Southwest Florida
Water Management District

# Hydrogeology, Water Quality, and Well Construction at the ROMP 115 – Royal Well Site in Sumter County, Florida

Southwest Florida Water Management District
Geohydrologic Data Section

December 2020

**Cover Photo:** Permanent monitor wells at the ROMP 115 – Royal well site in Sumter County, Florida in order from left to right: U Fldn Aq Monitor, L Fldn Aq (Below MCU I) Monitor. Photograph by Kara Ramsey.

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By Julia Zydek

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The hydrogeologic evaluations and interpretations contained in *Hydrogeology, Water Quality, and Well Construction at the ROMP 115 – Royal well site in Sumter 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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State of Florida License No. PG 2984

Date: 12/1/2020

# Foreword

The Geohydrologic Data Section (GEO) administers the Regional Observation and Monitor-well Program (ROMP) at the Southwest Florida Water Management District (District). The ROMP was started in 1974 in response to the need for hydrogeologic information by the District. The focus of the ROMP is to quantify the flow characteristics and water quality of the groundwater systems that serve as the primary source of water supply within southwest Florida. The original design of the ROMP consisted of an inland 10-mile grid network composed of 104 well sites and a coastal transect network composed of 57 coastal monitor transects of two to three well sites each. The number of wells at a well site varies with specific regional needs; usually two to five permanent monitor wells are constructed at each site. The numbering system for both networks generally increases from south to north with ROMP-labeled wells representing the inland grid network and TR-labeled wells representing the coastal transect network.

In addition to the ROMP, the GEO section constructs monitor wells and performs testing activities for other District programs and projects. The broad objectives at each well site are to determine the geology, hydrology, water quality, and hydraulic properties, and to install wells for long-term monitoring. Site activities include coring, testing, and well construction. These activities provide data for the hydrogeologic and groundwater quality characterization of the well sites. These characterizations are used to ensure the monitor wells are properly designed. At the completion of each well site, a summary report is generated and can be found at the District's website at www.watermatters.org/data. The monitor wells form the backbone of the District's long-term aquifer monitoring networks, which supply critical data for the District's regional models and hydrologic conditions reporting.

M. Ted Gates

Manager

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## Tables

# Conversion Factors and Datums

| Multiply | By | To obtain |
|---|---|---|
| | Length | |
| inch (in.) | 2.54 | centimeter (cm) |
| foot (ft) | 0.3048 | meter (m) |
| mile (mi) | 1.609 | kilometer (km) |
| | **Area** | |
| acre | 0.004047 | square kilometer ($km^2$) |
| square foot ($ft^2$) | 0.09290 | square meter ($m^2$) |
| | **Volume** | |
| gallon (gal) | 3.785 | liter (L) |
| gallon (gal) | 0.003785 | cubic meter ($m^3$) |
| cubic foot ($ft^3$) | 0.02832 | cubic meter ($m^3$) |
| | **Flow rate** | |
| foot per day (ft/d) | 0.3048 | meter per day (m/d) |
| cubic foot per day ($ft^3/d$) | 0.02832 | cubic meter per day ($m^3/d$) |
| gallon per day (gal/d) | 0.003785 | cubic meter per day ($m^3/d$) |
| mile per hour (mi/h) | 1.609 | kilometer per hour (km/h) |
| | **Pressure** | |
| atmosphere, standard (atm) | 101.3 | kilopascal (kPa) |
| bar | 100 | kilopascal (kPa) |
| | **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 insert datum name (and abbreviation) here for instance, “North American Vertical Datum of 1988 (NAVD 88).”

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).

# Abbreviations and Acronyms

| | |
|---|---|
| Accurate | Accurate Well Drilling |
| Applied | Applied Engineering Drilling, Inc. |
| APT | aquifer performance test |
| Aq | aquifer |
| bls | below land surface |
| CME | Central Mining Equipment |
| commun. | communication |
| CR | County Road |
| $day^{-1}$ | per day (used to report leakance rate) |
| District | Southwest Florida Water Management District |
| Earl's | Earl’s Well Drilling & Pump Service |
| EDP | Environmental Data Portal |
| FIPS | Federal Information Processing Standards |
| Fldn | Floridan |
| Fourqurean | Fourqurean Well Drilling |
| ft/day | feet per day |
| $ft^2$/day | foot squared per day |
| GAM(NAT) | natural gamma |
| gpm | gallons per minute |
| HWT | 4-inch internal diameter temporary steel casing |
| I | Interstate |
| K | horizontal hydraulic conductivity |
| KGS | Kansas Geological Survey |
| L | lower |
| NAD | North American Datum |
| m/L | mililiter |
| MCU I | middle confining unit I |
| Meq/L | milliequivalents per liter |
| mg/L | milligram per liter |
| NAD | North American Datum |
| NAVD 88 | North American Vertical Datum of 1988 |
| NDWRAP | Northern District Water Resources Assessment Project |
| NW | 3-inch internal diameter temporary steel casing |
| OB | observation |
| PVC | polyvinyl chloride |
| PW | 5-inch internal diameter temporary steel casing |
| RES | resistance geophysical log |
| RES (16N) | short normal resistivity |
| RES (64N) | long normal resistivity |
| ROMP | Regional Observation and Monitor-well Program |
| SDR | standard dimension ratio |
| SP | spontaneous potential |

## Abbreviations and Acronyms (continued)

| | |
|---|---|
| SP COND | specific conductivity |
| SR | State Road |
| TDS | total dissolved solids |
| TEMP | temperature |
| U | Upper |
| UDR | 200DLS Universal Drill Rig |

# Hydrogeology, Water Quality, and Well Construction at the ROMP 115 – Royal Well Site in Sumter County, Florida

By Julia Zydek

## Introduction

The Southwest Florida Water Management District (District) conducted a detailed hydrogeologic investigation at the Regional Observation and Monitor-well Program (ROMP) 115 – Royal well site in north-central Sumter County (fig. 1). The ROMP 115 – Royal (herein referred to as ROMP 115) well site supports the Northern District Water Resources Assessment Project (NDWRAP), the Northern Sumter County Data Collection Project, and fills a gap in the ROMP 10-mile grid network. The NDWRAP was initiated to assess the impacts of groundwater withdrawals, monitor the freshwater/saltwater interface, identify areas of poor groundwater quality, determine the nature of flow to major springs, and monitor groundwater levels in the surficial and Upper Floridan aquifers in the northern District (Ron Basso, written commun., 2007). The northern District encompasses all of Hernando, Citrus, and Sumter Counties as well as portions of Pasco, Polk, Lake, Marion, and Levy Counties. The Northern Sumter Data Collection Project is proposed as a cooperative effort with the Withlacoochee Regional Water Supply Authority, the Villages of Sumter County, and the District. Information gained from the project will be incorporated into groundwater models of the area for use in assessing impacts of groundwater withdrawals on lake levels, spring flow, and Withlacoochee River flow (R. Basso, written commun., 2008). The data collected at this well site will aid the District in making informed management decisions central to its core mission of balancing water needs of current and future users while protecting and maintaining water and related natural resources.

The ROMP 115 well site was developed in three phases: (1) exploratory core drilling and testing to 1,997 feet below land surface (bls), (2) well construction, and (3) aquifer performance testing. District staff conducted exploratory core drilling and testing between August 11, 2014, and September 28, 2015, using the District's Central Mining Equipment (CME) 75 and the 200DLS Universal Drill Rig (UDR) core drilling rigs. Well construction began March 2014 and ended July 2016. Aquifer performance testing began March 2016 and ended April 2016. The purpose of this report is to present all the activities performed and the data collected at the well site during the three phases.

## Acknowledgements

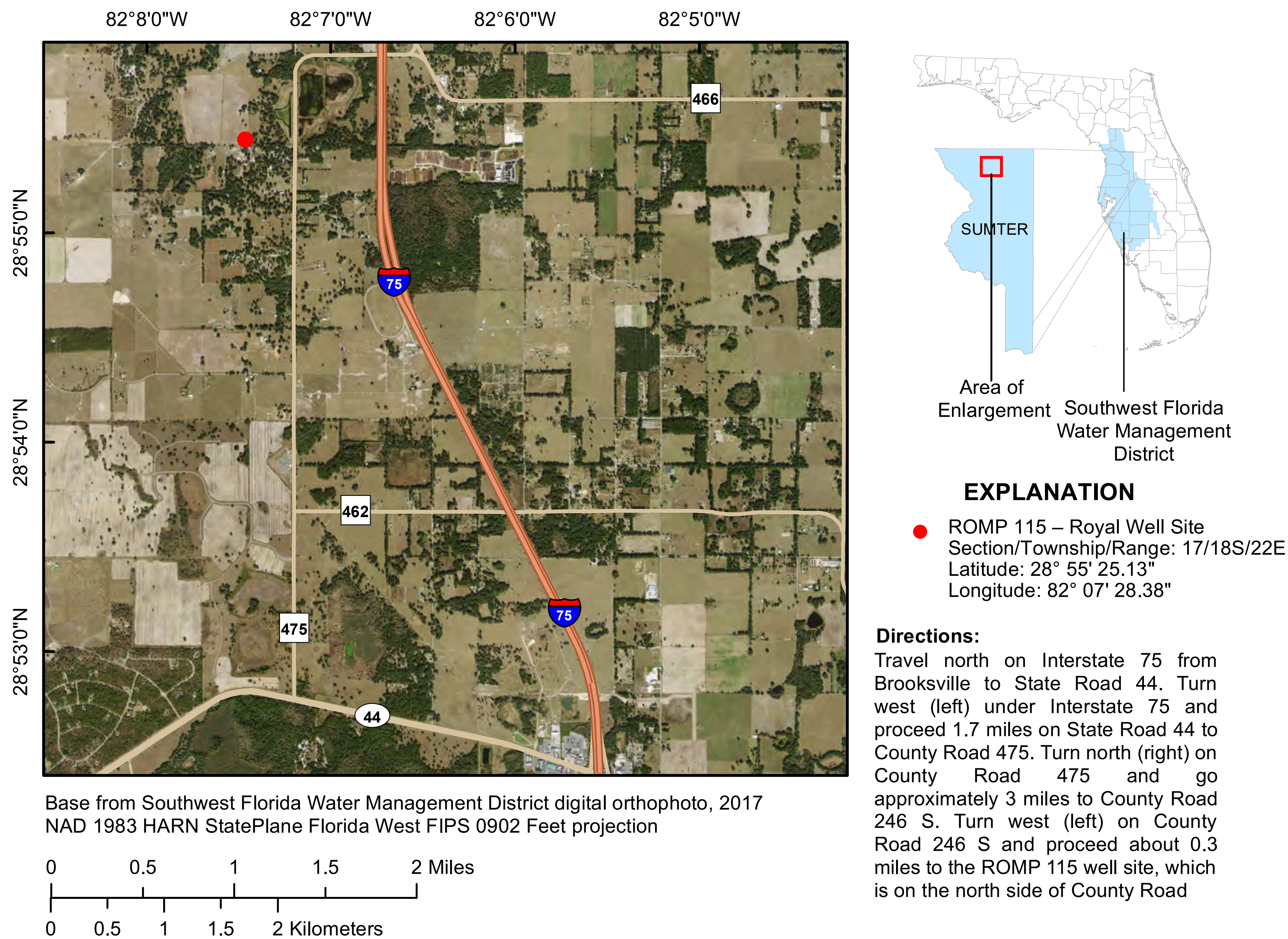
The Southwest Florida Water Management District would like to express sincere appreciation to Mr. Hurley Nichols for conveying the permanent and temporary easements necessary to further the District's goal of monitoring the water resources in all potable aquifers on site. The hydrogeologic data collected at the ROMP 115 well site will be combined with other regional data to help manage the water resources in northern Sumter County.

## Site Location

The ROMP 115 well site is located on a parcel of land in north-central Sumter County and consists of a 20-foot by 40-foot permanent well site granted by easement agreement from Hurley Nichols on April 21, 2011. The well site also consisted of a 200-foot by 300-foot temporary construction area granted by license agreement from Hurley Nichols that expired on July 31, 2016. The well site abuts the right-of-way; therefore, an easement for ingress/egress was not necessary. It is located in the southwest quarter of the northeast quarter of Section 17, Township 18 south, Range 22 east at latitude 28° 55' 25.13" north, longitude 82° 07' 28.38" west. The elevation at the ROMP 115 well site is surveyed to 63.80 feet above the North American Vertical Datum of 1988 (NAVD 88). District staff installed two vertical control stations near the site and performed vertical control surveys. Figure 2 presents the layout for the ROMP 115 well site.

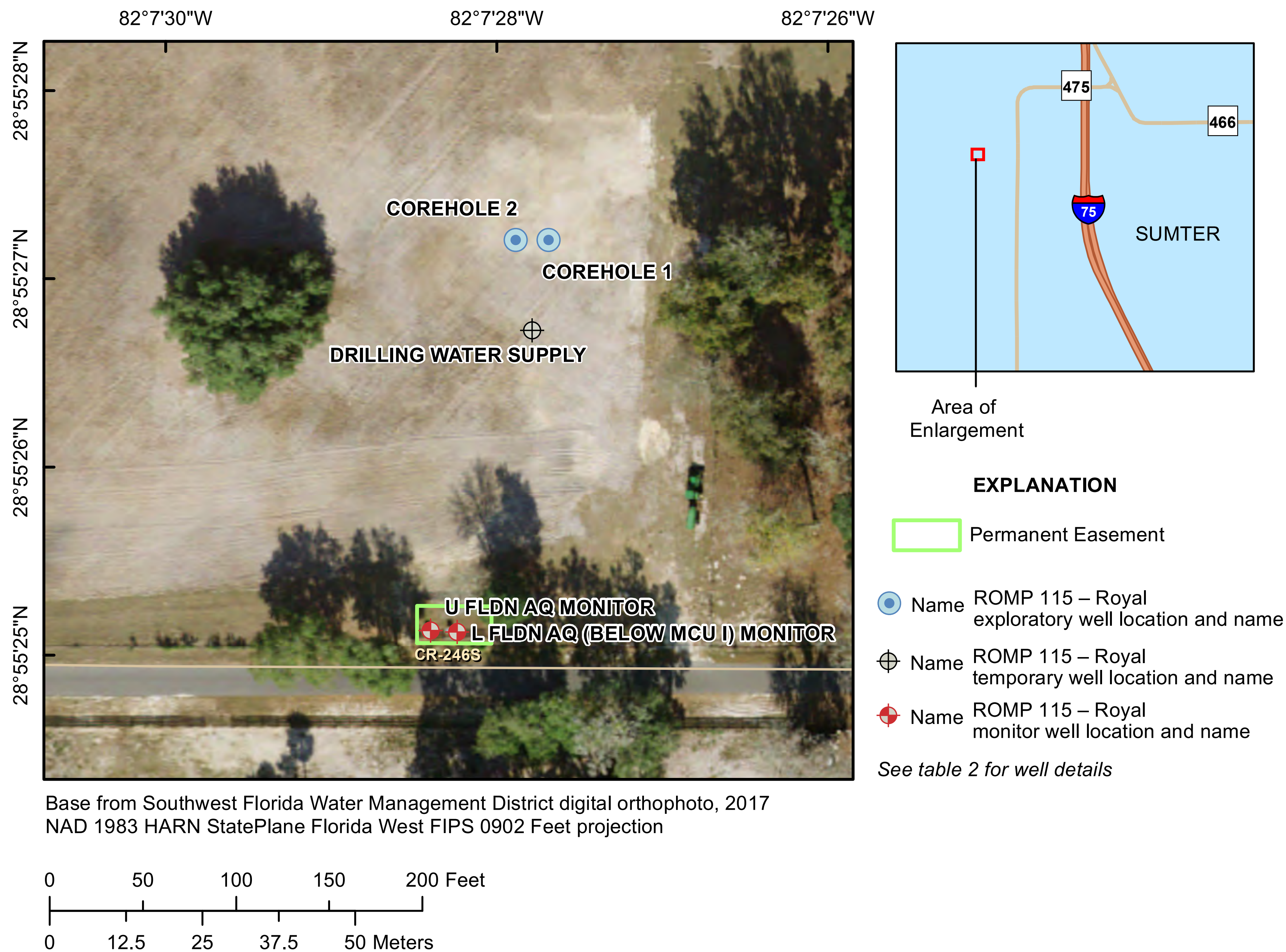
The well site can be located by traveling north on Interstate 75 (I-75) from Brooksville to State Road 44 (SR 44). Turn west (left) under I-75 and proceed 1.7 miles on SR 44 to County Road 475 (CR 475). Turn north (right) on CR 475 and go approximately 3 miles to CR 246 S. Turn west (left) on CR 246 S and proceed about 0.3 miles to the ROMP 115 well site, which is on the north side of CR 246.

The site is in the southwestern portion of the Sumter Upland within the Central Highlands region of the mid-peninsular physiographic zone of Florida (White, 1970). The Sumter Upland is bounded on the west by the Tsala Apopka Plain and remnants of the Western Valley, on the east by the Central Valley, on the north by the Ocala Hills and the Fair-




[FIPS, Federal Information Processing Standards; HARN, High Accuracy Reference Network; NAD, North American Datum; ROMP, Regional Observation and Monitor-well Program; S, South; E, East; °, degrees; ‘, minutes; “, seconds]

**Figure 1.** Location of the ROMP 115 – Royal well site in Sumter County, Florida.




[NAD, North American Datum; HARN, high accuracy reference network; FIPS, Federal information processing standards]

**Figure 2.** Well site layout for the ROMP 115 – Royal well site in Sumter County, Florida.

field Hills, on the west by the Cotton Plant Ridge and on the south by the Central valley and the Lake Harris Cross Valley (White, 1970). The site elevation (approximately 64 feet NAVD 88) suggests surface sediments were deposited during the Sangamon interglacial period of the Pleistocene epoch as part of the Penholoway Terrace or its related shoreline (Cooke, 1945; Healy, 1975).

## Methods

The ROMP 115 well site investigation was accomplished by using a variety of methods to collect hydrogeologic data including lithologic, hydraulic, geophysical, and water quality data. After exploratory core drilling and testing, monitor wells were constructed by contract drilling companies. The following sections provide the data collection method details specific to the ROMP 115 well site. Detailed descriptions of the data collection methods used by the Geohydrologic Data section are presented in appendix A. Data collected at this well site are available for download from the District’s website: www.swfwmd.state.fl.us (accessed November 17, 2020) using the Environmental Data Portal (EDP). Data are compiled in the ROMP 115 – Royal group. As of November 2020, available data include water quality and long-term water level data. This report is available for download from the District's website. Well construction details and survey data are also available for download from the EDP using the Advanced Metadata Retrieval application. Aquifer performance test (APT) data, slug test data, stratigraphy, and geophysical logs will be available in the future.

### Lithologic Sampling

Lithologic samples were collected from land surface to the total exploration depth of 1,997 feet bls. From August 11 to August 13, 2014, District staff used a hand auger to collect samples from land surface to 6 feet bls in Corehole 1. Then, District staff conducted punch-shoe sampling and hydraulic rotary core drilling using the District-owned CME 75 core drilling rig to 76 feet bls where competent limestone was encountered. Corehole 1 was plugged and a contractor was hired to install 10-inch surface casing to 70 feet bls for Corehole 2. After the surface casing was installed, District staff advanced the 4-inch HWT (4-inch inside diameter temporary steel casing) working casing to 76 feet bls. From September 18, 2014, to July 1, 2015, District staff resumed hydraulic rotary core drilling from 76 to 1,997 feet bls using the District-owned 200DLS UDR core drilling rig. Core samples were continuously collected and retrieved in 10-foot intervals using a wireline recovery system. The lithologic samples were boxed, labeled, and described.

### Hydraulic Testing

Hydraulic properties were estimated from nine slug test suites performed during exploratory core drilling. Testing began after core drilling through the unconsolidated sediments of the undifferentiated sand and clay unit and the weathered material of the Ocala Limestone in Corehole 2.

An off-bottom packer or the HWT working casing was used to isolate the first nine discrete intervals of the core hole during slug testing. The packer was installed 25 to 50 feet off bottom. A straddle packer was used to isolate the discrete interval for slug test 10. The pneumatic method was used for nine slug tests. A slug of air was introduced into the discrete interval lowering the hydraulic head (water level). A physical slug method was used for one slug test. A solid volume was introduced into the test interval, thereby raising the water level. The water level in the test intervals was measured with a pressure transducer and recorded on a datalogger as it returned to static conditions. Slug test data were analyzed to estimate horizontal hydraulic conductivity (herein referred to as hydraulic conductivity) of the isolated test intervals. The results from slug test 8 were omitted from this report because within the 10-foot test interval (1,877 to 1,887 feet bls), there was a one-foot cavity from 1,885 to 1,886 feet bls which produced a very high hydraulic conductivity value. This hydraulic conductivity value is essentially from the one-foot cavity; hence the value is an outlier and was not used in any modeling efforts. An APT was conducted at the ROMP 115 well site to estimate large-scale hydraulic properties of the Upper Floridan aquifer. The composite water level in the core hole (the entire open interval) was measured daily with an electronic water level meter before core drilling continued. Rainfall data were collected daily with a manual rain gauge. During airlift development, the drilling discharge flow rate was recorded every 20 to 40 feet of core hole advancement by discharging into a settling tub equipped with a V-notch weir.

### Water Quality Sampling

Ten groundwater samples were collected during exploratory core drilling. The samples were collected from discrete intervals isolated by an off-bottom packer before or after conducting slug test suites in Corehole 2. Eight samples were collected with a wireline bailer and two samples were collected with a nested bailer. One groundwater sample was collected during the Upper Floridan aquifer APT from from the cooling water diversion for the right-angle drive powering the turbine pump in the production well. Temperature, specific conductance, and pH were analyzed in the field, and the remainder of each sample was prepared and delivered to the District’s Chemistry Laboratory for further water quality analyses (Southwest Florida Water Management District, 2009). Additionally, temperature, specific conductance, and pH were monitored from the drilling discharge during core hole advancement.

## Geophysical Logging

Borehole geophysical logs are used to delineate stratigraphic units, identify permeable zones and confining units, characterize water quality, and help determine well casing points and grouting requirements. Geophysical logging was performed 12 times at varying intervals ranging from land surface to 1,978 feet bls at the ROMP 115 well site using District-owned Century® geophysical logging equipment (table 1 and appendix B). On November 6, 2014, a multifunction tool was run in Corehole 2 from land surface to 432 feet bls, prior to Fourqurean Well Drilling (Fourqurean) setting 6-inch Schedule 40 polyvinyl chloride (PVC) casing to 400 feet bls. The multifunction, caliper/gamma-ray, and induction tools were run in the core hole on September 17 and 18, 2015, after the total core depth of 1,997 feet bls was reached. A caliper log was run on April 26, 2016, in the upper Floridan monitor well prior to setting the 4.5-inch standard dimension ratio (SDR) 17 PVC casing. The multifunction and caliper/gamma-ray tools were run on July 14, 2016, after the permanent monitor wells were lined with 4.5-inch SDR 17 PVC casing.

# Well Construction

The ROMP 115 well site consists of two permanent monitor wells located on the permanent easement (fig. 2). The permanent monitor wells were constructed in the Upper Floridan aquifer and the Lower Floridan aquifer below middle confining unit I. A drilling water supply well was located on the temporary construction area. The District hired Fourqurean, Accurate Well Drilling (Accurate), Earl's Well Drilling & Pump Service (Earl's), and Applied Engineering Drilling, Incorporated (Applied) to construct the wells at the

**Table 1.** Summary of geophysical logs collected at the ROMP 115 – Royal well site in Sumter County, Florida

[MM/DD/YYYY, month/day/year; ft, feet; bls, below land surface; ROMP, Regional Observation and Monitor-well Program; U Fldn Aq, Upper Floridan aquifer; PVC, polyvinyl chloride, L Fldn Aq Below MCU I, Lower Floridan aquifer below middle confining unit I; well locations are shown in figure 2; well as-built diagrams are in Appendix B]

| Date (MM/DD/YYYY) | Station Name | Log Depth (ft bls) | Casing Type | Casing Depth (ft bls) | Borehole Diameter (inches) | Tool type | Tool number |
|---|---|---|---|---|---|---|---|
| 11/06/2014 | ROMP 115 Corehole 2 | 432 | Steel | 228 | 4 | multifunction | 8044C |
| 09/17/2015 | ROMP 115 Corehole 2 | 1,535.6/1,535.2 | Steel | 690.5 | 3 | multifunction; caliper/ gamma-ray | 8043C/9064A |
| 09/17/2015 | ROMP 115 Corehole 2 | 1,315.2/1,305.6 | Steel | 690.5 | 3 | multifunction; caliper/ gamma-ray | 8043C/9064A |
| 09/17/2015 | ROMP 115 Corehole 2 | 1,523 | Steel | 690.5 | 3 | induction | 9511C |
| 09/17/2015 | ROMP 115 Corehole 2 | 1,306.8 | Steel | 690.5 | 3 | induction | 9511C |
| 09/18/2015 | ROMP 115 Corehole 2 | 1,087.2/1,086 | Steel | 690.5 | 3 | multifunction; caliper/ gamma-ray | 8043C/9064A |
| 09/18/2015 | ROMP 115 Corehole 2 | 1,085.6 | Steel | 690.5 | 3 | induction | 9511C |
| 09/18/2015 | ROMP 115 Corehole 2 | 1,986.8 | Steel | 690.5 | 3 | caliper | 9064A |
| 04/26/2016 | ROMP 115 U Fldn Aq Monitor | 376.4 | Steel | 122 | 12 | caliper | 9165C |
| 07/14/2016 | ROMP 115 U Fldn Aq Monitor | 378.4/377.2 | PVC | 118 | 12 | multifunction; caliper/ gamma-ray | 8044C/9165C |
| 07/14/2016 | ROMP 115 L Fldn Aq (Below MCU I) Monitor | 1,115.2/1,114 | PVC | 570 | 14 | multifunction; caliper/ gamma-ray | 8044C/9165C |

site. The well as-built diagrams are presented in appendix C and a summary of the well construction details is provided in table 2. Daily logs for core drilling and well construction operations are available from the District's online document storage database. Additional well construction details can be found in the District's EDP.

In March 2014, Accurate constructed the water supply well using 4-inch driven galvanized steel casing to 71 feet bls and an open hole to 90 feet bls. It was constructed prior to starting exploratory core drilling. This well also served as the Upper Floridan aquifer observation well for the Upper Floridan APT after it was deepened to 300 feet bls by district staff using the District-owned CME 75 core drilling rig. It was plugged in July 2016 after the site investigation was completed.

In August 2014, Earl's was contracted to install 10-inch steel surface casing to 70 feet bls in Corehole 2 to stabilize the unconsolidated sediments during exploratory core drilling. However, the casing was too crooked to lower the 4-inch HWT temporary steel casing inside. Earl's plugged the crooked 10-inch steel surface casing. In September 2014, Earl's set another 10-inch steel surface casing a few feet away from the original Corehole 2.

From May 2015 to March 2016, Earl's and Applied constructed the 14-inch L Fldn Aq (Below MCU I) Monitor and the 12-inch U Fldn Aq Monitor wells on the permanent easement. The L Fldn Aq (Below MCU I) Monitor well was used as an observation well during the Upper Floridan APT, and the U Fldn Aq Monitor well was used as a production well during the APT. In June and July of 2016, both wells were

**Table 2.** Summary of well construction details at the ROMP 115 – Royal well site in Sumter County, Florida

[SID, station identification; ft, feet; bls, below land surface; WCP#, well construction permit number; --, no data; NA, not applicable; ROMP, Regional Observation and Monitor-well Program; U Fldn Aq, Upper Floridan aquifer; L Fldn Aq (Below MCU I), Lower Floridan aquifer below middle confining unit I; well locations are shown in figure 2; well as-built diagrams are in Appendix B]

| SID | Station Name | Open Interval (ft bls) | Distance from APT production well (ft) | Constructed By | Start Date | Complete Date | Status | WCP#(s) |
|---|---|---|---|---|---|---|---|---|
| 861956 | ROMP 115 Drilling Water Supply | 71-300 | 148.1 | Earl's Well Drilling & Pump Service, Southwest Florida Water Management District | 2/1/2016 | 7/7/2016 | Plugged | 835116, 849110, 851185 |
| 948875 | ROMP 115 Corehole 1 | 0-76 | NA | Southwest Florida Water Management District | 8/11/2014 | 8/13/2014 | Plugged | -- |
| 840582 | ROMP 115 Corehole 2 | 690.5-1,997 | NA | Earl's Well Drilling & Pump Service, Southwest Florida Water Management District | 9/3/2014 | 7/13/2016 | Plugged | 837807, 838043, 838258, 838271, 838586, 838587, 838669, 839796, 842895, 846605, 851184 |
| 872383 | ROMP 115 U Fldn Aq Monitor | 122-370 | NA | Applied Drilling Engineering Inc | 11/2/2015 | 6/20/2016 | Active | 843534, 847114, 851255 |
| 872386 | ROMP 115 L Fldn Aq (Below MCU I) Monitor | 570-1,100 | NA | Applied Drilling Engineering Inc | 11/2/2015 | 7/11/2016 | Active | 843532, 847113, 851257 |

lined with 4.5-inch SDR 17 casing by District staff for long-term monitoring.

# Geology

The geology at the ROMP 115 well site is based on the lithologic samples that were collected from exploratory core drilling that was conducted from land surface to 1,997 feet bls. The geologic units encountered at the well site include, in ascending order: the Cedar Keys Formation, the Oldsmar Formation, the Avon Park Formation, the Ocala Limestone, and the undifferentiated sand and clay deposits. A stratigraphic column detailing the hydrogeology encountered at the well site is presented in figure 3. The lithologic log is presented in appendix D. Digital photographs of the lithologic core samples are presented in appendix E.

## Cedar Keys Formation

The late Paleocene age Cedar Keys Formation was encountered from 1,617 to 1,997 feet bls, the total depth of coring at the ROMP 115 well site. The contact between the Cedar Keys and Oldsmar Formations is disconformable and is identified where the lithology changes from a light gray to yellowish gray, calcareous dolostone of the Cedar Keys Formation, which has abundant pinpoint vugs and some fractures to the sucrosic, brown dolostone of the Oldsmar Formation. There is a lack of identifiable fossils such as the foraminifera *Borelis gunteri* that would help date the formation as late Paleocene. It is common for Borelis gunteri to be absent or unidentifiable in the upper portion of the formation because the dolomitization process can obliterate the fossils in the original limestone (Miller, 1986).

The Cedar Keys Formation at this site is composed predominantly of dolostone that is yellowish gray to light gray, with anhedral crystallinity, and accessory organic laminations, pyrite, and clay. The remainder of the Cedar Keys Formation is composed of limestone and bedded anhydrite. The limestone is mudstone and wackestone that is light gray to yellowish gray, well indurated, microcrystalline to very fine crystalline, mottled, with organic laminations and seams with minor pyrite crystals. Anhydrite was encountered from 1,940 to 1,950 feet bls and is white to moderate dark gray to light olive gray and crystalline with a few dark green gray clay seams and very low permeability. Other forms of evaporites were present to a depth of 1,989.5 feet bls. Observed porosity within the Cedar Keys Formation ranges from less than five percent to 30 percent. The sources of porosity include intercrystalline, intergranular, vugular, and fractures. The caliper log run in the core hole (Appendix B, fig. B1) shows enlarged sections of the borehole between approximately 1,720 and 1,750 feet bls and support the presence of the fractured and sucrosic dolostones observed. Fossils observed within the Cedar Keys Formation include mollusks, forams, and possible bryozoa, and echinoid

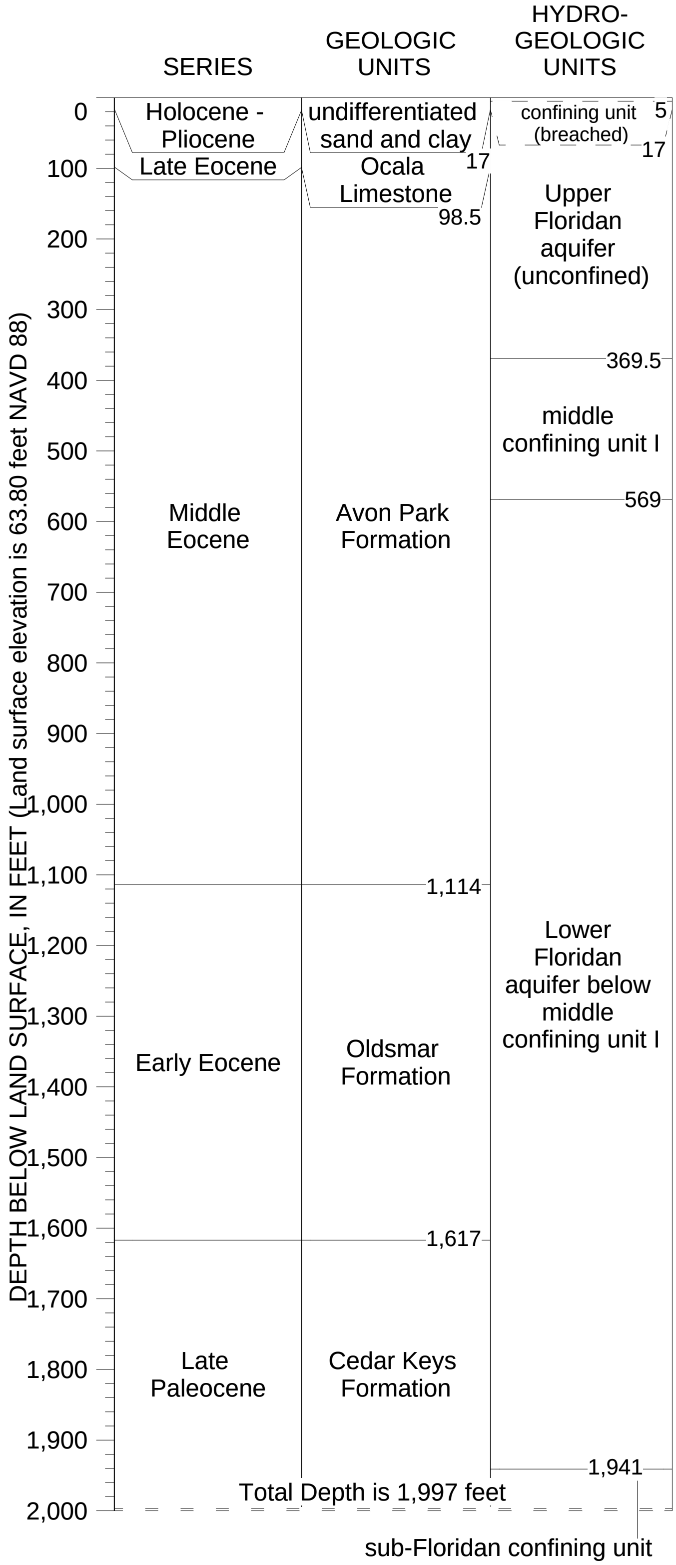



**Figure 3.** Stratigraphic column detailing the hydrogeologic setting at the ROMP 115 – Royal well site in Sumter County, Florida. The water table is at the shallowest occurrence of 12.61 feet bls recorded during coring and testing activities.

and mollusk molds. Pyrite, evaporites, and organics including laminae, seams, and lignite were also observed.

## Oldsmar Formation

The early Eocene age Oldsmar Formation was encountered from 1,114 to 1,617 feet bls (fig. 3). Fossils observed in the Oldsmar Formation include the foraminifera *Helicostegina gyralis*, echinoids, mollusks, bryozoa, miliolids, plant remains, and fossil molds. *Helicostegina gyralis* is not an index fossil of the Oldsmar Formation but it is characteristic (Miller, 1986). They are often observed in abundance near the contact with the Avon Park Formation, however, they were not observed in the field until about 1,301 feet bls. The Florida Geological Survey did observe *Helicostegina gyralis* at the top of the Oldsmar Formation (1,114 feet bls) during laboratory examination of the archived cores.

The lithology of the Oldsmar Formation consists of predominantly dolostone thinly to thickly interbedded with fossiliferous limestone. The dolostones are pale to moderate to dark yellowish brown to grayish orange, well indurated, and have anhedral to euhedral crystallinity. Accessory pyrite, calcite, glauconite, and white to clear quartz crystals, and organic laminations were also observed. The quartz crystals are often found in vugs that have a surface consistent with prior gypsum filling and subsequent dissolution. Observed porosity within the dolostones ranges from five to 30 percent. The sources of porosity include intercrystalline, fracture, moldic, vugular, intergranular, and pinpoint vugular.

The limestones range from very light orange to grayish orange wackestone to packstone with packstone being dominant. The limestones are dolomitic and well indurated. Accessory constituents include brown rhombic dolomite crystals, white to clear quartz crystals in vugs formerly filled with gypsum, organic laminations and specks, and sparry calcite. Observed porosity within the limestones ranges from five to 25 percent and the sources include intercrystalline, intergranular, moldic, pinpoint vugular, and vugular

The former gypsum-filled vugs that contain white to clear quartz crystals are present throughout the Oldsmar Formation. Some snowball quartz about one half to three quarters of an inch were observed in the reverse-air discharge and loose in core boxes. It is likely the snowball quartz was removed from the vugs during the coring and airlifting process.

The gamma-ray response shows an increase at approximately 1,200 feet bls within sucrosic dolostones where glauconite is apparent. At 1,280 feet bls, electric resistivity decreases in the fine grained, low permeability, dolomitic wackestone with organics and quartz filled vugs (appendix B, fig. B5 and appendix D). At 1,460 feet bls, electrical resistivity increases within good indurated packstone. There is a spike at 1,430 feet bls likely due to the presence of organics and clays (appendix B, fig. B6).

## Avon Park Formation

The middle Eocene age Avon Park Formation extends from 98.5 to 1,114 feet bls (fig. 3). The top of the Avon Park Formation is based on a gamma-ray peak and the appearance of organics from about 97 to 98.5 feet bls that is typical for the contact with the Ocala Limestone. A gamma-ray peak, attributable to the organics, and higher background counts (as compared to the Ocala Limestone) is characteristic of the top of the Avon Park Formation (Arthur and others, 2008; Tihansky and Knochenmus, 2001) (appendix B, fig. B3). Fossils identified within the Avon Park Formation include the index fossils *Neolaganum dalli* and *Cushmania americana*. Other fossils observed are miliolids, plant remnants, echinoid spines, and fossil molds of gastropods, pelecypods, and echinoids.

The Avon Park Formation is predominantly composed of dolostone with about five percent limestone. Accessory organics and clays combined make up approximately one percent of Avon Park lithology (appendix D).

The dolostones are grayish orange to yellowish gray and moderately to well indurated. Accessory minerals include pyrite, and clear and white quartz crystals were observed in vugs and molds. Some of the vugs and molds appeared to have contained gypsum that dissolved prior to secondary growth of quartz crystals. Observed porosity within the dolostones range from five to 30 percent and the sources include moldic, intercrystalline, vugular, intergranular, and fracture.

The limestones vary from wackestone to grainstone and are predominantly yellowish gray to very light orange, moderately to well indurated with skeletal, and crystal grain types, dolomitic, and weathered. Accessory minerals include calcite, pyrite, and dolomite. Lignite and organic flecks and laminations were also observed. Observed porosity within these limestones ranges from five to 30 percent and the sources include intergranular, moldic, intercrystalline, vugular, and pinpoint vugular.

Geophysical responses between 590 and 860 feet bls show consistently moderate to high electrical resistivity in the unconsolidated, sucrosic dolostones of the Upper Floridan aquifer (appendix B, fig. B2). At approximately 1,020 feet bls, there is a left kick on the resistivity plot, likely due to a cavity within the crumbly, low permeability dolostones encountered at that depth (appendix B, fig. B4). Electrical resistivity increases at approximately 1,100 feet bls (appendix B, fig. B5). There is a spike at approximately 1,140 feet bls within fossiliferous sucrosic dolostone with moderate to high permeability (appendix B, fig. B5).

## Ocala Limestone

At the ROMP 115 well site, the late Eocene age Ocala Limestone extends from 17 to 98.5 feet bls and is composed entirely of weathered limestone. The top of the Ocala Limestone is picked at the first occurrence of fossiliferous limestone. The Ocala Limestone varies from packstone to grainstone and is generally white to yellowish gray, and poorly to moderately indurated. Observed porosity ranges from 10 to 20 percent and the sources include intergranular and moldic. The fossils observed in the Ocala Limestone include mollusks, such as gastropods and pelecypods, and the benthic foraminifera *Lepidocyclina ocalana*, *Operculinoides sp.* and miliolids.

### Undifferentiated Sand and Clay

The undifferentiated sand and clay deposits extend from land surface to 17 feet at the ROMP 115 well site. These sediments are composed of quartz sand, clayey sand, clay, and accessory limestone (appendix D). Quartz sand extends from land surface to five feet bls and is grayish brown to grayish orange, sub-rounded to sub-angular with medium sphericity and accessory organics and phosphate. Observed porosity is approximately 20 percent and is intergranular. Clay extends from five to 11 feet bls and is yellowish gray to dark yellowish orange with 25 percent quartz sand and accessory limestone. Iron staining was observed on the quartz grains and clay.

From 11 to 16 feet bls, the lithology is very light orange to light yellowish orange sand with five percent clay. Light olive gray clay with 20 percent interbedded limestone extends from 16 to 17 feet bls.

## Hydrogeology

The ROMP 115 – Royal well site hydrogeology was delineated based on the results of nine slug tests collected during exploratory core drilling, an APT, lithologic descriptions, water levels, water quality data, and geophysical log data. The hydrogeologic units include, in descending order: a (breached) confining unit, the Upper Floridan aquifer, middle confining unit I, the Lower Floridan aquifer below middle confining unit I, and the sub-Floridan confining unit (fig. 3). The naming convention used for the hydrogeologic units in this report are consistent with aquifer nomenclature guidelines proposed by Laney and Davidson (1986) and the North American Stratigraphic Code (2005). A comparison of the nomenclature used in this report (District nomenclature that is not site-specific) and previously published reports is presented in appendix F.

As discussed in appendix A, the hydraulic conductivities derived from the slug tests may be underestimated because of unavoidable testing errors and limitations of the analyses (Butler, 1998). Consequently, the values should be used as an approximation of the relative differences between permeable and confining intervals. The slug test results are presented in table 3. A graph of the hydraulic conductivity estimates and isolated water level elevations with core hole depth is presented in figure 4. The slug test data acquisition sheets are presented in appendix G and the slug test curve-match analyses are given in appendix H.

The near daily water level data collected during the exploratory core drilling phase from the composite (non-isolated) core hole and the Upper Floridan aquifer (Drilling Water Supply) are presented in appendix I. Additionally, the core hole water level data measured within isolated test intervals provide a relative profile of water level change with depth within the Upper and Lower Floridan aquifers. The composite and test interval core hole water level data recorded during exploratory core drilling are presented in figure 4. The permanent monitor wells were outfitted with water level monitoring equipment and a hydrograph of water levels after exploratory core drilling is presented in figure 5.

A constant-rate APT was conducted in the Upper Floridan aquifer to estimate hydraulic parameters. Diagnostic radial flow plots and derivative analyses of the drawdown and recovery data were used to help characterize the Upper Floridan aquifer. In addition to the Upper Floridan APT, a Lower Floridan APT was planned. However, the ground surrounding the L Fldn Aq (Below MCU I) Monitor well began to slump approximately 25 hours into the drawdown phase of the Upper Floridan APT. The drawdown phase was terminated. The APT data collection sheets are presented in appendix J. The curve-match analyses are presented in appendix K.

### Surficial Aquifer

The surficial aquifer is absent at the ROMP 115 well site. The quartz sand from land surface to 5 feet bls within the undifferentiated sand and clay deposits was dry at the time of exploration and is presumed to be dry year-round. According to Arthur and others (2008), the well site is in a region where the surficial aquifer is not delineated due to thin basal confinement that is “breached by sinkholes or fractures and precludes characterization as a laterally extensive or functional surficial aquifer by lack of hydraulic continuity.”

Local drainage off the perpetual easement is essentially to the north to a small depression in the pasture on the temporary construction area, which is ultimately internally drained since recharge to the Upper Floridan aquifer is very high in this portion of the District. During some test pumping of the permanent wells prior to the APT, groundwater was discharged about 500 feet to the east of the well site and it was quickly absorbed (accompanied by rapid bubbling) into the ground. This report presents only the findings at the location of exploration where surficial sediments may be thin as compared to surrounding areas. No hydraulic tests were performed in this unit due to difficulty of testing unconsolidated sediments and no water quality samples were collected because the sediments were dry during exploratory core drilling. No permanent monitor well was constructed in the undifferentiated sand and clay sediments.

### Confining Unit (breached)

At the ROMP 115 well site, an apparent confining unit was delineated from five to 17 feet bls based on the lithologic character and observable porosity of the geologic materi-

**Table 3.** Results from the core hole slug tests performed during exploratory core drilling at the ROMP 115 – Royal well site in Sumter County, Florida

[No., number; MM/DD/YYYY, month/day/year; ft, feet; bls, below land surface; NAVD 88, North American Vertical Datum of 1988; gpm, gallons per minute; K, hydraulic conductivity; ft/d, feet per day; Fm, Formation; UFA, Upper Floridan aquifer; MCU I, middle confining unit I; LFA I, Lower Floridan aquifer below MCU I; KGS, Kansas Geological Survey; shaded records indicate slug tests of confining units; graphs of hydraulic conductivity and static groundwater level with depth are shown in figure 4, slug test curve-match analyses are in Appendix H]

| Slug Test No. | Date (MM/DD/YYYY) | Test Interval (ft bls) | Packer Test Water Level Elevation (ft NAVD 88) | Packer Test Discharge Rate [Q] (gpm) | Lithologic Description | Lithostratigraphic/ Hydrostratigraphic Unit | Slug Test Analytical solution | Slug Test Hydraulic Conductivity [K] (ft/d) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10/08/2014 | 186-237 | 48.71 | 30 | subhedral to occassionally anhedral dolostone, moderate to good induration, sucrosic, some fractures, moderate to high permeability | Avon Park Fm/UFA | Butler (1998) | 200 | |
| 2 | 10/23/2014 | 377-407 | 48.4 | 5 | subhedral to anhedral dolostone, moderate to good induration, low permeability | Avon Park Fm/ MCU I | KGS Model (1994) | 2 | |
| 3 | 01/26/2015 | 657-689 | 50.32 | 13 | anhedral dolostone, moderate to good induration, low to moderate permeability | Avon Park Fm/ LFA I | Butler (1998) | 110 | |
| 4 | 02/16/2015 | 947-987 | 50.85 | 15 | subhedral to anhedral dolostone, moderate to good induration, low to moderate permeability | Avon Park Fm/ LFA I | Butler (1998) | 98 | |
| 5 | 04/14/2015 | 1,236-1,287 | 50.45 | 14 | anhedral dolostone, good induration, many former gypsum filled vugs, now with quartz crystals inside, moderate permeability | Oldsmar Fm/LFA I | Butler (1998) | 140 | |
| 6 | 06/10/2015 | 1,557-1,597 | 50.35 | 12 | interbedded subhedral, well indurated, vuggy dolostone and dolomitic, well indurated, wackestone, low to occassionally high permeability | Oldsmar Fm/LFA I | Butler (1998) | 440 | |
| 7 | 06/23/2015 | 1,727-1,777 | 46.7 | 12.4 | subhedral to anhedral dolostone, moderate to good induration, sucrosic in part, few fractures lined with dolomite crystals, moderate permeability | Cedar Keys Fm/ LFA I | Butler (1998) | 140 | |
| 8 | 07/14/2015 | 1,877-1,887 | 46.56 | 13 | massive, fractured, anhedral dolostone, one foot cavity 1,885 to 1,886 ft bls, very high permeability | Cedar Keys Fm/ LFA I | Butler (1998) | 1,020 | One foot cavity in test interval resulted in high K value, not used for modeling |
| 9 | 09/28/2015 | 1,947-1,997 | 42.85 | 0.2 | bedded anhydrite with well indurated, anhedral dolostone with interstitial and nodular anhydrite, very low permeability | Cedar Keys Fm/ sub-Floridan confining unit | KGS Model (1994) | 0.03 | Solid slug-in initiation, falling-head |
| 10 | 03/18/2015 | 1,020-1,047 | 50.69 | 15 | anhedral dolostone, poor to good induration, fine grained dolomite crystal sand (1,026 to 1,029 ft bls), low to moderate permeability, some fractures | Avon Park Fm/ LFA I | Butler (1998) | 240 | Straddle packer used to conduct test after reaching total depth |

als. It is contained within the undifferentiated sand and clay deposits and consists of clayey sand and sandy clay with accessory limestone. The apparent low permeability of these sediments would suggest they restrict recharge to the Upper Floridan aquifer below. However, as referenced above, basal confinement of the surficial aquifer in this region is thin, discontinuous, and significantly breached by karst activity. This renders the confining unit hydraulically ineffective in this region with the underlying Upper Floridan aquifer essentially unconfined and represented by the water table (Basso, 2019). Although not confirmed here due to the dry surficial sands, in some places the breached confining unit might briefly delay recharge to the Upper Floridan aquifer during rainfall events, but typically realigns with the water table soon after.

Iron staining was noted on the lithologic log between five and 11 feet bls suggesting that the water table occurs in the upper portion of the confining unit frequently enough for redoximorphic features to develop. Additionally, the occurrence of these features within low permeability clayey sediments suggests oxygenated conditions (not saturated) that is induced or enhanced by clay breaching and further evidence for a lack of confinement (Basso, personal comm. 2020). Because of issues with setting the 10-inch casing described in the Well Construction section, water level data from the exploratory core hole were not recorded until the core hole was 86 feet deep and within the Upper Floridan aquifer. However, the near daily water levels recorded in the nearby Upper Floridan aquifer (Drilling Water Supply) well over the entire coring period (58 weeks) fluctuated between 13.42 and 17.94 feet bls, indicating that the water table was primarily above the top of limestone within the confining unit during that period. No hydraulic testing or water quality sampling were conducted in this unit during core drilling due to difficulty of testing unconsolidated sediments.

## Upper Floridan Aquifer

At the ROMP 115 well site, the Upper Floridan aquifer is one of two aquifers identified in the Floridan aquifer system during exploratory core drilling. As discussed in previous subsections, in general, a regionally extensive surficial aquifer is not present because the underlying clay confining unit is thin, discontinuous, and breached by karst features. As a result, long-term District monitor-well nests often show near to coincident water levels between the surficial sands and the Upper Floridan aquifer in this region. This broad region which generally spans the northern third of the District is thus described as a hydrogeologic province where the Upper Floridan aquifer is considered regionally unconfined and represented by the water table (Ron Basso, written commun., 2019).

Because it is unconfined, the top of the Upper Floridan aquifer as encountered at the well site outcrops at land surface, but is specifically coincident with the water table that can occur within the surficial sands, breached confining unit, or below the top of limestone (fig. 3). Notably, drilling fluid circulation was lost at 18 feet bls (one foot below the top of the Ocala Limestone), indicating the significant increase in permeability typically observed between the clayey sediments and the weathered limestone surface. The bottom of the Upper Floridan aquifer corresponds to the top of the low permeability middle confining unit I deeper in the Avon Park Formation.

As mentioned previously, water levels were not recorded in the core hole until it was 86 feet deep. From 86 feet bls to the base of the Upper Floridan aquifer at 369.5 feet, near daily water levels in the core hole ranged between 12.61 and 13.73 feet bls indicating the water table within the overlying confining unit. The water table in figure 3 is depicted at the shallowest occurrence recorded during coring and testing activities of 12.61 feet bls.

Although the Upper Floridan aquifer is a single aquifer, it can be subdivided based on local variations of hydraulic properties. Mappable intervals where permeability is not characteristic of the entire aquifer, whether substantially higher or lower, are referred to as zones (Laney and Davidson, 1986). Two zones often identified within the Upper Floridan aquifer but typically in the central and southern District are the Ocala low-permeability zone and the Avon Park high-permeability zone. Neither of these zones were detected at the ROMP 115 well site as expected since the well site is well beyond the known northern limits in northern Pasco County.

No slug tests were performed in the weathered Ocala Limestone of the Upper Floridan aquifer. One slug test was performed in the Avon Park Formation portion of the Upper Floridan aquifer. Slug test 1, with an interval of 186 to 237 feet bls, yielded a hydraulic conductivity estimate of 200 feet per day (ft/day) (table 3 and fig. 4).

A constant rate APT was conducted from April 18 to 19, 2016. Background water level data were collected before the drawdown phase (from March 31, 2016 to April 18, 2016) and after the recovery phase (from April 19 to April 25, 2016) to determine the regional water level trend. The U Fldn Aq Monitor well was pumped with an 8-inch turbine pump at an average rate of 2,300 gallons per minute (gpm) for approximately 24.6 hours (April 18, 2016 at 16:28 to April 19, 2016 at 17:04). The water was discharged approximately 1,300 feet east to Nichols Pond. The Drilling Water Supply well was used as an Upper Floridan aquifer observation well and was located approximately 170 feet northeast of the production well. An off-bottom packer was inflated in the core hole, which was used as a second observation well and located approximately 216 feet northeast of the production well (fig. 2). Prior to starting the drawdown phase on April 18, 2016, the static water level in the production well was 18.43 feet bls or 45.45 feet NAVD 88 placing it approximately at or just below the top of limestone. The maximum drawdown was 13.4 feet in the production well and approximately 0.1 feet in both the Drilling Water Supply well and the core hole. Around 17:03 on April 19, 2016, ground slumping was observed around the L Fldn Aq (Below MCU I) Monitor (non-pumped aquifer) and pumping was immediately ceased. A hydrograph of water levels before, during, and after the APT is presented in figure 6.

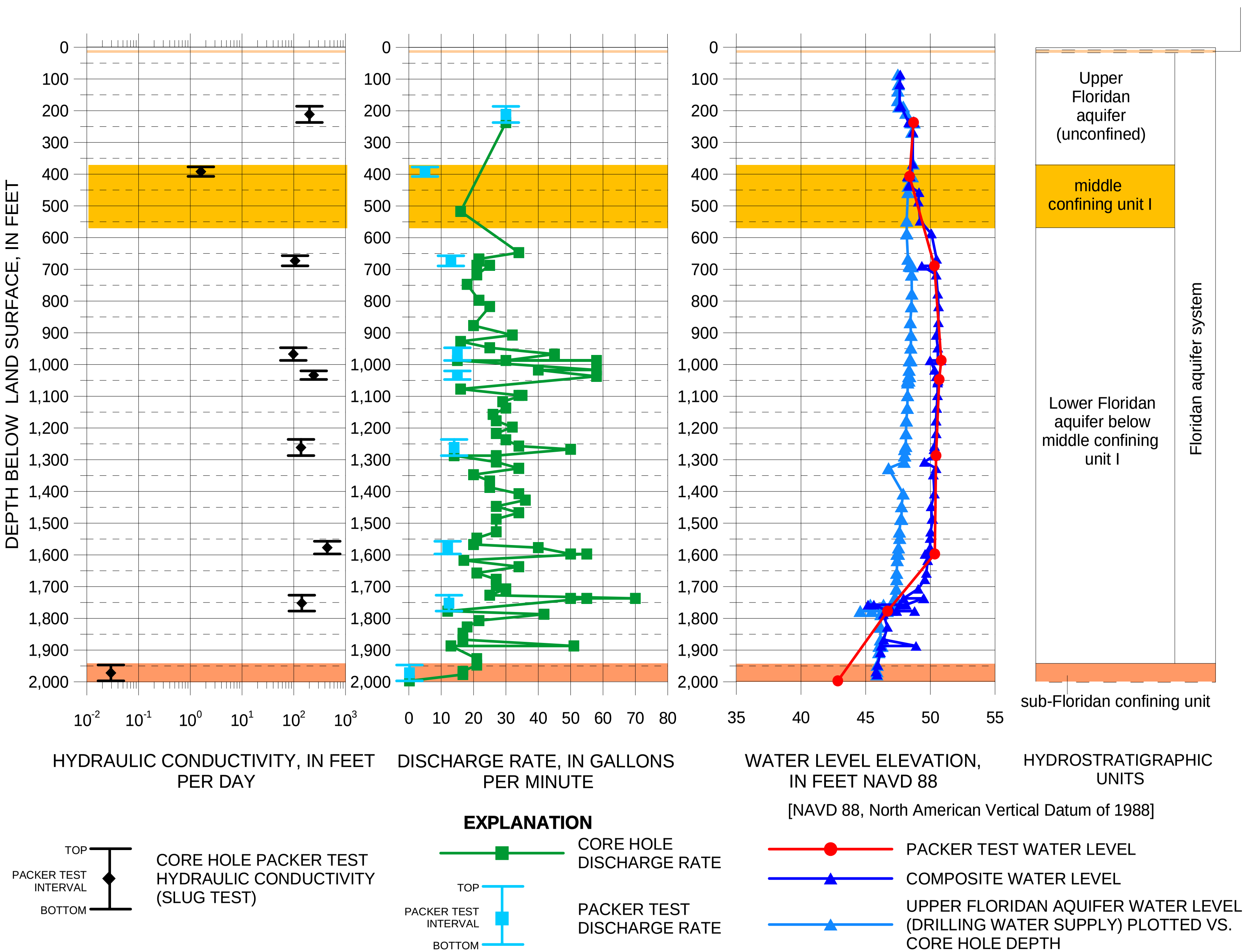
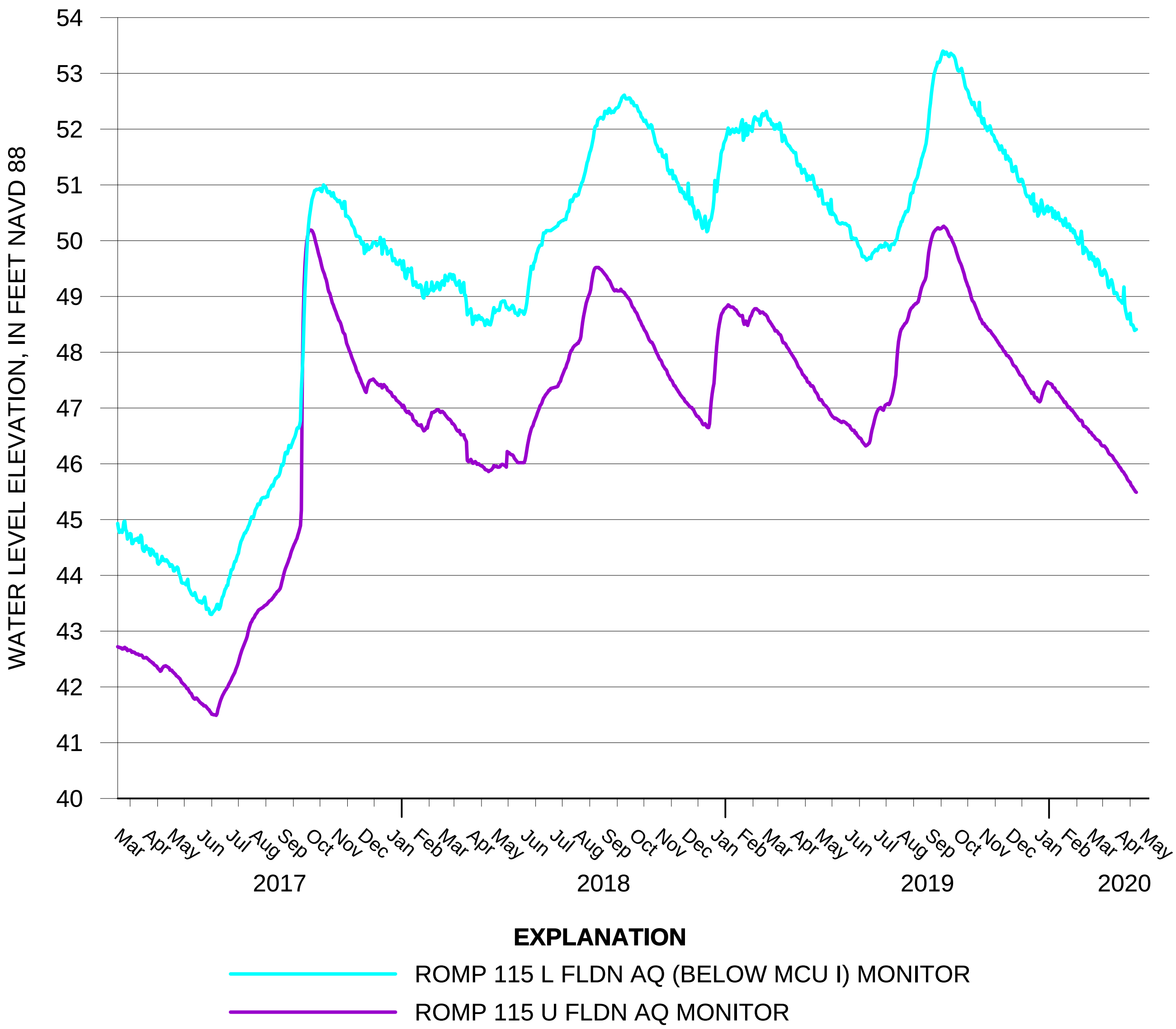


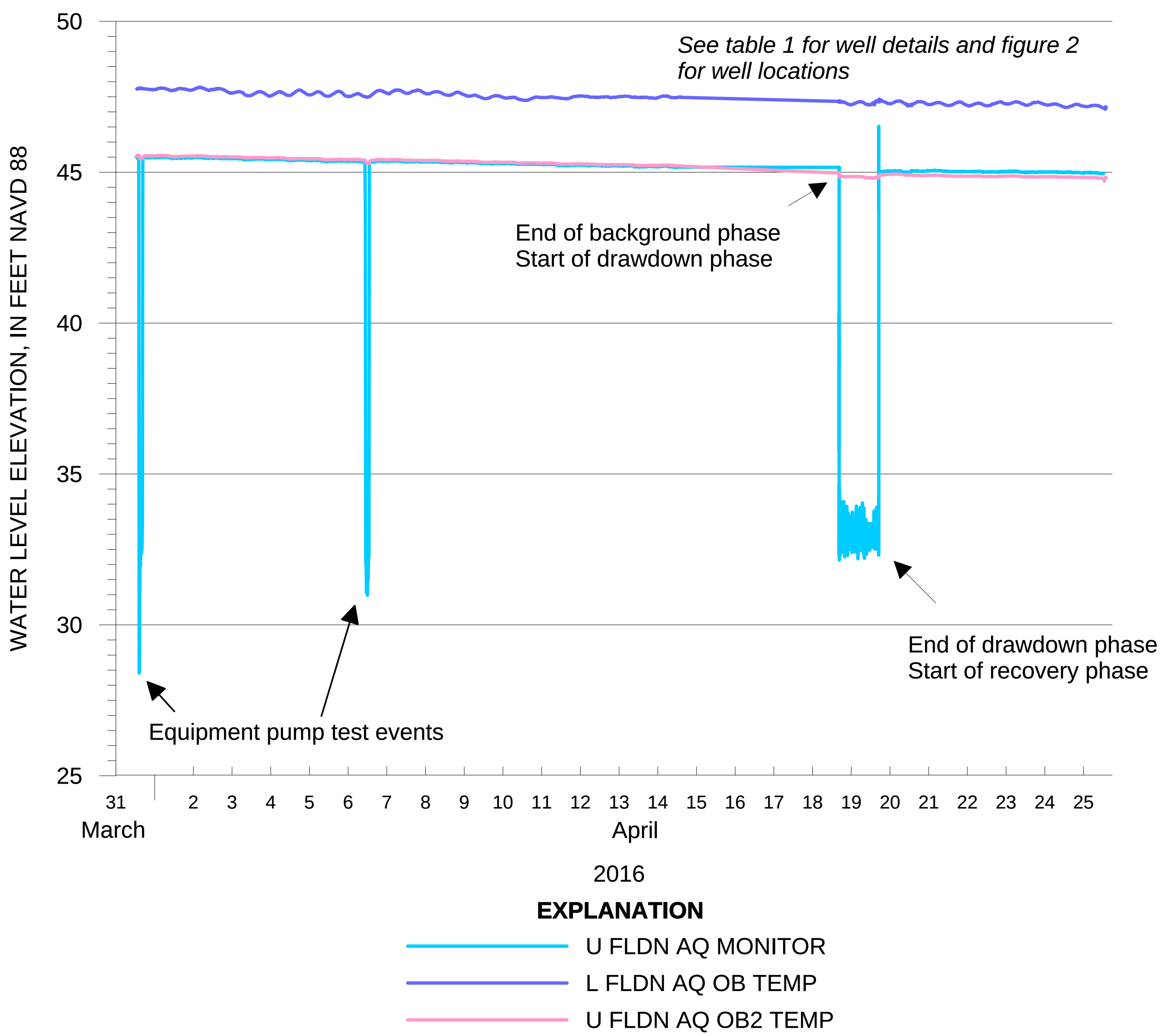

**Figure 4.** Horizontal hydraulic conductivity estimates and static water levels collected during core drilling at the ROMP 115 – Royal well site in Sumter County, Florida. Note, the airline is 20 feet shorter than the total depth of the core hole for each discharge measurement up to a maximum airline length of 400 feet.




[NAVD88, North American Vertical Datum of 1988; L, Lower; Fldn, Floridan; U, Upper; Aq, aquifer]

**Figure 5.** Hydrograph of the permanent monitor wells at the ROMP 115 – Royal well site in Sumter County, Florida.

Prior to the analysis, all observation well data were corrected for a declining regional water level trend (0.00002 ft/day) determined from linear extrapolation of background water level data collected before and after pumping. The recommended pumping duration for a leaky confined to unconfined aquifer is approximately 48 to 72 hours, respectively, to determine if late-time vertical leakage or delayed gravity drainage is present. However, the test was aborted after 25 hours because of the ground slumping that occurred around the L Fldn Aq (Below MCU I) Monitor well and pumping was immediately stopped. Despite the early shut down, curve-match analysis of drawdown data in both observation wells prior to the slumping event is valid and yield an estimated transmissivity value of 2,400,000 $ft^2$/day, a storativity of 0.001, and a specific yield of 0.01 $day^{-1}$ using the Neuman (1974) unconfined solution (appendix K, figs. K1 and K2 and table 4). The observation wells were also analyzed together using the Cooper-Jacob (1946) solution for unconfined aquifers applied prior to onset of limestone dewatering effects and match results of the Neuman solution for transmissivity and storativity (appendix K, fig. K3). Recovery data from both observation wells were analyzed together using the Theis (1935) residual drawdown/recovery method and match results of the other analyses for transmissivity (appendix K, fig K4). Despite the shortened duration of the Upper Floridan APT, diagnostics reveal an unconfined aquifer signature as the regional setting suggests. Consideration of the lithology in conjunction with the relative water table position during pumping supports that the temporary leakage observed during




[NAVD 88, North American Vertical Datum of 1988; U, Upper; FLDN, Floridan; AQ, aquifer; L, Lower; TEMP, Temporary]

**Figure 6.** Hydrograph of the wells monitored before, during, and after the APT conducted in the Avon Park Formation portion of the Upper Floridan aquifer at the ROMP 115 – Royal well site in Sumter County, Florida.

mid-time of the APT analysis is delayed gravity yield from dewatering limestone.

## Middle Confining Unit I

At the ROMP 115 well site, the middle confining unit I of Miller (1986) extends from 369.5 to 569 feet bls within dense, low permeability dolostones of the Avon Park Formation. This concurs reasonably well with contour maps of Miller (1986) suggesting the top of the unit occurs between 264 and 364 feet bls and is roughly between 100 and 200 feet thick in the vicinity of the well site. The confining unit was delineated based on core hole lithology, decreased discharge rates and hydraulic conductivity from discrete hydraulic testing of the core hole, and where the depth profile of core hole static water levels deviates from the concurrent static water levels in the Drilling Water Supply Well, which is open to the Upper Floridan aquifer (fig. 4). Slug test 2 was conducted in the middle confining unit I from 377 to 407 feet bls and yielded a hydraulic conductivity estimate of 2 ft/day (table 3 and fig. 4).

**Table 4.** Results from the aquifer performance test conducted at the ROMP 115 – Royal well site in Sumter County, Florida

[ft, feet; gpm, gallons per minute; ft2/d, square feet per day; day-1, feet per day per foot; construction details of analyzed wells are found in table 2; well locations are shown in figure 2; APT curve-match analyses are in Appendix K]

| Hydro-stratigraphic Unit Tested | Unit Thickness (b) (ft) | Average Pump Rate (gpm) | Test Duration (hours) | Distance to production well (feet) | Test Phase | Analytical Solution | Transmissivity (ft²/d) | Storativity (dimensionless | Specific Yield (dimensionless) |
|---|---|---|---|---|---|---|---|---|---|
| Upper Floridan aquifer | 353 | 2,300 | 24.4 | Water Supply (170), Corehole 2 (216) | Drawdown/ Recovery | Neuman (1974) (Appendix K, Figures K1 and K2) | 2,400,000 | 0.0006 | 0.005 |
| | | | | | Drawdown | Cooper-Jacob (1946) (Appendix K, Figure K3) | 2,400,000 | 0.0006 | |
| | | | | | Recovery | Theis (1935) residual drawdown/recovery (Appendix K, Figure K4) | 2,400,000 | | |

## Lower Floridan Aquifer Below Middle Confining Unit I

At the ROMP 115 well site, the Lower Floridan aquifer below middle confining unit I, herein referred to as Lower Floridan aquifer I, extends from 569 to 1,941 feet bls. The Lower Floridan aquifer I is contained within the Avon Park Formation from 569 to 1,114 feet bls, the entire Oldsmar Formation, and the Cedar Keys Formation to 1,941 feet bls. The top of the unit was delineated below middle confining unit I where the porosity and permeability of the Avon Park dolostones begin to increase with more vugs and fractures. The top of the unit also coincides with a water level change and increased drilling discharge rates. The bottom of the unit is identified at the top of persistent, low porosity bedded evaporites and evaporitic dolostones of the sub-Floridan confining unit.

