Southwest Florida
Water Management District

Hydrogeology, Water Quality, and Well Construction at the ROMP 38 – Parrish Well Site in Manatee County, Florida

Southwest Florida Water Management District
Geohydrologic Data Section

August 2023

Cover Photo: Well Site at the ROMP 38 – Parrish well site in Manatee County, Florida. Photograph by Michael T. Gates.

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By Kristina D. Mallams

August 2023

Southwest Florida Water Management District
Geohydrologic Data Section

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Suggested citation:
Mallams, K.D., 2023, Hydrogeology, Water Quality, and Well Construction at the ROMP 38 – Parrish Well Site in Manatee County, Florida: Southwest Florida Water Management District, 252 p.

The hydrogeologic evaluations and interpretations contained in *Hydrogeology, Water Quality, and Well Construction at the ROMP 38 – Parrish Well Site in Manatee County, Florida* have been prepared by or approved by a licensed Professional Geologist in the State of Florida, in accordance with Chapter 492, Florida Statutes.

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Date: Aug. 16, 2023

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 122 well sites and a coastal transect network composed of 24 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 oversees construction of monitor wells and performs aquifer testing activities for other District programs and projects. The broad objectives at each well site are to determine the hydrogeology, water quality, and hydraulic properties of the units present, and to install wells for long-term monitoring. Site activities include exploratory coring and testing, well construction, and aquifer performance testing. 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 for intended hydrologic targets. 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, hydrologic conditions reporting, and regulatory water use permitting.

M. Ted Gates

Manager

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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	4,047	square meter (m^2)
square foot (ft^2)	0.09290	square meter (m^2)
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
gallon (gal)	3.785	liter (L)
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 minute (gal/min)	0.06309	liter per second (L/s)
gallon per day (gal/d)	0.003785	cubic meter per day (m^3/d)
	Specific capacity	
gallon per minute per foot [(gal/min)/ft)]	0.2070	liter per second per meter [(L/s)/m]

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

°F=(1.8×°C)+32

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

°C=(°F-32)/1.8

Vertical coordinate information is referenced to the “North American Vertical Datum of 1988 (NAVD 88)."

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

Abbreviations and Acronyms

µmhos/cm	micromhos per centimeter
µg/L	micrograms per Liter
als	above land surface
Applied	Applied Drilling Engineering, Incorportated
Aq	aquifer
Avpk	Avon Park
bls	below land surface
bmp	below measuring point
Cannon	David Cannon Well Drilling, Incorporated
CGWQMN	Coastal Groundwater Quality Monitoring Network
cm	centimeter
CME	Central Mine Equipment
CPS	counts per second
District	Southwest Florida Water Management District
EDP	Environmental Data Portal
FGS	Florida Geological Survey
fig.	figure
Fldn	Floridan
ft.	foot or feet
gpm	gallons per minute
gpm/ft	gallons per minute per foot
HPZ	high-permeability zone
Huss	Huss Drilling, Incorporated
ID	inside diameter
Inc.	Incorporated
mg/L	milligrams per Liter
N/A	not applicable
NAVD 88	North American Vertical Datum of 1988
SDWRAP	Southern District Water Resources Assessment Project
No.	number
OD	outside diameter
Parrish	Parrish Well Drilling, Incorporated
PVC	polyvinyl chloride
Rowe	Rowe Drilling Company, Incorporated
SDR	Standard Dimension Ratio
SID	Station Identification
SU	Standard Unit
Surf	surficial
Swnn	Suwannee
SWUCA	Southern Water Use Caution Area
TDS	total dissolved solids
TIITF	Trustees of the Internal Improvement Trust Fund
U	Upper
WCP	well construction permit

Hydrogeology, Water Quality, and Well Construction at the ROMP 38 – Parrish Well Site in Manatee County, Florida

By Kristina D. Mallams

Introduction

The Southwest Florida Water Management District's (District) Geohydrologic Data Section conducted a hydrogeologic investigation at the Regional Observation and Monitor-well Program (ROMP) 38 – Parrish well site in Manatee County (fig. 1). The ROMP 38 – Parrish (herein referred to as ROMP 38) well site supports the Southern Water Use Caution Area (SWUCA), the Southern District Water Resource Assessment Project (SDWRAP) and infills a gap in the ROMP 10-mile grid network. The SWUCA was designated in 1992 to address declines in aquifer water levels induced by groundwater withdrawals for public supply, agriculture, mining, power generation, and recreational uses (Southwest Florida Water Management District, 2006). The SWUCA encompasses all DeSoto, Hardee, Manatee, and Sarasota counties and portions of Charlotte, Highlands, Hillsborough, and Polk counties. The SDWRAP is a long-term study within the SWUCA to determine the present and future impacts on the hydrogeologic system throughout the District for resource management purposes (Southwest Florida Water Management District, 1998). As part of the ROMP 10-mile grid network, this site will define the hydraulic properties of the aquifers and confining units and will monitor water quality and water levels. Additionally, this site was selected to determine the elevations of the saltwater/freshwater interface and the middle confining unit II in this region. The data collected at this well site will aid the District in making informed management decisions central to its core mission of balancing the water needs of current and future users while protecting and maintaining water and related natural resources. Four permanent monitor wells were constructed at this site. The data collected from these wells supports the District's mission by aiding in the refinement of the groundwater flow models used to evaluate future water supply, monitor long-term water quality and water level data, and establish minimum flow and level criteria.

