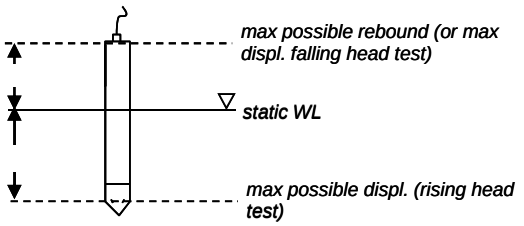
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 9/9/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 710 | Test Interval (ft - ft bls) | 661-710 |
| Test Casing Height (ft als) | 4.18 | Date of Last Development | 9/9/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 66.19 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 66.17 |
| Test Interval Length (ft) | 49 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 62.07 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 66.20 | 0.04 | 3.01 / 3.09 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.05 | 10.93 / 10.90 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.05 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 2.0 | 2.0 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.09 | 3.09 | 3.09 | 3.10 |
| Pre-test XD #2 | 10.90 | 10.90 | 10.90 | 10.90 |
| Expected Displacement (ft) | 1.922 | 1.980 | 2.052 | 2.030 |
| Observed Displacement (ft) | 2.444 | 2.545 | 3.350 | 2.008 |
| Slug Discrepancy (%) | 27% | 29% | 63% | 1% |
| Max Rebound above Static | 1.030 | 1.037 | 1.037 | 1.037 |
| Post-test XD #1 | 3.09 | 3.09 | 3.10 | 3.10 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST9a_661-710 | ROMP132_ST9b_661-710 | ROMP132_ST9c_661-710 | ROMP132_ST9d_661-710 |
| Specific Conductance (uS) | 433.0 | 433.0 | 433.0 | 433.0 |
| Temperature (C) | 22.5 | 22.5 | 22.5 | 22.5 |
| Lithology | Avon Park - interbedded pack-wackestone and dolostone; massive organic bed | | | |
| $K_h$ (ft/day) | 65.51 | 64.12 | 66.54 | 63.23 |
| Other | valve opened fast | valve opened fast | valve opened fast (meant to be slow) | valve opened slow |
| Comments | Head dependence determined from analyzing each peak of a trial | | | |
| | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-14.** Field sheet for the slug test conducted between 661 and 710 feet below land surface (slug test 9) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 10

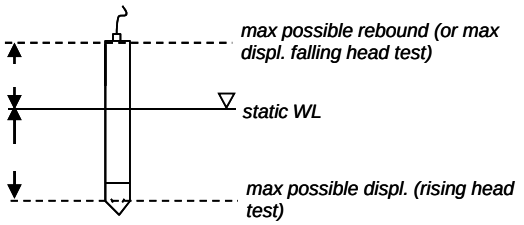
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 9/15/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 810 | Test Interval (ft - ft bls) | 751-810 |
| Test Casing Height (ft als) | 4.41 | Date of Last Development | 9/15/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 66.13 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 66.10 |
| Test Interval Length (ft) | 59 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 61.78 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 66.20 | 0.02 | 3.07 / 3.11 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.00 | 11.22 / 11.21 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.05 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 2.0 | 1.0 | 1.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.12 | 3.13 | 3.13 | 3.14 |
| Pre-test XD #2 | 11.20 | 11.20 | 11.20 | 11.20 |
| Expected Displacement (ft) | 2.037 | 2.030 | 0.986 | 0.971 |
| Observed Displacement (ft) | 2.015 | 2.661 | 1.124 | 0.957 |
| Slug Discrepancy (%) | 1% | 31% | 14% | 1% |
| Max Rebound above Static | none | none | none | none |
| Post-test XD #1 | 3.13 | 3.13 | 3.14 | 3.14 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST10a_751-810 | ROMP132_ST10b_751-810 | ROMP132_ST10c_751-810 | ROMP132_ST10d_751-810 |
| Specific Conductance (uS) | 460.7 | 460.7 | 460.7 | 460.7 |
| Temperature (C) | 22.3 | 22.3 | 22.3 | 22.3 |
| Lithology | Avon Park (Lake City) - packstone to grainstone | | | |
| $K_h$ (ft/day) | 1.691 | 2.308 | 2.004 | 1.821 |
| Other | valve opened slow | valve opened fast | valve opened fast (meant to be slow) | valve opened slow |
| Comments | Had to run different magnitudes to prove head dependence | | | |
| | Used Butler (1998) solution | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-15.** Field sheet for the slug test conducted between 751 and 810 feet below land surface (slug test 10) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 10 cont.

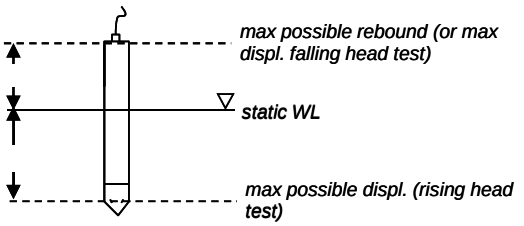
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 9/15/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 810 | Test Interval (ft - ft bls) | 751-810 |
| Test Casing Height (ft als) | 4.41 | Date of Last Development | 9/15/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 66.13 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 66.10 |
| Test Interval Length (ft) | 59 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 61.78 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 66.20 | 0.02 | 3.07 / 3.11 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.00 | 11.22 / 11.21 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.05 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test E | Test F | Test G | Test H |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | | | |
| Initiation method | pneumatic | | | |
| Rising/Falling head | rising | | | |
| Pre-test XD #1 | 3.15 | | | |
| Pre-test XD #2 | 11.20 | | | |
| Expected Displacement (ft) | 2.008 | | | |
| Observed Displacement (ft) | 1.986 | | | |
| Slug Discrepancy (%) | 1% | | | |
| Max Rebound above Static | none | | | |
| Post-test XD #1 | 3.15 | | | |
| Residual Dev. from $H_o$ (%) | 0% | | | |
| Data Logger File Name | ROMP132_ST10e_751-810 | | | |
| Specific Conductance (uS) | 460.7 | | | |
| Temperature (C) | 22.3 | | | |
| Lithology | Avon Park (Lake City) - packstone to grainstone | | | |
| $K_h$ (ft/day) | 1.720 | | | |
| Other | valve opened slow | | | |
| Comments | Had to run different magnitudes to prove head dependence | | | |
| | Used Butler (1998) solution | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-16.** Field sheet for the slug test conducted between 751 and 810 feet below land surface (slug test 10) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 11

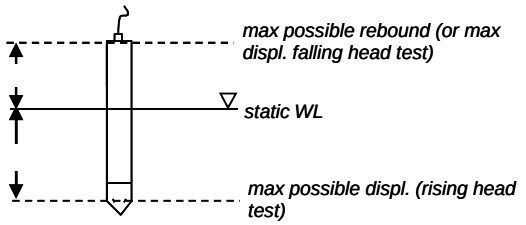
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 9/22/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 890 | Test Interval (ft - ft bls) | 845-890 |
| Test Casing Height (ft als) | 5.42 | Date of Last Development | 9/22/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 67.01 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 66.96 |
| Test Interval Length (ft) | 45 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 61.64 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 67 | 0.05 | 3.01 / 3.09 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.05 | 11.36 / 11.37 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.03 | |

| | |
|---|---|
| Data Logger | Splinter (CR800 - SN 3573) |
| Spacer Length | 5-feet |
| Spacer OD. | 1.625-inches |
| Comments: | |




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 2.0 | 1.0 | 1.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.09 | 3.08 | 3.12 | 3.13 |
| Pre-test XD #2 | 11.36 | 11.36 | 11.39 | 11.40 |
| Expected Displacement (ft) | 1.972 | 1.914 | 0.957 | 0.928 |
| Observed Displacement (ft) | 1.980 | 1.922 | 1.726 | 1.661 |
| Slug Discrepancy (%) | 0% | 0% | 80% | 79% |
| Max Rebound above Static | 1.196 | 1.175 | 0.638 | 0.645 |
| Post-test XD #1 | 3.08 | 3.11 | 3.13 | 3.13 |
| Residual Dev. from $H_o$ (%) | 0% | 1% | 0% | 0% |
| Data Logger File Name | ROMP132_ST11a_845-890 | ROMP132_ST11b_845-890 | ROMP132_ST11c_845-890 | ROMP132_ST11d_845-890 |
| Specific Conductance (uS) | 430.5 | 430.5 | 430.5 | 430.5 |
| Temperature (C) | 22.0 | 22.0 | 22.0 | 22.0 |
| Lithology | Avon Park (Lake City) - vuggy pack-grainstone with possible void | | | |
| $K_h$ (ft/day) | 110.7 | 110.8 | 120.2 | 129.1 |
| Other | valve opened slow | valve opened slow | valve opened fast | valve opened fast |
| Comments | Trials A & B used 3" ball valve, trials C & D used Dale's 3" flap valve which leaked slowly during trial D. Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-17.** Field sheet for the slug test conducted between 845 and 890 feet below land surface (slug test 11) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 12

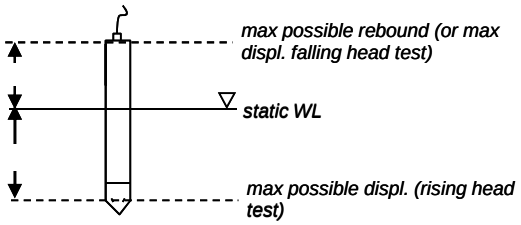
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 9/30/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 975 | Test Interval (ft - ft bls) | 906-975 |
| Test Casing Height (ft als) | 4.54 | Date of Last Development | 9/29/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 65.96 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 65.99 |
| Test Interval Length (ft) | 69 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 61.44 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 65.95 | 0.06 | 2.99 / 3.06 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.07 | 11.56 / 11.48 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.01 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 0.5 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.05 | 3.04 | 3.04 | 3.04 |
| Pre-test XD #2 | 11.48 | 11.46 | 11.46 | 11.46 |
| Expected Displacement (ft) | 2.023 | 0.972 | 0.457 | 1.784 |
| Observed Displacement (ft) | 3.068 | 0.986 | 0.486 | 2.480 |
| Slug Discrepancy (%) | 52% | 1% | 6% | 39% |
| Max Rebound above Static | none | none | none | none |
| Post-test XD #1 | 3.04 | 3.04 | 3.04 | 3.04 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST12a_906-975 | ROMP132_ST12b_906-975 | ROMP132_ST12c_906-975 | ROMP132_ST12d_906-975 |
| Specific Conductance (uS) | 438.4 | 438.4 | 438.4 | 438.4 |
| Temperature (C) | 22.1 | 22.1 | 22.1 | 22.1 |
| Lithology | Oldsmar - interbedded packstone to grainstone and dolostone | | | |
| $K_h$ (ft/day) | 2.747 | 3.159 | 3.624 | 2.876 |
| Other | valve opened fast | valve opened fast | valve opened slow | valve opend fast |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-18.** Field sheet for the slug test conducted between 906 and 975 feet below land surface (slug test 12) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 13

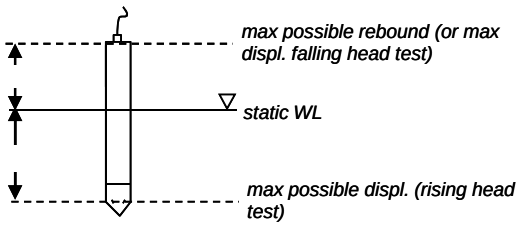
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 10/2/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 1,045 | Test Interval (ft - ft bls) | 981-1,045 |
| Test Casing Height (ft als) | 4.29 | Date of Last Development | 10/2/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 65.75 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 65.75 |
| Test Interval Length (ft) | 64 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 61.47 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 65.75 | 0.07 | 3.00 / 3.08 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.08 | 11.50 / 11.50 |
| Transducer #3 | 15 | 0603325 | pressure | | 0.02 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 1.0 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.08 | 3.08 | 3.08 | 3.08 |
| Pre-test XD #2 | 11.50 | 11.50 | 11.50 | 11.50 |
| Expected Displacement (ft) | 1.988 | 1.001 | 1.001 | 2.009 |
| Observed Displacement (ft) | 3.373 | 0.987 | 1.037 | 3.489 |
| Slug Discrepancy (%) | 70% | 1% | 4% | 74% |
| Max Rebound above Static | 1.168 | 0.675 | 0.675 | 1.175 |
| Post-test XD #1 | 3.08 | 3.08 | 3.08 | 3.08 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST13a_981-1045 | ROMP132_ST13b_981-1045 | ROMP132_ST13c_981-1045 | ROMP132_ST13d_981-1045 |
| Specific Conductance (uS) | 446.0 | 446.0 | 446.0 | 446.0 |
| Temperature (C) | 22.0 | 22.0 | 22.0 | 22.0 |
| Lithology | Oldsmar - dolostone and pack-grainstone w/ possible void | | | |
| $K_h$ (ft/day) | 56.53 | 63.06 | 63.21 | 58.73 |
| Other | valve opened fast | valve opened slow | valve opened slow | valve opened fast |
| Comments | Used Butler (1998) solution and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-19.** Field sheet for the slug test conducted between 981 and 1,045 feet below land surface (slug test 13) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 14

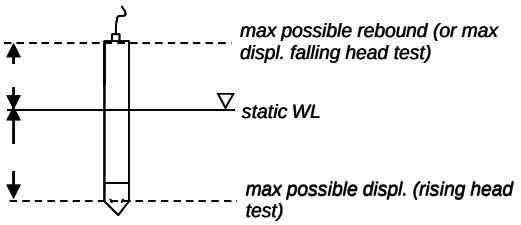
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 10/13/2008 |
| Well: | Core Hole | Performed by: | A. Janosik, T. Gates |
| Well Depth (ft bls) | 1,155 | Test Interval (ft - ft bls) | 1,076-1,155 |
| Test Casing Height (ft als) | 4.20 | Date of Last Development | 10/13/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 65.72 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 65.72 |
| Test Interval Length (ft) | 79 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 61.37 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 67.70 | 0.04 | 2.98 / 3.05 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.02 | 11.63 / 11.64 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.04 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 1.0 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.05 | 3.06 | 3.07 | 3.08 |
| Pre-test XD #2 | 11.64 | 11.64 | 11.65 | 11.64 |
| Expected Displacement (ft) | 1.986 | 1.000 | 1.015 | 2.037 |
| Observed Displacement (ft) | 2.603 | 1.066 | 1.044 | 3.052 |
| Slug Discrepancy (%) | 31% | 7% | 3% | 50% |
| Max Rebound above Static | 1.225 | 0.703 | 0.710 | 1.232 |
| Post-test XD #1 | 3.06 | 3.08 | 3.08 | 3.08 |
| Residual Dev. from $H_o$ (%) | 0% | 1% | 0% | 0% |
| Data Logger File Name | ROMP132_ST14a_1076-1155 | ROMP132_ST14b_1076-1155 | ROMP132_ST14c_1076-1155 | ROMP132_ST14d_1076-1155 |
| Specific Conductance (uS) | 452.9 | 452.9 | 452.9 | 452.9 |
| Temperature (C) | 22.3 | 22.3 | 22.3 | 22.3 |
| Lithology | Oldsmar - interbedded pack-wackestone and dolostone; abundant weathered quartz | | | |
| $K_h$ (ft/day) | 61.23 | 78.44 | 71.55 | 74.33 |
| Other | valve opened fast | valve opened slow | valve opened slow | valve opened fast |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-20.** Field sheet for the slug test conducted between 1,076 and 1,155 feet below land surface (slug test 14) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 15

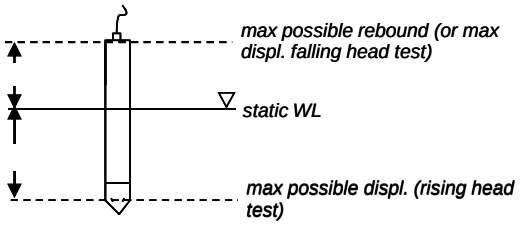
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 10/22/2008 |
| Well: | Core Hole | Performed by: | A. Janosik, J. LaRoche |
| Well Depth (ft bls) | 1,230 | Test Interval (ft - ft bls) | 1,186-1,230 |
| Test Casing Height (ft als) | 4.36 | Date of Last Development | 10/22/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 66.02 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 66.00 |
| Test Interval Length (ft) | 44 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 61.41 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 66 | 0.07 | 2.98 / 3.06 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.07 | 11.59 / 11.59 |
| Transducer #3 | 15 | 0603325 | pressure | | 0.00 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 1.0 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.05 | 3.05 | 3.05 | 3.08 |
| Pre-test XD #2 | 11.59 | 11.59 | 11.59 | 11.60 |
| Expected Displacement (ft) | 1.973 | 0.957 | 0.979 | 1.944 |
| Observed Displacement (ft) | 3.134 | 1.001 | 0.994 | 2.473 |
| Slug Discrepancy (%) | 59% | 5% | 2% | 27% |
| Max Rebound above Static | 1.170 | 0.650 | 0.630 | 1.150 |
| Post-test XD #1 | 3.05 | 3.05 | 3.07 | 3.08 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 1% | 0% |
| Data Logger File Name | ROMP132_ST15a_1186-1230 | ROMP132_ST15b_1186-1230 | ROMP132_ST15c_1186-1230 | ROMP132_ST15d_1186-1230 |
| Specific Conductance (uS) | 460.2 | 460.2 | 460.2 | 460.2 |
| Temperature (C) | 22.1 | 22.1 | 22.1 | 22.1 |
| Lithology | Oldsmar - fractured dolostone | | | |
| $K_h$ (ft/day) | 79.98 | 89.6 | 84.79 | 72.5 |
| Other | valve opened fast | valve opened slow | valve opened slow | valve opened fast |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-21.** Field sheet for the slug test conducted between 1,186 and 1,230 feet below land surface (slug test 15) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 16

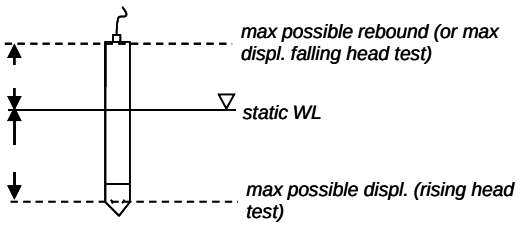
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 11/19/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 1,310 | Test Interval (ft - ft bls) | 1,246-1,310 |
| Test Casing Height (ft als) | 4.30 | Date of Last Development | 11/19/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 66.50 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 66.50 |
| Test Interval Length (ft) | 64 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.13 | Initial Annulus WL (ft btoc) | 61.80 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 66.50 | 0.07 | 3.00 / 3.09 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.11 | 11.20 / 11.19 |
| Transducer #3 | 15 | 0603325 | pressure | | 0.03 | |

| | |
|---|---|
| Data Logger | Splinter (CR800 - SN 3573) |
| Spacer Length | 5-feet |
| Spacer OD. | 1.625-inches |
| Comments: | Outside air temp = 42°F |
| | which may be reason for |
| | high reading in air |




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 1.0 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.10 | 3.09 | 3.08 | 3.09 |
| Pre-test XD #2 | 11.20 | 11.20 | 11.20 | 11.21 |
| Expected Displacement (ft) | 1.981 | 0.936 | 0.907 | 1.952 |
| Observed Displacement (ft) | 2.700 | 0.958 | 0.965 | 2.801 |
| Slug Discrepancy (%) | 36% | 2% | 6% | 43% |
| Max Rebound above Static | 1.306 | 0.697 | 0.682 | 1.277 |
| Post-test XD #1 | 3.09 | 3.08 | 3.09 | 3.10 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST16a_1246-1310 | ROMP132_ST16b_1246-1310 | ROMP132_ST16c_1246-1310 | ROMP132_ST16d_1246-1310 |
| Specific Conductance (uS) | 462.1 | 462.1 | 462.1 | 462.1 |
| Temperature (C) | 21.8 | 21.8 | 21.8 | 21.8 |
| Lithology | Oldsmar - highly fractured dolostone (boulder zone) | | | |
| $K_h$ (ft/day) | 101.2 | 168.3 | 164.8 | 118 |
| Other | valve opened fast | valve opened slow | valve opened slow | valve opened fast |
| Comments | There was a small response in annulus during trial A, packer was reset but response still observed. | | | |
| | Perhaps connection through fracture. Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-22.** Field sheet for the slug test conducted between 1,246 and 1,310 feet below land surface (slug test 16) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 17

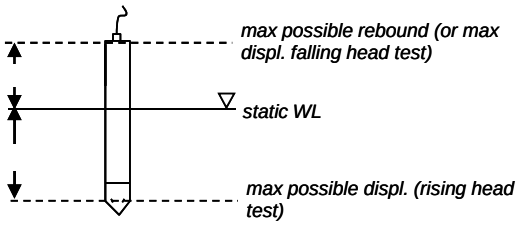
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 12/16/2008 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 1,390 | Test Interval (ft - ft bls) | 1,346-1,390 |
| Test Casing Height (ft als) | 3.73 | Date of Last Development | 12/16/2008 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 66.97 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | 67.06 |
| Test Interval Length (ft) | 44 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.62 | Initial Annulus WL (ft btoc) | 62.68 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 67 | 0.04 | 3.03 / 3.06 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.04 | 10.32 / 10.32 |
| Transducer #3 | 15 | 0603325 | pressure | | 0.00 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments: New measuring point for water levels is 0.62' above old MP.