A hydrograph of the permanent monitor wells since 2017 (fig. 5) demonstrates the Lower Floridan aquifer I is clearly a separate aquifer from the Upper Floridan aquifer with the head in the Lower Floridan aquifer I during this period approximately two to three feet higher than the Upper Floridan aquifer. Also, the Lower Floridan aquifer I water level data alone shows minor fluctuations because of non-corrected daily barometric effects of a confined aquifer. This barometric effect is not apparent in the Upper Floridan aquifer water level data which is more characteristic of unconfined to semi-confined aquifers (fig. 5). The Upper Floridan aquifer and Lower Floridan aquifer I groundwater levels responded to rainfall events, most notably after the passing of Hurricane Irma over the site on September 10, 2017, which dropped approximately 5.5 inches of rain as recorded at the rain station at the ROMP 112 – Rutland monitor well site located seven miles southeast. The storm caused the groundwater levels in the Upper Floridan aquifer and Lower Floridan aquifer I monitors to rise abruptly, narrowing to within roughly a foot of head difference at the maximum before returning to a similar head difference as before the event (fig. 5).

Six slug tests were performed in the Lower Floridan aquifer I (table 3 and fig. 4). Hydraulic conductivity estimates for slug tests 3 through 7 and slug test 10 ranged between 98 (slug test 4) and 440 ft/day (slug test 6). The results from slug test 8 is considered an outlier due to an anomalously high K value mostly governed by a one-foot cavity within the 10-foot test interval.

## Sub-Floridan confining unit

At the ROMP 115 well site, the top of the sub-Floridan confining unit of the Floridan aquifer system was encountered at 1,941 feet bls and continues beyond the total depth of exploration at 1,997 feet bls. Contour maps from Miller (1986) estimate the base of the Floridan aquifer system between approximately 1,964 and 2,064 feet bls at this location. The unit was identified at the top of crystalline anhydrite beds with well indurated, mottled dolostone. One slug test was performed from 1,947 to 1,997 feet bls with a hydraulic conductivity estimate of 0.03 ft/day.

## Groundwater Quality

The ROMP 115 – Royal well site groundwater quality characterization is based on results from eleven groundwater samples. Ten samples were collected from the Corehole 2 with a wireline bailer and a nested bailer during packer testing from 186 to 1,997 feet bls. No sampling was conducted above 186 feet because the sediments were too weathered. One groundwater sample was collected from the U Fldn Aq Monitor well after the Upper Floridan APT was conducted. Also, four discharge field measurements were collected during the Upper Floridan APT to monitor the discharge and were collected after approximately seven, 12, and 26 hours of pumping. The water quality data collection field sheets are presented in appendix L. Field measurements, laboratory analyses, equivalent weights and water types, molar ratios, and APT field measurements for the samples are presented in appendix M1, M2, M3, M4, and M5, respectively. The U.S. Environmental Protection Agency's National Secondary Drinking Water Regulations (secondary standards) for total dissolved solids (TDS), sulfate, chloride, and iron are 500 milligrams per liter (mg/L), 250 mg/L, 250 mg/L, and 0.3 mg/L, respectively (Hem, 1985; U.S. Environmental Protection Agency, 2012).

The results of the water quality sample collected from 186 to 237 feet bls indicate the groundwater in the Upper Floridan aquifer is fresh (TDS concentration is 285 mg/L) and potable because the constituents tested did not exceed secondary standards (fig. 7 and appendix M2).

Water quality sample 2 was collected within the middle confining unit I from 377 to 407 feet bls. The results indicate the groundwater is fresh but not potable. The TDS concentration is 299 mg/L. The iron concentration is 0.615 mg/L, which exceeded secondary standards. The increase in iron concentration is likely the result of the dissolution of iron-sulfide minerals and organic material present in the Avon Park Formation.

The results of water quality sample 3 collected within the Lower Floridan aquifer below I from 657 to 689 feet bls indicate the groundwater is fresh (TDS concentration is 352 mg/L) and potable because the constituents tested did not exceed secondary standards (fig. 7 and appendix M2).

The results of water quality sample 4 collected within the Lower Floridan aquifer below I from 947 to 987 feet bls indicate the groundwater is fresh but not potable in the Lower Floridan aquifer I until about 1,020 feet bls (fig. 7 and appendix M2). The TDS concentration is 452 mg/L but the iron concentration is 0.46, exceeding secondary standards.

The results of water quality sample 10 collected within the Lower Floridan aquifer below I from 1,020 to 1,047 feet bls indicate the groundwater is fresh (TDS concentration is 461 mg/L) and potable because the constituents tested did not exceed secondary standards (fig. 7 and appendix M2). This sample was collected at the end of data collection using a straddle packer to separate the test interval.

The results of water quality samples 5 and 6 indicate the groundwater is fresh but not potable in the Lower Floridan aquifer I until about 1,700 feet bls (fig. 7 and appendix M2). The TDS ranges from 459 to 481 mg/L but the iron concentration ranges between 0.387 to 0.51 mg/L, exceeding secondary standards.

The results of water quality samples 7, 8, and 9 indicate the water is neither fresh nor potable in the Lower Floridan aquifer I below about 1,700 feet and the sub-Floridan confining unit. The TDS ranges from 1,670 to 2,160 mg/L and sulfate concentration ranges from 984 to 1,300 mg/L (fig. 7 and appendix M2).

Generally, the water quality sample with the lowest ion concentrations and specific conductance is from groundwater within the Avon Park Formation. The water quality sample collected from the sub-Floridan confining unit within the Cedar Keys Formation has the highest ion concentrations and specific conductance.

Equivalent weights and water types were determined for each groundwater quality sample and are presented in appendix M3. The results of water quality sample 1 indicate the water type is calcium bicarbonate in the Upper Floridan aquifer (appendix M3). Water quality samples 2 and 3 results indicate the water type is calcium mixed-anion in the middle confining unit I and the Lower Floridan aquifer I. The results of all 10 water quality samples indicate sulfate is the most abundant anion except in water quality samples 1 and 3 where bicarbonate is the most abundant anion. An increase in sulfate concentration in water quality samples 2 and 3 result in the mixed-anion water type. Water quality samples 4 through 10 indicate the water type is calcium sulfate for the remainder of the Lower Floridan aquifer I and the sub-Floridan confining unit, which is likely caused by former gypsum filled vugs encountered in the Oldsmar Formation and anydrite encountered at 1,940 feet bls in the Cedar Keys Formation.

The trends of the relative abundances of each major cation and anion species analyzed for in the groundwater quality samples collected at the ROMP 115 well site are presented on a Piper (1944) diagram in figure 8 as percent milliequivalents. The groundwater samples collected from the Upper Floridan aquifer, middle confining unit I, and Lower Floridan aquifer I (samples 1 through 6 and 10) with increasing calcium-sulfate enrichment plot midway along the freshwater/deepwater mixing trend described by Tihansky (2005). The remaining Lower Floridan aquifer I and the sub-Floridan confining unit samples (samples 7 through 10) have higher calcium-sulfate enrichment and plot at the end of the freshwater/deepwater mixing trend, which indicates that enrichment is complete for these samples (Tihansky, 2005).

Select molar ratios were calculated to investigate groundwater quality changes with depth (fig. 9 and appendix M4). The gypsum track illustrates the interaction between fresh

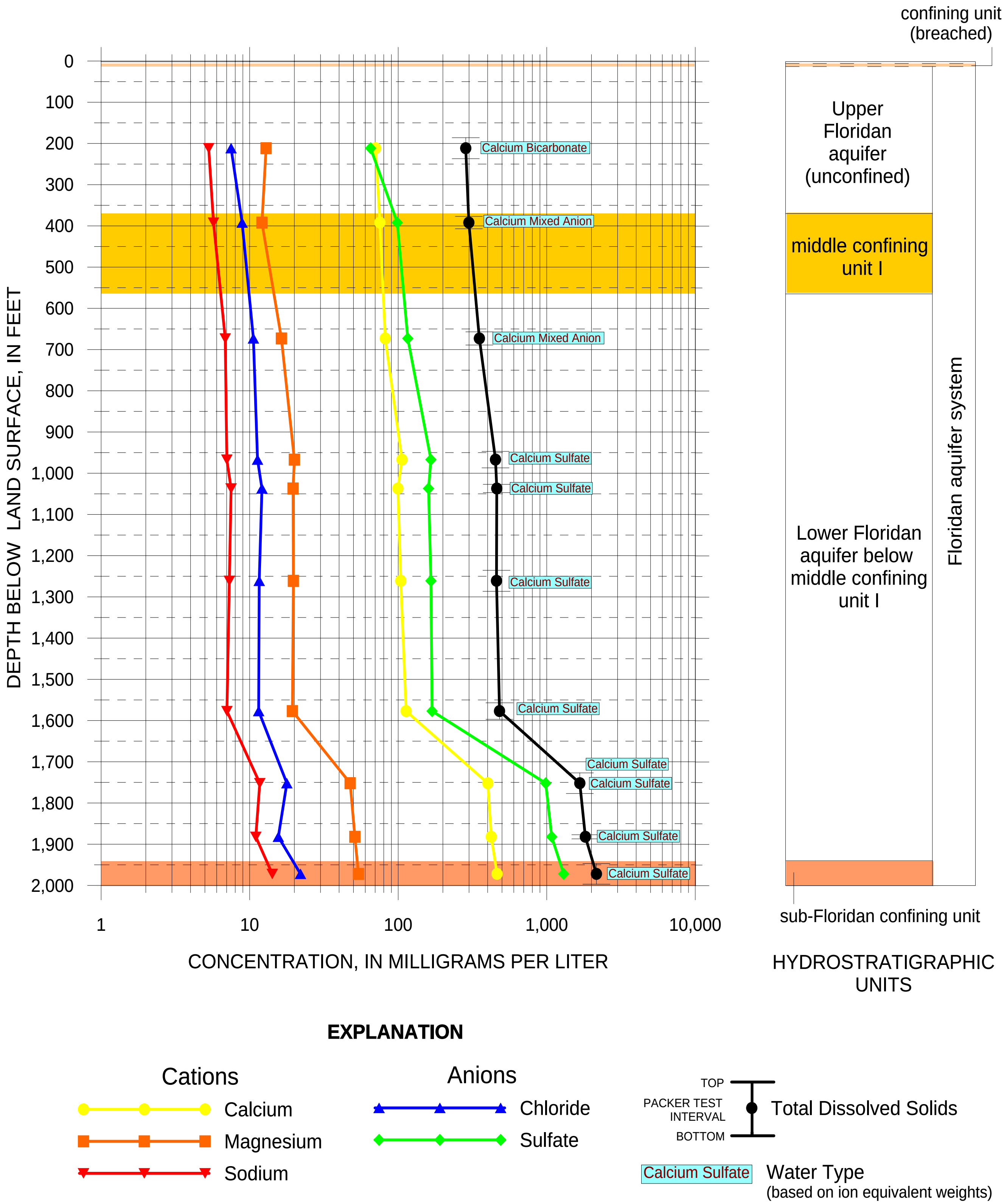



**Figure 7.** Select cations, anions, and total dissolved solids concentrations for groundwater quality samples collected at the ROMP 115 – Royal well site in Sumter County, Florida. Depth represents the middle of the discrete open interval at the time of sampling.

water and evaporites (gypsum and anhydrite). The dolomite track primarily identifies fresh water affected by dolomite. The sodium chloride track depicts effects from connate or seawater. The chloride to sulfate molar ratio on the gypsum track decreases in the interval from 1,727 to 1,777 feet bls because the sulfate concentration increases (fig. 9 and appendix M2 and M4). The calcium to bicarbonate and the sulfate to bicarbonate molar ratios increase in the Lower Floridan aquifer I and indicates evaporites are affecting the groundwater. The calcium to magnesium molar ratio on the dolomite track increases in the lower 400-foot portion of the Lower Floridan aquifer I within the Cedar Keys Formation where there is increased calcium concentration likely from the dissolution of gypsum and anhydrite. It is apparent there is no influence from connate or seawater on the groundwater at the well site because the sodium chloride track does not vary.

During the APT, field measurements of specific conductivity, pH, and temperature of the discharge was monitored (appendix M5). The purpose was to ensure the water quality of Nichols pond was not appreciably altered by the discharge and was one of the best management practices utilized for the Florida Department of Environmental Protection Agency's Generic Permit For Discharge Of Ground Water From Dewatering Operations permit (62-621.300(2)(a) Florida Administrative Code). One water quality sample was collected from the cooling water diversion for the right-angle drive powering the turbine pump in the production well the day after pumping was terminated. Laboratory results of this sample are included in appendix M2. Although the cooling water for the right-angle drive is not ideal for water quality sampling, the emergency shut down made it necessary to collect the sample in this manner. The results of the U Fldn Aq Monitor well groundwater sample (sample 11, between 120 and 370 feet bls) correlate to sample 1, which was also collected from the Upper Floridan aquifer during exploratory core drilling.

# Summary

The ROMP 115 – Royal well site, located in north-central Sumter County, was developed in three phases from August 2014 to April 2016. The phases included exploratory core drilling, well construction, and aquifer performance testing. The well site was selected to support the Northern District Water Resources Assessment Project, the Northern Sumter County Data Collection Project, and to fill in a gap in the ROMP 10-mile grid network. Geohydrologic data including core samples, geophysical logging, slug testing, aquifer performance testing, and groundwater quality sampling were collected at the site during the three phases. The two permanent wells constructed are the U Fldn Aq Monitor and the L Fldn Aq (Below MCU I) Monitor.

The geologic units encountered at the well site include, in ascending order, the Cedar Keys Formation, Oldsmar Formation, Avon Park Formation, Ocala Limestone, and undifferentiated sand and clay deposits. The Cedar Keys Formation extends from 1,617 to beyond the total depth of exploration of 1,997 feet bls and is predominantly light gray to olive gray to yellowish brown dolostone, light gray to yellowish gray mudstone and wackestone, and bedded anhydrite. The Oldsmar Formation extends from 1,114 to 1,617 feet bls and is predominantly interbedded very light orange to yellowish gray wackestone to packstone and dark yellowish brown to grayish dolostone with some quartz-filled vugs and organic laminations. The Avon Park Formation extends from 98.5 to 1,114 feet bls and is predominantly grayish orange to very light orange to yellowish gray dolostone with quartz-filled vugs and accessory organics and yellowish gray to very light orange wacketsone to grainstone with accessory calcite, pyrite, and lignite. The Ocala Limestone  from 17 to 98.5 feet bls and is white to yellowish gray weathered packstone and grainstone with substantial organics from 97 to 98.5 feet bls. The undifferentiated sand and clay deposits extend from land surface to 17 feet bls and are predominantly quartz sand, clayey sand, and clay with accessory plant remains, phosphate, and limestone.

The hydrogeologic units encountered at the well site include, in descending order, dry surface sediments, a breached confining unit, the unconfined Upper Floridan aquifer, middle confining unit I, the Lower Floridan aquifer I, and the sub-Floridan confining unit. The surface sediments extend from land surface to five feet bls. The breached confining unit extends from five to 17 feet bls.

The Upper Floridan aquifer extends from 17 to 369.5 feet bls. One slug test was performed with an interval from 186 to 237 feet bls that yielded a horizontal hydraulic conductivity estimate of 200 ft/day. A constant-rate APT within the Avon Park Formation portion of the Upper Floridan aquifer was conducted from April 18 to 19, 2016. The APT response curves indicate an unconfined aquifer with delayed gravity yield from dewatering limestone. Curve match analysis yielded a transmissivity estimate of 2,400,000 ft$^2$/day, a storativity of 0.001, and a specific yield of 0.01 day$^{-1}$.

Middle confining unit I extends from 369.5 to 569 feet bls. One slug test was performed with an interval from 377 to 407 feet bls that yielded a horizontal hydraulic conductivity estimate of 2 ft/day.

The Lower Floridan aquifer I extends from 569 to 1,941 feet bls. Six slug tests were performed in this aquifer with horizontal hydraulic conductivity estimates ranging from 98 (slug test 4) to 440 ft/day (slug test 6). The results of slug test 8 were not included in this report because a one-foot cavity from 1,877 to 1,887 feet bls within the 10-foot interval contributed to erroneously high hydraulic conductivity value. No APT was conducted in the Lower Floridan aquifer I due to the ground slumping around the L Fldn Aq Monitor well during the Upper Floridan APT.

The sub-Floridan confining unit extends from 1,941 to beyond the total depth of exploration at 1,997 feet bls. One slug test was performed with an interval from 1,947 to 1,997

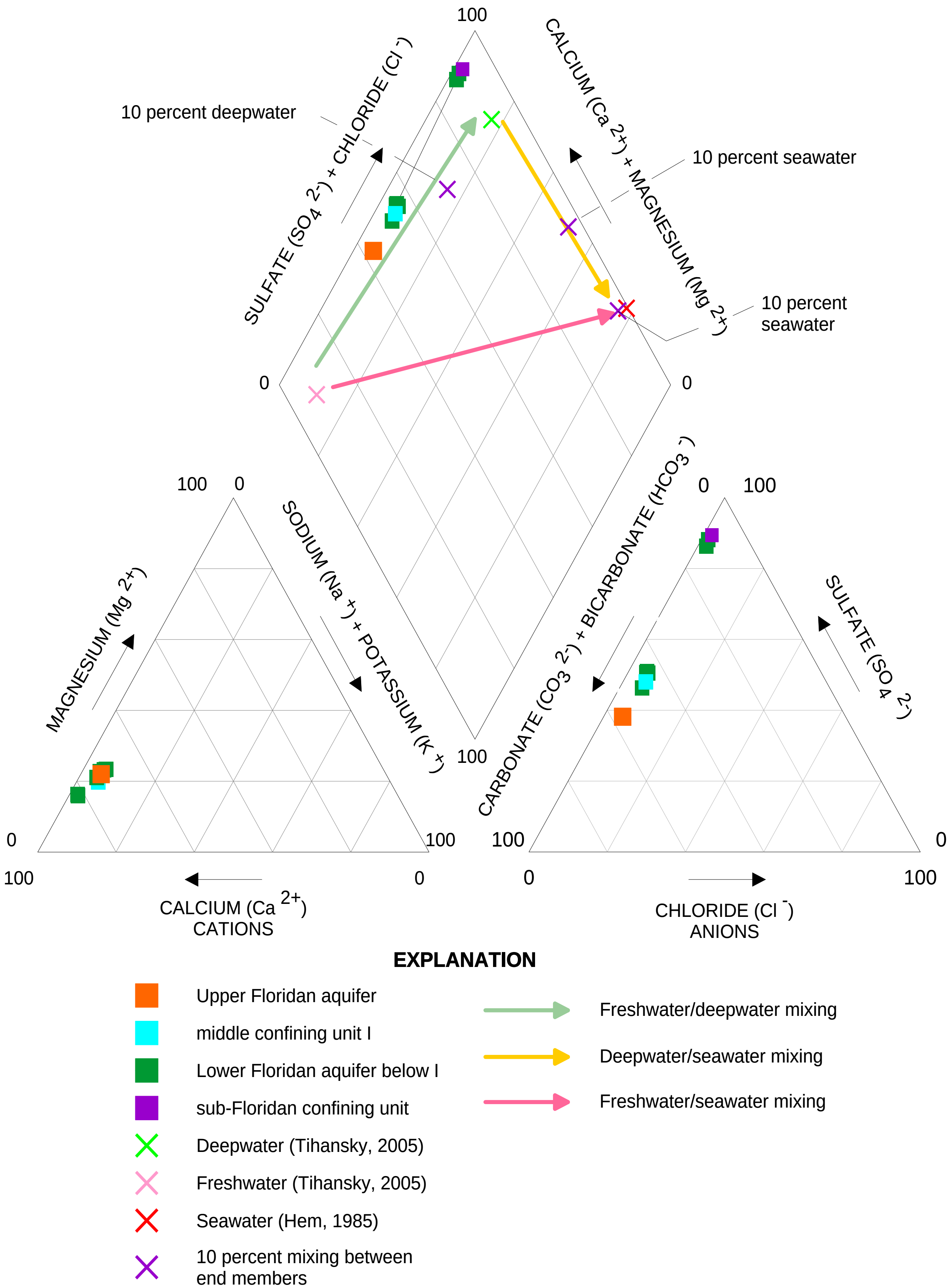



**Figure 8.** Piper Diagram of groundwater quality samples collected at the ROMP 115 – Royal well site in Sumter County, Florida.

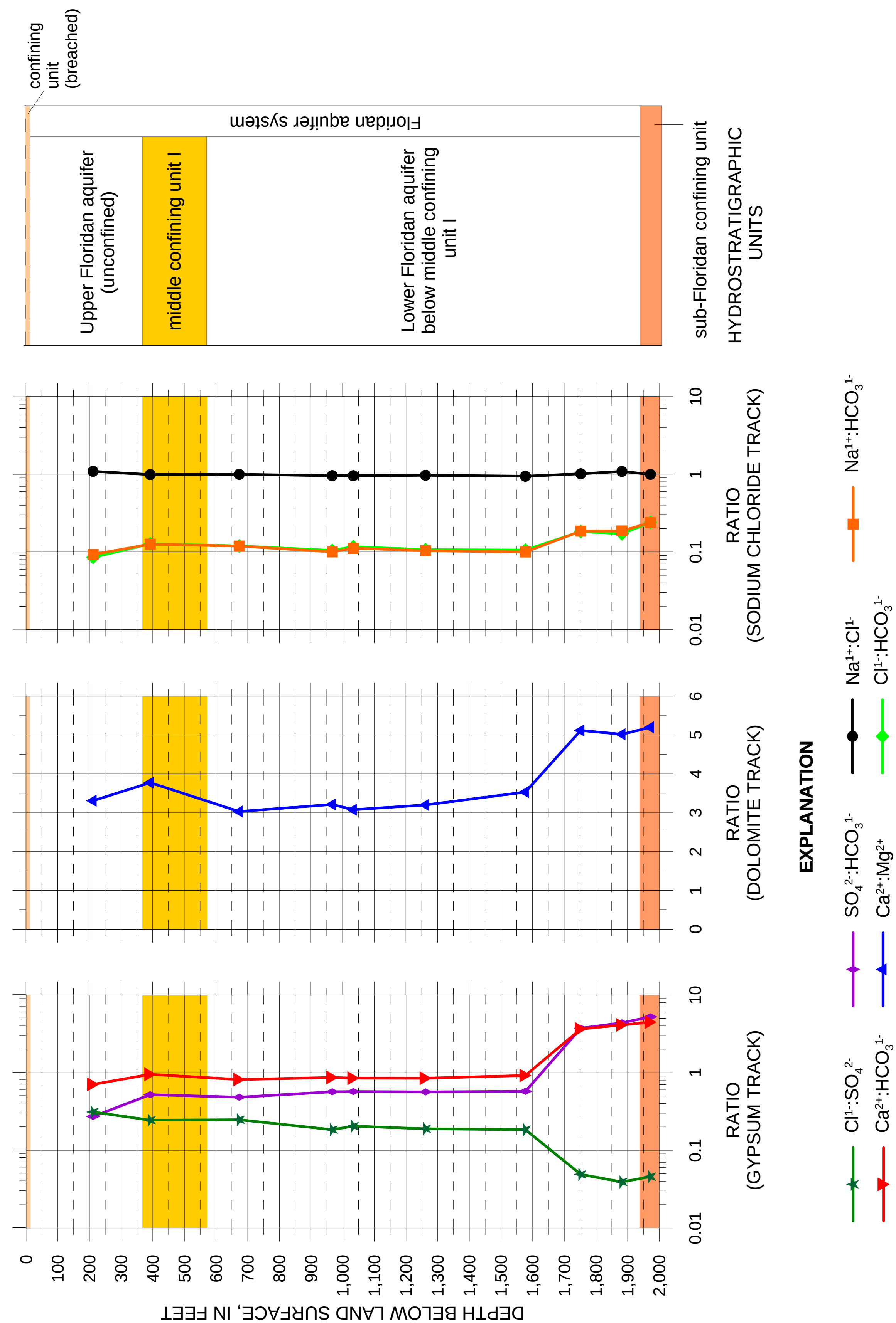



**Figure 9.** Select molar ratios with depth for groundwater quality samples collected at the ROMP 115 – Royal well site in Sumter County, Florida. Depth represents the middle of the discrete open interval at the time of sampling.

feet bls that yielded a horizontal hydraulic conductivity estimate of 0.03 ft/day.

Eleven groundwater quality samples were collected and analyzed for at the ROMP 115 well site. The groundwater quality sample results indicate that the Upper Floridan aquifer is fresh because the TDS concentration is less than 500 mg/L and potable because the concentrations of the constituents tested did not exceed the U.S. Environmental Protection Agency's secondary standards. The groundwater quality sample results indicate the groundwater within middle confining unit I is fresh because the TDS concentration is less than 500 mg/L but not potable because the iron concentration is 0.615 mg/L. The groundwater quality sample results indicate that the Lower Floridan aquifer I is fresh and potable to about 689 feet bls and between 1,020 and 1,047 feet bls (water quality sample 10, collected with the straddle packer) because the TDS concentration is less than 500 mg/L and the concentrations of the constituents tested did not exceed secondary standards. The groundwater quality sample results indicate that the Lower Floridan aquifer I is fresh between 947 and 987 feet bls and 1,557 to 1,597 feet bls because the TDS concentration is less than 500 mg/L but not potable because the iron concentration exceeds secondary standards. From a depth of 1,727 to the total depth of exploration at 1,997 feet bls, the Lower Floridan aquifer I and sub-Floridan confining unit is neither fresh nor potable because the TDS concentration exceeds 500 mg/L and the sulfate and iron concentrations exceed secondary standards. The water type is calcium bicarbonate within the Upper Floridan aquifer. The water type is calcium mixed-anion in the middle confining unit I and the Lower Floridan aquifer I until approximately 689 feet bls. The water type is calcium sulfate within remainder of the Lower Floridan aquifer I and the sub-Floridan confining unit. On a Piper diagram, the Upper Floridan aquifer, middle confining unit, and Lower Floridan aquifer I (to a depth of 1,597 feet bls) results plot midway along the freshwater/deepwater mixing trend of the quadrilateral. The Lower Floridan aquifer I beginning about 1,727 feet bls and the sub-Floridan confining unit results plot at the end of the freshwater/deepwater mixing trend of the quadrilateral. The calcium to magnesium molar ratio on the dolomite track increases in the lower 400-foot portion of the Lower Floridan aquifer I and into the sub-Floridan confining unit, which is likely because of increased calcium concentration from the dissolution of gypsum and anhydrite. There is no apparent influence from connate or seawater on the groundwater at the well site because the sodium to chloride ratio does not vary on the sodium chloride track.

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# Appendix A. Methods of the Geohydrologic Data Section

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 will be 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 will be conducted on the core hole providing additional hydrogeologic data. After well construction, an aquifer performance test (APT) will be conducted on each of the major freshwater aquifers or producing zones encountered at the project site. These data will be 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 an 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 HQ, HW, NW, and PW gauge working casings along with NQ or NRQ core drilling rods, associated bits, and reaming shells from Boart Longyear®. The HQ, HW, NW, and PW 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 HQ, HW, NW, and PW working casings and NQ and NRQ 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 hydrogeologists.

Recovery of the core samples is accomplished using a wireline recovery system (fig. A1). The District's drilling crew uses the Boart Longyear® NQ wireline inner barrel assembly. This system allows a 1.87-inch by 5 or 10-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 marked, and recovery estimates 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 will be archived at the Florida Geological Survey in Tallahassee, Florida.

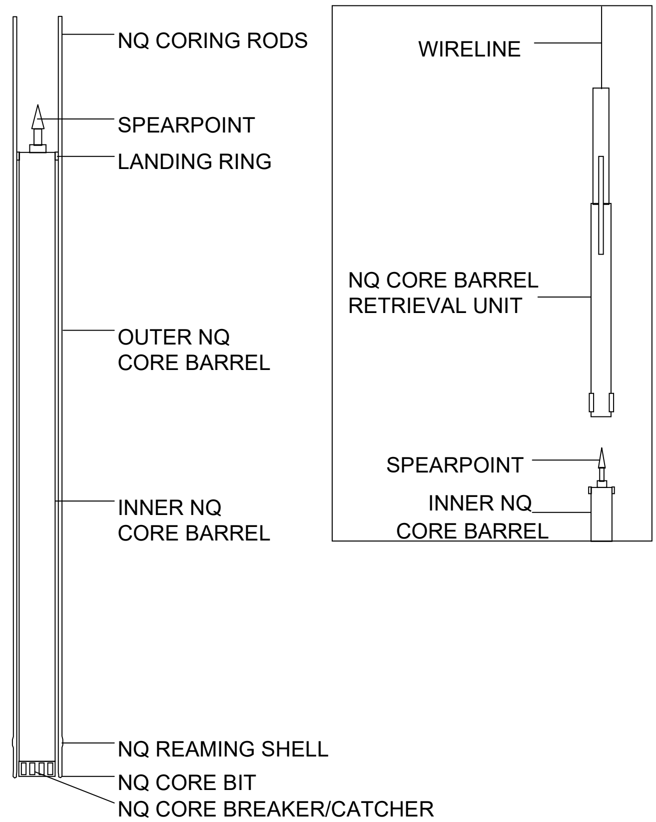



**Figure A1.** Boart Longyear® NQ Wireline Coring Apparatus.

### Unconsolidated Coring

Various methods exist for obtaining unconsolidated material core samples, 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 HQ, HW, NW, and PW working casings as well as permanent cas ings to stabilize the core hole. NQ and NRQ 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) pumping discharge method (fig. A2) 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

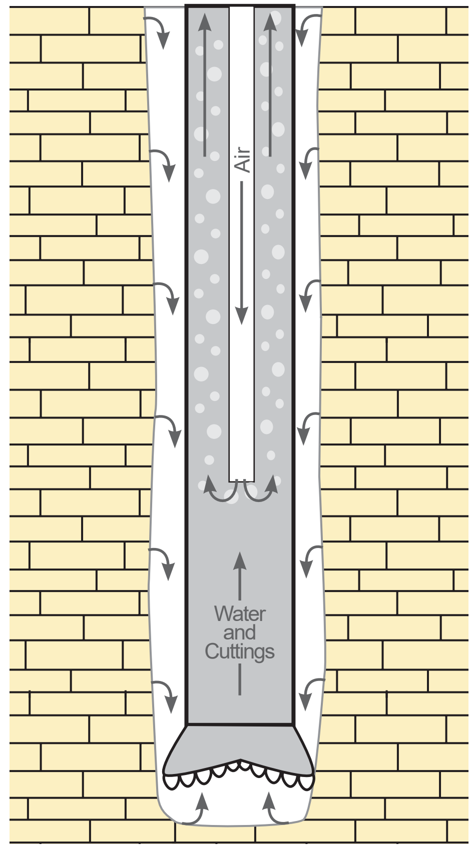
Formation (off-bottom) packer testing allows discrete testing of water levels, water quality, and hydraulic parameters. A competent core hole is necessary for packer testing, meaning unconsolidated sediments and some of the shallow weathered limestone cannot be tested using this technique. The packer assembly (fig. A3) is employed by raising the NQ or NRQ coring rods to a predetermined point, lowering the packer to the bottom of the rods by 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. However, these data 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. A3) as explained above, and air-lifting the water in the NQ or NRQ 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




**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 A2.** Reverse-air drilling and water sampling procedure.

discharge point, with a wireline retrievable stainless steel bailer (fig. A4), 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 through the orifice. Bailers are better for obtaining non-aerated samples, which are more representative because aerated samples may have elevated pH and consequently iron precipitation.

Once the water samples are at the surface, they are transferred into a clean polypropylene beaker. A portion of the sample is bottled according to standard District procedure for laboratory analysis (SWFWMD, 2009). A 500 ml bottle is filled with unfiltered water. Two bottles, one 250 ml and one 500 ml, are filled with water filtered through a 0.45-micron filter. A Masterflex® console pump is used to dispense the water into the bottles. The sample in the 250 ml bottle is acidified with nitric acid to a pH of 2 in order to preserve metals for analysis. The remainder is used to collect field parameters including specific conductance, temperature, pH, and chloride and sulfate concentrations. Temperature, specific conductance, and pH are measured using a YSI® multi-parameter handheld meter. Chloride and sulfate concentrations are analyzed with a YSI® 9000 photometer. The samples are delivered to the District's 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 are plotted on a Piper (1944) 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

Some hydraulic properties can be estimated by conducting a series of slug tests. During slug tests, 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 HQ or HW casing and the NQ or NRQ 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.

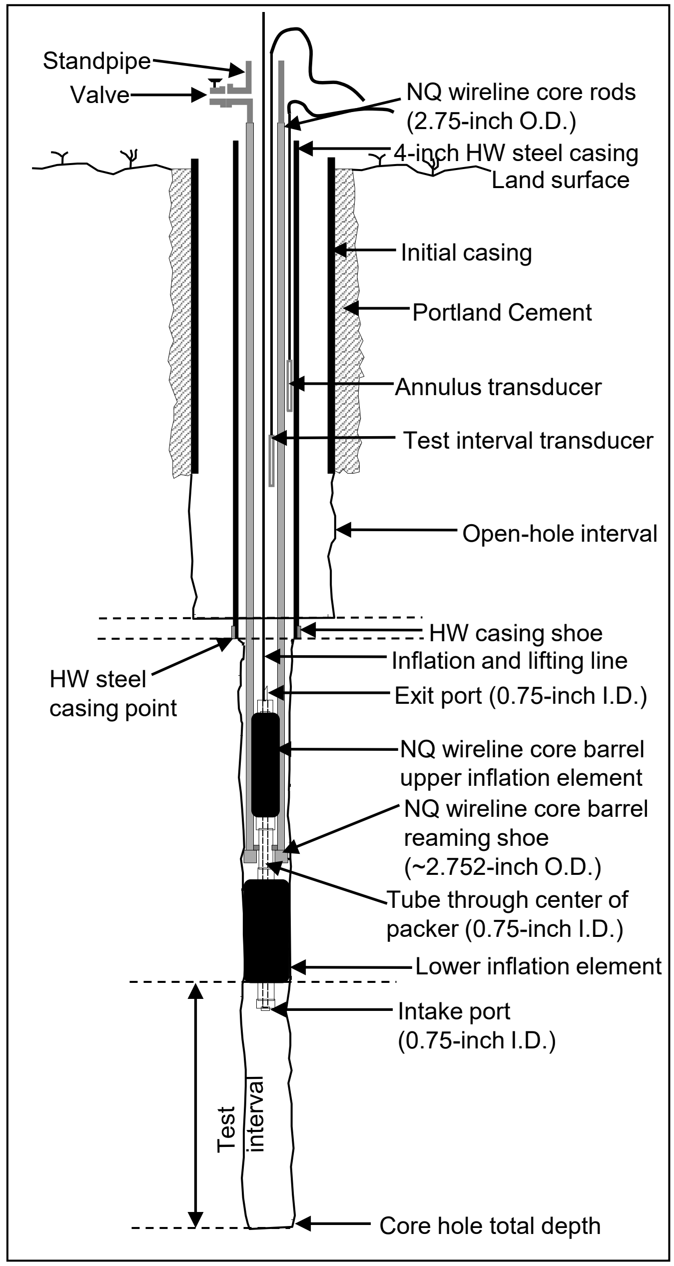



**Figure A3.** Formation (off-bottom) packer assembly deployed in the core hole.

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 of the 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 and once it returns to the

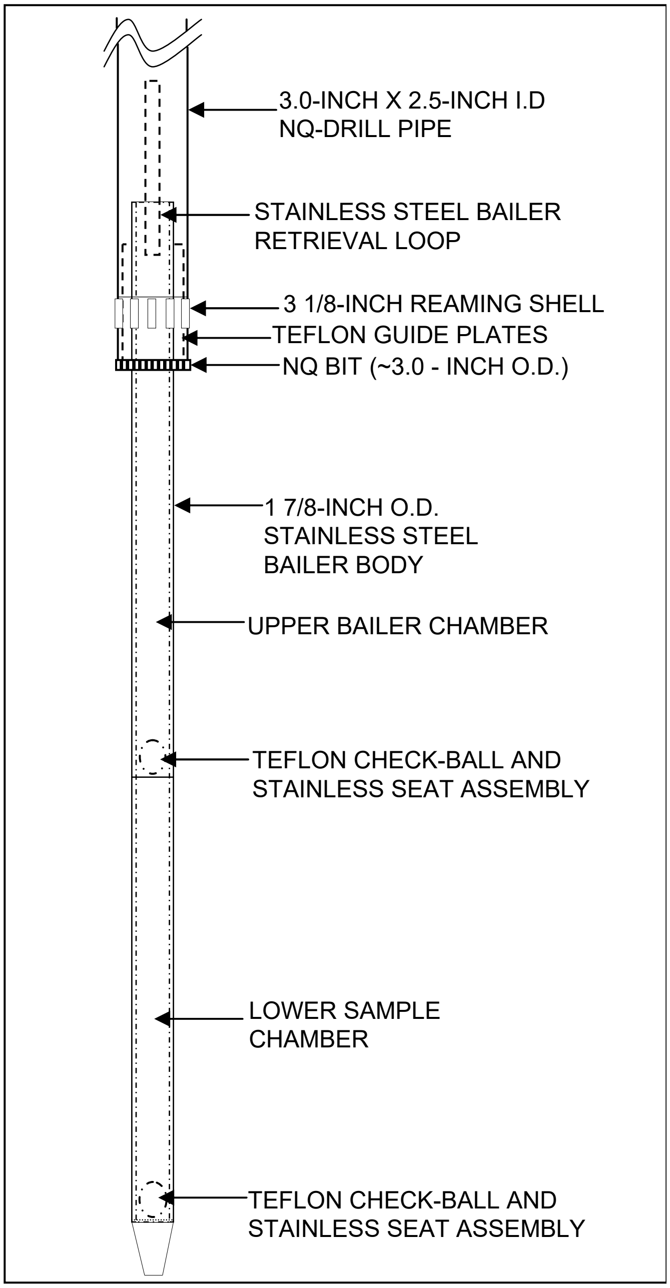



**Figure A4.** Diagram of the wireline retrievable bailer.

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). The water level is recorded until it reaches the initial static water level. The drop slug method is used for low hydraulic conductivity formations because of the slow slug initiation. This test initiation method is slower than the pneumatic method because the water 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 or NRQ rods raising the static water level. A specially designed PVC funnel fitted with a ball valve placed over the NQ or NRQ rods is used to deliver the water. The valve is opened releasing the water causing the water level to rise. The water level is recorded until the raised level falls (falling head test) back to 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, estimates of the hydraulic conductivity values are made based on the slug test data using AQTESOLV® (Duffield, 2007) software by applying the appropriate analytical solution.

Slug tests in which the formation packer assembly is used all have one common source of error resulting from the orifice restriction (fig. A3). The water during the slug tests moves through NQ or NRQ coring rods with an inner diameter of 2.38 inches, the orifice on the packer assembly that has an inner diameter of 0.75 inch, and the core hole that has a diameter of approximately 3 inches. The error associated with this restriction is evident as head dependence in the response data of multiple tests conducted on the same test interval with varying initial displacements. The error associated with the orifice restriction will result in an underestimation of the hydraulic conductivity values. In order to reduce the error associated with the orifice restriction, the District inserts a spacer within 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, aquifer characteristics, porosity, and flow zone detection), geologic (lithology, formation delineation), and physical characteristics (depth, diameter, casing depth, texture of well bore, packer points, and integrity of well construction).

Geophysical logging entails lowering the geophysical tool into the monitor well on a wireline and measuring the tool's response to the formations and water quality in and near the core hole during retrieval. 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-ray [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)

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

### Gamma [GAM(NAT)]

Natural gamma-ray logs measure the amount of natural radiation emitted by materials surrounding the borehole. Natural gamma radiation is emitted from decaying radioactive elements present in certain types of geologic materials, thus specific rock materials can be identified from the log. Some of these materials include clays that trap radioactive isotopes as they migrate with groundwater, organic deposits, and phosphates. Clays contain high amounts of radioactive isotopes in contrast to more stable rock materials like carbonates and sands, therefore, can be identified easily. One advantage using natural gamma-ray radiation is that it can be measured through PVC and steel casing, although it is subdued by steel casing. Gamma-ray logs are used chiefly to identify rock lithology and correlate stratigraphic units because gamma-ray radiation can be measured through casing and is relatively consistent.

### Spontaneous Potential (SP)

Spontaneous potential logs measure the electrical potential (voltages) 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. They 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, from rocks and fluids in the borehole to a point at land surface. Electrical resistance of the borehole materials is a measure of the current drop between a current electrode placed in the borehole and the electrode placed on land surface. The log must be run in a fluid-filled, uncased borehole. They are used for geologic correlation, such as 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 borehole materials and 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 further 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. 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 (aquifers) 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 as knowledge of 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 to ensure a successful test. 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. Diagnostic radial flow plots and derivative analyses of APT data are valuable tools in characterizing the type of aquifer present and specific boundary conditions that may be acting on the system during an APT.

## Single-Well Aquifer Performance Test

Single-well APTs includes one test (pumped) well within the production zone used for both pumping and monitoring the water level response. A single-well APT may include monitoring the background water level in the test well for a duration of at least twice the pumping period (Stallman, 1976). Background 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. After background data collection is complete and it is determined that a successful test can be accomplished, pumping is started. During the test, 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 used to estimate drawdown and then analyzed using analytical methods to estimate the hydraulic properties of the aquifer and adjacent confining units. Typically, response data is analyzed using AQTESOLV® (Duffield, 2007) software by applying the appropriate analytical solution.

Multi-Well Aquifer Performance Test

Multi-well APTs involve a test (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 period of at least twice the planned pumping period (Stallman, 1976). The background data allows for the determination of whether a successful test can be conducted and permits the estimation of drawdown. After the background data collection period is complete and it is determined that a successful test can be completed, pumping is started. During the test, 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 used to estimate drawdown and then analyzed using analytical or numerical methods to estimate the hydraulic properties of the aquifer and adjacent confining units. Typically, response data is analyzed using AQTESOLV® (Duffield, 2007) software by applying the appropriate analytical solution.

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# Appendix B. Geophysical Log Suites for the ROMP 115 – Royal Well Site in Sumter County, Florida

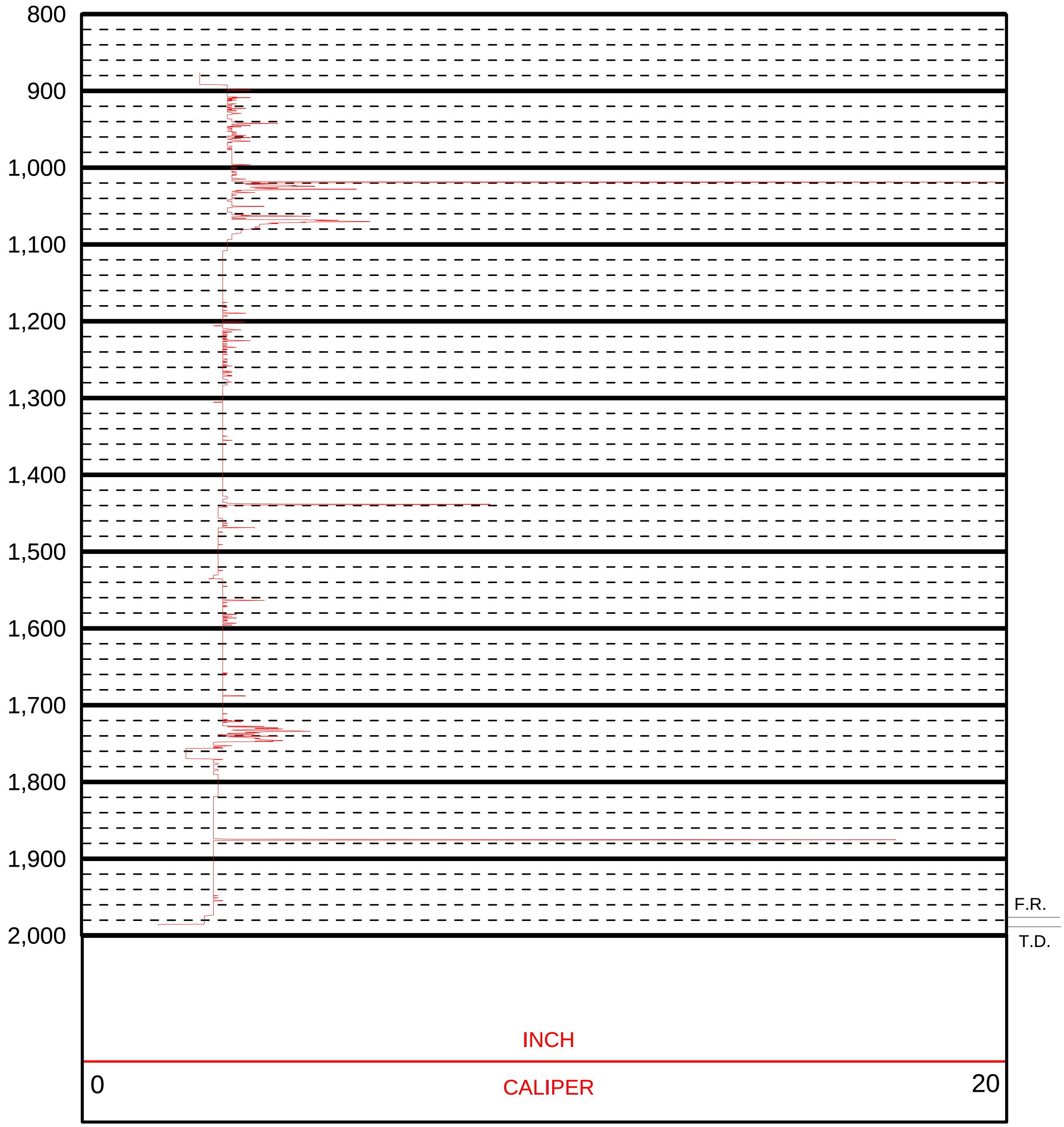



**Figure B1.** Gamma-ray and caliper log for Corehole 2 from 876 to 1,986.4 feet below land surface conducted at the ROMP 115 – Royal well site in Sumter County, Florida. The log was performed on September 18, 2015, using the 9064A (caliper/gamma-ray) tool. Steel 4-inch casing was approximately 79 feet below land surface at time of logging. The log scale is 1-inch per 200 feet and is linearly scaled. The FR is 1,979.7 feet below land surface.

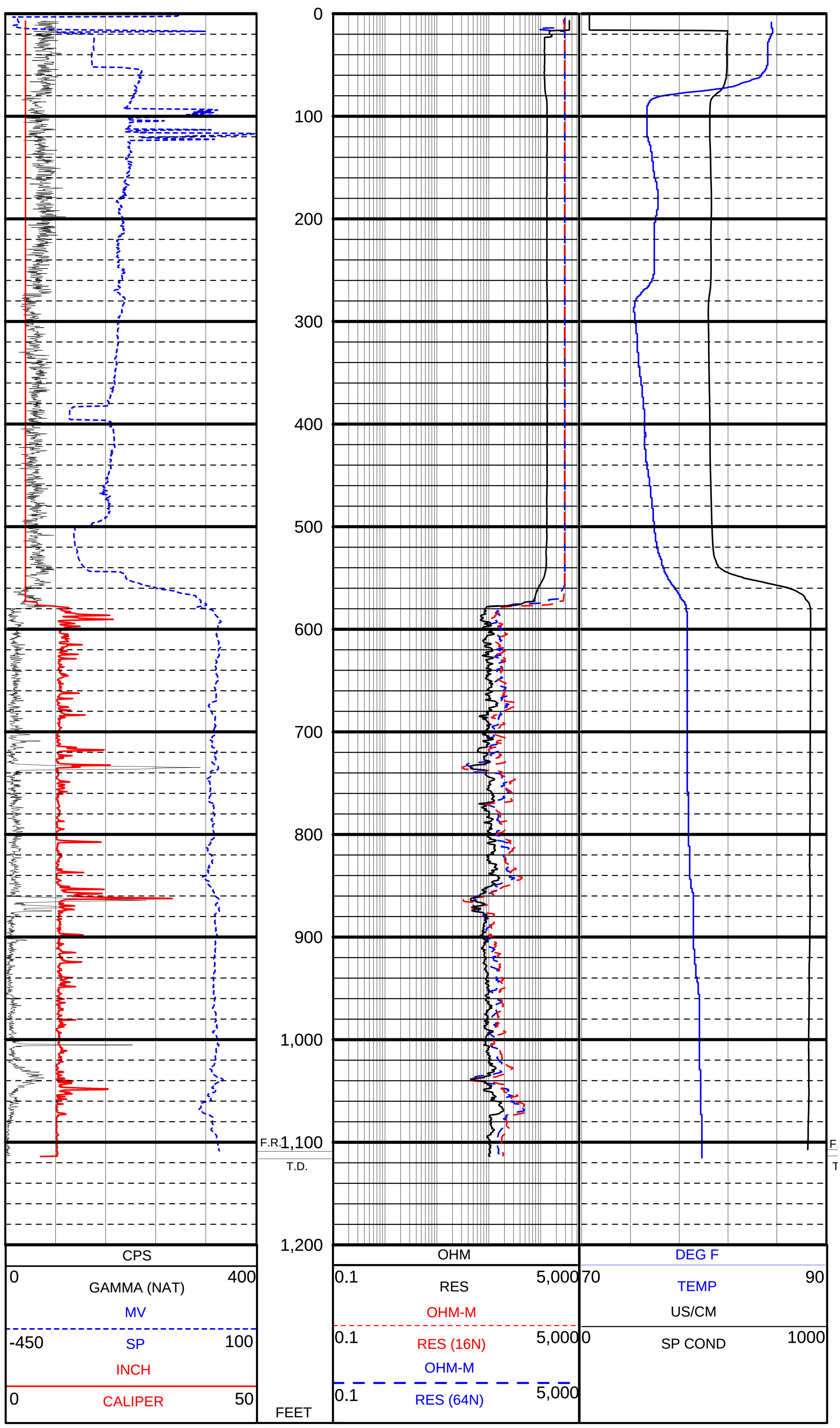



**Figure B2.** Geophysical log suite for the completed L Fldn Aq (Below I) Monitor well from 1.2 to 1,115.2 feet below land surface conducted at the ROMP 115 – Royal well site in Sumter County, Florida. The log was performed on July 14, 2016, using the 9165C (caliper/gamma-ray) and 8144C (multifunction) tools. Polyvinyl chloride 4.5-inch casing was installed to 570 feet below land surface at time of logging. The log scale is 1-inch per 100 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 1,107.2 feet below land surface.

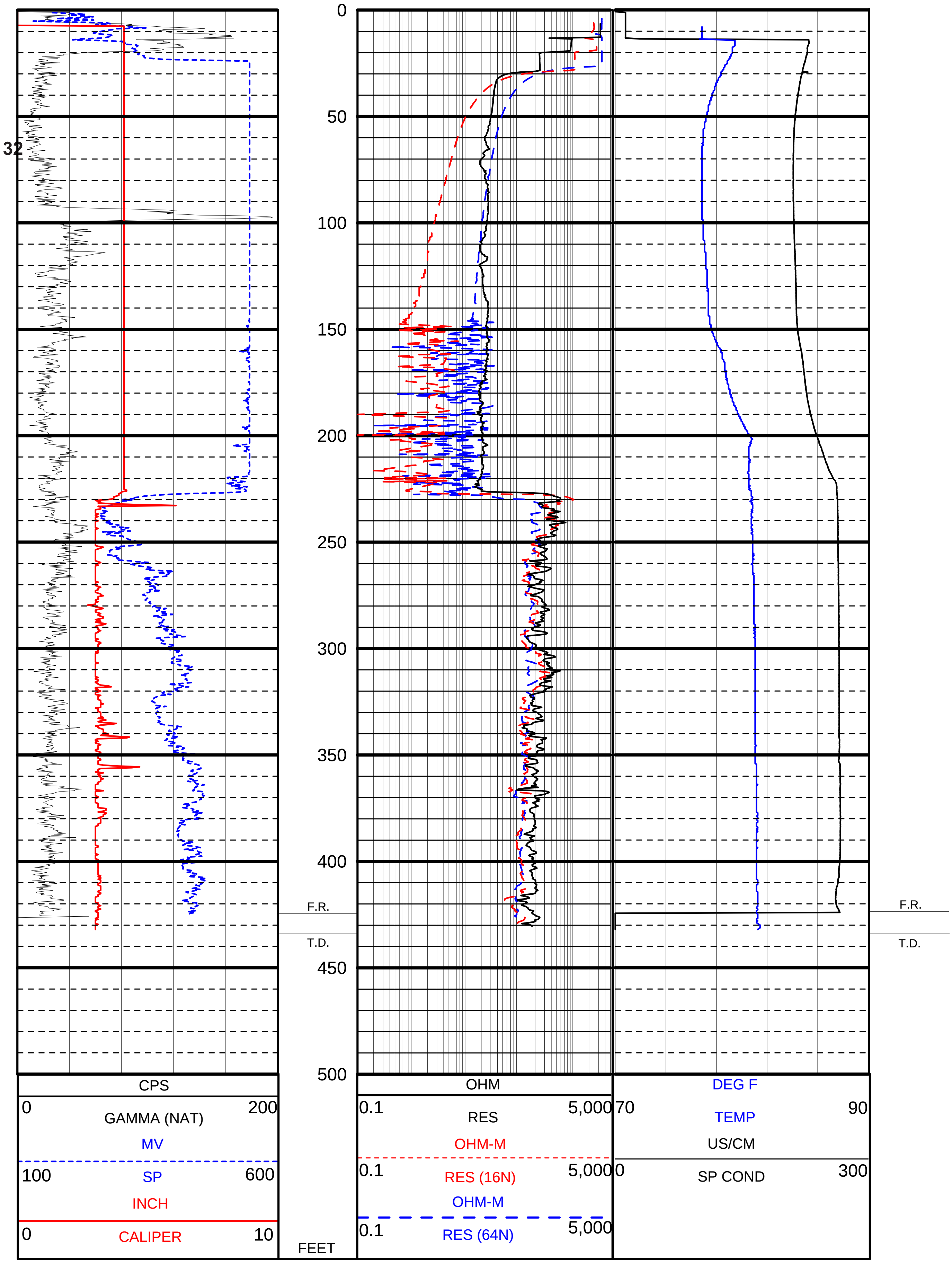



**Figure B3.** Geophysical log suite for Corehole 2 from 0.8 to 432 feet below land surface conducted at the ROMP 115 – Royal well site in Sumter County, Florida. The log was performed on November 6, 2014, using the 9165C (caliper/gamma-ray) and 8044C (multifunction) tools. Steel 4-inch casing was approximately 220 feet below land surface at time of logging. The log scale is 2-inch per 100 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 424 feet below land surface.

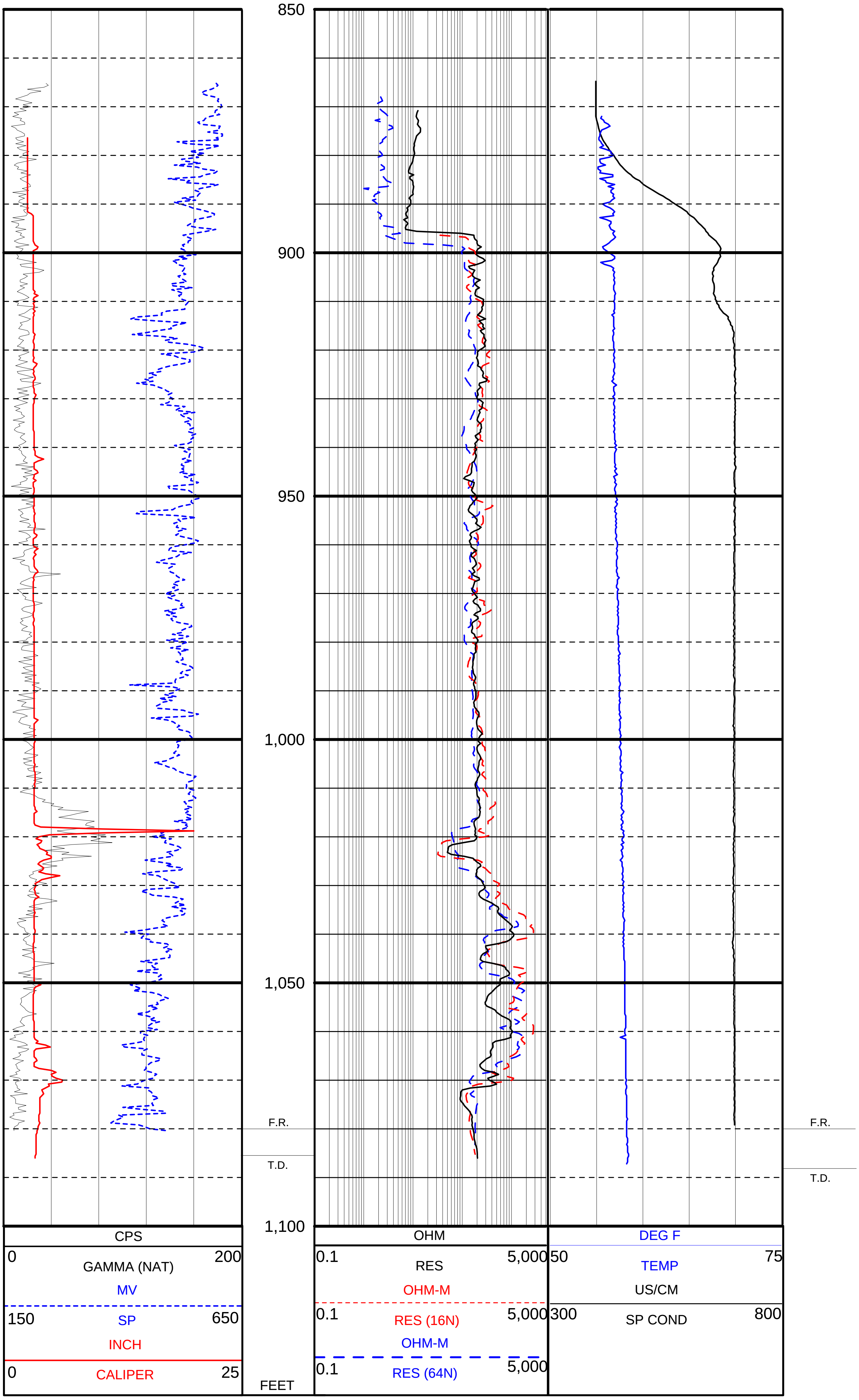



**Figure B4.** Geophysical log suite for Corehole 2 from 864.8 to 1,087.2 feet below land surface conducted at the ROMP 115 – Royal well site in Sumter County, Florida. The log was performed on September 18, 2015, using the 9064A (caliper/gamma-ray) and 8043C (multifunction) tools. Steel 10-inch casing was installed to 70 feet bls at time of logging. The log scale is 5 inches per 100 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 1,079.2 feet below land surface.

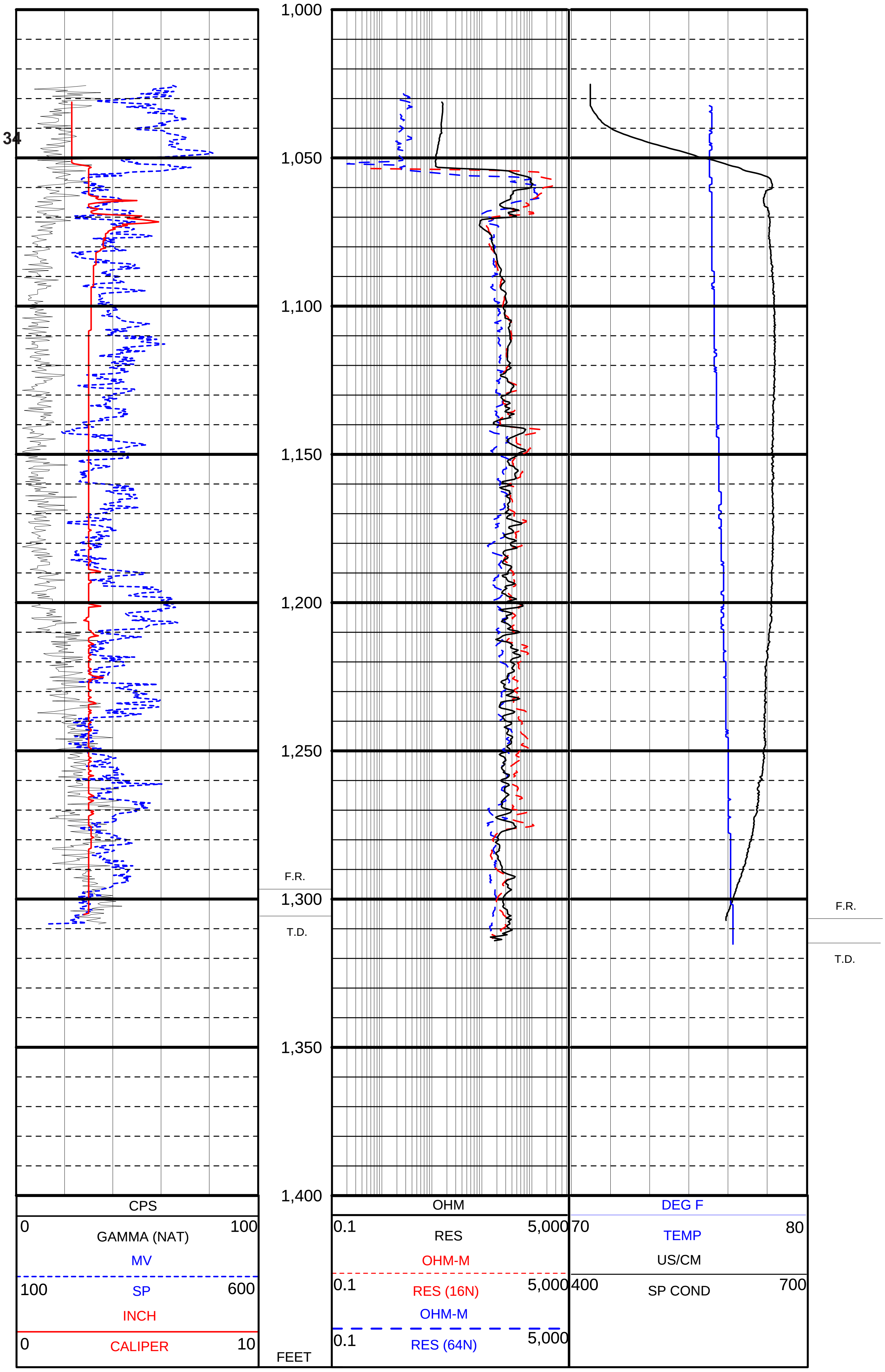



**Figure B5.** Geophysical log suite for Corehole 2 from 1025.2 to 1,315.2 feet below land surface conducted at the ROMP 115 – Royal well site in Sumter County, Florida. The log was performed on September 17, 2015, using the 9064A (caliper/gamma-ray) and 8043C (multifunction) tools. Steel 10-inch casing was installed to 70 feet bls at time of logging. The log scale is 3 inches per 100 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 1,298.5 feet below land surface.

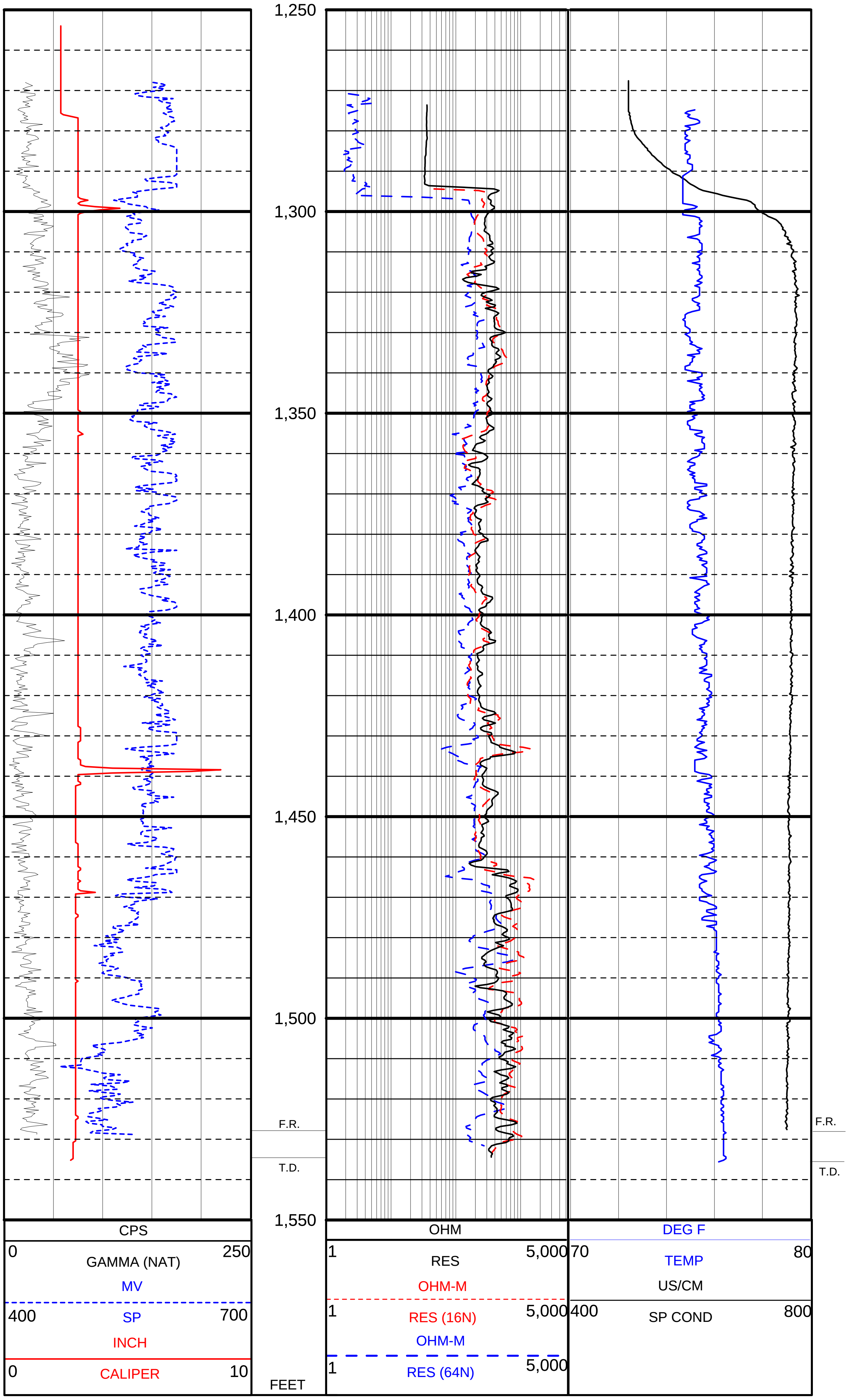
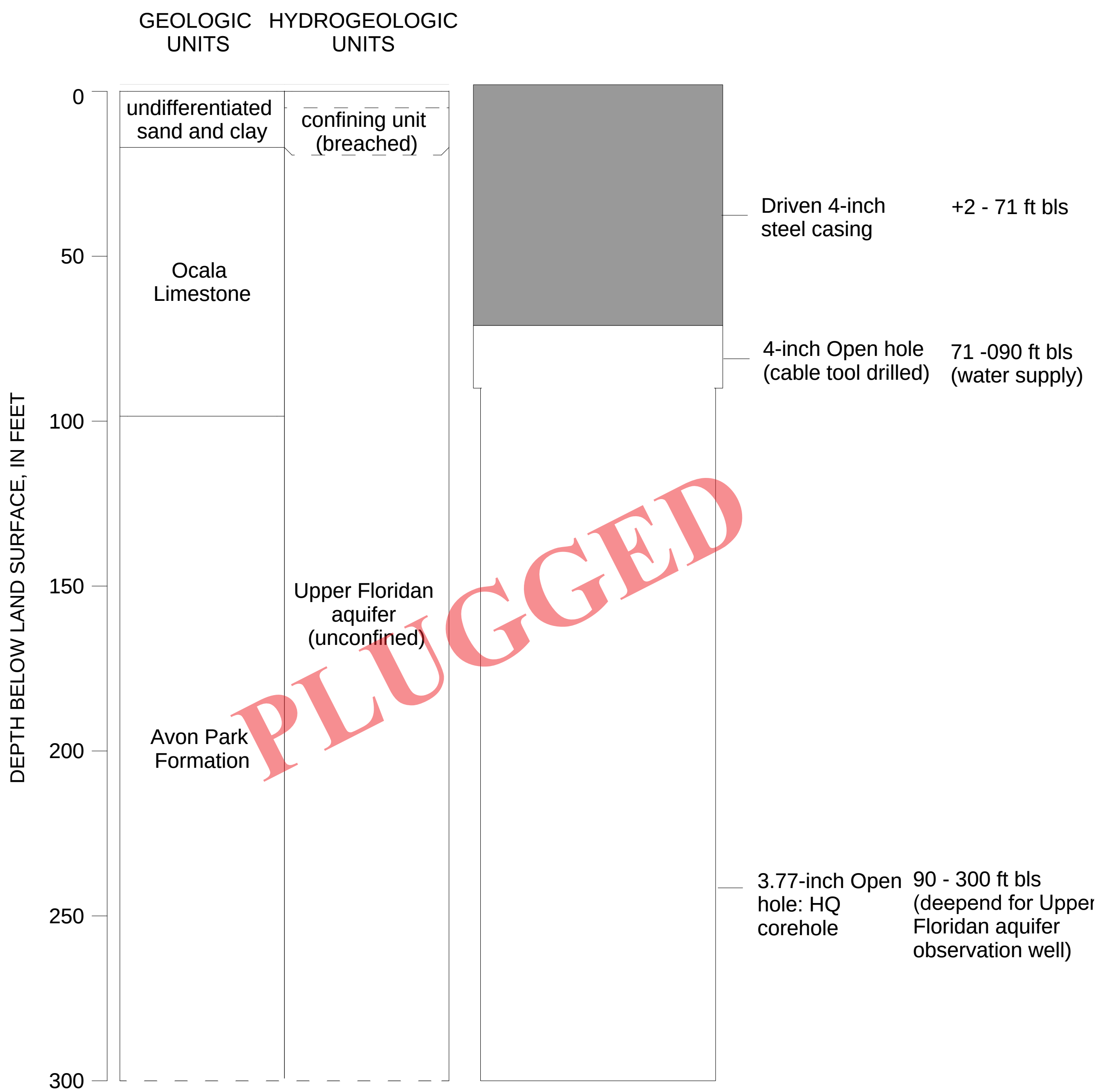



**Figure B6.** Geophysical log suite for Corehole 2 from 1267.6 to 1,535.6 feet below land surface conducted at the ROMP 115 – Royal well site in Sumter County, Florida. The log was performed on September 17, 2015 using the 9064A (caliper/gamma-ray) and 8043C (multifunction) tools. Steel 10-inch casing was installed to 70 feet bls at time of logging. The log scale is 4 inches per 100 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 1,527.6 feet below land surface.