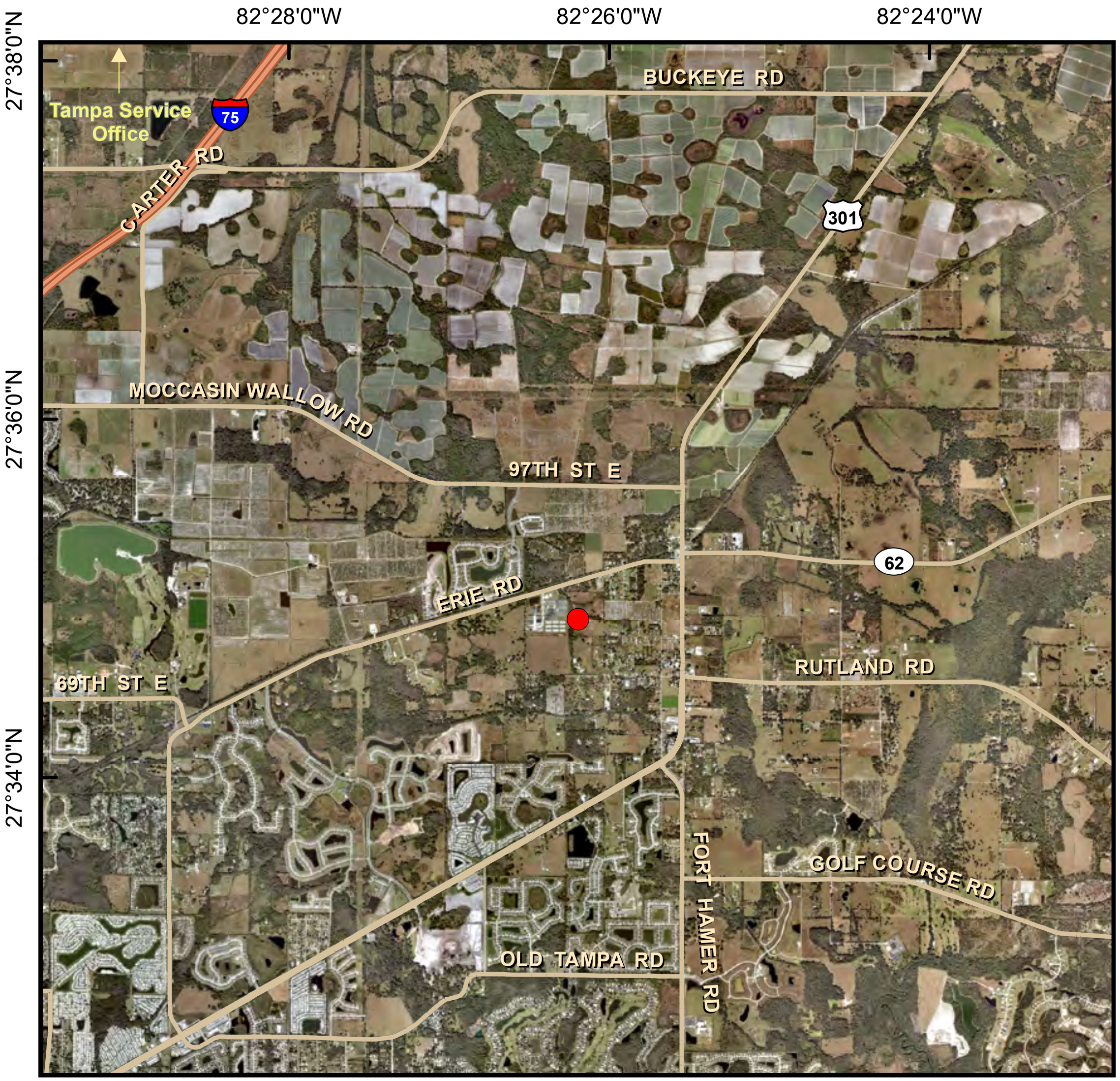
The ROMP 38 well site was developed in three phases: (1) exploratory core drilling and testing, (2) monitor well construction, and (3) aquifer performance testing. The exploratory core drilling and testing phase began at land surface on July 11, 2011, and ended at 1,600 feet below land surface (bls) on January 10, 2012, using the District's Central Mine Equipment (CME) 85 core drilling rig. Monitor well construction began on November 14, 2012, and was completed on April 11, 2013. Two aquifer performance tests (APTs) were conducted in the Upper Floridan aquifer from November through December 2014 and from October through November 2015. The purpose of this report is to present all the activities performed and the data collected at the well site during the three phases.