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 1.0 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.06 | 3.04 | 3.03 | 3.02 |
| Pre-test XD #2 | 10.32 | 10.32 | 10.32 | 10.32 |
| Expected Displacement (ft) | 1.994 | 0.986 | 0.993 | 1.878 |
| Observed Displacement (ft) | 2.560 | 1.044 | 1.022 | 2.552 |
| Slug Discrepancy (%) | 28% | 6% | 3% | 36% |
| Max Rebound above Static | 1.284 | 0.711 | 0.703 | 1.276 |
| Post-test XD #1 | 3.04 | 3.03 | 3.02 | 3.01 |
| Residual Dev. from $H_o$ (%) | 1% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST17a_1346-1390 | ROMP132_ST17b_1346-1390 | ROMP132_ST17c_1346-1390 | ROMP132_ST17d_1346-1390 |
| Specific Conductance (uS) | 474.6 | 474.6 | 474.6 | 474.6 |
| Temperature (C) | 22.5 | 22.5 | 22.5 | 22.5 |
| Lithology | Oldsmar - interbedded limestone and dolostone, possible void | | | |
| $K_h$ (ft/day) | 116.8 | 164 | 144.9 | 115.4 |
| Other | valve opened fast | valve opened slow | valve opened slow | valve opened fast |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-23.** Field sheet for the slug test conducted between 1,346 and 1,390 feet below land surface (slug test 17) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 18

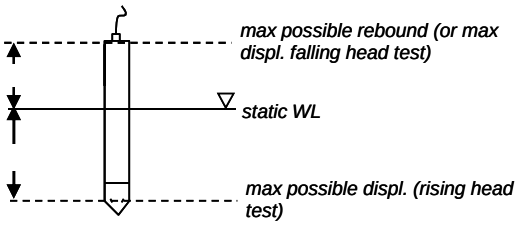
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 1/29/2009 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 1,460 | Test Interval (ft - ft bls) | 1,421-1,460 |
| Test Casing Height (ft als) | 3.82 | Date of Last Development | 1/28/2009 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 67.99 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | NM |
| Test Interval Length (ft) | 39 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.62 | Initial Annulus WL (ft btoc) | 63.50 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 68 | 0.04 | 2.99 / 3.13 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.09 | 9.50 / 9.43 |
| Transducer #3 | 15 | 0603325 | pressure | | 0.02 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments: raining out, transducer slipped down well a bit so Obsvd Sub = 3.13




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 1.0 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.13 | 3.12 | 3.12 | 3.12 |
| Pre-test XD #2 | 9.43 | 9.43 | 9.43 | 9.43 |
| Expected Displacement (ft) | 2.016 | 0.979 | 1.015 | 2.016 |
| Observed Displacement (ft) | 3.452 | 0.986 | 1.030 | 3.452 |
| Slug Discrepancy (%) | 71% | 1% | 1% | 71% |
| Max Rebound above Static | 1.320 | 0.711 | 0.733 | 1.313 |
| Post-test XD #1 | 3.12 | 3.12 | 3.12 | 3.10 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 1% |
| Data Logger File Name | ROMP132_ST18a_1421-1460 | ROMP132_ST18b_1421-1460 | ROMP132_ST18c_1421-1460 | ROMP132_ST18d_1421-1460 |
| Specific Conductance (uS) | 521.0 | 521.0 | 521.0 | 521.0 |
| Temperature (C) | 22.5 | 22.5 | 22.5 | 22.5 |
| Lithology | Oldsmar - Highly fractured crystaline dolostone | | | |
| $K_h$ (ft/day) | 228.1 | 220.2 | 210.3 | 223.8 |
| Other | valve opened fast | valve opened slow | valve opened slow | valve opened fast |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-24.** Field sheet for the slug test conducted between 1,421 and 1,460 feet below land surface (slug test 18) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 19

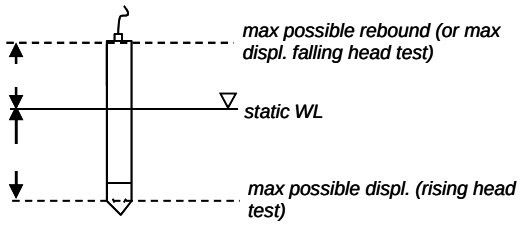
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 2/12/2009 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 1,500 | Test Interval (ft - ft bls) | 1,466-1,500 |
| Test Casing Height (ft als) | 3.42 | Date of Last Development | 2/12/2009 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 67.78 |
| Test Casing Type | NQ | Final Static WL (ft btoc) | NM |
| Test Interval Length (ft) | 34 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 0.62 | Initial Annulus WL (ft btoc) | 63.76 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | ? | test casing | 67.75 | 0.05 | 2.97 / 2.98 |
| Transducer #2 | 15 | 0603300 | annulus | 73 | 0.10 | 9.24 / 9.24 |
| Transducer #3 | 15 | 0603325 | pressure | | -0.01 | |

Data Logger: Splinter (CR800 - SN 3573)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments: annulus transducer
cable needs repair




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 1.0 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 2.98 | 2.96 | 2.95 | 2.94 |
| Pre-test XD #2 | 9.24 | 9.24 | 9.24 | 9.25 |
| Expected Displacement (ft) | 1.987 | 1.030 | 1.008 | 1.994 |
| Observed Displacement (ft) | 2.748 | 1.044 | 1.044 | 2.865 |
| Slug Discrepancy (%) | 38% | 1% | 4% | 44% |
| Max Rebound above Static | 1.349 | 0.776 | 0.747 | 1.342 |
| Post-test XD #1 | 2.96 | 2.95 | 2.94 | 2.95 |
| Residual Dev. from $H_o$ (%) | 1% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST19a_1466-1500 | ROMP132_ST19b_1466-1500 | ROMP132_ST19c_1466-1500 | ROMP132_ST19d_1466-1500 |
| Specific Conductance (uS) | 525.0 | 525.0 | 525.0 | 525.0 |
| Temperature (C) | 22.7 | 22.7 | 22.7 | 22.7 |
| Lithology | Oldsmar - Fractured, dense, euhedral dolostone | | | |
| $K_h$ (ft/day) | 330.3 | 650 | 783.9 | 315 |
| Other | valve opened fast | valve opened slow | valve opened slow | valve opened fast |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-25.** Field sheet for the slug test conducted between 1,466 and 1,500 feet below land surface (slug test 19) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 20

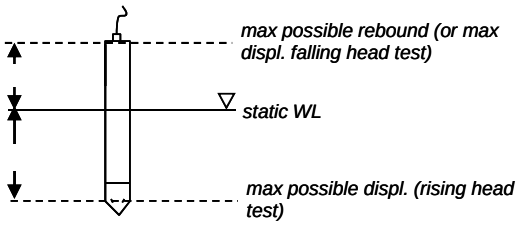
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/22/2010 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 1,607 | Test Interval (ft - ft bls) | 1,557-1,607 |
| Test Casing Height (ft als) | 7.03 | Date of Last Development | 7/22/2010 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 70.99 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | 71.07 |
| Test Interval Length (ft) | 50 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | 1.96 | Initial Annulus WL (ft btoc) | 65.39 |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | | test casing | 71 | -0.04 | 3.01/ 3.11 |
| Transducer #2 | 15 | | annulus | 75 | 0.07 | 9.61 / 9.66 |
| Transducer #3 | 15 | | pressure | | -0.06 | |

Data Logger: Rafael (CR800 - SN 2926)
Spacer Length: 5-feet
Spacer OD.: 1.625-inches
Comments:




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | 2.0 | 1.0 | 0.5 | 2.0 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.10 | 3.09 | 3.08 | 3.08 |
| Pre-test XD #2 | 9.66 | 9.66 | 9.65 | 9.66 |
| Expected Displacement (ft) | 1.934 | 1.663 | 0.557 | 2.044 |
| Observed Displacement (ft) | 2.785 | 1.136 | 0.894 | 2.821 |
| Slug Discrepancy (%) | 44% | 32% | 61% | 38% |
| Max Rebound above Static | 0.059 | 0.051 | 0.022 | 0.059 |
| Post-test XD #1 | 3.09 | 3.08 | 3.08 | 3.08 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0% | 0% |
| Data Logger File Name | ROMP132_ST20a_1557-1607 | ROMP132_ST20b_1557-1607 | ROMP132_ST20a_1557-1607 | ROMP132_ST20a_1557-1607 |
| Specific Conductance (uS) | 1122.0 | 1122.0 | 1122.0 | 1122.0 |
| Temperature (C) | 24.3 | 24.3 | 24.3 | 24.3 |
| Lithology | Cedar Keys - Dolostone (former packstone) | | | |
| $K_h$ (ft/day) | 5.878 | 6.666 | 6.695 | 5.939 |
| Other | | | | |
| Comments | Used Butler (1998) solution, and translation method during analysis. | | | |

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-26.** Field sheet for the slug test conducted between 1,557 and 1,607 feet below land surface (slug test 20) at the ROMP 132 well site in Marion County.

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 21

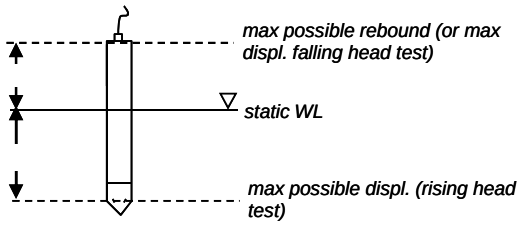
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/29/2010 |
| Well: | Core Hole | Performed by: | A. Janosik |
| Well Depth (ft bls) | 1,687 | Test Interval (ft - ft bls) | 1,637-1,687 |
| Test Casing Height (ft als) | 6.98 | Date of Last Development | 7/27/2010 |
| Test Casing Diameter (in) | 2 3/8 | Initial Static WL (ft btoc) | 73.31 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | 72.47 @ 11:48 8/2/10 |
| Test Interval Length (ft) | 50 | Slot Size & Filter Pack Type | none |
| Annulus Casing Height (ft als) | | Initial Annulus WL (ft btoc) | |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Exp/Obsvd Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | | test casing | 73.3 | -0.06 | 3.01/ 3.11 |
| Transducer #2 | 15 | | annulus | | | |
| Transducer #3 | 15 | | pressure | | | |

| | |
|---|---|
| Data Logger | Rafael (CR800 - SN 2926) |
| Spacer Length | 5-feet |
| Spacer OD. | 1.625-inches |
| Comments: | |




Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

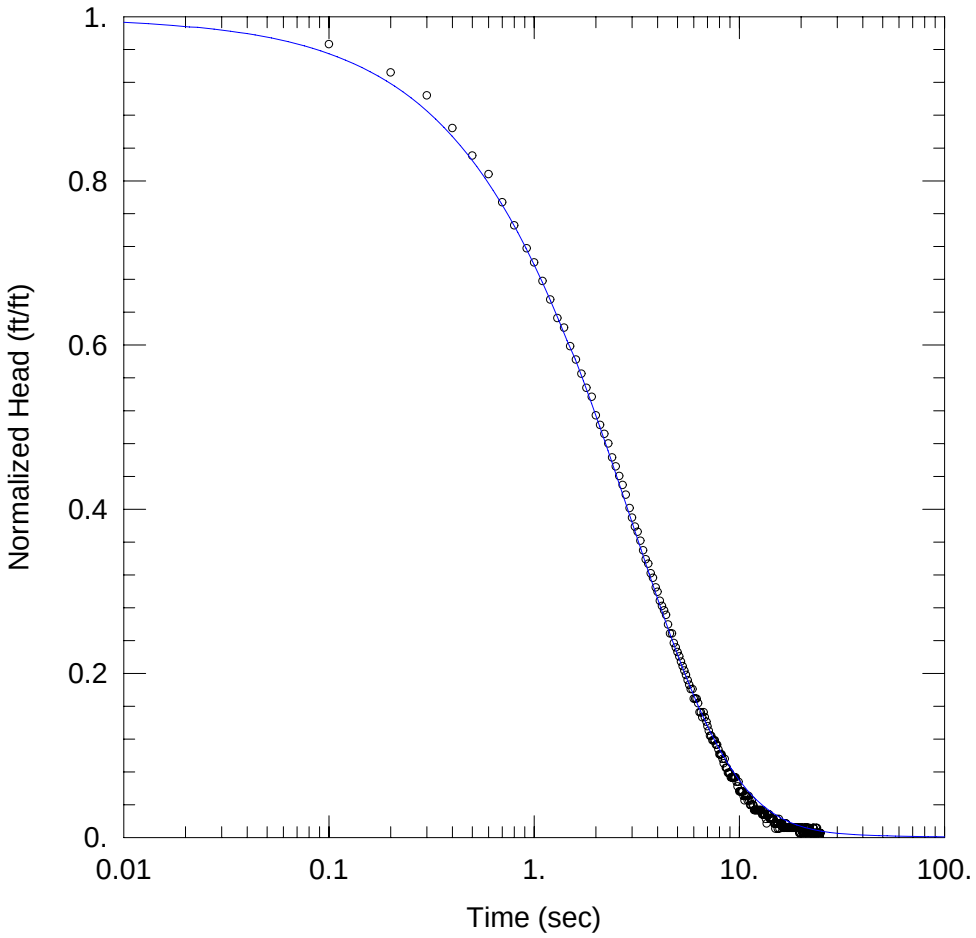
### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Diplacement (ft) | n/a | | | |
| Initiation method | physical | | | |
| Rising/Falling head | falling | | | |
| Pre-test XD #1 | 3.93 | | | |
| Pre-test XD #2 | 9.61 | | | |
| Expected Displacement (ft) | 1.566 | | | |
| Observed Displacement (ft) | lost data | | | |
| Slug Discrepancy (%) | | | | |
| Max Rebound above Static | n/a | | | |
| Post-test XD #1 | | | | |
| Residual Dev. from $H_o$ (%) | | | | |
| Data Logger File Name | ROMP132_ST21 | | | |
| Specific Conductance (uS) | 1413.0 | | | |
| Temperature (C) | 24.2 | | | |
| Lithology | Cedar Keys - confiner | | | |
| $K_h$ (ft/day) | extremely low | | | |
| Other | | | | |

Comments: Left test to run over weekend. Even after running for 4 days, didn't return to static. Also had problems w/ datalogger and lost initial data. Ran slow enough to know this is def a confining unit.

Notes: Slug Discrepancy <10%; Residual Deviation from $H_o$ < 5%; and Maximum Rebound < Spacer Placement above Static

**Figure E-27.** Field sheet for the slug test conducted between 1,637 and 1,687 feet below land surface (slug test 21) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 1 (71-100 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST1a_71-110.aqt
Date: 12/06/10 Time: 13:27:28

AQUIFER DATA

Saturated Thickness: 1435.8 ft

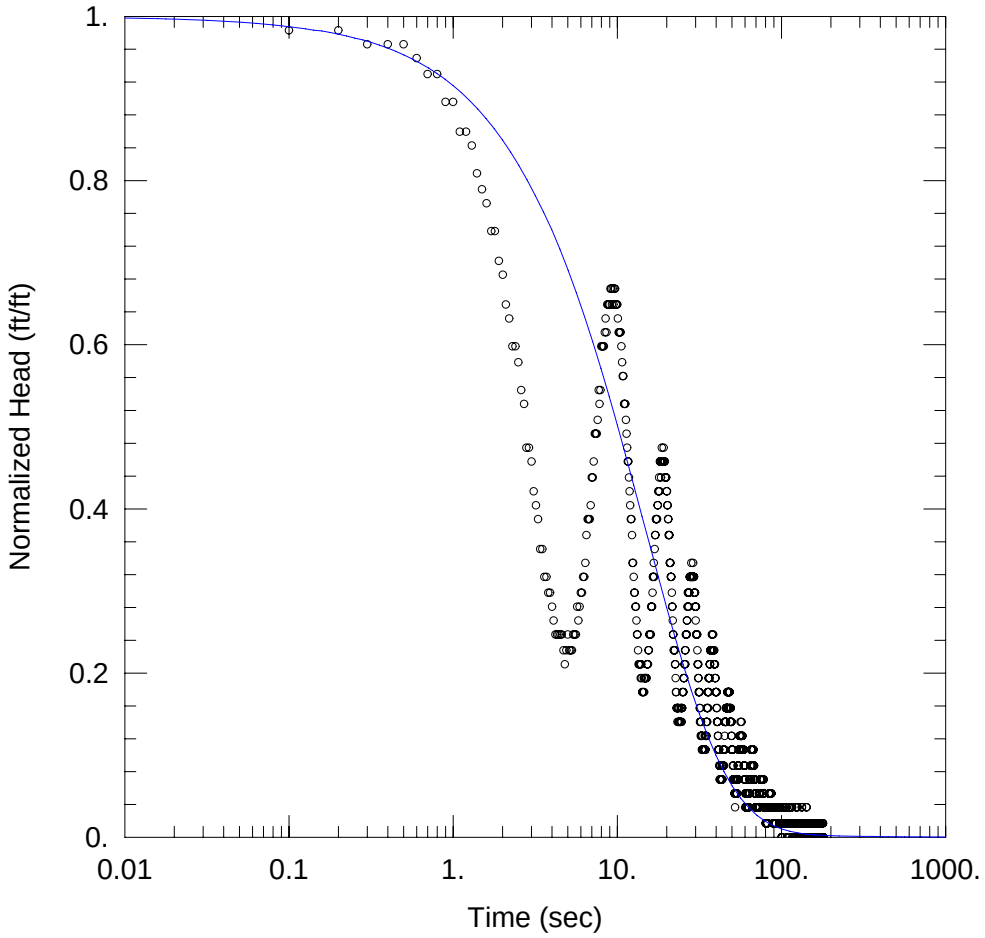
WELL DATA (ST1)

Initial Displacement: -1.283 ft
Total Well Penetration Depth: 45.83 ft
Casing Radius: 0.1664 ft
Static Water Column Height: 45.83 ft
Screen Length: 39. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model
Kr = 55.96 ft/day
Kz/Kr = 0.1
Ss = 1.0E-6 $ft^{-1}$

**Figure F-1.** Curve match solution from AQTESOLV® for hydraulic conductivity (Kr) using data from the slug test conducted between 71 and 110 feet below land surface (slug test 1) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 2 (132-175 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST2b_132-175.aqt
Date: 12/06/10 Time: 13:27:23

AQUIFER DATA

Saturated Thickness: 1572.6 ft

WELL DATA (ST2)

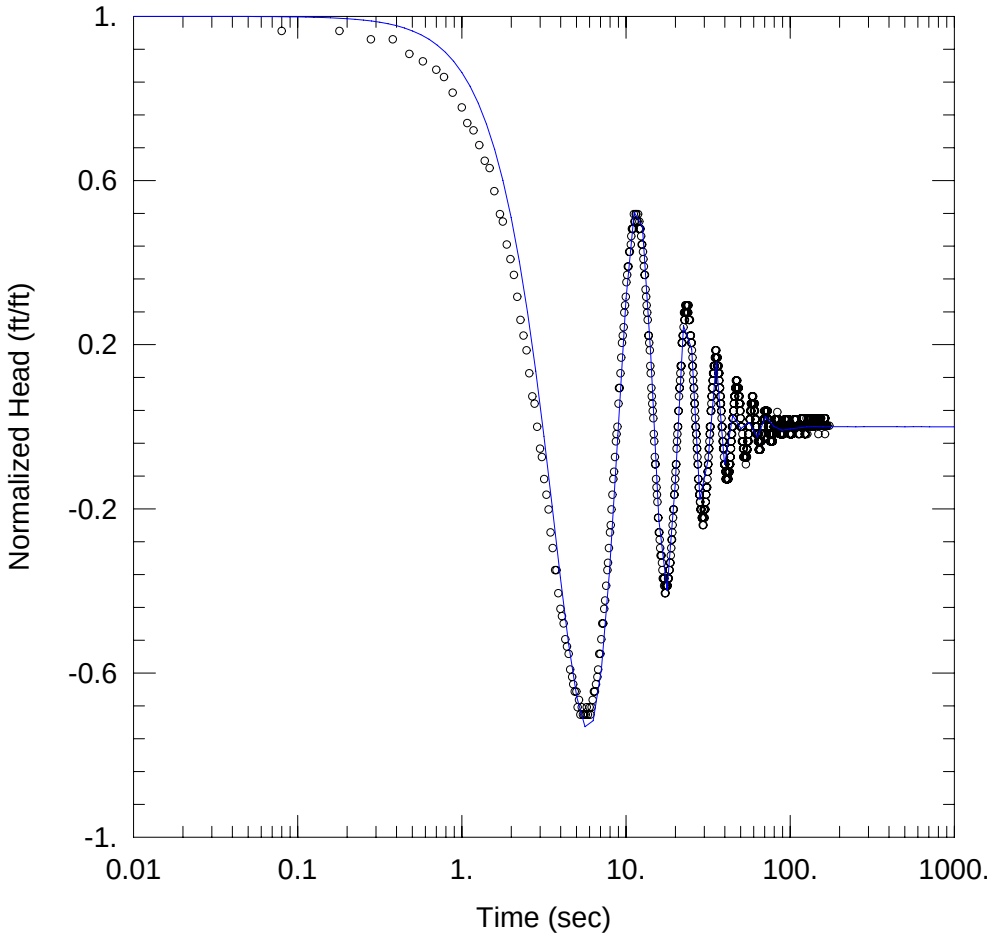
Initial Displacement: -0.413 ft
Total Well Penetration Depth: 110.6 ft
Casing Radius: 0.1664 ft
Static Water Column Height: 110.6 ft
Screen Length: 43. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 10.49 ft/day
Kz/Kr = 0.1
Ss = 1.0E-6 $ft^{-1}$

**Figure F-2.** Curve match solution from AQTESOLV® for hydraulic conductivity (Kr) using data from the slug test conducted between 132 and 175 feet below land surface (slug test 2) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 3 (180-215 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST3a_180-215.aqt
Date: 12/06/10 Time: 13:27:19