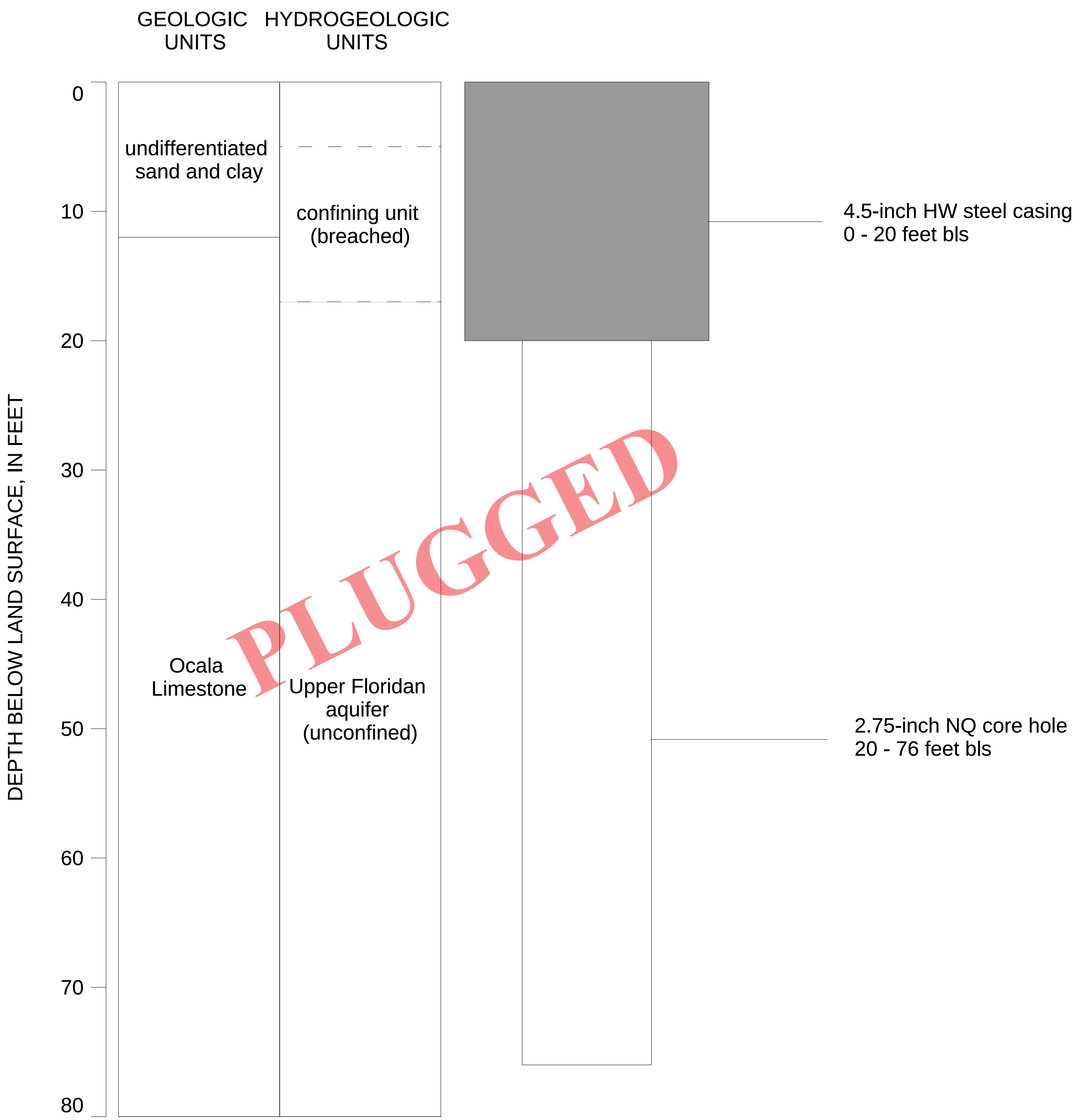
# Appendix C. Well As-built Diagrams for the ROMP 115 – Royal Well Site in Sumter County, Florida




| | |
|---|---|
| Well Name: | ROMP 115 DRILLING WATER SUPPLY |
| SID: | 861956 |
| WCP: | 835116, 849110, 851185 |
| S/T/R: | 17/18S/22E |
| Latitude: | 28° 55' 28.21" |
| Longitude: | 82° 07' 27.88" |
| Reporting Category: | LWRY |
| Const. Began: | 3/17/2014 |
| Const. Complete: | 7/7/2016 |

**EXPLANATION**

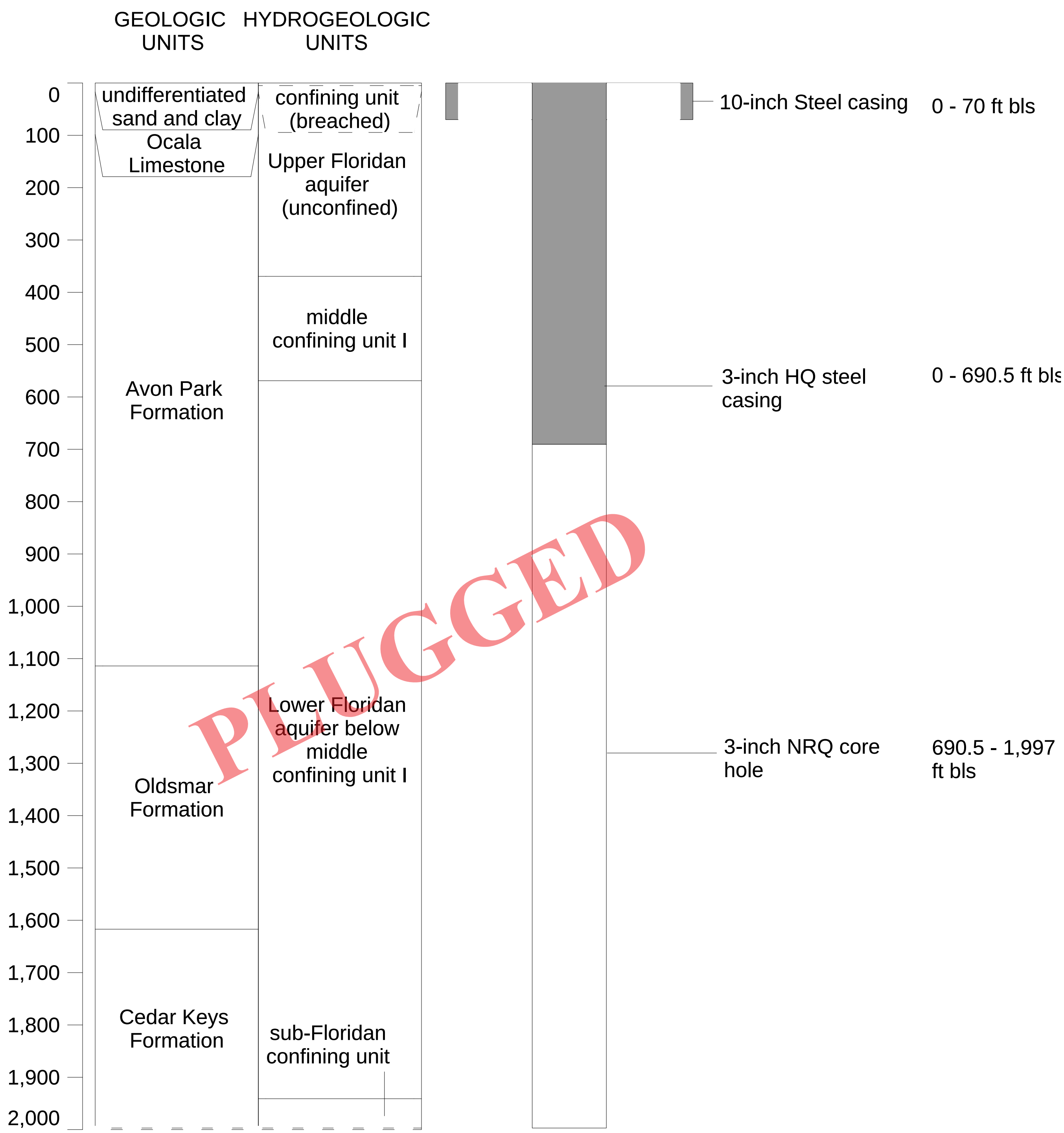
Galvanized steel   Open hole



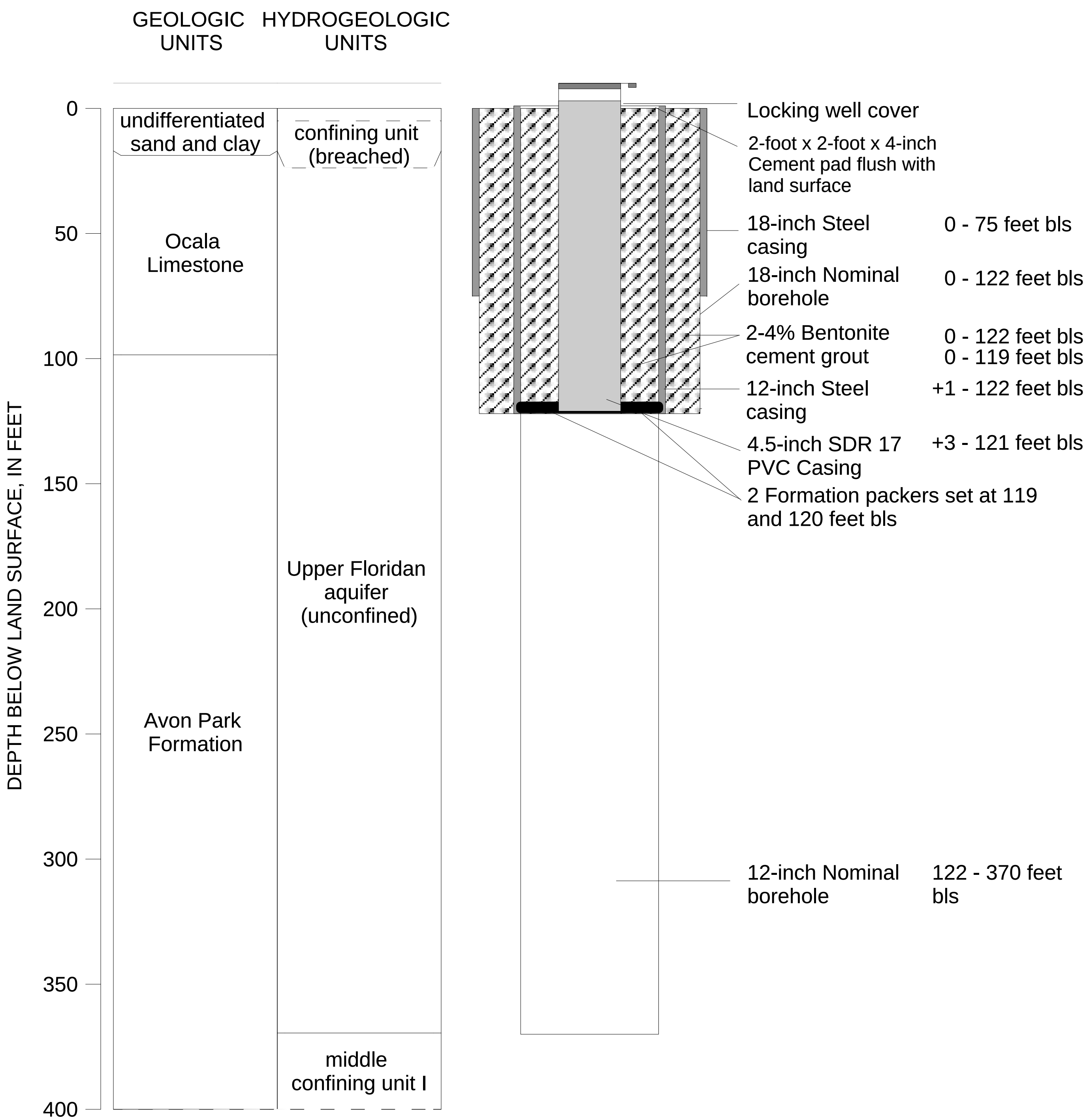

| | |
|---|---|
| Well Name: | ROMP 115 COREHOLE 1 |
| SID: | 948875 |
| WCP: | |
| S/T/R: | 17/18S/22E |
| Latitude: | 28° 55' 27.22" |
| Longitude: | 82° 07' 27.68" |
| Reporting Category: | LWRY |
| Const. Began: | 8/11/2014 |
| Const. Complete: | 8/13/2014 |

**EXPLANATION**

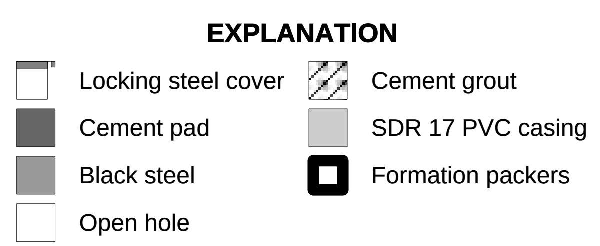
Galvanized steel    Open hole

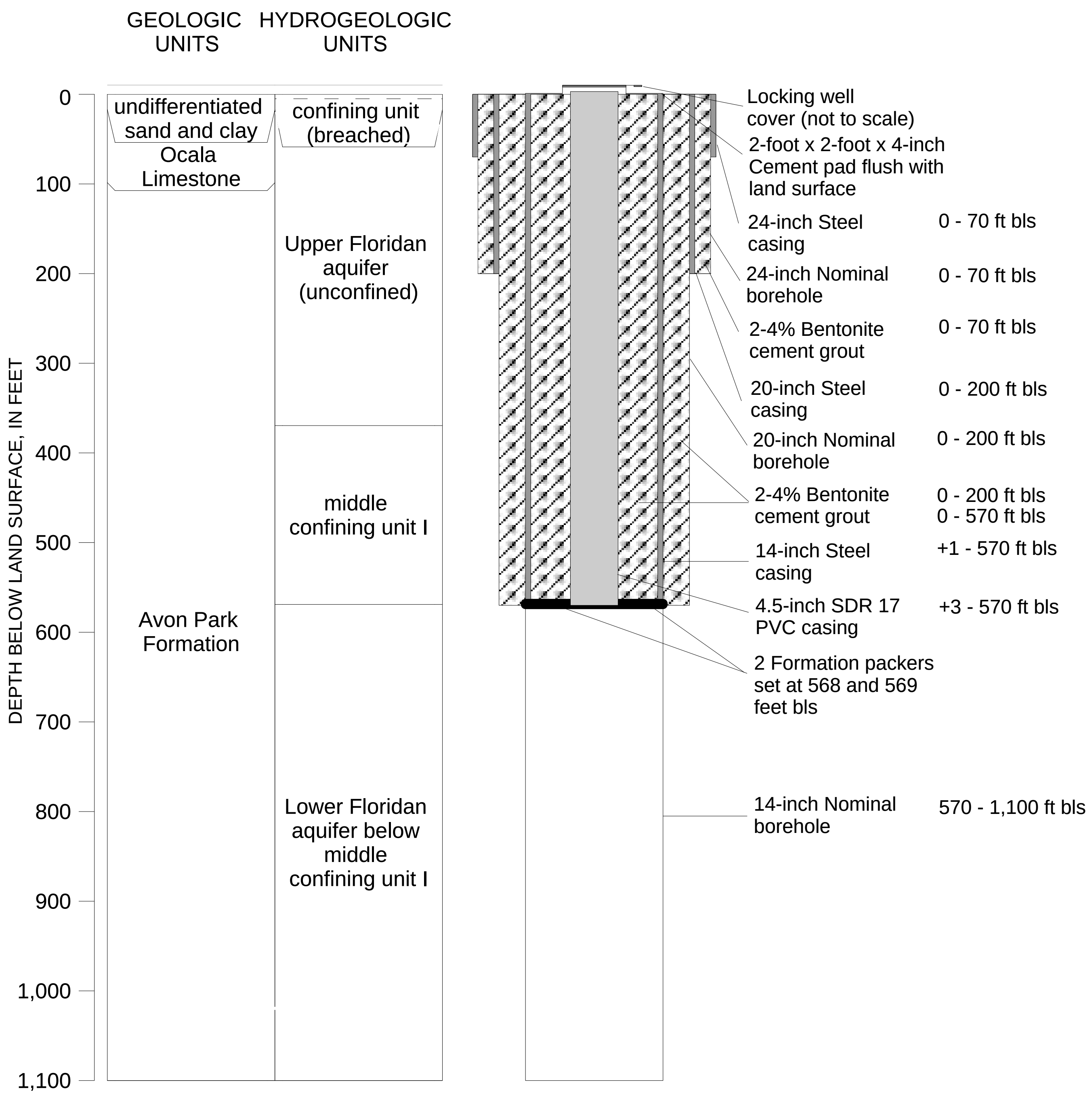



| | |
|---|---|
| Well Name: | ROMP 115 COREHOLE 2 |
| SID: | 840582 |
| WCP: | *see table 2 for complete list of WCPs* |
| S/T/R: | 17/18S/22E |
| Latitude: | 28° 55' 26.73" |
| Longitude: | 82° 07' 27.77" |
| Reporting Category: | LWRY |
| Const. Began: | 9/3/2014 |
| Const. Complete: | 7/13/2016 |




| | |
|---|---|
| Well Name: | ROMP 115 U FLDN AQ MONITOR |
| SID: | 872383 |
| WCP: | 843534, 847114, 851255 |
| S/T/R: | 17/18S/22E |
| Latitude: | 28° 55' 25.13" |
| Longitude: | 82° 07' 28.38" |
| Reporting Category: | LWRY |
| Const. Began: | 5/5/2016 |
| Const. Complete: | 6/20/2016 |






| | |
|---|---|
| Well Name: | ROMP 115 L FLDN AQ (BELOW MCU I) MONITOR |
| SID: | 872386 |
| WCP: | 843532, 847113, 851257 |
| S/T/R: | 17/18S/22E |
| Latitude: | 28° 55' 25.13" |
| Longitude: | 82° 07' 28.38" |
| Reporting Category: | LWRY |
| Const. Began: | 5/5/2015 |
| Const. Complete: | 7/11/2016 |

**EXPLANATION**

- Cement pad
- Galvanized steel
- Open hole
- Cement grout
- SDR 17 PVC casing
- Formation packers
- Locking well cover

# Appendix D. Lithologic Logs for the samples collected at the ROMP 115 – Royal Well Site in Sumter County, Florida

LITHOLOGIC WELL LOG PRINTOUT SOURCE: FGS

WELL NUMBER: W-19609 COUNTY: SUMTER
TOTAL DEPTH: 76 FT. LOCATION: LAT = 28° 55’ 24.2”
19 SAMPLES FROM 0 TO 76 FT. LON = 82° 07’ 27.2”

COMPLETION DATE: ELEVATION: 61.3 FT

OWNER/DRILLER: Southwest Florida Water Management District/Clinton Smith
WORKED BY ZACHARY R. ZARRANZ
WELL NAME: ROMP-115 Royal CH-1; This description relates to ROMP 115 and is the upper section of W-19607.

0 - 17 090 UDSC Undifferentiated Sand and Clay
17 124OCAL Ocala Limestone

0 - 1 Sand; Moderate Gray (N5) To Grayish Brown (10YR 6/2)
Intergranular
Grain Size: Medium; Range: Very Fine To Coarse
Roundness: Sub-rounded To Sub-angular; Medium Sphericity
Unconsolidated Induration
Accessory Minerals: Organics-7%; Plant Remains-1%; Phosphatic Sand-<1%
Med grained quartz sand with organics and plant roots. Trace phosphate

1 - 3 Sand; Grayish Brown (10YR 6/2) To Dark Yellowish Orange (10YR 6/6)
Intergranular
Grain Size: Medium; Range: Very Fine To Coarse
Roundness: Sub-rounded To Sub-angular; Medium Sphericity
Unconsolidated Induration
Accessory Minerals: Organics-2%; Plant Remains-<1%
More orange sand similar grain size and roundness to above.

3 - 5 Sand; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intergranular
Grain Size: Medium; Range: Very Fine To Coarse
Roundness: Sub-angular To Sub-rounded; Medium Sphericity
Unconsolidated Induration
Accessory Minerals: Phosphatic Sand-1%
Lighter than above again. Clay observed at the base of the interval.

5 - 6 Clay; Dark Yellowish Orange (10YR 6/6) To Grayish Brown (10YR 6/2)
Intergranular
Poor Induration
Cement Type(s): Clay Matrix
Accessory Minerals: Quartz Sand-25%; Limestone-1%
Recovery of core has little core integrity, but this is the last interval of rubbly recovery. Quartz sand coated clay with iron staining and trace pieces of fine limestone throughout the interval.

6 - 11 Clay; Yellowish Gray (5Y 8/1) To Dark Yellowish Orange (10YR 6/6)
Intergranular
Moderate Induration
Cement Type(s): Clay Matrix
Accessory Minerals; Limestone-7%
Fossils: Benthic Foraminifera
Few fossils seen in the clay, Ironed stained clay with more limestone content. First interval that is complete core, but still not 100% recovery.

11 - 16 Sand; Very Light Orange (10YR 8/2) To Light Yellowish Orange (10YR 8/6)
Intergranular
Grain Size: Very Fine; Range: Microcrystalline To Medium
Roundness: Sub-rounded To Angular; Medium Sphericity
Moderate Induration
Cement Type(s): Clay Matrix
Accessory Minerals: Clay-5%
Silicified sand interval. Light color gives look of carbonate but reaction is little to none when tested with HCL and Alizarin Red.

16 - 17 Clay; Light Olive Gray (5Y 6/1) To Light Gray (N7)
Intergranular
Moderate Induration
Cement Type(s): Clay Matrix
Accessory Minerals: Limestone-20%
Base of UDSC. Limestone interbedded within the clay. Not 100% recovery.

17 - 22 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intergranular
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Poor Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Chalky; Friable
Fossils: Benthic Foraminifera
Top of Ocala Limestone. Chalky friable wackestone that is highly fossiliferous, as well as very chalky and friable. This interval is coated in drillers mud.

22 - 27 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intergranular
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Medium
Poor Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Friable; Chalky
Fossils: Benthic Foraminifera
Similar to above, parts of interval not as friable, but lithology is consistent.

27 - 32 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intergranular, Moldic
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Medium
Poor Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Friable; Chalky
Fossils: Benthic Foraminifera; Fossil Molds; Fossil Fragments
Similar to above, parts within the interval are more well indurated than other parts.
Fossils present throughout. In molds and fossils as well as fossil fragments.

32 - 37 Packstone; White (N9) To Yellowish Gray (5Y 8/1)
Intergranular
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Medium
Poor Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Friable; Chalky
Fossils: Benthic Foraminifera
Similar to above, rock type tending to packstone.

37 - 41 Packstone; White (N9) To Yellowish Gray (5Y 8/1)
Intergranular, Moldic
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Medium
Moderate Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Chalky
Fossils: Benthic Foraminifera
Similar to above, lithology changes to packstone and fossils are present just not as concentrated as in previous intervals.

41 - 46 Packstone; White (N9) To Yellowish Gray (5Y 8/1)
Intergranular
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Medium
Poor Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Chalky; Friable
Fossils: Benthic Foraminifera
Similar to above, sections of interval with better induration than others. Benthic foraminifera present throughout interval.

46 - 51 Packstone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine

Poor Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Chalky; Friable
Fossils: Benthic Foraminifera
Similar to above, core is intact for the most part but is very friable. Fossils present within the middle of the core and recovery becomes more rubbly at the base of the interval.

51 - 56 Packstone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Poor Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Chalky; Friable
Fossils: Benthic Foraminifera; Mollusks
Similar to above, allochem percentage is increasing but interval is still considered a packstone.

56 - 61 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Poor Induration
Cement Type(s): Calcilutite Matrix
Other Features: Chalky; Friable; Fossiliferous
Fossils: Benthic Foraminifera
Similar to above, more chalky and friable.

61 - 67 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Poor Induration
Cement Type(s): Calcilutite Matrix
Other Features: Friable; Fossiliferous; Chalky
Fossils: Benthic Foraminifera
Similar to above, friable wackestone with benthic foraminifera.

67 - 72 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Poor Induration
Cement Type(s): Calcilutite Matrix
Accessory Minerals: Iron Stain-<1%
Other Features: Friable; Chalky; Fossiliferous
Fossils: Benthic Foraminifera

Rubbly return in the last 4 feet of interval. Parts of interval slightly more cemented than others.

72 - 76 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Skeletal; Calcilutite
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Chalky; Friable
Fossils: Benthic Foraminifera
Base of CH-1, interval base where induration becomes moderate at the base.

LITHOLOGIC WELL LOG PRINTOUT SOURCE: FGS

WELL NUMBER: W-19607
TOTAL DEPTH: 1,997 FT.
507 SAMPLES FROM 0 TO 1,997 FT.

COUNTY: SUMTER
LOCATION: T.18S R.22E S.17
LAT = 28° 55' 24.2"
LON = 82° 07' 27.2"

COMPLETION DATE:
ELEVATION: 61.3 FT

OWNER/DRILLER: SWFWMD/ SOUTH WEST FLORIDA WATER MANAGEMENT DISTRICT
WORKED BY ZACHARY R. ZARRANZ
WELL NAME: ROMP 115 - Royal; ROMP 115 This description is the continuation of W-19609 CH-1. CH-2 continues to 1,998 ft.

| | | | |
|---|---|---|---|
| 76 | - | 98.5 | 124OCAL Ocala Limestone |
| 98.5 | - | 1114 | 124AVPK Avon Park Formation |
| 1114 | - | 1617 | 124OLDM Oldsmar Formation |
| 1,617 | - | | 125CDRK Cedar Keys Formation |

76 - 87 Wackestone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline
Grain Type: Skeletal; Calcilutite
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Calcilutite Matrix
Accessory Minerals: Plant Remains-<1%
Other Features: Low Recrystallization; Fossiliferous; Chalky
Fossils: Benthic Foraminifera; Miliolids
10 feet of interval represented by less than two foot of core in the box. Wackestone with low recrystallization throughout, coated by trace amounts of plant remains that give the look of black specs on the core.

87 - 95 Limestone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Calcilutite; Biogenic
Grain Size: Microcrystalline; Range: Microcrystalline To Coarse
Good Induration
Cement Type(s): Calcilutite Matrix
Accessory Minerals: Iron Stain-<1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Fossil Fragments; Benthic Foraminifera; Mollusks
Interval that is unmarked with depth blocks, and is probably poor recovery as recovery is very rubbly. It is recrystallized limestone and iron stained fossils and molds. With depth more of a complete core is recognized, but overall the core is not intact at all.

95 - 97 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline, Moldic
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Medium

| | | | |
|---|---|---|---|
| | | | Good Induration<br>Cement Type(s): Calcilutite Matrix<br>Accessory Minerals: Calcite-1%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Fossil Fragments; Benthic Foraminifera<br>Single piece of carbonate, hard and dense with calcite crystal growth within the middle of the core. Sharp contact with organic rich interval below. |
| 97 | - | 98.5 | Limestone; White (N9) To Dark Yellowish Brown (10YR 2/2)<br>Intergranular<br>Grain Type: Biogenic; Calcilutite<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Poor Induration<br>Cement Type(s): Calcilutite Matrix; Organic Matrix<br>Accessory Minerals: Organics-35%<br>Limestone and organics in this interval where interval is dark brown/black. When examined with microscope, the sample reacts like limestone when tested with HCl. Base of Ocala Limestone. |
| 98.5 | - | 101 | Wackestone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)<br>Intercrystalline<br>Grain Type: Calcilutite; Skeletal Cast<br>Grain Size: Microcrystalline; Range: Microcrystalline To Medium<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Organic Matrix<br>Sedimentary Structures: Mottled<br>Accessory Minerals: Organics-22%<br>Other Features: Medium Recrystallization; Medium Recrystallization<br>Fossils: Fossil Molds; Fossil Fragments; Benthic Foraminifera; Mollusks<br>Dark gray interval that is a carbonate with a high organic percentage. Fossil molds present throughout interval. Top of Avon Park Formation. |
| 101 | - | 106 | Wackestone; Grayish Brown (10YR 6/2) To Dark Yellowish Brown (10YR 2/2)<br>Intercrystalline<br>Grain Type: Calcilutite; Biogenic<br>Grain Size: Microcrystalline; Range: Microcrystalline To Medium<br>Poor Induration<br>Cement Type(s): Calcilutite Matrix; Organic Matrix<br>Sedimentary Structures: Mottled<br>Accessory Minerals: Organics-25%<br>Other Features: Fossiliferous<br>Fossils: Fossil Molds; Fossil Fragments; Benthic Foraminifera; Mollusks<br>Darker and softer interval of carbonate and organics. Parts are very muddy but also there are parts where grains are easily distinguishable. |
| 106 | - | 109 | Packstone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)<br>Intercrystalline<br>Grain Type: Skeletal Cast; Calcilutite |

Grain Size: Microcrystalline; Range: Microcrystalline To Medium
Moderate Induration
Cement Type(s): Calcilutite Matrix
Sedimentary Structures: Mottled
Accessory Minerals: Organics-20%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Fossil Fragments; Mollusks; Gastropods
Recrystallized packstone where grains have been fused by recrystallization. Organics abundant as well as fossil molds and fragments.

109 - 110.5 Wackestone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)
Intercrystalline
Grain Type: Calcilutite; Skeletal Cast
Grain Size: Microcrystalline; Range: Microcrystalline To Medium
Moderate Induration
Cement Type(s): Calcilutite Matrix
Sedimentary Structures: Mottled
Accessory Minerals: Organics-13%
Other Features: Fossiliferous; Low Recrystallization
Fossils: Fossil Molds; Gastropods; Mollusks; Fossil Fragments
Organic abundance is lessening with depth in the interval. Gastropod fossils are dominant in this interval.

110.5 - 114.5 Wackestone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)
Intercrystalline
Grain Type: Calcilutite; Skeletal Cast
Grain Size: Microcrystalline; Range: Microcrystalline To Medium
Moderate Induration
Cement Type(s): Calcilutite Matrix
Other Features: Fossiliferous; Medium Recrystallization
Fossils: Fossil Molds; Gastropods
Little to none with organics in this interval. Gastropods again the most abundant fossil type. Shell fossil molds are also common in this interval.

114.5 - 117 Dolostone; Grayish Brown (10YR 6/2) To Grayish Orange (10YR 7/4)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Low Recrystallization
Core has transitioned to dolostone, at the bottom of the interval begins to become sucrosic.

117 - 120 Dolostone; Dark Yellowish Brown (10YR 4/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine

Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Accessory Minerals: Calcilutite-4%
Other Features: Low Recrystallization
Fossils: Fossil Molds
Darker dolostone that in the top of the interval is rubbly and coated in calcilutite.
Remainder of the interval is anhedral dolostone with pinpoint vugs.

120 - 121 Dolostone; Grayish Brown (10YR 6/2) To Light Yellowish Orange (10YR 8/6)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Accessory Minerals: Iron Stain-<1%
Other Features: Fossiliferous; Low Recrystallization
Fossils: Fossil Molds; Gastropods
Single foot of core that is Anhedral and moldic, then tends back to sucrosic looking dolostone.

121 - 122.5 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Accessory Minerals: Organics-3%
Moderate yellowish brown dolostone. Parts of this interval are covered in white mold. Not coated in mold, but it is present without having to look at it through a microscope.

122.5 - 127.2 Dolostone; Grayish Brown (10YR 6/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-1%
Other Features: Fossiliferous
Fossils: Fossil Molds; Gastropods; Echinoid
More consistent interval of lighter dolostone that has abundant pinpoint vugs outside and on the inside of the core. Molds are present, gastropod and echinoid. Minor organic laminations throughout core interval.

127.2 - 130 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Iron Stain-<1%

Other Features: Low Recrystallization
Lighter hard dense dolostone. 3 feet of continuous core with few pinpoint vugs and iron stain in fractures and molds.

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| 130 | - | 132.1 | Dolostone; Light Yellowish Orange (10YR 8/6) To Dark Yellowish Orange (10YR 6/6)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Accessory Minerals: Organics-1%<br>Other Features: Low Recrystallization<br>Fossils: Fossil Molds<br>More yellow porous dolostone interval where pinpoint vugs dominate. Base of interval is marked by muddy organics and then darker pinpoint vug dominated dolostone. |
| 132.1 | - | 135.5 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Accessory Minerals: Organics-3%<br>Fossils: Fossil Molds; Echinoid<br>Dark muddy organics topping this interval. Dark brown dolostone continues throughout interval with an abundant amount of pinpoint vugs. Moldic porosity becomes more evident at the bottom of interval. |
| 135.5 | - | 138.5 | Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Fossiliferous; Low Recrystallization<br>Fossils: Fossil Molds; Echinoid<br>Dolostone interval that has more abundant pinpoint vugs than above, this interval looks like a pumice stone, but is much more dense and crystalline. Lighter color than above. |
| 138.5 | - | 141.5 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Medium Recrystallization<br>Fossils: Fossil Molds<br>Interval is similar to above, pinpoint vugs dominate the interval, but unlike the interval above, recrystallization is increasing and the vugs are being changed becoming shallower and frosted over. The interval below is very crystalline and lacks pinpoint vugs completely. |

141.5 - 146 Dolostone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-2%
Other Features: Low Recrystallization
Gray dolostone with minor organic laminations throughout the interval. Crystalline and anhedral dense dolostone that ends with a foot of rubble return before tending back to the anhedral dense dolostone.

146 - 147 Dolostone; Dark Yellowish Brown (10YR 4/2) To Dark Yellowish Orange (10YR 6/6)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization
Rubbly interval that is recrystallized and semi-sucrosic. Less massive and darker in color than above.

147 - 152 Dolostone; Yellowish Gray (5Y 7/2) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Massive
Accessory Minerals: Organics-1%
Other Features: Low Recrystallization
Fossils: Fossil Molds; Echinoid
Massive lighter colored interval of dolostone with some organic mottling and low recrystallization. Fossil molds become more evident at the base of the interval.

152 - 154 Dolostone; Yellowish Gray (5Y 7/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Moldic, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Accessory Minerals: Calcite-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Gastropods; Mollusks
Light colored dolostone with expansive molds. These molds have calcite growth within them. Fossil molds are well preserved in this interval.

154 - 159 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration

Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Burrowed
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Similar to above, just less moldic porosity and anhedral crystallinity with increased recrystallization. Bag of sediment in core box with "Sediment from cavity depth:158'-160'."

159 - 163 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 7/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Gastropods
Similar light colored dolostone as above. This interval has a slightly less abundance of pinpoint vugs and fossil molds.

163 - 167 Dolostone; Grayish Orange (10YR 7/4) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Fossiliferous; Medium Recrystallization
Fossils: Fossil Molds; Echinoid
Rubbly interval, continued recrystallized light colored dolostone, abundant pinpoint vugs in this interval. Four feet represented in a two foot row in this box, 50% recovery.

167 - 171.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Organics-1%; Iron Stain-<1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Gastropods
Interval is very similar to the one ending at 163'. Pinpoint vugs dominated dolostone with fossil molds and recrystallization throughout. The base of this interval has organics that coat the outside of the core.

171.5 - 176 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Cones; Echinoid; Gastropods

Slightly darker interval of dolostone than previous intervals above. More sucrosic, but still consistent abundance of pinpoint vugs and fossil molds. Cones present in this interval.

176 - 181 Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Fossiliferous; Sucrosic
Fossils: Fossil Molds; Echinoid; Cones
Rubbly recovery in the upper part of the interval, but consistent lithology through entire interval. Fossil molds of echinoids and cones present.

181 - 182 Clay; Light Olive Gray (5Y 6/1) To Grayish Orange (10YR 7/4)
Intercrystalline, Low Permeability
Poor Induration
Cement Type(s): Clay Matrix; Dolomite
Accessory Minerals: Dolomite-20%
Other Features: Dolomitic
Thin platy clay interval that is coated in dolomite crystals.

182 - 186.5 Dolostone; Grayish Orange (10YR 7/4) To Light Yellowish Orange (10YR 8/6)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Fossiliferous; Sucrosic; Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Cones; Mollusks
Similar to the interval above the clay 176'-181', this lithology continues until it meets a bedding contact where crystallinity becomes less subhedral and more toward anhedral.

186.5 - 191.5 Dolostone; Grayish Orange (10YR 7/4) To Light Yellowish Orange (10YR 8/6)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Fossiliferous; Sucrosic; Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Cones; Mollusks
Similar to above, interval ends with rubble and crystallinity becoming less subhedral.

191.5 - 197 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Low Permeability; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite

Other Features: Medium Recrystallization
Interval where recovery is poor. 7 feet represented by 2 feet in this box. Recovery is also very rubbly, less moldic and less permeable.

197 - 201 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Low Permeability; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Sucrosic; Low Recrystallization
Trace sulfides present. Less sucrosic than intervals above, but still sucrosic. Low permeability interval with little to no pinpoint vugs.

201 - 202.5 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)
Intercrystalline, Possibly High Permeablity; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Sucrosic; Fossiliferous; Low Recrystallization
Fossils: Benthic Foraminifera
Sucrosic dolostone that is highly permeable and porous. Sucrosic frosted over forams cemented together.

202.5 - 207 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Gray (N8)
Intercrystalline, Low Permeability, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Low Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Gastropods
More gray interval that has fewer fossil molds and pinpoint vugs than above, but still present throughout interval. Hard dense interval that continues with depth but has increased molds and vugs. Trace sulfides found at the base of the interval.

207 - 211.5 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Burrowed
Accessory Minerals: Organics-1%
Other Features: Fossiliferous; Low Recrystallization
Fossils: Fossil Molds; Echinoid; Gastropods
Gray moldic dolostone interval. Organic laminations sporadic in this interval. Rubbly section in the middle of interval.

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| 211.5 | - | 213 | Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Low Permeability; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Low Recrystallization<br>Trace sulfides. Low permeability that has no pinpoint vugs or molds on the outside of the core. Core has to be fractured to see molds that have been recrystallized. |
| 213 | - | 217 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated; Burrowed<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization<br>Fossils: Fossil Molds; Benthic Foraminifera<br>Grayish recrystallized dolostone with pinpoint vugs and burrows. Recrystallization makes its difficult to identify foraminifera in this interval. |
| 217 | - | 218.5 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization<br>Fossils: Fossil Molds<br>Similar to above, interval is ended at a much more laminated permeable bedding contact. |
| 218.5 | - | 222.5 | Dolostone; Grayish Brown (10YR 6/2) To Grayish Orange (10YR 7/4)<br>Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Mollusks<br>Dense crystalline dolostone that has sections of the interval that are dominated by fossil molds. Other sections are less permeable recrystallized dolostone. Top of interval marked by organic laminations. |
| 222.5 | - | 227 | Dolostone; Light Olive Gray (5Y 6/1) To Grayish Orange (10YR 7/4)<br>Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Subhedral |

Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Interbedded; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Trace sulfides within core. Interbedded subhedral recrystallized dolostone. Dark gray low permeability dolostone interbedded with more orange slightly porous dolostone. Little to no fossil molds throughout interval.

227 - 232 Dolostone; Grayish Brown (10YR 6/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Pinpoint molds dominant in this interval. Mostly Intercrystalline recrystallized dolostone. Fossil molds present, but replaced by darker dolostone.

232 - 237 Dolostone; Grayish Brown (10YR 6/2) To Dark Yellowish Orange (10YR 6/6)
Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Interbedded
Other Features: Medium Recrystallization; Friable
Interbedded dolostone that is interbedded with friable euhedral dolostone and hard dense low permeability anhedral dolostone. Top of interval has pinpoint vugs and some fossil molds, with depth the dolostone becomes friable. The friable sections are no more than 6 inches to a foot in length and are rubbly.

237 - 242 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Light Gray (N7)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization; Weathered
Recrystallized dolostone that with depth becomes more weathered. Core is smooth on the outside, but inside the middle of the core crystallinity is subhedral throughout.

242 - 245.5 Dolostone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)
Intercrystalline, Moldic, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization; Fossiliferous

Fossils: Fossil Molds; Echinoid; Mollusks; Gastropods
Lighter colored hard dolostone. Low recrystallization and large fossil molds throughout interval.

245.5 - 250 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Low Recrystallization
Fossils: Fossil Molds
Lighter colored dolostone similar to above, but recrystallization and moldic porosity are lessened in this interval. Sulfides present in this interval determined to be 1%. Few organic laminations through interval.

250 - 252 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization; Chalky
Fossils: Fossil Molds
Chalkier interval that has less than normal amount of pinpoint vugs. Parts of this interval are recrystallized and has pinpoint vugs. Other parts within the interval are chalky and cover the pinpoint vugs.

252 - 256 Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)
Intercrystalline, Moldic, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Mollusks
Similar to above, but more recrystallization in this interval. Molds are more evident in this interval. The chalky similarity is lost due to recrystallization. More pinpoint vugs as well.

256 - 259.5 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Fossiliferous; Low Recrystallization
Fossils: Fossil Molds
Similar to above, but fossil molds and moldic porosity are not as prominent.

259.5 - 263 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Interbedded
Accessory Minerals: Organics-3%
Other Features: Low Recrystallization
Light colored dolostone, similar to above, but has organic laminations throughout. Also interbedded in this interval, the non-laminated sections have less induration and are more low permeability.

263 - 266.5 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Similar light colored dolostone as above, with depth pinpoint vugs becoming more abundant. By the end of the interval, pinpoint vug porosity is less evident.

266.5 - 267 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Fossils: Fossil Molds; Echinoid; Mollusks
Low permeability dolostone where pinpoint vugs are more present within the core and can only be seen when fractured with a hammer. Very well preserved Echinoid molds.

267 - 268.1 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Gray (N5)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Interbedded; Laminated
Accessory Minerals: Organics-2%
Other Features: Low Recrystallization
Gray and light gray interbedded anhedral recrystallized dolostone with organic laminations.

268.1 - 270 Dolostone; Yellowish Gray (5Y 7/2) To Dark Grayish Yellow (5Y 6/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Moderate Induration
Cement Type(s): Dolomite

Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Darker more gray and yellow interval that has organic laminations and increased recrystallization with depth.

270 - 273.8 Dolostone; Yellowish Gray (5Y 7/2) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Fossils: Fossil Molds; Gastropods; Mollusks; Echinoid
Similar to above, gray dolostone interval that is recrystallized throughout.

273.8 - 275 Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Interbedded; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Weathered
Fossils: Fossil Molds
Lighter colored dolostone in this interval. Interbedding occurs with the gray dolostone that is more recrystallized than its surroundings creating weathering in those more gray sections.

275 - 276.5 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Medium
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Fossils: Fossil Molds
Similar color to above. Interval looks like a dolomitized packstone.

276.5 - 277 Dolostone; Yellowish Gray (5Y 7/2) To White (N9)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Lighter color, more hard and dense interval with pinpoint vugs visible on the interior of the core. Echinoid fossil molds very well preserved in this interval.

277 - 279 Dolostone; Yellowish Gray (5Y 7/2) To White (N9)
Intercrystalline, Possibly High Permeability; Highly (50-90%); Subhedral

Grain Size: Microcrystalline; Range: Microcrystalline To Medium
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Fossils: Fossil Molds; Fossil Fragments; Benthic Foraminifera
Similar to the interval that was a dolomitized packstone. More dolomitized foraminifera in this interval.

279 - 282.5 Dolostone; Yellowish Gray (5Y 7/2) To Dark Grayish Yellow (5Y 6/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Benthic Foraminifera
More darker gray interval that is recrystallized with fossil molds and has pinpoint vugs evident throughout. More recrystallized than above where individual grains and forams were visible.

282.5 - 287 Dolostone; Yellowish Gray (5Y 7/2) To Dark Grayish Yellow (5Y 6/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Interbedded; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Mollusks
Similar to above, this interval is interbedded with more highly recrystallized sections within the interval, that gives portions of the interval a muddy crystalline look compared to the grainy crystallinity of the remainder of the interval.

287 - 289 Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)
Intercrystalline, Possibly High Permeability, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Fine; Range: Microcrystalline To Medium
Moderate Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization; Fossiliferous; Granular
Fossils: Fossil Molds; Miliolids; Echinoid; Mollusks
This interval with depth has the look of a dolomitized grainstone. Dolomitized foraminifera compromise the majority of the lithology in this interval.

289 - 291 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite

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| | | | Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-1%<br>Other Features: Low Recrystallization<br>Trace organics laminated throughout. Gray dolostone that is recrystallized and has little fossil molds and or pinpoint vugs. |
| 291 | - | 293 | Dolostone; Yellowish Gray (5Y 7/2) To Grayish Orange (10YR 7/4)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-4%<br>Other Features: Low Recrystallization; Friable<br>Chalk like texture, friable, organic laminated dolostone interval. Softer than many previous intervals with little to none fossil molds or fragments. |
| 293 | - | 295 | Dolostone; Yellowish Gray (5Y 7/2) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Low Permeability; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated; Interbedded<br>Accessory Minerals: Organics-5%<br>Other Features: Low Recrystallization; Weathered<br>Similar to look above interval but, more well indurated. Organic laminations run through entire interval and is interbedded with more weathered beds that have visible pore space compared to the dense beds with chalk like texture that are low permeability. |
| 295 | - | 299.5 | Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Mollusks<br>Massively bedded dolostone with abundant pinpoint vugs and fossil molds. Organics present at 298' and the interval is less indurated than the rest of the bed. |
| 299.5 | - | 302.5 | Dolostone; Yellowish Gray (5Y 7/2) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Medium Recrystallization; Fossiliferous; Weathered |

Fossils: Fossil Molds
Similar to above, but much more light gray in color and pinpoint vugs look to be more weathered grains than fossil molds in this interval. Fossil molds still present throughout, just not in the abundance as above.

302.5 - 306 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Interbedded
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Weathered
Fossils: Fossil Molds
Recrystallized dolostone with organic laminations and interbedding throughout this interval. Organic laminations more at the top of the interval but continues throughout. Interbedding occurs with a few inches of low permeability fractured dolostone and more thicker beds of weathered dolostone. This lithology is similar to below where bedding is much more massive. Fossil molds seen as pinpoint vugs only in this interval.

306 - 311 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Interbedded
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Fossiliferous; Weathered
Fossils: Fossil Molds
Trace sulfides. Recrystallized dolostone with few laminations at the top of the interval and increased recrystallization with depth as well as interbedding with a less weathered bed at the bottom of the interval.

311 - 312.4 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Low recrystallized subhedral dolostone with pinpoint vugs.

312.4 - 314 Dolostone;
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated

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| | | | Accessory Minerals: Organics-1%<br>Other Features: Low Recrystallization<br>Hard dense low permeability interval. Organic laminations at the top of the interval. |
| 314 | - | 318.5 | Dolostone; Grayish Brown (10YR 6/2) To Yellowish Gray (5Y 7/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-3%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds<br>Recrystallized dolostone that in the upper part of the interval has organic laminations and the lower part of the interval is clean from organic laminations. |
| 318.5 | - | 320.5 | Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)<br>Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated<br>Accessory Minerals: Organics-1%<br>Other Features: Low Recrystallization<br>Recrystallized dolostone that is massively bedded and has pinpoint vugs throughout. Organic laminations at the bottom of the interval. |
| 320.5 | - | 325 | Dolostone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Vugular, Moldic; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Interbedded<br>Other Features: Medium Recrystallization; Weathered; Fossiliferous<br>Fossils: Fossil Molds; Echinoid<br>Dolostone interval with interbedding of low permeability dolostone and weathered dolostone with fossil molds and pinpoint vugs. |
| 325 | - | 327 | Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Low Recrystallization; Friable<br>Anhedral dolostone interval. With depth the interval is highly fractured and has a friable zone at 326'. Interval becomes more white at the base of the interval. |

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| 327 | - | 328 | Dolostone; Very Light Orange (10YR 8/2) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-7%<br>Other Features: Low Recrystallization<br>Chalk like organic laminated dolostone, little to no fossil molds in this interval. |
| 328 | - | 333 | Dolostone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Medium Recrystallization<br>Fossils: Fossil Molds; Echinoid<br>More white interval of dolostone that has recrystallization and with depth becomes more chalk like texture and slightly friable. |
| 333 | - | 337 | Dolostone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Medium Recrystallization<br>Fossils: Fossil Molds; Echinoid<br>Very similar interval to above, fossil molds less evident as recovery in this interval is more rubbly than above. |
| 337 | - | 340 | Dolostone; Light Olive Gray (5Y 6/1) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Medium Recrystallization<br>Fossils: Fossil Molds<br>More gray dolostone interval that begins with rubbly recovery and pinpoint vugs. The remainder of the interval becomes more crystalline and complete core. |
| 340 | - | 345 | Dolostone; Yellowish Gray (5Y 8/1) To White (N9)<br>Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-2% |

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| | | | Other Features: Medium Recrystallization; Chalky; Friable<br>Fossils: Fossil Molds; Echinoid<br>Dolostone interval that becomes more chalky and friable with depth. Top of interval has organic laminations and the chalky feel continues through the rest of the interval. Fossil molds are very fine and become most evident at the base of the interval. |
| 345 | - | 350 | Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Interbedded; Laminated<br>Other Features: Medium Recrystallization; Weathered<br>Fossils: Fossil Molds; Echinoid<br>Interbedded dolostone interval. Where interbedding occurs between more weathered intervals with organic laminations and then crystalline dolostone with no weathering. |
| 350 | - | 354 | Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Medium Recrystallization<br>Fossils: Fossil Molds; Echinoid; Mollusks<br>Dolostone interval in which fossil molds are present throughout, and are mostly anhedral with little recrystallization showing on the outside of the core. |
| 354 | - | 357 | Dolostone; Yellowish Gray (5Y 8/1) To White (N9)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Mottled<br>Accessory Minerals: Organics-1%<br>Other Features: Low Recrystallization; Friable<br>Fossils: Fossil Molds<br>Light gray interval that with depth becomes rubbly and friable. After the organic mottling is when the interval becomes rubbly and friable. |
| 357 | - | 361 | Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Other Features: Medium Recrystallization; Weathered<br>Fossils: Fossil Molds; Mollusks; Echinoid<br>Dolostone interval that becomes more weathered with depth. Very slightly moldic but mostly |

pinpoint porosity.

361 - 363 Dolostone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization; Friable
Fossils: Fossil Molds
Light colored dolostone that has a moldic porosity throughout and has some of those molds filled with chalk like grains that rub off onto your hands. With depth this interval becomes rubbly and more friable.

363 - 367 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Burrowed
Other Features: Medium Recrystallization; Friable
Fossils: Fossil Molds; Echinoid
Differential dolostone alteration in this interval where the majority of the interval is light colored dolostone with a silty and friable feel. The more altered dolostone is dark gray hard and anhedral and is within burrows and fossil molds in the upper portion of this interval. Interval also is rubbly and does not have 100% recovery.

367 - 370 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-2%
Other Features: Low Recrystallization; Friable
Differential dolostone alteration in this interval as well. Lighter dolomitic intraclasts within gray highly mottled dolostone. Organics and iron staining present at the bottom of the interval. Rubbly recovery and not 100% recovery.

370 - 377 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Gray (N5)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-4%
Other Features: Medium Recrystallization
Dolostone interval that begins with an organic rich bed that has iron staining. Then

becomes hard dense and exhibits low permeability. That section of the interval is lighter anhedral dolostone with organic mottling and this interval ends on a sharp bedding contact.

377 - 381 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Fossils: Fossil Molds
Completely different dolostone interval than above, silty texture within core, more yellowish brown and much more porous than above. Fossil molds present throughout but not abundant.

381 - 384 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Fossils: Fossil Molds
More gray interval compared to above, rubbly recovery through most of this interval, fossil molds and pin point vugs abundant.

384 - 387 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization; Friable
Fossils: Fossil Molds
Similar to the 377' interval in color and crystallinity.

387 - 389 Dolostone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Trace sulfides in this interval. Light colored dolostone interval that is recrystallized and has pinpoint vugs throughout. Fossil molds not very abundant. With depth this interval becomes more low permeability which continues in the next interval.

389 - 390 Dolostone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration

Cement Type(s): Dolomite
Other Features: Low Recrystallization
Hard dense low permeability dolostone. Sharply contacts a laminated interval below than goes back into this lithology below.

390 - 391.5 Dolostone; Yellowish Gray (5Y 8/1) To Grayish Orange (10YR 7/4)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-3%
Other Features: Low Recrystallization; Friable
Friable organic laminated interval. When fractured the core is very friable and at the base of this bed the sample becomes hard and dense again.

391.5 - 394 Dolostone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Low permeability dolostone interval mottled with organics, mostly in the upper part of the interval. Few fossil molds present in this interval.

394 - 397.5 Dolostone; Very Light Orange (10YR 8/2) To White (N9)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Similar to above, mottled low permeability dolostone interval. Less organics than above.

397.5 - 399 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%; Calcite-<1%
Other Features: Medium Recrystallization; Weathered

Fossils: Fossil Molds
Slightly weathered and organic laminated dolostone. Trace calcite growth within the laminations.

399 - 401 Dolostone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Hard dense low permeable dolostone that has external mottled dots of extra recrystallization throughout. Organic laminations present at the base of the interval. Where in the next interval laminations are prominent.

401 - 404.5 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Interbedded
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Interbedded dolostone interval that has beds with organic laminations which has a darker color and lighter dolostone with pinpoint vugs and no laminations.

404.5 - 408.5 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization; Weathered
Clean dolostone interval that does not have many accessories or sedimentary structures. Pinpoint vugs present throughout the interval. The interval has a slightly silty texture and is weathered.

408.5 - 413.5 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization; Weathered
About 20 feet of sample in this core box (34). Not 100% recovery. This interval is very similar to the interval above. Recovery becomes rubbly toward the bottom of this interval.

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| 413.5 | - | 417 | Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Other Features: Low Recrystallization; Weathered; Friable<br>Interval similar to above, increased weathering in this interval as well as rubbly recovery in the bottom part of the interval. |
| 417 | - | 422 | Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Mottled<br>Accessory Minerals: Organics-2%<br>Other Features: Low Recrystallization<br>Chalk like texture mottled soft dolostone. Light gray and with fossil molds. This interval is not 100% recovery. |
| 422 | - | 427.8 | Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Mottled<br>Accessory Minerals: Organics-5%<br>Other Features: Medium Recrystallization; Weathered<br>Similar to above, more complete core than previous interval. Very similar lithology, increased organics in this interval. |
| 427.8 | - | 430 | Dolostone; Moderate Light Gray (N6) To White (N9)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Other Features: Low Recrystallization<br>Gray and white dolostone that is gray on the outside of the core and white within the core. With depth the interval becomes more rubbly. |
| 430 | - | 433 | Dolostone; White (N9) To Light Gray (N7)<br>Intercrystalline, Low Permeability; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Mottled<br>Accessory Minerals: Organics-3% |

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| | | | Other Features: Medium Recrystallization<br>Hard white dolostone with organics mottled throughout the interval. The organics decrease with depth in the interval and the base is marked by organic laminations of the interval below. |
| 433 | - | 437 | Dolostone; Yellowish Gray (5Y 8/1) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-5%<br>Other Features: Low Recrystallization<br>Organically laminated interval of dolostone, with depth interval becomes rubbly and less laminated. |
| 437 | - | 442 | Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization<br>Massive dolostone interval with pinpoint vugs, but not an abundant amount of them. Clean chalky dolostone that with depth increases the amount of recrystallization of the interval. |
| 442 | - | 447 | Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)<br>Intercrystalline; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Mottled; Laminated<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization<br>Similar to above, organic laminations present, but account for a small percentage of the interval. |
| 447 | - | 451 | Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-3%<br>Other Features: Medium Recrystallization<br>Similar to above, more organic laminations as well as pinpoint vugs in this interval. |
| 451 | - | 453 | Dolostone; Very Light Orange (10YR 8/2) To Light Yellowish Orange (10YR 8/6)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine |

Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Similar to above, more yellow and vugular dolostone interval. Subhedral crystallinity in this interval which gives the sample a slightly silty feel.

453 - 457 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated
Accessory Minerals: Organics-6%
Other Features: Low Recrystallization
Fossils: Fossil Molds; Gastropods
Organically mottled and laminated interval with pinpoint vugs and few large fossil molds.

457 - 460 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-3%
Other Features: Low Recrystallization
Dolostone interval with organic laminations throughout in thin laminations. Middle of the interval has less of a chalk like texture and pinpoint vugs.

460 - 463 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Low Recrystallization
Fossils: Fossil Molds
Massive subhedral dolostone with pinpoint vugs and few fossil molds.

463 - 465 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Low Recrystallization
Dolostone interval with organic laminations. Top of the interval has more pinpoint vugs and

more recrystallization and with depth the organic laminations appear and recrystallization is consistent for the interval.

465 - 467 Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-3%
Other Features: Low Recrystallization
Similar to above, more consistent lithology with thin organic laminations.

467 - 469 Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Low Recrystallization
Similar to above, less thin organic laminations.

469 - 470.5 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Similar to above, increased recrystallization and increased organic laminations.

470.5 - 473 Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Dolostone interval similar to above, slightly more weathered interval with more pinpoint vugs and fossil molds.

473 - 474 Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite

Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Low Recrystallization
Similar to above, almost the exact same color core. Organic laminations present and less pinpoint vugs than above.

474 - 477 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Gastropods
Dolostone interval similar to above, in this interval there is increased recrystallization and more pinpoint vugs and fossil molds. Organic laminations thin and only at 475' in this interval.

477 - 478 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Shorter dolostone interval similar to above, more white in color and more chalk like texture than above, but consistent amount of pinpoint vugs.

478 - 483.8 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-4%
Other Features: Medium Recrystallization; Weathered
Fossils: Fossil Molds; Echinoid
Organically laminated dolostone interval. Moderate recrystallization throughout and weathered sample at the top of the interval. Pinpoint vugs are very fine in this interval.

483.8 - 487 Dolostone; Light Gray (N7) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Massive
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization

Fossils: Fossil Molds; Gastropods
Massive dolostone interval with some organic laminations throughout the interval. The top and bottom of this interval are marked by moldic gray dolostone, this gray dolostone is more anhedral and hard compared to the samples around it.

487 - 490.3 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled; Massive
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Weathered
Fossils: Fossil Molds
Similar to above, massive light colored dolostone. Few organic laminations throughout interval with mottling of organics as well. Weathering present at 488'-489'. Fossil molds very fine but present, and top of interval when fractured is iron stained, staining is not seen anywhere else in the interval.

490.3 - 492.6 Dolostone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%
Other Features: Low Recrystallization
Massive dolostone interval with sporadic organic mottling. Recrystallization is present throughout. Interval ends with similar lithology but becomes rubbly.

492.6 - 494.8 Dolostone; Yellowish Gray (5Y 8/1) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-6%
Other Features: Medium Recrystallization
Similar to above, more rubbly and organically laminated interval. Sharp contact at base of the interval to more moldic dolostone.

494.8 - 499.7 Dolostone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Massive

Accessory Minerals: Organics-3%; Iron Stain-<1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Massive dolostone with organic mottling throughout and pinpoint vugs. With depth this interval darkens in color and becomes more anhedral.

499.7 - 501 Dolostone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization; Weathered
Light dolostone interval with weathering at the top of the interval, base of interval is a distinct color change and organic bed. Few pinpoint vugs at the top of the interval.

501 - 504.5 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds
Massive dolostone with organic laminations at the top of the interval and mottling throughout the rest of the interval. Fossil molds and pinpoint vugs abundant throughout. With depth the pinpoint vugs have less abundance.

504.5 - 508 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-5%
Other Features: Medium Recrystallization
Dolostone interval that is rubbly at the top and bottom of the interval. Organically laminated and mottled dolostone with abundant pinpoint vugs. With depth organics dissipate.

508 - 512.5 Dolostone; White (N9) To Yellowish Gray (5Y 7/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-2%
Other Features: Low Recrystallization

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| | | | Massive lighter colored dolostone with sporadic organic laminations and mottling. Rubbly recovery at top of the interval but consistent core with depth. Pinpoint vugs present throughout but not abundant especially not within the center of the core. |
| 512.5 | - | 517 | Dolostone; White (N9) To Yellowish Gray (5Y 8/1)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-2%<br>Other Features: Low Recrystallization<br>Not 100% recovery. Massive mottled dolostone, light color but not super dense and low permeability as other samples that have this look possess. Three feet of sample that is represented by five feet in the core box. |
| 517 | - | 520.5 | Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated; Interbedded<br>Accessory Minerals: Organics-3%<br>Other Features: Medium Recrystallization<br>Dolostone interval that has pinpoint vugs at different times within the interval. It is interbedded with organically laminated with no pinpoint vugs. This occurs in between the vugular beds and at the base of the interval. |
| 520.5 | - | 523 | Dolostone; White (N9) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated; Massive<br>Accessory Minerals: Organics-2%<br>Other Features: Low Recrystallization<br>Light colored dolostone with low recrystallization and organic laminations in the middle of the interval, after the organics the color turns slightly more yellow and has pinpoint vugs. |
| 523 | - | 528 | Dolostone; Yellowish Gray (5Y 7/2) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated; Mottled<br>Accessory Minerals: Organics-3%<br>Other Features: Low Recrystallization |

Dolostone interval that is low permeability through much of the interval but still has sporadic pinpoint vugs. Organic laminations present as well as organic mottling.

528 - 530.5 Dolostone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Not 100% recovery. Light color dolostone similar to above, but no evident organic laminations or pinpoint vugs.

530.5 - 533.1 Dolostone; Grayish Brown (10YR 6/2) To Moderate Light Gray (N6)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-7%
Other Features: High Recrystallization
Not 100% recovery. Large organic bed at the top of the interval followed by silty mottled dolostone, followed by silicified dark brown dolostone. Odd interval with not 100% recovery and this silicified dolostone continuing into the next box and having an uncomfortable contact

533.1 - 538 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated
Accessory Minerals: Organics-7%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds
Recrystallized dolostone interval with abundant pinpoint vugs and fossil molds. Organic mottling throughout interval with few organic laminations. Middle of interval more silty than surrounding dolostone.

538 - 543 Dolostone; Grayish Brown (10YR 6/2) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated
Accessory Minerals: Organics-8%
Other Features: Medium Recrystallization; Fossiliferous

Fossils: Fossil Molds
Similar to above, larger organic laminations in this interval with secondary mineral growth, needle like crystals, within the organics.

543 - 546 Dolostone; Dark Yellowish Brown (10YR 4/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated
Accessory Minerals: Organics-7%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid
Interval similar to above, less abundant pinpoint vugs in this interval compared to above, vugs still present. Large organic bed at base of interval creating a sharp contact to much whiter dolostone of the next interval.

546 - 551 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated; Massive
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization
Lighter, hard, dense, low permeability dolostone. Lighter color dolostone with organic laminations and mottling. Pinpoint vugs become present toward the bottom of the interval where it also becomes slightly rubbly.

551 - 555 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Massive
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Similar to above, dolostone interval begins with rubbly dolostone but majority of interval is massive low permeability dolostone with organics mottled throughout.

555 - 555.8 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-1%

Other Features: Medium Recrystallization
Light colored anhedral dolostone interval. Abundant pinpoint vugs in the interval and with depth the inside of the core has organic laminations and the texture becomes a little chalk like.

555.8 - 561 Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Burrowed
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Massive dolostone interval with abundant pinpoint vugs throughout. Organics mottled throughout the interval and filled inside few fossil molds. Large burrow found at 557.5'. Light brown color is becoming increasingly brown with depth in the next few intervals.

561 - 566 Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Gastropods; Cones; Echinoid
Similar to above, light brown anhedral dolostone with abundant pinpoint vugs. Less organics than above, but they are still evident. More larger fossil molds in this interval.

566 - 569 Dolostone; Grayish Orange (10YR 7/4) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-6%
Other Features: Low Recrystallization
Softer organic rich dolostone interval. Organically laminated and mottled dolostone that is more friable less crystalline compared to intervals above and below. Has rubbly recovery.

569 - 573 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%

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| | | | Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Cones; Echinoid; Gastropods<br>Darker brown dolostone, the darkest dolostone interval within 50 feet. Larger fossil molds in this interval. Organic mottling at the bottom of the interval and the color change bedding contact happens abruptly. |
| 573 | - | 578 | Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Calcite-1%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Similar to above, lighter brown in color and more fine sized fossil molds. Rubbly recovery at the bottom of the interval. |
| 578 | - | 583 | Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Calcite-1%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Very similar to above. Some secondary calcite growth within some fossil molds. |
| 583 | - | 585.2 | Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Mottled; Massive<br>Accessory Minerals: Organics-2%; Calcite-<1%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Similar to above, organic mottling through interval and within some fossil molds. Calcite growth present but not as evident as above. |
| 585.2 | - | 586 | Dolostone; Grayish Orange (10YR 7/4) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated |

Accessory Minerals: Organics-3%
Other Features: Low Recrystallization
Short bed of organically laminated dolostone between larger beds of the abundant pinpoint vugged dolostone. Pinpoint vugs present in this interval but not in the abundance as above. Interval ends where pinpoint vugs once again become abundant.

586 - 587 Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-2%
Other Features: Low Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones
Similar to previous intervals above. Abundant pinpoint vugged dolostone with mottled organics and organics filling fossil molds.

587 - 591 Dolostone; Grayish Orange (10YR 7/4) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones
Rubbly recovery of dolostone with abundant pinpoint vugs. Interval becomes complete core halfway through interval and the interval ends when organic laminations become evident in lighter colored dolostone.

591 - 594.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Interbedded; Laminated; Mottled
Accessory Minerals: Organics-3%; Calcite-<1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones
Interbedded dolostone interval where organically laminated chalk like textured dolostone is interbedded with recrystallized dolostone with abundant pinpoint vugs. Organic mottling within some fossil molds. Trace secondary crystal growth within fossil molds.

594.5 - 597 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine

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| | | | Good Induration<br>Cement Type(s): Dolomite<br>Accessory Minerals: Calcite-<1%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds<br>Dolostone interval similar to above, calcification of fossil molds, few of which still remain in the core. Interval becomes rubbly at base of interval. |
| 597 | - | 603 | Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Accessory Minerals: Quartz-1%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Recrystallized dolostone interval similar to above, similar quartz growth within fossil molds followed by rubbly recovery, and in this interval larger molds have secondary quartz growth. Interval ends at organic laminations where pinpoint vugs dissipate. |
| 603 | - | 608 | Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Mottled<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Similar to above, no evident fossil molds with calcite growth. Organics mottled sporadically throughout interval. Base of interval is rubbly again. |
| 608 | - | 610.5 | Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Chalk like textured dolostone but still recrystallized and with pinpoint vugs. Chalky at top of interval and at the base where organic laminations occur. |
| 610.5 | - | 613.5 | Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine |

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| | | | Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Recrystallized dolostone interval similar to previous intervals above. Recrystallized throughout, pinpoint vugs are abundant throughout interval as well as fine fossil molds. |
| 613.5 | - | 617 | Dolostone; Grayish Orange (10YR 7/4) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Mottled<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones |
| 617 | - | 620 | Dolostone; Grayish Orange (10YR 7/4) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Similar to above, 100% recovery in this interval. Very similar lithology with abundant pinpoint vugs and fossil molds. |
| 620 | - | 625 | Dolostone; Grayish Orange (10YR 7/4) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled; Laminated<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization; Friable; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Dolostone that is similar to above, it also has organic laminations and is friable around the organics. Rubbly recovery in almost the entire interval. |
| 625 | - | 630 | Dolostone; Grayish Orange (10YR 7/4) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-1% |

Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Cones
Similar dolostone interval to above. Rubbly section within the middle of the core. More fine pinpoint vugs and fossil molds in this interval.