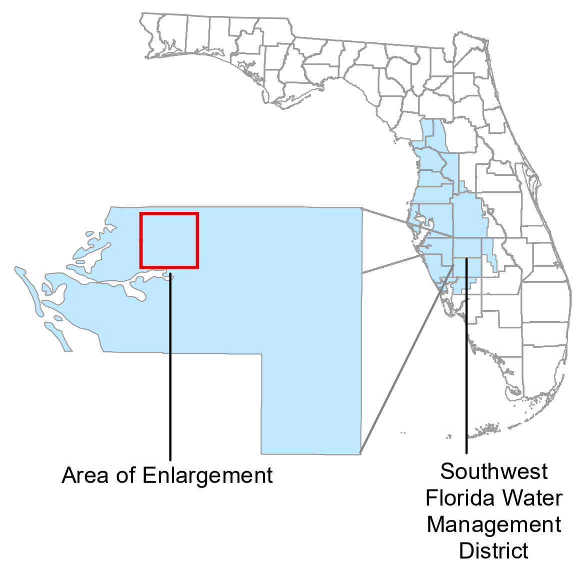
Site Location

The ROMP 38 well site is located on a parcel of land in northwestern Manatee County approximately 5 miles east of the Interstate-75/Interstate-275 southern interchange. The Little Manatee River is 5.6 miles to the north and the Manatee River is 4.4 miles to the south. It is in the southeast ¼ of the northeast ¼ of Section 30, Township 33 South, and Range 19 East at latitude 27° 34′ 52.02″ North and longitude 82° 26′ 11.13" West (fig. 1). The land surface elevation is approximately 36 feet above the North American Vertical Datum of 1988 (NAVD 88). Two vertical control stations (benchmark identifiers 786375 and 780144) were installed on and surveyed at the perpetual easement by District staff in May 2013 with elevations of 35.93 and 35.99 feet NAVD 88, respectively. The ROMP 38 well site consists of a 20-foot by 100-foot permanent well site granted by an easement agreement from Manatee County. The well site also consists of a 250-foot by 300-foot temporary construction area and an access road beginning at Erie Road and ending at the permanent easement access (fig. 2).

The ROMP 38 well site can be located by traveling south on U.S. Highway 301 from the District's Tampa Service Office. Merge onto the ramp to Orlando/Interstate-4 East. Drive east on Interstate-4 for 0.5 miles and merge onto the ramp to Interstate-75 south towards Naples. Drive south for 31 miles and take exit 229 towards Parrish. Continue east on Moccasin Wallow Road for 9 miles to the intersection of U.S. Highway 301 and Moccasin Wallow Road. Turn south onto U.S. Route 301 and continue for 0.5 miles. Turn west on Erie Road and continue for 0.8 miles. The access road entrance is on the south side of the road. Take the access road for 0.25 miles. The ROMP 38 well site is on the south side of the road.

The ROMP 38 well site is within the northeastern portion of the Peninsular Coastal Lowlands Province of the Peace River District in west-central Florida (Williams et al, 2022). Numerous rivers and streams occur in the Peace River District because of the low permeability sediments that underlie most





EXPLANATION

● ROMP 38 – Parish Well Site
Section/Township/Range: S30/T33S/R19E
Latitude: 27° 34' 52.02" N
Longitude: 82° 26' 11.13" W

Directions:

From the Tampa Service Office, travel south on U.S. Highway 301. Merge onto the ramp to Orlando/Interstate-4 East. Drive east on Interstate-4 for 0.5 miles and merge onto the ramp to Interstate-75 south towards Naples. Drive south for 31 miles and take exit 229 towards Parrish. Continue east on Moccasin Wallow Road for 9 miles to the intersection of U.S. Route 301 and Moccasin Wallow Road. Turn south onto U.S. Highway 301 and continue for 0.5 miles. Turn west on Erie Road and continue for 0.8 miles. The access road entrance is on the south side of the road. Take the access road for 0.25 miles. The ROMP 38 well site is on the south side of the road.

Base from Southwest Florida Water Management District digital orthophoto, 2014
NAD 1983 HARN StatePlane Florida West FIPS 0902 Feet Projection

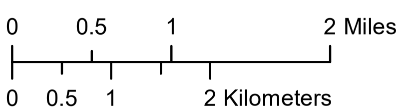


Figure 1. Location of the ROMP 38 – Parrish well site in Manatee County, Florida.