AQUIFER DATA

Saturated Thickness: 1572.5 ft Anisotropy Ratio (Kz/Kr): 0.1

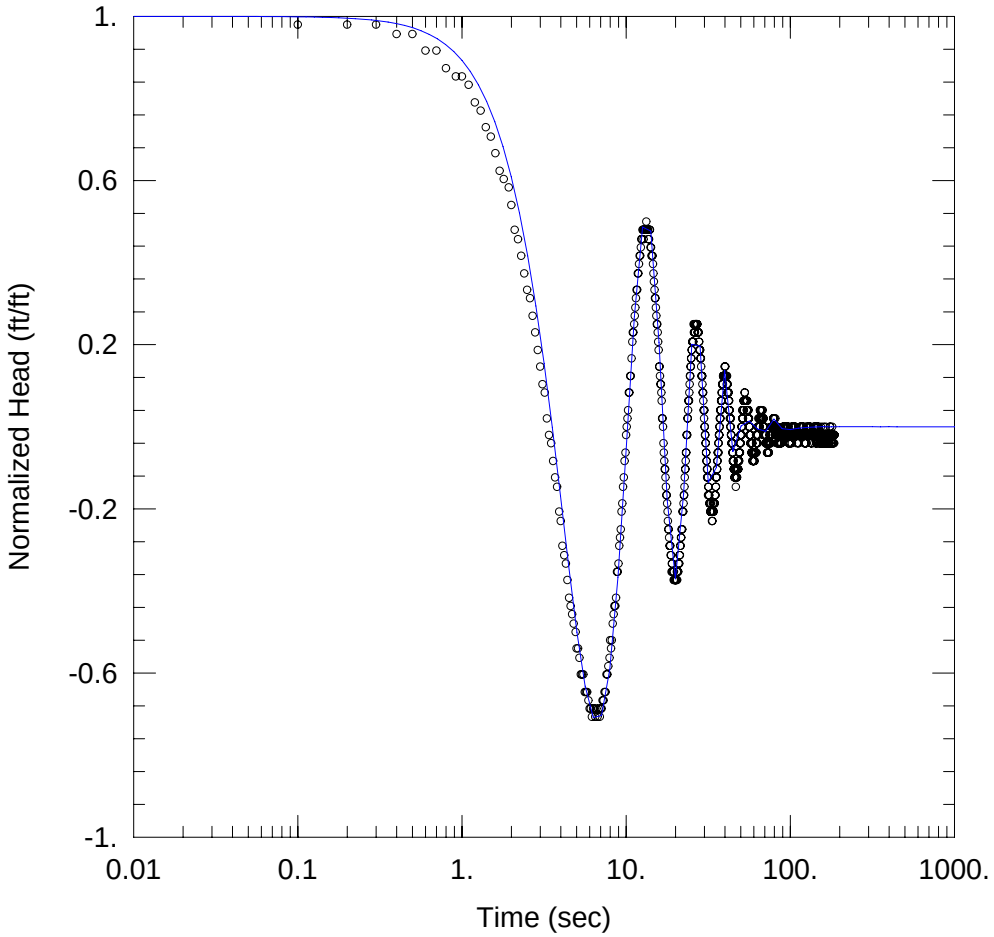
WELL DATA (ST3)

Initial Displacement: -0.392 ft
Static Water Column Height: 150.5 ft
Total Well Penetration Depth: 150.5 ft
Screen Length: 35. ft
Casing Radius: 0.06751 ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler
K = 130. ft/day
Le = 111. ft

**Figure F-3.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 180 and 215 feet below land surface (slug test 3) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 4 (233-285 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST4a_233-285.aqt
Date: 12/06/10 Time: 13:27:13

AQUIFER DATA

Saturated Thickness: 1572.5 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST4)

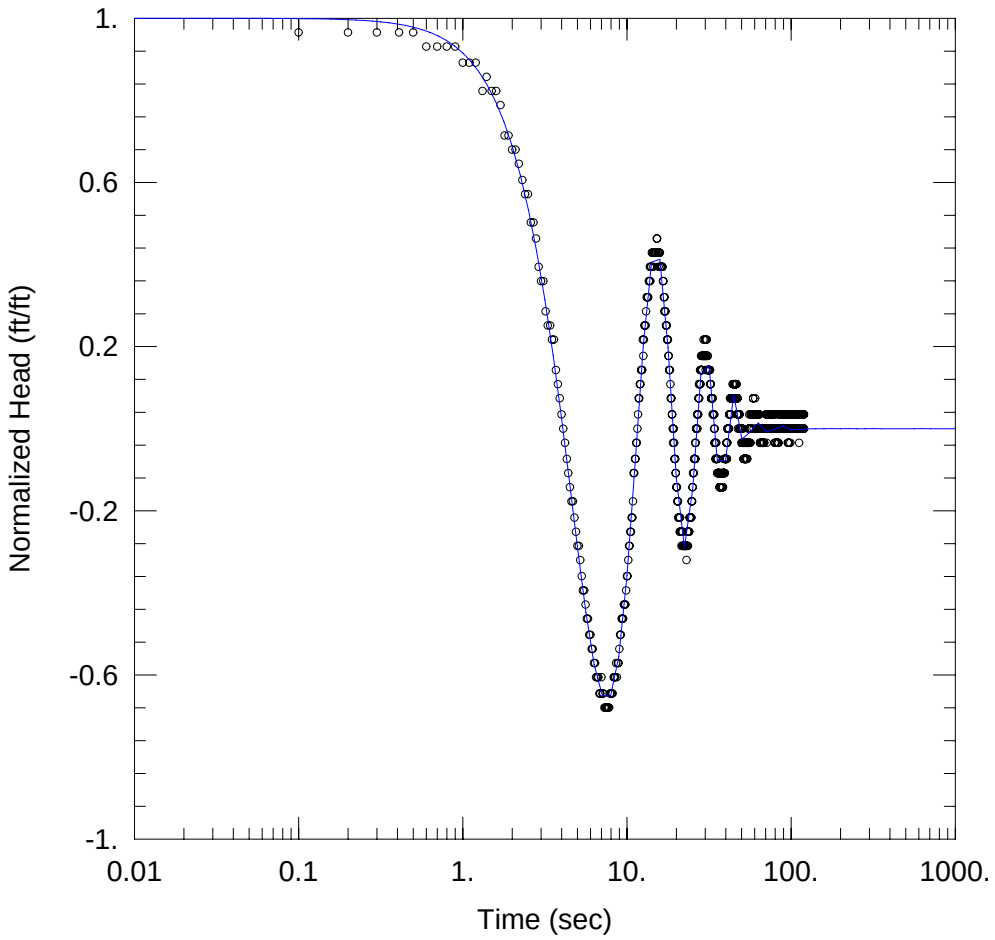
Initial Displacement: -0.348 ft
Total Well Penetration Depth: 220.5 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 220.5 ft
Screen Length: 52. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 78.83 ft/day Le = 142.4 ft

**Figure F-4.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 233 and 285 feet below land surface (slug test 4) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 5 (303-360 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST5b_303-360.aqt
Date: 12/06/10 Time: 13:27:08

AQUIFER DATA

Saturated Thickness: 1572.4 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST5)

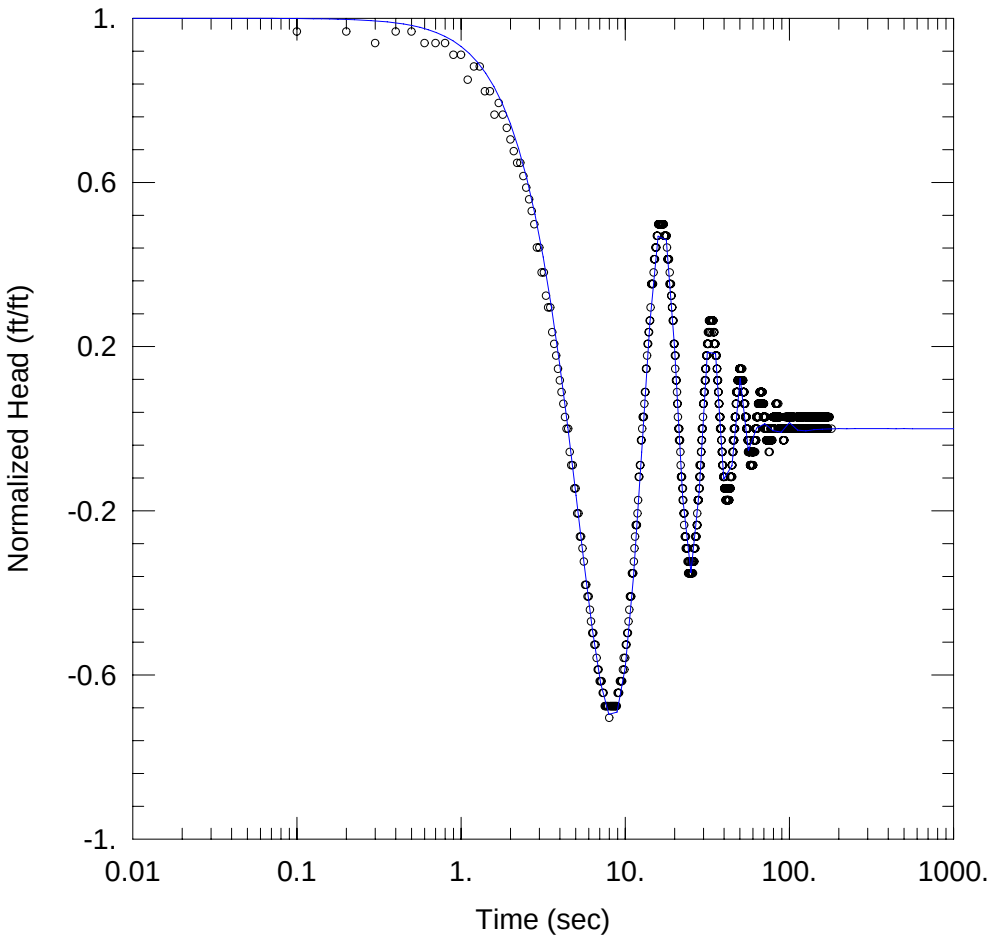
Initial Displacement: -0.203 ft
Total Well Penetration Depth: 295.4 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 295.4 ft
Screen Length: 57. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 52.11 ft/day Le = 180.9 ft

**Figure F-5.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 303 and 360 feet below land surface (slug test 5) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 6 (381-440 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST6b_381-440.aqt
Date: 12/06/10 Time: 13:27:03

AQUIFER DATA

Saturated Thickness: 1572.3 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST6)

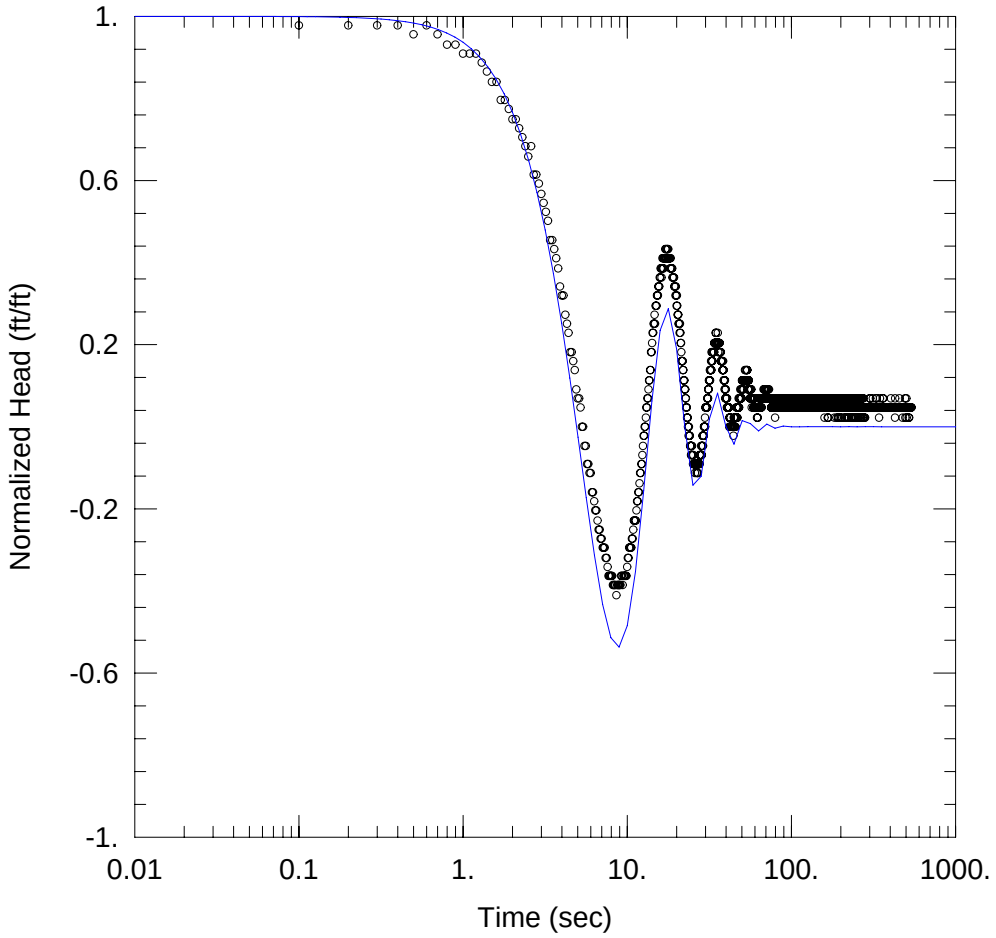
Initial Displacement: -0.247 ft
Total Well Penetration Depth: 374.3 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 375.3 ft
Screen Length: 59. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 60.15 ft/day Le = 225.4 ft

**Figure F-6.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 381 and 440 feet below land surface (slug test 6) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 7 (486-555 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST7e_486-555.aqt
Date: 12/06/10 Time: 13:26:57

AQUIFER DATA

Saturated Thickness: 1572.6 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST7)

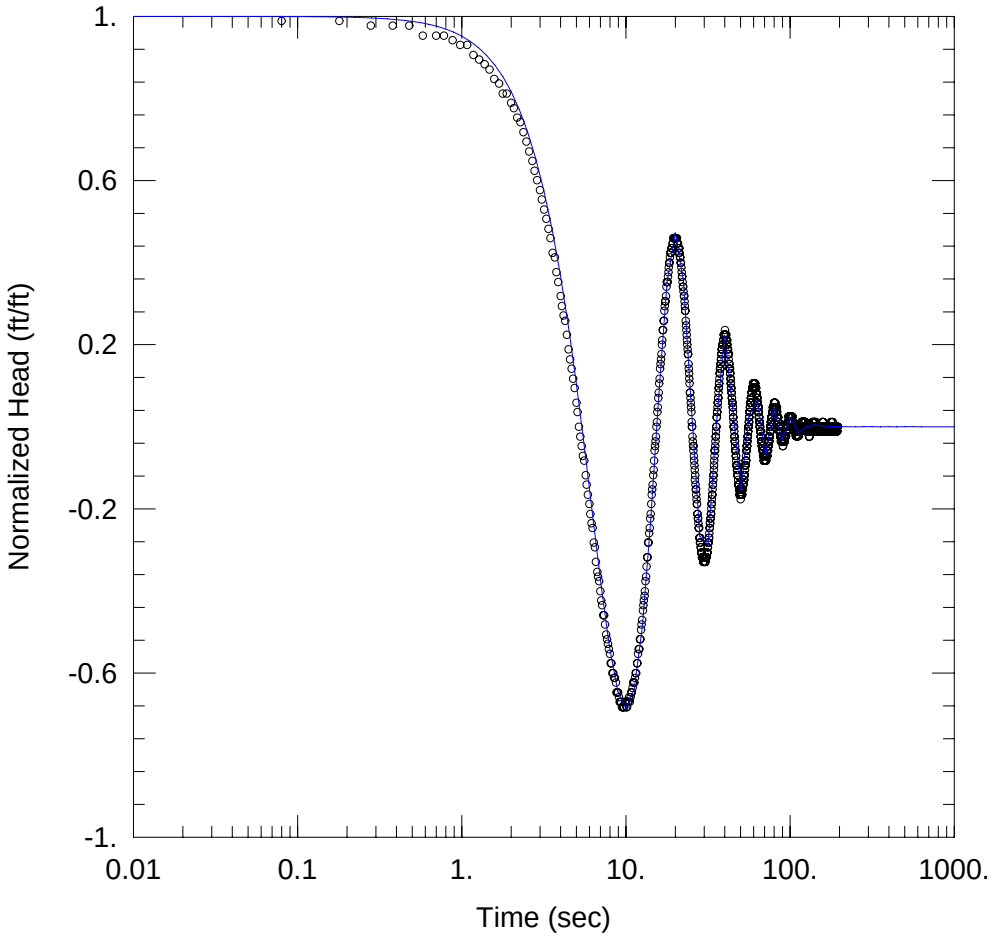
Initial Displacement: -0.319 ft
Total Well Penetration Depth: 490.6 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 490.6 ft
Screen Length: 69. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 26.02 ft/day Le = 239.8 ft

**Figure F-7.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 486 and 555 feet below land surface (slug test 7) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 8 (587-630 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST8a_587-630.aqt
Date: 12/06/10 Time: 13:26:53

AQUIFER DATA

Saturated Thickness: 1573.8 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST8)

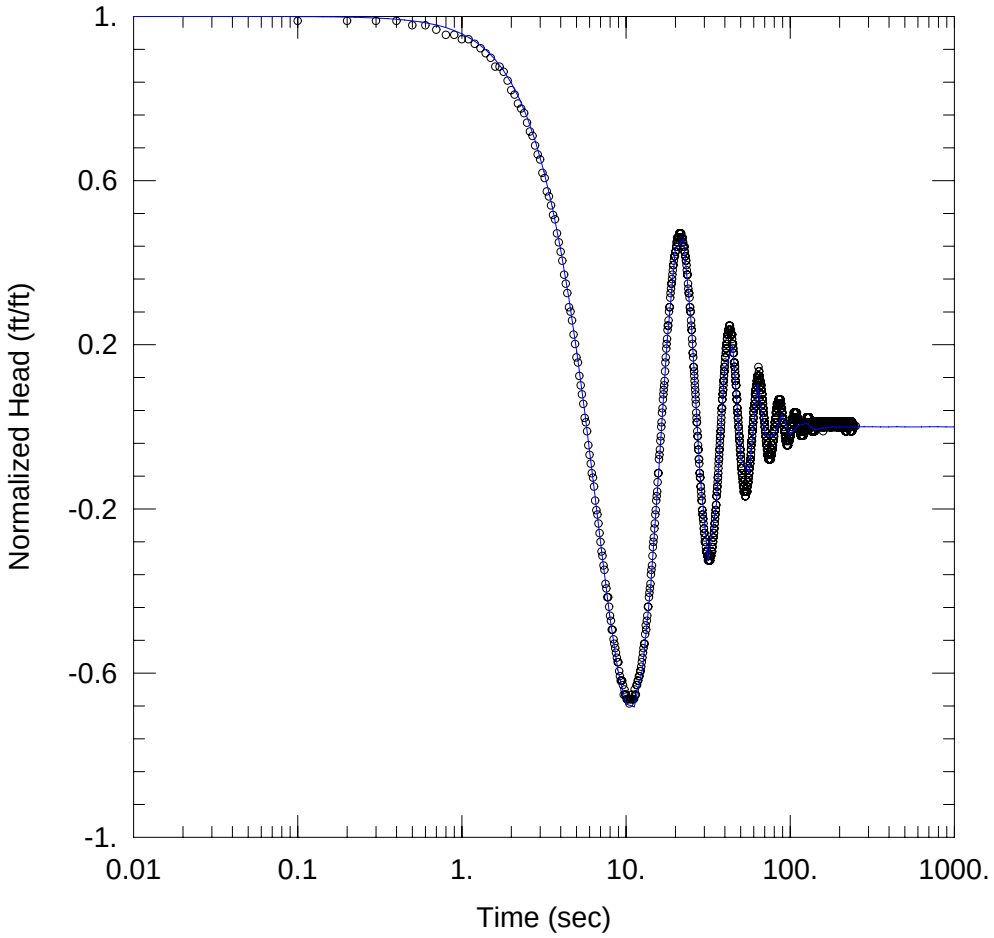
Initial Displacement: -0.616 ft
Total Well Penetration Depth: 566.8 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 566.8 ft
Screen Length: 43. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 70.51 ft/day Le = 322.8 ft

**Figure F-8.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 587 and 630 feet below land surface (slug test 8) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 9 (661-710 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST9d_661-710.aqt
Date: 12/06/10 Time: 13:26:47