630 - 632 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-1%
Other Features: Low Recrystallization
Lighter colored low permeability dolostone interval with abundant pinpoint vugs and more of a silty texture within the core.

632 - 635 Dolostone; Grayish Orange (10YR 7/4) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds
Rubbly recovery at the top of the interval, with less vuggy dolostone mottled with organics at the base of the interval.

635 - 638.2 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization
Lighter colored dolostone with anhedral crystallinity throughout and pin point vugs on the outside of the core. Low permeability throughout with organic laminations more prevalent toward the base of the interval.

638.2 - 642.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%; Quartz-1%

Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid
Dolostone interval that has secondary quartz growth at 639.5'. Recrystallized interval with organics laminations. Interval ends after an organic lamination when lithology becomes lighter in color after the lamination.

642.5 - 646.5 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization
Similar to above, this dolostone is lighter in color and has abundant pinpoint vugs with anhedral crystallinity.

646.5 - 651.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Chalky
Similar to above, this dolostone interval has more rubbly recovery and silty texture to the core. Organic laminations present but not very prominent.

651.5 - 656 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Similar to above in look of core, this dolostone interval is more dense and low permeability than above. The interval has a sharp bedding contact at 656' at an organic lamination that separates the intervals. Pinpoint vugs abundant with some organic vug fill throughout the interval.

656 - 661.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Interbedded; Massive
Accessory Minerals: Organics-1%
Other Features: Fossiliferous; Medium Recrystallization

Fossils: Fossil Molds; Echinoid
Massive anhedral dolostone interval interbedded with subhedral chalk like textured dolostone. Pinpoint vugs prominent in the anhedral dolostone and a low percentage of organics are seen within the interval.

661.5 - 666.3 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-1%; Quartz-<1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones; Gastropods
Interval is similar to above in dolostone with abundant pinpoint vugs. This interval has large fossil molds throughout interval. The base of the interval is marked with organic laminations.

666.3 - 668.3 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Accessory Minerals: Organics-1%; Quartz-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones; Gastropods
Similar to above, this interval has a rubbly return and organics are seen as vug fill in some pinpoint vugs and fossil molds.

668.3 - 671 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: High Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds; Echinoid; Cones; Gastropods
Dolostone interval with abundant pinpoint vugs. With depth the interval is lower permeability and has differential recrystallization within vug and mold space at the base of the interval.

671 - 673.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%

Other Features: Fossiliferous; Low Recrystallization
Fossils: Fossil Molds; Echinoid; Cones
Slightly rubbly dolostone interval where an organic lamination sits within a complete section of the interval. With depth the pinpoint vugs become more fine.

673.5 - 677 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Fossiliferous; Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Cones
Dolostone interval similar to above in color. Massive consistent dolostone with abundant pinpoint vugs and moderate recrystallization throughout.

677 - 680 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-<1%
Other Features: High Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones; Gastropods
Highly moldic and recrystallized dolostone interval where recrystallization is high, but less so around vugs and molds. With depth the recrystallization takes over the vug and mold space and lessens in the pore space with depth. Trace organics mottled through the interval and fill in some fossil molds.

680 - 684.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-4%
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Cones
Interval similar to above in color, this dolostone interval has a decreased number of pinpoint vugs and increased organic laminations. Crystallinity is anhedral but interval is permeable.

684.5 - 689 Dolostone; Very Light Orange (10YR 8/2) To White (N9)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite

Sedimentary Structures: Laminated
Accessory Minerals: Organics-4%
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid
Similar dolostone interval to above. Organic laminations present and thick to upwards of multiple inches at the bottom of the interval. Next interval is a no recovery interval. This shows that most likely more organics were present and too soft to be recovered by drillers.

689 - 690.5 No Sample;

690.5 - 692 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Dolostone interval with few pinpoint vugs and molds. Organic laminations through the interval and base of interval is marked with a sharp contact of vuggy dolostone.

692 - 695.5 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Organics-<1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones
Dolostone interval similar to above, Organic laminations present starting at 695.5'.

695.5 - 698.5 Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-4%
Other Features: Low Recrystallization
Dolostone with an increased amount of organics. The top of the interval is marked by organic laminations. By the base of the interval organics are less evident but the base is marked by an organic bed with good induration.

698.5 - 702 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine

Good Induration
Cement Type(s): Dolomite
Accessory Minerals: Organics-<1%
Other Features: Medium Recrystallization
Dolostone interval that is hard and dense but still permeable and has few pinpoint vugs.

702 - 707 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-3%
Other Features: Low Recrystallization
Dolostone interval with mottled organics. As well as differential recrystallization in large vugs. Interval below is similar but more crystalline.

707 - 709.8 Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-4%
Other Features: Low Recrystallization
Similar to above, with same differential recrystallization and mottled organics. Base of interval is large organic bed that has been recrystallized as well.

709.8 - 714.8 Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Organics-<1%
Other Features: Medium Recrystallization
Massive low permeability dolostone. Few pinpoint vugs on the outside of the core.

714.8 - 720 Peat; Black (N1) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline
Poor Induration
Cement Type(s): Organic Matrix
Sedimentary Structures: Interbedded
Accessory Minerals: Dolomite-25%
Interbedded dolostone and peat interval. Highly organically laminated dolostone marks the top of the interval, than a peat bed persists for three feet. Laminated anhedral dolostone for another foot followed by more peat and very rubbly laminated dolostone to mark the end

of the interval.

720 - 722.5 Dolostone; Very Light Orange (10YR 8/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%; Quartz-<1%
Other Features: Medium Recrystallization
Organic laminations continue at the top of the interval and with depth organics decrease to trace by the end of the interval. Low permeability dolostone with some pinpoint vugs. Some secondary crystal growth within said vugs.

722.5 - 726.8 Dolostone; Grayish Orange (10YR 7/4) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Low Recrystallization
Dolostone interval that has more pinpoint vugs than above. The base of interval is marked by more brown sucrosic dolostone.

726.8 - 729.5 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization
Fossils: Fossil Molds
More massive anhedral dolostone interval. Abundant pinpoint vugs throughout interval.

729.5 - 733 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%; Quartz-<1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Cones; Gastropods; Echinoid
Massive dolostone interval that with depth becomes more moldic and has trace secondary quartz growth within some mold space.

733 - 737 Dolostone; Very Light Orange (10YR 8/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral

Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Quartz-2%; Organics-2%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Gastropods; Echinoid
Similar to above, but this interval is more moldic and has more secondary quartz growth, as well as organic laminations and a higher level of recrystallization.

737 - 739.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Accessory Minerals: Quartz-2%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Coral; Gastropods
Frosted quartz not connected to dolostone at the top of the interval. Anhedral dolostone interval with abundant pinpoint vugs, and a gradational bedding contact at the base of the interval.

739.5 - 744 Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Dolostone interval where organically laminated dolostone grades into more anhedral crystalline dolostone. Pinpoint vugs become present with depth in the more crystalline dolostone. This interval has a gradational bedding contact.

744 - 748 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds; Echinoid; Mollusks; Gastropods
Fossiliferous dolostone interval more so than above. Anhedral dolostone with a sucrosic look inside few fossil molds.

748 - 753 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Quartz-<1%; Organics-<1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid
Similar to above, more pinpoint vugs compared to larger fossil molds of above. Interval gets slightly silty toward the bottom of the interval.

753 - 757.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Accessory Minerals: Quartz-3%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Mollusks; Cones
Dolostone interval that begins similar to above, but increases recrystallization level with depth. Quartz secondary crystal growth in some vugs and around a small poor recovery zone near the base of the interval.

757.5 - 762 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds
More massive dolostone interval, slightly lower amount of recrystallization and pinpoint vugs than above. This interval with depth has organic laminations at 760.5' and with depth becomes more silty and has chalk like texture.

762 - 765.5 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 7/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Burrowed
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Cones; Echinoid
Sharp bedding contact to more recrystallized vuggy dolostone similar to previous intervals above. Burrowed molds at the top of the interval and with depth the interval becomes

slightly more yellow gray.

765.5 - 769 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 7/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Cones; Echinoid
Dolostone interval similar to above, abundant pinpoint vugs and fine fossil molds throughout the interval with a moderate amount of recrystallization of the interval.

769 - 771 Dolostone; Very Light Orange (10YR 8/2) To White (N9)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Burrowed
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Fossiliferous; Chalky
Fossils: Fossil Molds
Dolostone interval, more recrystallized and dense than above, but still similar. The base of the interval becomes chalky and organics laminations mark the base of the interval.

771 - 774.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds
interval similar to above, overall lower recrystallization than above. This interval has more abundant pinpoint vugs throughout the interval. At the base of the interval the bedding contact grades to more crystalline and less pinpoint vug porosity of the interval below.

774.5 - 777.5 Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated; Interbedded
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Cones; Echinoid

Dolostone interval similar to above, interbedded with more crystalline dolostone with organic laminations and mottled organics. Mottled organics dispersed throughout the entire interval. Crystalline dolostone within the interval is silty when fractured, lower permeability than the rest of the interval but still permeable.

777.5 - 780.7 Dolostone; Grayish Orange (10YR 7/4) To White (N9)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%
Other Features: High Recrystallization
Fossils: Fossil Molds; Cones
More crystalline dense low permeability dolostone interval than above. Base of interval is marked by an organic lamination and overall color change for the intervals below.

780.7 - 784 Dolostone; Grayish Brown (10YR 6/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-2%
Other Features: High Recrystallization
Fossils: Fossil Molds; Cones; Echinoid
Dolostone interval similar to above, top of interval marked by an organic lamination, at 783' the color darkens but goes back to the dominant color of the interval. The next interval is consistent with the darker color that is sparsely seen in this interval.

784 - 787.5 Dolostone; Dark Yellowish Brown (10YR 4/2) To Dark Yellowish Orange (10YR 6/6)
Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-5%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
More brown dolostone interval with organic laminations throughout the interval. With depth by the base of the interval the lithology is almost completely white in color, but still has crystalline and silty feel of the rest of the interval.

787.5 - 792 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration

Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-3%; Quartz-1%
Other Features: Medium Recrystallization
Lighter colored massive dolostone interval with organic laminations and mottling in the upper half of the interval. The bottom half has secondary quartz growth, but consistent lithology. Minimal organics in the bottom half of the interval except the base of the interval is marked with another organic lamination. After the interval pinpoint porosity dominates.

792 - 796.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones
More vugular interval with fossil molds throughout. At 796' the interval has organics and becomes rubbly until the end of the interval.

796.5 - 799 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Quartz-2%; Organics-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones
Interval similar to above, less organics and in this interval secondary quartz crystal growth is evident within fossil molds and on the outside of the core.

799 - 804 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Quartz-5%; Organics-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Cones; Echinoid
Massive recrystallized dolostone interval with abundant pinpoint vugs and fine fossil molds. Quartz crystal growth in this interval is highest accumulation in one interval seen thus far. Organic lamination at 802', after the lamination recrystallization increases slightly quartz crystals are seen in much less abundance.

804 - 808 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Quartz-2%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones
Interval similar to above, rubbly recovery at the base of the interval. Not 100% recovery. Secondary quartz growth present throughout the interval. Silty feel at the base of the interval in the rubbly recovery. Abundant fine fossil molds and pinpoint vugs.

808 - 813 Dolostone; Very Light Orange (10YR 8/2) To White (N9)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones
Lighter colored dolostone similar to above, this interval has organics throughout as well as in laminations. Rubbly and chalk like textured recovery around the organics in this interval. As well as organics in some fossil molds.

813 - 817 Dolostone; Very Light Orange (10YR 8/2) To Light Olive Gray (5Y 6/1)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Mollusks; Gastropods; Echinoid; Cones
Highly moldic dolostone interval with a very small section of the interval being olive gray. Molds persist through the entire interval and are larger than previous intervals.

817 - 819 Dolostone; Very Light Orange (10YR 8/2) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid
Light colored dolostone interval similar to above, much lower amount of fossil molds

compared to above. This interval has organics mottled throughout and organic laminations at the base of the interval.

819 - 824 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled; Burrowed
Accessory Minerals: Organics-4%; Quartz-2%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid; Cones
Interval similar to above, this interval has burrows and the burrows are filled with organics. Organic laminations, mottling present in this interval.

824 - 829 Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-3%; Quartz-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Cones
Not 100% recovery. Similar interval to above, this interval has organics and abundant fossil molds. Rubbly recovery at the end of box 73 and more complete recovery to end the interval.

829 - 833 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Quartz-2%
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Cones; Gastropods; Mollusks
Dolostone interval similar to above, abundant pinpoint vugs and fossil molds as well as quartz growth in this interval especially around rubbly and silty sections of this interval.

833 - 837.2 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated

Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds; Echinoid; Cones; Mollusks
Recrystallized dolostone interval that is similar to above, has a abundant pinpoint vug section within the interval that has organics laminations, and with depth the abundant vugs return and becomes sucrosic by the end of the interval.

837.2 - 842.2 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds; Echinoid; Cones
Similar to above, abundant pinpoint vugs and recrystallization throughout. Thin organic laminations at points in the interval and with depth the interval gets a chalk like texture.

842.2 - 845.5 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%; Quartz-<1%
Other Features: Medium Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds; Echinoid; Cones
Similar to above in overall recrystallization and vugs, but this interval has more chalk like texture.

845.5 - 849.2 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-3%; Quartz-<1%
Other Features: Medium Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds; Echinoid; Cones
Similar to above, more low permeability toward the bottom of the interval, this interval at the base marks a sharp contact with dolostone with a very high organic content.

849.2 - 855.7 Dolostone; Grayish Brown (10YR 6/2) To Dark Yellowish Brown (10YR 2/2)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration

Cement Type(s): Dolomite
Dolostone interval similar to above.

855.7 - 859 Dolostone; Light Olive Gray (5Y 6/1) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Mottled
Accessory Minerals: Organics-10%
Other Features: Low Recrystallization; Calcareous
Calcareous dolostone with organics and low recrystallization. Light color dolostone that follows a distinct organic bed, Lower level of induration in this interval and base of interval marked by induration change.

859 - 860.7 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Similar to above, more complete and well indurated dolostone interval. This interval grades into a sucrosic texture and that texture persists for the next couple boxes.

860.7 - 864 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-4%
Other Features: Medium Recrystallization; Sucrosic
Massive sucrosic dolostone with organics mottled throughout. Interval becomes more crystalline with depth.

864 - 869 Dolostone; Dark Yellowish Brown (10YR 4/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Interbedded
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Darker crystalline dolostone interval. This interval is interbedded with a more weathered, grainy dolostone with fracture porosity. By the base of this interval sucrosic texture

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| | | | dominates. |
| 869 | - | 874 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization; Sucrosic; Calcareous<br>Massive sucrosic dolostone that at the top of the interval is mottled with organics. Slightly calcareous throughout the interval with lighter colored grains dispersed throughout. |
| 874 | - | 879 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)<br>Intercrystalline; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-2%; Quartz-1%<br>Other Features: Medium Recrystallization; Sucrosic<br>Similar to above, secondary quartz grains becoming visible in matrix. |
| 879 | - | 884 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)<br>Intercrystalline; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Quartz-2%; Organics-1%<br>Other Features: Medium Recrystallization; Sucrosic<br>Not 100% recovery. Similar to above, this interval has more quartz in it due to secondary recrystallization. Slightly rubbly recovery at points. |
| 884 | - | 889 | Dolostone; Dark Yellowish Orange (10YR 6/6) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-2%; Quartz-<1%<br>Other Features: Medium Recrystallization; Sucrosic<br>Similar to above, quartz present but much less than above and much more fine grained. |
| 889 | - | 894 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)<br>Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Subhedral |

Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Interval similar to above, more complete recovery and a higher degree of recrystallization in this interval. Sucrosic and mottled organics throughout.

894 - 899 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Similar to above, organics mottled throughout. Pinpoint vugs becoming more abundant and distinguishable from the sucrosic texture.

899 - 904 Dolostone; Dark Yellowish Orange (10YR 6/6) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Sucrosic; Calcareous
Similar to above, pinpoint vugs less abundant and evident in this interval. Calcareous to a low degree as light colored grains persist within the matrix and react to HCl more significantly than surrounding grains. The calcareous dolostone has been noticeable since the large organic interval in the 850's.

904 - 907.5 Dolostone; Dark Yellowish Orange (10YR 6/6) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Sucrosic; Calcareous
Fossils: Fossil Molds; Echinoid
Dolostone interval similar to above, this interval has a higher degree of induration as well as more visible and larger fossil molds.

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| 907.5 | - | 910 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization; Sucrosic; Calcareous<br>Fossils: Fossil Molds; Echinoid<br>Similar to above, not as high a level of induration as above, but similar abundant echinoid fossil molds. |
| 910 | - | 914 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-3%<br>Other Features: Medium Recrystallization; Sucrosic; Calcareous<br>Fossils: Fossil Molds<br>Similar to above, base of interval is marked by higher degree of recrystallization and larger fossil molds. |
| 914 | - | 917 | Dolostone;<br>Intercrystalline, Fracture; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Mottled<br>Accessory Minerals: Quartz-2%; Organics-1%<br>Other Features: Medium Recrystallization; Sucrosic<br>Fossils: Fossil Molds; Echinoid<br>Not 100% recovery. More weathered and fractured dolostone with quartz vug fill. Rubbly recovery toward the base of interval, and increased degree of recrystallization. |
| 917 | - | 922 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Low Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid<br>Highly fossiliferous dolostone interval, fossils are in the process of being dolomitized. Molds are abundant in this interval. |

922 - 925 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Low Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid
Similar to above, low amounts of differential recrystallization that look like laminations in this interval. Abundant fossils and pinpoint molds throughout and at the base of this interval the sample becomes more crystalline and less moldic.

925 - 929.5 Dolostone; Dark Yellowish Orange (10YR 6/6) To Grayish Orange (10YR 7/4)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Interbedded; Laminated
Accessory Minerals: Organics-2%
Other Features: High Recrystallization; Medium Recrystallization; Sucrosic
Dolostone interval with mottling at the top of the interval of differential recrystallization. With depth the interval becomes interbedded with sucrosic dolostone that has organic laminations. Crystalline interval has more of a high level of recrystallization than the sucrosic beds.

929.5 - 934.5 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: Medium Recrystallization
Mostly massive anhedral dolostone, parts of this interval are mottled with differential recrystallization giving it a more sucrosic look similar to a lot of surrounding lithology. Base of interval becomes rubbly.

934.5 - 938 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Similar to above, rubbly recovery for entire interval, pinpoint vugs become more abundant with depth in interval. With mottling returning marking the base of this interval.

938 - 943 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-5%; Quartz-1%
Other Features: Medium Recrystallization; Sucrosic
Similar to above, mottled and laminated with organics. Secondary quartz growth present as well. Mottling of differential recrystallization throughout interval. That section of dolostone has mostly subhedral crystallinity.

943 - 948 Dolostone; Dark Yellowish Orange (10YR 6/6) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-4%; Quartz-2%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds; Echinoid
More sucrosic dolostone interval.

948 - 952 Dolostone; Dark Yellowish Orange (10YR 6/6) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-4%; Quartz-2%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Very similar to above, grades into more crystalline dolostone at the base of the interval.

952 - 957 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-3%; Quartz-1%
Other Features: Medium Recrystallization
More crystalline dolostone interval, organics present in laminations and mottling. Mottling of differential recrystallization as well.

957 - 961.5 Dolostone; Dark Yellowish Brown (10YR 4/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral

Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-3%; Quartz-2%
Other Features: High Recrystallization
Fossils: Fossil Molds; Echinoid
Crystalline dolostone interval similar to above. Organically laminated sections as well as mottled throughout the interval. Quartz growth in vug fill and in parts totally recrystallized core.

961.5 - 964 Dolostone; Grayish Orange (10YR 7/4) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-5%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
More sucrosic dolostone interval with mottled and laminated organics. Fossil molds present throughout the interval.

964 - 967.5 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Interbedded; Laminated; Mottled
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Dolostone interval with interbeds of highly crystalline dolostone and sucrosic organically laminated dolostone. Similar to intervals seen above, but this interval the beds are large enough to call the interval interbedded.

967.5 - 972 Dolostone; Dark Yellowish Orange (10YR 6/6) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-6%; Quartz-1%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds
Rubbly recovery at the middle of the interval. Organics present as well as secondary quarts growth. Organics more noticeable in this interval due to the rubbly recovery.

972 - 976 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-5%; Quartz-1%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Dolostone interval similar to above, organics present as laminations and mottled throughout. Rubbly at parts and secondary quarts growth is present.

976 - 981 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Orange (10YR 6/6)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-2%; Quartz-1%
Other Features: Medium Recrystallization
Massive dolostone interval, mostly anhedral, small section of interval with organic laminations and slightly more grainy than surrounding core.

981 - 986 Dolostone; Dark Yellowish Orange (10YR 6/6) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated; Interbedded
Accessory Minerals: Organics-5%; Quartz-1%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Massive dolostone interval similar to above, more sucrosic texture than crystalline dolostone in this interval than above. Which is the lithology that persists with depth.

986 - 990.5 Dolostone; Dark Yellowish Orange (10YR 6/6) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-5%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid; Gastropods
Sucrosic dolostone interval, mottled organics throughout the interval. Fossiliferous, fossil still not completely dolomitized. Fossil molds more evident in this interval than others above.

990.5 - 994 Dolostone; Dark Yellowish Orange (10YR 6/6) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid; Gastropods
Similar to above, this interval toward the base becomes more recrystallized and less sucrosic. The fossil molds become more evident and that continues with depth.

994 - 999 Dolostone; Dark Yellowish Orange (10YR 6/6) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-4%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid; Gastropods
Massive dolostone bed that is similar to the base of the previous interval. This interval is recrystallized and sucrosic at the same time, partial total recrystallization of dolostone, where about half the crystals are subhedral and half are anhedral. Organics mottled throughout as well as fossil molds.

999 - 1002 Dolostone; Dark Yellowish Orange (10YR 6/6) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid; Gastropods
Very similar to above, interval base is marked by a transition to more crystalline than sucrosic dolostone.

1002 - 1005.5 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds
More crystalline dolostone interval with fossil molds and a moderate degree of recrystallization.

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| 1005.5 | - | 1007 | Dolostone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Moldic; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization; Calcareous; Fossiliferous<br>Fossils: Fossil Molds; Echinoid<br>Moldic dolostone that has a calcareous component. Rubbly recovery in this interval around the calcareous sections. |
| 1007 | - | 1012 | Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)<br>Intercrystalline, Moldic, Fracture; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled; Laminated<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization; Calcareous; Fossiliferous; Sucrosic<br>Fossils: Fossil Molds; Echinoid; Gastropods<br>Interval similar to above, some sections of this mottled interval have sucrosic texture, are calcareous, and crystalline. Fossil molds present throughout. |
| 1012 | - | 1016.5 | Dolostone; Dark Yellowish Orange (10YR 6/6) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline, Moldic; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Quartz-2%; Organics-1%<br>Other Features: Medium Recrystallization; Fossiliferous; Calcareous; Sucrosic<br>Fossils: Fossil Molds; Echinoid; Gastropods<br>Interval similar to above, with depth the interval grades into more complete crystalline dolostone. By the end of the interval the rocks darken and have less molds. |
| 1016.5 | - | 1021 | Dolostone; Dark Yellowish Brown (10YR 4/2) To Dark Yellowish Brown (10YR 2/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-6%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds; Echinoid; Gastropods<br>Darker crystalline dolostone interval, with depth the interval becomes more crystalline but fossils are still visible. |

1021 - 1026 Dolostone; Dark Yellowish Brown (10YR 4/2) To Dark Yellowish Brown (10YR 2/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-8%
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds; Echinoid
Similar to above, massive dolostone with laminated and mottled organics.

1026 - 1031 Dolostone; Dark Yellowish Brown (10YR 4/2) To Dark Yellowish Brown (10YR 2/2)
Intercrystalline, Fracture; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-5%
Other Features: Medium Recrystallization; Friable
Dolostone interval that is friable at the top of the interval with mottled organics, with depth the interval becomes more crystalline and less friable. Recovery also becomes rubbly toward the base of the interval and into the next few intervals.

1031 - 1036 Dolostone; Dark Yellowish Brown (10YR 4/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Not 100% recovery. Massive gray rubbly recovery dolostone. Consistent anhedral dolostone.

1036 - 1041 Dolostone; Grayish Brown (10YR 6/2) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Not 100% recovery. Dolostone interval similar to above. Sections of the interval have subhedral grainy dolostone mottling, and with depth the interval is less rubbly and more complete core.

1041 - 1044 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline; Highly (50-90%); Anhedral

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| | | | Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization<br>Massive dolostone interval of complete core and recovery. |
| 1044 | - | 1047 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Interbedded<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization<br>Similar to above. Interbedded grainy dolostone with organic laminations. This grainy subhedral dolostone interval persist after 1047' for another 3 feet. |
| 1047 | - | 1050 | Dolostone; Grayish Orange (10YR 7/4) To Light Yellowish Orange (10YR 8/6)<br>Intercrystalline; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Moderate Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-3%<br>Other Features: Medium Recrystallization; Sucrosic; Friable<br>Friable dolostone interval, with organic laminations. Sharply contacts massive dense crystalline dolostone to mark the base of this interval. |
| 1050 | - | 1055 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Low Permeability; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: High Recrystallization<br>Massive low permeability dark hard dense dolostone. |
| 1055 | - | 1059 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds |

Dolostone interval similar to above, this interval grades into subhedral grained dolostone with sporadic fossil molds. Organics mottled throughout the interval, mostly in the subhedral section of the interval.

1059 - 1064 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Low Permeability, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization
Dolostone interval similar to above, more crystalline and low permeability.

1064 - 1067.5 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization
Similar to above, massive dolostone with very few vugs and complete crystallinity.

1067.5 - 1072.5 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization
Similar to above, last two feet of the interval becomes rubbly.

1072.5 - 1077.1 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization
Similar to above, massive dolostone interval. Rubbly at parts and grades into a light colored highly calcareous interval. Possible base of Avon Park Formation.

1077.1 - 1082 Grainstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Possibly High Permeability; Highly (50-90%); Subhedral
Grain Type: Skeletal; Crystals
Grain Size: Very Fine; Range: Very Fine To Medium
Moderate Induration
Cement Type(s): Calcilutite Matrix; Dolomite

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| | | | Accessory Minerals: Dolomite-10%<br>Other Features: Medium Recrystallization; Fossiliferous; Dolomitic<br>Fossils: Fossil Molds; Fossil Fragments; Echinoid; Gastropods<br>Large missing interval within this box. 19 feet of core recovery in a box that should be 10 feet. Possible cavity. Core makes a sharp contact with a slightly dolomitic grainstone interval. Core is less indurated than crystalline dolostone than above. |
| 1082 | - | 1087 | Grainstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Possibly High Permeability; Highly (50-90%); Subhedral<br>Grain Type: Skeletal; Crystals<br>Grain Size: Fine; Range: Very Fine To Medium<br>Moderate Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Dolomite-10%<br>Other Features: Medium Recrystallization; Fossiliferous; Dolomitic<br>Fossils: Fossil Molds; Fossil Fragments; Echinoid; Gastropods<br>Similar to above, same box with 19 feet of recovery. Trace sulfides in this interval. |
| 1087 | - | 1092 | Grainstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Possibly High Permeability; Highly (50-90%); Subhedral<br>Grain Type: Skeletal; Crystals<br>Grain Size: Very Fine; Range: Very Fine To Medium<br>Moderate Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Dolomite-10%<br>Other Features: Medium Recrystallization; Fossiliferous; Dolomitic<br>Fossils: Fossil Molds; Fossil Fragments; Echinoid<br>Similar to above, 100% recovery in this interval as we moved to a box with 10 feet of recovery. |
| 1092 | - | 1096.5 | Grainstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Possibly High Permeability; Highly (50-90%); Subhedral<br>Grain Type: Skeletal; Calcilutite<br>Grain Size: Very Fine; Range: Very Fine To Medium<br>Moderate Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Dolomite-10%<br>Other Features: Medium Recrystallization; Fossiliferous; Dolomitic<br>Fossils: Fossil Fragments; Echinoid<br>Similar to above, the interval is more well indurated than above. |
| 1096.5 | - | 1098.6 | Grainstone; White (N9) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Type: Skeletal; Crystals<br>Grain Size: Fine; Range: Very Fine To Medium |

Moderate Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Accessory Minerals: Dolomite-10%
Other Features: Medium Recrystallization; Fossiliferous; Dolomitic
Fossils: Fossil Molds; Fossil Fragments
Similar to above, color of this interval is more white, the interval is also more well indurated.

1098.6 - 1103 Grainstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Type: Skeletal; Crystals
Grain Size: Very Fine; Range: Very Fine To Medium
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Dolomite-8%
Other Features: Medium Recrystallization; Fossiliferous; Dolomitic
Fossils: Fossil Molds; Fossil Fragments
Similar to above, interval is more yellow gray than above, degree of recrystallization and induration is similar.

1103 - 1106 Grainstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline; Highly (50-90%); Subhedral
Grain Type: Skeletal; Crystals
Grain Size: Very Fine; Range: Very Fine To Medium
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Dolomite-8%
Other Features: Medium Recrystallization; Fossiliferous; Dolomitic
Fossils: Fossil Molds; Fossil Fragments; Gastropods; Echinoid
Very similar to above, massive calcareous dolostone. Interval lightens in the next interval.

1106 - 1109.5 Grainstone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Subhedral
Grain Type: Skeletal; Crystals
Grain Size: Fine; Range: Very Fine To Medium
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Dolomite-8%
Other Features: Medium Recrystallization; Fossiliferous; Dolomitic
Fossils: Fossil Molds; Fossil Fragments; Echinoid
Similar to above, lighter colored interval. Fossiliferous and continued recrystallization and induration.

1109.5 - 1114 Packstone; Very Light Orange (10YR 8/2) To White (N9)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Type: Skeletal; Crystals

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| | | | Grain Size: Very Fine; Range: Very Fine To Medium<br>Moderate Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Dolomite-8%<br>Other Features: Medium Recrystallization; Fossiliferous; Dolomitic<br>Fossils: Fossil Molds; Fossil Fragments<br>Similar to above, recrystallized calcareous dolostone interval. |
| 1114 | - | 1119 | Grainstone; Very Light Orange (10YR 8/2) To White (N9)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Type: Skeletal; Crystals<br>Grain Size: Very Fine; Range: Very Fine To Medium<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Dolomite-6%<br>Other Features: Medium Recrystallization; Fossiliferous; Dolomitic<br>Fossils: Fossil Molds; Fossil Fragments; Benthic Foraminifera<br>Similar to above, massive light colored grainstone. After the stark lithology change due to a large cavity at 1077' this interval's lithology is a less peloidal grainstone, and the first observation of the foram Helicostegina gyralis marks the top of the Oldsmar Formation. This formation pick is placed at 1114', but can be as deep as 1283.5'. |
| 1119 | - | 1124 | Packstone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Type: Skeletal; Crystals<br>Grain Size: Very Fine; Range: Very Fine To Medium<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Dolomite-5%<br>Other Features: Medium Recrystallization; Fossiliferous; Dolomitic<br>Fossils: Fossil Molds; Fossil Fragments<br>Similar to above. |
| 1124 | - | 1129 | Packstone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Type: Skeletal; Crystals<br>Grain Size: Very Fine; Range: Very Fine To Medium<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization; Fossiliferous; Dolomitic<br>Fossils: Fossil Molds; Fossil Fragments; Gastropods<br>Massive light color calcareous dolostone interval. This interval is grading toward sucrosic dolostone as in this interval the calcilutite content is decreasing. |

1129 - 1134 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic
Massive sucrosic dolostone. Interval has darkened in color and increased in dolomitization to where dolomite crystals are present in which previous intervals dolomitized fossils were still visible.

1134 - 1137 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Moldic; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic
Dolostone interval similar to above, this interval has few large molds throughout the interval.

1137 - 1141 Dolostone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Other Features: Medium Recrystallization; Sucrosic; Calcareous
Similar to above, this interval has more of a calcareous component than above. With depth the calcareous component lessens.

1141 - 1145 Dolostone; Grayish Brown (10YR 6/2) To Light Olive Gray (5Y 6/1)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Fragments; Echinoid
More sucrosic complete dolostone interval. Degree of recrystallization that fossils are still visible but dolomitized and crystals are subhedral and sucrosic at the same time. Few large molds throughout the interval.

1145 - 1147 Dolostone; Dark Yellowish Orange (10YR 6/6) To Grayish Brown (10YR 6/2)
Intercrystalline, Possibly High Permeability; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Moderate Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous; Friable

Fossils: Fossil Fragments
Continued dolostone interval that is fossiliferous at the top and with depth in the interval become less indurated, more friable. The interval becomes less fossiliferous and more sucrosic.

1147 - 1152 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic
More crystalline and indurated dolostone interval. Similar look of core just a higher degree of recrystallization and induration.

1152 - 1157 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Fossil Fragments; Echinoid
Massive dolostone interval similar to above, large fossil molds believed to be echinoid molds as an outer echinoid shell has not be completely destroyed within a mold.

1157 - 1162 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Fossil Fragments; Echinoid
Massive dolostone interval similar to above.

1162 - 1167 Dolostone; Grayish Brown (10YR 6/2) To Light Gray (N7)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds; Fossil Fragments; Echinoid
Dolostone interval similar to above, recovery gets rubbly toward the base of the interval, but at the base of the interval the degree of recrystallization and induration is higher than seen in previous intervals.

1167 - 1169.5 Dolostone; Grayish Brown (10YR 6/2) To Light Gray (N7)
Intercrystalline, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Fossil Fragments; Echinoid
Dolostone that is similar to above, organic laminations toward the lower end of the interval. Interval base is marked by the reoccurrence of a calcareous component to the dolostone, with the core abruptly lightening in color.

1169.5 - 1174 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Gray (N8)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Glauconite-1%; Spar-1%
Other Features: Medium Recrystallization; Calcareous
Light colored calcareous dolostone interval. Few fossil molds present. Glauconite present at 1172' in what looks like a fracture infill.

1174 - 1176 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Calcareous; Sucrosic
Similar to above, a higher degree of dolomitization in this interval.

1176 - 1181 Dolostone; Grayish Orange (10YR 7/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous; Calcareous
Fossils: Fossil Molds; Fossil Fragments; Echinoid
Similar to previous intervals, less of a calcareous component to this interval. Some differential recrystallization throughout the interval, with parts of the interval looking sucrosic and parts looking hard and crystalline. Fine fossil molds present mostly echinoid molds.

1181 - 1185.5 Dolostone; Dark Yellowish Orange (10YR 6/6) To Yellowish Gray (5Y 8/1)
Intercrystalline, Moldic; Highly (50-90%); Subhedral

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| | | | Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite; Calcilutite Matrix<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Calcilutite-8%<br>Other Features: Medium Recrystallization; Fossiliferous; Sucrosic; Calcareous<br>Fossils: Fossil Molds; Fossil Fragments; Echinoid<br>Trace sulfides Similar to above, but more of a calcareous component. Fossil are calcareous and entire recrystallization degree in this interval is lower than that above. |
| 1185.5 | - | 1190.5 | Dolostone; Dark Yellowish Orange (10YR 6/6) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization; Sucrosic<br>Fossils: Fossil Molds<br>Dolostone interval with a lowered calcareous component. Sucrosic interval with few large fossil molds. |
| 1190.5 | - | 1193 | Dolostone; Very Light Orange (10YR 8/2) To Light Olive Gray (5Y 6/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated<br>Accessory Minerals: Glauconite-1%<br>Other Features: Medium Recrystallization; Sucrosic; Fossiliferous<br>Fossils: Fossil Molds; Echinoid<br>Massive laminated dolostone interval with fossil molds and echinoid fossils throughout the interval. With depth the interval becomes more dolomitized, this increase in degree of dolomitization can be seen within the laminations as well. |
| 1193 | - | 1196.5 | Dolostone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)<br>Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization; Sucrosic; Fossiliferous<br>Fossils: Fossil Molds; Echinoid<br>Similar to above, glauconite less evident in this interval. Fossil molds evident but less echinoid fossils in this interval. |
| 1196.5 | - | 1200 | Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)<br>Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral |

Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid
More recrystallized interval. Hard crystalline interval but still sucrosic. Echinoid fossils throughout the interval. Abrupt bedding contact marking the base of the interval.

1200 - 1203 Dolostone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Calcilutite-10%
Other Features: Medium Recrystallization; Calcareous; Fossiliferous
Fossils: Fossil Molds; Fossil Fragments
Calcareous dolostone interval. Highly fossiliferous interval that is in the process of being dolomitized. Trace sulfides in this interval.

1203 - 1207 Dolostone; Moderate Light Gray (N6) To Light Olive Gray (5Y 6/1)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Glauconite-<1%
Other Features: Medium Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds; Fossil Fragments
More completely dolomitized interval, sucrosic within fossil molds and fractures. Massive dolostone with fossil molds, fractures, and trace sulfides including glauconite.

1207 - 1212 Dolostone; Moderate Light Gray (N6) To Light Olive Gray (5Y 6/1)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Glauconite-1%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Very similar to above, glauconite more noticeable. Sucrosic texture within fractures and molds.

1212 - 1217 Dolostone; Moderate Light Gray (N6) To Light Olive Gray (5Y 6/1)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine

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| | | | Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Glauconite-2%<br>Other Features: Medium Recrystallization; Fossiliferous; Sucrosic<br>Fossils: Fossil Molds; Echinoid; Fossil Fragments<br>Similar to above, at 1215'-1216' the interval becomes less crystalline, fossils, individual grains, and glauconite all visible. With depth the interval returns to crystalline anhedral look and feel. Recovery is slightly rubbly at parts of the interval. |
| 1217 | - | 1222 | Dolostone; Light Gray (N7) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Accessory Minerals: Glauconite-2%<br>Other Features: Medium Recrystallization; Sucrosic<br>Fossils: Fossil Molds<br>Similar to above, more rubbly recovery than above. |
| 1222 | - | 1227 | Dolostone; Light Gray (N7) To Moderate Yellowish Brown (10YR 5/4)<br>Intercrystalline, Fracture, Moldic; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization; Sucrosic; Fossiliferous<br>Fossils: Fossil Molds<br>Massive fractured dolostone that is sucrosic around the fractures and within fossil molds. Otherwise crystalline and anhedral. |
| 1227 | - | 1232 | Dolostone; Light Gray (N7) To Moderate Yellowish Brown (10YR 5/4)<br>Intercrystalline, Fracture, Moldic; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization; Sucrosic<br>Fossils: Fossil Molds; Echinoid<br>Very similar to above, rubbly recovery at 1230' then returns to complete core recovery. |
| 1232 | - | 1237 | Dolostone; Grayish Orange (10YR 7/4) To Moderate Yellowish Brown (10YR 5/4)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled |

Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Less recrystallized interval where sucrosic texture takes over. Slight organic mottling in the interval.

1237 - 1238 Dolostone; Grayish Orange (10YR 7/4) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-<1%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid; Gastropods
Similar to above, a continuation of this sucrosic bed.

1238 - 1242 Dolostone; Grayish Orange (10YR 7/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid
More crystalline dolostone, less sucrosic than previous interval, but sucrosic texture is still present in this fractured interval. Large fossil molds present.

1242 - 1244 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Moldic, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds
Similar to above, more crystalline interval, but still slightly sucrosic within molds and fractures.

1244 - 1249 Dolostone; Grayish Orange (10YR 7/4) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Fracture, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Massive fractured dolostone, sucrosic texture around fractures and molds. Crystalline interval for the most part.

1249 - 1254 Dolostone; Grayish Orange (10YR 7/4) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Fracture, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Very similar to previous interval continuation of fractured bed. The base of this interval is less fractured than the rest of the interval.

1254 - 1259 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Fracture, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Fractured dolostone interval similar to above, with depth the interval becomes much less sucrosic, darker, and more crystalline. Fractures present throughout interval.

1259 - 1262 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Moldic, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Very similar to above, less large molds so less sucrosic texture dominates across the interval. Molds are still present though.

1262 - 1267 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Moldic, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Similar to above, more fractured interval where fractured ends of the core are sucrosic while the center part of the core has anhedral crystallinity.

1267 - 1271 Dolostone; Grayish Brown (10YR 6/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Fracture, Moldic; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine

Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid
Similar to above, lighter in colored and more fractured and sucrosic in this interval.

1271 - 1273 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Quartz-1%
Other Features: Medium Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds; Echinoid; Gastropods
Similar to the massive crystalline dolostone interval. This interval has large fossil molds with secondary quartz growth within some of them. Sucrosic texture within some molds and fractures.

1273 - 1276.5 Dolostone; Dark Yellowish Orange (10YR 6/6) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Similar to above, more fractured and rubbly recovery. Along with that, sucrosic texture is more evident within molds and around fractures.

1276.5 - 1278.5 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization
Massive crystalline dolostone interval, few fossil molds and sporadic sucrosic texture within the interval.

1278.5 - 1281 Dolostone; Grayish Orange (10YR 7/4) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Fracture; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization; Sucrosic

Rubbly fractured sucrosic dolostone interval. Bedding contact to massive crystalline dolostone below.

1281 - 1283 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Quartz-2%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Massive crystalline dolostone with secondary quartz growth within some fossil molds.

1283 - 1288 Wackestone; Yellowish Gray (5Y 8/1) To Grayish Orange (10YR 7/4)
Intercrystalline; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Very Fine; Range: Very Fine To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Quartz-<1%
Other Features: Low Recrystallization; Dolomitic
Fossils: Fossil Molds
Massive calcareous dolostone interval. Very light color core that is close to equivalent amounts of dolostone and calcilutite. Within the darker laminations of the interval the dolomite content is increasing. Very few fossil molds and fragments in the interval and those below. Base of this interval is rubbly recovery. Top of Oldsmar formation can potentially be placed at 1283'. Above this interval is sucrosic coarse vuggy dolostone along with glauconite.

1288 - 1293 Wackestone; Yellowish Gray (5Y 8/1) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Very Fine; Range: Very Fine To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Quartz-1%
Other Features: Low Recrystallization; Dolomitic
Fossils: Fossil Molds; Fossil Fragments
Similar to above, increase in dolomitic laminations. Again interval is very close to being a calcareous dolostone.

1293 - 1298 Wackestone; Yellowish Gray (5Y 8/1) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal

Grain Size: Very Fine; Range: Very Fine To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Quartz-3%
Other Features: Low Recrystallization; Dolomitic
Fossils: Fossil Molds
Similar to above, more secondary quartz growth.

1298 - 1303 Dolostone; Light Gray (N7) To Grayish Orange (10YR 7/4)
Intercrystalline, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Quartz-2%
Other Features: Medium Recrystallization; Calcareous
Fossils: Fossil Molds
Dolostone interval that is more dolomitic and slightly more gray than above. Quartz growth present within large molds.

1303 - 1308 Wackestone; Yellowish Gray (5Y 8/1) To Grayish Orange (10YR 7/4)
Intercrystalline; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Very Fine; Range: Very Fine To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Quartz-<1%
Other Features: Medium Recrystallization; Dolomitic
Similar to above, lighter color and less dolomitic than above.

1308 - 1313 Wackestone; Yellowish Gray (5Y 8/1) To Grayish Orange (10YR 7/4)
Intercrystalline; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Very Fine; Range: Very Fine To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Quartz-1%; Organics-<1%
Other Features: Medium Recrystallization; Dolomitic
Fossils: Fossil Molds; Fossil Fragments
Continued bed as above.

1313 - 1318 Wackestone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)
Intercrystalline; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal

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| | | | Grain Size: Very Fine; Range: Very Fine To Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive; Laminated<br>Accessory Minerals: Quartz-1%<br>Other Features: Medium Recrystallization; Dolomitic<br>Fossils: Fossil Molds<br>Similar to above, increased dolomitization in this interval. |
| 1318 | - | 1319.5 | Dolostone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated<br>Accessory Minerals: Quartz-1%<br>Other Features: Medium Recrystallization; Calcareous<br>Fossils: Fossil Molds<br>Similar to above. Dolomitic interval with more secondary quartz growth and calcareous content is lowering as next interval is more completely dolomitic. |
| 1319.5 | - | 1324 | Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated<br>Accessory Minerals: Organics-2%; Quartz-1%<br>Other Features: Medium Recrystallization; Sucrosic; Fossiliferous<br>Fossils: Fossil Molds; Echinoid<br>More completely dolomitic interval with organic laminations and secondary quartz growth. Pinpoint echinoid molds throughout the interval. |
| 1324 | - | 1329 | Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated<br>Accessory Minerals: Quartz-2%; Organics-1%<br>Other Features: Medium Recrystallization; Sucrosic<br>Fossils: Fossil Molds<br>Similar to above, organic laminations and secondary quartz growth present. |
| 1329 | - | 1330.5 | Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine |

Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Quartz-1%
Other Features: Medium Recrystallization; Sucrosic
Similar to above, interval grading back into calcareous dolostone.

1330.5 - 1335.5 Wackestone; White (N9) To Grayish Brown (10YR 6/2)
Intercrystalline, Possibly High Permeability; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Very Fine; Range: Very Fine To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-4%
Other Features: Low Recrystallization; Dolomitic; Fossiliferous
Fossils: Fossil Molds; Echinoid
Wackestone interval that has a lower level of recrystallization as well as dolomitization. Fossils present in the interval show to be lighter than the surrounding core. Organic laminations present through most of the interval.

1335.5 - 1340.5 Dolostone; Light Gray (N7) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Calcareous; Sucrosic
Fossils: Fossil Molds; Echinoid
Calcareous dolostone grades into a more dolomitic interval with more echinoid fossil molds. More of a grainy texture within this interval where sucrosic texture is evident around a predominately anhedral crystalline texture.

1340.5 - 1343.4 Dolostone; Light Gray (N7) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Sucrosic; Calcareous
Fossils: Fossil Molds; Echinoid
Similar to above, with depth grades back into a calcareous dolostone. Organic laminations with a continued grainy sucrosic texture.

1343.4 - 1348.4 Wackestone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline; Highly (50-90%); Subhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Very Fine; Range: Very Fine To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-3%
Other Features: Low Recrystallization; Dolomitic
Fossils: Fossil Molds; Echinoid
Massive wackestone with organic laminations and pinpoint vugs. With depth recrystallization lowers and so does dolomitization.

1348.4 - 1353 Packstone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)
Intercrystalline
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Fossils: Fossil Molds
Samples have crossed over the transition to being more calcareous than dolomitic making this interval and the next few a dolomitic packstone.

1353 - 1358 Packstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Glauconite-2%
Other Features: Low Recrystallization; Dolomitic; Fossiliferous
Fossils: Fossil Molds; Echinoid
Dolomitic packstone similar to above, more dolomitic in sections of the interval than above, but the description interval would be a dolomitic packstone as the calcareous component dominates the interval.

1358 - 1363 Packstone; Yellowish Gray (5Y 8/1) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Fracture
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Mottled

Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Dolomitic
Interval filled with dolomitic intraclasts and mottling. Some organics within the interval. Dolomitic crystals have subhedral crystallinity and a sucrosic look within the core. With depth the mottling and intraclasts persist into the next interval with more recrystallization.

1363 - 1365 Packstone; Yellowish Gray (5Y 8/1) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Fracture
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Dolomitic
Similar to above, continued dolomitic packstone with intraclasts.

1365 - 1369 Dolostone; Grayish Brown (10YR 6/2) To Moderate Light Gray (N6)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Mottled; Massive
Other Features: Medium Recrystallization; Sucrosic; Calcareous
Fossils: Fossil Molds; Fossil Fragments; Cones; Gastropods
Dolomite dominated interval that is recrystallized and fractured. Fracture fill was once calcareous and now has been dolomitized but not completely to the point where fossils are destroyed.

1369 - 1371 Packstone; Very Light Orange (10YR 8/2) To Light Olive Gray (5Y 6/1)
Intercrystalline, Fracture, Moldic
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Mottled
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Fossils: Cones; Gastropods
Dolomitic packstone that is grading toward dolomite toward the base of the interval.

1371 - 1376 Wackestone; Light Olive Gray (5Y 6/1) To Very Light Gray (N8)
Intercrystalline, Fracture, Moldic
Grain Type: Skeletal; Biogenic
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Other Features: High Recrystallization; Dolomitic; Fossiliferous

Fossils: Fossil Molds; Fossil Fragments
More recrystallized dolomitic packstone interval. With depth the recrystallization level lowers. Fossiliferous interval with partially dolomitized fossils and pinpoint vugs.

1376 - 1377 Packstone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Skeletal; Biogenic
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Other Features: Medium Recrystallization; Dolomitic
More of a packstone bed, still dolomitic packstone. Single foot interval that grades into a more muddy and recrystallized interval.

1377 - 1382 Wackestone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Fossils: Fossil Molds; Echinoid
More recrystallized dolomitic wackestone. Less evident forams than in previous intervals.

1382 - 1383.5 Wackestone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Similar to above, continued dolomitic wackestone bed.

1383.5 - 1388.5 Wackestone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Crystals
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Fossils: Fossil Molds
Dolomitic wackestone that is moderately recrystallized throughout. With depth the interval grades to a more dolomitic lithology, but never completely becoming a dolostone. Few fossil molds present.

1388.5 - 1392.5 Packstone; Grayish Brown (10YR 6/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Crystals
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Fossils: Fossil Molds; Fossil Fragments
Dolomitic packstone, recrystallized forams visible throughout interval as well as pinpoint vugs.

1392.5 - 1397 Packstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Dolomitic
Fossils: Fossil Molds; Echinoid
Dolomitic packstone that is most dolomitic at 1395.5' where dolomitization has almost silicified this small section of the interval. Similar to above otherwise, more abundant pinpoint vugs.

1397 - 1400.8 Packstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Other Features: Low Recrystallization; Dolomitic
Fossils: Fossil Molds; Fossil Fragments
Very similar to above, slight lower level of recrystallization across this entire interval.

1400.8 - 1404 Packstone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Crystals
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Higher degree of recrystallization in this interval than above.

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| 1404 | - | 1409 | Wackestone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)<br>Intercrystalline, Pinpoint, Fracture<br>Grain Type: Skeletal; Calcilutite<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Other Features: Medium Recrystallization; Dolomitic; Fossiliferous<br>Fossils: Fossil Molds<br>Similar to above, slight fracture porosity in this interval. |
| 1409 | - | 1413 | Wackestone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)<br>Intercrystalline<br>Grain Type: Skeletal; Calcilutite<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive; Laminated; Mottled<br>Other Features: Medium Recrystallization; Dolomitic; Fossiliferous<br>Fossils: Fossil Molds<br>Similar to above, increased level of recrystallization, with more dolomitic laminations and mottlings throughout the interval. |
| 1413 | - | 1417 | Wackestone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)<br>Intercrystalline, Pinpoint, Fracture<br>Grain Type: Skeletal; Calcilutite<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Other Features: Medium Recrystallization; Dolomitic; Fossiliferous<br>Very similar to above. |
| 1417 | - | 1421 | Wackestone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)<br>Intercrystalline, Pinpoint<br>Grain Type: Skeletal; Calcilutite<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization; Dolomitic; Fossiliferous<br>Similar to above, less silicified recrystallization in this interval. |
| 1421 | - | 1426 | Packstone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)<br>Intercrystalline, Pinpoint<br>Grain Type: Skeletal; Calcilutite<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration |

Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous; Dolomitic
Fossils: Coral; Benthic Foraminifera; Fossil Molds
More fossiliferous dolomitic packstone interval. Where dolomitic influence is there, but in this interval it is not very strong.

1426 - 1429 Packstone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Fossiliferous; Dolomitic
Fossils: Cones; Benthic Foraminifera; Fossil Molds
Very similar to above, continued bed where base of interval is marked by an interbedded of recrystallization degree below.

1429 - 1433.2 Wackestone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Interbedded
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous; Sucrosic
Fossils: Cones; Benthic Foraminifera
Similar to above, this interval is interbedded with dolomitized sections within the interval. Gray anhedral crystallinity with weathered sucrosic texture. The not highly dolomitized sections of the interval are similar to above.

1433.2 - 1438 Wackestone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Interbedded
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Very similar to above interval with dolomitized interbedding. This interval has that but the level of recrystallization is slightly higher across the entire interval. This interval has some intraclasts and there is not sucrosic texture in any part of this interval.

1438 - 1441.5 Dolostone; Grayish Brown (10YR 6/2) To Light Gray (N7)
Intercrystalline, Possibly High Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine

Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Massive; Interbedded
Other Features: Medium Recrystallization; Calcareous
Larger dolomitized interval, dolostone not different from interbedded dolostone above, this interval just is more completely dolomitic, the base of the interval is interbedded into a dolomitic packstone.

1441.5 - 1444.5 Wackestone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint
Grain Type: Skeletal; Calcilutite
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Moderate Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Other Features: Low Recrystallization; Dolomitic
Fossils: Benthic Foraminifera
Dolomitic wackestone that is situated in between two highly recrystallized dolostone beds. Foraminifera present but recrystallization makes them hard to distinguish, overall soft lithology as pick can easily scratch the rock.

1444.5 - 1447.4 Packstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline
Grain Type: Skeletal; Crystals
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Fossils: Benthic Foraminifera; Fossil Molds
Similar to above, increased level of recrystallization throughout the interval, as well as dolomitization at the top of the interval that can be seen as dolomitic laminations. Less dolomitization at the base of the interval.

1447.4 - 1452.4 Wackestone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Fracture, Moldic
Grain Type: Skeletal; Crystals
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Dolomitic; Fossiliferous
Fossils: Fossil Molds
Similar to above, lighter in color with dolomitic laminations. With depth the interval becomes more crystalline and recrystallized, exhibiting more fracture porosity. Trace sulfides of possibly pyrite.

1452.4 - 1458.6 Mudstone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Fracture
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Other Features: Medium Recrystallization; Dolomitic
Fossils: Benthic Foraminifera; Fossil Molds
Similar to above, with depth the interval becomes has more of a chalk like texture, but is still moderately recrystallized.

1458.6 - 1463.6 Wackestone; Very Light Orange (10YR 8/2) To White (N9)
Intercrystalline, Pinpoint, Fracture
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Other Features: Medium Recrystallization; Dolomitic
Similar to above, chalk like texture is still present when the sample is fractured with a hammer.

1463.6 - 1467 Wackestone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint, Fracture
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Other Features: Medium Recrystallization; Dolomitic
Similar to above, slightly more dolomitic with laminations throughout the interval, with the base of the interval a sharp contact to hard dense crystalline dolostone.

1467 - 1472 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Yellowish Gray (5Y 8/1)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Accessory Minerals: Glauconite-<1%
Other Features: High Recrystallization; Fossiliferous; Sucrosic
Fossils: Fossil Molds
Massive crystalline dolostone that lightens in color with depth in the interval. Sucrosic look within fossil molds and some fractures throughout the interval. Trace sulfides in the interval.

1472 - 1477 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine

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| | | | Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated<br>Accessory Minerals: Organics-1%; Glauconite-<1%<br>Other Features: Medium Recrystallization; Sucrosic<br>More massive less moldic dolostone interval than above, similar fractures and sucrosic look within the fractures. Organic lamination at 1476' and trace glauconite that fills a fracture vein. |
| 1477 | - | 1480.5 | Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization<br>Fossils: Fossil Molds<br>Similar to above, organics present and few fossil molds. |
| 1480.5 | - | 1485.5 | Dolostone; Yellowish Gray (5Y 8/1) To Moderate Yellowish Brown (10YR 5/4)<br>Intercrystalline, Fracture; Highly (50-90%); Anhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Other Features: Medium Recrystallization; Sucrosic; Fossiliferous<br>Fossils: Fossil Molds<br>Mottled dolostone interval with differential recrystallization in the interval. Similar dolostone, but it is on its way to being anhedral dense crystalline dolostone. |
| 1485.5 | - | 1489.4 | Dolostone; Very Light Orange (10YR 8/2) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated; Mottled<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization<br>Similar to above, mottled differentially recrystallized dolostone interval. |
| 1489.4 | - | 1492.4 | Dolostone; Light Gray (N7) To Grayish Brown (10YR 6/2)<br>Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive |

Other Features: High Recrystallization; Sucrosic
Fractured dolostone interval with sucrosic texture within all fractures.

1492.4 - 1494.2 Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Other Features: Medium Recrystallization; Sucrosic
Top of this interval is less recrystallized than above. With depth in the interval the recrystallization returns and the interval is hard and dense.

1494.2 - 1497 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: High Recrystallization
Highly recrystallized dense dolostone with fracture porosity but not as high degree as intervals above.

1497 - 1500 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous; Calcareous
Fossils: Fossil Molds; Cones; Echinoid
Sucrosic dolostone that grades into more subhedral crystalline dolostone. Pinpoint vugs and fossil molds present throughout. Organics and other carbonates mottled throughout the interval as well. With depth sucrosic texture is only seen within fractures and fossil molds.

1500 - 1504 Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-4%
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Echinoid; Cones
Lighter color more anhedral dolostone. Grainy feel within the center of the core which has large molds. Organics mottled throughout and decrease with depth.

1504 - 1507 Dolostone; Grayish Brown (10YR 6/2) To Very Light Orange (10YR 8/2)
Intercrystalline, Fracture, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Interval similar to above, with differentially recrystallized pockets throughout the interval where these pockets have subhedral crystallinity. Organics mottled throughout, though slightly. Interval base is marked by organics and a much more sucrosic bed below.

1507 - 1510 Dolostone; Grayish Orange (10YR 7/4) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Recrystallized dolostone interval with few organic laminations and abundant pinpoint vugs. Recrystallization level slightly lowers with depth but the interval is sucrosic throughout.

1510 - 1515 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Massive; Interbedded
Other Features: Medium Recrystallization; Sucrosic; Calcareous
Fossils: Fossil Molds; Echinoid
Similar to above, abundant pinpoint vugs and recrystallization. This interval is interbedded with a calcareous dolostone. Calcareous component increasing with depth.

1515 - 1518 Wackestone; Moderate Light Gray (N6) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Other Features: Medium Recrystallization; Dolomitic
Interval is recrystallized as above, but not sucrosic or subhedral crystallinity. Calcareous component is increased but interval is a dolostone. With depth the interval grades back to sucrosic recrystallized subhedral crystallinity.

1518 - 1523 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Massive sucrosic dolostone interval.

1523 - 1524.3 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Similar to above, base of interval is marked with a sharp bedding contact to calcareous dolostone.

1524.3 - 1527 Wackestone; White (N9) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Interbedded
Other Features: Medium Recrystallization; Dolomitic; Sucrosic
Fossils: Fossil Molds; Cones; Echinoid
Interbedded dolostone interval where sucrosic dolostone with pinpoint vugs is interbedded with a calcareous dolostone that is more anhedral and has little to no fossil molds.

1527 - 1528.5 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Calcilutite; Biogenic
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive
Other Features: Low Recrystallization; Dolomitic
Wackestone interval, most likely with a low dolomitic percentage. Interval grades into calcareous dolostone with depth.

1528.5 - 1531 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration

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| | | | Cement Type(s): Dolomite; Calcilutite Matrix<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization; Calcareous; Sucrosic<br>Fossils: Fossil Molds<br>Calcareous dolostone interval that is similar to above, but increased recrystallization and dolomitization make this interval dolostone dominant. With depth after a small bed with organic mottling the dolomitization degree decreases and base of interval is marked. |
| 1531 | - | 1536 | Dolostone; Yellowish Gray (5Y 8/1) To Moderate Yellowish Brown (10YR 5/4)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite; Calcilutite Matrix<br>Sedimentary Structures: Massive; Interbedded<br>Other Features: Medium Recrystallization; Calcareous; Sucrosic<br>Fossils: Fossil Molds<br>interbedded dolostone interval that is interbedded with calcareous dolostone. Calcareous dolostone has abundant visible dolomite grains. Pinpoint vugs more abundant in the sucrosic dolostone. |
| 1536 | - | 1538.5 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite; Calcilutite Matrix<br>Sedimentary Structures: Mottled<br>Other Features: Medium Recrystallization; Sucrosic; Calcareous<br>Fossils: Fossil Molds; Echinoid; Cones<br>Calcareous dolostone interval where the calcareous component increases with depth in the interval and where calcilutite is mottled throughout the interval. The base of interval is marked where calcareous component begins to dominate. |
| 1538.5 | - | 1544 | Wackestone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)<br>Intercrystalline<br>Grain Type: Biogenic; Calcilutite<br>Grain Size: Very Fine; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Accessory Minerals: Organics-1%<br>Other Features: Low Recrystallization; Dolomitic<br>Fossils: Fossil Molds; Echinoid; Cones; Gastropods<br>Dolomitic mudstone interval where the dolomitization degree increases with depth. The top of the interval has more recrystallization and fossils than any other part of the interval and with depth organics and dolomite grains appear more readily. |

1544 - 1546.2 Packstone; Grayish Brown (10YR 6/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Type: Skeletal; Crystals
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Dolomitic
Fossils: Fossil Molds
Packstone interval with mottled organics and a dolomitic component throughout the interval. The organics are concentrated at the base of the interval.

1546.2 - 1549 Wackestone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline
Grain Type: Calcilutite; Biogenic
Grain Size: Microcrystalline; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Other Features: Low Recrystallization; Dolomitic
A dolomtic wackestone interval, where the dolomitization increases with depth.

1549 - 1553 Packstone; Grayish Brown (10YR 6/2) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Subhedral
Grain Type: Skeletal; Crystals
Grain Size: Very Fine; Range: Very Fine To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Other Features: Medium Recrystallization; Dolomitic
Similar to above. More visible grains within this interval.

1553 - 1558 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid
Moderately recrystallized and fractured dolostone interval. This recrystallization and sucrosic texture is most concentrated around the fractures. With depth the interval becomes slightly calcareous and the base of the interval is marked by the lithology becoming dominantly calcareous.

1558 - 1562 Wackestone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline

Grain Type: Calcilutite; Biogenic
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Other Features: Medium Recrystallization; Dolomitic
Fossils: Fossil Molds
A dolomitic wackestone interval, dolomite grains visible in the matrix throughout the interval. Increased recrystallization in this interval compared to some of the other dolomitic limestone intervals.
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Calcareous; Fossiliferous
Fossils: Fossil Molds
Massive calcareous dolostone interval where the calcareous component is highest at the top and base of the interval and is predominately dolomitic within the majority of the middle of the interval.

1567 - 1572 Dolostone; Moderate Yellowish Brown (10YR 5/4) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Laminated
Other Features: Medium Recrystallization; Sucrosic; Calcareous; Fossiliferous
Fossils: Fossil Molds; Echinoid
Recrystallized sucrosic dolostone interval, calcareous component in the middle of this interval but dolomite grains are present throughout that section. Increased recrystallization and sucrosic texture with depth.

1572 - 1577 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid
Hard dense massive recrystallized dolostone interval. Predominantly dolostone with very little to no calcareous component. Massive dolostone bed follows this interval. Sucrosic texture seen within fossil molds and fractures.

1577 - 1582 Dolostone; Grayish Orange (10YR 7/4) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine

Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: High Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid
Dolostone interval similar to above, this interval has more fractures and a greater percentage of sucrosic texture. With depth the fractures decrease as well as pinpoint vugs.

1582 - 1587 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Burrowed
Accessory Minerals: Quartz-<1%
Other Features: High Recrystallization
Fossils: Fossil Molds; Echinoid
Massive low permeability dolostone interval with a large burrow at 1585'. Fossil molds are sporadic and are sucrosic within the molds.

1587 - 1590.2 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: High Recrystallization
Fossils: Fossil Molds; Echinoid
Similar to above, no burrows in this interval and with depth the crystallinity becomes more permeable than the previous interval.

1590.2 - 1595 Dolostone; Grayish Brown (10YR 6/2) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid
Not 100% recovery. Sucrosic dolostone that exhibits the sucrosic texture in pockets where the texture is exposed. The majority of the interval is crystalline and has little to no pinpoint vugs.

1595 - 1602 Dolostone; Grayish Orange (10YR 7/4) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Moldic; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration

Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid
Highly sucrosic and moldic dolostone interval with abundant pinpoint vugs throughout.

1602 - 1607 Dolostone; Grayish Brown (10YR 6/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Moldic, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds; Echinoid
Sucrosic dolostone interval similar to above, with depth the sucrosic texture decreases and the anhedral crystallinity dominates.

1607 - 1612 Dolostone; Grayish Brown (10YR 6/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Low Permeability, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Massive dolostone interval similar to above, this interval has similar sucrosic intervals to above, but this interval the sucrosic sections are much more thin compared to above.

1612 - 1617 Dolostone; Grayish Brown (10YR 6/2) To White (N9)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic; Calcareous
Fossils: Fossil Molds; Echinoid; Cones
Top of interval is grainy sucrosic dolostone with circular fossil molds. The remainder of the interval is moderately indurated with slight fractures throughout as well as pinpoint vugs. The lightening of color in the interval suggest the reoccurrence of a calcareous component.

1617 - 1620 Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization; Fossiliferous; Calcareous
Fossils: Fossil Molds; Fossil Fragments; Echinoid; Cones; Benthic Foraminifera

Light color calcareous dolostone interval. Abundant pinpoint vugs as well as slight fractures throughout the interval. The base of the interval becomes more crystalline, grayer, and fractured. This interval marks the top of the Cedar Keys formation. It is the first interval where the brown color and sucrosic texture left the core. Just above the formation pick, the interval is coarse, recrystallized, brown dolostone. This is the first noticeable geophysical back kick along with the sudden lithology change is why formation pick chosen here. Formation pick can possibly be deeper than this but sufficient evidence and data are not there. Possible deeper picks 1667' and 1804'.

1620 - 1625 Dolostone; Grayish Brown (10YR 6/2) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Massive, fractured dolostone interval. Anhedral crystallinity with pinpoint vugs and some organic laminations in this interval.

1625 - 1630 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Massive; Mottled; Burrowed; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Calcareous
Fossils: Fossil Molds
Calcareous dolostone interval with differential dolomitization and recrystallization. It is seen in this interval as gray mottling and pinpoint vugs within the gray spots. Some burrows tracks.

1630 - 1634 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite; Calcilutite Matrix
Sedimentary Structures: Massive; Mottled
Other Features: Medium Recrystallization; Calcareous
Fossils: Fossil Molds
Similar interval to above, calcareous dolostone with pinpoint vugs and differential recrystallization.

1634 - 1639 Dolostone; Yellowish Gray (5Y 8/1) To Very Light Orange (10YR 8/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine

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| | | | Good Induration<br>Cement Type(s): Dolomite; Calcilutite Matrix<br>Sedimentary Structures: Massive<br>Other Features: Low Recrystallization; Fossiliferous<br>Fossils: Fossil Molds<br>Similar to above, lithology looks calcareous but when tested with chemicals reactions are dolomitic. |
| 1639 | - | 1643 | Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite; Calcilutite Matrix<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization; Fossiliferous<br>Fossils: Fossil Molds<br>Similar to above, increased recrystallization and dolomitization in this interval. |
| 1643 | - | 1646 | Dolostone; Yellowish Gray (5Y 8/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Subhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization; Granular; Fossiliferous<br>Fossils: Fossil Molds<br>Granular dolostone interval that is light gray and is moderately recrystallized. Granular dolostone is not as recrystallized as surroundings pinpoint vugs are concentrated within the recrystallized sections. With depth the granular dolostone becomes more dominant. |
| 1646 | - | 1651 | Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Low Recrystallization; Granular<br>Fossils: Fossil Molds<br>Slightly rubbly recovery at the top of the interval not 100% recovery. Similar granular dolostone with a low level of recrystallization of the entire interval with depth that recrystallization degree increases. |
| 1651 | - | 1656 | Dolostone; Yellowish Gray (5Y 7/2) To Light Olive Gray (5Y 6/1)<br>Intercrystalline, Pinpoint; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite |

Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-5%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Slightly higher recrystallized dolostone interval than above, this interval has organic laminations throughout the interval and increased pinpoint vugs and increased induration of the entire interval.

1656 - 1659 Dolostone; Light Olive Gray (5Y 6/1) To Yellowish Gray (5Y 7/2)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Similar to above, higher degree of recrystallization in this interval give parts of the interval sucrosic texture, this texture is difficult to observe due to the color of the samples in the interval. With depth the interval becomes more crystalline.

1659 - 1664 Dolostone; White (N9) To Moderate Light Gray (N6)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
More crystalline dolostone interval that has organic laminations throughout. Some increased recrystallization within the interval creating a mottled look throughout the interval.