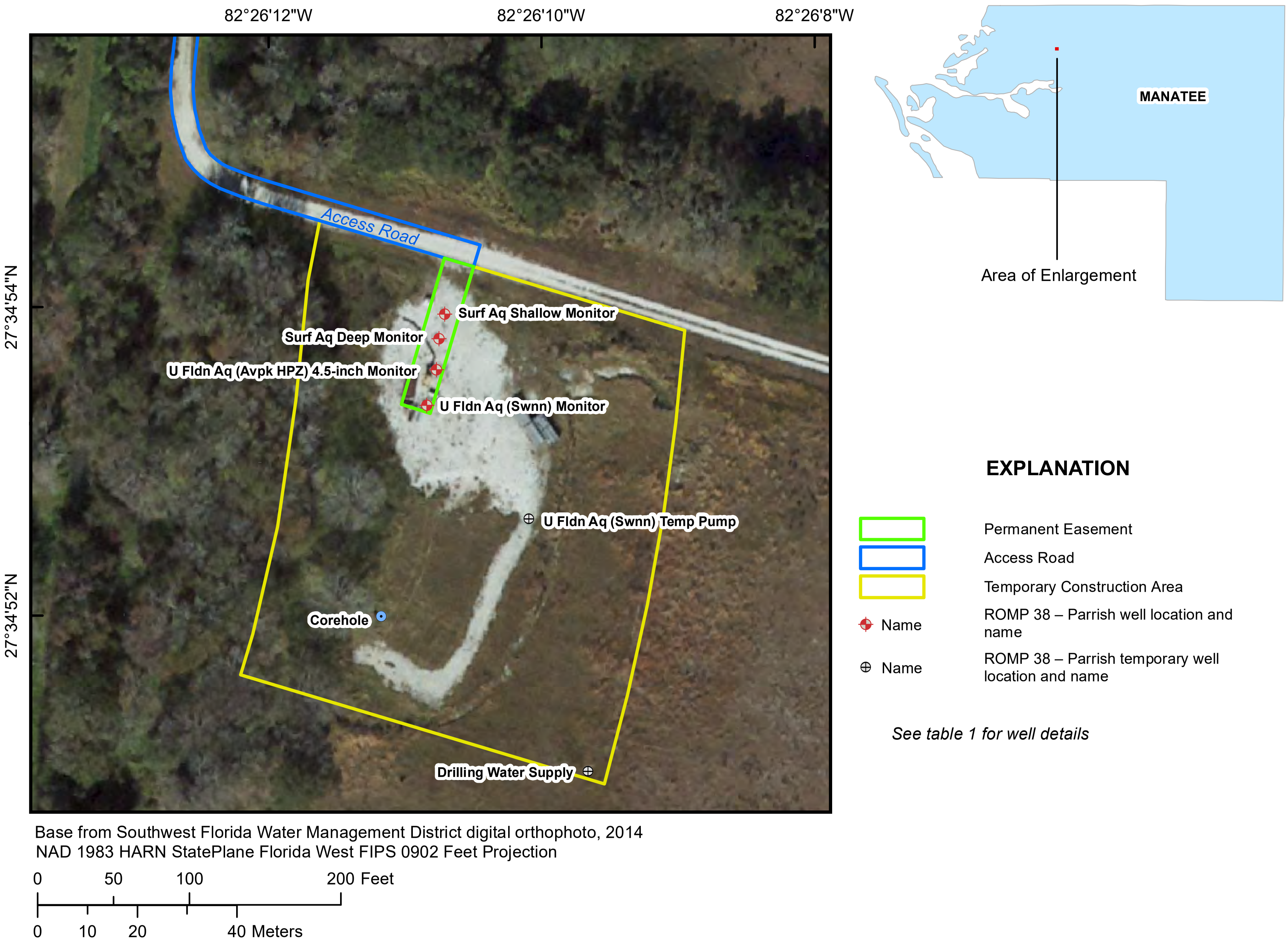


Figure 2. Well site layout for the ROMP 38 – Parrish well site in Manatee County, Florida.

of the district (Williams et al, 2022). The Peninsular Coastal Lowlands Province is located in the western part of the Peace River District. It includes western Hillsborough, western Manatee, most of Sarasota and Charlotte, southwestern DeSoto, and Glades counties, and northwesternmost Hendry County. The Peninsular Coastal Lowlands Province is relatively flat with inland low-elevation regions (Williams et al, 2022). The well site is about 5 miles west of the DeSoto Plain region and 10 miles east of the Gulf of Mexico, near the eastern boundary of the Tampa Bay Coastal Drainage Basin. The land use surrounding the well site is predominately cropland, pastureland, and low-density residential. The adjacent parcel to the west is a 17-acre field and container nursery operation.

Methods

During the construction of the ROMP 38 well site, a variety of hydrogeologic data was collected including lithologic, hydraulic, geophysical, and water quality data. After exploratory core drilling and testing, monitor wells and temporary pump test wells were constructed by private contract drilling contractors. The following sections provide the data collection method details specific to the ROMP 38 well site. Detailed descriptions of the data collection methods used by the Geohydrologic Data section are presented in appendix A. As of May 19, 2014, long-term water level and water quality data, well construction details, and survey information at this well site are available for download from the District's website: www.swfwmd.state.fl.us using the Environmental Data Portal (EDP) and the Advanced Metadata Retrieval application (accessed July 20, 2023). Data including well site reports, hydrostratigraphy and geophysical logs are available to view and download from the Geohydrologic Data Map Viewer: *https://swfwmd.maps.arcgis.com/apps/webappviewer/index.html?id=5cfe38abbae84d1fadfdf0953c3126bc* (accessed December 2022). APT data and slug test data will be available in the future.

Lithologic Sampling

Lithologic samples were collected from land surface to the total exploration depth of 1,600 feet bls by District staff using the District's CME 85 core drilling rig. On July 11, 2011, District staff used a post hole digger to dig a pilot hole from land surface to 3.75 feet bls in the core hole. Then, District staff conducted punch shoe sampling using mud to 70 feet bls, where dark greenish-gray clay prevented advancement. District staff switched to hydraulic-rotary core drilling using mud and cored to 100 feet bls. District staff set 4-inch HWT (4-inch inside diameter temporary steel casing) from land surface to 62 feet bls to prevent hole collapse. From July 18, 2011, to January 10, 2012, District staff resumed hydraulic-rotary core drilling using mud from 100 to 185 feet bls and water from 185 to 1,600 feet bls. Core samples were continuously collected and retrieved in 10-foot intervals using a wireline recovery system. The lithologic samples were boxed, labeled, described, and transported to the Florida Geological Survey (FGS) for further analysis and storage.

Hydraulic Testing

Hydraulic properties were estimated from 11 slug test suites performed during exploratory core drilling and testing. Testing began after core drilling through the unconsolidated Quaternary sediments, the Peace River Formation, and the upper portion of the undifferentiated Arcadia Formation. An off-bottom packer was used to isolate the discrete intervals of the core hole during slug testing. The packer was deployed with varying depths of 35 to 55 feet from the bottom of the core hole. All slug tests were conducted as rising-head tests initiated with a pneumatic (air) slug. The drill rods were temporarily sealed, and a slug of air was introduced to temporarily lower the hydraulic head (water level) in the discrete test interval and then released. The water level in the test interval was measured with a pressure transducer and recorded on a data logger as it returned to static conditions. Slug test data were analyzed to estimate the horizontal hydraulic conductivity (herein referred to as hydraulic conductivity) of the isolated test intervals. Two constant-rate APTs were conducted at the ROMP 38 well site to estimate the large-scale hydraulic properties of the Upper Floridan aquifer. The composite water level in the core hole (not isolated) and the Drilling Water Supply well were measured daily using a Solinst electronic water level meter before core drilling continued. Rainfall data were collected daily with a manual rain gauge. During reverse-airlift development of the core hole between coring runs, (every 10 to 90 feet of core hole advancement), the discharge flow rates were measured using a settling tub equipped with a V-notch weir to monitor relative changes in formation permeability. Apparent permeability was estimated based on the drilling discharge rate using the following scale: 5 to 15 gallons per minute (gpm) is very low, 16 to 25 gpm is low, 26 to 35 gpm is moderately low, 36 to 45 gpm is moderately high, 46 to 55 gpm is high, and greater than 55 gpm is very high.