AQUIFER DATA

Saturated Thickness: 1575. ft Anisotropy Ratio (Kz/Kr): 0.1

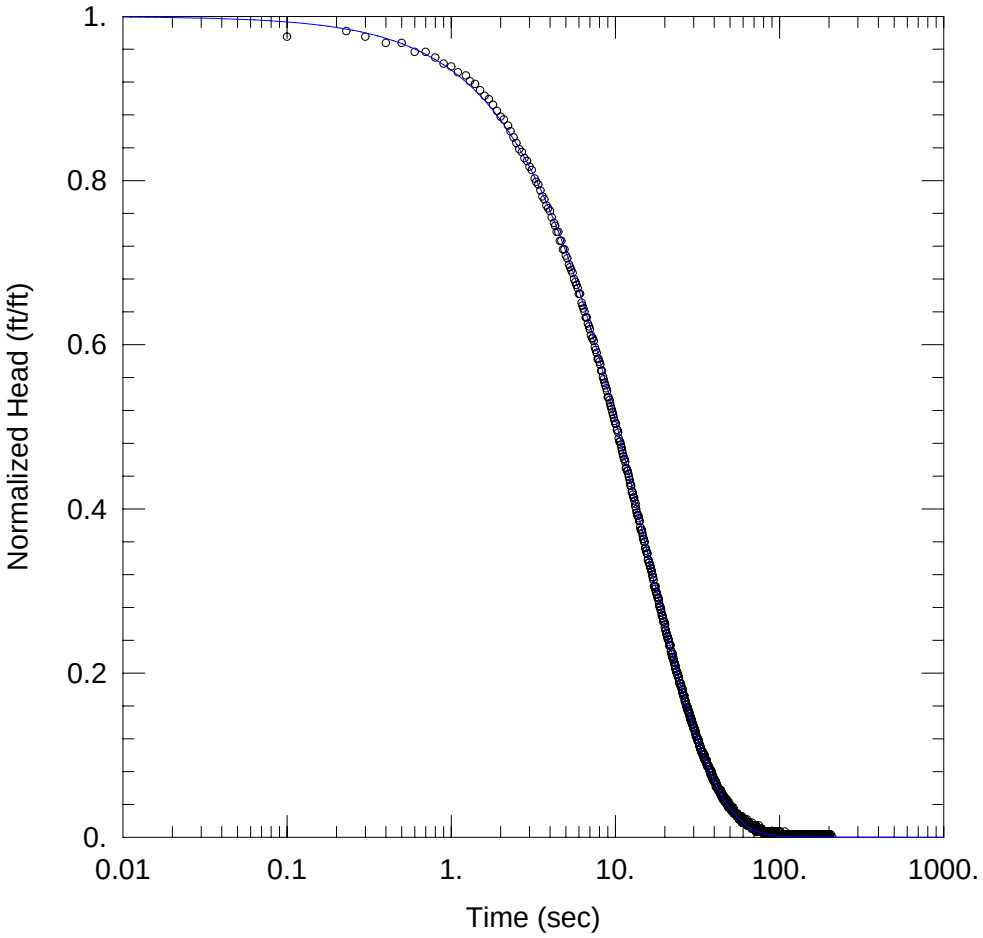
WELL DATA (ST9)

Initial Displacement: -0.645 ft
Static Water Column Height: 648. ft
Total Well Penetration Depth: 648. ft
Screen Length: 49. ft
Casing Radius: 0.06751 ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler
K = 63.23 ft/day
Le = 368.1 ft

**Figure F-9.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 661 and 710 feet below land surface (slug test 9) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 10 (751-810 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST10a_751-810.aqt
Date: 12/06/10 Time: 13:26:41

AQUIFER DATA

Saturated Thickness: 1575.3 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST10)

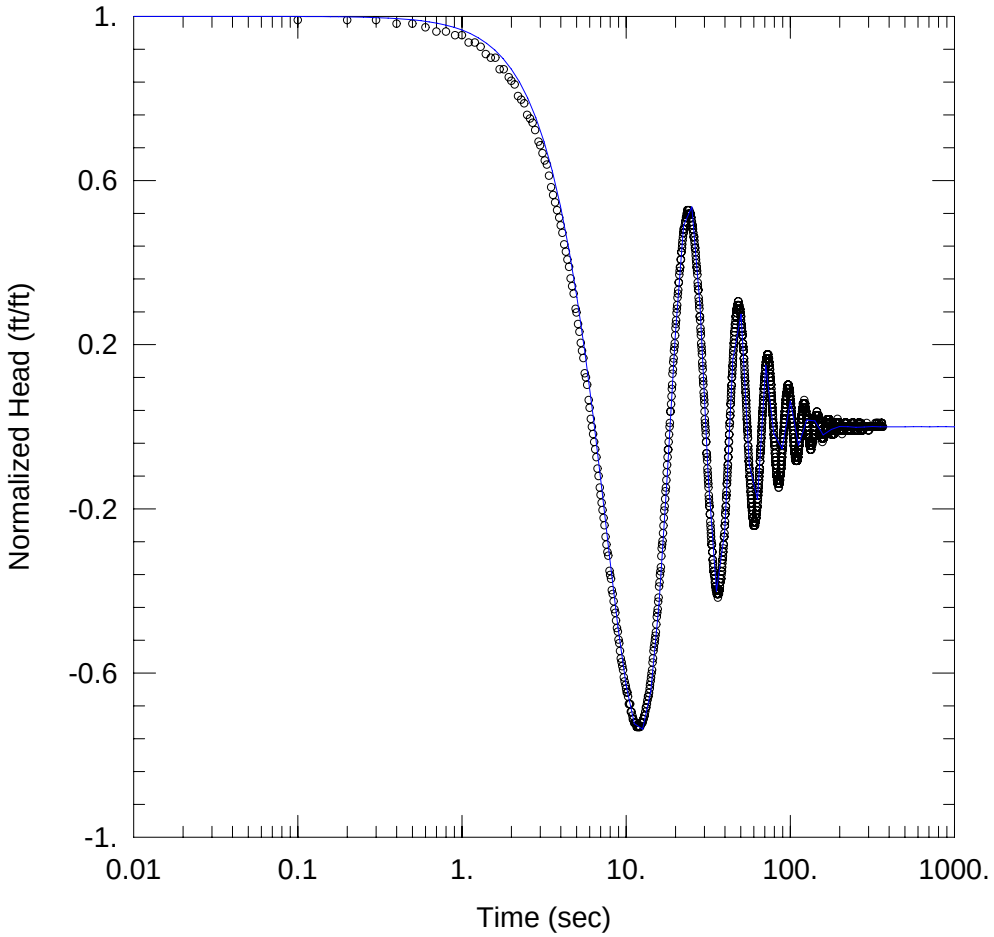
Initial Displacement: -2.015 ft
Total Well Penetration Depth: 748.3 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 748.3 ft
Screen Length: 59. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 1.691 ft/day Le = 0.1 ft

**Figure F-10.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 751 and 810 feet below land surface (slug test 10) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 11 (845-890 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST11a_845-890.aqt
Date: 12/06/10 Time: 13:26:36

AQUIFER DATA

Saturated Thickness: 1575.4 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST11)

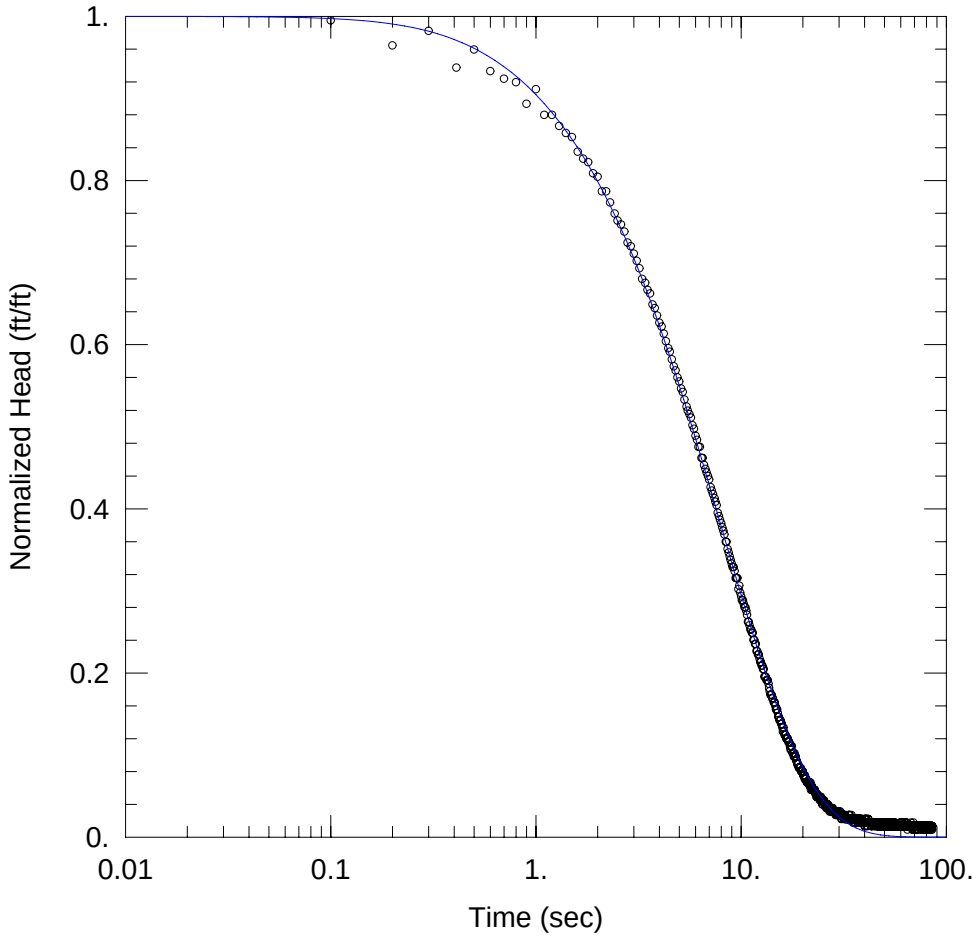
Initial Displacement: -0.783 ft
Total Well Penetration Depth: 828.4 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 828.4 ft
Screen Length: 45. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 110.7 ft/day Le = 472.5 ft

**Figure F-11.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 845 and 890 feet below land surface (slug test 11) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 12 (906-975 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST12a_906-975.aqt
Date: 12/06/10 Time: 13:26:30

AQUIFER DATA

Saturated Thickness: 1575.6 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST12)

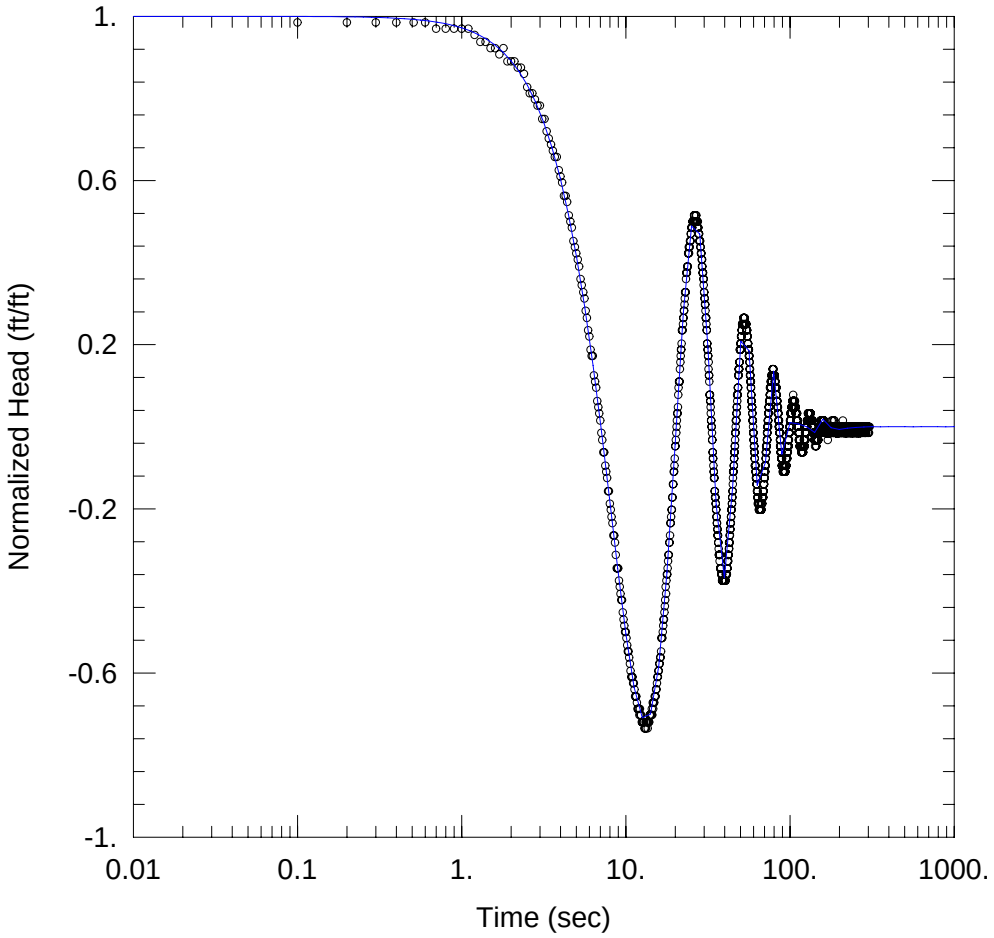
Initial Displacement: -1.632 ft
Total Well Penetration Depth: 913.6 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 913.6 ft
Screen Length: 69. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 2.747 ft/day Le = 50.07 ft

**Figure F-12.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 906 and 975 feet below land surface (slug test 12) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 13 (981-1045 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST13c_981-1045.aqt
Date: 12/06/10 Time: 13:26:25

AQUIFER DATA

Saturated Thickness: 1575.5 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST13)

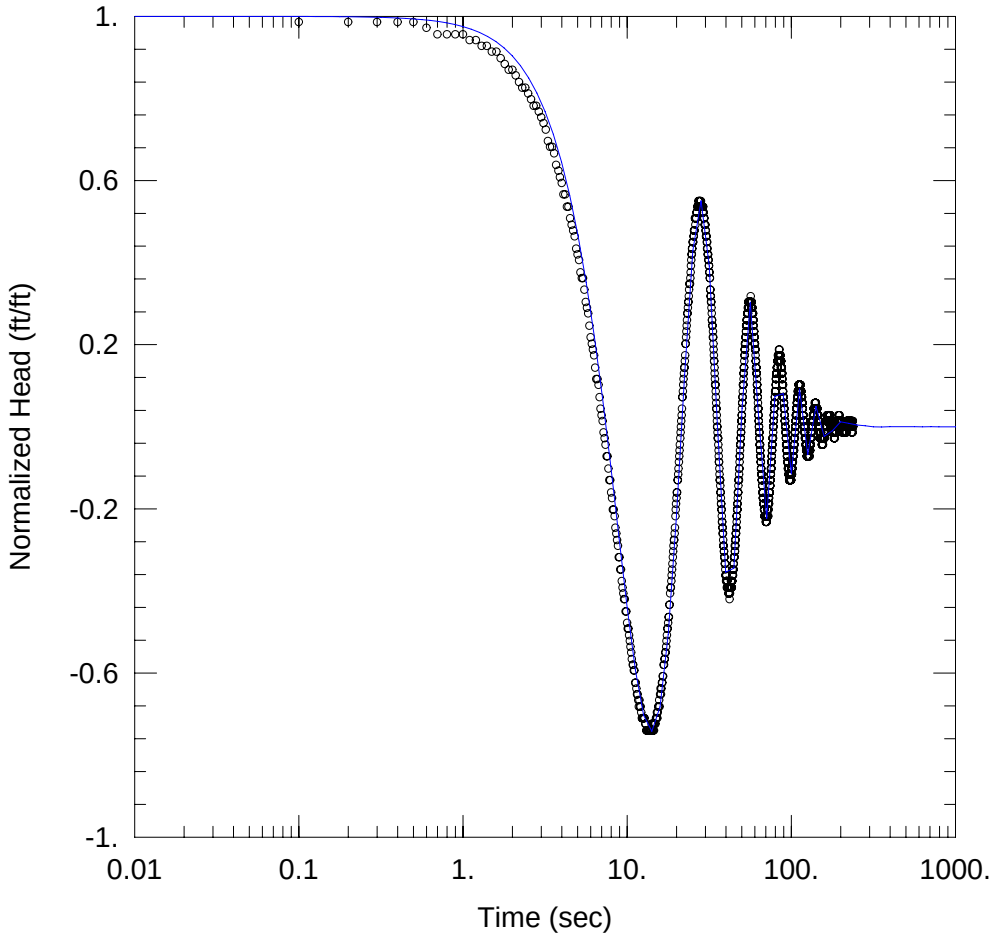
Initial Displacement: -0.464 ft
Total Well Penetration Depth: 983.5 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 983.5 ft
Screen Length: 64. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 63.21 ft/day Le = 562.1 ft

**Figure F-13.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 981 and 1,045 feet below land surface (slug test 13) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 14 (1076-1155 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST14c_1076-1155.aqt
Date: 12/06/10 Time: 13:26:18

AQUIFER DATA

Saturated Thickness: 1575.5 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST14)

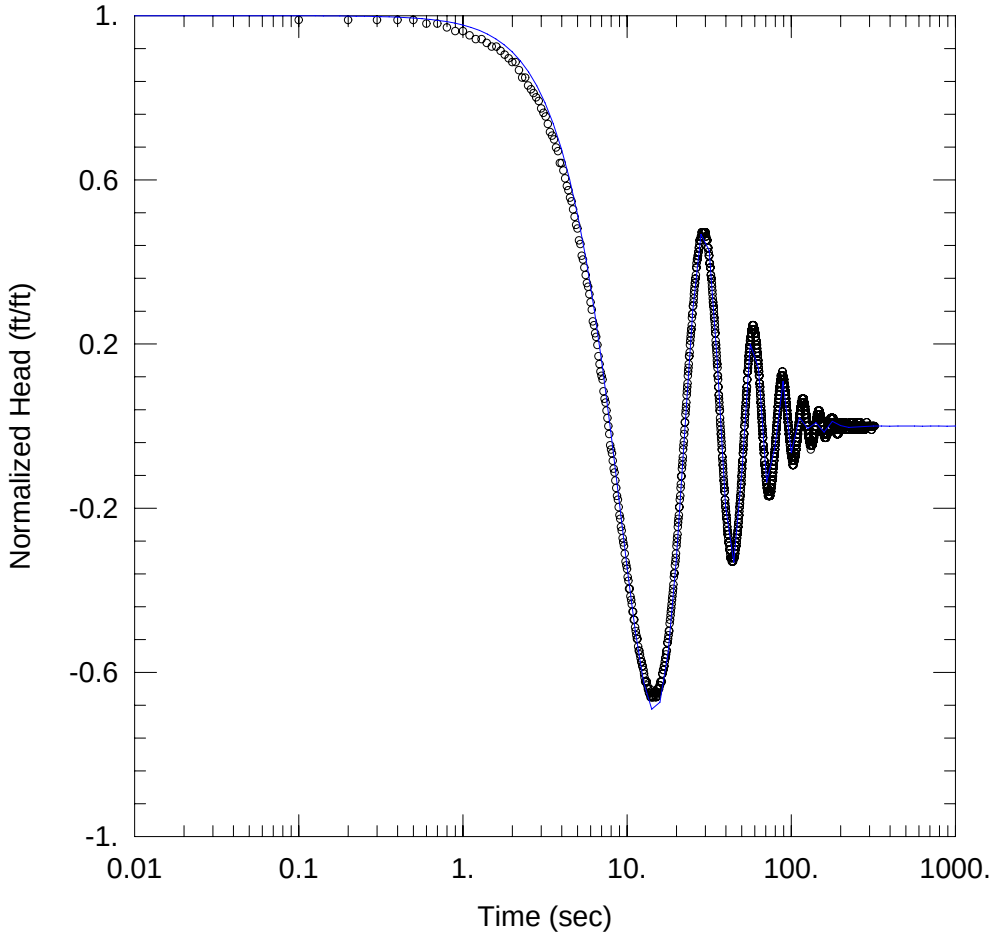
Initial Displacement: -0.5 ft
Total Well Penetration Depth: 1093.5 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 1093.5 ft
Screen Length: 79. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 71.55 ft/day Le = 636.1 ft

**Figure F-14.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 1,076 and 1,155 feet below land surface (slug test 14) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 15 (1186-1230 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST15d_1186-1230.aqt
Date: 12/06/10 Time: 13:26:11

AQUIFER DATA

Saturated Thickness: 1575.3 ft
Anisotropy Ratio (Kz/Kr): 0.1

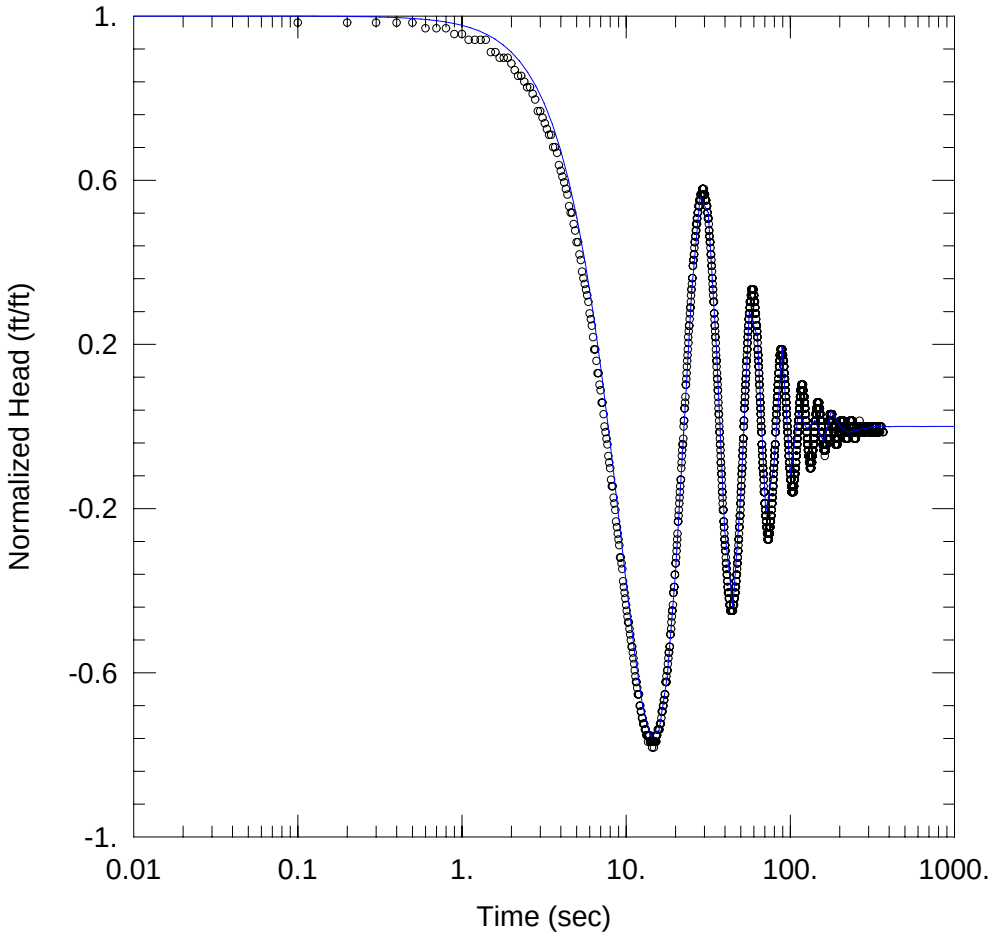
WELL DATA (ST15)