1664 - 1667 Dolostone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization
Rubbly recovery at the base of the interval not 100% recovery. Massive consistent dolostone interval where the base of the interval is anhedral crystallinity with very rubbly return.
The next interval is more subhedral and consist to the majority of this interval.

1667 - 1672 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration

Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: Medium Recrystallization
Massive dolostone interval with few pinpoint vugs. Darker dolostone can be seen slightly mottling the interval.

1672 - 1676 Dolostone; Yellowish Gray (5Y 7/2) To Very Light Orange (10YR 8/2)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Fossils: Fossil Molds; Cones; Echinoid
Similar to above, slightly more yellow brown in color. Very fine organics mottled throughout as well as very fine and sporadic fossil molds. Moderate recrystallization throughout.

1676 - 1680 Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization
Similar to above, with a slight varying degree of recrystallization throughout the interval creating a mottled look. Organics laminated at the top of the interval and mottled throughout.

1680 - 1685 Dolostone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Not 100% recovery, 5 foot sample filling 6 feet of core box. Massive dolostone with a moderate level of recrystallization, few fractures and a very low percentage of organics that are present in laminations at the top of the interval. Few fossil molds in this interval.

1685 - 1690 Dolostone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine

Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Very similar to above, base of interval marked by an increased level of recrystallization and moldic porosity. Overall slightly higher degree of recrystallization of the entire interval compared to above.

1690 - 1695 Dolostone; Very Light Orange (10YR 8/2) To Moderate Light Gray (N6)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Massive
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Highly laminated dolostone interval, organic laminations are present sporadically within the interval. Differential dolomitization and recrystallization laminations more evident and present within the interval. With depth in the interval the laminations becomes thicker and thicker. Pinpoint vugs and fossil molds more present toward the top of the interval.

1695 - 1696.5 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Light color dolostone interval with moldic and pinpoint vug porosity. This interval has a more weathered texture compared to the smoother intervals above.

1696.5 - 1700.5 Dolostone; Very Light Orange (10YR 8/2) To Grayish Orange (10YR 7/4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Texture of this interval similar to above, granular dolostone interval with moderate recrystallization and pinpoint vugs throughout. Differential dolomitization present throughout the interval with more gray mottled dolostone.

1700.5 - 1705 Dolostone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline, Pinpoint, Moldic; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: Medium Recrystallization
Dolostone interval with abundant pinpoint vugs and moderate to low overall recrystallization of the interval. Differential dolomitization is present within the interval as well giving the interval a slightly mottled look.

1705 - 1707 Dolostone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: Medium Recrystallization
Interval similar to above, slightly higher degree of recrystallization with similar amounts of pinpoint vugs and mottling.

1707 - 1712 Dolostone; Very Light Orange (10YR 8/2) To Moderate Light Gray (N6)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Mottled dolostone due to differential recrystallization and dolomitization. Parts of the interval are porous light dolostone and parts are darker gray crystalline dolostone. Mottling is most present at 1710' as it decreases with depth in the interval but is present throughout with trace sulfides present.

1712 - 1717 Dolostone; Grayish Brown (10YR 6/2) To Moderate Light Gray (N6)
Intercrystalline, Moldic, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Very similar to above, mottled dolostone interval. This interval has more evident fossil molds and a higher overall degree of recrystallization. Organic laminations present.

1717 - 1719 Dolostone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Other Features: Medium Recrystallization; Fossiliferous
Fossils: Fossil Molds
Similar to above, less mottling in this interval and more abundant pinpoint vugs. As well as an overall higher degree of recrystallization.

1719 - 1724 Dolostone; Dark Yellowish Brown (10YR 4/2) To Yellowish Gray (5Y 7/2)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Massive highly dense fractured dolostone with organic laminations. Sucrosic texture with fractures and fossil molds.

1724 - 1729 Dolostone; Moderate Gray (N5) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: Medium Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Similar to above, more anhedral and less fossil molds in this interval. In this interval the sucrosic texture is seen in very fine mottling with a higher degree of recrystallization within the interval.

1729 - 1734 Dolostone; Dark Yellowish Brown (10YR 4/2) To Dark Yellowish Brown (10YR 2/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Styolitic
Other Features: High Recrystallization; Sucrosic; Fossiliferous
Fossils: Fossil Molds
Similar to above, higher overall degree of recrystallization. Interval has more abundant fractures and the entire interval is rubbly recovery.

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| 1734 | - | 1737.7 | Dolostone; Dark Yellowish Brown (10YR 4/2) To Dark Yellowish Brown (10YR 2/2)<br>Intercrystalline, Fracture; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: High Recrystallization; Sucrosic<br>Fossils: Fossil Molds<br>Similar to above, interval recovery is more complete core especially be the base of the interval. Sucrosic texture within some fossil molds and fractures. |
| 1737.7 | - | 1742.7 | Dolostone; Dark Red Purple (5RP 2/2) To Moderate Gray (N5)<br>Intercrystalline, Fracture; Highly (50-90%); Subhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Medium<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: High Recrystallization; Sucrosic<br>Fossils: Fossil Molds<br>Similar to previous interval with the rubbly recovery of this highly recrystallized and sucrosic dolostone. Not 100% recovery 14 feet in a 10 foot box. Fossil molds present within this rubbly interval but they are not abundant. |
| 1742.7 | - | 1747 | Dolostone; Moderate Light Gray (N6) To Dark Yellowish Brown (10YR 2/2)<br>Intercrystalline, Fracture, Moldic; Highly (50-90%); Subhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Medium<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: High Recrystallization; Sucrosic<br>Fossils: Fossil Molds<br>Similar to above, base of the interval becomes more complete core so rubbly recovery is less so. Base of the interval has almost euhedral crystallinity and highly sucrosic. |
| 1747 | - | 1752 | Dolostone; Moderate Light Gray (N6) To Dark Gray (N3)<br>Intercrystalline, Fracture, Moldic; Highly (50-90%); Subhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: High Recrystallization; Sucrosic<br>Fossils: Fossil Molds<br>Not 100% recovery. Dolostone interval similar to above, with a high degree of recrystallization and sporadic fossil molds. Dominant fracture porosity and a high amount of sucrosic texture within the interval. |

1752 - 1757 Dolostone; Light Olive Gray (5Y 6/1) To Moderate Gray (N5)
Intercrystalline, Fracture; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: High Recrystallization; Sucrosic
Fossils: Fossil Molds
Not 100% recovery due to rubbly recovery of this interval. Similar to above, high recrystallization and sucrosic texture within molds and fractures.

1757 - 1758 Dolostone; Light Olive Gray (5Y 6/1) To Moderate Gray (N5)
Intercrystalline, Fracture; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Accessory Minerals: Organics-2%
Other Features: High Recrystallization; Sucrosic
Similar to above, this interval is the continuation of the rubbly recovery interval above. This interval has organics at the base of the interval.

1758 - 1763 Dolostone; Moderate Gray (N5) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: High Recrystallization; Sucrosic
Fossils: Fossil Molds
Massive more complete core dolostone interval. High degree of recrystallization and sucrosic texture within the fractures of the interval. Fracture porosity dominates this interval and only sporadic fossil molds.

1763 - 1768 Dolostone; Moderate Gray (N5) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: High Recrystallization; Sucrosic
Very similar to above, more sucrosic texture. Few to no fossil molds.

1768 - 1773 Dolostone; Dark Yellowish Brown (10YR 4/2) To Moderate Yellowish Brown (10YR 5/4)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite

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| | | | Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization; Sucrosic<br>Similar to above, this interval is recrystallized but not as high as of degree as above. |
| 1773 | - | 1778 | Dolostone; Dark Yellowish Brown (10YR 4/2) To Moderate Gray (N5)<br>Intercrystalline, Fracture; Highly (50-90%); Anhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Accessory Minerals: Organics-1%<br>Other Features: Medium Recrystallization; Sucrosic<br>Fossils: Fossil Molds<br>Similar to above, recrystallization degree is slightly higher in this interval than above. Base of interval is marked with organic laminations. Rubbly recovery for a foot at 1774'-1775'. Sporadic fossil molds in this interval. |
| 1778 | - | 1783 | Dolostone; Grayish Brown (10YR 6/2) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline, Fracture; Highly (50-90%); Subhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: High Recrystallization; Sucrosic<br>Massive dolostone interval similar to above, sucrosic texture is more evident in this interval. |
| 1783 | - | 1788 | Dolostone; Moderate Yellowish Brown (10YR 5/4) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline, Fracture, Moldic; Highly (50-90%); Anhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated<br>Accessory Minerals: Organics-3%<br>Other Features: Medium Recrystallization; Sucrosic<br>Fossils: Fossil Molds<br>This interval is similar to above, this interval has organic laminations and an overall lower degree of recrystallization. Fossil molds present and parts of the interval around the organic laminations are not sucrosic. |
| 1788 | - | 1792 | Dolostone; Grayish Brown (10YR 6/2) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline, Fracture; Highly (50-90%); Anhedral<br>Grain Size: Very Fine; Range: Microcrystalline To Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Mottled<br>Other Features: Medium Recrystallization; Sucrosic<br>Fossils: Fossil Molds |

Similar to above, moderate recrystallization with fracture porosity and fossil molds present. Sucrosic texture within fractures and some of the molds. Within the interval differential recrystallization gives the interval a mottled look with the specs of higher recrystallized dolostone.

1792 - 1797 Dolostone; Grayish Brown (10YR 6/2) To Dark Yellowish Brown (10YR 4/2)
Intercrystalline, Fracture, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Massive dense dolostone interval, this interval is fractured, has sporadic fossil molds, and differential recrystallization within the interval where small sections of the interval are subhedral and sucrosic.

1797 - 1802 Dolostone; Light Olive Gray (5Y 5/2) To Grayish Brown (10YR 6/2)
Intercrystalline, Fracture, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Similar to above, more fractured interval with organics mottled and laminated throughout the interval. The laminated organics have spiny crystals growing within the organic layer.

1802 - 1805 Dolostone; Yellowish Gray (5Y 8/1) To Yellowish Gray (5Y 7/2)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive
Other Features: Medium Recrystallization
Interval similar to above, massive recrystallized dolostone, this interval has an overall lower degree of recrystallization. Few fossil molds and little to no organics within this interval.

1805 - 1809 Dolostone; Yellowish Gray (5Y 8/1) To Grayish Brown (10YR 6/2)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization

Fossils: Fossil Molds
Dolostone interval similar to above, at the top of this interval pinpoint vugs are present and the base of the interval is marked by organic laminations.

1809 - 1814 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Interval similar to above, this interval has organics mottled throughout the interval, this interval is also more subhedral and much less dense than intervals above. Little to no fossil molds within the interval.

1814 - 1817 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Very similar to above, with depth the interval becomes slightly weathered and the recovery at the base of the interval. Not 100% recovery.

1817 - 1820.5 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Similar to above, this interval with depth is increasing in recrystallization and with depth the interval is darkening in color. This interval has fossil molds and pinpoint vugs that become more present with depth.

1820.5 - 1824.3 Dolostone; Light Olive Gray (5Y 6/1) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-2%

Other Features: Medium Recrystallization
Organically laminated dolostone interval with subhedral crystallinity.

1824.3 - 1827 Dolostone; Moderate Olive Brown (5Y 4/4) To Grayish Brown (10YR 6/2)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-5%
Other Features: Medium Recrystallization; Calcareous
Dolostone interval similar to above, the top of this interval has a higher degree of recrystallization than the rest of the interval, interval has organic laminations and is rubbly recovery at the base of the interval.

1827 - 1831 Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Massive anhedral dolostone interval with organic laminations at the top of the interval and pinpoint vugs throughout the interval. Base of interval marked by mottling with large dolomite crystals. After that mottling the crystallinity is subhedral.

1831 - 1836 Dolostone; Light Olive Gray (5Y 6/1) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-4%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Massive dolostone interval with organic laminations and organic mottling throughout few fossil molds but molds in this interval are larger.

1836 - 1837.5 Dolostone; Light Olive Gray (5Y 6/1) To Yellowish Gray (5Y 8/1)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated
Accessory Minerals: Iron Stain-<1%; Organics-1%
Other Features: Medium Recrystallization

Anhedral low permeability dolostone interval with mottled iron staining throughout this interval. Base of interval marked by organic lamination.

1837.5 - 1842.5 Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Massive anhedral dolostone interval with few organic laminations.

1842.5 - 1847.5 Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Very similar to above, massive anhedral dolostone interval.

1847.5 - 1850 Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization
Similar to above, more mottled organics in this interval than above.

1850 - 1855 Dolostone; Light Olive Gray (5Y 6/1) To Grayish Brown (10YR 6/2)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Anhedral dolostone interval that has a mottled look to it, but is just differently colored. Organic laminations present. Base of interval marked by interval lightening in color.

1855 - 1860 Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine

Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Massive dolostone interval that is slightly layered due to differential dolomitization and has organic laminations present. Few fossil molds and overall moderate recrystallization.

1860 - 1865 Dolostone; Very Light Gray (N8) To Light Gray (N7)
Intercrystalline, Moldic; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Similar dolostone interval to above, this interval has a lower degree of recrystallization as crystals are anhedral but individual crystals are visible throughout the interval. Organics mottled throughout.

1865 - 1867 Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization
Dolostone interval with organics mottled throughout. This interval has larger organic mottles compared to above. Few to no fossil molds in this interval and the starting and ending point of the interval being marked with organic laminations.

1867 - 1869 Dolostone; Very Light Orange (10YR 8/2) To Yellowish Gray (5Y 8/1)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated; Mottled
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Lighter colored slightly weathered less anhedral dolostone interval. Interval is less compacted and spaces are visible between grains. Layered parts of this interval have a higher degree of recrystallization.

1869 - 1874 Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)
Intercrystalline, Fracture; Highly (50-90%); Anhedral

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| | | | Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated; Mottled<br>Other Features: Medium Recrystallization<br>Fossils: Fossil Molds<br>Layered dolostone interval with rubbly recovery and anhedral crystallinity. Layering within the interval vary from millimeters between to feet between layers. Some fracture porosity and fossil molds. Mottled instead of layered at the base of the interval. |
| 1874 | - | 1879 | Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Laminated<br>Other Features: Medium Recrystallization<br>Very similar to above, this interval is not rubbly as it is above. |
| 1879 | - | 1882.5 | Dolostone; Yellowish Gray (5Y 8/1) To Light Gray (N7)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization<br>Light colored layered dolostone interval with very finely spaced layers throughout. Organic laminations present within the interval as well. |
| 1882.5 | - | 1887 | Dolostone; Very Light Gray (N8) To Moderate Light Gray (N6)<br>Intercrystalline, Fracture; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive<br>Other Features: Medium Recrystallization, 1 ft Cavity 1,885-1,886, confirmed with camera<br>Massive fractured anhedral dolostone interval. Similar to above, less evident layering. |
| 1887 | - | 1892 | Dolostone; Light Olive Gray (5Y 6/1) To Light Gray (N7)<br>Intercrystalline, Fracture; Highly (50-90%); Anhedral<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Dolomite<br>Sedimentary Structures: Massive; Laminated; Mottled<br>Accessory Minerals: Organics-2% |

Other Features: Medium Recrystallization
Very similar to above, fractured dolostone interval. This interval has more organics which are mottled toward the base of the interval.

1892 - 1897 Mudstone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)
Intercrystalline, Pinpoint, Fracture; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Crystals
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Dolomitic
Lighter colored interval of a mudstone. This interval has a very fine grainy/chalk like texture of the core when it is fractured with a hammer. Rubbly recovery in parts of this interval.

1897 - 1902 Mudstone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline, Fracture, Low Permeability; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Crystals
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-3%
Other Features: Medium Recrystallization; Dolomitic
Lighter colored, layered, mudstone interval. Organic laminations and mottling present as well. Rubbly recovery in parts of the interval.

1902 - 1907 Wackestone; Yellowish Gray (5Y 8/1) To White (N9)
Intercrystalline; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization; Chalky
Light colored dolostone interval with dolomitic mottling throughout the interval. Organics present at the base of the interval.

1907 - 1909 Wackestone; Yellowish Gray (5Y 7/2) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Anhedral
Grain Type: Calcilutite; Skeletal
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite

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| | | | Sedimentary Structures: Massive; Mottled; Laminated<br>Accessory Minerals: Organics-2%<br>Other Features: Medium Recrystallization; Dolomitic<br>Wackestone interval similar to above, slightly more gray than white in this interval. Organics mottled and seen in laminations throughout the interval. |
| 1909 | - | 1911.2 | Mudstone; Light Gray (N7) To Dark Yellowish Brown (10YR 4/2)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Type: Calcilutite; Crystals<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Massive; Mottled; Laminated<br>Accessory Minerals: Organics-4%<br>Other Features: Medium Recrystallization; Dolomitic<br>Similar to above, this interval has the same color to above, but the interval is highly mottled and has abundant organics at the top of the interval. |
| 1911.2 | - | 1913 | Mudstone; Light Gray (N7) To Yellowish Gray (5Y 8/1)<br>Intercrystalline; Highly (50-90%); Anhedral<br>Grain Type: Calcilutite; Crystals<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Laminated<br>Accessory Minerals: Organics-3%<br>Other Features: Medium Recrystallization; Dolomitic<br>More gray mudstone interval with organic laminations throughout the interval. |
| 1913 | - | 1915 | Mudstone; Yellowish Gray (5Y 8/1) To Light Gray (N7)<br>Intercrystalline; Highly (50-90%); Subhedral<br>Grain Type: Calcilutite; Crystals<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite<br>Sedimentary Structures: Laminated; Mottled<br>Accessory Minerals: Organics-3%<br>Other Features: Medium Recrystallization; Dolomitic<br>Organically laminated mudstone interval with dots throughout the interval of crystalline dolostone. |
| 1915 | - | 1920 | Mudstone; Light Gray (N7) To Light Olive Gray (5Y 6/1)<br>Intercrystalline, Fracture; Highly (50-90%); Subhedral<br>Grain Type: Calcilutite; Crystals<br>Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine<br>Good Induration<br>Cement Type(s): Calcilutite Matrix; Dolomite |

Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-4%
Other Features: Medium Recrystallization; Dolomitic
Mudstone interval similar to above, this interval has organic laminations as well as other layering due to differential recrystallization. The base of the interval has more crystallinity, fracture porosity, more concentrated laminations, and has a rubbly recovery.

1920 - 1921.5 Dolostone; White (N9) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
More white colored dolostone interval with organic laminations sporadically throughout the interval and dots of crystalline dolostone throughout.

1921.5 - 1926.5 Dolostone; Very Light Gray (N8) To Moderate Gray (N5)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-8%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
Highly mottled dolostone. This darker gray dolostone has clasts of differential recrystallization throughout the interval. Mostly subhedral but parts of the interval are more crystalline.

1926.5 - 1931 Mudstone; Very Light Gray (N8) To Moderate Light Gray (N6)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Subhedral
Grain Type: Calcilutite; Crystals
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Calcilutite Matrix; Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-9%
Other Features: Medium Recrystallization; Dolomitic
Fossils: Fossil Molds
Interval similar to above, more calcilutite and concentrated organic laminations and with depth the differential recrystallization clasts decrease.

1931 - 1934 Dolostone; Yellowish Gray (5Y 8/1) To Moderate Light Gray (N6)
Intercrystalline, Fracture, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine

Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated
Accessory Minerals: Organics-5%
Other Features: Medium Recrystallization
Fossils: Fossil Molds
More fractured, mottled, and layered dolostone interval than above. This interval has large differentially recrystallized pieces within the interval giving the interval a mottled and intraclastic look. Organic laminations present sporadically within the interval. Few pinpoint vugs throughout the interval and slightly rubbly recovery at parts within the interval.

1934 - 1939 Dolostone; Light Gray (N7) To Moderate Dark Gray (N4)
Intercrystalline, Pinpoint; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-10%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Similar to intervals above, highly mottled interval with abundant organic laminations, the mottling comes from differential recrystallization. Some small molds within this interval that have a sucrosic look within them.

1939 - 1940 Dolostone; Light Gray (N7) To Moderate Dark Gray (N4)
Intercrystalline, Pinpoint; Highly (50-90%); Subhedral
Grain Size: Very Fine; Range: Microcrystalline To Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-10%
Other Features: Medium Recrystallization; Sucrosic
Fossils: Fossil Molds
Very similar to above, less large differentially dolomitized dolostone pieces within the interval.

1940 - 1945 Anhydrite; Light Olive Gray (5Y 6/1) To Moderate Dark Gray (N4)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Anhydrite; Dolomite
Sedimentary Structures: Mottled; Laminated
Other Features: High Recrystallization
Anhydrite interval that has trace organic laminations.

1945 - 1950 Anhydrite; Light Olive Gray (5Y 6/1) To Moderate Dark Gray (N4)
Intercrystalline, Fracture, Low Permeability; Highly (50-90%); Anhedral

Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Anhydrite; Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-2%
Other Features: High Recrystallization
This interval is similar to above, more fracture porosity throughout the interval. This interval within the fractures has more organic laminations.

1950 - 1955 Dolostone; Light Olive Gray (5Y 6/1) To Moderate Dark Gray (N4)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: High Recrystallization
Very similar to above, massive anhedral dolostone interval. Evaporites return at base of interval.

1955 - 1960 Dolostone; Light Gray (N7) To Moderate Gray (N5)
Intercrystalline, Fracture; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled
Accessory Minerals: Organics-<1%
Other Features: High Recrystallization
Highly mottled dolostone interval with evaporites. This interval is highly crystalline throughout. Trace organics within the interval.

1960 - 1965 Dolostone; Light Gray (N7) To Moderate Gray (N5)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: High Recrystallization
Similar to above, this interval is less mottled with depth but highly recrystallized and crystalline throughout.

1965 - 1966 Dolostone; Light Gray (N7) To Moderate Gray (N5)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: High Recrystallization
Continued interval from above, base of interval marked by organic lamination and a sharp

recrystallization change marking the bedding contact.

1966 - 1971 Dolostone; White (N9) To Light Gray (N7)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated
Accessory Minerals: Organics-1%
Other Features: Medium Recrystallization
Lighter colored less crystalline dolostone interval that is highly mottled with evaporites within the interval. Laminated organics present at the base and the base marked by a concentration of laminations.

1971 - 1974 Dolostone; White (N9) To Moderate Gray (N5)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: Medium Recrystallization
Similar to above, light colored dolostone mottled with evaporites throughout. In this interval the mottling is not as concentrated in singular sections within the interval as above, this interval is mottled throughout.

1974 - 1977 Dolostone; Light Gray (N7) To Moderate Gray (N5)
Intercrystalline; Highly (50-90%); Subhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Mottled; Laminated; Massive
Other Features: Medium Recrystallization
Similar to above, this interval is more layered, with differential recrystallization within the interval. Mottled evaporites present but less so within this interval.

1977 - 1982 Dolostone; Light Gray (N7) To Yellowish Gray (5Y 8/1)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Crystalline dolostone interval similar to above, where evaporites are not evident and the mottling throughout this interval is of organics and differential recrystallization.

1982 - 1986.5 Dolostone; Light Gray (N7) To Moderate Gray (N5)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Laminated; Mottled
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization
Very similar to above, with depth the interval is becoming more gray in color and crystalline in texture.

1986.5 - 1989.5 Dolostone; Very Light Gray (N8) To Moderate Light Gray (N6)
Intercrystalline, Low Permeability; Highly (50-90%); Anhedral
Grain Size: Microcrystalline; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Other Features: High Recrystallization
Fossils: Fossil Molds; Mollusks
Dolostone interval with mottled evaporites throughout. More so than above, interval is highly compacted but the interval looks to have pore space but has been recrystallized over.

1989.5 - 1994 Dolostone; White (N9) To Olive Gray (5Y 4/1)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled; Laminated
Accessory Minerals: Organics-2%
Other Features: Medium Recrystallization; Crystalline
Massive dolostone interval with some differential recrystallization that is seen within this interval as mottling. Organic laminations present in very thin laminations.

1994 - 1997 Dolostone; Yellowish Gray (5Y 8/1) To Light Olive Gray (5Y 6/1)
Intercrystalline; Highly (50-90%); Anhedral
Grain Size: Very Fine; Range: Microcrystalline To Very Fine
Good Induration
Cement Type(s): Dolomite
Sedimentary Structures: Massive; Mottled
Accessory Minerals: Organics-<1%
Other Features: Medium Recrystallization; Crystalline
Similar dolostone interval to above, this interval has large crystalline mottling in one main spot in the last foot of the interval, and many very fine dots of mottling. Base of interval becomes slightly grainy and Total depth is marked 1997'.

# Appendix E. Digital Photographs of Core Samples Retrieved at the ROMP 115 – Royal Well Site in Sumter County, Florida


30'
26'
20'
16.0'
11.0'


11.0'
6.0'
5.0'
4.0
3.0
2.0'
1.0
R 115

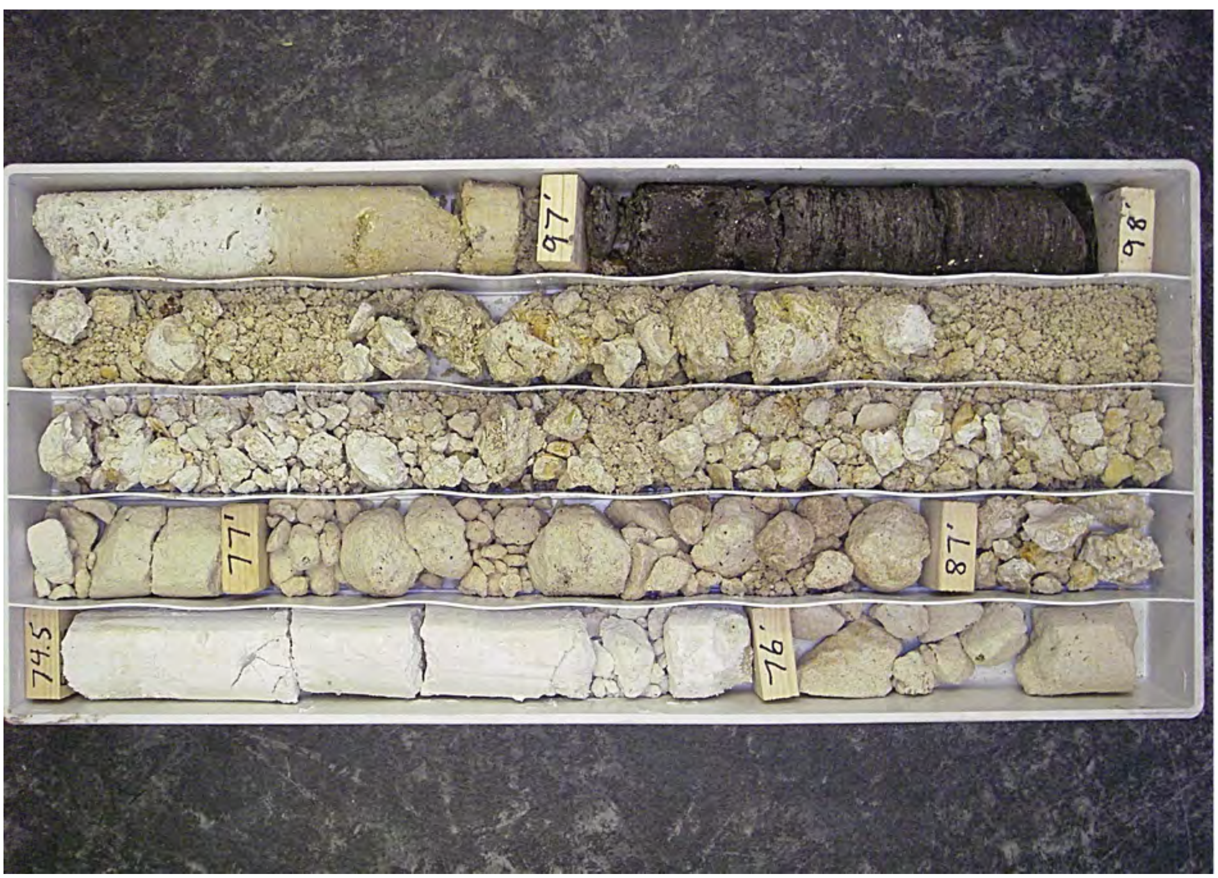

51'
46'
40'
41'


40'
36'
R115
31'


74.5'
71'
66'
63'

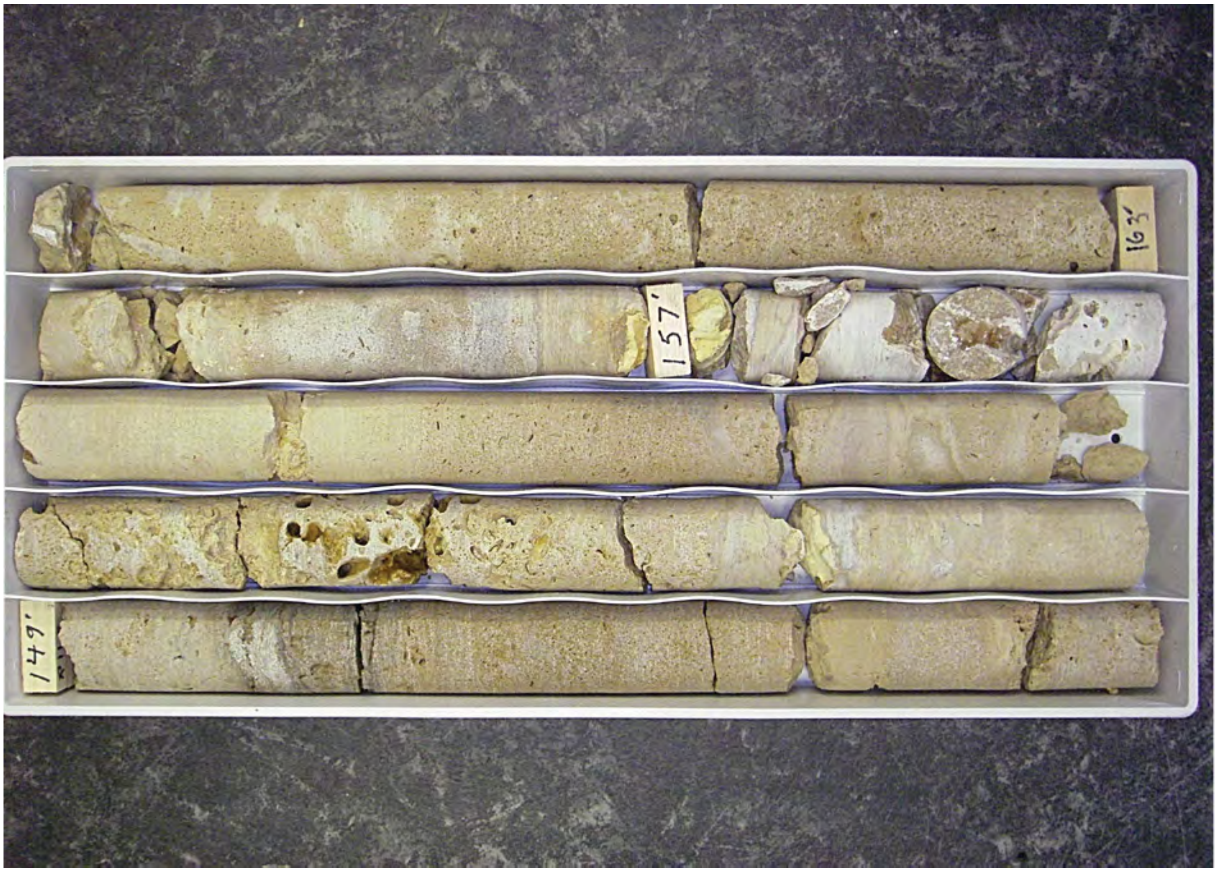

61'
63'
56'
51'

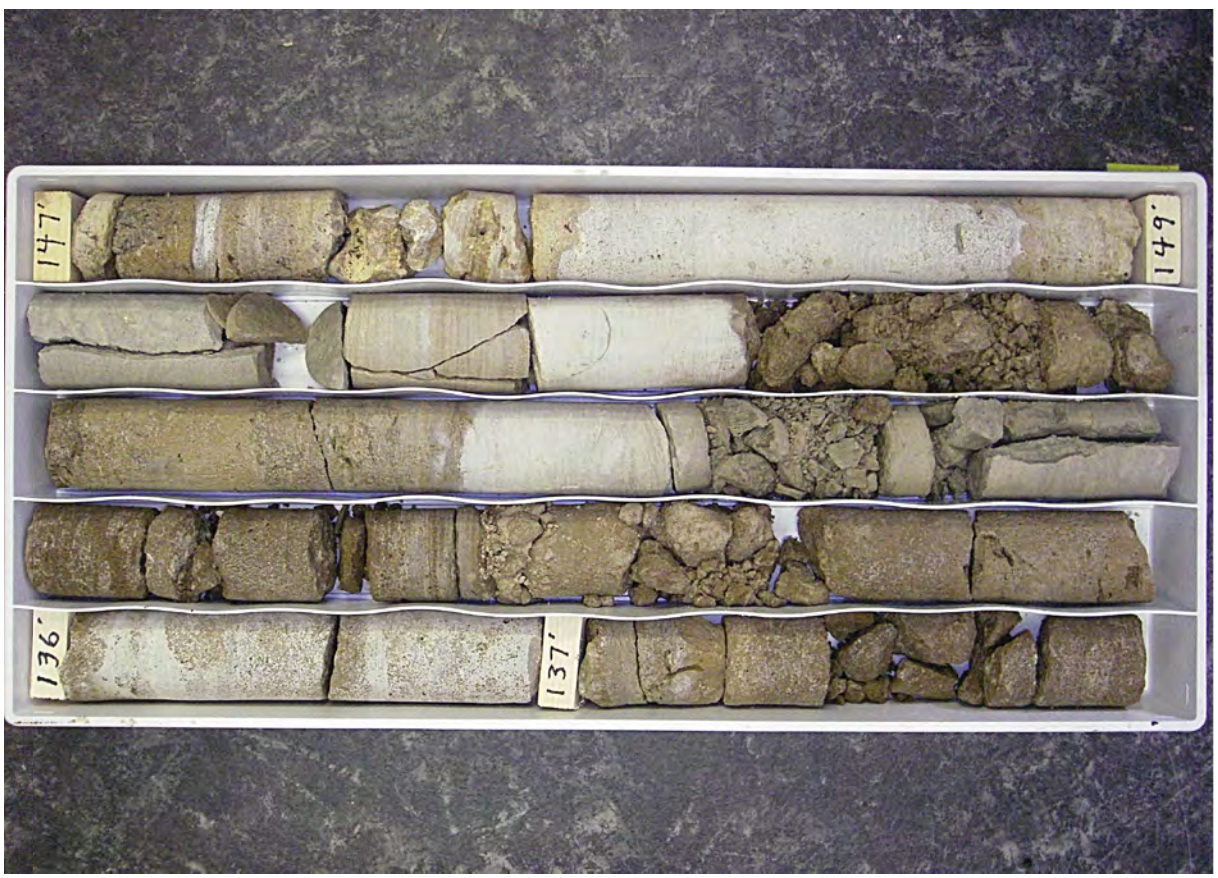

110.5'
107'
98'


97'
98'
77'
87'
74.5
76'


136'
124.5
127'


124.5
117'
110.5'


163'
157'
149'


147'
149'
136'
137'


187'
190'
176'
177'


176'


217'
R115
207'


205.8'
R115
197'

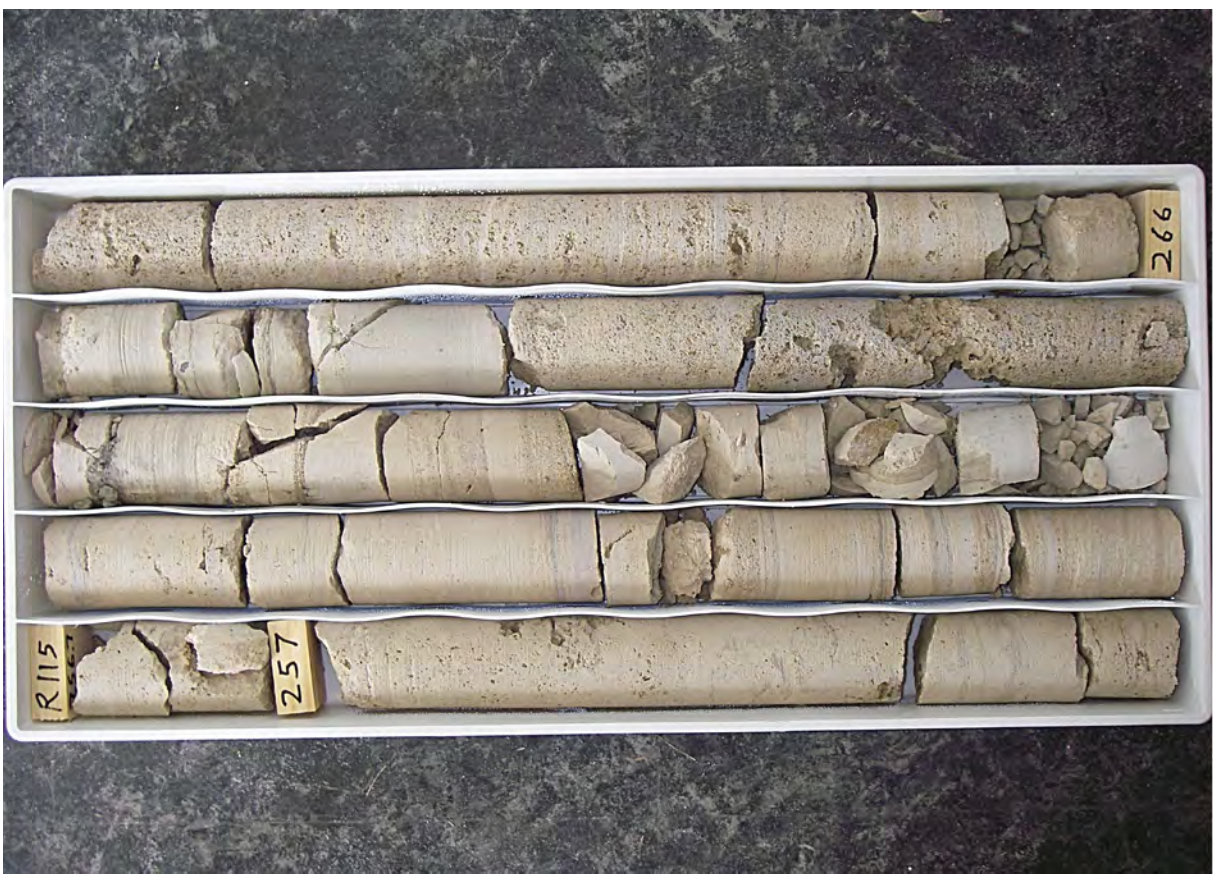

237
R115


227'
R115


256.7
R115


247
R115


276'
R115
267


266
R115
257


299.5
297
289


289
287'
277'
R115


318.5
317
310.4


310.4
307
299.5


347
347.5
337
331


331
327
318.5


375
367
361'

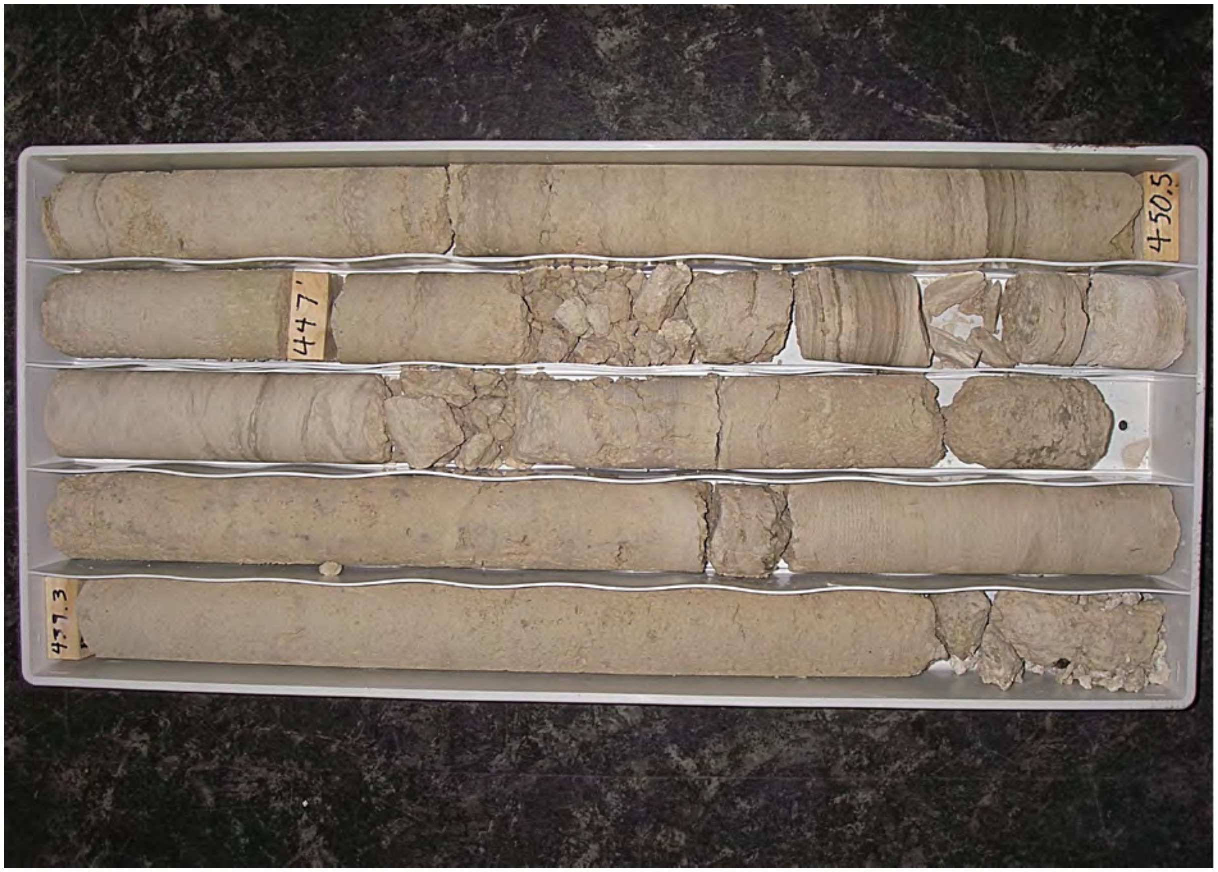

361'
357
347.5

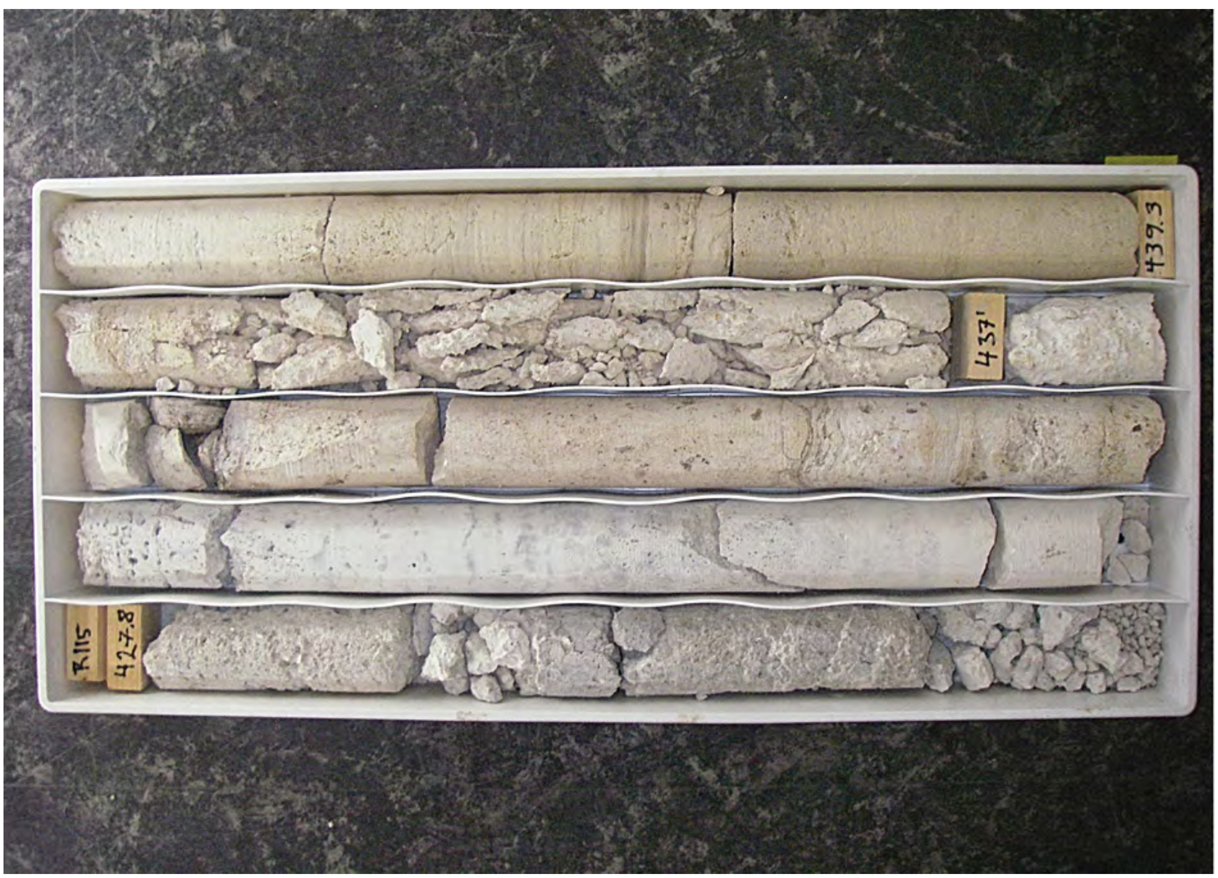

397'
398.5
389'


387'
389'
375
377


427'
427.8
417'
R115
408.5'

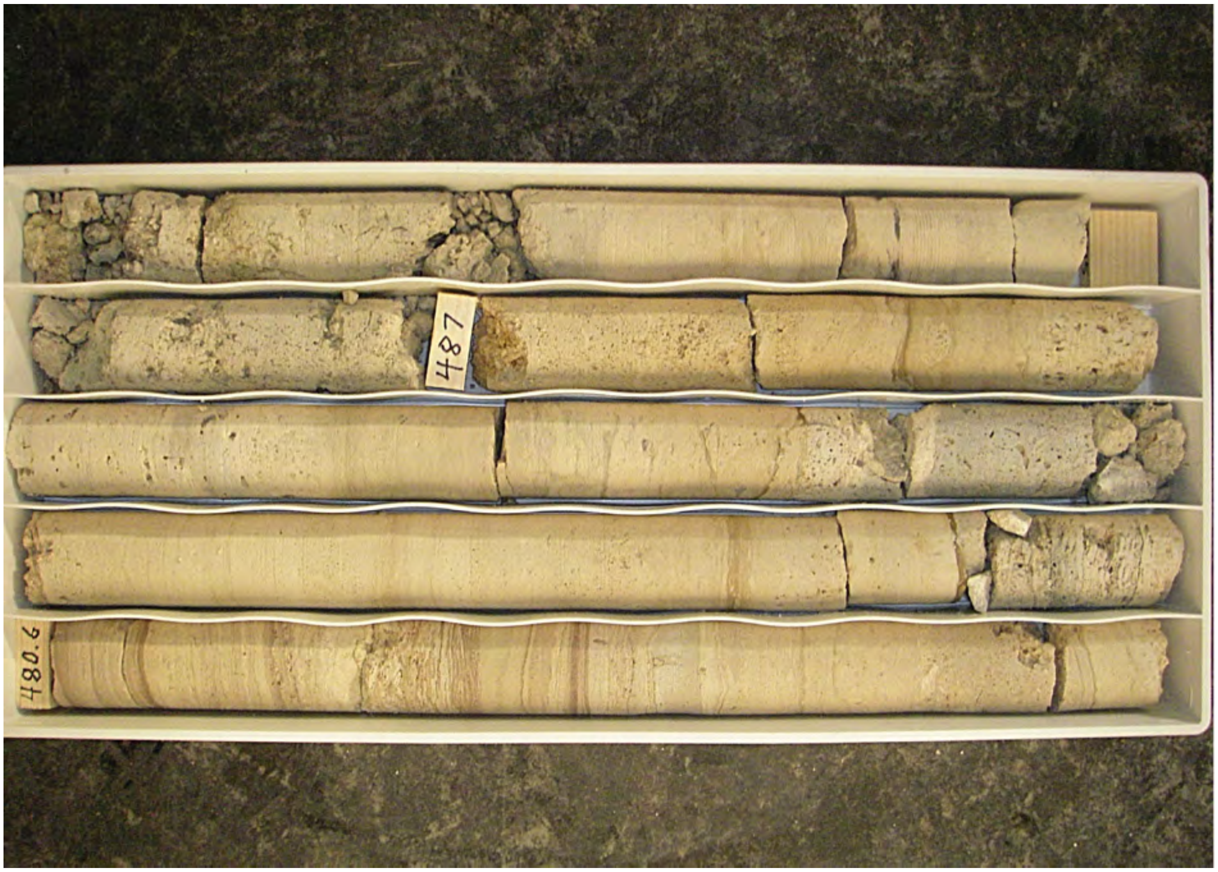

407
408.5'
398.5


450.5
447'


439.3
437'
R115
427.8

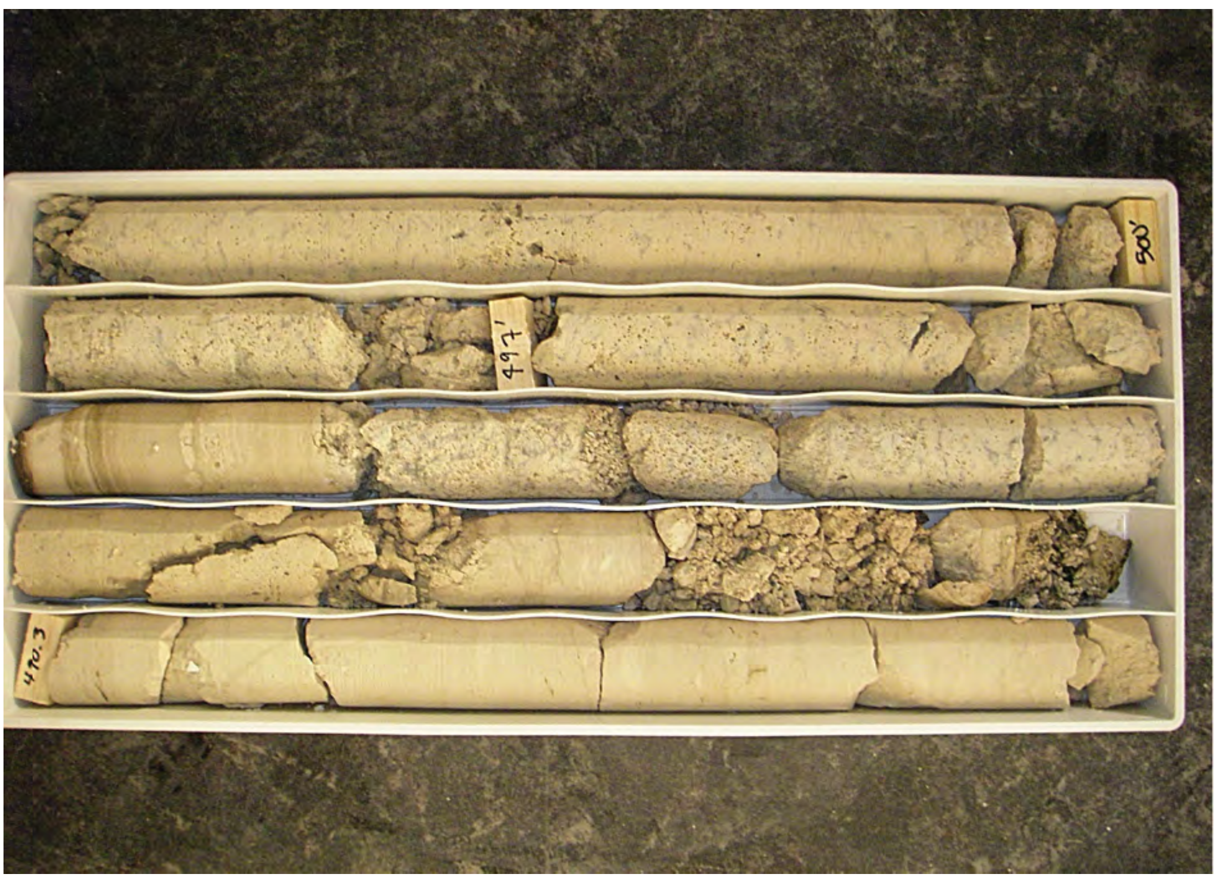

470.5
467'
461'


461'
457
450.5


487
480.6


480.6
477
470.5


507'
500'


500'
497'
490.3


544
537'
533'


533'
527
521.5


564.7
557'
555'


555'
547
544'


585.7
575.5
577


575.5
567
564.7
R115


604'
597'
594.5'


594.5'
585.7
587'


625
617'
613.5


613.5
607'
604'


647
647.7'
6374
R115


637.4
627
625


656.5
657'


656.5'
647.7'


684.5
677
675


675'
667'
666.3


709.8'
707'
697
696'


696'
687'


731.8
727'
720'


720'
717'
709.8'


751'
747'
741.5


741.5
737'
731.8'


771.3'
767'
762


762
757'
751'


787'
780'


780'
777'
771.3

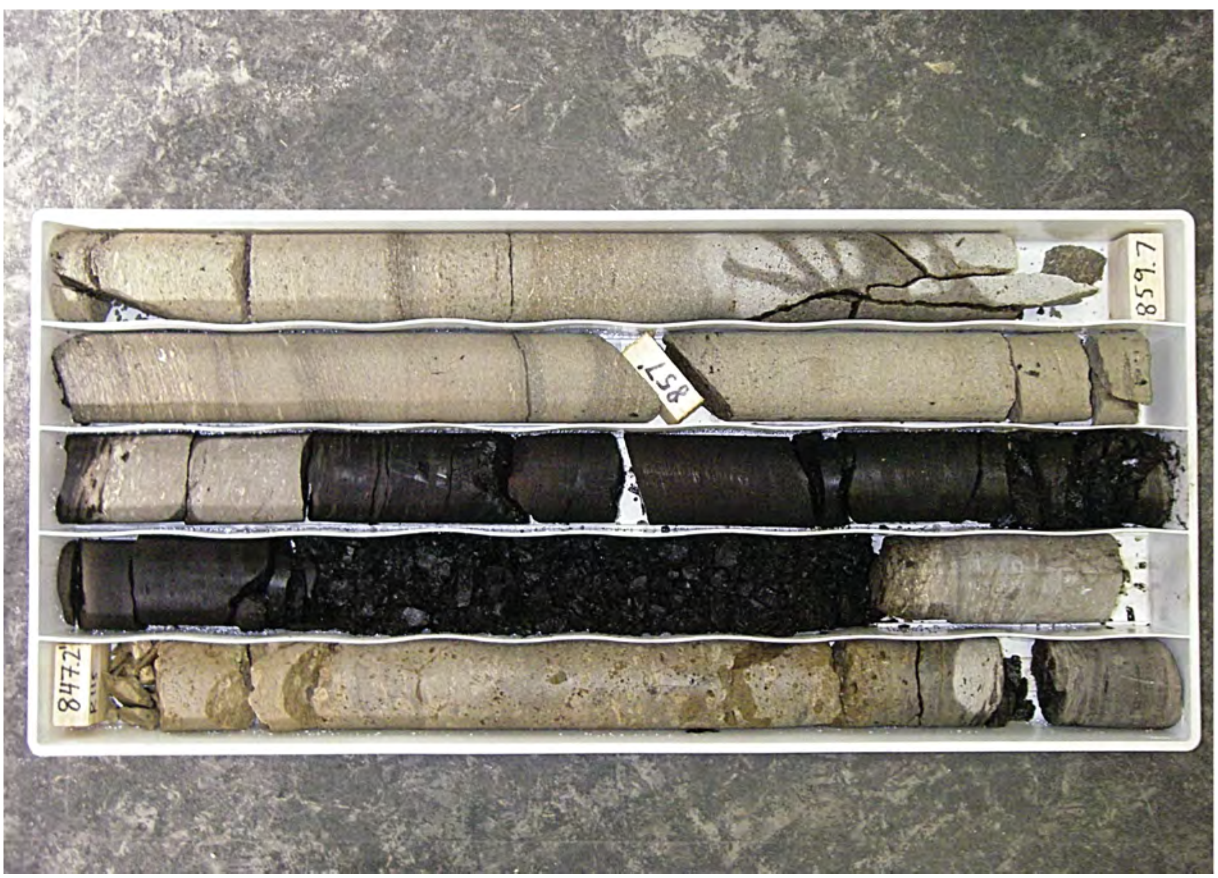

807'
808'
799'


799'
797'
789.2'


827'
827.2'
R115
817.8


817'
817.8'
808'


869
867
859.7


859.7
857
847.2


892'
887'
881'


881'
877'
869'


912'
907'
902'


902'
897'
892'

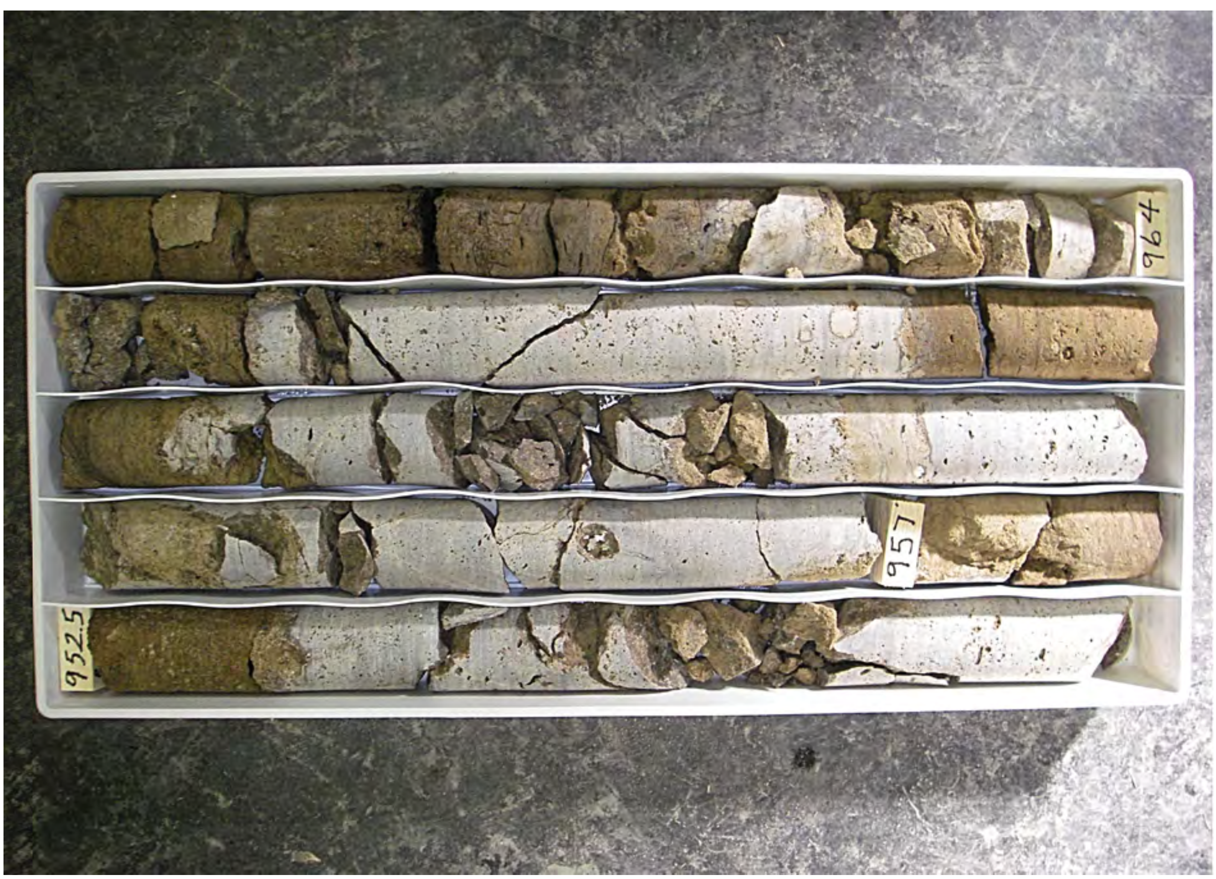

932.5'
927'
922'


922'
917'
912'

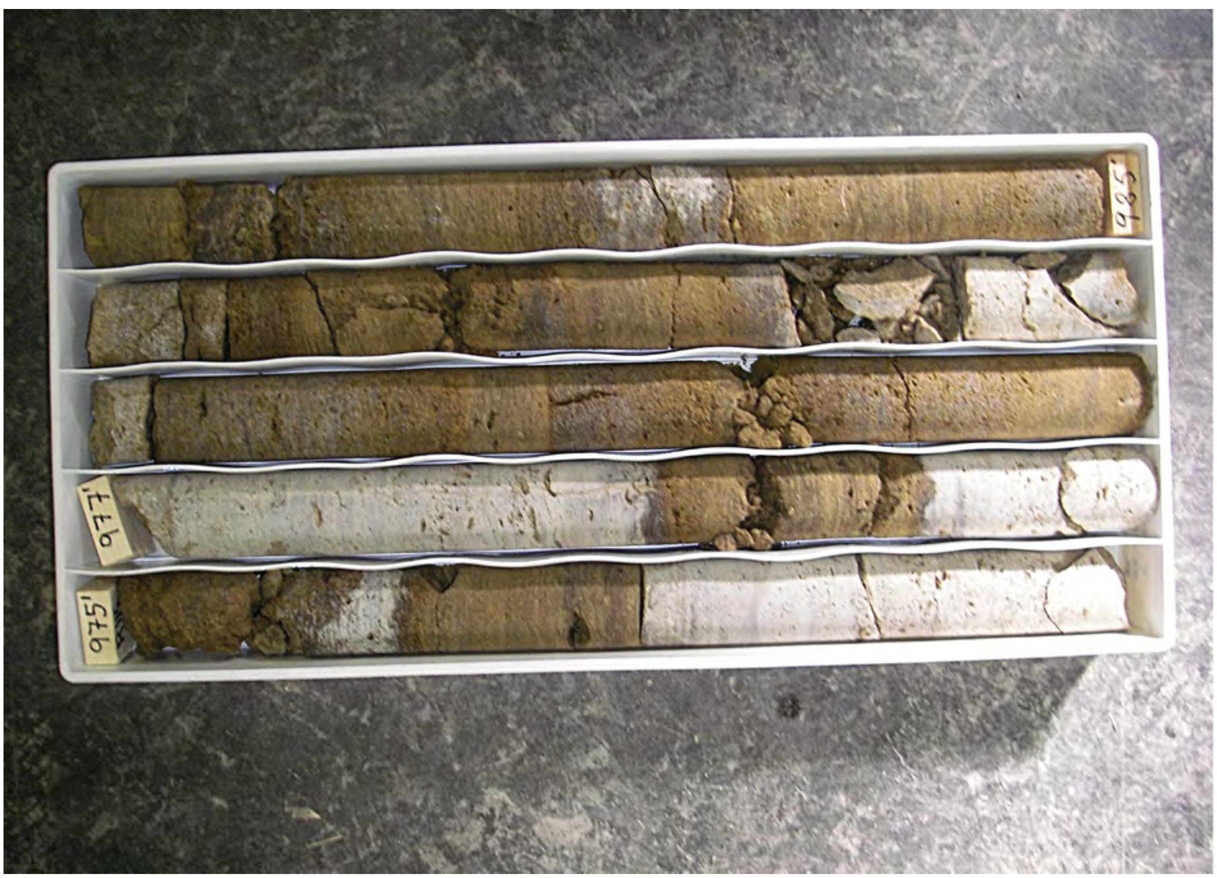

952.5
947'
942.5'


942.5'
937'


975'
967'
964'


964
957
952.5


994'
987'
985'
R115


985
977'
975'


1013'
1007
1004.5
R115


1004.5
997'
994'


1032.5
1027'
1022'


1022'
1017'
1013'
R115


1047
1042


1042'
1037
1032.5


1070.5
1067
1060.5


1060.5
1057'
R115
1051'


1097
1098.3
1089'


1087'
1089'
1077'
1070.5'


1116.5
1107.3


1107.3
1098.3


1135.7
1126
1127'


1126
1116.5
1117


1154.3
1145.5
R 115
1147'


1145.5
1135.7
R115
1137


1172.5
1167'
1163.8'


1163.8'
1157'
1154.8'


1191.5
1187'
1182'


1182
1177'
1172.5'


1211'
1207'
1201'


1201'
1197'
1191.5


1232
1227
1221


1221'
1217'
1211'


1252
1247
1241.5


1241.5
1237


1271
1267
1262


1262
1257
1252


1289.5
1287
1280.5
R115


1280.5
1277


1307
1308.3
1298.8'