Water Quality Sampling

Thirteen groundwater samples were collected during exploratory core drilling and testing and during the Suwannee Limestone portion of the Upper Floridan APT. These groundwater samples were collected from discrete intervals isolated by the off-bottom packer before or after conducting the slug test suites in the core hole. Eleven water quality samples were collected from the surface discharge and one water quality sample was collected with a nested bailer. One groundwater sample was collected from the discharge pipe during the Suwannee Limestone portion of the Upper Floridan APT. A portion of each sample was analyzed in the field for temperature, specific conductance, pH, chloride, and sulfate. The remainder of each sample was then processed and delivered to the District's Chemistry Laboratory for further analysis

(Southwest Florida Water Management District, 2020). The core hole was purged clean by reverse airlifting between each core run to remove fine cuttings. During these purges, field readings of specific conductance, temperature, and pH were monitored from the drilling discharge to monitor relative changes in water quality. Groundwater sampling was consistent with the Water Quality Monitoring Program's Standard Operating Procedures (Water Quality Monitoring Program, 2020).

Geophysical Logging

Borehole geophysical logs are used to help delineate stratigraphic units, identify permeable zones and confining units, characterize water quality, and help determine well casing points and grouting requirements. Borehole geophysical logging was performed by District staff 16 times at varying intervals from land surface to 1,600 feet bls at the ROMP 38 well site using District-owned Century® down-hole geophysical logging equipment (table 1 and appendix B). The first suite of logs was performed on July 20, 2011, after the Drilling Water Supply well was constructed. The 9165C caliper/gamma-ray was run from land surface to 339.5 feet bls to verify the final casing depth and total depth of the well. The next five suites of logs were performed on the core hole. The second suite of logs was performed on July 26, 2011, using the multifunction and the caliper/gamma-ray tools. The multifunction tool collected data from 1-foot to 141.3 feet bls and the caliper/gamma-ray tool collected data from 1-foot to 137.5 feet bls. The third suite of logs was performed on August 30, 2011, with the multifunction and the caliper/gamma-ray tools. The multifunction tool collected data from 1-foot to 490.6 feet bls, and the caliper/gamma-ray tool collected data from 1-foot to 490.4 feet bls. The fourth suite of logs was performed on January 19, 2012, after core drilling and testing were complete. The slim hole induction tool collected data from inside the steel core rods (2.38-inch NQ) from land surface to 1,601.7 feet bls. Only the gamma-ray data from the induction tool were valid inside the steel casing. After tripping the rods out of the core hole, the fifth suite of logs collected data from the open core hole on January 23, 2012, using the multifunc-

Table 1. Summary of geophysical logs collected at the ROMP 38 – Parrish well site in Manatee County, Florida

[MM/DD/YYYY, month/day/year; ft, feet; bls, below land surface; PVC, polyvinyl chloride; U Fldn Aq, Upper Floridan aquifer; Avpk, Avon Park; HPZ, high-permeability zone; Swnn, Suwannee; Sch., Schedule; SDR, Standard Dimension Ratio; well locations are shown in figure 2, geophysical logs are in appendix B; multifunction tool includes natural gamma, 16-inch short-normal resistivity, 64-inch long-normal resistivity, fluid resistivity, spontaneous potential, single-point resistance, and temperature]

Date (MM/DD/YYYY)	Station Name	Log Interval (ft bls - ft bls)	Casing Type	Casing Depth (ft bls)	Borehole Diameter (inches)	Tool Type	Tool Number
07/20/2011	ROMP 38 Drilling Water Supply	0 - 339.5	Sch. 40 PVC	156	5	caliper / gamma-ray	9165C
07/26/2011	ROMP 38 Corehole	1 - 141.3; 1 - 137.5	Steel	0	3	multifunction; caliper / gamma-ray	8144C / 9165C
08/30/2011	ROMP 38 Corehole	1 - 490.6; 1 - 490.4	Steel	180	4	multifunction; caliper / gamma-ray	8144C / 9165C
01/19/2012	ROMP 38 Corehole	5.3 - 1,601.7	Steel	1,600	3	induction	9060C
01/23/2012	ROMP 38 Corehole	1,314.4 - 1,546.8	Steel	0	3	multifunction	8044C
03/06/2012	ROMP 38 Corehole	0 - 1,184.3	Steel	450	6	caliper / gamma-ray	9165C
01/22/2013	ROMP 38 U Fldn Aq (Avpk HPZ) Monitor	0 - 916	Steel	399	16	multifunction; caliper / gamma-ray	8144C / 9165C
02/19/2013	ROMP 38 U Fldn Aq (Avpk HPZ) Monitor	876.8 - 1,204; 0 - 1,204	Steel	912	10	multifunction; caliper / gamma-ray	8144C / 9165C
03/28/2013	ROMP 38 U Fldn Aq (Swnn) Monitor	0 - 643.2	Sch. 40 PVC	425	6	caliper / gamma-ray	9165C
08/28/2013	ROMP 38 Drilling Water Supply	0 - 339.6	Sch. 40 PVC	156	5	caliper / gamma-ray	9165C
01/06/2016	ROMP 38 U Fldn Aq (Avpk HPZ) Monitor	890 - 1,214	Steel	910	10	caliper / gamma-ray	9165C
05/24/2016	ROMP 38 U Fldn Aq (Avpk HPZ) 4.5-inch Monitor	0 - 1,196	SDR 17 PVC	1,110	4.5	caliper / gamma-ray	9165C