Initial Displacement: -0.769 ft
Total Well Penetration Depth: 1168.3 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 1168.3 ft
Screen Length: 44. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler
K = 72.5 ft/day
Le = 692.5 ft

**Figure F-15.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 1,186 and 1,230 feet below land surface (slug test 15) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 16 (1246-1310 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST16b_1246-1310.aqt
Date: 12/06/10 Time: 13:26:06

AQUIFER DATA

Saturated Thickness: 1574.8 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST16)

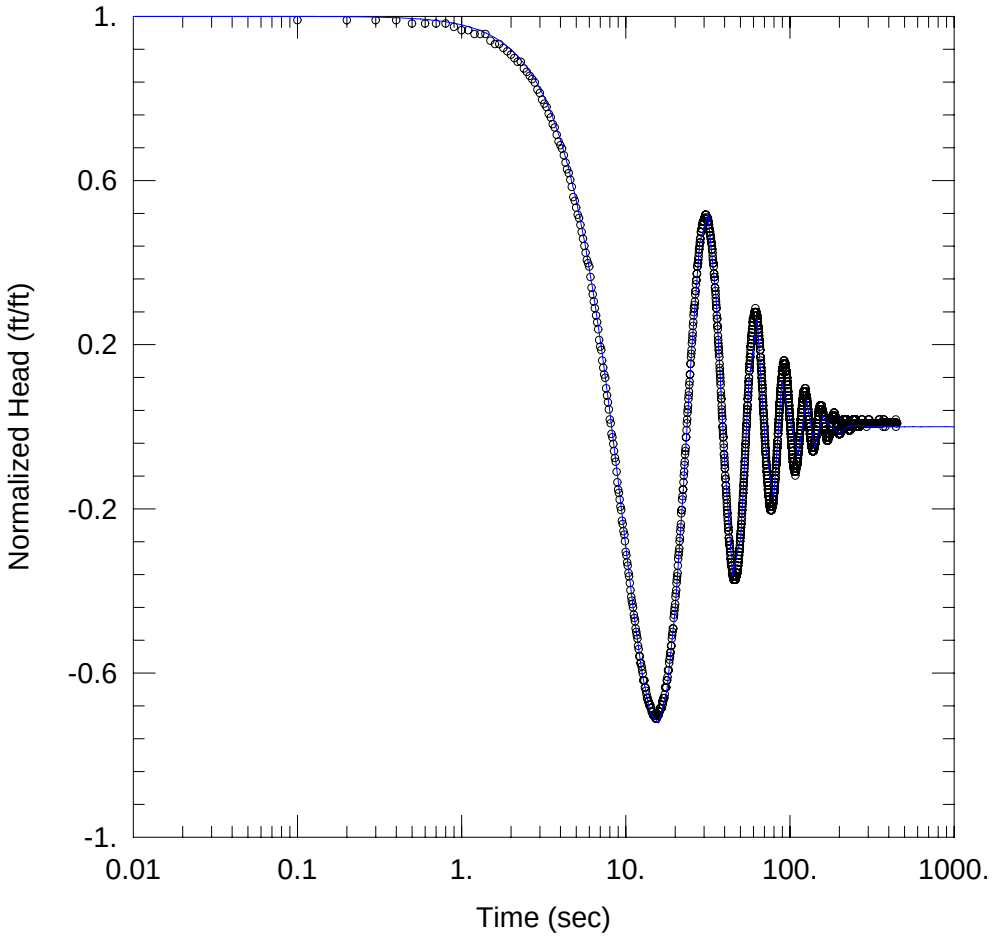
Initial Displacement: -0.501 ft
Total Well Penetration Depth: 1247.8 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 1247.8 ft
Screen Length: 64. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 168.3 ft/day Le = 702.2 ft

**Figure F-16.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 1,246 and 1,310 feet below land surface (slug test 16) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 17 (1346-1390 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST17a_1346-1390.aqt
Date: 12/06/10 Time: 13:26:01

AQUIFER DATA

Saturated Thickness: 1574.4 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST17)

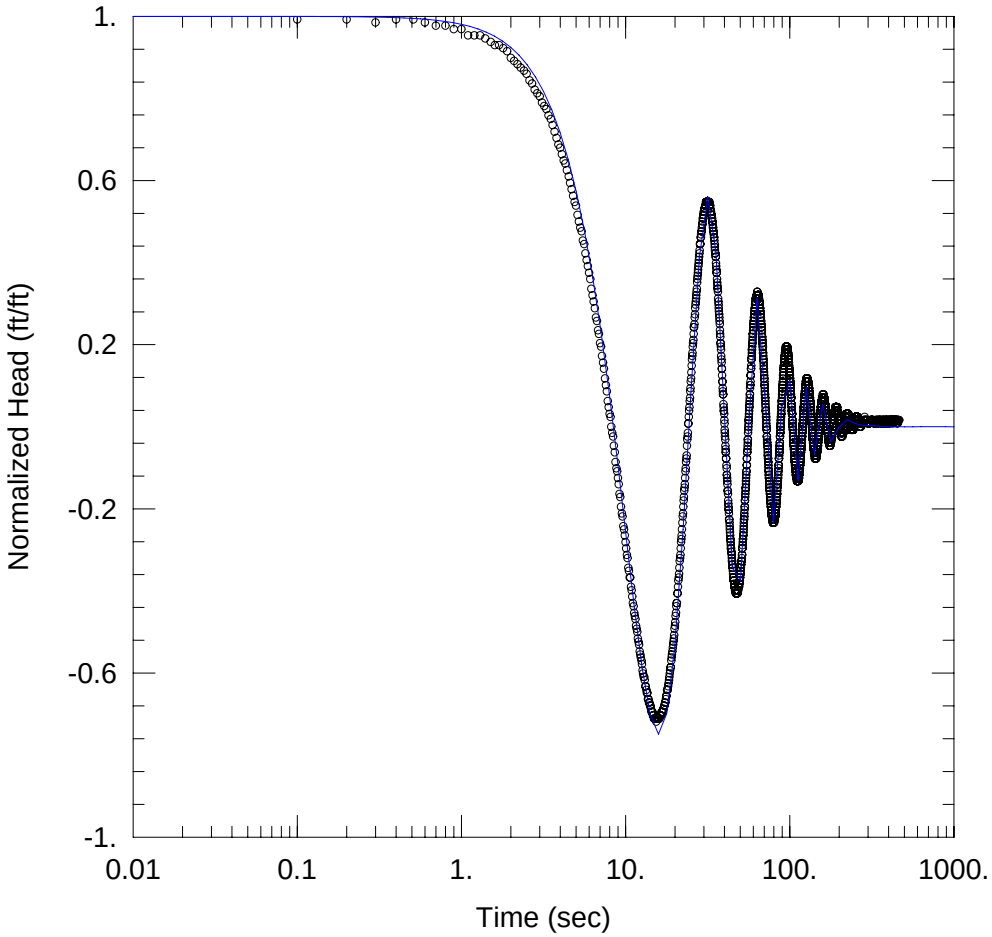
Initial Displacement: -0.856 ft
Total Well Penetration Depth: 1327.4 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 1327.4 ft
Screen Length: 44. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 116.8 ft/day Le = 765.5 ft

**Figure F-17.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 1,346 and 1,390 feet below land surface (slug test 17) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 18 (1421-1460 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST18d_1421-1460.aqt
Date: 12/06/10 Time: 13:25:53

AQUIFER DATA

Saturated Thickness: 1573.5 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST18)

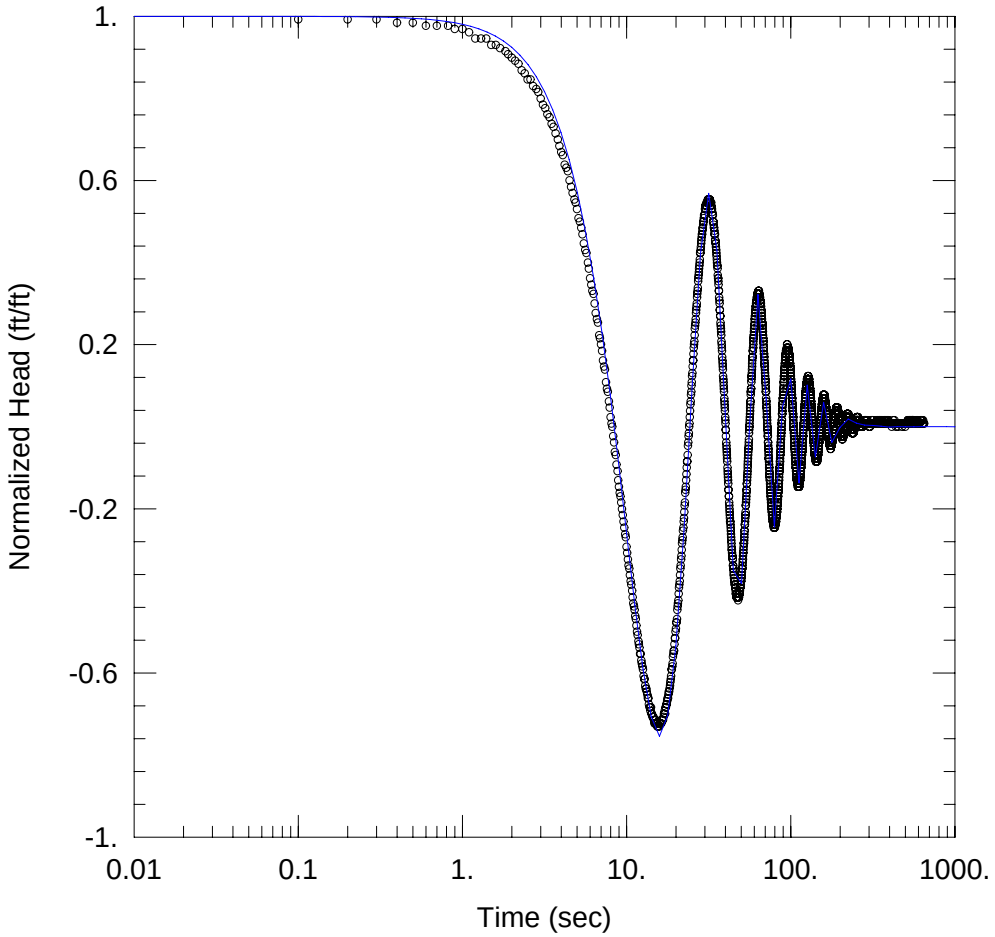
Initial Displacement: -0.928 ft
Total Well Penetration Depth: 1396.5 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 1396.5 ft
Screen Length: 39. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 223.8 ft/day Le = 818.5 ft

**Figure F-18.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 1,421 and 1,460 feet below land surface (slug test 18) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 19 (1466-1500 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST19d_1466-1500.aqt
Date: 12/06/10 Time: 13:25:48

AQUIFER DATA

Saturated Thickness: 1573.1 ft Anisotropy Ratio (Kz/Kr): 0.1

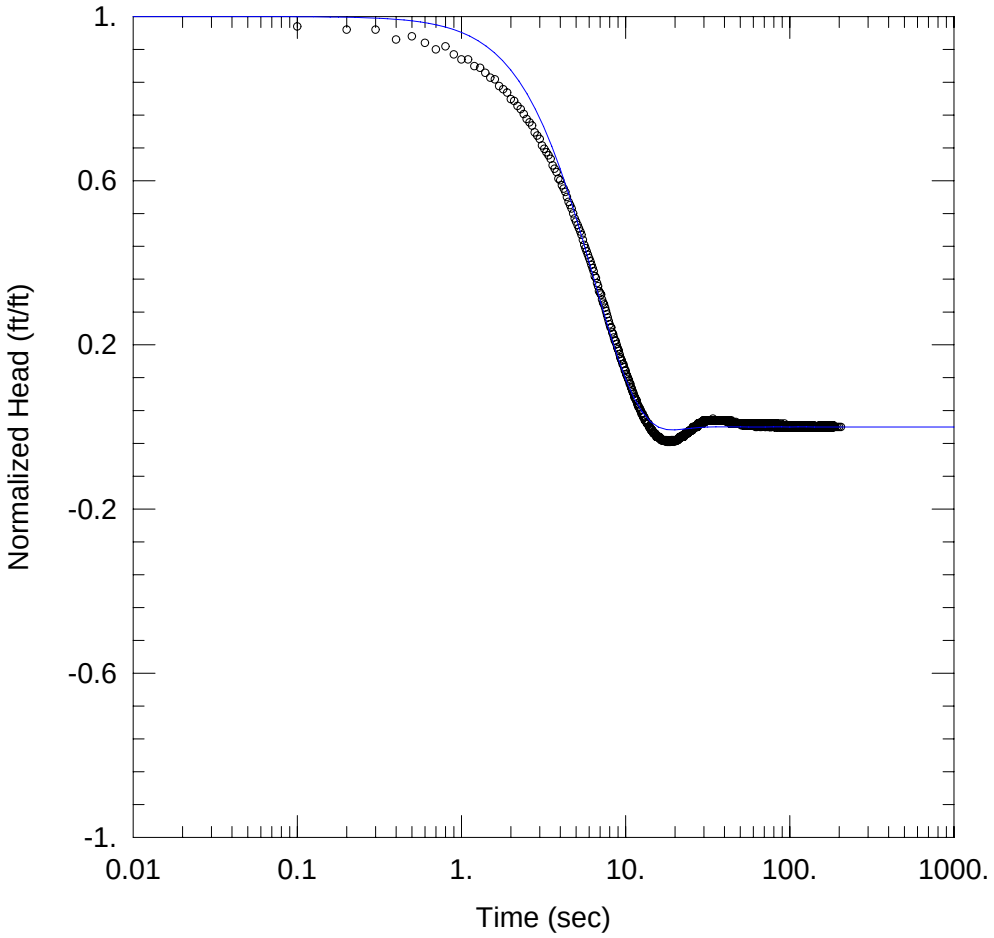
WELL DATA (ST19)

Initial Displacement: -0.943 ft
Total Well Penetration Depth: 1436.1 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 1436.1 ft
Screen Length: 34. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler
K = 315. ft/day
Le = 817.6 ft

**Figure F-19.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 1,466 and 1,500 feet below land surface (slug test 19) at the ROMP 132 well site in Marion County.




ROMP 132 - SLUG TEST 20 (1557-1607 FEET BELOW LAND SURFACE)

Data Set: D:\...\ROMP132_ST20d_1557-1607.aqt
Date: 12/06/10 Time: 13:34:07

AQUIFER DATA

Saturated Thickness: 1573. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (ST20)

Initial Displacement: -1.817 ft
Total Well Penetration Depth: 1543. ft
Casing Radius: 0.06751 ft
Static Water Column Height: 1543. ft
Screen Length: 50. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
K = 5.939 ft/day
Solution Method: Butler
Le = 350.1 ft

**Figure F-20.** Curve match solution from AQTESOLV® for hydraulic conductivity (K) using data from the slug test conducted between 1,557 and 1,607 feet below land surface (slug test 20) at the ROMP 132 well site in Marion County.

## AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

**General Information:** Upper Floridan aquifer APT - Information about data logger "Donatello"

| | | | |
|---|---|---|---|
| Site Name: | ROMP 132 - Blitch Plantation | Date: | 12/16/2009 - 1/4/2010 |
| Reporting Code: | LWBL | Performed by: | Anna Janosik |
| County: | Marion | S/T/R: | 28/13/20 |
| Pumped Well: | Temp Upper Floridan Aquifer (SID 750869) | Pumped Zone OB(s): | Perm UFA monitor (SID 750867) |
| Pump Type: | 10-inch diesel lineshaft | | exploratory core hole (SID 709163) |
| Test Rate/Duration: | 3000 gpm / 24 hours | | drilling water supply (SID 750886) |
| Pump Set Depth: | 120 feet below land surface | | |

**Setup Information:**

| | | | |
|---|---|---|---|
| Datalogger: | Donatello (CR 1000) | Time Synchronized: | 12/16/2009 and 12/28/2009 @12:00 |
| Datalogger SN: | 11463 | Time Datum: | NIST |
| Program Name: | ROMP132_APT_DONNY.CR1 | | |
| Program Start Date: | 12/16/2009 @ 14:45 | | |
| Program End Date: | 1/4/2010 @ 10:55 | | |

**Test Information:**

| | | | |
|---|---|---|---|
| Pump On Time: | 12/28/2009 @ 13:23 | Flow Meter Totalizer Start: | 25,796,000 gal |
| Pump Off Time: | 12/29/2009 @ 13:23 | Flow Meter Totalizer End: | 30,006,000 gal |

| | | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Well*** | | | | CH | WS | PUMP | MON | | Flow Meter | NAVD 88 Survey monument 709163A |
| ***Riser ht.*** | ***als ft*** | | | | | | | | | |
| ***TOC elev*** | ***elev ft*** | | | 110.85 | 116.67 | 109.01 | 112.55 | | | <- Elev Ref |
| ***static W/L*** | ***btoc ft*** | | | 67.08 | 72.82 | 65.14 | 68.74 | | | <- Date: 12/16/2009 |
| ***static W/L*** | ***elev ft*** | | | 43.77 | 43.85 | 43.87 | 43.81 | | | TOC elev - static WL(btoc) |
| ***XD Rating*** | ***psi*** | | | 20 | 20 | 50 | 20 | | | |
| ***Serial No.*** | | | | 0809063 | 0901238 | 0809065 | 0809059 | | | |
| ***Reading in Air*** | ***ft*** | | | 0.03 | | 0.04 | 0.05 | | 0.15 | |
| ***XD depth*** | ***btoc ft*** | | | 87 | 82 | 100 | 89 | | | |
| ***XD elev*** | ***elev ft*** | | | 23.85 | 34.67 | 9.01 | 23.55 | | | TOC elev - XD depth(btoc) |
| ***XD subm.*** | ***wl tape ft*** | | | 19.92 | 9.18 | 34.86 | 20.26 | | | WL tape value of submergence |
| ***XD subm.*** | ***XD read ft*** | | | 19.83 | 9.10 | 34.93 | 20.13 | | | XD value of submergence |
| ***XD Diff.*** | ***ft*** | | | | | | | | | $Subm._{WL\ tape} - Subm._{XD}$ |

| Date | Time | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | Totalizer | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CH | WS | PUMP | MON | logger voltg | FM | (g x 1000) | |
| Units | ----------> | | | ft submerg | ft submerg | ft submerg | ft submerg | volts | gpm | | |
| 12/22/09 | 12:41 | | | 19.85 | 9.10 | 34.93 | 20.13 | 13.08 | | | watchdog error = 1 |
| 12/28/09 | 12:00 | | | 19.78 | 9.04 | 34.88 | 20.07 | 13.34 | -0.85 | 25796 | time sync/from logger |
| | 14:00 | | | 19.10 | 9.05 | 32.06 | 19.41 | 13.26 | 1960.14 | | from logger |
| | 15:00 | | | | | | | | unplugged | 26082 | FM gauge=3000 gpm-3100 gpm |
| | 16:00 | | | | | | | | | 26256 | |
| | 16:55 | | | | | | | | | 26602 | |
| | 18:00 | | | | | | | | | | |
| | 18:04 | | | 18.96 | 8.95 | 31.03 | 19.26 | 12.37 | disconnected from logger -- incorrect readings | 26413 | from logger |
| 12/29/09 | 8:06 | | | | | | | | | 29079 | |
| | 9:26 | | | | | | | | | 29313 | |

**Figure G-1.** Field sheet for data collected with the data logger 'Donatello' during the Upper Floridan aquifer performance test conducted at the ROMP 132 well site in Marion County.

## AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

**General Information:** Upper Floridan aquifer APT - Information about data logger "Leo"

| | | | |
|---|---|---|---|
| Site Name: | ROMP 132 - Blitch Plantation | Date: | 12/16/2009 - 1/4/2010 |
| Reporting Code: | LWBL | Performed by: | Anna Janosik |
| County: | Marion | S/T/R: | 28/13/20 |
| Pumped Well: | Temp Upper Floridan Aquifer (SID 750869) | Pumped Zone OB(s): | Perm UFA monitor (SID 750867) |
| Pump Type: | 10-inch diesel lineshaft | | exploratory core hole (SID 709163) |
| Test Rate/Duration: | 3000 gpm / 24 hours | | drilling water supply (SID 750886) |
| Pump Set Depth: | 120 feet below land surface | | |

**Setup Information:**

| | | | |
|---|---|---|---|
| Datalogger: | Leonardo (CR 1000) | Time Synchronized: | 12/16/2009 and 12/28/2009 @12:10 |
| Datalogger SN: | 4714 | Time Datum: | NIST |
| Program Name: | ROMP132_APT_LEO.CR1 | | |
| Program Start Date: | 12/16/2009 @ 13:50 | | |
| Program End Date: | 1/4/2010 @ 11:05 | | |

**Test Information:**

| | | | |
|---|---|---|---|
| Pump On Time: | 12/28/2009 @ 13:23 | Flow Meter Totalizer Start: | 25,796,000 gal |
| Pump Off Time: | 12/29/2009 @ 13:23 | Flow Meter Totalizer End: | 30,006,000 gal |

| | | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Well*** | | | | CH | WS | PUMP | MON | | Flow Meter | NAVD 88 Survey monument 709163A |
| ***Riser ht.*** | ***als ft*** | | | | | | | | | |
| ***TOC elev*** | ***elev ft*** | | | 110.85 | 116.67 | 109.01 | 112.55 | | | <- Elev Ref |
| ***static W/L*** | ***btoc ft*** | | | 67.08 | 72.82 | 65.14 | 68.74 | | | <- Date: 12/16/2009 |
| ***static W/L*** | ***elev ft*** | | | 43.77 | 43.85 | 43.87 | 43.81 | | | TOC elev - static WL(btoc) |
| ***XD Rating*** | ***psi*** | | | 20 | 20 | 50 | 20 | | | changed dessicant. Also when pulled from well after test, noticed some ports were full of pipe dope |
| ***Serial No.*** | | | | 0901244 | 0901240 | 0809064 | 0901241 | | | |
| ***Reading in Air*** | ***ft*** | | | 0.11 | | 0.22 | 0.08 | | | |
| ***XD depth*** | ***btoc ft*** | | | 82 | 83 | 95 | 84 | | | |
| ***XD elev*** | ***elev ft*** | | | 28.85 | 33.67 | 14.01 | 28.55 | | | TOC elev - XD depth(btoc) |
| ***XD subm.*** | ***wl tape ft*** | | | 14.92 | 10.18 | 29.86 | 15.26 | | | WL tape value of submergence |
| ***XD subm.*** | ***XD read ft*** | | | 14.93 | 10.21 | 29.61 | 15.22 | | | XD value of submergence |
| ***XD Diff.*** | ***ft*** | | | | | | | | | Subm.$_{WL\ tape}$ - Subm.$_{XD}$ |

| Date | Time | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | Totalizer | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CH | WS | PUMP | MON | logger voltg | | (g x 1000) | |
| Units | ----------> | | | ft submerg | ft submerg | ft submerg | ft submerg | volts | | | |
| 12/22/09 | 12:35 | | | 14.88 | 10.16 | 29.50 | 15.16 | 13.45 | | | from logger |
| 12/28/09 | 12:10 | | | 14.83 | 10.11 | 29.44 | 15.09 | 13.45 | | | from logger/time sync |
| | 18:00 | | | 14.02 | 10.04 | 21.10 | 14.29 | | | | from logger |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

**Figure G-2.** Field sheet for data collected with the data logger 'Leonardo' during the Upper Floridan aquifer performance test conducted at the ROMP 132 well site in Marion County.

## AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

**General Information:** Manual Readings

Site Name: ROMP 132 - Blitch Plantation | Date: 12/16/2009 - 1/4/2010

Reporting Code: LWBL | Performed by: Anna Janosik

County: Marion | S/T/R: 28/13/20

| | SID | 709163 | 750886 | 750869 | 750867 | | | | | Totalizer | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Time | CH | WS | PUMP | MON | rain gauge | | | | (g x 1000) | |
| units → | | ft btoc | ft btoc | ft btoc | ft btoc | inches | | | | | |
| 12/16/2009 | | 67.08 | 72.82 | 65.14 | 68.74 | | | | | | |
| 12/22/2009 | | | | | | 0.29 | | | | | |
| 12/28/2009 | 11:00 | | | | | 0.11 | | | | | |
| | 12:00 | | | | | | | | | 25796 | |
| | 12:15 | 67.17 | 72.96 | | 68.88 | | | | | | |
| | 13:23 | PUMP ON - BEGIN DRAWDOWN | | | | | | | | | |
| | 15:00 | FLOW METER GAUGE READING 3000 - 3100 (BOUNCING) | | | | | | | | 26082 | |
| | 15:23 | DISCHARGE WATER REACHES ENTRANCE TO CAVE | | | | | | | | | |
| | 16:00 | | | | | | | | | 26256 | |
| | 16:30 | CAVE BACKS UP W/ WATER; BEGINS FORMING POOL | | | | | | | | | |
| | 16:50 | 67.98 | | | 69.65 | | | | | | |
| | 16:55 | | | | | | | | | 26413 | |
| | 17:00 | | 73.04 | | | | | | | | |
| | 17:30 | POOL REACHES SECOND CAVE OPENING @ HIGHER ELEVATION, SINK STILL DRY | | | | | | | | | |
| | 18:00 | | | | | | | | | 26602 | |
| 12/29/2009 | 8:06 | | | | | | | | | 29079 | |
| | 8:09 | | | | 69.80 | | | | | | |
| | 8:11 | 68.11 | | | | | | | | | |
| | 8:18 | | 73.17 | | | | | | | | |
| | 9:26 | | | | | | | | | 29313 | |
| | 10:08 | | | | | | | | | 29437 | |
| | 11:22 | | | | | | | | | 29652 | |
| | 12:18 | | | | 69.76 | | | | | | |
| | 12:21 | 68.08 | | | | | | | | | |
| | 12:25 | WATER LEVEL TAPE BATTERY DEAD | | | | | | | | 29835 | |
| | 13:23 | PUMP OFF - BEGIN RECOVERY | | | | | | | | | |
| 1/4/2010 | 11:00 | | | | | 0.79 | | | | | frozen |
| | 11:11 | | | | 68.9 | | | | | | |
| | 11:22 | 67.22 | | | | | | | | | |
| | 11:37 | | 73 | | | | | | | | |

**Figure G-3.** Field sheet for data collected manually during the Upper Floridan aquifer performance test conducted at the ROMP 132 well site in Marion County.

## AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

**General Information:** Upper Floridan aquifer APT - Information about data logger "Mikey" (orifice)

| | | | |
|---|---|---|---|
| Site Name: | ROMP 132 - Blitch Plantation | Date: | 12/16/2009 - 1/4/2010 |
| Reporting Code: | LWBL | Performed by: | Anna Janosik |
| County: | Marion | S/T/R: | 28/13/20 |
| Pumped Well: | Temp Upper Floridan Aquifer (SID 750869) | Pumped Zone OB(s): | Perm UFA monitor (SID 750867) |
| Pump Type: | 10-inch diesel lineshaft | | exploratory core hole (SID 709163) |
| Test Rate/Duration: | 3000 gpm / 24 hours | | drilling water supply (SID 750886) |
| Pump Set Depth: | 120 feet below land surface | | |

**Setup Information:**

| | | | |
|---|---|---|---|
| Datalogger: | Michelangelo (CR 1000) | Time Synchronized: | 12/28/2009 @ 11:54 |
| Datalogger SN: | 11462 | Time Datum: | NIST |
| Program Name: | ROMP132_APT_orifice.CR1 | | |
| Program Start Date: | 12/28/2009 @ 11:55 | | |
| Program End Date: | 12/29/2009 @ 13:35 | | |

**Test Information:**

| | | | |
|---|---|---|---|
| Pump On Time: | 12/28/2009 @ 13:23 | Flow Meter Totalizer Start: | 25,796,000 gal |
| Pump Off Time: | 12/29/2009 @ 13:23 | Flow Meter Totalizer End: | 30,006,000 gal |

| | | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Well*** | | | | Orifice | Orifice | | | | Flow Meter | |
| ***Riser ht.*** | ***als ft*** | | | n/a | n/a | | | | | |
| ***TOC elev*** | ***elev ft*** | | | n/a | n/a | | | | | <- Elev Ref |
| ***static W/L*** | ***btoc ft*** | | | n/a | n/a | | | | | <- Date: |
| ***static W/L*** | ***elev ft*** | | | n/a | n/a | | | | | TOC elev - static WL(btoc) |
| ***XD Rating*** | ***psi*** | | | 20 | 20 | | | | | |
| ***Serial No.*** | | | | 0809056 | 0809057 | | | | | |
| ***Reading in Air*** | ***ft*** | | | 0.06 | 0.05 | | | | | |
| ***XD depth*** | ***btoc ft*** | | | n/a | n/a | | | | | |
| ***XD elev*** | ***elev ft*** | | | n/a | n/a | | | | | TOC elev - XD depth(btoc) |
| ***XD subm.*** | ***wl tape ft*** | | | n/a | n/a | | | | | WL tape value of submergence |
| ***XD subm.*** | ***XD read ft*** | | | n/a | n/a | | | | | XD value of submergence |
| ***XD Diff.*** | ***ft*** | | | n/a | n/a | | | | | Subm.$_{WL\ tape}$ - Subm.$_{XD}$ |

| Date | Time | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | Totalizer | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Orifice | Orifice | | | | logger voltg | (g x 1000) | |
| Units | ----------> | | | ft $H_2O$ | ft $H_2O$ | | | | volts | | |
| 12/28/09 | 11:54 | | | 0.06 | 0.05 | | | | 12.55 | | time sync |
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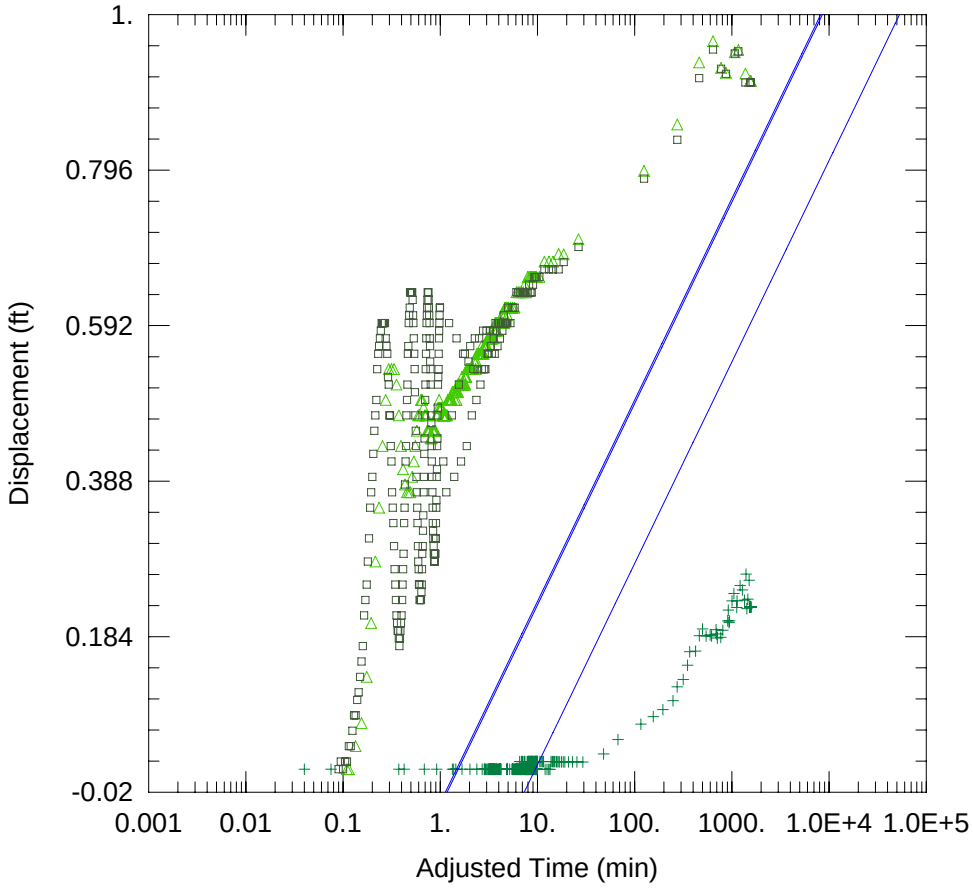
**Figure G-4.** Field sheet for data collected with the data logger 'Michelangelo' during the Upper Floridan aquifer performance test conducted at the ROMP 132 well site in Marion County.




WELL TEST ANALYSIS

Data Set: D:\...\ROMP132_DDREC_COMBINED_Donny_straightline_revJJL_alj.aqt
Date: 04/12/11 Time: 16:31:45

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 132
Location: Marion County
Test Date: 12/28/2009

AQUIFER DATA

Saturated Thickness: 1572. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| pumped | 0 | 0 |

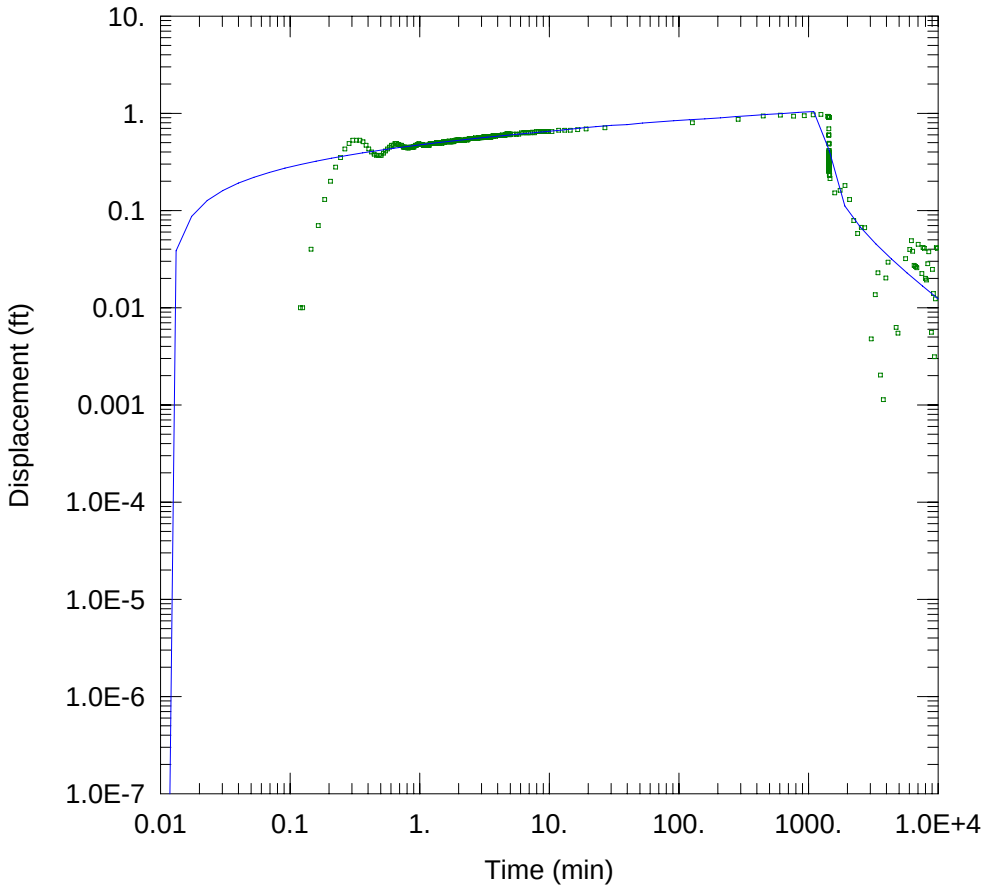
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| △ ch | 195 | 0 |
| + ws | 486 | 0 |
| ▫ ob | 191 | 0 |

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob
T = 3.803E+5 $ft^2$/day S = 0.02186

**Figure H-1.** Curve match solution output from AQTESOLV® using the Cooper Jacob straight line method for the estimation of transmissivity (T) using groundwater level data collected from the Upper Floridan aquifer monitor well, exploratory core hole, and drilling water supply well during the Upper Floridan aquifer performance test at the ROMP 132 well site in Marion County.




WELL TEST ANALYSIS

Data Set: D:\...\ROMP132_DDREC_COMBINED_Donny_theis_ch_alj.aqt
Date: 04/25/11 Time: 14:24:07

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 132
Location: Marion County
Test Well: Pumped
Test Date: 12/28/2009

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| pumped | 0 | 0 |

Observation Wells

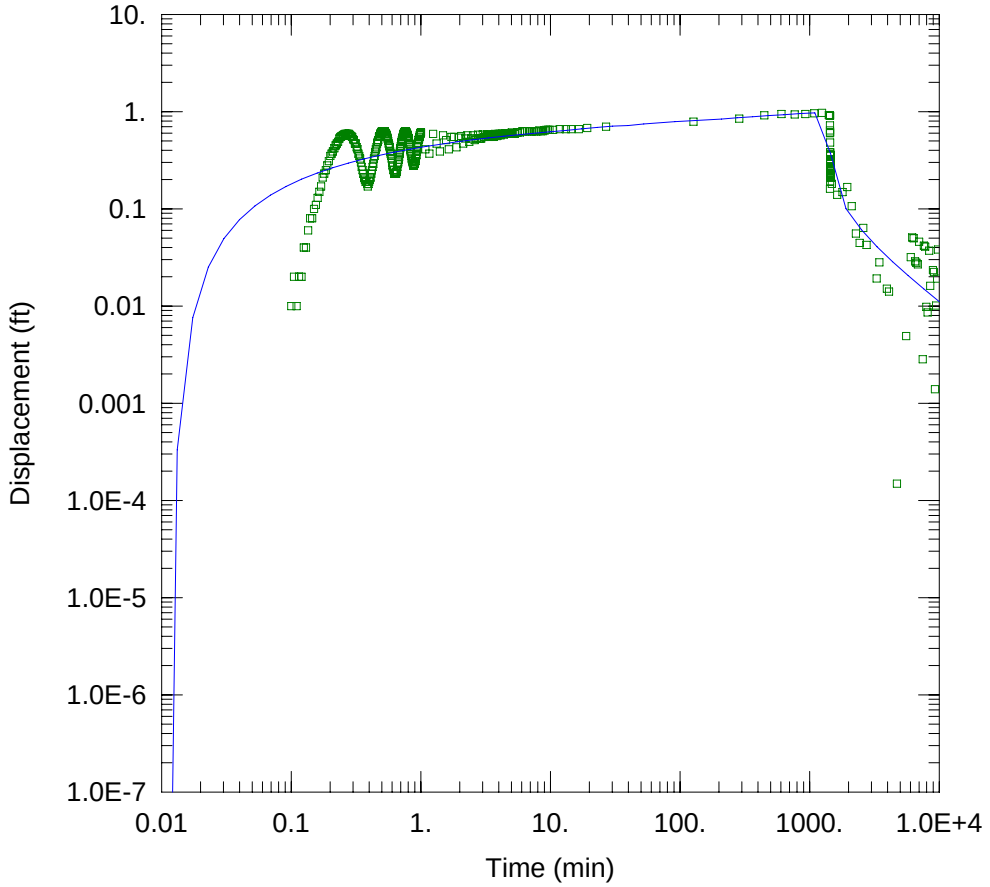
| Well Name | X (ft) | Y (ft) |
|---|---|---|
| ch | 195 | 0 |

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 5.538E+5 $ft^2$/day
S = 8.01E-5
Kz/Kr = 0.1
b = 1572. ft

**Figure H-2.** Curve match solution output from AQTESOLV® using the Theis/Hantush method for the estimation of transmissivity (T) using groundwater level data collected from the exploratory core hole during the Upper Floridan aquifer performance test at the ROMP 132 well site in Marion County.




WELL TEST ANALYSIS

Data Set: D:\...\ROMP132_DDREC_COMBINED_Donny_theis_ob_alj.aqt
Date: 04/25/11 Time: 14:10:55

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 132
Location: Marion County
Test Well: Pumped
Test Date: 12/28/2009

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| pumped | 0 | 0 |

Observation Wells

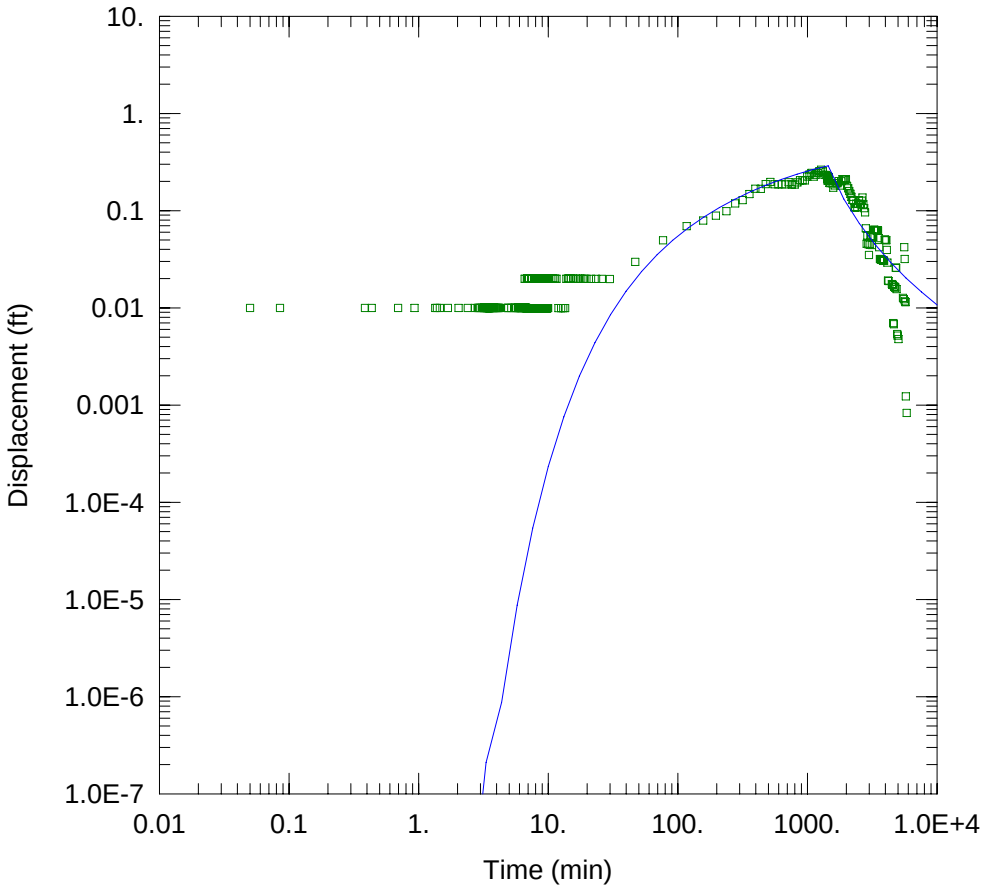
| Well Name | X (ft) | Y (ft) |
|---|---|---|
| ob | 191 | 0 |

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 6.144E+5 $ft^2$/day
S = 0.0006431
Kz/Kr = 0.1
b = 1572. ft

**Figure H-3.** Curve match solution output from AQTESOLV® using the Theis/Hantush method for the estimation of transmissivity (T) using groundwater level data collected from the Upper Floridan aquifer monitor well during the Upper Floridan aquifer performance test at the ROMP 132 well site in Marion County.