1298.8
1297'
1289.5


1329
1327
1317.5


1317
1317.5
1308.3


1347
1348.4
1338.8
R115

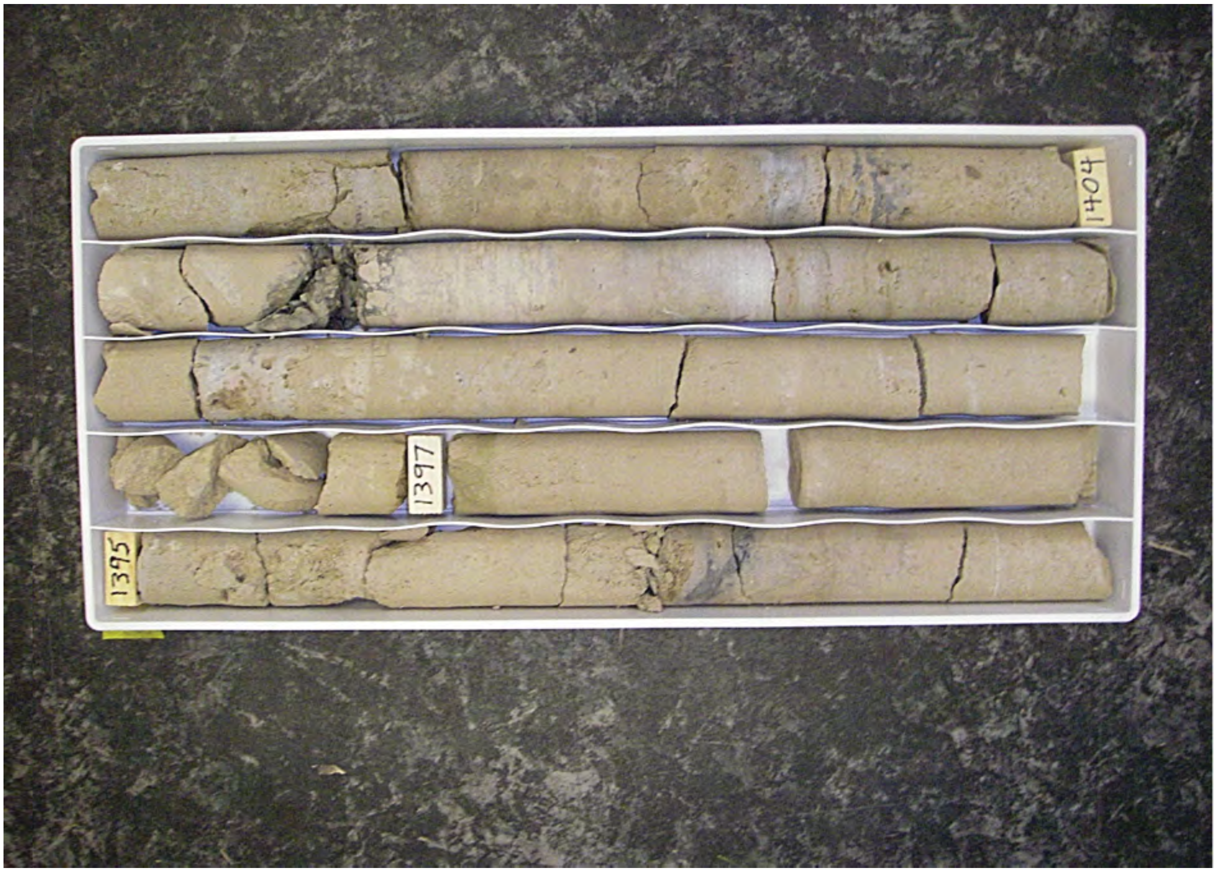

1337
1338.8
1329

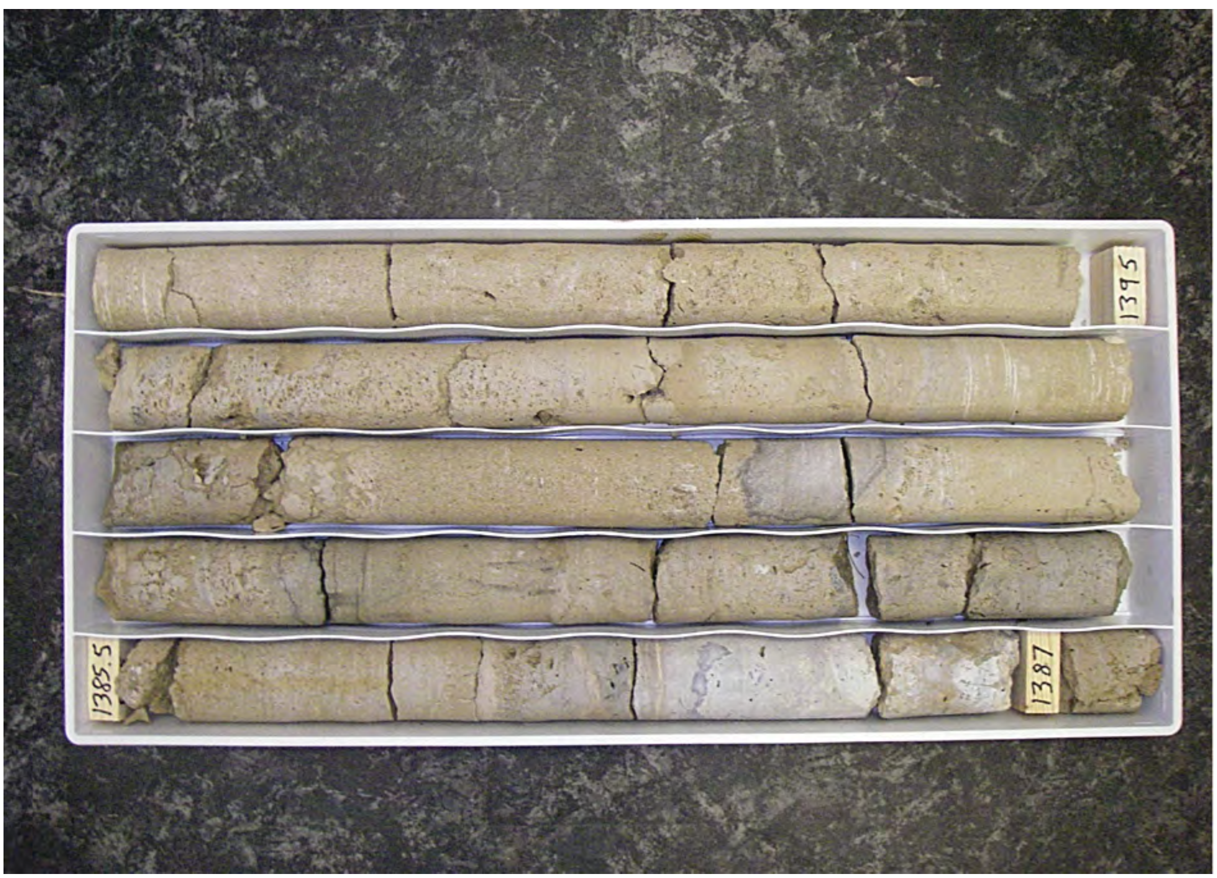

1366.8
1357.3


1357.3
1348.4


1385.5
1376
1377

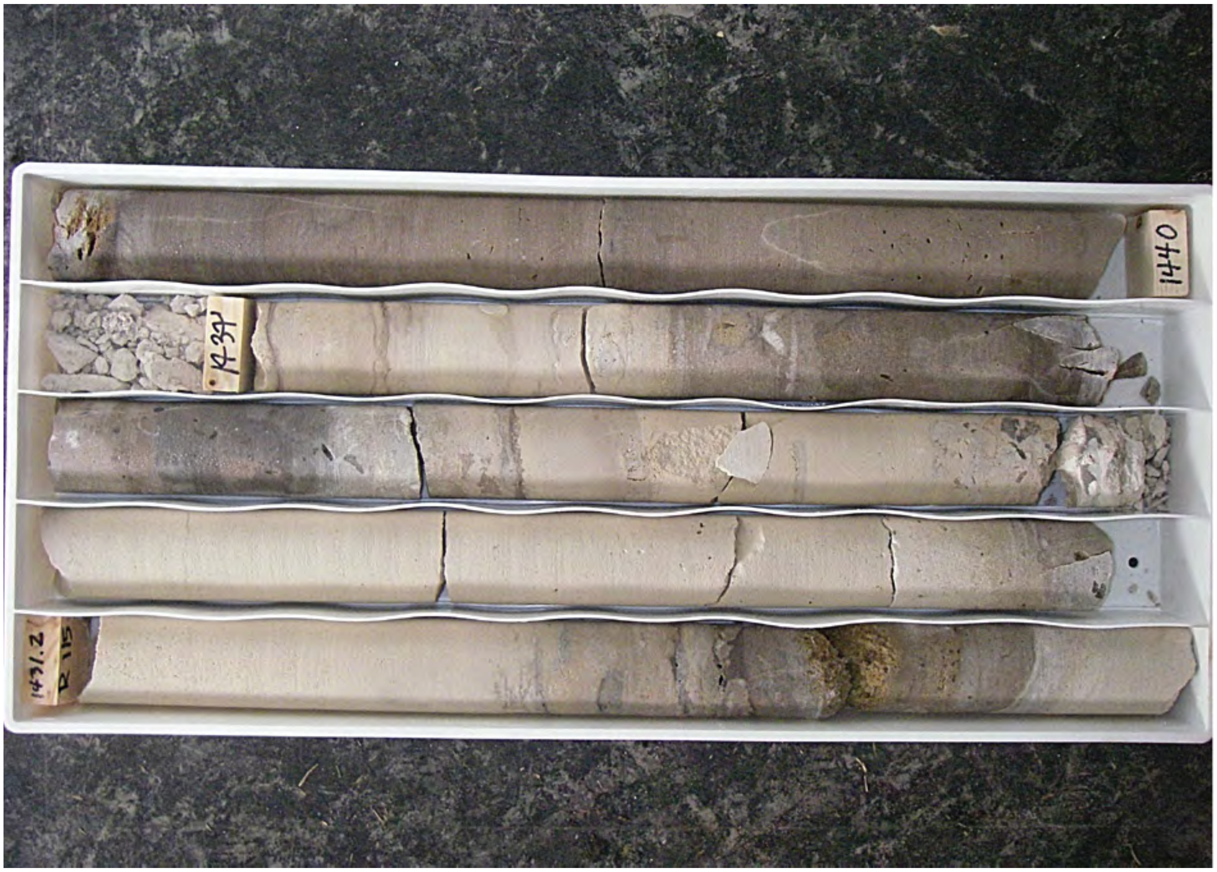

1376
1366.8
1367


1404
1397
1395

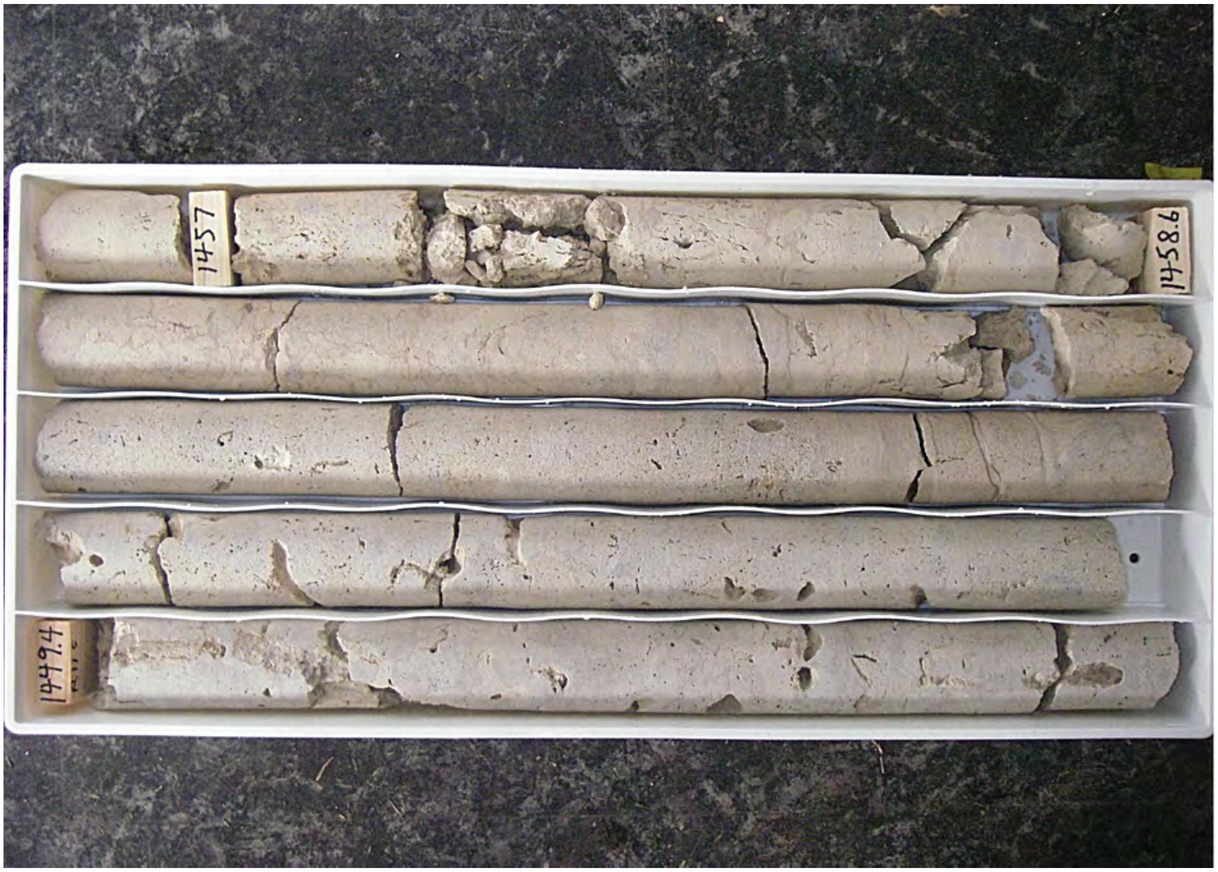

1395
1385.5
1387

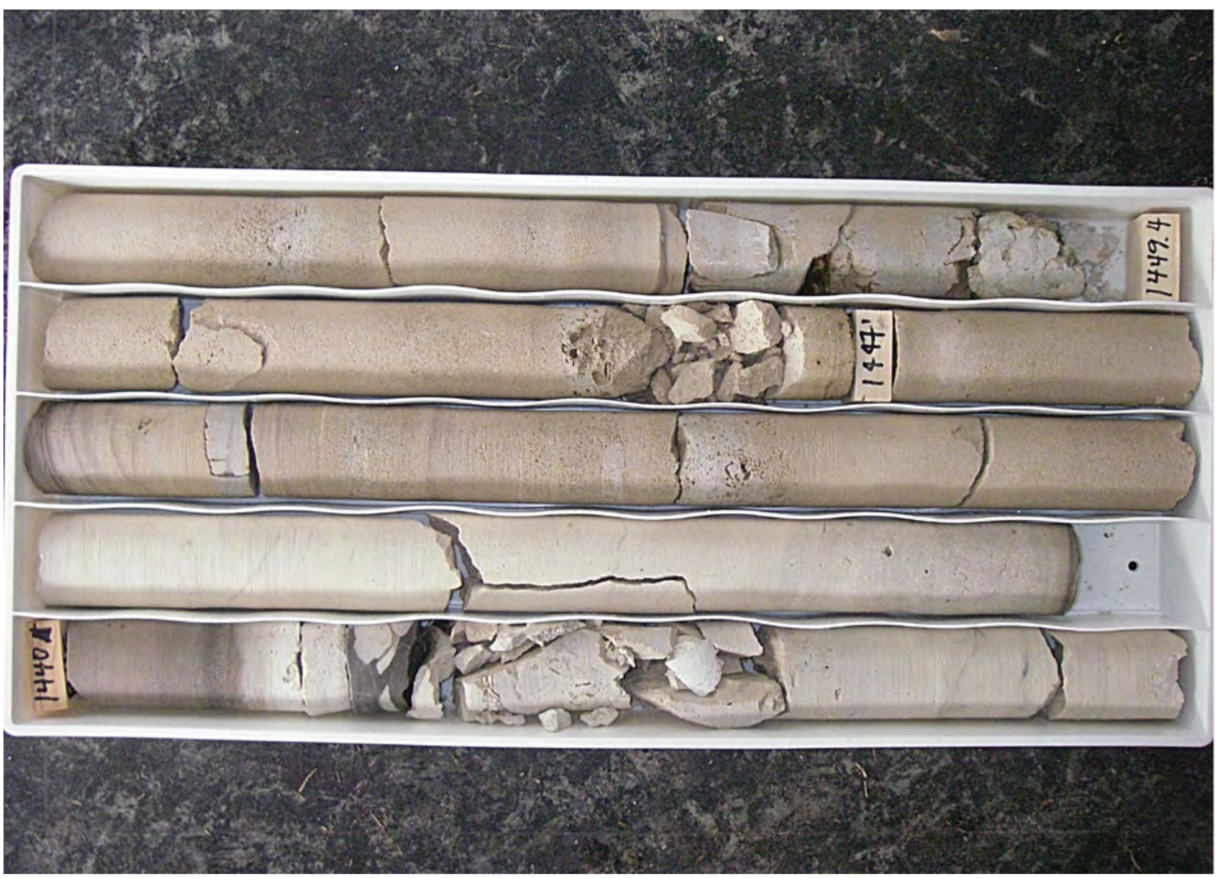

1429.5'
1417
1413.3


1413.3
1407
1404


1440
1437'


1431.2'
1427'
1423.5


1457
1458.6
1449.4


1449.4
1447'
1440

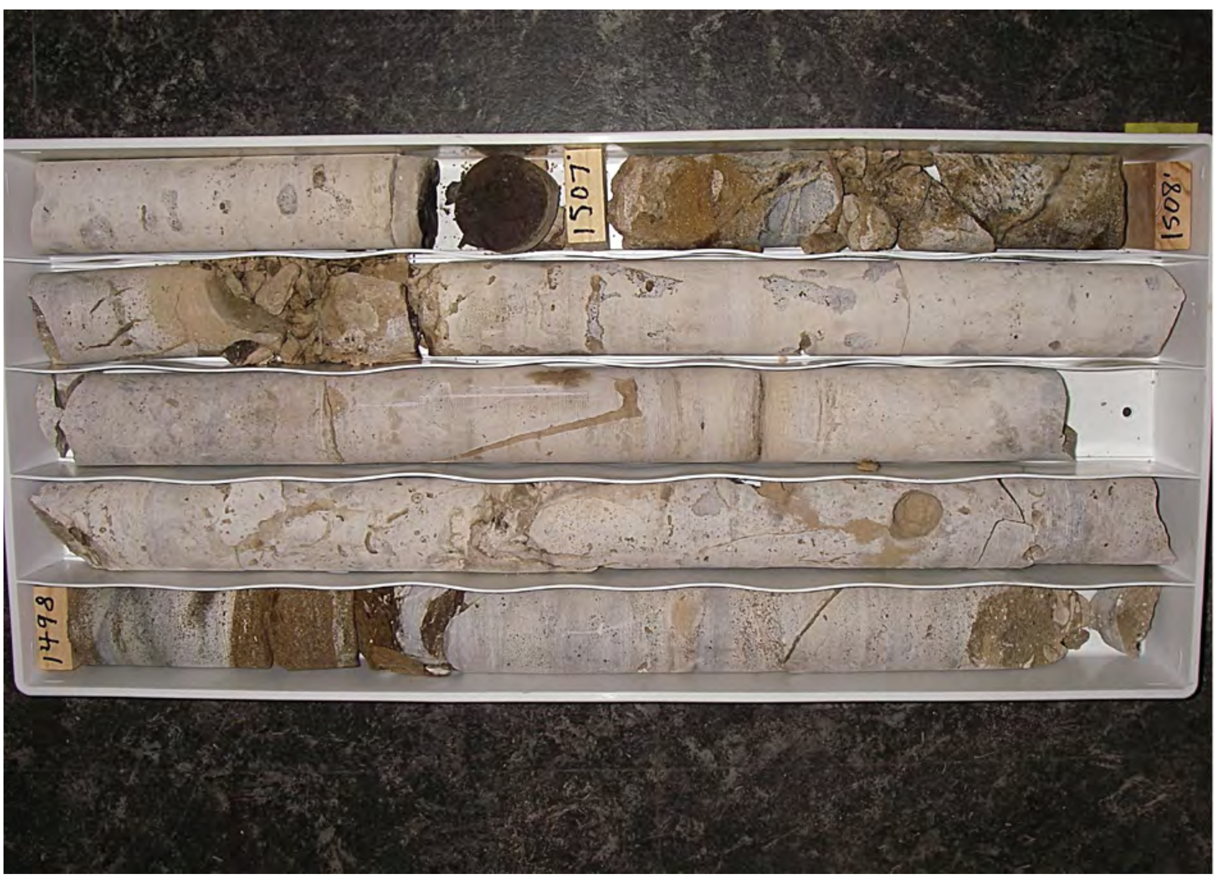

1477'
1478.5
1467.5


1467'
1467.5
1458.6


1497

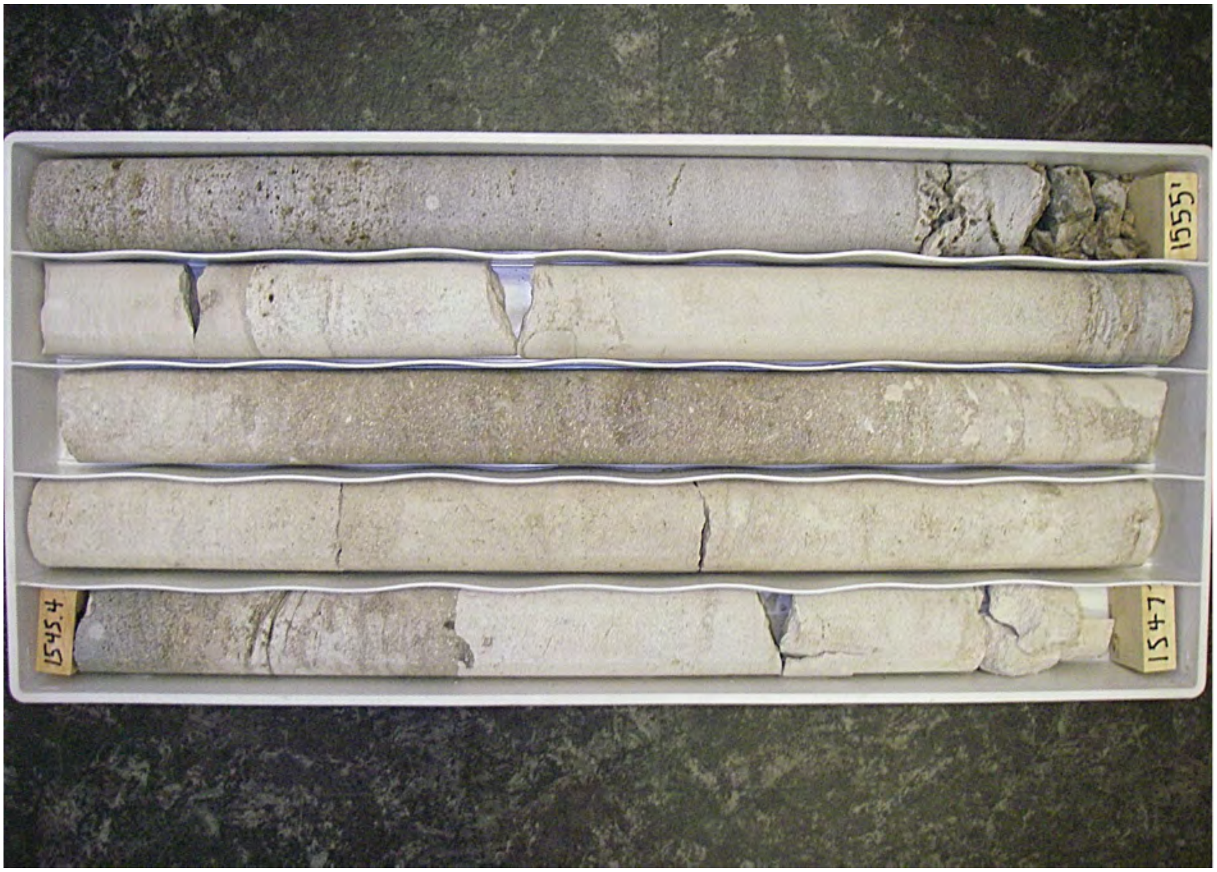

1487
1478.5


1517'
1508


1507
1508'
1498


1536'
1526.5'
1527'


1517'


1555'
1545.4
1547'


1545.4
1536'
1537'


1573.5
1567'
1564.8


1564.8'
1557'
1555'


1595'
1584'
1584


1584
1577'
1573.5


1615.5
1605.8
1607


1603.8
1595
1597


1634
1627
1624

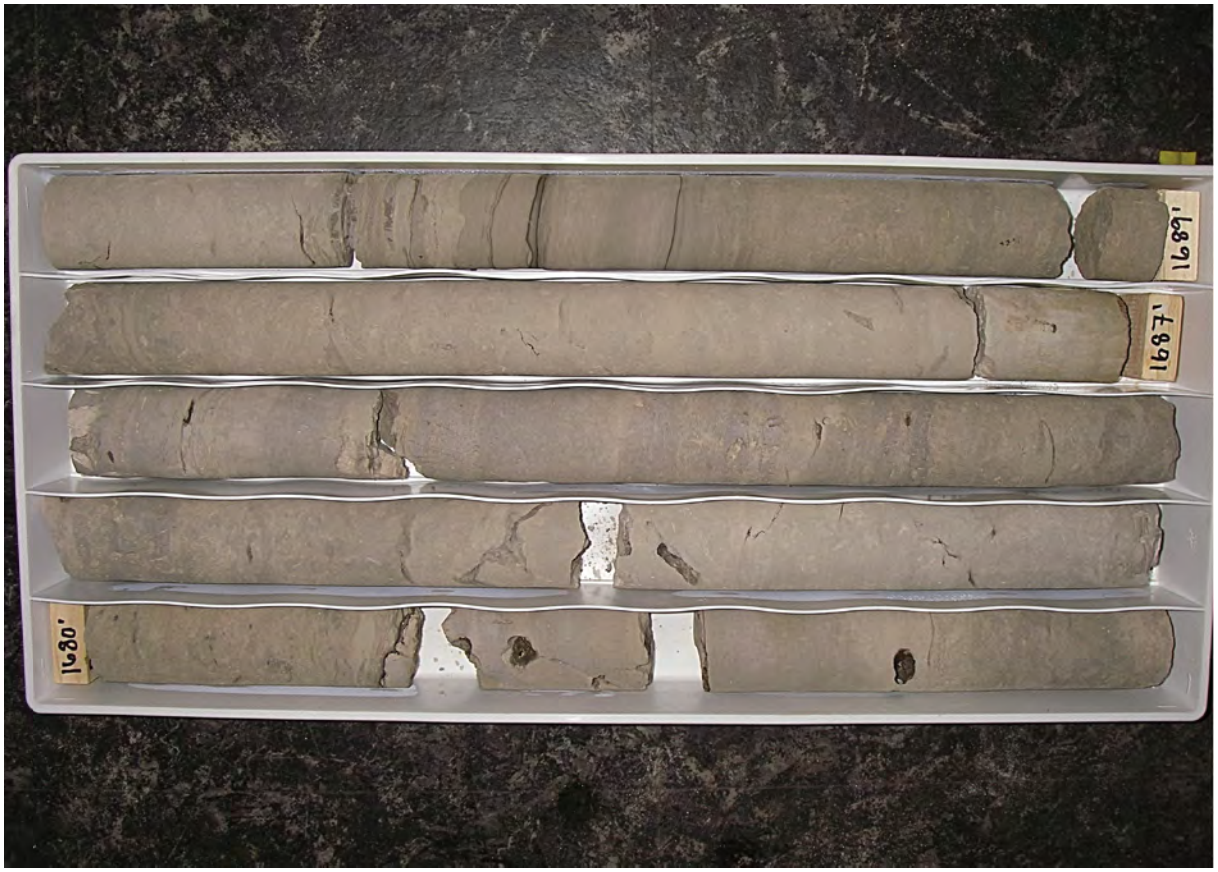

1624
1615.5
1617


1652'
1647'
1643


1643
1637
1634


1669.8
1667
1661


1661
1657
1652


1689'
1687'
1680'


1680'
1677
1669.8


1707'
1708.6
1698.5'


1697
1698.5
1689'


1727
1728.7
1718.3


1717
1718.3
1708.6
R115


1773.5
1767
1763


1763
1757
1751'


1777'
1782.5


1782.5
1777'
1773.5
R115


1811'
1807'
1801.5

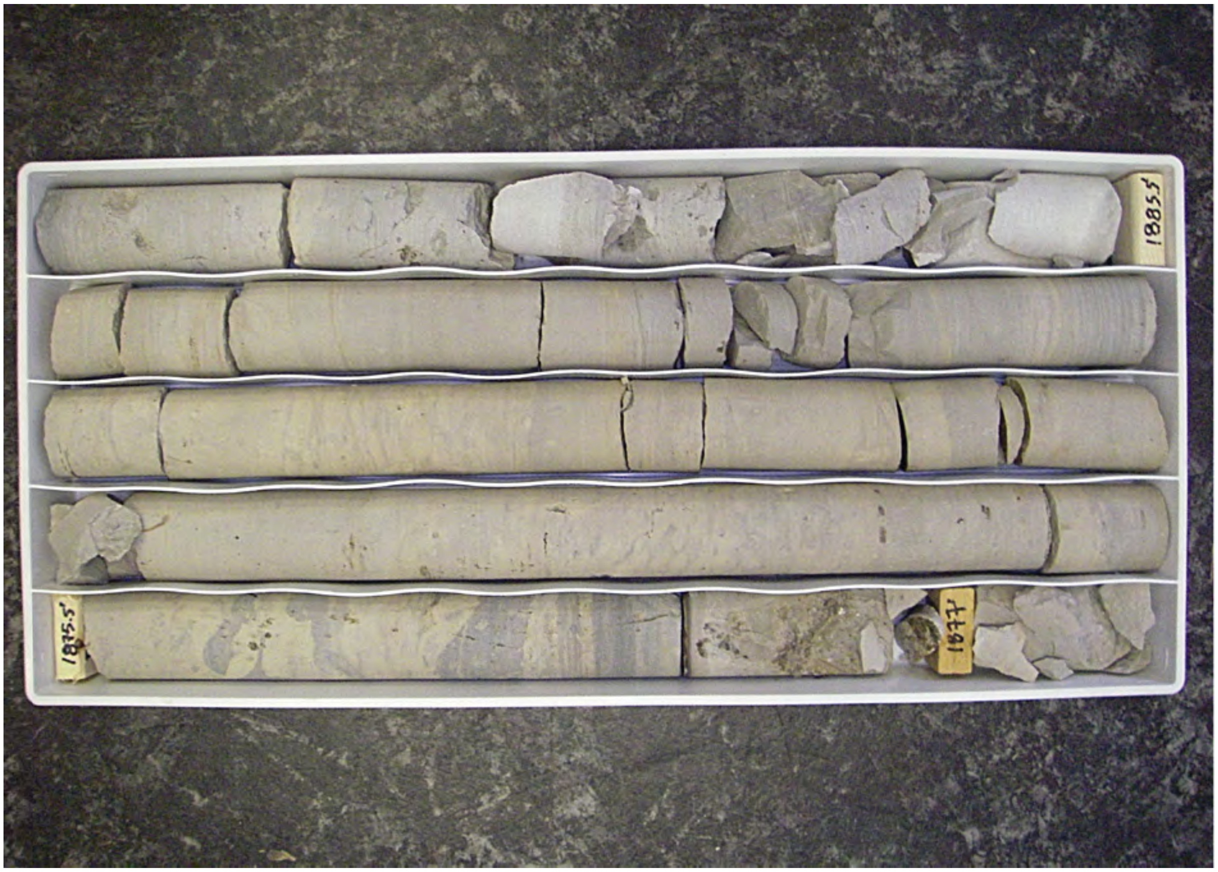

1801.5
1797
1792


1827'
1820.3


1820.3
1817
1811'


1866.5
1857'


1857'
1847.7


1885.5'
1875.5'
1877

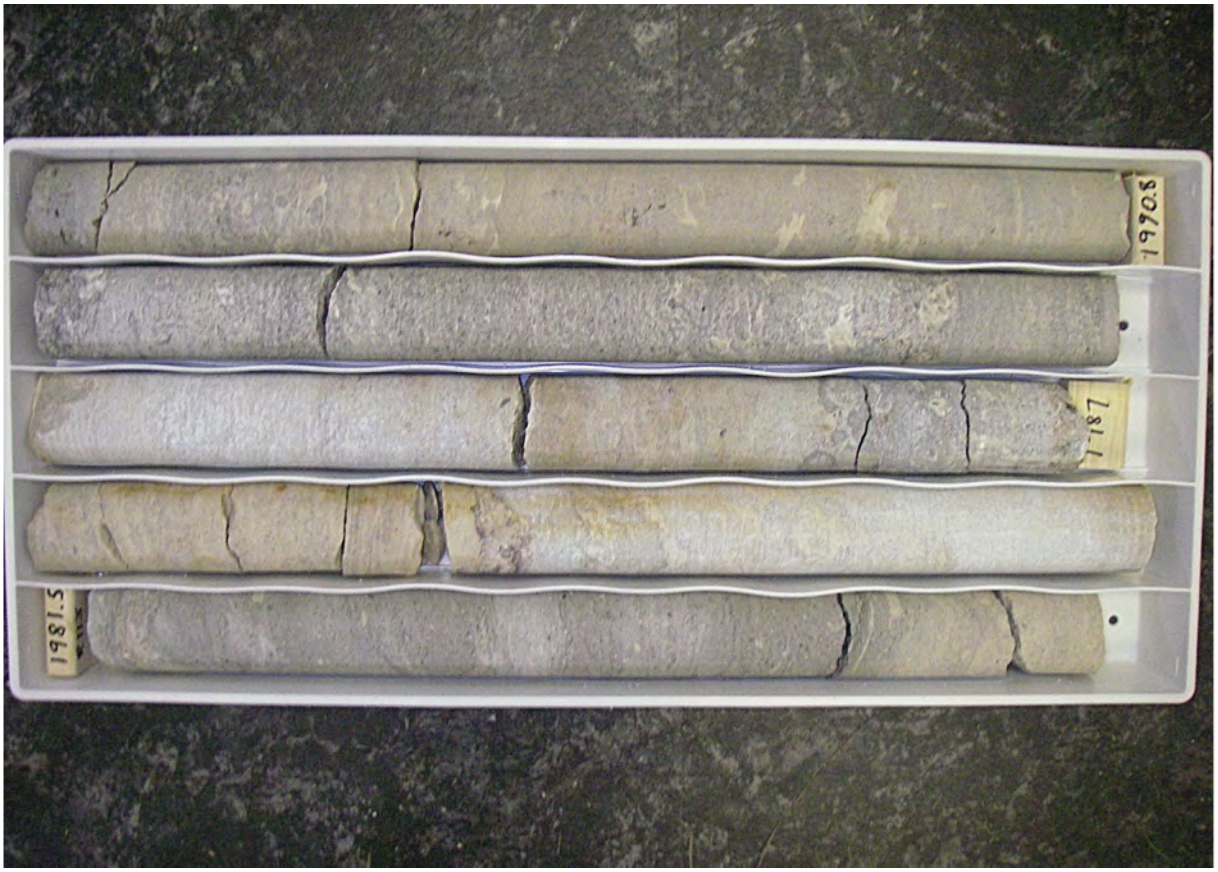

1875.5'
1866.5


1953
1947


1943.5
1937
1934


1972
1967'
1962.5'

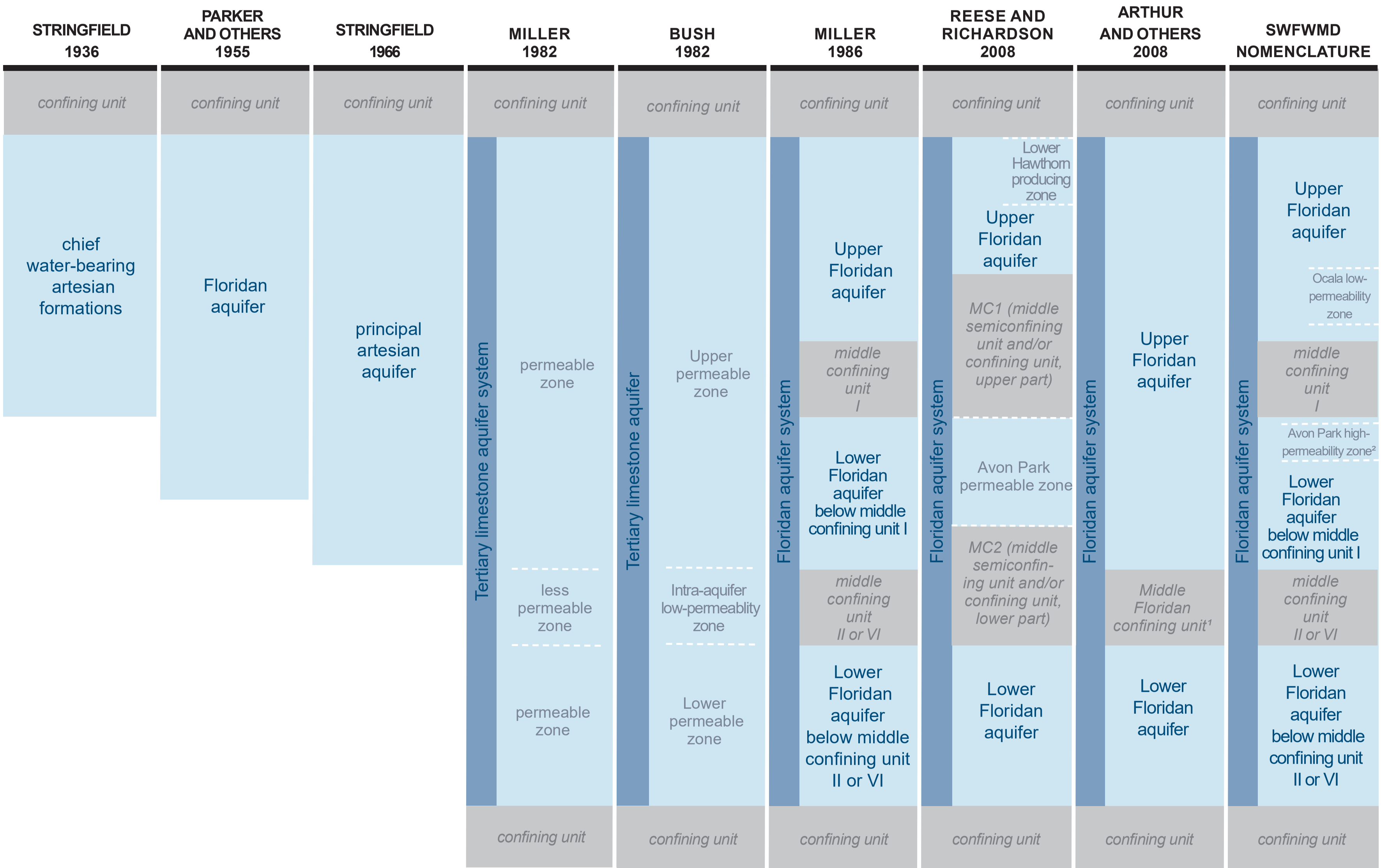

1962.5'
1957
1953


1970.8
1981.5


1981.5
1977
1972


1997'
TOTAL DEPTH
1990.8

# Appendix F. Correlation Charts

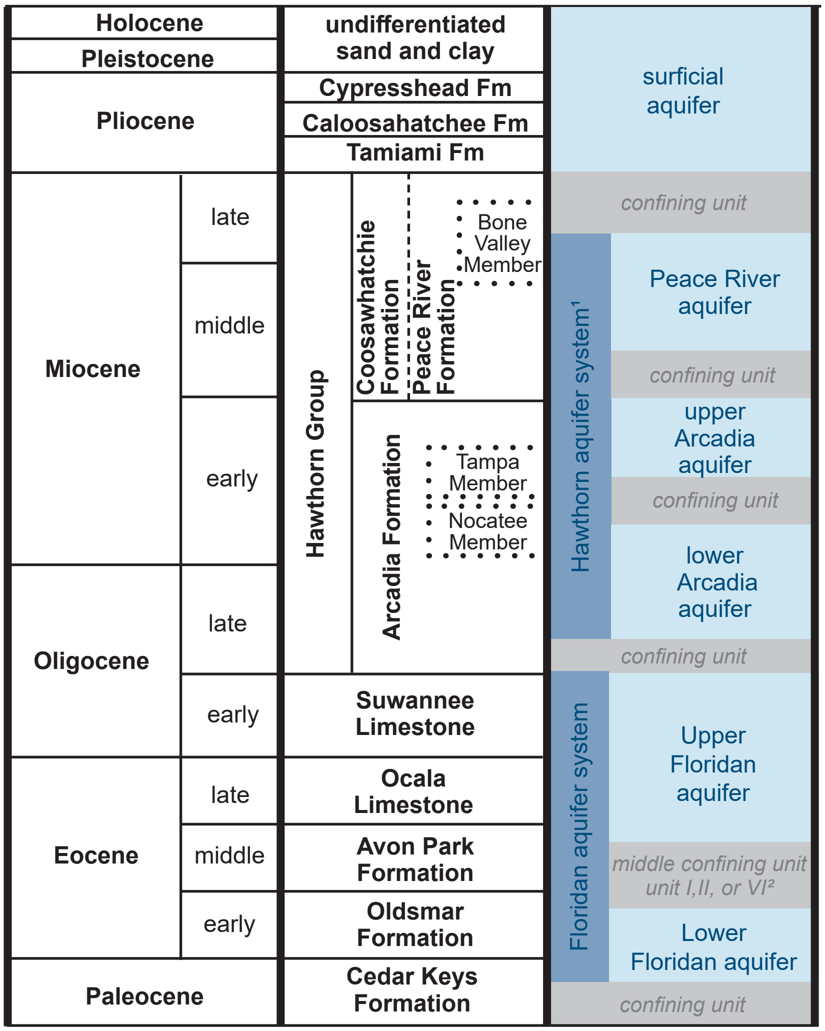



[Terms shown are for hydrogeologic units present within the Southwest Florida Water Management District]

[1] Arthur and others acknowledge existence of the middle confining unit I within the Southwest Florida Water Management but do not map it for Special Publication 68.

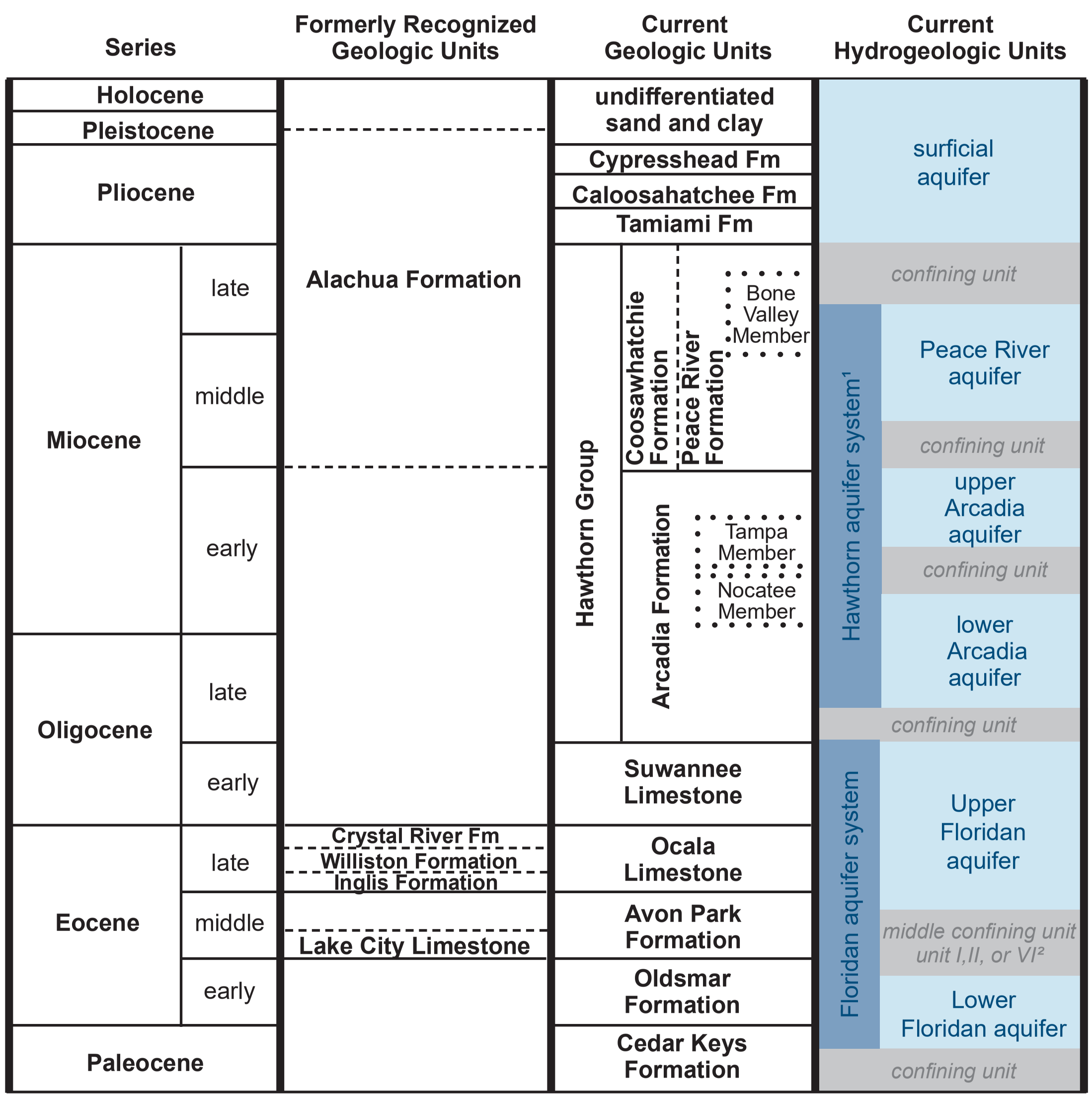
[2] The Avon Park high-permeability zone (SWFWMD fracture zone) crosses middle confining unit I in central Polk County; therefore, it occurs above the middle confining unit I in northern Polk and below the middle confining unit I in southern Polk.

Southwest Florida Water Management District Hydrogeologic Framework




*This chart may be used to correlate the stratigraphic units in this report to the current hydrogeologic framework model of the Southwest Florida Water Management District.*
*Note: ¹The Hawthorn aquifer system was previouly referred to as the Intermediate aquifer system. ²One or more of the middle confining units dividing the Upper and Lower Floridan aquifers may be present at a well site. The aquifer beneath each middle confining unit present is designated as Lower Floridan aquifer below the middle confining unit it is beneath.*

Southwest Florida Water Management District Hydrogeologic Framework




*This chart may be used to correlate the stratigraphic units in previuosly published District reports to the current geologic and hydrogeologic framework model of the Southwest Florida Water Management District.*
*Note: [1]The Hawthorn aquifer system was previously referred to as the Intermediate aquifer system. [2]One or more of the middle confining units dividing the Upper and Lower Floridan aquifers may be present at a well site. The aquifer beneath each middle confining unit present is designated as Lower Floridan aquifer below the middle confining unit it is beneath.*

# Appendix G. Slug Test Data Acquisition Sheets for the ROMP 115 – Royal Well Site in Sumter County, Florida

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 1

### General Information

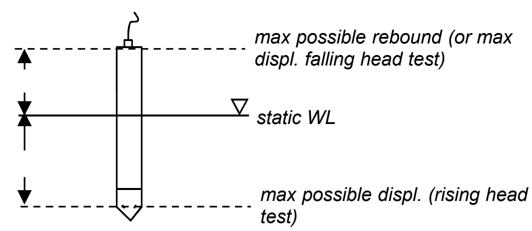
| | |
|---|---|
| Wellsite: ROMP 115 – Royal | Date: 10/8/14 |
| Well: CH-2 | Performed by: JC & JZ |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 237 | Test Interval (ft - ft bls) | 186-237 |
| Test Casing Height (ft als) | 6.39 | Date of Last Development | 10/6/14 |
| Test Casing Diameter (in) | 4 | Initial Static WL (ft btoc) | 19.04 |
| Test Casing Type | HWT | Final Static WL (ft btoc) | 18.98 |
| Test Interval Length (ft) | 51 | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | none | Initial Annulus WL (ft btoc) | none |
| | | Test Interval (m - m bls) | |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | | 704727 | test casing | | -0.11 | 3.00 |
| Transducer #2 | | 0603325 | pressure | | --- | --- |
| Transducer #3 | no annulus | | annulus | | -0.07 | -0.07 |

| | |
|---|---|
| Data Logger | |
| Spacer Length | 5' |
| Spacer OD. | 1.66'/1.1383' |
| 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 Displacement (ft) | 1.00 | 0.5 | 1.00 | 1.00 |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.00 | 3.04 | 3.05 | 3.06 |
| Pre-test XD #2 | 0.97 | 0.56 | 1.04 | 1.05 |
| Expected Displacement (ft) | 1.012 ? | 0.609 | | 1.085 |
| Observed Displacement (ft) | 0.975 | 0.543 | invalid | 1.034 |
| Slug Discrepancy (%) | 3.66% | 10.8% | | 4.7% |
| Max Rebound above Static | 0.543 | 0.395 | | 0.587 |
| Post-test XD #1 | 3.02 | 3.04 | 3.06 | 3.06 |
| Residual Dev. from $H_o$ (%) | 0.67% | 0 | | 0 |
| Data Logger File Name | R115-ST1A_186-237_1ft.csv | R115-ST1B_186-237_half.csv | | R115-ST1C_186-237_1ft.csv |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | AVPK dolo mod-hi perm | | | |
| $K_h$ | | | | |
| Other | | | | |
| Comments | | | | |

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

# SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 2A

## General Information

Wellsite: ROMP 115 – Royal — Date: 10/22/14

Well: CH-2 — Performed by: JC & JZ

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 407 | Test Interval (ft - ft bls) | 377-407 |
| Test Casing Height (ft als) | 6.55 (stick up) | Date of Last Development | 10/20/14 |
| Test Casing Diameter (in) | 3" | Initial Static WL (ft btoc) | 19.42 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | |
| Test Interval Length (ft) | 30 | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | | Initial Annulus WL (ft btoc) | |

## Set-up Information

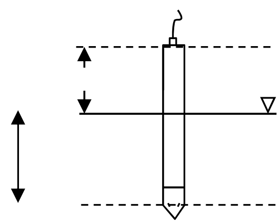
| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1404390 | test casing | | -0.02 | 3.08 |
| Transducer #2 | 15 | 0603325 | pressure | | -0.04 | 0.91 |
| Transducer #3 | 20 | 0809063 | annulus | | 0.02 | 2.09 |

Data Logger: Rafael

Spacer Length: 5'

Spacer OD.:

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 Displacement (ft) | 1.00 | | | |
| Initiation method | pneumatic | | | |
| Rising/Falling head | | | | |
| Pre-test XD #1 | 3.08 | | | |
| Pre-test XD #2 | 0.91 | | | |
| Expected Displacement (ft) | 0.953 | | | |
| Observed Displacement (ft) | 0.983 | | | |
| Slug Discrepancy (%) | 3.15% | | | |
| Max Rebound above Static | 1.107 | | | |
| Post-test XD #1 | 3.07 | | | |
| Residual Dev. from $H_o$ (%) | 0.32% | | | |
| Data Logger File Name | R115_ST2A_377-407_1ft.csv | | | |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | | | | |
| $K_h$ | | | | |
| Other | | | | |

Comments:

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

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 2B

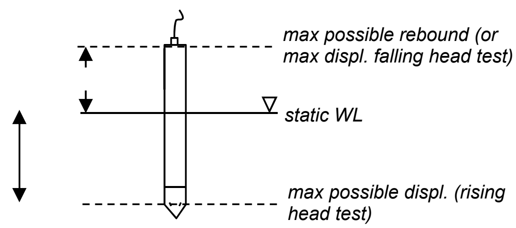
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 10/23/14 |
| Well: | CH-2 | Performed by: | JC |
| Well Depth (ft bls) | 407 | Test Interval (ft - ft bls) | 377-407 |
| Test Casing Height (ft als) | 6.55 | Date of Last Development | 10/20/14 |
| Test Casing Diameter (in) | 3" | Initial Static WL (ft btoc) | 19.51 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | 19.45 |
| Test Interval Length (ft) | 30' | Slot Size & Filter Pack Type | -- |
| 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) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1404390 | test casing | | -0.04 | 3.03 |
| Transducer #2 | 15 | 0603325 | pressure | | -0.05 | 0.52 |
| Transducer #3 | 20 | 0809063 | annulus | | in well | 2.06 |

| | |
|---|---|
| Data Logger | Rafael |
| Spacer Length | 5' |
| Spacer OD. | |
| Comments: | |




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

### Test Data

program would not work

| | Test B | Test C | Test C | Test D |
|---|---|---|---|---|
| Target Displacement (ft) | 0.50 | 1 | | |
| Initiation method | pneumatic | pneumatic | | |
| Rising/Falling head | rising | rising | | |
| Pre-test XD #1 | 3.01 | 3.06 | | |
| Pre-test XD #2 | 0.52 | 0.96 | | |
| Expected Displacement (ft) | 0.579 | | | |
| Observed Displacement (ft) | 0.675 | | | |
| Slug Discrepancy (%) | 16% | | | |
| Max Rebound above Static | 0.697 | | | |
| Post-test XD #1 | 3.03 | | | |
| Residual Dev. from $H_o$ (%) | 0.66% | | | |
| Data Logger File Name | R115_ST2B_377-407_half.csv | | | |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | | | | |
| $K_h$ | | | | |
| Other | | | | |
| Comments | | | | |

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

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 3

### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 1/26/15 |
| Well: | CH-2 | Performed by: | JMC |
| Well Depth (ft bls) | 689 | Test Interval (ft - ft bls) | 657-689 |
| Test Casing Height (ft als) | 6.75 | Date of Last Development | 1/22/15 |
| Test Casing Diameter (in) | 3" | Initial Static WL (ft btoc) | 17.79 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | 17.81 |
| Test Interval Length (ft) | 32' | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | 6.75 | Initial Annulus WL (ft btoc) | 17.79 |
| | | Final Annulus WL (ft btoc) | 17.82 |

### Set-up Information

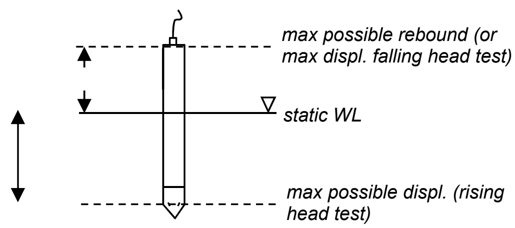
| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1404390 | test casing | | 0 | 3.12 |
| Transducer #2 | 15 | 1415642 | pressure | | 0.10 | 0.10 |
| Transducer #3 | 20 | 0809063 | annulus | | 0.04 | 5.15 |

Data Logger: Rafael

Spacer Length: 5'

Spacer OD.:

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 Displacement (ft) | 0.5' | 1' | 0.5' | |
| Initiation method | pneumatic | pneumatic | pneumatic | |
| Rising/Falling head | rising | rising | rising | |
| Pre-test XD #1 | 3.12 | 3.12 | 3.11 | |
| Pre-test XD #2 | 0.10 | 0.12 (1.20) | 0.12 (0.58) | |
| Expected Displacement (ft) | 0.484 | 1.026 | 0.447 | |
| Observed Displacement (ft) | 0.454 | 1.004 | 0.528 | |
| Slug Discrepancy (%) | 3% | 2.2% | 8.1% | |
| Max Rebound above Static | 0.33 | 0.616 | 0.279 | |
| Post-test XD #1 | 3.12 | 3.11 | 3.10 | |
| Residual Dev. from $H_o$ (%) | 0% | 1% | 1% | |
| Data Logger File Name | R115_ST3A_657-689_half.csv | R115_ST3A_657-689_1ft.csv | R115_ST3A_657-689_half.csv | |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | | | | |
| $K_h$ | | | | |
| Other | | | | |

Comments

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

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 4

### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 2/16/15 |
| Well: | CH-2 | Performed by: | JMC |
| Well Depth (ft bls) | 987 | Test Interval (ft - ft bls) | 947-987 |
| Test Casing Height (ft als) | | Date of Last Development | immediately prior |
| Test Casing Diameter (in) | 3" | Initial Static WL (ft btoc) | 17.27 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | 17.4 |
| Test Interval Length (ft) | 947 - 987 (40') | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | | Initial Annulus WL (ft btoc) | 17.26 |

### Set-up Information

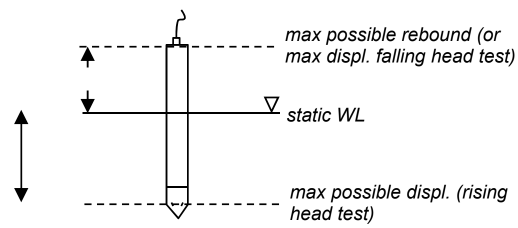
| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1404390 | test casing | | -0.2 | 3.02 |
| Transducer #2 | 15 | 1415642 | pressure | | 0.09 | 0.14 |
| Transducer #3 | 20 | 0809063 | annulus | | 0.04 | 2.73 |

Data Logger: Splinter - trailer mount

Spacer Length: 5'

Spacer OD.:

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 Displacement (ft) | 0.5' | 1' | 0.5' | 0.5' |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.00 | 2.97 | 2.97 | 2.96 |
| Pre-test XD #2 | 0.14 (0.63) | 0.13 (1.10) | (0.10) 2.10 | 0.13 (0.62) |
| Expected Displacement (ft) | -0.486 | 0.965 | 1.959 | 0.493 |
| Observed Displacement (ft) | -0.486 | 0.892 | 1.893 | 0.464 |
| Slug Discrepancy (%) | 0% | 7.3% | 6.6% | 2.90% |
| Max Rebound above Static | -0.595 | 1.291 | 2.155 | 0.791 |
| Post-test XD #1 | 3 | 2.99 | 2.94 | 2.96 |
| Residual Dev. from $H_o$ (%) | 0% | 1% | 3% | 0% |
| Data Logger File Name | R115_ST4A_947-987_half.csv | R115_ST4B_947-687_1ft.csv | R115_ST4C_947-687_2ft.csv | R115_ST4D_947-987_half.csv |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | sucrosic dolostone w/ some fractures | | | |
| $K_h$ | | | | |
| Other | | | | |
| Comments | | | | |

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

# SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 5

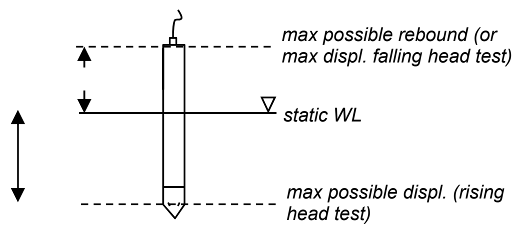
## General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 3/18/15 |
| Well: | CH-2 | Performed by: | JC & JZ |
| Well Depth (ft bls) | 1287 | Test Interval (ft - ft bls) | 1236-1287 |
| Test Casing Height (ft als) | | Date of Last Development | 3/17/15 |
| Test Casing Diameter (in) | 3" | Initial Static WL (ft btoc) | 16.46 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | |
| Test Interval Length (ft) | 51' | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | | Initial Annulus WL (ft btoc) | 16.34 |

## Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1404390 | test casing | | 0.01 | |
| Transducer #2 | 15 | 1415642 | pressure | | 0.12 | |
| Transducer #3 | 20 | 0809063 | annulus | | 0.05 | |

| | |
|---|---|
| Data Logger | Splinter |
| Spacer Length | 5' |
| Spacer OD. | |
| 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 Displacement (ft) | 0.5' | 1' | 2' | 0.5' |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.01 | 2.99 | 2.99 | 3.01 |
| Pre-test XD #2 | 3.67 | 3.65 | 3.65 | 3.65 |
| Expected Displacement (ft) | -0.523 | -1.03 | 1.996 | 0.624 |
| Observed Displacement (ft) | -0.53 | -1.03 | 1.988 | 0.609 |
| Slug Discrepancy (%) | 1.3% | 0% | 3.7% | 14.60% |
| Max Rebound above Static | -0.82 | -1.291 | -2.293 | -0.83 |
| Post-test XD #1 | 3.00 | 2.99 | 3.01 | 3.00 |
| Residual Dev. from $H_o$ (%) | 0.33% | 0% | 2% | 0.33% |
| Data Logger File Name | R115_ST5A_1236-1287_half.csv | R115_ST5B_1236-1287_1ft.csv | R115_ST3A_657-689_2ft.csv | R115_ST5D_1236-1287_half.cvs |
| Specific Conductance (uS) | NA | NA | NA | NA |
| Temperature (C) | NA | NA | NA | NA |
| Lithology | vuggy dolostone | | | |
| $K_h$ | | | | |
| Other | | | | |
| Comments | | | | |

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

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 6

### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 4/14/15 |
| Well: | CH-2 | Performed by: | JC |
| Well Depth (ft bls) | 1597 | Test Interval (ft - ft bls) | 1557-1597 |
| Test Casing Height (ft als) | 6.77 | Date of Last Development | immediately prior |
| Test Casing Diameter (in) | 3" | Initial Static WL (ft btoc) | 17.78 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | 18.04 |
| Test Interval Length (ft) | 40' | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | | Initial Annulus WL (ft btoc) | |
| | | Annulus XD at 20' below stick up | |

### Set-up Information

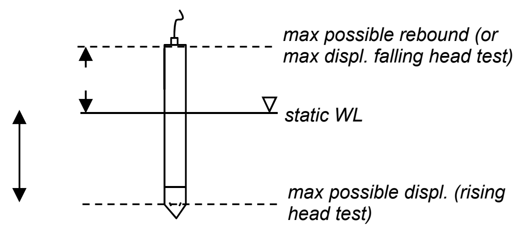
| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1404390 | test casing | | 0 | |
| Transducer #2 | 15 | 1415642 | pressure | | 0.10 | |
| Transducer #3 | 20 | 0809063 | annulus | | 0.03 | |

Data Logger: Splinter (trailer mounted)

Spacer Length: 5'

Spacer OD.:

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 Displacement (ft) | 0.5' | 1' | 1' | 0.5' |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 2.93 | 2.87 | 2.87 | invalid |
| Pre-test XD #2 | 0.12 | 0.11 | 0.12 | |
| Expected Displacement (ft) | -0.359 | 0.857 | -1.004 | |
| Observed Displacement (ft) | 0.352 | 0.857 | 1.004 | |
| Slug Discrepancy (%) | 6.1% | 2.1% | 2.9% | |
| Max Rebound above Static | -0.572 | 1.099 | -1.378 | |
| Post-test XD #1 | 2.93 | 2.86 | 2.85 | |
| Residual Dev. from $H_o$ (%) | 0% | 0.3% | 5.7% | |
| Data Logger File Name | R115_ST6A_1557-1597_half.csv | R115_ST6B_1557-1597_1ft.csv | R115_ST6C_1557-1597_1ft.csv | |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | limestone + sucrosic dolostone | | | |
| $K_h$ | | | | |
| Other | | | | |
| Comments | | | | |

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

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 7

### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 6/10/15 |
| Well: | CH-2 | Performed by: | JC & JZ |
| Well Depth (ft bls) | 1777 | Test Interval (ft - ft bls) | 1727-1777 |
| Test Casing Height (ft als) | 6.98 | Date of Last Development | immediately prior |
| Test Casing Diameter (in) | 2.875' | Initial Static WL (ft btoc) | 21.64 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | |
| Test Interval Length (ft) | 50' | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | 6.98 | Initial Annulus WL (ft btoc) | 19.80 |

### Set-up Information

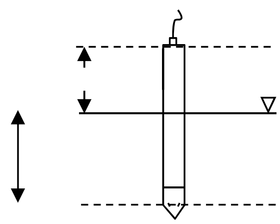
| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1108430 | test casing | | -0.05 | 3.09 |
| Transducer #2 | 15 | 1415642 | pressure | | 0.08 | 0.10 |
| Transducer #3 | 20 | 809063 | annulus | | 0.06 | 3.08 |

Data Logger: Splinter (trailer mounted)

Spacer Length: 5'

Spacer OD.:

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 Displacement (ft) | 0.5' | 1' | 2' | 0.5' |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.09 | 3.09 | 3.10 | 3.08 |
| Pre-test XD #2 | 3.08 | 3.08 | 3.08 | 3.07 |
| Expected Displacement (ft) | -0.501 | -0.972 | -1.952 | -0.479 |
| Observed Displacement (ft) | -0.501 | -0.929 | -1.974 | -0.45 |
| Slug Discrepancy (%) | 0% | 4.4% | 1.12% | 6.05% |
| Max Rebound above Static | -0.762 | -1.335 | -2.344 | -0.842 |
| Post-test XD #1 | 3.09 | 3.09 | 3.08 | 3.07 |
| Residual Dev. from $H_o$ (%) | 0% | 0% | 0.65% | 0.3% |
| Data Logger File Name | R115_ST7A_1727-1777_half.csv | R115_ST7B_1727-1777_1ft.csv | R115_ST7C_1727-1777_2ft.csv | R115_ST7D_1727-1777_half.csv |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | fractured dolostone | | | |
| $K_h$ | | | | |
| Other | | | | |
| Comments | | | | |

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

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 8

### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 6/23/15 |
| Well: | CH-2 | Performed by: | JC & JZ |
| Well Depth (ft bls) | 1887' | Test Interval (ft - ft bls) | 1877-1887 |
| Test Casing Height (ft als) | 6.83 | Date of Last Development | immediately prior |
| Test Casing Diameter (in) | 2.875' | Initial Static WL (ft btoc) | 21.63 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | 21.84 |
| Test Interval Length (ft) | 10' | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | 6.83 | Initial Annulus WL (ft btoc) | 19.7 |

### Set-up Information

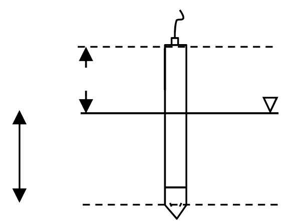
| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1108430 | test casing | | -0.02 | 3.04 |
| Transducer #2 | 15 | 1415642 | pressure | | 0.10 | 0.04 |
| Transducer #3 | 20 | 0809063 | annulus | | 0.02 | 3 |

Data Logger: Splinter

Spacer Length: 5'

Spacer OD.:

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 Displacement (ft) | 0.5' | 1' | 2' | 0.5' |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.01 | 2.98 | 2.96 | 2.94 |
| Pre-test XD #2 | 2.99 | 2.98 | 2.96 | 2.93 |
| Expected Displacement (ft) | 0.45 | 0.914 | 1.879 | 0.319 |
| Observed Displacement (ft) | 0.486 | 0.95 | 2.009 | 0.312 |
| Slug Discrepancy (%) | 8% | 4.0% | 6.9% | 2.2% |
| Max Rebound above Static | -0.58 | -1.175 | 2.198 | -0.406 |
| Post-test XD #1 | 3.00 | 2.96 | 2.94 | 2.90 |
| Residual Dev. from $H_o$ (%) | 0.33% | 0.67% | 0.67% | 1.3% |
| Data Logger File Name | R115_ST8A_1877-1887_half.csv | R115_ST8B_1877-1887_1ft.csv | R115_ST8C_1877-1887_2ft.csv | R115_ST8D_1877-1887_half.csv |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | | | | |
| $K_h$ | | | | |
| Other | | | | |

Comments:

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

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 9

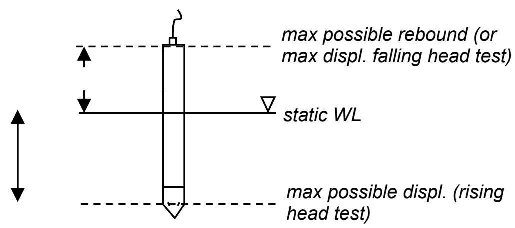
### General Information

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 7/7-8/2015 |
| Well: | CH-2 | Performed by: | JC |
| Well Depth (ft bls) | 1997' | Test Interval (ft - ft bls) | 1947-1997 |
| Test Casing Height (ft als) | 6.04 | Date of Last Development | 7/6/15 |
| Test Casing Diameter (in) | NRQ 2.375 | Initial Static WL (ft btoc) | 23.05 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | |
| Test Interval Length (ft) | 50' | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | 6.04 | Initial Annulus WL (ft btoc) | |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1108430 | test casing | | -0.03 | -0.03 |
| Transducer #2 | not used | -- | pressure | | | |
| Transducer #3 | 20 | 809063 | annulus | | 0.05 | 5.02 |

| | |
|---|---|
| Data Logger | Splinter- Trailer Mount |
| Spacer Length | 5' |
| Spacer OD. | 1.662 |
| Comments: | |




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

### Test Data

Using spacer + 2' of cable as slug. Lower slug/start slug test @ 12:18

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Displacement (ft) | 2.5' (2.5147) | | | |
| Initiation method | Spacer = slug-in | | | |
| Rising/Falling head | falling | | | |
| Pre-test XD #1 | 9.5 | | | |
| Pre-test XD #2 | 5.02 | | | |
| Expected Displacement (ft) | 2.5 | | | |
| Observed Displacement (ft) | | | | |
| Slug Discrepancy (%) | | | | |
| Max Rebound above Static | | | | |
| Post-test XD #1 | | | | |
| Residual Dev. from $H_o$ (%) | | | | |
| Data Logger File Name | | | | |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | | | | |
| $K_h$ | | | | |
| Other | | | | |

Comments: Method: use 5' spacer as solid slug. Stop spacer 1' above WL, start test, lower spacer 8' so it is 7' below initial WL, WL will displace 2.5', therefore deepest tested interval submergence will be 9.5'

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

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 9 Redo

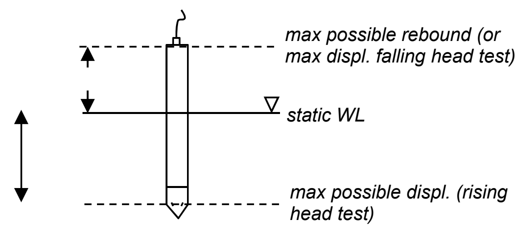
### General Information
Spacer cable as solid slug (spacer + 2' of combo cable)

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 7/14/15 |
| Well: | CH-2 | Performed by: | JC |
| Well Depth (ft bls) | 1997 | Test Interval (ft - ft bls) | 1947-1997 |
| Test Casing Height (ft als) | 5.88 | Date of Last Development | 7/9/2015 (Th) |
| Test Casing Diameter (in) | NRQ 2.375 | Initial Static WL (ft btoc) | 24.39 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | |
| Test Interval Length (ft) | 50' | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | 5.88 | Initial Annulus WL (ft btoc) | 20.4 |
| | | Final Annulus WL (ft btoc) | |
| Started ST at 10:40 | | TI (meters btoc) 593 - 608m | |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1108430 | test casing | | -0.02 | 9.56 |
| Transducer #2 | not used | -- | pressure | | -- | -- |
| Transducer #3 | 20 | 0809063 | annulus | | 0.06 | 4.97 |

| | |
|---|---|
| Data Logger | Rafael |
| Spacer Length | 5' |
| Spacer OD. | 1.662 |
| Comments: | Using spaces as solid slug |




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

### Test Data
Using spacer as slug + 2' of composite cable. Lower slug tp 1' above static WL, then drop it 8' (7' of subm + 2.5' WL disp

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Displacement (ft) | 2.5' | | | |
| Initiation method | solid slug-in | | | |
| Rising/Falling head | falling | | | |
| Pre-test XD #1 | 9.56 | | | |
| Pre-test XD #2 | 4.97 | | | |
| Expected Displacement (ft) | | | | |
| Observed Displacement (ft) | 9.61 | | | |
| Slug Discrepancy (%) | | | | |
| Max Rebound above Static | | | | |
| Post-test XD #1 | 7.07 | | | |
| Residual Dev. from $H_o$ (%) | | | | |
| Data Logger File Name | R115_ST9redo_1947-1997_2ft.cs | | | |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | Evaporites (Anhydrite) + fine-grained dolostone | | | |
| $K_h$ | | | | |
| Other | | | | |
| Comments | Redo of ST9 due to a memory problem? w/ splinter data logger (trailer mount) | | | |

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

## SLUG TEST - DATA ACQUISITION SHEET

**ST NO.** 10

### General Information

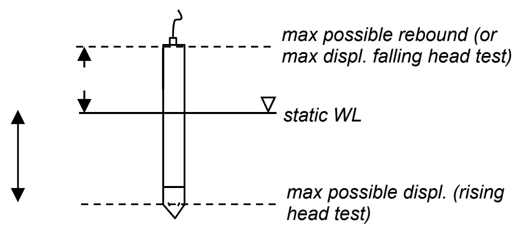
Straddle Packer Test

| | | | |
|---|---|---|---|
| Wellsite: | ROMP 115 – Royal | Date: | 9/28/15 |
| Well: | CH-2 | Performed by: | JC & TF |
| Well Depth (ft bls) | 1997 | Test Interval (ft - ft bls) | 1020-1047 |
| Test Casing Height (ft als) | 4.04 | Date of Last Development | 9/24/15 |
| Test Casing Diameter (in) | 2.378 NRQ | Initial Static WL (ft btoc) | 14.71 |
| Test Casing Type | NRQ | Final Static WL (ft btoc) | 14.64 |
| Test Interval Length (ft) | 27 | Slot Size & Filter Pack Type | -- |
| Annulus Casing Height (ft als) | 4.04 | Initial Annulus WL (ft btoc) | 14.73 |
| | | Final Annulus WL (ft btoc) | |