tion logging tool. As the multifunction tool was run from 1,546.8 feet bls to land surface, it was obstructed in the open core hole at 1,314.4 feet bls. Data collection stopped while the drilling staff retrieved the tool from the core hole, resulting in limited data. The remaining data (from land surface to 1,314.4 feet bls) was collected during the construction of the *U Fldn Aq (Avpk HPZ) Monitor* well. The last geophysical log collected from the core hole was performed on March 6, 2012, after the core hole was back-plugged from 1,546 to 1,184.3 feet bls. Data were collected using the caliper/gamma-ray tool from land surface to 1,184.3 feet bls.

The next two suites of logs were collected from the Upper Floridan aquifer (Avpk HPZ) Monitor well. On January 22, 2013, data were collected from land surface to 916 feet bls, using the multifunction and caliper/gamma-ray tools before installing the final 10-inch casing. On February 19, 2013, the multifunction and caliper/gamma-ray tools collected data from 876.8 to 1,204 feet bls, and from land surface to 1,204 feet bls, respectively, after well completion of the Upper Floridan aquifer (Avpk HPZ) Monitor well.

On March 28, 2013, the caliper/gamma-ray tool collected data from land surface to 643.2 feet bls after the well completion of the Upper Floridan aquifer (Swnn) monitor.

On August 28, 2013, the caliper/gamma-ray tool collected data from land surface to 339.6 feet bls at the Drilling Water Supply well. The data were used to estimate the core hole volume before District staff back-plugged the Drilling Water Supply well from 340 to 280 feet bls.

On January 6, 2016, data were collected at the Upper Floridan aquifer (Avpk HPZ) Monitor well from 890 to 1,214 feet bls, using the caliper/gamma-ray tool. The data were collected in preparation to install a Standard Dimension Ratio (SDR) 17 PVC liner in the monitor well. After the liner was installed, the caliper/gamma-ray tool was used to collect data from land surface to 1,196 feet bls in the U Fldn Aq (Avpk HPZ) 4.5-inch Monitor well on May 24, 2016. The data were used to confirm the total depth of the liner.

Well Construction

The ROMP 38 well site consists of four permanent monitor wells located on the permanent easement (fig. 2). Permanent monitor wells (Station Names *italicized* herein refer to table 2) were constructed in the surficial aquifer (*Surf Aq Shallow Monitor* and *Surf Aq Deep Monitor*), and in the Upper Floridan aquifer (*U Fldn Aq [Swnn] Monitor*, and *U Fldn Aq [Avpk HPZ] Monitor*, which was later modified to the *U Fldn Aq [Avpk HPZ] 4.5-inch Monitor*). Two temporary wells were constructed on the temporary construction easement: the *Drilling Water Supply* and the *U Fldn Aq (Swnn) Temp Pump* wells. All temporary wells were plugged after testing was completed. The District contracted Parrish Well Drilling, Inc. (Parrish), Huss Drilling, Inc. (Huss), Applied Drilling Engineering, Inc. (Applied), David Cannon Well Drilling, Inc. (Cannon), and Rowe Drilling Company, Inc. (Rowe) to perform well construction and abandonments at the well site. A summary of the well construction details is presented in table 2 and well as-built diagrams are presented in appendix C. 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 Environmental Data Portal (EDP) and the Advanced Metadata Retrieval application.

From July 12 to 19, 2011, Cannon constructed the *Drilling Water Supply* on the temporary construction area. The *Drilling Water Supply* well was used as a temporary water supply during exploratory core drilling and well construction activities. The total depth of the well was 340 feet bls, with a 5-inch Schedule 40 PVC casing installed from 2 feet als to 156 feet bls (table 2, and appendix C, fig. C1). The majority of the open interval was open to the upper Arcadia aquifer and the underlying confining unit, but water level data collected during core drilling suggests the bottom of the well may have been connected to the Upper Floridan aquifer. The water levels presented in Figure 4 show the Drilling Water Supply well and the core hole composite water levels begin to align past 340 feet bls. On April 17, 2015, the *Drilling Water Supply* well was back-plugged from 340 to 280 feet bls by District staff and was used as an *upper Arcadia aquifer observation* well for the Suwannee Limestone portion of the Upper Floridan APT. After testing was complete, the well was plugged by Huss on May 17, 2016.

On July 11, 2011, District staff began exploratory core drilling and testing in the core hole on the temporary easement using the CME 85 core drilling rig. From August 31 to October 5, 2011, District staff installed 10-inch steel surface casing from land surface to 74 feet bls, 6-inch steel casing from land surface to 450 feet bls and advanced the HWT temporary steel casing to 490 feet bls in the core hole to prevent hole collapse. On October 26, 2011, District staff lowered the HWT temporary steel casing to 573 feet bls because it came loose and slipped down the core hole. Exploratory core drilling and testing continued to a depth of 1,600 feet bls (appendix C, fig. C2). After exploratory core drilling and testing, District staff back-plugged the core hole from 1,600 to 1,200 feet bls and inflated a wire line packer at 900 feet bls to isolate the Avon Park high-permeability zone. This allowed the core hole to be used as an observation well for the Avon Park high-permeability zone of the Upper Floridan APT (appendix C, fig. C3). In April 2015, Huss back-plugged the core hole from 1,200 to 648 feet bls and it was used as an observation well for the Suwannee Limestone portion of the Upper Floridan APT (appendix C, fig. C4). Following project completion, the core hole was plugged by District staff from January 8 to 13, 2016.