WELL TEST ANALYSIS

Data Set: D:\...\ROMP132_DDREC_COMBINED_Donny_theis_ws_alj.aqt
Date: 04/25/11 Time: 14:23:51

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 132
Location: Marion County
Test Well: Pumped
Test Date: 12/28/2009

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| pumped | 0 | 0 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| ws | 486 | 0 |

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 6.358E+5 $ft^2$/day
S = 0.2521
Kz/Kr = 0.1
b = 1572. ft

**Figure H-4.** Curve match solution output from AQTESOLV® using the Theis/Hantush method for the estimation of transmissivity (T) using groundwater level data collected from the water supply well during the Upper Floridan aquifer performance test at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 1

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 6/12/2008 |
| Well: | Core Hole | Time: | 12:25 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 110 | Packed Interval (ft-ft bls) | 71-110 |
| Casing (HW) Depth (ft bls) | 71 | Packed Interval (m-m bls) | 21.6-33.5 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | 64.21 |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | none |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.6528 | g/ft | X | 7 | ft (interval) | = | 5 | gallons |
| 2 | 0.3623 | g/ft | X | 39 | ft (interval) | = | 14 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 19 | gallons |

Pump Method: Rental Geosub

Airline Length: none feet

Discharge Rate (gpm): 2 gpm

Pump Time / Volume: 10 minutes **X THREE =** 30 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: No packer. Tested through HW. Water level too low to use airline as pump method.
Pump set 71 ft btoc = 69.62 ft bls; WL 65.59 ft btoc = 64.21 ft bls; dd to 65.80 ft btoc

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 11:10 | 372.9 | 24.3 | 6.96 |
| 11:20 | 381.6 | 23.9 | 7.07 |
| 11:31 | 382.1 | 23.9 | 7.18 |
| 11:45 | 382.5 | 23.9 | 7.26 |
| 11:55 | 382.3 | 23.9 | 7.27 |
| 12:05 | 382.7 | 23.9 | 7.29 |
| 12:17 | 382.3 | 23.9 | 7.33 |
| 12:25 | 382.7 | 23.9 | 7.34 |
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Start Purge 10:36

End Purge 12:30

Sample Time 12:25

| | Multimeter |
|---|---|
| Sp. Cond. (µS/cm) | 382.7 |
| Temperature (°C) | 23.9 |
| pH (SU) | 7.34 |

| | Photometer |
|---|---|
| Chloride (mg/l) | 7.9 |
| Sulfate (mg/l) | 9 |
| pH (SU) | 7.50 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-1.** Field sheet for the groundwater quality sample collected between 71 and 110 feet below land surface (water quality sample 1) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 2

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/8/2008 |
| Well: | Core Hole | Time: | 15:50 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 175 | Packed Interval (ft-ft bls) | 132-175 |
| Casing (HW) Depth (ft bls) | 132 | Packed Interval (m-m bls) | 40.2-53.3 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | 64.39 |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | 64.38 |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.3623 | g/ft | X | 132 | ft (interval) | = | 48 | gallons |
| 2 | 0.6528 | g/ft | X | 43 | ft (interval) | = | 28 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 76 | gallons |

Pump Method: Reverse Air

Airline Length: 165 feet

Discharge Rate (gpm): 10 gpm

Pump Time / Volume: 7.7 minutes **X THREE =** 23 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: No packer. Tested through HW (set at 132 ft bls)

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 15:20 | 405.5 | 23.3 | 7.06 |
| 15:30 | 407.9 | 22.9 | 7.55 |
| 15:40 | 400.1 | 22.9 | 7.80 |
| 15:50 | 407.9 | 22.9 | 7.91 |
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Start Purge 12:10

End Purge 16:15

Sample Time 15:50

| | Multimeter | | Photometer |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 407.9 | Chloride (mg/l) | 7.5 |
| Temperature (°C) | 22.9 | Sulfate (mg/l) | 8 |
| pH (SU) | 7.91 | pH (SU) | 8.10 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-2.** Field sheet for the groundwater quality sample collected between 132 and 175 feet below land surface (water quality sample 2) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 3

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/10/2008 |
| Well: | Core Hole | Time: | 12:52 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 215 | Packed Interval (ft-ft bls) | 180-215 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 54.9-65.5 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 180 | ft (interval) | = | 41 | gallons |
| 2 | 0.3623 | g/ft | X | 35 | ft (interval) | = | 13 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 54 | gallons |

Pump Method: Reverse Air

Airline Length: 160 feet

Discharge Rate (gpm): 16 gpm

Pump Time / Volume: 3 minutes **X THREE =** 10 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments:

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 12:15 | 398.0 | 23.0 | 7.11 |
| 12:25 | 419.9 | 22.6 | 7.65 |
| 12:35 | 434.6 | 22.5 | 7.85 |
| 12:45 | 434.7 | 22.5 | 7.92 |
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Start Purge 12:02

End Purge 13:05

Sample Time 12:52

| | Multimeter | | Photometer |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 427.2 | Chloride (mg/l) | 8.7 |
| Temperature (°C) | 22.5 | Sulfate (mg/l) | 7 |
| pH (SU) | 7.97 | pH (SU) | 7.90 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-3.** Field sheet for the groundwater quality sample collected between 180 and 215 feet below land surface (water quality sample 3) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 4

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/22/2008 |
| Well: | Core Hole | Time: | 17:20 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 285 | Packed Interval (ft-ft bls) | 233-285 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 71.0-86.9 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 233 | ft (interval) | = | 54 | gallons |
| 2 | 0.3623 | g/ft | X | 52 | ft (interval) | = | 19 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 72 | gallons |

Pump Method: Reverse Air

Airline Length: 200 feet

Discharge Rate (gpm): 22 gpm

Pump Time / Volume: 3 minutes **X THREE =** 10 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: Borrowed YSI 556 to take duplicate readings. Readings below are recorded as YSI 63/YSI 556 however the pH probe on the YSI 556 is out of calib. (see daily log).

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 16:45 | 399.6/429 | 22.8/22.20 | 7.15/7.35 |
| 16:58 | 414.7/426 | 22.2/22.10 | 7.66/7.22 |
| 17:05 | 414.0/426 | 22.2/22.13 | 7.78/7.20 |
| 17:10 | 407.0/427 | 22.3/22.10 | 7.83/7.39 |
| 17:15 | 415.0/426 | 22.4/22.08 | 7.90/7.41 |
| 17:20 | 414.3/426 | 22.3/22.09 | 7.89/7.39 |
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Start Purge 16:26

End Purge 17:30

Sample Time 17:20

| | Multimeter |
|---|---|
| Sp. Cond. (µS/cm) | 414.3/426 |
| Temperature (°C) | 22.3/22.09 |
| pH (SU) | 7.89/7.39 |

| | Photometer |
|---|---|
| Chloride (mg/l) | 8.0 |
| Sulfate (mg/l) | 4 |
| pH (SU) | 8.00 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-4.** Field sheet for the groundwater quality sample collected between 233 and 285 feet below land surface (water quality sample 4) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 5

**General Information**

Wellsite: ROMP 132 - Blitch Plantation
Well: Core Hole
SID# 709163
Date: 7/29/2008
Time: 10:55
Performed by: A. Janosik

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 360 | Packed Interval (ft-ft bls) | 303-360 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 92.3-109.7 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 303 | ft (interval) | = | 70 | gallons |
| 2 | 0.3623 | g/ft | X | 57 | ft (interval) | = | 21 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 91 | gallons |

Pump Method: Reverse Air
Airline Length: 240 feet
Discharge Rate (gpm): 26 gpm
Pump Time / Volume: 4 minutes **X THREE =** 11 minutes
Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer
Comments: Borrowed YSI 556 to take duplicate readings. Readings below are recorded as YSI 63/YSI 556 however the pH probe on the YSI 556 is out of calibration

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

Water Quality During Purge

| Time | Sp. Cond. | Temp. | pH |
|---|---|---|---|
| 10:25 | 406.8/427 | 23.3/22.25 | 7.57/7.45 |
| 10:35 | 412.1/426 | 22.5/22.13 | 7.79/7.48 |
| 10:45 | 413.3/425 | 22.5/22.17 | 7.96/7.78 |
| 10:55 | 411.7/426 | 22.5/22.13 | 8.00/7.83 |
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Start Purge 10:00
End Purge 10:55
Sample Time 10:55

| | Multimeter |
|---|---|
| Sp. Cond. (µS/cm) | 411.7/426 |
| Temperature (°C) | 22.5/22.13 |
| pH (SU) | 8.00/7.83 |

| | Photometer |
|---|---|
| Chloride (mg/l) | 7.3 |
| Sulfate (mg/l) | 5 |
| pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-5.** Field sheet for the groundwater quality sample collected between 303 and 360 feet below land surface (water quality sample 5) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 6

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/6/2008 |
| Well: | Core Hole | Time: | 9:35 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 440 | Packed Interval (ft-ft bls) | 381-440 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 116.1-134.1 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 381 | ft (interval) | = | 88 | gallons |
| 2 | 0.3623 | g/ft | X | 59 | ft (interval) | = | 21 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 109 | gallons |

Pump Method: Reverse Air

Airline Length: 240 feet

Discharge Rate (gpm): 25 gpm

Pump Time / Volume: 4 minutes **X THREE =** 13 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: Borrowed YSI 556 to take duplicate readings. Readings below are recorded as YSI 63/YSI 556 however the pH probe on the YSI 556 is out of calibration

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 9:05 | 411.6/427 | 22.6/22.28 | 7.84/7.56 |
| 9:12 | 414.9/427 | 22.2/22.01 | 7.90/7.63 |
| 9:30 | 413.5/426 | 22.2/22.07 | 8.07/7.74 |
| 9:35 | 413.7/426 | 22.2/22.02 | 8.12/7.94 |
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Start Purge 8:10

End Purge 9:45

Sample Time 9:35

| | Multimeter |
|---|---|
| Sp. Cond. (µS/cm) | 413.7/426 |
| Temperature (°C) | 22.2/22.02 |
| pH (SU) | 8.12/7.94 |

| | Photometer |
|---|---|
| Chloride (mg/l) | 7.1 |
| Sulfate (mg/l) | 7 |
| pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-6.** Field sheet for the groundwater quality sample collected between 381 and 440 feet below land surface (water quality sample 6) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 7

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/14/2008 |
| Well: | Core Hole | Time: | 10:50 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 555 | Packed Interval (ft-ft bls) | 486-555 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 147.8-169.2 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 486 | ft (interval) | = | 112 | gallons |
| 2 | 0.3623 | g/ft | X | 69 | ft (interval) | = | 25 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 137 | gallons |

Pump Method: Reverse Air

Airline Length: 240 feet

Discharge Rate (gpm): 21 gpm

Pump Time / Volume: 7 minutes **X THREE =** 20 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: Readings below are recorded as YSI 63/YSI 556 however the pH probe on the YSI 556 is out of calibration; SULFUR SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 10:25 | 449.0/466 | 22.2/21.82 | 7.36/7.86 |
| 10:35 | 452.2/466 | 21.8/21.75 | 7.60/7.73 |
| 10:40 | 451.1/465 | 21.8/21.73 | 7.80/7.77 |
| 10:50 | 450.4/465 | 21.8/21.74 | 7.95/7.74 |
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Start Purge 9:02

End Purge 11:00

Sample Time 10:50

| Multimeter | |
|---|---|
| Sp. Cond. (µS/cm) | 450.4/465 |
| Temperature (°C) | 21.8/21.74 |
| pH (SU) | 7.95/7.74 |

| Photometer | |
|---|---|
| Chloride (mg/l) | 9.2 |
| Sulfate (mg/l) | 10 |
| pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-7.** Field sheet for the groundwater quality sample collected between 486 and 555 feet below land surface (water quality sample 7) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 8

**General Information**

Wellsite: ROMP 132 - Blitch Plantation
Well: Core Hole
SID# 709163
Date: 8/2/2008
Time: 17:20
Performed by: A. Janosik

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 630 | Packed Interval (ft-ft bls) | 587-630 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 178.9-192.0 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 587 | ft (interval) | = | 135 | gallons |
| 2 | 0.3623 | g/ft | X | 48 | ft (interval) | = | 17 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 152 | gallons |

Pump Method: Reverse Air
Airline Length: 240 feet
Discharge Rate (gpm): 25 gpm
Pump Time / Volume: 6 minutes **X THREE =** 18 minutes
Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer
Comments: Readings below are recorded as YSI 63/YSI 556 however the pH probe on the YSI 556 is out of calibration. NO SMELL. Depth of 178.9-193.5 m accidentally recorded on sheet sent to lab

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 16:50 | 406.9/426 | 23.2/22.19 | 7.42/7.69 |
| 17:00 | 403.9/423 | 22.5/22.13 | 7.80/7.61 |
| 17:10 | 409.9/423 | 22.2/22.04 | 7.91/7.68 |
| 17:20 | 409.2/422 | 22.2/22.09 | 7.98/7.64 |
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Start Purge 15:49
End Purge 17:30
Sample Time 17:20

| | Multimeter |
|---|---|
| Sp. Cond. (µS/cm) | 409.2/426 |
| Temperature (°C) | 22.2/22.09 |
| pH (SU) | 7.98/7.64 |

| | Photometer |
|---|---|
| Chloride (mg/l) | 0.5 |
| Sulfate (mg/l) | 7 |
| pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-8.** Field sheet for the groundwater quality sample collected between 587 and 630 feet below land surface (water quality sample 8) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 9

**General Information**

Wellsite: ROMP 132 - Blitch Plantation
Well: Core Hole
SID# 709163
Date: 9/9/2008
Time: 13:17
Performed by: A. Janosik

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 710 | Packed Interval (ft-ft bls) | 661-710 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 201.5-216.4 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 661 | ft (interval) | = | 152 | gallons |
| 2 | 0.3623 | g/ft | X | 49 | ft (interval) | = | 18 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 170 | gallons |

Pump Method: Reverse Air
Airline Length: 240 feet
Discharge Rate (gpm): 10 gpm
Pump Time / Volume: 17 minutes **X THREE =** 51 minutes
Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer
Comments: Meter = YSI 63. FAINT SULFUR SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

Water Quality During Purge

| Time | Sp. Cond. | Temp. | pH |
|---|---|---|---|
| 12:17 | 432.2 | 22.7 | 7.90 |
| 12:25 | 431.9 | 22.5 | 8.03 |
| 12:35 | 432.5 | 22.5 | 8.13 |
| 12:47 | 428.3 | 22.5 | 8.22 |
| 12:57 | 418.7 | 22.5 | 8.27 |
| 13:07 | 433.0 | 22.5 | 8.30 |
| 13:17 | 433.0 | 22.5 | 8.27 |
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Start Purge 11:35
End Purge 13:25
Sample Time 13:17

| Multimeter | |
|---|---|
| Sp. Cond. (µS/cm) | 433.0 |
| Temperature (°C) | 22.5 |
| pH (SU) | 8.27 |

| Photometer | |
|---|---|
| Chloride (mg/l) | 5.5 |
| Sulfate (mg/l) | 7 |
| pH (SU) | 8.15 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-9.** Field sheet for the groundwater quality sample collected between 661 and 710 feet below land surface (water quality sample 9) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 10

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 9/15/2008 |
| Well: | Core Hole | Time: | 14:00 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 810 | Packed Interval (ft-ft bls) | 751-810 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 228.9-246.9 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 751 | ft (interval) | = | 173 | gallons |
| 2 | 0.3623 | g/ft | X | 59 | ft (interval) | = | 21 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 194 | gallons |

Pump Method: Reverse Air

Airline Length: 240 feet

Discharge Rate (gpm): 12 gpm

Pump Time / Volume: 16 minutes **X THREE =** 49 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: FAINT SULFUR SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

Water Quality During Purge

| Time | Sp. Cond. | Temp. | pH |
|---|---|---|---|
| 13:15 | 459.7 | 22.5 | 7.57 |
| 13:25 | 460.3 | 22.3 | 7.94 |
| 13:35 | 460.7 | 22.3 | 8.00 |
| 13:45 | 460.7 | 22.3 | 8.05 |
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Start Purge 12:35

End Purge 13:45

Sample Time 14:00

| | Multimeter | | Photometer |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 460.7 | Chloride (mg/l) | 7.2 |
| Temperature (°C) | 22.3 | Sulfate (mg/l) | 6 |
| pH (SU) | 8.05 | pH (SU) | 8.20 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-10.** Field sheet for the groundwater quality sample collected between 751 and 810 feet below land surface (water quality sample 10) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 11

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 9/22/2008 |
| Well: | Core Hole | Time: | 18:00 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 890 | Packed Interval (ft-ft bls) | 845-890 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 257.6-271.3 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 845 | ft (interval) | = | 194 | gallons |
| 2 | 0.3623 | g/ft | X | 45 | ft (interval) | = | 16 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 211 | gallons |

Pump Method: Reverse Air

Airline Length: 240 feet

Discharge Rate (gpm): 25 gpm

Pump Time / Volume: 8 minutes **X THREE =** 25 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: NO SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

Water Quality During Purge

| Time | Sp. Cond. | Temp. | pH |
|---|---|---|---|
| 17:30 | 433.8 | 22.2 | 7.72 |
| 17:40 | 431.5 | 22.1 | 7.83 |
| 17:50 | 430.9 | 22.1 | 7.92 |
| 18:00 | 430.5 | 22.0 | 7.93 |
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Start Purge 17:05

End Purge 18:00

Sample Time 18:00

| | Multimeter |
|---|---|
| Sp. Cond. (µS/cm) | 430.5 |
| Temperature (°C) | 22.0 |
| pH (SU) | 7.93 |

| | Photometer |
|---|---|
| Chloride (mg/l) | 5.7 |
| Sulfate (mg/l) | 9 |
| pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-11.** Field sheet for the groundwater quality sample collected between 845 and 890 feet below land surface (water quality sample 11) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 12

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 9/29/2008 |
| Well: | Core Hole | Time: | 16:35 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 975 | Packed Interval (ft-ft bls) | 906-975 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 275.8-297.2 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 906 | ft (interval) | = | 208 | gallons |
| 2 | 0.3623 | g/ft | X | 69 | ft (interval) | = | 25 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 233 | gallons |

Pump Method: Reverse Air

Airline Length: 300 feet

Discharge Rate (gpm): 20 gpm

Pump Time / Volume: 12 minutes **X THREE =** 35 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: SULFUR SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 15:55 | 438.2 | 22.3 | 7.43 |
| 16:05 | 437.7 | 22.2 | 7.65 |
| 16:15 | 438.3 | 22.2 | 7.81 |
| 16:25 | 437.4 | 22.2 | 7.90 |
| 16:35 | 438.4 | 22.1 | 7.91 |
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Start Purge 15:25

End Purge 16:35

Sample Time 16:35

| | Multimeter | | Photometer |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 438.4 | Chloride (mg/l) | 4.7 |
| Temperature (°C) | 22.1 | Sulfate (mg/l) | 8 |
| pH (SU) | 7.91 | pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-12.** Field sheet for the groundwater quality sample collected between 906 and 975 feet below land surface (water quality sample 12) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 13

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 10/2/2008 |
| Well: | Core Hole | Time: | 12:55 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1,045 | Packed Interval (ft-ft bls) | 981-1,045 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 299.0-318.5 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 981 | ft (interval) | = | 226 | gallons |
| 2 | 0.3623 | g/ft | X | 64 | ft (interval) | = | 23 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 249 | gallons |

Pump Method: Reverse Air

Airline Length: 300 feet

Discharge Rate (gpm): 30 gpm

Pump Time / Volume: 8 minutes **X THREE =** 25 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: NO SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

Water Quality During Purge

| Time | Sp. Cond. | Temp. | pH |
|---|---|---|---|
| 12:25 | 437.8 | 21.9 | 7.51 |
| 12:35 | 446.2 | 22.0 | 7.71 |
| 12:45 | 446.7 | 21.9 | 7.83 |
| 12:55 | 446.0 | 22.0 | 7.80 |
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Start Purge 11:35

End Purge 13:05

Sample Time 12:55

| Multimeter | | Photometer | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 446.0 | Chloride (mg/l) | 4.4 |
| Temperature (°C) | 22.0 | Sulfate (mg/l) | 0 |
| pH (SU) | 7.80 | pH (SU) | 8.00 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-13.** Field sheet for the groundwater quality sample collected between 981 and 1,045 feet below land surface (water quality sample 13) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 14