### Set-up Information

| | Type (psi) | Serial No. | Purpose & Depth (ft btoc) | | Reading in air (ft) | Submergence (ft) |
|---|---|---|---|---|---|---|
| Transducer #1 | 15 | 1404390 | test casing | | -0.03 | 3.03 |
| Transducer #2 | 15 | 0603325 | pressure | | -0.06 | -0.04 |
| Transducer #3 | 20 | 0809060 | annulus | | -0.02 | 3.01 |

| | |
|---|---|
| Data Logger | Rafael |
| Spacer Length | 5' |
| Spacer OD. | 1.662 |
| Comments: | Straddle Packer Test |



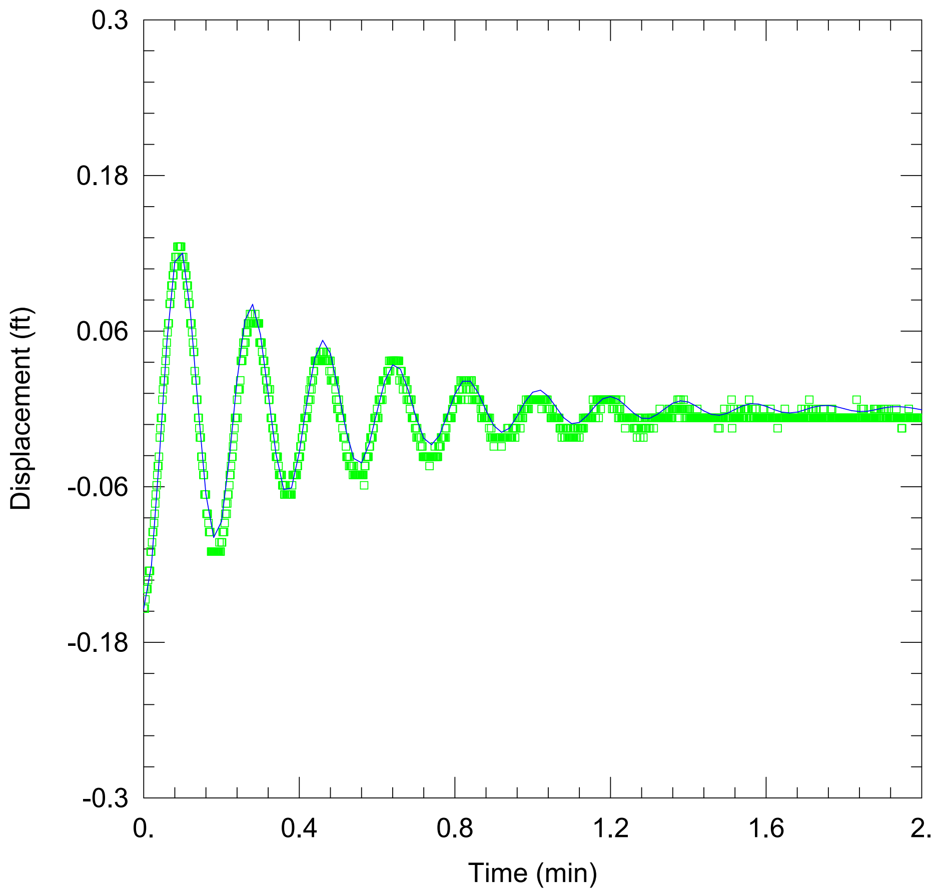

Note: Reading in Air of the Transducer should be < +/-1% of the Full Scale of the Transducer

### Test Data

| | Test A | Test B | Test C | Test D |
|---|---|---|---|---|
| Target Displacement (ft) | 0.5' | 1.0' | 2.0' | 0.5' |
| Initiation method | pneumatic | pneumatic | pneumatic | pneumatic |
| Rising/Falling head | rising | rising | rising | rising |
| Pre-test XD #1 | 3.03 | 3.05 | 3.06 | 3.08 |
| Pre-test XD #2 | -0.04 | -0.04 | -0.04 | -0.04 |
| Expected Displacement (ft) | -0.52 | -1.055 | -2.015 | -0.55 |
| Observed Displacement (ft) | -0.5 | -1.055 | -2.015 | -0.542 |
| Slug Discrepancy (%) | 0% | 0.0% | 0.00% | 1.48% |
| Max Rebound above Static | -0.784 | -1.473 | -2.132 | -0.806 |
| Post-test XD #1 | 3.05 | 3.06 | 3.08 | 3.09 |
| Residual Dev. from $H_o$ (%) | 0.66% | 0.33% | 0.65% | 0.33% |
| Data Logger File Name | 115_SPST10A_1020-1047_half.c | 15_SPST10B_1020-1047_1ft.c | 115_SPST10C_1020-1047_2ft.cs | 15_SPST10A_1020-1047_half.c |
| Specific Conductance (uS) | | | | |
| Temperature (C) | | | | |
| Lithology | | | | |
| $K_h$ | | | | |
| Other | | | | |
| Comments | Straddle Packer Test | | | |

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

# Appendix H. Slug Test Curve-Match Analyses for the ROMP 115 – Royal Well Site in Sumter County, Florida




R115_ST1C_186-237

Data Set: C:\...\R115_ST1C_186-237jcButler-lop1st min.aqt
Date: 08/10/20 Time: 15:52:58

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 10/8/14

AQUIFER DATA

Saturated Thickness: 220. ft
Anisotropy Ratio (Kz/Kr): 0.1

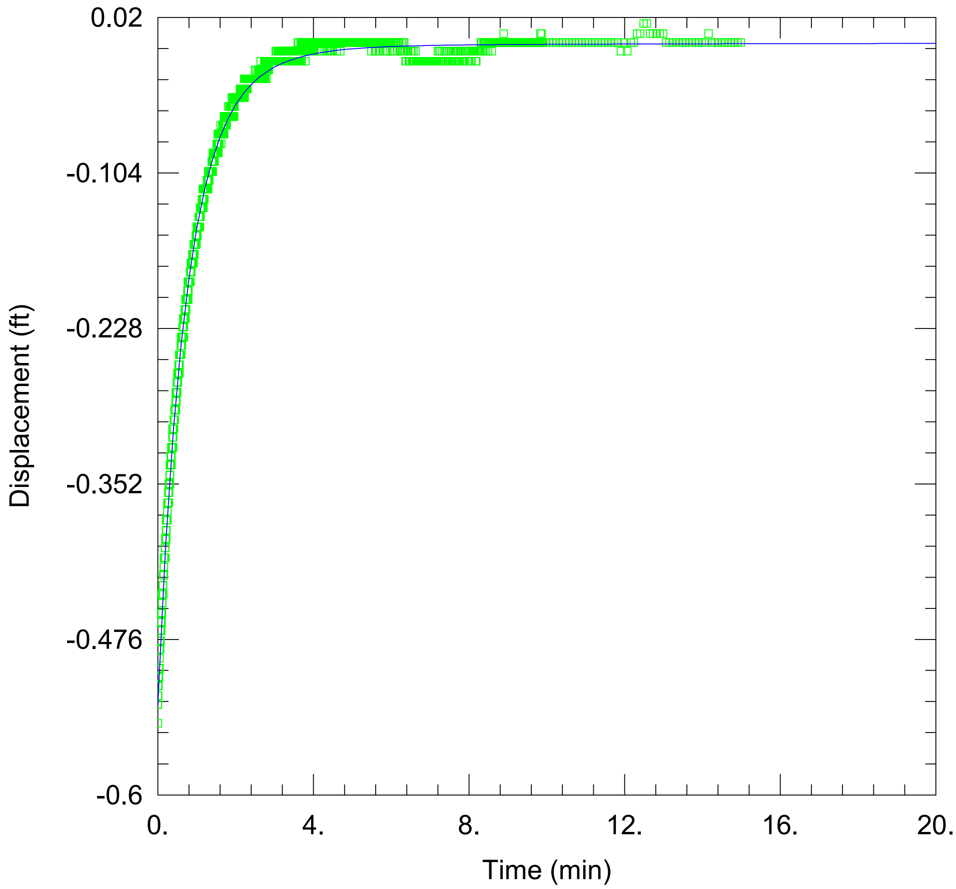
WELL DATA (Core hole)

Initial Displacement: -0.154 ft
Total Well Penetration Depth: 220. ft
Casing Radius: 0.06838 ft
Static Water Column Height: 211.6 ft
Screen Length: 51. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 201. ft/day
Le = 99.36 ft




R115_ST2B_377-407

Data Set: C:\...\R115_ST2B_377-407jcKGS.aqt
Date: 08/10/20 Time: 15:54:45

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 10/23/14

AQUIFER DATA

Saturated Thickness: 37.5 ft

WELL DATA (COREHOLE 2)

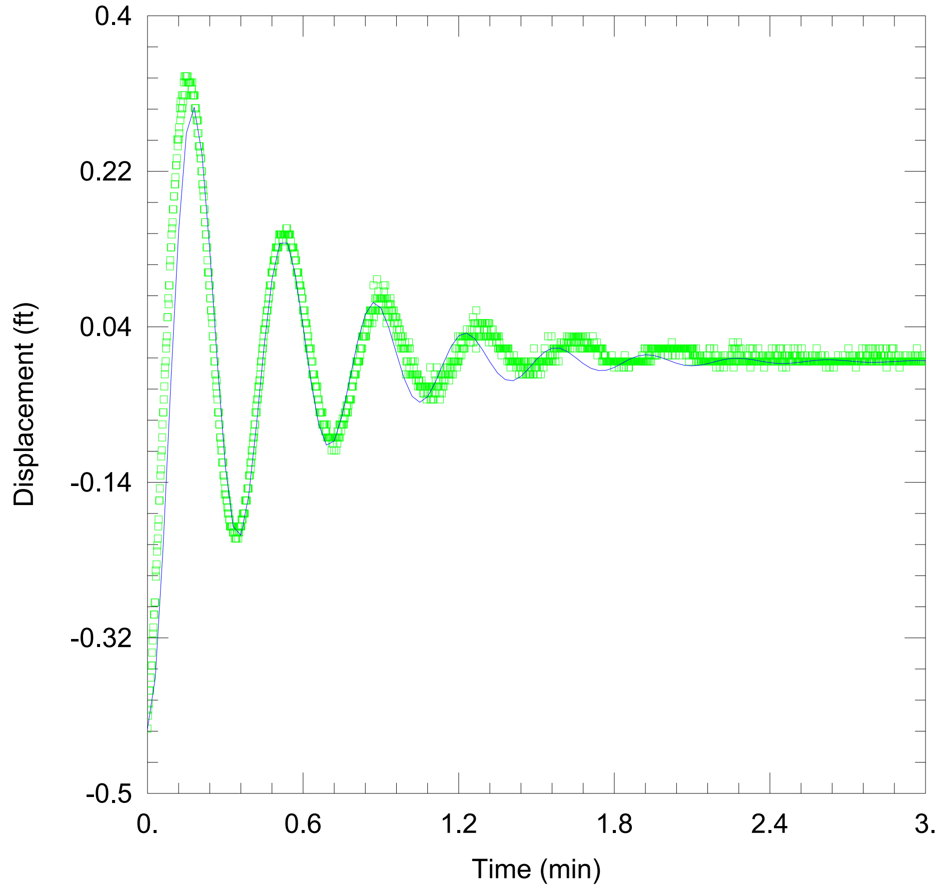
Initial Displacement: -0.528 ft
Total Well Penetration Depth: 37.5 ft
Casing Radius: 0.06838 ft

Static Water Column Height: 380.9 ft
Screen Length: 30. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 1.647 ft/day
Ss = 5.025E-13 $ft^{-1}$
Kz/Kr = 0.1




R115_ST3A_657-689

Data Set: L:\...\R115_ST3A_657-689jc.aqt
Date: 07/22/20 Time: 14:24:34

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 1/26/15

AQUIFER DATA

Saturated Thickness: 120. ft Anisotropy Ratio (Kz/Kr): 0.1

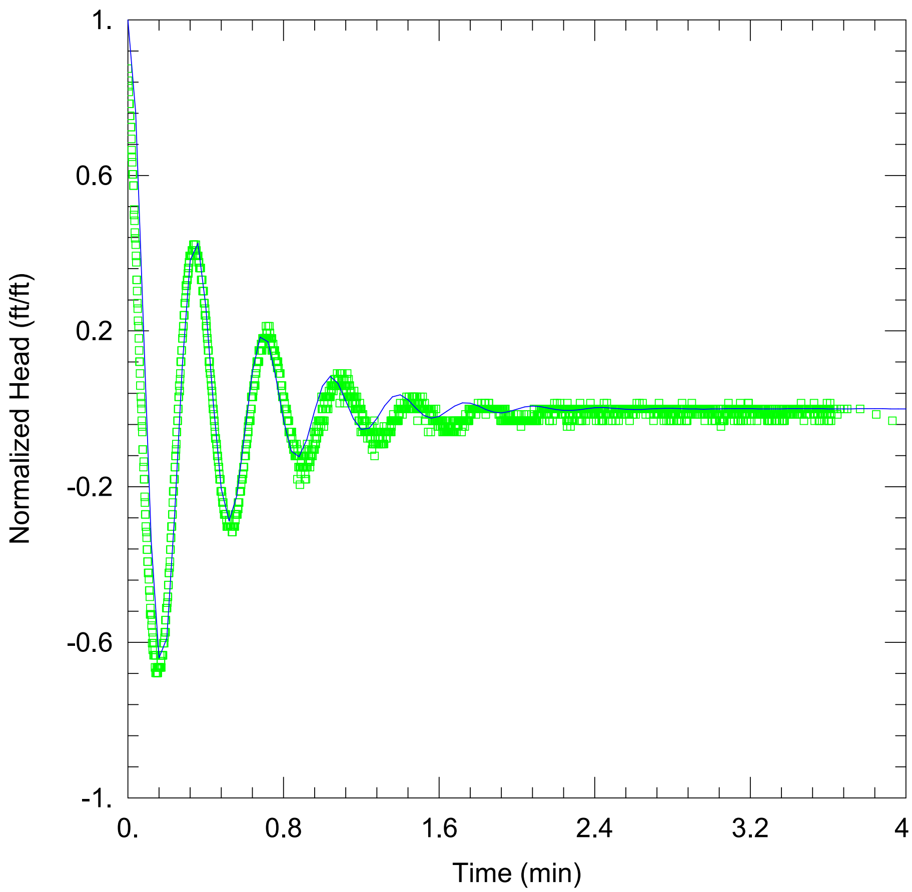
WELL DATA (CH 2)

Initial Displacement: -0.425 ft Static Water Column Height: 664.5 ft
Total Well Penetration Depth: 120. ft Screen Length: 32. ft
Casing Radius: 0.06838 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 105.9 ft/day Le = 354.5 ft




R115_ST4A_947-987

Data Set: L:\...\R115_ST4A_947-987jc.aqt
Date: 07/22/20
Time: 14:25:54

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 2/16/15

AQUIFER DATA

Saturated Thickness: 418. ft
Anisotropy Ratio (Kz/Kr): 0.1

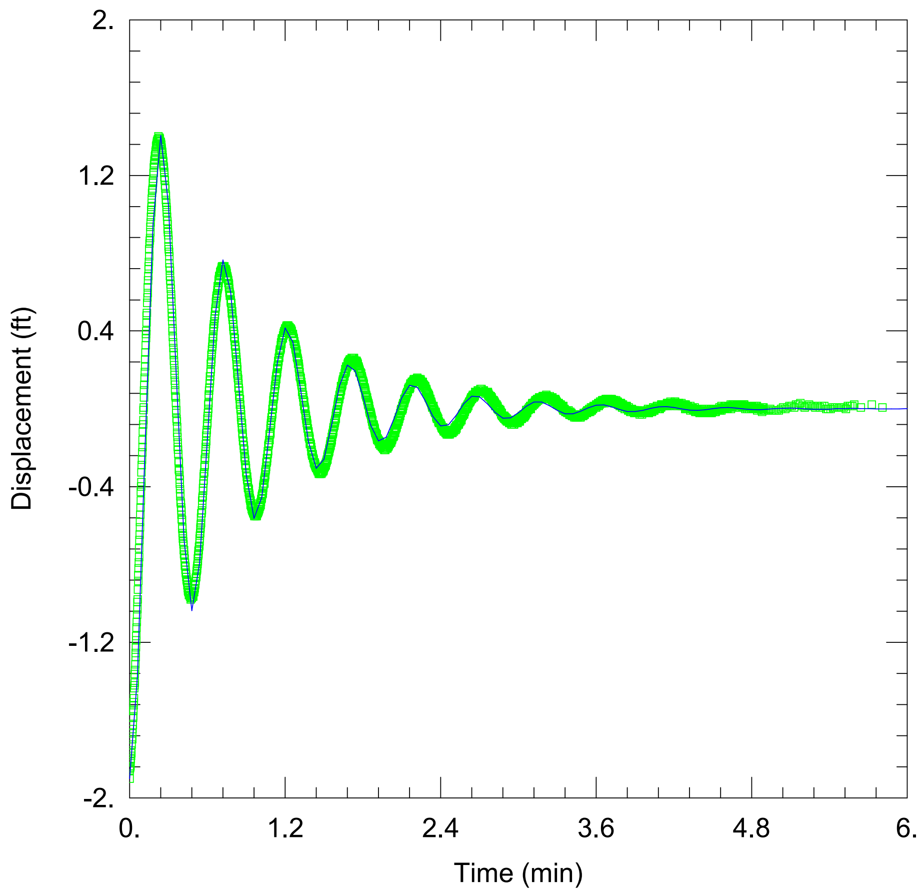
WELL DATA (COREHOLE 2)

Initial Displacement: -0.486 ft
Total Well Penetration Depth: 418. ft
Casing Radius: 0.06838 ft
Static Water Column Height: 963. ft
Screen Length: 40. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 97.85 ft/day
Le = 348.2 ft




R115_ST5C_1236-1287

Data Set: L:\...\R115_ST5D_1236-1287jc.aqt
Date: 07/22/20 Time: 14:27:02

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 3/18/15

AQUIFER DATA

Saturated Thickness: 718. ft Anisotropy Ratio (Kz/Kr): 0.1

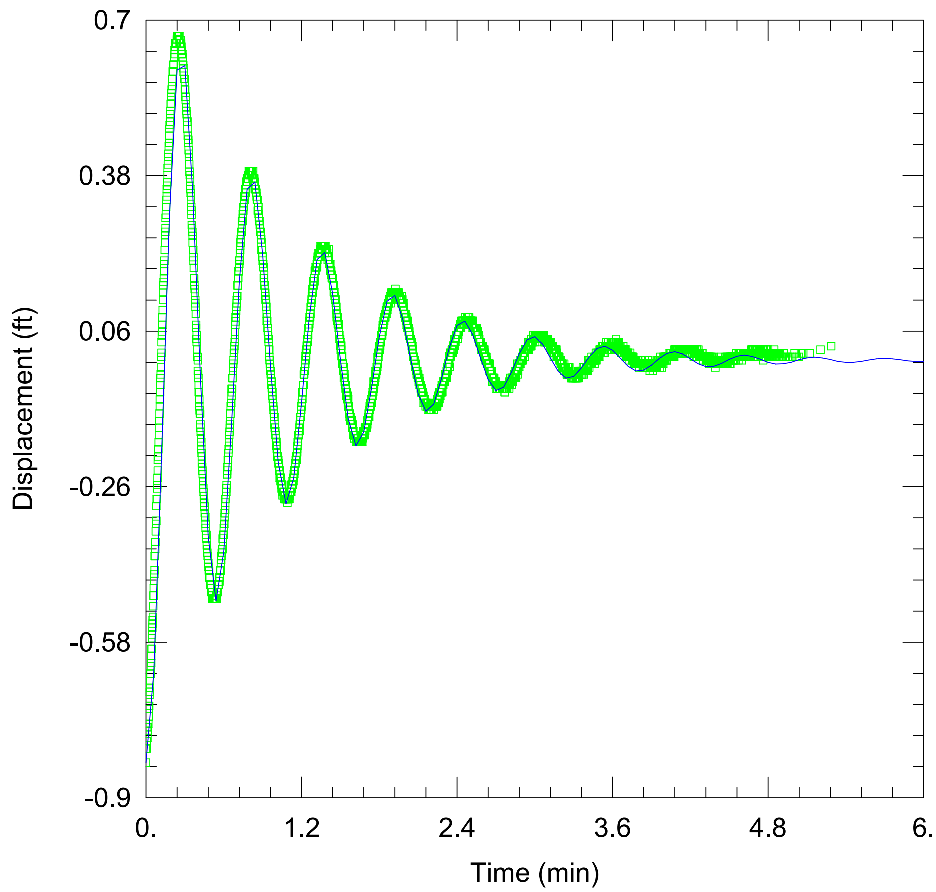
WELL DATA (COREHOLE 2)

Initial Displacement: -1.901 ft Static Water Column Height: 1265. ft
Total Well Penetration Depth: 718. ft Screen Length: 51. ft
Casing Radius: 0.06838 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 138.3 ft/day Le = 682.8 ft




R115_ST6B_1557-1597

Data Set: C:\...\R115_ST6A_1557-1597jc.aqt
Date: 08/10/20 Time: 16:05:35

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 4/14/15

AQUIFER DATA

Saturated Thickness: 1028. ft Anisotropy Ratio (Kz/Kr): 0.1

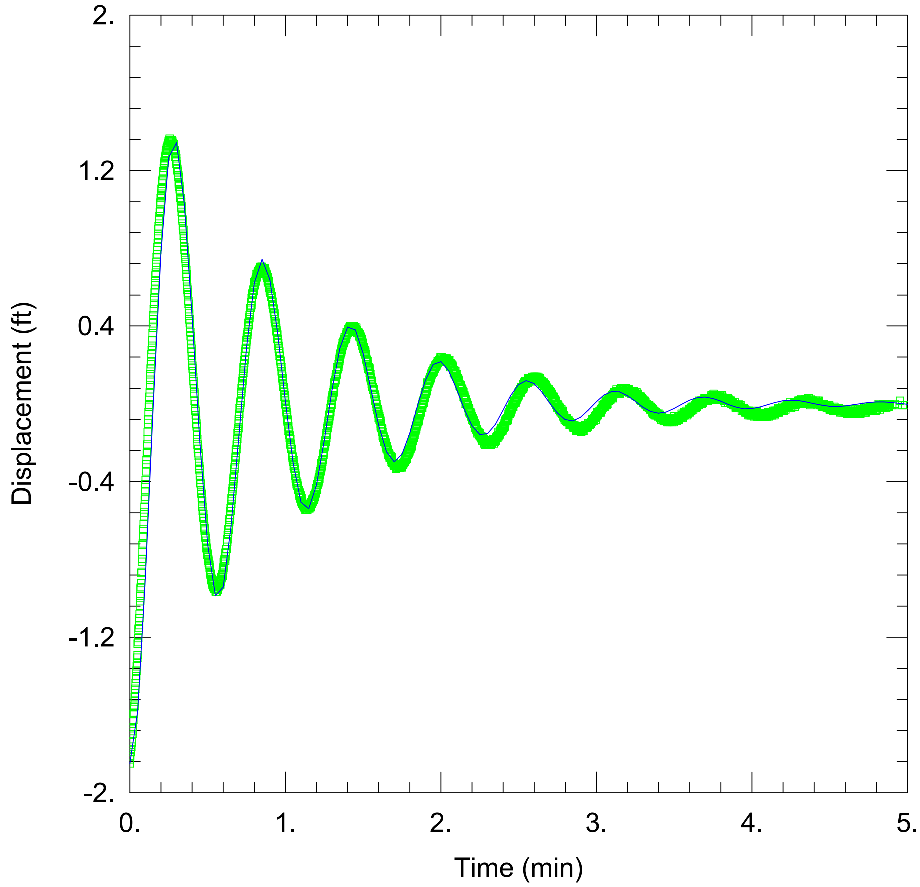
WELL DATA (COREHOLE 2)

Initial Displacement: -0.828 ft Static Water Column Height: 1572.5 ft
Total Well Penetration Depth: 1028. ft Screen Length: 40. ft
Casing Radius: 0.06838 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 443.9 ft/day Le = 859.3 ft




R115_ST7C_1727-1777

Data Set: C:\...\R115_ST7A_1727-1777jc.aqt
Date: 08/10/20 Time: 16:07:11

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 4/14/15

AQUIFER DATA

Saturated Thickness: 1208. ft
Anisotropy Ratio (Kz/Kr): 0.1

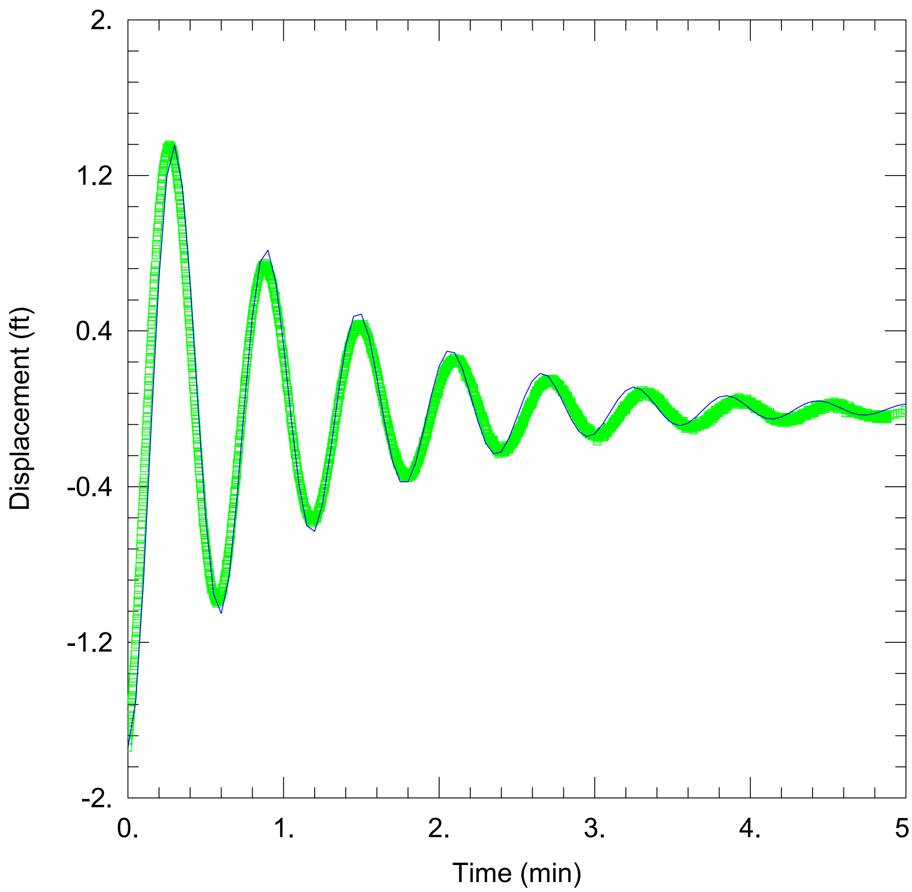
WELL DATA (COREHOLE)

Initial Displacement: -1.85 ft
Total Well Penetration Depth: 1208. ft
Casing Radius: 0.06838 ft
Static Water Column Height: 1748.4 ft
Screen Length: 50. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 143.2 ft/day
Le = 936.1 ft




R115_ST8A_1877-1887

Data Set: C:\...\R115_ST8A_1877-1887jc.aqt
Date: 08/10/20 Time: 16:08:13

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 6/23/15

AQUIFER DATA

Saturated Thickness: 1372. ft
Anisotropy Ratio (Kz/Kr): 0.1

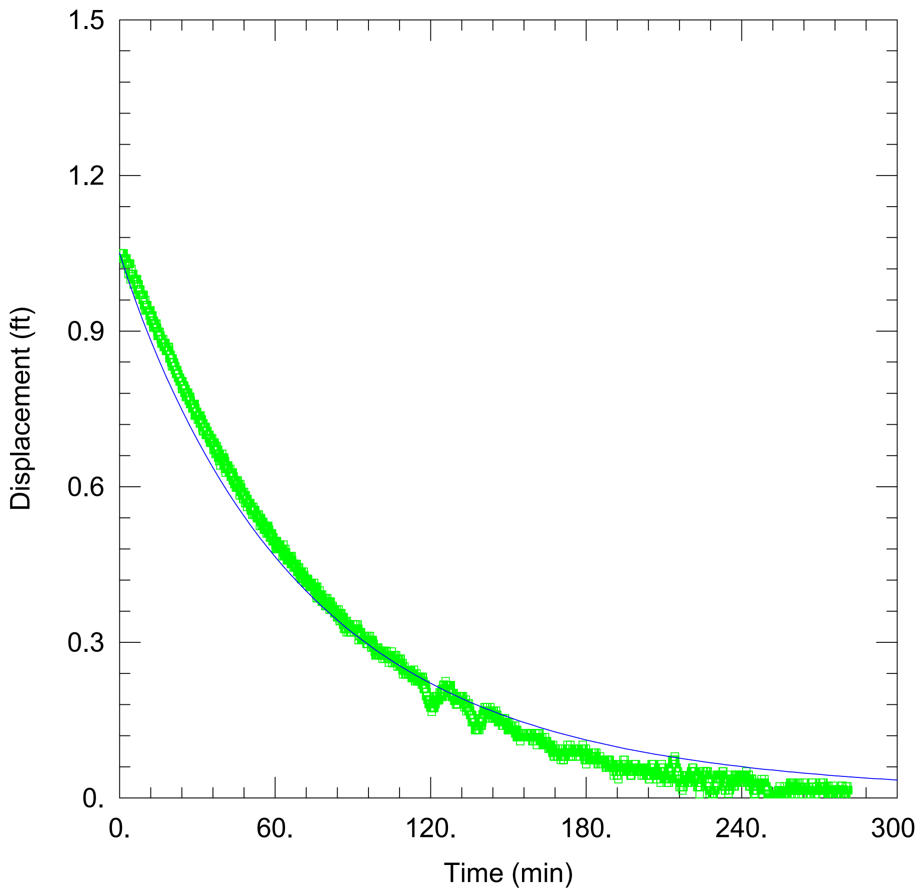
WELL DATA (COREHOLE 2)

Initial Displacement: -1.741 ft
Total Well Penetration Depth: 1318. ft
Casing Radius: 0.06838 ft
Static Water Column Height: 1858.5 ft
Screen Length: 10. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 4.437E+4 ft/day
Le = 1020.3 ft




R115 ST9 1947-1997

Data Set: C:\...\R115_ST9A_redo_1947-1997jcFH.aqt
Date: 08/10/20 Time: 16:08:47

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 7/14/15

AQUIFER DATA

Saturated Thickness: 50. ft

WELL DATA (Core hole)

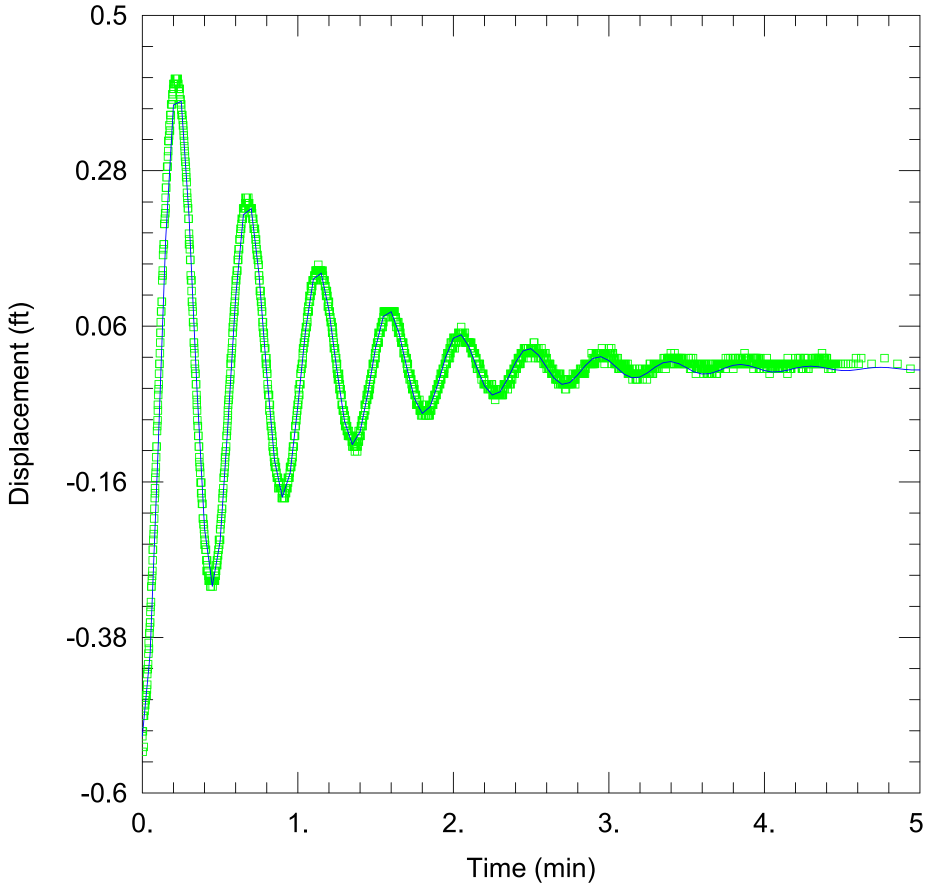
Initial Displacement: 1.05 ft
Total Well Penetration Depth: 56. ft
Casing Radius: 0.09652 ft

Static Water Column Height: 1966.7 ft
Screen Length: 50. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.02771 ft/day
Ss = 7.289E-14 $ft^{-1}$
Kz/Kr = 0.1




R115_ST10A_1020-1047

Data Set: C:\...\R115_ST10A_1020-1047jc.aqt
Date: 08/10/20 Time: 16:09:19

PROJECT INFORMATION

Company: SWFWMD
Client: JC
Project: R115
Location: Sumter County
Test Well: COREHOLE
Test Date: 9/28/15

AQUIFER DATA

Saturated Thickness: 478. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (COREHOLE)

Initial Displacement: -0.52 ft
Total Well Penetration Depth: 478. ft
Casing Radius: 0.06838 ft

Static Water Column Height: 1028.3 ft
Screen Length: 27. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 243.2 ft/day Le = 596. ft

# Appendix I. Daily Water Levels Recorded During Core Drilling and Testing at the ROMP 115 – Royal Well Site in Sumter County, Florida

**Appendix I.** Daily water levels recorded during exploratory core drilling and testing at the ROMP 115 – Royal well site in

[MM/DD/YYYY, month/day/year; HH:MM, hour:minute; HWT, 4-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of well locations are shown in figure 2; well as-built diagrams are in appendix B]

| Date (MM/DD/YYYY) | Time (HH:MM) | 4-inch HWT Deepest Casing Depth (ft bls) | 4-inch HWT Temporary Casing Static Water Level (ft btoc) | 4-inch HWT Temporary Casing Static Water Level (ft bls) | 3-inch HQ Casing Total Depth (ft bls) | 3-inch HQ Temporary casing Static Water Level (ft btoc) | 3-inch HQ Temporary casing Static Water Level (ft bls) | NRQ Core Hole Total Depth (ft bls) |
|---|---|---|---|---|---|---|---|---|
| 8/11/2014 | 11:10 | -- | -- | -- | -- | -- | -- | -- |
| 8/12/2014 | 9:00 | -- | -- | -- | -- | -- | -- | -- |
| 8/13/2014 | 11:15 | -- | -- | -- | -- | -- | -- | -- |
| 8/18/2014 | 11:00 | -- | -- | -- | -- | -- | -- | -- |
| 8/19/2014 | 9:30 | -- | -- | -- | -- | -- | -- | -- |
| 8/20/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/21/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/22/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/25/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/26/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/27/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/28/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/1/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/2/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/3/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/4/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/5/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/8/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/9/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/10/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/11/2014 | -- | -- | -- | -- | -- | -- | -- | -- |

Sumter County, Florida

casing; HQ, 3-inch temporary casing; NRQ, 2.38-inch internal diameter core drilling rod; NAVD88, North American Vertical Datum of 1988; --, not applicable;

| NRQ Core Hole Static Water Level (ft btoc) | NRQ Core Hole Static Water Level (ft bls) | NRQ Core Hole Static Water Level (ft NAVD 88) | Drilling Water Spply Static Water Level (ft btoc) | Drilling Water Spply Static Water Level (ft bls) | Drilling Water Spply Static Water Level (ft NAVD 88) | Rain Gauge (inches) | Comments |
|---|---|---|---|---|---|---|---|
| -- | -- | -- | 17.58 | 14.88 | 46.41 | -- | |
| -- | -- | -- | 17.56 | 14.86 | 46.43 | -- | |
| -- | -- | -- | 17.55 | 14.85 | 46.44 | -- | |
| -- | -- | -- | 17.56 | 14.86 | 46.43 | -- | |
| -- | -- | -- | 17.57 | 14.87 | 46.42 | -- | |
| -- | -- | -- | 17.57 | 14.87 | 46.42 | -- | |
| -- | -- | -- | 17.63 | 14.93 | 46.36 | -- | |
| -- | -- | -- | 17.65 | 14.95 | 46.34 | -- | |
| -- | -- | -- | 17.63 | 14.93 | 46.36 | -- | |
| -- | -- | -- | -- | -- | -- | -- | |
| -- | -- | -- | 17.70 | 15.00 | 46.29 | 0.50 | |
| -- | -- | -- | -- | -- | -- | -- | |
| -- | -- | -- | -- | -- | -- | -- | |
| -- | -- | -- | 17.80 | 15.10 | 46.19 | -- | |
| -- | -- | -- | 17.80 | 15.10 | 46.19 | -- | |
| -- | -- | -- | 17.80 | 15.10 | 46.19 | -- | |
| -- | -- | -- | -- | -- | -- | -- | |
| -- | -- | -- | -- | -- | -- | -- | |
| -- | -- | -- | 17.70 | 15.00 | 46.29 | 2.50 | |
| -- | -- | -- | 17.66 | 14.96 | 46.33 | -- | |
| -- | -- | -- | -- | -- | -- | 0.025 | |

**Appendix I.** (Continued) Daily water levels recorded during exploratory core drilling and testing at the ROMP 115 – Royal

[MM/DD/YYYY, month/day/year; HH:MM, hour:minute; HWT, 4-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of well locations are shown in figure 2; well as-built diagrams are in appendix B]

| Date (MM/DD/YYYY) | Time (HH:MM) | 4-inch HWT Deepest Casing Depth (ft bls) | 4-inch HWT Temporary Casing Static Water Level (ft btoc) | 4-inch HWT Temporary Casing Static Water Level (ft bls) | 3-inch HQ Casing Total Depth (ft bls) | 3-inch HQ Temporary casing Static Water Level (ft btoc) | 3-inch HQ Temporary casing Static Water Level (ft bls) | NRQ Core Hole Total Depth (ft bls) |
|---|---|---|---|---|---|---|---|---|
| 9/15/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/16/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/17/2014 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/18/2014 | -- | 70 | -- | -- | -- | -- | -- | -- |
| 9/22/2014 | -- | 70 | 15.58 | 13.73 | -- | -- | -- | 86 |
| 9/23/2014 | -- | 70 | 15.62 | 13.77 | -- | -- | -- | 117 |
| 9/24/2014 | -- | 128 | 15.58 | 13.73 | -- | -- | -- | 137 |
| 9/25/2014 | -- | 128 | -- | -- | -- | -- | -- | 167 |
| 9/29/2014 | -- | 128 | 15.55 | 13.7 | -- | -- | -- | 187 |
| 9/30/2014 | -- | -- | -- | -- | -- | -- | -- | 187 |
| 10/1/2014 | -- | 186 | 18.42 | 16.57 | -- | -- | -- | 207 |
| 10/2/2014 | 10:10 | 186 | 14.85 | 13 | -- | -- | -- | 237 |
| 10/6/2014 | 10:40 | 186 | 14.5 | 12.65 | -- | -- | -- | 237 |
| 10/7/2014 | 11:00 | 186 | -- | -- | -- | -- | -- | 237 |
| 10/8/2014 | 9:50 | 186 | 14.51 | 12.66 | -- | -- | -- | 237 |
| 10/9/2014 | 9:20 | 186 | -- | -- | -- | -- | -- | 237 |
| 10/10/2014 | -- | 186 | 15.42 | 12.52 | -- | -- | -- | 237 |
| 10/13/2014 | 10:00 | 226 | 14.46 | 12.61 | -- | -- | -- | 237 |
| 10/14/2014 | 9:00 | 228 | 14.51 | 12.66 | -- | -- | -- | 237 |
| 10/15/2014 | 9:30 | 228 | 14.43 | 12.58 | -- | -- | -- | 267 |
| 10/16/2014 | 11:15 | 228 | 14.42 | 12.57 | -- | -- | -- | 367 |

well site in Sumter County, Florida

casing; HQ, 3-inch temporary casing; NRQ, 2.38-inch internal diameter core drilling rod; NAVD88, North American Vertical Datum of 1988; --, not applicable;

| NRQ Core Hole Static Water Level (ft btoc) | NRQ Core Hole Static Water Level (ft bls) | NRQ Core Hole Static Water Level (ft NAVD 88) | Drilling Water Spply Static Water Level (ft btoc) | Drilling Water Spply Static Water Level (ft bls) | Drilling Water Spply Static Water Level (ft NAVD 88) | Rain Gauge (inches) | Comments |
|---|---|---|---|---|---|---|---|
| -- | -- | -- | 17.67 | 14.97 | 46.32 | -- | |
| -- | -- | -- | 17.70 | 15.00 | 46.29 | -- | |
| -- | -- | -- | 17.65 | 14.95 | 46.34 | -- | |
| -- | -- | -- | 17.66 | 14.96 | 46.33 | -- | |
| 17.57 | 13.68 | 47.68 | 17.73 | 15.03 | 46.26 | -- | |
| 17.03 | 13.72 | 47.64 | 17.70 | 15.00 | 46.29 | -- | |
| -- | -- | -- | 17.73 | 15.03 | 46.26 | -- | reset HWT at 128 feet bls |
| -- | -- | -- | 17.75 | 15.05 | 46.24 | -- | possible cavity between 158 and 160 feet bls |
| 16.11 | 13.73 | 47.63 | 17.65 | 14.95 | 46.34 | 2.75 | |
| 16.5 | 13.62 | 47.74 | 17.31 | 14.61 | 46.68 | 1.90 | |
| -- | -- | -- | 17.11 | 14.41 | 46.88 | 0.60 | |
| 16.13 | 13.03 | 48.33 | 16.73 | 14.03 | 47.26 | 0.20 | |
| 20.47 | 12.69 | 48.67 | 16.52 | 13.82 | 47.47 | 0.05 | |
| -- | -- | -- | 16.55 | 13.85 | 47.44 | 0.00 | hole flowing, packer blew |
| 20.49 | 12.61 | 48.75 | 16.52 | 13.82 | 47.47 | 0.00 | |
| -- | -- | -- | 16.48 | 13.78 | 47.51 | 0.00 | airlifting |
| -- | -- | -- | 16.50 | 13.80 | 47.49 | 0.00 | tripped out |
| -- | -- | -- | 16.55 | 13.85 | 47.44 | 0.00 | tripped out |
| 16.15 | 12.72 | 48.64 | 16.52 | 13.82 | 47.47 | 0.00 | |
| 16.54 | 12.7 | 48.66 | 16.65 | 13.95 | 47.34 | 0.25 | |
| 15.99 | 12.72 | 48.64 | 16.55 | 13.85 | 47.44 | 0.00 | |

**Appendix I.** (Continued) Daily water levels recorded during exploratory core drilling and testing at the ROMP 115 – Royal

[MM/DD/YYYY, month/day/year; HH:MM, hour:minute; HWT, 4-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of well locations are shown in figure 2; well as-built diagrams are in appendix B]

| Date (MM/DD/YYYY) | Time (HH:MM) | 4-inch HWT Deepest Casing Depth (ft bls) | 4-inch HWT Temporary Casing Static Water Level (ft btoc) | 4-inch HWT Temporary Casing Static Water Level (ft bls) | 3-inch HQ Casing Total Depth (ft bls) | 3-inch HQ Temporary casing Static Water Level (ft btoc) | 3-inch HQ Temporary casing Static Water Level (ft bls) | NRQ Core Hole Total Depth (ft bls) |
|---|---|---|---|---|---|---|---|---|
| 10/20/2014 | 10:45 | 228 | 14.51 | 12.66 | -- | -- | -- | 407 |
| 10/22/2014 | 14:00 | 228 | 14.55 | 12.7 | -- | -- | -- | 407 |
| 10/23/2014 | 11:00 | 228 | -- | -- | -- | -- | -- | 407 |
| 10/27/2014 | 12:00 | 228 | 14.74 | 12.89 | -- | -- | -- | 407 |
| 10/28/2014 | 10:00 | 228 | 14.79 | 12.94 | -- | -- | -- | 437 |
| 10/30/2014 | 10:00 | 228 | 14.8 | 12.95 | -- | -- | -- | 437 |
| 1/6/2015 | 9:30 | -- | -- | -- | 437 | 15.41 | 12.23 | 457 |
| 1/7/2015 | 12:30 | -- | -- | -- | 437 | 15.43 | 12.22 | 487 |
| 1/8/2015 | 10:25 | -- | -- | -- | 437 | 15.08 | 12.21 | 547 |
| 1/12/2015 | 12:33 | -- | -- | -- | 437 | 14.31 | 11.28 | 587 |
| 1/13/2015 | 8:30 | -- | -- | -- | 437 | 13.87 | 11.27 | 587 |
| 1/15/2015 | 9:30 | -- | -- | -- | 437 | 14.65 | 10.82 | 667 |
| 1/21/2015 | 9:30 | -- | -- | -- | 439 | 13 | 11.17 | 688 |
| 1/22/2015 | 10:00 | -- | -- | -- | 439 | 18.34 | 11.3 | 689 |
| 1/26/2015 | 13:30 | -- | -- | -- | 439 | 17.8 | 11.05 | 689 |
| 2/2/2015 | 10:30 | -- | -- | -- | 690.5 | 14.2 | 11.87 | 690.5 |
| 2/3/2015 | 9:30 | -- | -- | -- | 690.5 | 13.13 | 11.3 | 690.5 |
| 2/4/2015 | 9:15 | -- | -- | -- | 690.5 | 13.77 | 10.77 | 717 |
| 2/5/2015 | 9:40 | -- | -- | -- | 690.5 | 13.62 | 10.61 | 777 |
| 2/9/2015 | 10:30 | -- | -- | -- | 690.5 | 13.53 | 10.5 | 817 |
| 2/10/2015 | 9:30 | -- | -- | -- | 690.5 | 13.62 | 10.51 | 867 |

well site in Sumter County, Florida

casing; HQ, 3-inch temporary casing; NRQ, 2.38-inch internal diameter core drilling rod; NAVD88, North American Vertical Datum of 1988; --, not applicable;

| NRQ Core Hole Static Water Level (ft btoc) | NRQ Core Hole Static Water Level (ft bls) | NRQ Core Hole Static Water Level (ft NAVD 88) | Drilling Water Spply Static Water Level (ft btoc) | Drilling Water Spply Static Water Level (ft bls) | Drilling Water Spply Static Water Level (ft NAVD 88) | Rain Gauge (inches) | Comments |
|---|---|---|---|---|---|---|---|
| 17.81 | 12.91 | 48.45 | 16.62 | 13.92 | 47.37 | 0.00 | |
| 16.6 | 12.95 | 48.41 | 16.71 | 14.01 | 47.28 | 0.00 | |
| 19.52 | 12.97 | 48.39 | 16.71 | 14.01 | 47.28 | 0.00 | packer in for slug test 2 |
| 19.19 | 13.13 | 48.23 | 16.86 | 14.16 | 47.13 | 0.00 | |
| 15.65 | 12.87 | 48.49 | 16.90 | 14.20 | 47.09 | 0.00 | |
| 15.86 | 13.03 | 48.33 | 16.94 | 14.24 | 47.05 | -- | |
| 15.41 | 12.23 | 49.13 | 16.95 | 14.25 | 47.04 | 3.45 | |
| 15.49 | 12.28 | 49.08 | -- | -- | -- | 0.50 | |
| 15.01 | 12.14 | 49.22 | 17.05 | 14.35 | 46.94 | 0.00 | |
| 14.33 | 11.3 | 50.06 | 17.04 | 14.34 | 46.95 | 0.08 | |
| 13.87 | 11.27 | 50.09 | 17.05 | 14.35 | 46.94 | 1.65 | |
| 14.7 | 10.87 | 50.49 | 16.95 | 14.25 | 47.04 | -- | |
| -- | -- | -- | 16.85 | 14.15 | 47.14 | 0.20 | |
| 18.28 | 11.24 | 50.12 | 16.80 | 14.10 | 47.19 | 0.00 | |
| 18.76 | 12.01 | 49.35 | 16.75 | 14.05 | 47.24 | 2.00 | |
| -- | -- | -- | 16.62 | 13.92 | 47.37 | -- | |
| -- | -- | -- | 16.70 | 14.00 | 47.29 | 0.00 | |
| 13.9 | 10.9 | 50.46 | 16.67 | 13.97 | 47.32 | 0.00 | |
| 13.79 | 10.78 | 50.58 | 16.65 | 13.95 | 47.34 | 0.66 | |
| 13.75 | 10.72 | 50.64 | 16.68 | 13.98 | 47.31 | 0.00 | |
| 13.84 | 10.73 | 50.63 | 16.77 | 14.07 | 47.22 | 0.20 | |

**Appendix I.** (Continued) Daily water levels recorded during exploratory core drilling and testing at the ROMP 115 – Royal

[MM/DD/YYYY, month/day/year; HH:MM, hour:minute; HWT, 4-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of well locations are shown in figure 2; well as-built diagrams are in appendix B]

| Date (MM/DD/YYYY) | Time (HH:MM) | 4-inch HWT Deepest Casing Depth (ft bls) | 4-inch HWT Temporary Casing Static Water Level (ft btoc) | 4-inch HWT Temporary Casing Static Water Level (ft bls) | 3-inch HQ Casing Total Depth (ft bls) | 3-inch HQ Temporary casing Static Water Level (ft btoc) | 3-inch HQ Temporary casing Static Water Level (ft bls) | NRQ Core Hole Total Depth (ft bls) |
|---|---|---|---|---|---|---|---|---|
| 2/11/2015 | 9:30 | -- | -- | -- | 690.5 | 13.95 | 10.74 | 907 |
| 2/12/2015 | 10:45 | -- | -- | -- | 690.5 | 13.85 | 10.72 | 947 |
| 2/16/2015 | 11:45 | -- | -- | -- | 690.5 | 13.72 | 10.64 | 987 |
| 2/17/2015 | 14:15 | -- | -- | -- | 690.5 | 13.68 | 10.46 | 987 |
| 2/18/2015 | 10:00 | -- | -- | -- | 690.5 | 13.78 | 11.36 | 987 |
| 2/19/2015 | 9:00 | -- | -- | -- | 690.5 | 14.44 | 10.97 | 1,017 |
| 2/23/2015 | 10:45 | -- | -- | -- | 690.5 | 13.85 | 10.71 | 1,037 |
| 2/24/2015 | 12:15 | -- | -- | -- | 690.5 | 13.85 | 10.59 | 1,037 |
| 2/25/2015 | 10:00 | -- | -- | -- | 690.5 | 13.71 | 10.62 | 1,037 |
| 2/26/2015 | 9:15 | -- | -- | -- | 690.5 | 13.66 | 10.58 | 1,051 |
| 3/2/2015 | 11:30 | -- | -- | -- | 690.5 | 12.72 | 10.89 | 1,051 |
| 3/3/2015 | 9:00 | -- | -- | -- | 690.5 | 13.67 | 10.7 | 1,057 |
| 3/4/2015 | 8:45 | -- | -- | -- | 690.5 | 13.64 | 10.65 | 1,097 |
| 3/5/2015 | 9:15 | -- | -- | -- | 690.5 | 13.74 | 10.68 | 1,137 |
| 3/9/2015 | 13:00 | -- | -- | -- | 690.5 | 13.62 | 10.73 | 1,177 |
| 3/10/2015 | 9:00 | -- | -- | -- | 690.5 | 14.15 | 10.79 | 1,177 |
| 3/11/2015 | 9:00 | -- | -- | -- | 690.5 | 13.77 | 10.8 | 1,217 |
| 3/12/2015 | 13:30 | -- | -- | -- | 690.5 | 13.12 | 10.29 | 1,257 |
| 3/16/2015 | 9:00 | -- | -- | -- | 690.5 | 14.08 | 10.96 | 1,267 |
| 3/17/2015 | 8:30 | -- | -- | -- | 690.5 | 18.18 | 10.99 | 1,287 |
| 3/18/2015 | 8:45 | -- | -- | -- | 690.5 | 16.26 | 10.85 | 1,287 |

well site in Sumter County, Florida

casing; HQ, 3-inch temporary casing; NRQ, 2.38-inch internal diameter core drilling rod; NAVD88, North American Vertical Datum of 1988; --, not applicable;

| NRQ Core Hole Static Water Level (ft btoc) | NRQ Core Hole Static Water Level (ft bls) | NRQ Core Hole Static Water Level (ft NAVD 88) | Drilling Water Spply Static Water Level (ft btoc) | Drilling Water Spply Static Water Level (ft bls) | Drilling Water Spply Static Water Level (ft NAVD 88) | Rain Gauge (inches) | Comments |
|---|---|---|---|---|---|---|---|
| 14.11 | 10.9 | 50.46 | 16.71 | 14.01 | 47.28 | 0.00 | |
| 13.91 | 10.78 | 50.58 | 16.73 | 14.03 | 47.26 | 0.00 | |
| 13.85 | 10.77 | 50.59 | 16.84 | 14.14 | 47.15 | -- | |
| 13.75 | 10.53 | 50.83 | 16.72 | 14.02 | 47.27 | 0.15 | |
| 13.79 | 11.37 | 49.99 | 16.82 | 14.12 | 47.17 | 0.70 | |
| 14.5 | 11.03 | 50.33 | 16.86 | 14.16 | 47.13 | -- | |
| 14.03 | 10.89 | 50.47 | 16.89 | 14.19 | 47.10 | 0.00 | |
| 14 | 10.74 | 50.62 | 16.82 | 14.12 | 47.17 | 0.06 | |
| 13.82 | 10.73 | 50.63 | 16.85 | 14.15 | 47.14 | 0.08 | |
| 13.84 | 10.76 | 50.6 | 16.88 | 14.18 | 47.11 | 0.34 | |
| -- | -- | -- | 16.98 | 14.28 | 47.01 | 0.16 | tripped out |
| 13.76 | 10.79 | 50.57 | 16.97 | 14.27 | 47.02 | 0.00 | |
| 13.79 | 10.8 | 50.56 | 16.98 | 14.28 | 47.01 | 0.00 | |
| 13.92 | 10.86 | 50.5 | 17.00 | 14.30 | 46.99 | 0.00 | |
| 13.81 | 10.92 | 50.44 | 17.07 | 14.37 | 46.92 | 0.05 | |
| 14.27 | 10.91 | 50.45 | 17.08 | 14.38 | 46.91 | 0.00 | |
| 13.87 | 10.9 | 50.46 | 17.10 | 14.40 | 46.89 | 0.00 | |
| 13.86 | 11.03 | 50.33 | 17.12 | 14.42 | 46.87 | 0.00 | |
| 14.19 | 11.07 | 50.29 | 17.21 | 14.51 | 46.78 | 0.00 | |
| 18.22 | 11.03 | 50.33 | 17.22 | 14.52 | 46.77 | 0.00 | |
| 16.46 | 11.05 | 50.31 | 17.20 | 14.50 | 46.79 | 0.00 | |

**Appendix I.** (Continued) Daily water levels recorded during exploratory core drilling and testing at the ROMP 115 – Royal

[MM/DD/YYYY, month/day/year; HH:MM, hour:minute; HWT, 4-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of well locations are shown in figure 2; well as-built diagrams are in appendix B]

| Date (MM/DD/YYYY) | Time (HH:MM) | 4-inch HWT Deepest Casing Depth (ft bls) | 4-inch HWT Temporary Casing Static Water Level (ft btoc) | 4-inch HWT Temporary Casing Static Water Level (ft bls) | 3-inch HQ Casing Total Depth (ft bls) | 3-inch HQ Temporary casing Static Water Level (ft btoc) | 3-inch HQ Temporary casing Static Water Level (ft bls) | NRQ Core Hole Total Depth (ft bls) |
|---|---|---|---|---|---|---|---|---|
| 3/19/2015 | 8:00 | -- | -- | -- | 690.5 | 13.81 | 10.86 | 1,307 |
| 3/23/2015 | 11:00 | -- | -- | -- | 690.5 | 12.86 | 11.64 | 1,327 |
| 3/24/2015 | 9:15 | -- | -- | -- | 690.5 | 13.95 | 11.07 | 1,347 |
| 3/25/2015 | 11:15 | -- | -- | -- | 690.5 | 13.92 | 11.06 | 1,407 |
| 3/30/2015 | 20:00 | -- | -- | -- | 690.5 | 14.44 | 11.52 | 1,447 |
| 3/31/2015 | 9:30 | -- | -- | -- | 690.5 | -- | -- | 1,487 |
| 4/1/2015 | 8:30 | -- | -- | -- | 690.5 | 14.7 | 11.24 | 1,487 |
| 4/2/2015 | 9:00 | -- | -- | -- | 690.5 | 14.22 | 11.17 | 1,487 |
| 4/6/2015 | 11:30 | -- | -- | -- | 690.5 | 14.19 | 11.29 | 1,527 |
| 4/7/2015 | 9:45 | -- | -- | -- | 690.5 | 14.28 | 11.31 | 1,547 |
| 4/8/2015 | 8:45 | -- | -- | -- | 690.5 | 14.35 | 11.44 | 1,577 |
| 4/9/2015 | 9:30 | -- | -- | -- | 690.5 | 14.46 | 11.57 | 1,597 |
| 4/13/2015 | 11:00 | -- | -- | -- | 690.5 | 14.45 | 11.69 | 1,597 |
| 4/14/2015 | 10:30 | -- | -- | -- | 690.5 | 18.6 | 11.77 | 1,597 |
| 4/15/2015 | 9:10 | -- | -- | -- | 690.5 | 14.82 | 11.65 | 1,617 |
| 4/20/2015 | 11:00 | -- | -- | -- | 690.5 | 14.60 | 11.73 | 1,657 |
| 4/21/2015 | 9:15 | -- | -- | -- | 690.5 | 14.65 | 11.66 | 1,677 |
| 4/22/2015 | 9:45 | -- | -- | -- | 690.5 | 14.67 | 11.72 | 1,707 |
| 4/23/2015 | 9:00 | -- | -- | -- | 690.5 | 14.9 | 11.67 | 1,737 |
| 4/27/2015 | 11:00 | -- | -- | -- | 690.5 | 14.74 | 11.83 | 1,737 |
| 4/28/2015 | 9:00 | -- | -- | -- | 690.5 | 16.43 | 13.38 | 1,737 |

well site in Sumter County, Florida

casing; HQ, 3-inch temporary casing; NRQ, 2.38-inch internal diameter core drilling rod; NAVD88, North American Vertical Datum of 1988; --, not applicable;

| NRQ Core Hole Static Water Level (ft btoc) | NRQ Core Hole Static Water Level (ft bls) | NRQ Core Hole Static Water Level (ft NAVD 88) | Drilling Water Spply Static Water Level (ft btoc) | Drilling Water Spply Static Water Level (ft bls) | Drilling Water Spply Static Water Level (ft NAVD 88) | Rain Gauge (inches) | Comments |
|---|---|---|---|---|---|---|---|
| 13.96 | 11.81 | 49.55 | 17.25 | 14.55 | 46.74 | 0.00 | |
| 14.03 | 10.91 | 50.45 | 18.45 | 15.75 | 45.54 | 0.70 | |
| 14 | 11.12 | 50.24 | -- | -- | -- | 0.05 | |
| 13.9 | 11.04 | 50.32 | 17.32 | 14.62 | 46.67 | 0.00 | |
| 14.21 | 11.29 | 50.07 | 17.45 | 14.75 | 46.54 | 0.80 | |
| 14.17 | 11.23 | 50.13 | 17.44 | 14.74 | 46.55 | 0.00 | |
| -- | -- | -- | 17.47 | 14.77 | 46.52 | 0.00 | |
| 14.22 | 11.17 | 50.19 | 17.51 | 14.81 | 46.48 | 0.00 | |
| 14.23 | 11.33 | 50.03 | 17.61 | 14.91 | 46.38 | 0.05 | |
| 14.34 | 11.37 | 49.99 | 17.59 | 14.89 | 46.40 | 0.00 | |
| 14.28 | 11.37 | 49.99 | 17.68 | 14.98 | 46.31 | 0.00 | |
| 14.35 | 11.46 | 49.9 | 17.69 | 14.99 | 46.30 | 0.00 | |
| 14.52 | 11.76 | 49.6 | 17.79 | 15.09 | 46.20 | 0.26 | |
| 18.49 | 11.66 | 49.7 | 17.79 | 15.09 | 46.20 | 2.00 | |
| 14.73 | 11.56 | 49.8 | 17.78 | 15.08 | 46.21 | 0.40 | |
| 14.53 | 11.66 | 49.7 | 17.82 | 15.12 | 46.17 | 0.05 | |
| 14.77 | 11.78 | 49.58 | 17.82 | 15.12 | 46.17 | 1.30 | |
| 15.24 | 12.29 | 49.07 | 17.85 | 15.15 | 46.14 | 0.00 | |
| 16.65 | 13.42 | 47.94 | 17.89 | 15.19 | 46.10 | 0.00 | |
| 14.76 | 11.85 | 49.51 | 17.95 | 15.25 | 46.04 | 0.20 | |
| 14.94 | 11.89 | 49.47 | 18.00 | 15.30 | 45.99 | 0.45 | after sweep |

**Appendix I.** (Continued) Daily water levels recorded during exploratory core drilling and testing at the ROMP 115 – Royal

[MM/DD/YYYY, month/day/year; HH:MM, hour:minute; HWT, 4-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of well locations are shown in figure 2; well as-built diagrams are in appendix B]

| Date (MM/DD/YYYY) | Time (HH:MM) | 4-inch HWT Deepest Casing Depth (ft bls) | 4-inch HWT Temporary Casing Static Water Level (ft btoc) | 4-inch HWT Temporary Casing Static Water Level (ft bls) | 3-inch HQ Casing Total Depth (ft bls) | 3-inch HQ Temporary casing Static Water Level (ft btoc) | 3-inch HQ Temporary casing Static Water Level (ft bls) | NRQ Core Hole Total Depth (ft bls) |
|---|---|---|---|---|---|---|---|---|
| 4/29/2015 | 9:00 | -- | -- | -- | 690.5 | 15.00 | 11.80 | 1,757 |
| 4/30/2015 | 9:45 | -- | -- | -- | 690.5 | 15.00 | 11.91 | 1,757 |
| 6/1/2015 | 14:45 | -- | -- | -- | 690.5 | 15.89 | 12.97 | 1,757 |
| 6/2/2015 | 9:00 | -- | -- | -- | 690.5 | 15.98 | 12.90 | 1,757 |
| 6/3/2015 | 8:45 | -- | -- | -- | 690.5 | -- | -- | 1,777 |
| 6/4/2015 | 9:00 | -- | -- | -- | 690.5 | 17.36 | 14.58 | 1,777 |
| 6/5/2015 | 9:00 | -- | -- | -- | 690.5 | -- | -- | 1,777 |
| 6/8/2015 | 10:00 | -- | -- | -- | 690.5 | 17.71 | 14.68 | 1,777 |
| 6/9/2015 | 10:00 | -- | -- | -- | 690.5 | 17.07 | 13.72 | 1,777 |
| 6/10/2015 | 10:00 | -- | -- | -- | 690.5 | 20.01 | 14.31 | 1,777 |
| 6/11/2015 | 8:30 | -- | -- | -- | 690.5 | 19.84 | 12.84 | 1,777 |
| 6/16/2015 | 8:30 | -- | -- | -- | 690.5 | 16.06 | 12.84 | 1,787 |
| 6/17/2015 | 8:30 | -- | -- | -- | 690.5 | 16.04 | 12.80 | 1,827 |
| 6/18/2015 | 8:30 | -- | -- | -- | 690.5 | 15.74 | 12.91 | 1,867 |
| 6/23/2015 | 8:35 | -- | -- | -- | 690.5 | 16.99 | 14.01 | 1,887 |
| 6/24/2015 | 8:30 | -- | -- | -- | 690.5 | 20.00 | 13.17 | 1,887 |
| 6/25/2015 | 8:30 | -- | -- | -- | 690.5 | 17.68 | 13.05 | 1,907 |
| 6/29/2016 | 10:30 | -- | -- | -- | 690.5 | 16.92 | 13.51 | 1,947 |
| 6/30/2015 | 8:30 | -- | -- | -- | 690.5 | -- | -- | 1,967 |
| 7/1/2015 | 9:15 | -- | -- | -- | 690.5 | -- | -- | 1,977 |

well site in Sumter County, Florida

casing; HQ, 3-inch temporary casing; NRQ, 2.38-inch internal diameter core drilling rod; NAVD88, North American Vertical Datum of 1988; --, not applicable;

| NRQ Core Hole Static Water Level (ft btoc) | NRQ Core Hole Static Water Level (ft bls) | NRQ Core Hole Static Water Level (ft NAVD 88) | Drilling Water Spply Static Water Level (ft btoc) | Drilling Water Spply Static Water Level (ft bls) | Drilling Water Spply Static Water Level (ft NAVD 88) | Rain Gauge (inches) | Comments |
|---|---|---|---|---|---|---|---|
| 16.42 | 13.22 | 48.14 | 18.00 | 15.30 | 45.99 | 0.05 | |
| 16.80 | 13.71 | 47.65 | 18.03 | 15.33 | 45.96 | 0 | |
| 19.09 | 16.17 | 45.19 | 19.86 | 17.16 | 44.13 | 0 | |
| 18.80 | 15.72 | 45.64 | 18.84 | 16.14 | 45.15 | 0.1 | |
| 17.36 | 14.63 | 46.73 | 20.64 | 17.94 | 43.35 | 0 | 1-inch airline cracked or broken |
| 17.44 | 14.66 | 46.7 | 18.56 | 15.86 | 45.43 | 0 | |
| -- | -- | -- | 18.88 | 17.05 | 44.24 | 0.14 | |
| 16.99 | 13.96 | 47.4 | 18.93 | 16.23 | 45.06 | 1.3 | |
| 15.92 | 12.57 | 48.79 | 18.91 | 16.21 | 45.08 | 0.03 | |
| 19.99 | 14.29 | 47.07 | 18.94 | 16.24 | 45.05 | 0 | |
| 21.66 | 14.66 | 46.7 | 18.95 | 16.25 | 45.04 | 0.36 | packer set at 1727 feet bls for NRQ and HQ readings |
| 18.20 | 14.98 | 46.38 | 19.04 | 16.34 | 44.95 | 0.4 | |
| 17.91 | 14.67 | 46.69 | 19.07 | 16.37 | 44.92 | 0 | |
| 17.79 | 14.96 | 46.4 | 19.08 | 16.38 | 44.91 | 0 | |
| 15.44 | 12.46 | 48.9 | 19.24 | 16.26 | 45.03 | 0.25 | |
| 21.98 | 15.15 | 46.21 | 19.18 | 16.48 | 44.81 | 0 | packer set at 1877 feet bls for NRQ and HQ readings (slug test 8) |
| 19.84 | 15.21 | 46.15 | 19.21 | 16.51 | 44.78 | 0 | |
| 18.84 | 15.43 | 45.93 | 19.33 | 16.63 | 44.66 | 0 | water supply taken at about 13:00 |
| 18.53 | 15.54 | 45.82 | 19.35 | 16.65 | 44.64 | 0.14 | airline broke off |
| 18.33 | 15.47 | 45.89 | 19.36 | 16.66 | 44.63 | 0.02 | airline broke off |

**Appendix I.** (Continued) Daily water levels recorded during exploratory core drilling and testing at the ROMP 115 – Royal