From November 29, 2012, through February 18, 2013, Rowe constructed the *U Fldn Aq (Avpk HPZ) Monitor* well on the permanent easement (appendix C, fig. C5). The *U Fldn Aq (Avpk HPZ) Monitor* well was used as a temporary pumped well during the Avon Park high-permeability zone portion of the Upper Floridan APT (*U Fldn Aq [Avpk HPZ] Temp Pump*).

After the 20-inch surface casing was installed, a 19-inch nominal hole was drilled to 441 feet bls. During the installation of the intermediate 16-inch steel casing, Rowe experienced difficulties getting the casing past 399 feet bls. After multiple attempts, the 16-inch casing was successfully installed at 399 feet bls. The final 10-inch steel casing was installed as a back-off casing, from 369 to 910 feet bls. The purpose of backing off the 10-inch final casing was to accommodate the 10-inch line shaft during the Avon Park Formation portion of the Upper Floridan APT. After completion of both Upper Floridan APTs, Huss lined the *U Fldn Aq (Avpk HPZ) Monitor* well with 4.5-inch standard dimension ratio (SDR) 17 casing for long-term monitoring (appendix C, fig. C6). The *U Fldn Aq (Avpk HPZ) Monitor* well was assigned a new Station ID (SID) number and renamed *U Fldn Aq (Avpk HPZ) 4.5-Inch Monitor* well due to the considerable modification of the well.

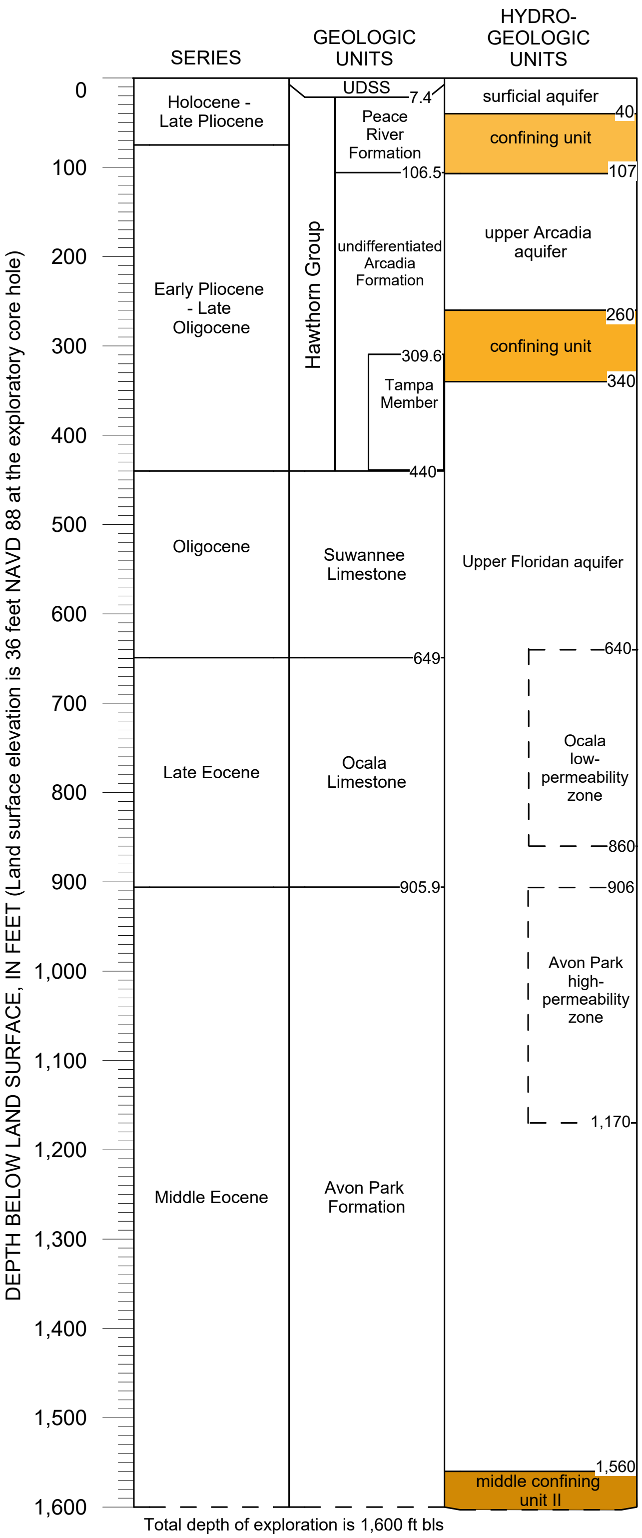
From March 4 through March 26, 2013, Applied constructed the *U Fldn Aq (Swnn) Monitor* well on the permanent easement (appendix C, fig. C7). This well was used as an observation well during the Avon Park Formation portion of the Upper Floridan APT.

On April 11, 2013, Huss constructed the *Surf Aq Deep Monitor* well and the *Surf Aq Shallow Monitor* well on the permanent easement (appendix C, figs. C8 and C9). Until November 2021, the *Surf Aq Deep Monitor* well was identified as the Peace River Monitor well. Further discussion in the Hydrogeology section of this report will provide additional information.