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 10/13/2008 |
| Well: | Core Hole | Time: | 17:00 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1,155 | Packed Interval (ft-ft bls) | 1,076-1,155 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 327.9-352.0 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1076 | ft (interval) | = | 248 | gallons |
| 2 | 0.3623 | g/ft | X | 79 | ft (interval) | = | 29 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 276 | gallons |

Pump Method: Reverse Air

Airline Length: 300 feet

Discharge Rate (gpm): 30 gpm

Pump Time / Volume: 9 minutes **X THREE =** 28 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: SLIGHT SULFUR SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 16:28 | 452.1 | 22.6 | 7.50 |
| 16:38 | 452.6 | 22.4 | 7.70 |
| 16:48 | 452.2 | 22.4 | 7.77 |
| 16:58 | 452.9 | 22.3 | 7.75 |
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Start Purge 15:45

End Purge 17:05

Sample Time 17:00

| | Multimeter | | Photometer |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 452.9 | Chloride (mg/l) | 7.6 |
| Temperature (°C) | 22.3 | Sulfate (mg/l) | 10 |
| pH (SU) | 7.75 | pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-14.** Field sheet for the groundwater quality sample collected between 1,076 and 1,155 feet below land surface (water quality sample 14) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 15

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 10/22/2008 |
| Well: | Core Hole | Time: | 9:30 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1,230 | Packed Interval (ft-ft bls) | 1,186-1,230 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 361.5-374.9 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1186 | ft (interval) | = | 273 | gallons |
| 2 | 0.3623 | g/ft | X | 44 | ft (interval) | = | 16 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 289 | gallons |

Pump Method: Reverse Air

Airline Length: 300 feet

Discharge Rate (gpm): 30 gpm

Pump Time / Volume: 10 minutes **X THREE =** 29 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: NO SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 8:50 | 466.7 | 21.5 | 7.40 |
| 9:00 | 465.3 | 21.9 | 7.77 |
| 9:10 | 462.3 | 22.1 | 7.90 |
| 9:20 | 461.8 | 22.1 | 7.94 |
| 9:30 | 460.2 | 22.1 | 7.99 |
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Start Purge 8:22

End Purge 9:40

Sample Time 9:30

| Multimeter | | Photometer | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 460.2 | Chloride (mg/l) | 5.7 |
| Temperature (°C) | 22.1 | Sulfate (mg/l) | 3 |
| pH (SU) | 7.99 | pH (SU) | 8.10 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-15.** Field sheet for the groundwater quality sample collected between 1,186 and 1,230 feet below land surface (water quality sample 15) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 16

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 11/19/2008 |
| Well: | Core Hole | Time: | 13:40 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1,310 | Packed Interval (ft-ft bls) | 1,246-1,310 |
| Casing (HW) Depth (ft bls) | 133 | Packed Interval (m-m bls) | 379.8-399.3 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1246 | ft (interval) | = | 287 | gallons |
| 2 | 0.3623 | g/ft | X | 64 | ft (interval) | = | 23 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 310 | gallons |

Pump Method: Reverse Air

Airline Length: 300 feet

Discharge Rate (gpm): 30 gpm

Pump Time / Volume: 10 minutes **X THREE =** 31 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: Air temp = 50°F, maybe making sample temp low. Temp probe slow to react. Also maybe taking long time for hoses to warm to sample temp. NO SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 12:55 | 461.2 | 21.4 | 6.77 |
| 13:05 | 461.9 | 21.7 | 7.14 |
| 13:10 | 462.2 | 21.7 | 6.65 |
| 13:20 | 461.9 | 21.7 | 7.31 |
| 13:30 | 461.4 | 21.8 | 7.56 |
| 13:40 | 462.1 | 21.8 | 7.62 |
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Start Purge 12:19

End Purge 13:55

Sample Time 13:40

***additional comment:***
Water very clear. Could see bottom of discharge pond.

| Multimeter | | Photometer | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 462.1 | Chloride (mg/l) | 6.9 |
| Temperature (°C) | 21.8 | Sulfate (mg/l) | 6 |
| pH (SU) | 7.62 | pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-16.** Field sheet for the groundwater quality sample collected between 1,246 and 1,310 feet below land surface (water quality sample 16) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 17

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 12/16/2008 |
| Well: | Core Hole | Time: | 13:25 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1,390 | Packed Interval (ft-ft bls) | 1,346-1,390 |
| Casing (HW) Depth (ft bls) | 135 | Packed Interval (m-m bls) | 410.3-423.7 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1346 | ft (interval) | = | 310 | gallons |
| 2 | 0.3623 | g/ft | X | 44 | ft (interval) | = | 16 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 326 | gallons |

Pump Method: Reverse Air

Airline Length: 360 feet

Discharge Rate (gpm): 35 gpm

Pump Time / Volume: 9 minutes **X THREE =** 28 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments: NO SMELL

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

Water Quality During Purge

| Time | Sp. Cond. | Temp. | pH |
|---|---|---|---|
| 12:45 | 472.6 | 22.4 | 6.92 |
| 12:55 | 472.6 | 22.5 | 7.25 |
| 13:05 | 474.5 | 22.5 | 7.55 |
| 13:15 | 473.8 | 22.5 | 7.72 |
| 13:25 | 474.6 | 22.5 | 7.74 |
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Start Purge 12:15

End Purge 13:30

Sample Time 13:25

| Multimeter | | Photometer | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 474.6 | Chloride (mg/l) | 5.8 |
| Temperature (°C) | 22.5 | Sulfate (mg/l) | 9 |
| pH (SU) | 7.74 | pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-17.** Field sheet for the groundwater quality sample collected between 1,346 and 1,390 feet below land surface (water quality sample 17) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 18

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 1/29/2009 |
| Well: | Core Hole | Time: | 12:25 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1,460 | Packed Interval (ft-ft bls) | 1,421-1,460 |
| Casing (HW) Depth (ft bls) | 135 | Packed Interval (m-m bls) | 433.1-445.0 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1461 | ft (interval) | = | 336 | gallons |
| 2 | 0.3623 | g/ft | X | 39 | ft (interval) | = | 14 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 350 | gallons |

Pump Method: Reverse Air

Airline Length: 360 feet

Discharge Rate (gpm): 34 gpm

Pump Time / Volume: 10 minutes **X THREE =** 31 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments:

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 11:35 | 521 | 22.5 | 7.02 |
| 11:45 | 521 | 22.5 | 7.45 |
| 11:55 | 520 | 22.5 | 7.60 |
| 12:05 | 521 | 22.5 | 7.73 |
| 12:15 | 521 | 22.5 | 7.79 |
| 12:25 | 521 | 22.5 | 7.79 |
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Start Purge 10:53

End Purge 12:30

Sample Time 12:25

| | Multimeter |
|---|---|
| Sp. Cond. (µS/cm) | 521 |
| Temperature (°C) | 22.5 |
| pH (SU) | 7.79 |

| | Photometer |
|---|---|
| Chloride (mg/l) | 8.5 |
| Sulfate (mg/l) | 9 |
| pH (SU) | 7.95 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-18.** Field sheet for the groundwater quality sample collected between 1,421 and 1,460 feet below land surface (water quality sample 18) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 19

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 2/12/2009 |
| Well: | Core Hole | Time: | 13:20 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1,500 | Packed Interval (ft-ft bls) | 1,466-1,500 |
| Casing (HW) Depth (ft bls) | 135 | Packed Interval (m-m bls) | 446.8-457.2 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1466 | ft (interval) | = | 337 | gallons |
| 2 | 0.3623 | g/ft | X | 34 | ft (interval) | = | 12 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 350 | gallons |

Pump Method: Reverse Air

Airline Length: 360 feet

Discharge Rate (gpm): 34 gpm

Pump Time / Volume: 10 minutes **X THREE =** 31 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments:

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 12:40 | 526 | 22.6 | 7.11 |
| 12:50 | 525 | 22.7 | 7.46 |
| 13:10 | 526 | 22.7 | 7.74 |
| 13:20 | 525 | 22.7 | 7.79 |
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Start Purge 12:10

End Purge 14:00

Sample Time 13:20

| | Multimeter | | Photometer |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 525 | Chloride (mg/l) | 8.6 |
| Temperature (°C) | 22.7 | Sulfate (mg/l) | 10 |
| pH (SU) | 7.79 | pH (SU) | 8.05 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-19.** Field sheet for the groundwater quality sample collected between 1,466 and 1,500 feet below land surface (water quality sample 19) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 20

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 7/22/2010 |
| Well: | Core Hole | Time: | 14:35 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1,607 | Packed Interval (ft-ft bls) | 1,557-1,607 |
| Casing (HQ) Depth (ft bls) | 139 | Packed Interval (m-m bls) | 474.7-489.9 |
| Casing (HQ) Diameter (in.) | 3 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NRQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1557 | ft (interval) | = | 358 | gallons |
| 2 | 0.3623 | g/ft | X | 50 | ft (interval) | = | 18 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 376 | gallons |

Pump Method: Reverse Air

Airline Length: 160 feet

Discharge Rate (gpm): 8 gpm

Pump Time / Volume: 47 minutes **X THREE =** 141 minutes

Collection Method: (Surface Discharge) or Wireline Bailer or Nested Bailer

Comments:

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 13:26 | 1124 | 24.38 | 6.12 |
| 13:42 | 1124 | 24.41 | 7.15 |
| 13:52 | 1125 | 24.47 | 7.45 |
| 14:04 | 1125 | 24.28 | 7.55 |
| 14:12 | 1125 | 24.20 | 7.63 |
| 14:22 | 1125 | 24.23 | 7.70 |
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Start Purge 11:00

End Purge 14:35

Sample Time 14:35

| Multimeter | |
|---|---|
| Sp. Cond. (µS/cm) | 1122 |
| Temperature (°C) | 24.25 |
| pH (SU) | 7.76 |

| Photometer | |
|---|---|
| Chloride (mg/l) | 86.0 |
| Sulfate (mg/l) | 379 |
| pH (SU) | 8.15 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-20.** Field sheet for the groundwater quality sample collected between 1,557 and 1,607 feet below land surface (water quality sample 20) at the ROMP 132 well site in Marion County.

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 21

**General Information**

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 132 - Blitch Plantation | Date: | 8/2/2010 |
| Well: | Core Hole | Time: | 17:00 |
| SID# | 709163 | Performed by: | A. Janosik |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1,687 | Packed Interval (ft-ft bls) | 1,637-1,687 |
| Casing (HQ) Depth (ft bls) | 139 | Packed Interval (m-m bls) | 499.0-514.2 |
| Casing (HQ) Diameter (in.) | 3 | Initial Test Interval WL (ft bls) | not measured |
| Hole Diameter (in.) | NRQ (2 3/8) | Initial Annulus WL (ft bls) | not measured |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 0.3623 | g/ft | X | 50 | ft (interval) | = | 18 gallons |
| 2 | | g/ft | X | | ft (interval) | = | 2 gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 20 gallons |

Pump Method: Reverse Air

Airline Length: 160 feet

Discharge Rate (gpm): <1 gpm

Pump Time / Volume: _____ minutes **X THREE =** _____ minutes

Collection Method: Surface Discharge or Wireline Bailer or (Nested Bailer)

Comments: FLOW TOO LOW TO GET 3 WELL VOLUMES. PURGED ENOUGH TO FILL BAILER ONE TIME (SEE DAILY LOGS 8/2/2010). SAMPLE MAY NOT BE TRUE.

Note: NQ=0.2301 gal/ft; HW=0.6528 gal/ft; open hole(NQ)=0.3623 gal/ft

**Test Information**

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
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Start Purge: SEE DAILY LOGS

End Purge: 16:30

Sample Time: 17:00

| | Multimeter | | Photometer |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 1413 | Chloride (mg/l) | 28.0 |
| Temperature (°C) | 24.20 | Sulfate (mg/l) | 930 |
| pH (SU) | 7.04 | pH (SU) | 7.60 |

Samples Sent to District's Laboratory for Standard Complete Analysis? (Y) or N

**Figure I-21.** Field sheet for the groundwater quality sample collected between 1,637 and 1,687 feet below land surface (water quality sample 21) at the ROMP 132 well site in Marion County.

**Table J-1.** Groundwater quality parameters collected in the field at the ROMP 132 well site in Marion County, Florida.

[Depths are in feet below land surface; Specific conductivity is reported in microSiemens per centimeter; $Cl^-$, chloride concentration in milligrams per liter; $SO_4^{2-}$, sulfate concentration in milligrams per liter]

| Sample number | Sampled interval top | Sampled interval bottom | Temperature in degrees Celsius | pH | Specific conductivity | $Cl^-$ | $SO_4^{2-}$ |
|---|---|---|---|---|---|---|---|
| 1 | 71 | 110 | 23.9 | 7.34 | 382.7 | 7.9 | 9 |
| 2 | 132 | 175 | 22.9 | 7.91 | 407.9 | 7.5 | 8 |
| 3 | 180 | 215 | 22.5 | 7.97 | 427.2 | 8.7 | 7 |
| 4 | 233 | 285 | 22.3 | 7.89 | 414.3 | 8.0 | 4 |
| 5 | 303 | 360 | 22.5 | 8.00 | 411.7 | 7.3 | 5 |
| 6 | 381 | 440 | 22.2 | 8.12 | 413.7 | 7.1 | 7 |
| 7 | 486 | 555 | 21.8 | 7.95 | 450.4 | 9.2 | 10 |
| 8 | 587 | 630 | 22.2 | 7.98 | 409.2 | 0.5 | 7 |
| 9 | 661 | 710 | 22.5 | 8.27 | 433.0 | 5.5 | 7 |
| 10 | 751 | 810 | 22.3 | 8.05 | 460.7 | 7.2 | 6 |
| 11 | 845 | 890 | 22.0 | 7.93 | 430.5 | 5.7 | 9 |
| 12 | 906 | 975 | 22.1 | 7.91 | 438.4 | 4.7 | 8 |
| 13 | 981 | 1,045 | 22.0 | 7.80 | 446.0 | 4.4 | 0 |
| 14 | 1,076 | 1,155 | 22.3 | 7.75 | 452.9 | 7.6 | 10 |
| 15 | 1,186 | 1,230 | 22.1 | 7.99 | 460.2 | 5.7 | 3 |
| 16 | 1,246 | 1,310 | 21.8 | 7.62 | 462.1 | 6.9 | 6 |
| 17 | 1,346 | 1,390 | 22.5 | 7.74 | 474.6 | 5.8 | 9 |
| 18 | 1,421 | 1,460 | 22.5 | 7.79 | 521.0 | 8.5 | 9 |
| 19 | 1,466 | 1,500 | 22.7 | 7.79 | 525.0 | 8.6 | 10 |
| 20 | 1,557 | 1,607 | 24.25 | 7.76 | 1,122 | 86 | 379 |
| 21 | 1,637 | 1,687 | 24.20 | 7.04 | 1,413 | 28 | 930 |

**Table J-2.** Groundwater quality parameters from laboratory analysis of samples collected at the ROMP 132 well site in Marion County, Florida.

[All depths are in feet below land surface; <, less than; Alk, alkalinity in milligrams per liter; $Ca^{2+}$, calcium concentration in milligrams per liter; $Cl^{-}$, chloride concentration in milligrams per liter; Cond., conductivity in microSiemens per centimeter; $Fe^{2+}$, iron concentration in micrograms per liter; $K^{+}$, potassium concentration in milligrams per liter; $Mg^{2+}$, magnesium concentration in milligrams per liter; $Na^{+}$, sodium concentration in milligrams per liter; No., number; $SO_4^{2-}$, sulfate concentration in milligrams per liter; $Sr^{2+}$, strontium concentration in milligrams per liter; TDS, total dissolved solids in milligrams per liter]

| Sample Number | Sampled interval top | Sampled interval bottom | $Cl^{-}$ | Alk. | TDS | $SO_4^{2-}$ | Si | pH | Cond. | $Ca^{2+}$ | $Fe^{2+}$ | $Mg^{2+}$ | $K^{+}$ | $Na^{+}$ | $Sr^{2+}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 71 | 110 | 6.7 | 180.4 | 236 | 5.0 | 14.4 | 7.78[a] | 389 | 71.6 | 74 | 2.07 | < 0.25[b] | 6.81 | < 0.25[b] |
| 2 | 132 | 175 | 6.6 | 207.7[a] | 237 | 6.6 | 15.8 | 8.34[a] | 419 | 77.9 | <12.5[b] | 8.14 | 1.75 | 5.16 | < 0.25[b] |
| 3 | 180 | 215 | 8.1 | 215.2[a] | 263 | 3.2 | 18.2 | 8.27[a] | 446 | 82.9 | <12.5[b] | 8.16 | 0.76[c] | 5.33 | < 0.25[b] |
| 4 | 233 | 285 | 6.8 | 213.1 | 248 | 3.2 | 17.5 | 8.26[a] | 423 | 64.7 | <12.5[b] | 15.50 | 0.49[c] | 4.47 | < 0.25[b] |
| 5 | 303 | 360 | 6.1 | 217.3[a] | 221 | 3.4 | 17.6 | 8.29[a] | 424 | 61.9 | <12.5[b] | 15.60 | 0.48[c] | 4.01 | < 0.25[b] |
| 6 | 381 | 440 | 6.9[ad] | 212.6[ad] | 240[d] | 7.1[ad] | 18.4[ad] | 8.23[ad] | 424[ad] | 64.0 | <12.5[b] | 14.50 | 0.55[c] | 4.18 | < 0.25[b] |
| 7 | 486 | 555 | 9.1 | 218.1[a] | 272 | 15.5 | 16.5 | 8.26[a] | 460 | 52.5 | 23.6[c] | 27.20 | 1.22 | 5.62 | < 0.25[b] |
| 8 | 587 | 630 | 7.0[a] | 207.5 | 240 | 7.5[a] | 20.9 | 8.23[a] | 420 | 64.1 | 12.9[c] | 15.00 | 0.51[c] | 4.27 | < 0.25[b] |
| 9 | 661 | 710 | 6.5[a] | 218.0[a] | 249 | 6.6[a] | 22.0 | 8.35[a] | 435 | 65.1a | <12.5[ab] | 16.7[a] | 0.95[ac] | 5.91[a] | < 0.25[ab] |
| 10 | 751 | 810 | 8.3[ad] | 208.5[ad] | 246[ad] | 12.1[ad] | 15.7[ad] | 8.02[ad] | 443[ad] | 68.7 | <12.5[b] | 18.60 | 1.33 | 5.81 | 0.25[c] |
| 11 | 845 | 890 | 6.2[ad] | 218.2[ad] | 248[ad] | 7.3[ad] | 16.8[ad] | 8.25[ad] | 435[ad] | 68.9 | <12.5[b] | 14.00 | 0.67[c] | 4.58 | < 0.25[b] |
| 12 | 906 | 975 | 6.3[ad] | 219.7[ad] | 247[d] | 6.9[ad] | 16.1[ad] | 8.24[ad] | 439[ad] | 63.0 | 24.1[c] | 19.80 | 0.86[c] | 4.38 | 0.33[c] |
| 13 | 981 | 1,045 | 6.6[ad] | 226.9[ad] | 256[d] | 10.2[ad] | 19.1[ad] | 8.24[ad] | 449[ad] | 62.4 | 25[c] | 21.20 | 0.87[c] | 4.60 | < 0.25[b] |
| 14 | 1,076 | 1,155 | 7.3[ad] | 217.1[ad] | 256[d] | 7.7[ad] | 22.0[ad] | 8.25[ad] | 443[ad] | 68.6 | 16.3[c] | 15.80 | 0.54[c] | 4.44 | < 0.25[b] |
| 15 | 1,186 | 1,230 | 6.6 | 222.3[a] | 275 | 8.8 | 20.0 | 8.12[a] | 443 | 70.6 | <12.5[b] | 15.30 | 0.52[c] | 4.54 | < 0.25[b] |
| 16 | 1,245 | 1,310 | 7.2 | 223.2[a] | 255 | 8.1 | 20.6 | 8.24[a] | 455 | 71.4 | <12.5[b] | 14.20 | 0.43[c] | 4.41 | < 0.25[b] |
| 17 | 1,346 | 1,390 | 7.3 | 227.7[a] | 269 | 9.8 | 20.8 | 8.16[a] | 462 | 76.5 | <12.5[b] | 12.50 | 0.33[c] | 4.15 | <0.25[b] |
| 18 | 1,421 | 1,460 | 7.8 | 241.0 | 307 | 19.8 | 19.1 | 8.20[a] | 511 | 80.9 | 18.4[c] | 13.20 | 0.41[c] | 4.71 | 0.43[c] |
| 19 | 1,466 | 1,500 | 8.6 | 237.6 | 293 | 22.9 | 19.0 | 8.18[a] | 489 | 81.5 | 17.4[c] | 13.70 | 0.41[c] | 4.81 | 0.47[c] |
| 20 | 1,557 | 1,607 | 68.6 | 204.7 | 747 | 264.0 | 18.2 | 8.04[a] | 1,071 | 160.0 | <12.5[b] | 27.40 | 1.16 | 44.9 | 5.11 |
| 21 | 1,637 | 1,687 | 25.6 | 214.9[a] | 1,190 | 628.0 | 15.0 | 7.72[a] | 1,473 | 300.0 | 2,870.0 | 22.70 | 0.99 | 15.50 | 9.18 |

[a] sample held past recommended holding time

[b] compound not detected, laboratory method detection limit reported

[c] reported value is between the laboratory method detection limit and the laboratory practical quantification limit which is 4 times the detection limit

[d] the laboratory analysis was from an un-preserved or improperly preserved sample