[MM/DD/YYYY, month/day/year; HH:MM, hour:minute; HWT, 4-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of well locations are shown in figure 2; well as-built diagrams are in appendix B]

| Date (MM/DD/YYYY) | Time (HH:MM) | 4-inch HWT Deepest Casing Depth (ft bls) | 4-inch HWT Temporary Casing Static Water Level (ft btoc) | 4-inch HWT Temporary Casing Static Water Level (ft bls) | 3-inch HQ Casing Total Depth (ft bls) | 3-inch HQ Temporary casing Static Water Level (ft btoc) | 3-inch HQ Temporary casing Static Water Level (ft bls) | NRQ Core Hole Total Depth (ft bls) |
|---|---|---|---|---|---|---|---|---|
| 7/6/2015 | 11:30 | -- | -- | -- | 690.5 | -- | -- | 1,997 |
| 7/7/2015 | 9:00 | -- | -- | -- | 690.5 | 20.44 | 14.40 | 1,997 |
| 7/8/2015 | 9:20 | -- | -- | -- | 690.5 | 20.41 | 14.37 | 1,997 |
| 7/9/2015 | 9:00 | -- | -- | -- | 690.5 | 20.45 | 15.22 | 1,997 |
| 7/13/2015 | 11:00 | -- | -- | -- | 690.5 | 19.19 | 13.31 | 1,997 |
| 7/14/2015 | 8:45 | -- | -- | -- | 690.5 | 20.40 | 14.52 | 1,997 |
| 7/15/2015 | -- | -- | -- | -- | 690.5 | 19.19 | 13.31 | 1,997 |
| 7/16/2015 | 9:20 | -- | -- | -- | 690.5 | 16.00 | 14.17 | 1,997 |
| 7/20/2015 | 10:30 | -- | -- | -- | 690.5 | 15.99 | 14.16 | 1,997 |
| 7/21/2015 | 13:45 | -- | -- | -- | 690.5 | 15.42 | -- | 1,997 |
| 7/22/2015 | 10:40 | -- | -- | -- | 690.5 | 15.27 | -- | 1,997 |
| 7/23/2015 | 9:00 | -- | -- | -- | 690.5 | 15.29 | -- | 1,997 |
| 7/27/2015 | 10:30 | -- | -- | -- | 690.5 | 15.21 | -- | 1,997 |
| 7/31/2015 | 9:45 | -- | -- | -- | 690.5 | 16.20 | 13.18 | 1,997 |
| 8/10/2015 | 11:45 | -- | -- | -- | 690.5 | 14.26 | 12.43 | 1,997 |
| 8/11/2015 | 9:15 | -- | -- | -- | 690.5 | 15.28 | 12.42 | 1,997 |
| 8/12/2015 | 9:45 | -- | -- | -- | 690.5 | 14.89 | 12.12 | 1,997 |
| 8/13/2015 | 8:00 | -- | -- | -- | 690.5 | 16.75 | 14.12 | 1,997 |
| 8/17/2015 | 11:15 | -- | -- | -- | 690.5 | 14.65 | 11.92 | 1,997 |

well site in Sumter County, Florida

casing; HQ, 3-inch temporary casing; NRQ, 2.38-inch internal diameter core drilling rod; NAVD88, North American Vertical Datum of 1988; --, not applicable;

| NRQ Core Hole Static Water Level (ft btoc) | NRQ Core Hole Static Water Level (ft bls) | NRQ Core Hole Static Water Level (ft NAVD 88) | Drilling Water Spply Static Water Level (ft btoc) | Drilling Water Spply Static Water Level (ft bls) | Drilling Water Spply Static Water Level (ft NAVD 88) | Rain Gauge (inches) | Comments |
|---|---|---|---|---|---|---|---|
| 18.99 | 15.97 | 45.39 | 19.46 | 16.76 | 44.53 | 0.3 | airline broke off |
| 23.18 | 17.14 | 44.22 | 19.48 | 16.78 | 44.51 | 0.24 | packer set for NRQ and HQ readings (slug test 9) |
| 22.98 | 16.94 | 44.42 | 19.49 | 16.79 | 44.50 | 0 | packer set for NRQ and HQ readings (slug test 9) |
| 23.00 | 17.77 | 43.59 | 19.55 | 16.85 | 44.44 | 0 | packer set for NRQ and HQ readings (slug test 9) |
| 23.27 | 17.39 | 43.97 | 19.58 | 16.88 | 44.41 | 1.75 | |
| 24.39 | 18.51 | 42.85 | 19.57 | 16.87 | 44.42 | 0.36 | packer set at 1947 feet bls for above water levels (slug test 9 redo) |
| 23.27 | 17.39 | 43.97 | 19.58 | 16.88 | 44.41 | 0.52 | |
| -- | -- | -- | 19.59 | 16.89 | 44.40 | 0.1 | NRQ out of hole to log core hole |
| -- | -- | -- | 19.57 | 16.87 | 44.42 | 2.3 | |
| -- | -- | -- | 19.58 | -- | -- | 0.9 | |
| -- | -- | -- | 19.51 | -- | -- | 0.02 | |
| -- | -- | -- | 19.5 | -- | -- | 0.28 | |
| -- | -- | -- | 19.39 | -- | -- | 1.7 | |
| 16.29 | 13.27 | 48.09 | 18.41 | 15.71 | 45.58 | 5 | |
| -- | -- | -- | 17.35 | 14.55 | 46.74 | 1.35 | |
| 15.15 | 12.29 | 49.07 | 17.32 | 14.62 | 46.67 | 0 | |
| 14.85 | 12.05 | 49.31 | 17.29 | 14.59 | 46.70 | 0 | |
| 14.80 | 12.17 | 49.19 | 17.25 | 14.55 | 46.74 | 0.04 | |
| 14.80 | 12.07 | 49.29 | 17.29 | 14.59 | 46.70 | 1.1 | |

**Appendix I.** (Continued) Daily water levels recorded during exploratory core drilling and testing at the ROMP 115 – Royal

[MM/DD/YYYY, month/day/year; HH:MM, hour:minute; HWT, 4-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of well locations are shown in figure 2; well as-built diagrams are in appendix B]

| Date (MM/DD/YYYY) | Time (HH:MM) | 4-inch HWT Deepest Casing Depth (ft bls) | 4-inch HWT Temporary Casing Static Water Level (ft btoc) | 4-inch HWT Temporary Casing Static Water Level (ft bls) | 3-inch HQ Casing Total Depth (ft bls) | 3-inch HQ Temporary casing Static Water Level (ft btoc) | 3-inch HQ Temporary casing Static Water Level (ft bls) | NRQ Core Hole Total Depth (ft bls) |
|---|---|---|---|---|---|---|---|---|
| 8/18/2015 | 7:30 | -- | -- | -- | 690.5 | 14.59 | 11.88 | 1,997 |
| 8/19/2015 | 7:30 | -- | -- | -- | 690.5 | 14.85 | 11.81 | 1,997 |
| 8/20/2015 | 7:30 | -- | -- | -- | 690.5 | 15.59 | 12.76 | 1,997 |
| 8/21/2015 | 9:30 | -- | -- | -- | 690.5 | 13.55 | 11.42 | 1,997 |
| 8/24/2015 | 11:00 | -- | -- | -- | 690.5 | 14.38 | 11.65 | 1,997 |
| 8/25/2015 | 7:30 | -- | -- | -- | 690.5 | 14.67 | 11.59 | 1,997 |
| 8/26/2015 | 7:30 | -- | -- | -- | 690.5 | 14.04 | 11.33 | 1,997 |
| 8/27/2015 | 7:30 | -- | -- | -- | 690.5 | 15.42 | 11.46 | 1,997 |
| 8/31/2015 | 12:00 | -- | -- | -- | 690.5 | 14.61 | 11.43 | 1,997 |
| 9/1/2015 | 9:00 | -- | -- | -- | 690.5 | 14.51 | 11.40 | 1,997 |
| 9/2/2015 | 9:45 | -- | -- | -- | 690.5 | 15.28 | 12.17 | 1,997 |
| 9/3/2015 | 7:15 | -- | -- | -- | 690.5 | 13.21 | 11.38 | 1,997 |
| 9/9/2015 | 11:00 | -- | -- | -- | 690.5 | 15.63 | 11.21 | 1,997 |
| 9/10/2015 | 8:30 | -- | -- | -- | 690.5 | 14.68 | -- | 1,997 |
| 9/11/2015 | 7:30 | -- | -- | -- | 690.5 | 11.11 | -- | 1,997 |
| 9/14/2015 | 12:00 | -- | -- | -- | 690.5 | 11.10 | -- | 1,997 |
| 9/15/2015 | 9:00 | -- | -- | -- | 690.5 | 13.38 | 10.94 | 1,997 |
| 9/16/2015 | 8:35 | -- | -- | -- | 690.5 | 13.38 | 11.55 | 1,997 |
| 9/17/2015 | 9:05 | -- | -- | -- | 690.5 | 13.95 | 10.79 | 1,997 |
| 9/18/2015 | 7:30 | -- | -- | -- | 690.5 | 13.49 | 10.77 | 1,997 |
| 9/21/2015 | 10:37 | -- | -- | -- | 690.5 | 14.27 | 10.86 | 1,997 |
| 9/22/2015 | 13:00 | -- | -- | -- | 690.5 | 13.41 | 11.58 | 1,997 |

well site in Sumter County, Florida

casing; HQ, 3-inch temporary casing; NRQ, 2.38-inch internal diameter core drilling rod; NAVD88, North American Vertical Datum of 1988; --, not applicable;

| NRQ Core Hole Static Water Level (ft btoc) | NRQ Core Hole Static Water Level (ft bls) | NRQ Core Hole Static Water Level (ft NAVD 88) | Drilling Water Spply Static Water Level (ft btoc) | Drilling Water Spply Static Water Level (ft bls) | Drilling Water Spply Static Water Level (ft NAVD 88) | Rain Gauge (inches) | Comments |
|---|---|---|---|---|---|---|---|
| 14.65 | 11.94 | 49.42 | 17.24 | 14.54 | 46.75 | 0 | |
| 14.92 | 11.88 | 49.48 | 17.26 | 14.56 | 46.73 | 1.25 | |
| 14.39 | 11.56 | 49.8 | 17.27 | 14.57 | 46.72 | 0 | |
| -- | -- | -- | 17.21 | 14.51 | 46.78 | 0 | |
| 14.39 | 11.66 | 49.7 | 17.2 | 14.5 | 46.79 | 0.72 | |
| 15.56 | 12.48 | 48.88 | 17.19 | 14.49 | 46.80 | 0 | |
| 16.38 | 13.69 | 47.67 | 17.04 | 14.34 | 46.95 | 0.3 | |
| 17.41 | 13.45 | 47.91 | 17.06 | 14.36 | 46.93 | 0.11 | |
| 16.79 | 13.61 | 47.75 | 16.77 | 14.07 | 47.22 | 3.7 | |
| 15.69 | 12.58 | 48.78 | 16.74 | 14.04 | 47.25 | 0.04 | |
| 14.44 | 11.33 | 50.03 | 16.38 | 13.68 | 47.61 | 0.13 | |
| -- | -- | -- | 16.67 | 13.97 | 47.32 | 0 | NRQ tripped out |
| 15.28 | 10.86 | 50.5 | 16.53 | 13.83 | 47.46 | 1.85 | |
| 14.18 | -- | -- | 16.47 | -- | -- | 0.18 | |
| 13.41 | -- | -- | 16.44 | -- | -- | --- | no stick up |
| 13.21 | -- | -- | 16.35 | -- | -- | 0.8 | |
| 13.22 | 10.78 | 50.58 | 16.31 | 13.61 | 47.68 | 0 | |
| 13.00 | 11.17 | 50.19 | 16.31 | 13.61 | 47.68 | --- | |
| 13.70 | 10.54 | 50.82 | 16.26 | 13.56 | 47.73 | 0 | |
| 13.42 | 10.70 | 50.66 | 16.21 | 13.51 | 47.78 | 0 | |
| 13.76 | 10.35 | 51.01 | 16.19 | 13.49 | 47.80 | 0.19 | |
| | | | 16.12 | 13.42 | 47.87 | 0 | |

# Appendix J. Aquifer Performance Test Data Acquisition Sheets for the ROMP 115 – Royal Well Site in Sumter County, Florida

## AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

### General Information:

Site Name: ROMP 115 – ROYAL
Date: 3/31/2016
Reporting Code:
Performed by:
County:
S/T/R:
Pumped Well: UFA
Pumped Zone OB(s): UFA
Pump Type: 8" turbine
Test Rate/Duration:
Non-Pumped Zone OB(s):
Pump Set Depth:

### Setup Information:

Datalogger: Virtual Hermit
Time Synchronized:
Datalogger SN:
Time Datum:
Program Name:
Program Start Date:
Program End Date:

### Test Information:

Pump On Time:
Flow Meter Totalizer Start:
Pump Off Time:
Flow Meter Totalizer End:

| | | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Well*** | | UFA PW | LFA PW | UFA OB | LFA OB | Baro Troll | UFA OB 2 | | | |
| ***Riser ht.*** | ***als ft*** | ~0.5 | 0.5 | ~1.0 | 3.18 + TOC | | | | | |
| ***TOC elev*** | ***elev ft*** | 64.38 | 63.80 | 62.29 | 64.54 | | 62.29 | | | <- Elev Ref. ___________ |
| ***static W/L*** | ***btoc ft*** | 18.93 | 16.02 | 16.77 | 16.79 | | 16.77 | | | <- Date 3/31 12:18 |
| ***static W/L*** | ***elev ft*** | 45.45 | 47.78 | 45.52 | 47.75 | | 45.52 | | | TOC elev - static WL(btoc) |
| ***XD Rating*** | ***psi*** | 100 | 100 | 30 | 30 | | 30 | | | |
| ***Serial No.*** | | 324089 | 396485 | 324569 | 324740 | 323512 | 324737 | | | |
| ***Reading in Air*** | ***ft*** | | | | | | | | | |
| ***XD depth*** | ***btoc ft*** | 78 | 100 | 25 | 25 | | 25 | | | |
| ***XD elev*** | ***elev ft*** | -- | -- | -- | -- | -- | -- | | | TOC elev - XD depth(btoc) |
| ***XD subm.*** | ***wl tape ft*** | 59.07 | 83.98 | 8.23 | 8.21 | | 8.23 | | | WL tape value of submergence |
| ***XD subm.*** | ***XD read ft*** | 59.08 | 83.37 | 8.10 | 8.07 | | 7.95 | | | 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 (g x 1000) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | -----------> | Elev | Elev | Elev | Elev | Elev | Elev | | | | |
| 3/31/16 | 12:09 | 18.93 | 16.02 | 16.77 | 16.79 | | 45.52 | | | | WL tape BTOC |
| 3/31/16 | 12:36 | 45.41 | 47.83 | 45.53 | 47.74 | | 45.54 | | | | XD reads static |
| 3/31/16 | 12:40 | | | | | | | | | | start BKG |
| 3/31/16 | 14:20 | 30.70 | 47.77 | 45.46 | 47.85 | | 45.46 | | | 2300 | start pump |
| 3/31/16 | 14:30 | 28.60 | 47.82 | 45.44 | 47.75 | | 45.44 | | | 2850 | |
| | 15:50 | 33.53 | 47.84 | 45.45 | 47.78 | | 45.45 | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

3-3-2016 LFA OB annulus (packer is set) = 1.15' btoc

final flow meter reading 102044x1000

## AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

11:27 #393760 removed from UFA OB - reading in air -0.273' (swapped w/ #324569)

### General Information:

| | | | |
|---|---|---|---|
| Site Name: | ROMP 115 – ROYAL | Date: | 3/29/2016 |
| Reporting Code: | LWRY | Performed by: | |
| County: | Sumter | S/T/R: | |
| Pumped Well: | UFA | Pumped Zone OB(s): | UFA OB |
| Pump Type: | 6" LS turbine | | |
| Test Rate/Duration: | | Non-Pumped Zone OB(s): | |
| Pump Set Depth: | | | |

### Setup Information:

| | | | |
|---|---|---|---|
| Datalogger: | Virtual Hermit | Time Synchronized: | |
| Datalogger SN: | | Time Datum: | |
| Program Name: | | | |
| Program Start Date: | | | |
| Program End Date: | | | |

### Test Information:

| | | | |
|---|---|---|---|
| Pump On Time: | | Flow Meter Totalizer Start: | |
| Pump Off Time: | | Flow Meter Totalizer End: | |

| | | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Well*** | | UFA PW | LFA PW | UFA OB | LFA OB | Baro Troll | UFA OB 2 | Manometer | | |
| ***Riser ht.*** | ***als ft*** | ~0.5' | ~0.5' | ~1.0' | ~1.5' | | | | | |
| ***TOC elev*** | ***elev ft*** | 64.38 | 63.80 | 62.29 | 61.36 | | | | | <- Elev Ref. |
| ***static W/L*** | ***btoc ft*** | 18.72 | 16.04 | 16.72 | 17.99 | | 16.72 | | | <- Date |
| ***static W/L*** | ***elev ft*** | 45.66 | 47.76 | 45.57 | 43.37 | | 45.61 | | | TOC elev - static WL(btoc) |
| ***XD Rating*** | ***psi*** | 100 | 100 | 30 | 30 | | 30 | 30 | | |
| ***Serial No.*** | | 324089 | 396485 | 324569 | 324740 | 323512 | 324737 | | | 11:13 |
| ***Reading in Air*** | ***ft*** | 0.083 | -0.037 | 0.019 | 0.029 | 14.741 | 0.031 | | | |
| ***XD depth*** | ***btoc ft*** | 78 | 100 | 25 | 25 | | 25 | | | |
| ***XD elev*** | ***elev ft*** | -- | -- | -- | -- | -- | -- | -- | -- | TOC elev - XD depth(btoc) |
| ***XD subm.*** | ***wl tape ft*** | | | 8.28 | | | 8.28 | | | WL tape value of submergence |
| ***XD subm.*** | ***XD read ft*** | | | 8.15 | | | 7.95 | | | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | GPM | (g x 1000) | |
| Units | -----------> | | | | | | | | | | |
| WL | 15:16 | 59.073 | | 8.171 | 7.945 | | | | | | |
| | 15:28 | 54.91 | | 8.14 | | | 7.92 | | 2200 | | |
| | 15:34 | 53.20 | | 8.13 | | | 7.91 | | | | |
| | 15:45 | | | 8.11 | | | 7.89 | | | | |
| | 16:10 | 47.12 | | 8.10 | | | 7.87 | | 2200 | | |
| | 16:20 | 44.05 | | 8.09 | | | 7.86 | | 2400 | | 1850 RPM |
| | 16:42 | 45 | | 8.08 | | | 7.86 | | 2400 | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

3-3-2016 LFA OB annulus = 1.15' btoc w/ packer set

## AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

### General Information:

| | | | |
|---|---|---|---|
| Site Name: | ROMP 115 – ROYAL | Date: | 4/18/2016 |
| Reporting Code: | LWRY | Performed by: | Jim Clayton |
| County: | Sumter | S/T/R: | |
| Pumped Well: | UFA | Pumped Zone OB(s): | |
| Pump Type: | 8" turbine | | |
| Test Rate/Duration: | | Non-Pumped Zone OB(s): | |
| Pump Set Depth: | | | |

### Setup Information:

| | | | |
|---|---|---|---|
| Datalogger: | Virtual Hermit | Time Synchronized: | |
| Datalogger SN: | | Time Datum: | |
| Program Name: | | | |
| Program Start Date: | | | |
| Program End Date: | | | |

### Test Information:

| | | | |
|---|---|---|---|
| Pump On Time: | | Flow Meter Totalizer Start: | |
| Pump Off Time: | | Flow Meter Totalizer End: | 102044 |

| | | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Well*** | | UFA PW | LFA PW | UFA OB | LFA OB | Baro Troll | UFA OB 2 | | | |
| ***Riser ht.*** | ***als ft*** | ~0.5 | 0.5 | ~1.0 | 3.18 + TOC | | ~1.0 | | | |
| ***TOC elev*** | ***elev ft*** | 64.38 | 63.80 | 62.29 | 64.54 | | 62.29 | | | <- Elev Ref. ___________ |
| ***static W/L*** | ***btoc ft*** | 19.36 | 16.64 | 17.34 | 17.23 | | 17.34 | | | <- Date _______________ |
| ***static W/L*** | ***elev ft*** | 45.02 | 47.16 | 44.95 | 47.31 | | 44.95 | | | TOC elev - static WL(btoc) |
| ***XD Rating*** | ***psi*** | 100 | 100 | 30 | 30 | | 30 | | | |
| ***Serial No.*** | | 324089 | 396485 | 324569 | 324740 | | 324737 | | | |
| ***Reading in Air*** | ***ft*** | | | | | | | | | |
| ***XD depth*** | ***btoc ft*** | | | | | | | | | |
| ***XD elev*** | ***elev ft*** | | | | | | | | | TOC elev - XD depth(btoc) |
| ***XD subm.*** | ***wl tape ft*** | | | | | | | | | WL tape value of submergence |
| ***XD subm.*** | ***XD read ft*** | | | | | | | | | XD value of submergence |
| ***XD Diff.*** | ***ft*** | | | | | | | Michelangelo | | $Subm._{WL\ tape}$ - $Subm._{XD}$ |

| Date | Time | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | Totalizer (g x 1000) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Totalizer | | | |
| Units | -----------> | Level (SE) | Level (SE) | Level (SE) | Level (SE) | PSI/$^{o}$C | Level (SE) | gpm | | | |
| 4/18/16 | 16:31 | 33.36 | 47.22 | 44.87 | 47.32 | 14.79/81.97 | 44.87 | 2352 | | | 4.09 NTU @ 17:45 |
| | 19:26 | 33.26 | 47.17 | 44.85 | 47.31 | 14.80/72.1 | 44.84 | 2286 | | | |
| | 20:35 | 32.72 | 47.15 | 44.85 | 47.28 | 14.8/68.98 | 44.85 | 2284 | | | |
| | 22:35 | 32.86 | 47.14 | 44.85 | 47.22 | 14.8/60.9 | 44.85 | 2288 | | | |
| 4/19/16 | 00:36 | 32.55 | 47.11 | 44.84 | 47.24 | 14.8/59.5 | 44.85 | 2290 | | | |
| | 2:48 | 33.09 | 47.16 | 44.85 | 47.29 | 14.8/56.5 | 44.85 | 2292 | | | |
| | 6:00 | 32.29 | 47.20 | 44.84 | 47.32 | 14.8/54.4 | 44.84 | 2291 | | | |
| | 8:03 | | | | | | | | | | man tube = 2.68' |
| | 8:06 | | | | | | | | | | PXD = 2.50' |
| | 11:42 | 32.84 | 47.09 | 44.80 | 47.23 | 14.8/77.3 | 44.81 | 2296 | | | man = 2.76 |

17:03 step test - LFA caving in 17:04 shut pump off final reading w/ pump off -5.03 PXD = 2.56

**AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET**

WQ Sheet
+ other notes

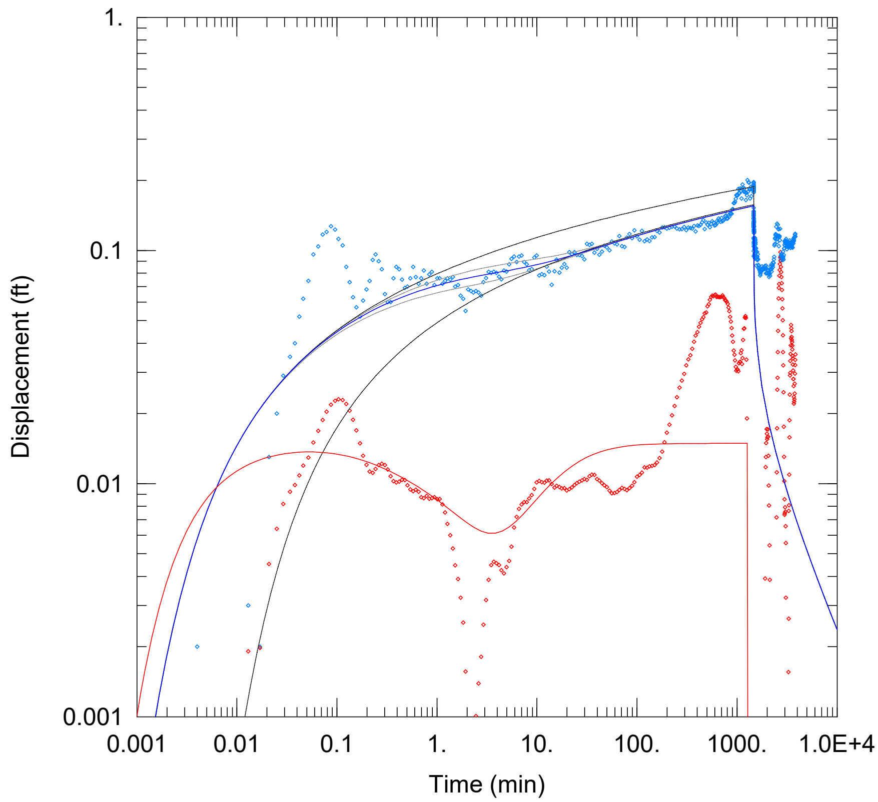
R115 UFA DD

**General Information:**

| | | | |
|---|---|---|---|
| Site Name: | R115 – Royal | Date: | 4/18/16 |
| Reporting Code: | | Performed by: | JC + others |
| County: | Sumter | S/T/R: | |

| Datalogger: | | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | Totalizer | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Time | Turbidity | (NTU) | Cond | Temp | pH | | | Lab Sample | (g x 1000) | |
| | | Q | Pond | μS/cm | °C | | | | ✓ | flow meter | |
| 4/18/16 | 17:43 | 4.09 | | | | | | | | 2307 | |
| | 18:50 | slight orange tinted discharge for ~1.5 minutes | | | | | | | | 2294 | |
| | 18:25 | | | 406 | 23.99 | 7.26 | | | | 2291 | |
| | 19:16 | unplugged cable from Michelangelo for about 30 seconds | | | | | | | | | |
| | 19:30-23:00 | checked discharge in mason jar 3X, discharge was clear each time | | | | | | | | | |
| | 23:44 | 1.63 | | 4.14 | 24.10 | 6.66 | | | | | clear |
| 4/19/16 | 2:48 | | | | | | | | | | clear |
| | 6:16 | 1.06 | | 412 | 23.81 | 6.77 | | | | | clear |
| | 12:07 | 2.64 | | | | | ~11:30 am orange sludge for about 30 seconds | | | | |
| | 12:09 | 2.04 | | | | | | | | | |
| | 12:17 | | | 414 | 24.86 | 7.46 | | | | | |
| | 12:27 | mason jar clear | | | | | | | | | |
| | 16:55 | mason jar clear - LFA pumped well caving in - emergency shut test down | | | | | | | | | |

# Appendix K. Aquifer Performance Test Curve-Match Analyses for the ROMP 115 – Royal Well Site in Sumter County, Florida




R115 UFA APT

Data Set: L:\...\R115UFA_APT_K1_OB1_NeumanJJLFinal.aqt
Date: 07/22/20 Time: 14:38:06

PROJECT INFORMATION

Company: SWFWMD
Client: JMC
Project: ROMP 115 – Royal
Location: Sumter County
Test Well: UFA PW
Test Date: 4/18/2016

AQUIFER DATA

Saturated Thickness: 353. ft

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| UFA PW | 0 | 0 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| UFA OB1 | 0 | 170 |

SOLUTION

Aquifer Model: Unconfined

Solution Method: Neuman

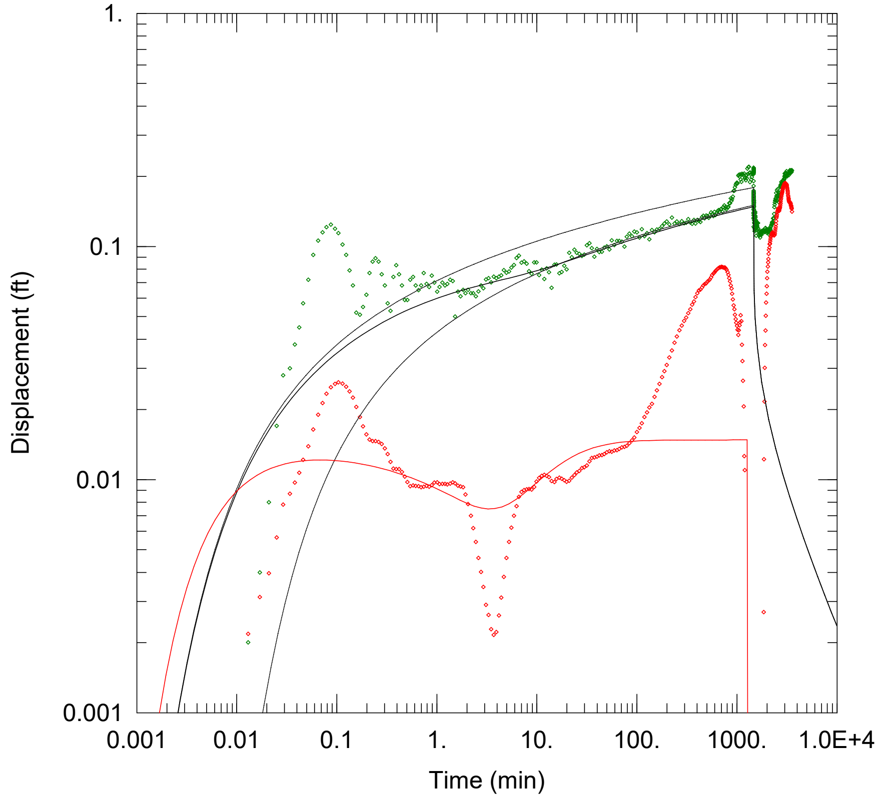
T = 2.356E+6 $ft^2$/day

S = 0.000616

Sy = 0.004831

Kz/Kr = 0.009367

**Figure K1.** AQTESOLV© curve-match solution using drawdown and recovery data collected from the Drilling Water Supply well during the Upper Floridan aquifer performance test conducted at the ROMP 115 – Royal well site in Sumter County, Florida.




R115 UFA APT

Data Set: L:\...\R115UFA_APT_K2_OB2_NeumanJJLFinal.aqt
Date: 07/22/20 Time: 14:38:29

PROJECT INFORMATION

Company: SWFWMD
Client: JMC
Project: ROMP 115 - Royal
Location: nr Wildwood, FL
Test Well: UFA PW
Test Date: 6/15/2010

AQUIFER DATA

Saturated Thickness: 353. ft

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| UFA PW | 0 | 0 |

Observation Wells

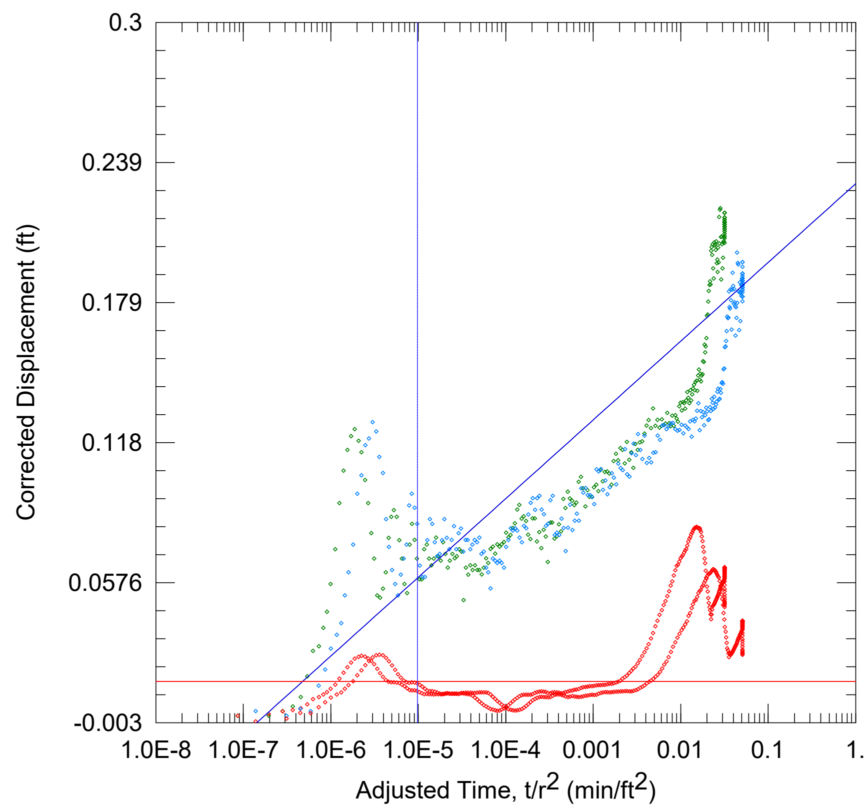
| Well Name | X (ft) | Y (ft) |
|---|---|---|
| ◦ UFA OB2 | 0 | 215 |

SOLUTION

Aquifer Model: Unconfined Solution Method: Neuman

T = 2.371E+6 $ft^2$/day S = 0.0006469
Sy = 0.004571 Kz/Kr = 0.009178

**Figure K2.** AQTESOLV© curve-match solution using drawdown and recovery data collected from the core hole during the Upper Floridan aquifer performance test conducted at the ROMP 115 – Royal well site in Sumter County, Florida.




R115 UFA APT

Data Set: L:\...\R115UFA_APT_K3_OB1OB2_UncC-JacobJJLFinal.aqt
Date: 07/22/20 Time: 14:38:58

PROJECT INFORMATION

Company: SWFWMD
Client: JMC
Project: ROMP 115 - Royal
Location: nr Wildwood, FL
Test Well: UFA PW
Test Date: 6/15/2010

AQUIFER DATA

Saturated Thickness: 353. ft Anisotropy Ratio (Kz/Kr): 0.009178

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| UFA PW | 0 | 0 |

Observation Wells

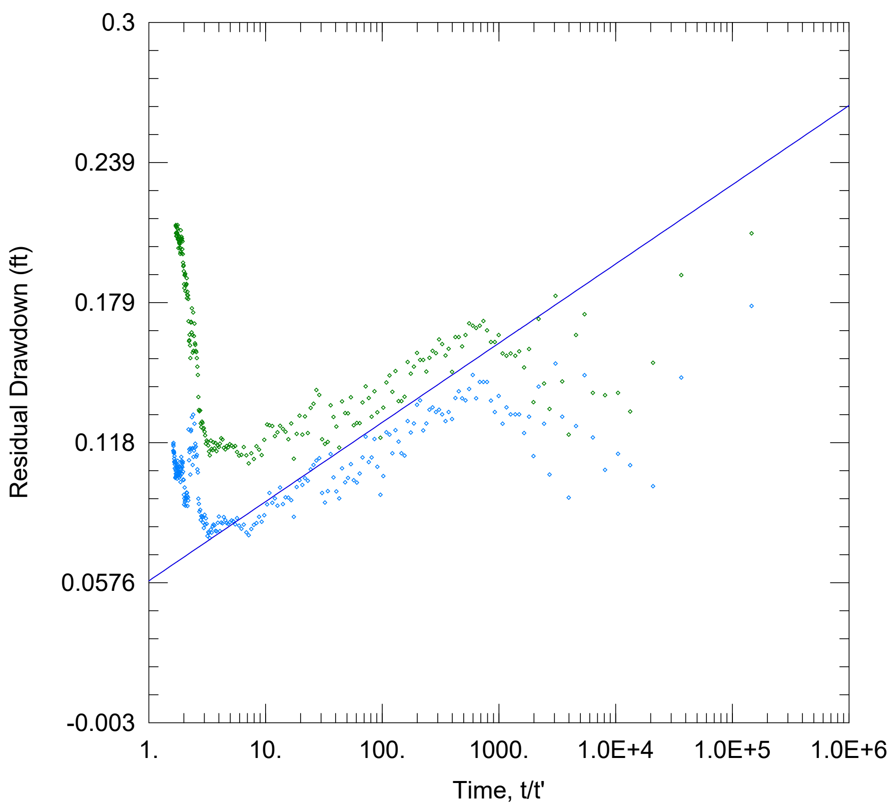
| Well Name | X (ft) | Y (ft) |
|---|---|---|
| UFA OB2 | 0 | 215 |
| UFA OB1 | 0 | 170 |

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 2.371E+6 $ft^2$/day S = 0.0006469

**Figure K3.** AQTESOLV© curve-match solution using drawdown data collected from the Drilling Water Supply well and core hole during the Upper Floridan aquifer performance test conducted at the ROMP 115 – Royal well site in Sumter County, Florida.




R115 UFA APT

Data Set: L:\...\R115UFA_APT_K4_OB1OB2_TheisRecJJLFinal.aqt
Date: 07/22/20 Time: 14:41:34

PROJECT INFORMATION

Company: SWFWMD
Client: JMC
Project: ROMP 115 – Royal
Location: Sumter County
Test Well: UFA PW
Test Date: 4/18/2016

AQUIFER DATA

Saturated Thickness: 353. ft Anisotropy Ratio (Kz/Kr): 0.009367

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| UFA PW | 0 | 0 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| UFA OB2 | 0 | 215 |
| UFA OB1 | 0 | 170 |

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 2.356E+6 $ft^2$/day S/S' = 0.01995

**Figure K4.** AQTESOLV© curve-match solution using recovery data collected from the Drilling Water Supply well and core hole during the Upper Floridan aquifer performance test conducted at the ROMP 115 – Royal well site in Sumter County, Florida.

# Appendix L. Water Quality Sample Data Acquisition Sheets for the ROMP 115 – Royal Well Site in Sumter County, Florida

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 1

**General Information**

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 10/9/2014 |
| Well | CH2 | Time | 12:20 |
| SID# | 840582 | Performed by | JC |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 237 | Packed Interval (ft-ft bls) | 186-237 |
| Casing (HW) Depth (ft bls) | 186 | Packed Interval (m-m bls) | 57-72 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | 18.98 |
| Hole Diameter (in.) | 3 | Initial Annulus WL (ft bls) | |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 0.3623 | g/ft | X | 51 | ft (interval) = | 18.5 | gallons |
| 2 | 0.6528 | g/ft | X | 186 | ft (interval) = | 141.4 | gallons |
| | | | | | **TOTAL PURGE VOLUME (one) =** | 160 | gallons |

Pump Method: Air Lift

Airline Length: 120 feet

Discharge Rate (gpm): 30 gpm

Purge Volume /Discharge Rate: 5.33 minutes **X THREE =** 16 minutes

Collection Method: Surface Discharge Wireline Bailer Nested Bailer

Comments: Worked on electrical issues in the trailer during air lifting, tested 4" HW casing to open corehole.

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

**Test Information**

Multimeter Serial # ________________

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 9:30 | 425 | 24.2 | |
| 10:20 | 430.3 | 24.4 | |
| 11:00 | 432 | 24.6 | |
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Start Purge 9:15

End Purge 11:15

Sample Time 11:30

Multimeter Serial #

Photometer Serial # ______________

| | | | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 431.7 | Chloride (mg/l) | 0 |
| Temperature ($^{o}$C) | 24.5 | Sulfate (mg/l) | 70 |
| pH (SU) | 7.78 | pH (SU) | |

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

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 2

**General Information**

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 10/23/2014 |
| Well | CH2 | Time | 17:10 |
| SID# | 840582 | Performed by | JC |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 407 | Packed Interval (ft-ft bls) | 377-407 |
| Casing (HW) Depth (ft bls) | 228 | Packed Interval (m-m bls) | 115-124 |
| Casing (HW) Diameter (in.) | 4 | Initial Test Interval WL (ft bls) | 19.45 |
| Hole Diameter (in.) | 3 | Initial Annulus WL (ft bls) | |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 377 | ft (interval) | = | 87 | gallons |
| 2 | 0.3623 | g/ft | X | 30 | ft (interval) | = | 11 | gallons |
| | | | | | **TOTAL PURGE VOLUME (one) =** | | 98 | gallons |

Pump Method: Reverse air

Airline Length: 100 feet

Discharge Rate (gpm): 5 gpm

Purge Volume /Discharge Rate: 20 minutes **X THREE =** 60 minutes

Collection Method: Surface Discharge Wireline Bailer Nested Bailer

Comments: NA

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

**Test Information**

Multimeter Serial #

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 16:20 | 432 | 24 | |
| 16:40 | 440 | 24.1 | |
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Start Purge 16:07

End Purge 17:00

Sample Time 17:10

Multimeter Serial #

Photometer Serial #

| | | | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 443.2 | Chloride (mg/l) | 4 |
| Temperature ($^{o}$C) | 24.2 | Sulfate (mg/l) | 84 |
| pH (SU) | 7.49 | pH (SU) | |

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

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 3

**General Information**

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 1/22/2015 |
| Well | CH2 | Time | 13:45 |
| SID# | 840582 | Performed by | JC & LM |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 689 | Packed Interval (ft-ft bls) | 657-689 |
| Casing (HW) Depth (ft bls) | 657 | Packed Interval (m-m bls) | 200-210 |
| Casing (HW) Diameter (in.) | | Initial Test Interval WL (ft bls) | |
| Hole Diameter (in.) | 0.3623 | Initial Annulus WL (ft bls) | |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 657 | ft (interval) | = | 151 | gallons |
| 2 | 0.3623 | g/ft | X | 32 | ft (interval) | = | 11.6 | gallons |
| | | | | | **TOTAL PURGE VOLUME (one) =** | | 162.6 | gallons |

Pump Method: Air lift without nested bailer.

Airline Length: 100 feet

Discharge Rate (gpm): 13 gpm

Purge Volume /Discharge Rate: 12.5 minutes **X THREE =** 37.5 minutes

Collection Method: Surface Discharge Wireline Bailer Nested Bailer

Comments: Used bailer to collect sample below airline

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

**Test Information**

Multimeter Serial # _______________

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 14:20 | 532 | 25.8 | 7.77 |
| 14:45 | 530 | 25.5 | --- |
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Start Purge: 14:00

End Purge: 15:10

Sample Time: 15:15

Multimeter Serial #

Photometer Serial # _______________

| | | | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 530 | Chloride (mg/l) | 6.1 |
| Temperature ($^{o}$C) | 25.4 | Sulfate (mg/l) | 120 |
| pH (SU) | 7.72 | pH (SU) | |

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

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 4

**General Information**

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 2/18/2015 |
| Well | CH2 | Time | |
| SID# | 840582 | Performed by | JC & JZ |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 987 | Packed Interval (ft-ft bls) | 942-987 |
| Casing (HW) Depth (ft bls) | 690.5 | Packed Interval (m-m bls) | 288.6-300.8 |
| Casing (HW) Diameter (in.) | | Initial Test Interval WL (ft bls) | |
| Hole Diameter (in.) | | Initial Annulus WL (ft bls) | |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 947 | ft (interval) | = | 218 | gallons |
| 2 | 0.3623 | g/ft | X | 40 | ft (interval) | = | 14.5 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 232.5 | gallons |

Pump Method Air lift with nested bailer.

Airline Length 100 feet

Discharge Rate (gpm) 15 gpm

Purge Volume /Discharge Rate 15.5 minutes **X THREE =** 46.5 minutes

Collection Method: Surface Discharge or Wireline Bailer or Nested Bailer

Comments: WQ sample collect 2 days after slug test, nested bailer

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

**Test Information**

Multimeter Serial # ________

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 13:40 | 666 | 26.6 | 8.16 |
| | | | |
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Start Purge 12:00

End Purge 13:45

Sample Time 13:45

Multimeter Serial #

Photometer Serial # ________

| | | | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 660 | Chloride (mg/l) | 5 |
| Temperature ($^{o}$C) | 26.2 | Sulfate (mg/l) | 138 |
| pH (SU) | 7.83 | pH (SU) | |

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

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 5

**General Information**

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 3/17/2015 |
| Well | CH2 | Time | 15:30 |
| SID# | 840582 | Performed by | JC |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1287 | Packed Interval (ft-ft bls) | 1236-1287 |
| Casing (HW) Depth (ft bls) | 690.5 | Packed Interval (m-m bls) | 377-392 |
| Casing (HW) Diameter (in.) | | Initial Test Interval WL (ft bls) | |
| Hole Diameter (in.) | | Initial Annulus WL (ft bls) | |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1237 | ft (interval) | = | 285 | gallons |
| 2 | 0.3623 | g/ft | X | 51 | ft (interval) | = | 18.5 | gallons |
| | | | | **TOTAL PURGE VOLUME (one) =** | | | 303.5 | gallons |

Pump Method Reverse air

Airline Length 100 feet

Discharge Rate (gpm) 14 gpm

Purge Volume /Discharge Rate 21.7 minutes **X THREE =** 65.1 minutes

Collection Method: Surface Discharge, Wireline Bailer, Nested Bailer

Comments: Wireline bailer to about 200' bls

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

**Test Information**

Multimeter Serial #

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 14:30 | 666 | 22.5 | 7.89 |
| 15:15 | 674 | 23 | 8.01 |
| | | | |
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Start Purge 13:45

End Purge 15:15

Sample Time 15:30

Multimeter Serial #

Photometer Serial #

| | | | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 674.5 | Chloride (mg/l) | 6.2 |
| Temperature ($^{o}$C) | 22.62 | Sulfate (mg/l) | 138 |
| pH (SU) | 8.06 | pH (SU) | |

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

## WATER QUALITY SAMPLE ACQUISITION

**WQ No.** 6

### General Information

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 4/14/2015 |
| Well | CH2 | Time | 14:45 |
| SID# | 840582 | Performed by | LM |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1597 | Packed Interval (ft-ft bls) | 1557-1597 |
| Casing (HW) Depth (ft bls) | 690.5 | Packed Interval (m-m bls) | 474.7-486.9 |
| Casing (HW) Diameter (in.) | 2.875 | Initial Test Interval WL (ft bls) | |
| Hole Diameter (in.) | | Initial Annulus WL (ft bls) | |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1557 | ft (interval) | = | 358.3 | gallons |
| 2 | 0.3623 | g/ft | X | 40 | ft (interval) | = | 14.5 | gallons |
| | | | | | **TOTAL PURGE VOLUME (one) =** | | 372.8 | gallons |

Pump Method: Reverse air

Airline Length: 100 feet

Discharge Rate (gpm): 12 gpm

Purge Volume /Discharge Rate: 31.3 minutes **X THREE =** 93.2 minutes

Collection Method: Surface Discharge Wireline Bailer Nested Bailer

Comments:

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

### Test Information

Multimeter Serial #

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| | | | |
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Start Purge 10:45

End Purge 14:30

Sample Time 14:45

Multimeter Serial #

Photometer Serial #

| | | | |
|---|---|---|---|
| Sp. Cond. (μS/cm) | 660 | Chloride (mg/l) | 4.9 |
| Temperature ($^{o}$C) | 27.4 | Sulfate (mg/l) | 165 |
| pH (SU) | 7.62 | pH (SU) | |

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

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 7

**General Information**

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 6/11/2015 |
| Well | CH2 | Time | 13:30 |
| SID# | 840582 | Performed by | JC |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1777 | Packed Interval (ft-ft bls) | 1727-1777 |
| Casing (HW) Depth (ft bls) | 690.5 | Packed Interval (m-m bls) | 526.5-541.8 |
| Casing (HW) Diameter (in.) | 2.875 | Initial Test Interval WL (ft bls) | |
| Hole Diameter (in.) | | Initial Annulus WL (ft bls) | |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1727 | ft (interval) | = | 397.4 | gallons |
| 2 | 0.3623 | g/ft | X | 50 | ft (interval) | = | 18.1 | gallons |
| | | | | | **TOTAL PURGE VOLUME (one) =** | | 415.5 | gallons |

Pump Method Reverse Air

Airline Length 100 feet

Discharge Rate (gpm) 12.4 gpm

Purge Volume /Discharge Rate 33.5 minutes **X THREE =** 100.5 minutes

Collection Method: Surface Discharge Wireline Bailer Nested Bailer

Comments:

NA

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

**Test Information**

Multimeter Serial #

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 11:45 | 1646 | 28.67 | 7.90 |
| 12:11 | 1644 | 28.91 | 7.89 |
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Start Purge 9:45

End Purge 13:25

Sample Time 13:30

Multimeter Serial #

Photometer Serial #

| | | | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 1645 | Chloride (mg/l) | 11 |
| Temperature ($^{o}$C) | 27.87 | Sulfate (mg/l) | 840 |
| pH (SU) | 7.52 | pH (SU) | |

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

**WATER QUALITY SAMPLE ACQUISITION**

**WQ No.** 8

**General Information**

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 6/24/2015 |
| Well | CH2 | Time | 11:10 |
| SID# | 840582 | Performed by | JC |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1887 | Packed Interval (ft-ft bls) | 1877-1887 |
| Casing (HW) Depth (ft bls) | 690.5 | Packed Interval (m-m bls) | 572-575 |
| Casing (HW) Diameter (in.) | 2.875 | Initial Test Interval WL (ft bls) | 15.15 |
| Hole Diameter (in.) | | Initial Annulus WL (ft bls) | --- |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2301 | g/ft | X | 1857 | ft (interval) | = | 427 | gallons |
| 2 | 0.3623 | g/ft | X | 10 | ft (interval) | = | 3.6 | gallons |
| | | | | | **TOTAL PURGE VOLUME (one) =** | | 430.6 | gallons |

Pump Method Air lift

Airline Length 100 feet

Discharge Rate (gpm) 13 gpm

Purge Volume /Discharge Rate 33 minutes **X THREE =** 100 minutes

Collection Method: Surface Discharge, Wireline Bailer, Nested Bailer

Comments:

NA

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

**Test Information**

Multimeter Serial #

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 10:00 | 1884 | 27.95 | 7.88 |
| 10:20 | 1945 | 28.22 | 7.92 |
| 10:42 | 1962 | 28.45 | 7.92 |
| 10:55 | 1965 | 29.03 | 7.93 |
| | | | |
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Start Purge 9:00

End Purge 10:55

Sample Time 11:10

RAQ + ~1" brown hose of WS well $H_20$ = 1130 µS/cm + a 3" hose is flowing ~50 gpm into pit

Multimeter Serial #

Photometer Serial #

| | | | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 1967 | Chloride (mg/l) | 10.5 |
| Temperature ($^{o}$C) | 27.87 | Sulfate (mg/l) | > 1000 4x dilution |
| pH (SU) | 7.54 | pH (SU) | |

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

## WATER QUALITY SAMPLE ACQUISITION

**WQ No.** 9

### General Information

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 7/9/2015 |
| Well | CH2 | Time | 17:10 |
| SID# | 840582 | Performed by | JC |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1997 | Packed Interval (ft-ft bls) | 1947-1997 |
| Casing (HW) Depth (ft bls) | 690.5 | Packed Interval (m-m bls) | 593-608 |
| Casing (HW) Diameter (in.) | 2.875 | Initial Test Interval WL (ft bls) | 17.77 |
| Hole Diameter (in.) | NRQ | Initial Annulus WL (ft bls) | 15.22 |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.3623 | g/ft | X | 50 | ft (interval) | = | 18.12 | gallons |
| 2 | | g/ft | X | | ft (interval) | = | | gallons |

**TOTAL PURGE VOLUME (one) =** ______ gallons

Pump Method Air lift

Airline Length 100 feet

Discharge Rate (gpm) 0.2 gpm

Purge Volume /Discharge Rate 90 minutes **X ~~THREE~~ TWO =** 180 minutes

Collection Method: Surface Discharge or Wireline Bailer or Nested Bailer

Comments:

Q from test interval will never reach surface so decide to do 2 TI volumes

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

### Test Information

Multimeter Serial # ______

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 14:37 | 2014 | 32.02 | 7.49 |
| 16:05 | 2210 | 28.90 | 7.30 |
| 16:32 | 2240 | 28.00 | 7.35 |
| 16:55 | 2242 | 27.10 | 7.35 |
| | | | |
| | | | |
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Start Purge 13:45

End Purge 17:00

Sample Time 17:10

Multimeter Serial #

Photometer Serial # ______

| | | | |
|---|---|---|---|
| Sp. Cond. (µS/cm) | 2242 | Chloride (mg/l) | 12 |
| Temperature ($^oC$) | 27.06 | Sulfate (mg/l) | > 1200 |
| pH (SU) | 7.38 | pH (SU) | |

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

## WATER QUALITY SAMPLE ACQUISITION

**WQ No.** 10

### General Information

| | | | |
|---|---|---|---|
| Wellsite | R115 - Royal | Date | 9/24/2015 |
| Well | CH2 | Time | 12:10 |
| SID# | 840582 | Performed by | TF |

| | | | |
|---|---|---|---|
| Well Depth (ft bls) | 1997 | Packed Interval (ft-ft bls) | 1020-1047 |
| Casing (HW) Depth (ft bls) | 690.5 | Packed Interval (m-m bls) | 311-319 |
| Casing (HW) Diameter (in.) | 2.875 | Initial Test Interval WL (ft bls) | 14.50 |
| Hole Diameter (in.) | NRQ | Initial Annulus WL (ft bls) | 14.61 |

Note: 1ft = 0.3048 m

Purge Volume (gallons)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.231 | g/ft | X | 947 | ft (interval) | = | 218.7 | gallons |
| 2 | | g/ft | X | | ft (interval) | = | | gallons |
| | | | | | **TOTAL PURGE VOLUME (one) =** | | 218.7 | gallons |

Pump Method: Air lift

Airline Length: 100 feet

Discharge Rate (gpm): 15 gpm

Purge Volume /Discharge Rate: 14.5 minutes **X THREE =** 44 minutes

Collection Method: Surface Discharge or Wireline Bailer or Nested Bailer

Comments: water quality from straddle packer 1020' to 1097' bls

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

### Test Information

Multimeter Serial # 08M100149

| Water Quality During Purge | | | |
|---|---|---|---|
| Time | Sp. Cond. | Temp. | pH |
| 14:55 | 721 | 25.63 | 7.83 |
| 15:20 | 659 | 25.70 | 7.77 |
| 15:25 | 658 | 26.23 | 7.63 |

Start Purge: 14:30

End Purge: 15:30

Sample Time: 15:45

Multimeter Serial #08M100149

| | |
|---|---|
| Sp. Cond. (µS/cm) | 657 |
| Temperature (°C) | 26.98 |
| pH (SU) | 7.63 |

Photometer Serial # A08121380 - 1529

| | |
|---|---|
| Chloride (mg/l) | 6.3 |
| Sulfate (mg/l) | 122 |
| pH (SU) | |

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

# Appendix M. Water Quality Data for the Groundwater Quality Samples Collected at the ROMP 115 – Royal Well Site in Sumter County, Florida

**Table M1.** Field analyses results of the water quality samples collected during core drilling and testing at the ROMP 115 – Royall well site in Sumter County, Florida

[No., number; SID, station identification; MM/DD/YYYY, month/day/year; HH:MM, hours:minutes; ft, feet; bls, below land surface; °C, degrees Celsius; SU, standard units; µmhos/cm, micromhos per centimeter; $Cl^{1-}$, chloride; mg/L, milligrams per Liter; $SO_4^{2-}$, sulfate; --, not applicable/not recorded]

| Water Quality Sample No. | Monitor Well SID No. | Date (MM/DD/YYYY) | Time (HH:MM) | Sample Interval (ft bls) | Temperature (oC) | pH (SU) | Specific Conductance (µmhos/cm) | Major Anions | | Sample Collection Method/ Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | $Cl^{1-}$ (mg/L) | $SO_4^{2-}$ (mg/L) | |
| 1 | 840582 | 10/09/2014 | 12:20 | 186-237 | 24.5 | 7.78 | 431.7 | 0 | 70 | Wireline bailer sample |
| 2 | 840582 | 10/23/2014 | 17:10 | 377-407 | 24.2 | 7.49 | 443.2 | 4 | 84 | Wireline bailer sample |
| 3 | 840582 | 01/22/2015 | 15:15 | 657-689 | 25.4 | 7.72 | 530 | 6.1 | 120 | Wireline bailer sample |
| 4 | 840582 | 02/18/2015 | 13:45 | 947-987 | 26.2 | 7.83 | 660 | 5 | 138 | Nested bailer sample |
| 5 | 840582 | 03/17/2015 | 15:30 | 1,236-1,287 | 22.62 | 8.06 | 674.5 | 6.2 | 138 | Wireline bailer sample |
| 6 | 840582 | 04/14/2015 | 14:45 | 1,557-1,597 | 27.4 | 7.62 | 660 | 4.9 | 165 | Wireline bailer sample |
| 7 | 840582 | 06/11/2015 | 13:30 | 1,727-1,777 | 27.87 | 7.52 | 1645 | 11 | 840 | Wireline bailer sample |
| 8 | 840582 | 06/24/2015 | 11:10 | 1,877-1,887 | 27.87 | 7.54 | 1967 | 10.5 | >1000 | Wireline bailer sample |
| 9 | 840582 | 07/09/2015 | 17:20 | 1,947-1,997 | 27.06 | 7.38 | 2242 | 12 | >1200 | Nested bailer sample |
| 10 | 840582 | 09/24/2015 | 15:45 | 1,020-1,047 | 26.98 | 7.63 | 657 | 6.3 | 122 | Wireline bailer sample |

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**Table M2.** Laboratory analyses results of the water quality samples collected during exploratory core drilling at the ROMP

[No., number; SID, station identification; MM/DD/YYYY, month/day/year; HH:MM, hours:minutes; ft, feet; bls, below land surface; SU, standard units; $Fe^{2+}$, iron; $Sr^{2+}$, strontium; Si, silica; $SiO_2$, silicon dioxide; $CaCO_3$, calcium carbonate]

| Water Quality Sample No. | Monitor Well SID No. | Date (MM/DD/YYYY) | Time (HH:MM) | Sample Interval (ft bls) | pH (SU) | Specific Conductance (µmhos/cm) | Major Anions | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | $Cl^{1-}$ (mg/L) | $SO_4^{2-}$ (mg/L) | $HCO_3^{1-}$ (mg/L) |
| 1 | 840582 | 10/09/2014 | 12:20 | 186 - 237 | 8.13[U, J] | 428.5 | 7.5 | 65.2 | 151.9 |
| 2 | 840582 | 10/23/2014 | 17:10 | 377 - 407 | 8.2[U, J] | 446.8 | 8.9 | 98.6 | 120.4 |
| 3 | 840582 | 01/22/2015 | 15:15 | 657 - 689 | 8.3[U, J] | 544 | 10.6 | 116 | 152.8 |
| 4 | 840582 | 02/18/2015 | 13:45 | 947 - 987 | 8.32[U, J] | 686 | 11.3 | 166 | 186.1 |
| 5 | 840582 | 03/17/2015 | 15:30 | 1,236-1,287 | 8.27[U, J] | 694 | 11.6 | 166 | 186.8 |
| 6 | 840582 | 04/14/2015 | 14:45 | 1,557-1,597 | 8.25[U, J] | 702.6 | 11.5 | 169 | 187.0 |
| 7 | 840582 | 06/11/2015 | 13:30 | 1,727-1,777 | 8.08[U, J] | 1,861.5 | 17.8 | 984 | 167.5 |
| 8 | 840582 | 06/24/2015 | 11:10 | 1,877-1,887 | 8.03[U, J] | 1,979.6 | 15.6 | 1080 | 156.8 |
| 9 | 840582 | 07/09/2015 | 17:20 | 1,947-1,997 | 8.13[U, J] | 2,251.2 | 22 | 1300 | 157.8 |
| 10 | 840582 | 09/24/2015 | 15:45 | 1,020-1,047 | 8.27[Q, N1] | 655.5 | 12.1 | 160 | 178.2 |
| 11 | 872383 | 04/20/2016 | 15:00 | 120-370 | 8.41[Q, N1] | 407.4 | 10.5 | 43.3 | 148.1 |

[U] The ion was analyzed for but not detected. Value is reported as the method detection limit.

[J] Estimated value, value not accurate.

[N1] Test is not NELAC certified by this laboratory. Certification was not requested.

[Q] Sample was held beyond holding time. Field pH is used in analyses due to a 15 minute holding time.

**Table M3.** The equivalent weight and percent equivalent weight for select ions and the water type for groundwater quality

[No., number; ft, feet; bls, below land surface; $Ca^{2+}$, calcium; $Mg^{2+}$, magnesium; $Na^{+}$, sodium; $K^{+}$, potassium; $HCO_3^{1-}$, bicarbonate; $Cl^{1-}$, chloride; $SO_4^{2-}$, sulfate; this site because hydroxyl ions are insignificant in groundwater and carbonate ions are typically not present if pH is less than 8.3 standard units (Hem, 1985); See

| Water Quality Sample No. | Sample Interval (ft bls) | Cations | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | $Ca^{2+}$ | | $Mg^{2+}$ | | $Na^{1+}$ | | K1+ | |
| | | meq/L | % | meq/L | % | meq/L | % | meq/L | % |
| 1 | 186-237 | 3.51 | 73.0 | 1.062 | 22.06 | 0.231 | 4.79 | 0.007 | 0.14 |
| 2 | 377-407 | 3.76 | 75.0 | 0.996 | 19.9 | 0.248 | 4.96 | 0.005 | 0.11 |
| 3 | 657-689 | 4.08 | 70.9 | 1.346 | 23.4 | 0.298 | 5.17 | 0.035 | 0.61 |
| 4 | 947-987 | 5.29 | 72.7 | 1.646 | 22.6 | 0.305 | 4.2 | 0.038 | 0.52 |
| 5 | 1,236-1,287 | 5.19 | 72.4 | 1.62 | 22.6 | 0.318 | 4.4 | 0.037 | 0.52 |
| 6 | 1,557-1,597 | 5.6 | 74.4 | 1.60 | 21.1 | 0.306 | 4.04 | 0.037 | 0.49 |
| 7 | 1,727-1,777 | 20.01 | 81.7 | 3.909 | 16.0 | 0.509 | 2.1 | 0.052 | 0.21 |
| 8 | 1,877-1,887 | 21.11 | 81.7 | 4.21 | 16.3 | 0.479 | 1.85 | 0.051 | 0.20 |
| 9 | 1,947-1,997 | 23.1 | 81.9 | 4.44 | 15.7 | 0.618 | 2.19 | 0.054 | 0.19 |
| 10 | 1,020-1,047 | 4.97 | 71.5 | 1.61 | 23.2 | 0.326 | 4.70 | 0.044 | 0.63 |

115 – Royal well site in Sumter County, Florida

µmhos/cm, micromhos per centimeter; $Cl^{1-}$, chloride; mg/L, milligrams per Liter; $SO_4^{2-}$, sulfate; $Ca^{2+}$, calcium; $Mg^{2+}$, magnesium; $Na^{+}$, sodium; $K^{+}$, potassium;

| Major Cations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $Ca^{2+}$ (mg/L) | $Mg^{2+}$ (mg/L) | $Na^{1+}$ (mg/L) | $K^{1+}$ (mg/L) | $Fe^{2+}$ (mg/L) | $Sr^{2+}$ (mg/L) | Si as $SiO_2$ (mg/L) | Total Dissolved Solids (mg/L) | Total Alkalinity $CaCO_3$ (mg/L) | Sample Collection Method/ Remarks |
| 70.4 | 12.9 | 5.3 | 0.82 | 0.0127 | 0.79 | 11.2 | 285[J] | 151.9 | Wireline bailer sample |
| 75.3 | 12.1 | 5.71 | 1.26 | 0.615 | 1.61 | 12 | 299[J] | 120.4 | Wireline bailer sample |
| 81.8 | 16.36 | 6.85 | 1.37 | 0.0376 | 2.23 | 13.8 | 352[J] | 152.8 | Wireline bailer sample |
| 106 | 20 | 7.02 | 1.48 | 0.455 | 2.43 | 13.7 | 452[J] | 186.1 | Nested bailer sample |
| 104 | 19.7 | 7.3 | 1.45 | 0.387 | 2.21 | 13.6 | 459[J] | 186.8 | Wireline bailer sample |
| 113 | 19.4 | 7.03 | 1.45 | 0.51 | 2.28 | 9 | 481[J] | 187.0 | Wireline bailer sample |
| 401 | 47.5 | 11.7 | 2.03 | 1.26 | 9 | 13 | 1670[J] | 167.5 | Wireline bailer sample |
| 423 | 51.1 | 11 | 2.01 | 2.29 | 9.61 | 12.7 | 1820[J] | 156.8 | Wireline bailer sample |
| 463 | 54 | 14.2 | 2.11 | 1.28 | 11.3 | 13.5 | 2160[J] | 157.8 | Nested bailer sample |
| 99.5 | 19.6 | 7.5 | 1.72 | 0.0317 | 2.245[N1] | 13.3[N1] | 461 | 178.2 | Wireline bailer sample |
| 65.2 | 9.35 | 5.96 | 1.4 | 0.0237 | 0.50[N1] | 11.0[N1] | 251 | 148.1 | Right-angle drive cooling water diversion |

samples collected during core drilling and testing at the ROMP 115 – Royal well site in Sumter County, Florida

meq/L, milliequivalents per liter; %, percent; total alkalinity is used as $HCO_3^{1-}$ because it is assumed $CO_3^{2-}$ and $H_2CO_3$ are negligible based on groundwater pH at tables M1 and M2 for sample site identification (SID) numbers]

| Anions | | | | | | |
|---|---|---|---|---|---|---|
| $HCO_3^{1-}$ | | $Cl^{1-}$ | | $SO_4^{2-}$ | | |
| meq/L | % | meq/L | % | meq/L | % | Water Type |
| 2.49 | 61.3 | 0.212 | 5.2 | 1.357 | 33.45 | Calcium Bicarbonate |
| 1.97 | 46.1 | 0.251 | 5.87 | 2.053 | 47.99 | Calcium Mixed Anion |
| 2.50 | 48.0 | 0.299 | 5.73 | 2.415 | 46.28 | Calcium Mixed Anion |
| 3.05 | 44.7 | 0.319 | 4.67 | 3.456 | 50.6 | Calcium Sulfate |
| 3.06 | 44.7 | 0.327 | 4.78 | 3.46 | 50.5 | Calcium Sulfate |
| 3.06 | 44.4 | 0.324 | 4.70 | 3.5 | 50.9 | Calcium Sulfate |
| 2.75 | 11.57 | 0.502 | 2.12 | 20.5 | 86.3 | Calcium Sulfate |
| 2.57 | 10.1 | 0.440 | 1.73 | 22.49 | 88.2 | Calcium Sulfate |
| 2.59 | 8.5 | 0.621 | 2.05 | 27.1 | 89.4 | Calcium Sulfate |
| 2.92 | 44.3 | 0.341 | 5.18 | 3.33 | 50.5 | Calcium Sulfate |

**Table M4.** Select molar ratios for groundwater quality samples collected during core dilling and testing at the ROMP 115 – Royal well site in Sumter County, Florida

[No., number; ft, feet; bls, below land surface; Cl1-, chloride; SO42-, sulfate; Ca2+, calcium; HCO31-, bicarbonate; Mg2+, magnesium; Na+, sodium; total alkalinity is used as HCO31- because it is assumed CO32- and H2CO3 are negligible based on groundwater pH at this site because hydroxyl ions are insignificant in groundwater and carbonate ions are typically not present if pH is less than 8.3 standard units (SU) (Hem, 1985): See tables M1 and M2 for sample site identification (SID) numbers]

| Water Quality Sample No. | Sample Interval (ft bls) | $Cl^{1-}:SO_4^{2-}$ | $Ca^{2+}:HCO_3^{1-}$ | $SO_4^{2-}:HCO_3^{1-}$ | $Ca^{2+}:Mg^{2+}$ | $Cl^{1-}:HCO_3^{1-}$ | $Na^{1+}:HCO_3^{1-}$ | $Na^{1+}:Cl^{1-}$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 186-237 | 0.31 | 0.71 | 0.27 | 3.3 | 0.08 | 0.09 | 1.09 |
| 2 | 377-407 | 0.24 | 0.95 | 0.52 | 3.77 | 0.13 | 0.13 | 0.99 |
| 3 | 657-689 | 0.2 | 0.81 | 0.48 | 3.03 | 0.12 | 0.12 | 1.00 |
| 4 | 947-987 | 0.18 | 0.87 | 0.57 | 3.21 | 0.10 | 0.10 | 0.96 |
| 5 | 1,236-1,287 | 0.19 | 0.85 | 0.56 | 3.20 | 0.11 | 0.10 | 0.97 |
| 6 | 1,557-1,597 | 0.18 | 0.92 | 0.57 | 3.53 | 0.11 | 0.10 | 0.94 |
| 7 | 1,727-1,777 | 0.05 | 3.64 | 3.73 | 5.12 | 0.18 | 0.19 | 1.01 |
| 8 | 1,877-1,887 | 0.04 | 4.11 | 4.37 | 5.02 | 0.17 | 0.19 | 1.09 |
| 9 | 1,947-1,997 | 0.05 | 4.47 | 5.23 | 5.20 | 0.24 | 0.24 | 1.00 |
| 10 | 1,020-1,047 | 0.20 | 0.85 | 0.57 | 3.08 | 0.12 | 0.11 | 0.96 |

**Table M1.** Field water quality readings during the aquifer performance tests conducted at the ROMP 115 – Royal well site in Sumter County, Florida

[MM/DD/YYYY, month/day/year; HH:MM, hours:minutes; µmhos/cm, micromhos per centimeter; °C, degrees Celsius; SU, standard units]

| Aquifer Preformance Test | Date (MM/DD/YYYY) | Time (HH:MM) | Specific Conductance (µmhos/cm) | Temperature (°C) | Sample Collection Method/Remarks |
|---|---|---|---|---|---|
| Upper Floridan aquifer | 04/18/2016 | 18:25 | 406 | 23.99 | Reading taken from right-angle drive cooling diversion |
| Upper Floridan aquifer | 04/18/2016 | 23:44 | 414 | 24.10 | Reading taken from right angle drive cooling diversion |
| Upper Floridan aquifer | 04/19/2016 | 6:16 | 412 | 23.81 | Reading taken from right angle drive cooling diversion |
| Upper Floridan aquifer | 04/19/2016 | 12:17 | 414 | 24.86 | Reading taken from right angle drive cooling diversion |

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