Table 2. Summary of well construction details at the ROMP 38 – Parrish well site in Manatee County, Florida

[SID, station identification; ft, feet; bls, below land surface; MM/DD/YYYY, month/day/year; WCP, well construction permit; U, Upper; Fldn, Floridan; Aq, aquifer; Swnn, Suwannee; Avpk, Avon Park; HPZ, high-permeability zone; PVC, polyvinyl chloride; ROMP, Regional Observation and Monitor-well Program; Temp, temporary; SDR 17, Standard Dimension Ratio 17; Sch. 40, Schedule 40; well locations are shown in figure 2, well as-builts are in appendix C]

SID	Station Name	Alternate Name	Open Interval (ft bls - ft bls)	Casing Type	Casing Diameter (inches)	Constructed By	Start Date (MM/DD/YYYY)	Complete Date (MM/DD/YYYY)	Status	WCP(s)
786375	ROMP 38 Drilling Water Supply	Upper Arcadia aquifer Ob well	156-340	Sch. 40 PVC	5	Cannon, District, Huss	07/12/2011	07/19/2011, 04/17/2015	Inactive	814003, 842057, 849447
780144	ROMP 38 Corehole	ROMP 38 U Fldn Aq (Swnn) Temp Ob well, ROMP 38 U Fldn Aq (Avpk HPZ) Temp Ob well	450-1,600	Steel	6	District, Huss	07/11/2011	01/10/2012	Inactive	814147, 841995, 817440, 847317
833274	ROMP 38 U Fldn Aq (Avpk HPZ) Monitor	U Fldn Aq (Avpk HPZ) Temp Pump	910-1,200	Steel	10	Rowe	11/29/2012	02/18/2013	Inactive	825125
833271	ROMP 38 U Fldn Aq (Swnn) Monitor		425-640	Sch. 40 PVC	6	Applied	03/04/2013	03/26/2013	Active	837322
833361	ROMP 38 Surf Aq Deep Monitor		15-40	Sch. 40 PVC	6	Huss	04/11/2013	04/11/2013	Active	828057
833360	ROMP 38 Surf Aq Shallow Monitor		2-5	Sch. 40 PVC	6	Huss	04/11/2013	04/11/2013	Active	828058
857425	ROMP 38 U Fldn Aq (Swnn) Temp Pump		420-640	Steel	8	Parrish	09/16/2015	09/21/2015	Inactive	845696, 847319
863048	ROMP 38 U Fldn Aq (Avpk HPZ) 4.5-Inch Monitor		1,100-1,200	SDR 17 PVC	4.5	Huss	03/01/2016	05/17/2016	Active	849449



[NAVD 88, North American Vertical Datum of 1988; UDQS, Undifferentiated Quaternary Sediments]

Figure 3. Stratigraphic column detailing the hydrogeologic setting at the ROMP 38 – Parrish well site in Manatee County, Florida.

From September 16 through 21, 2015, Parrish constructed the *U Fldn Aq (Swnn) Temp Pump* well on the temporary construction easement (appendix C, fig. C10). This well was used as the pumped well during the Suwannee Limestone portion of the Upper Floridan APT and was plugged by District staff on January 20, 2016, after project completion.

Geology

The lithostratigraphy of the ROMP 38 well site is based on lithologic samples collected by post-hole digging from land surface to 3.75 feet bls, punch-shoe sampling from 3.75 to 70 feet bls, and by hydraulic rotary core drilling from 70 to 1,600 feet bls. The geologic units encountered at the well site include, in ascending order: the Avon Park Formation, the Ocala Limestone, the Suwannee Limestone, the Tampa Member of the Arcadia Formation, the undifferentiated Arcadia Formation, the Peace River Formation, and the undifferentiated sand, clay, and shell sediments. A stratigraphic column detailing the hydrogeology encountered at the well site is presented in figure 3. The lithologic log described by the FGS in 2012 is presented in appendix D. Digital photographs of the lithologic core samples are presented in appendix E.

Avon Park Formation (Middle Eocene)

At the ROMP 38 well site, the Avon Park Formation extends from 905.9 feet to beyond the total depth of exploration of 1,600 feet bls. The contact between the Avon Park Formation and the overlying Ocala Limestone is disconformable (Chen, 1965 and Arthur et al., 2008) and is easily identified at this location. The top of the Avon Park Formation is based on the disappearance of the foraminifera *Nummulites vanderstoki* and *Lepidocyclina ocalana*, index fossils characteristic of the Ocala Limestone, and the appearance of *Neolaganum dali* echinoid fossil, an index fossil of the Avon Park Formation (Arthur et al, 2008). A gamma-ray count increase at about 910 feet bls and subsequent higher background counts compared to the Ocala Limestone is also characteristic of the top of the Avon Park Formation (Arthur et al, 2008; Tihansky and Knochenmus, 2001) (appendix B, fig. B1).

At the ROMP 38 well site, the lithology of the upper portion of the Avon Park Formation (905.9 to 995.5 feet bls) is a combination of limestone (51 percent) and dolostone (49 percent). The limestone beds range from very light orange to grayish orange packstone, wackestone, and mudstone, with packstone being dominant. Accessory minerals include organics, dolomite, calcite, and spar crystals. Induration is moderate. Observable porosity, based on visual inspection of the core, is intergranular, ranging from 5 to 18 percent, with an average of 8 percent. Secondary porosity in the form of fractures begins to appear starting at 909.6. The apparent permeability, based on the measured core hole purge discharge rate, is low, based on the measured core hole purge discharge rate of 21 gpm. The dolostone alteration within this interval is high to complete, containing subhedral and anhedral crystallinity. The limestone and dolostone are fossiliferous and contain molds and fragments of benthic foraminifera, including cones, echinoids, and mollusks. Some of the echinoid molds within this segment are believed to be *Neolaganum dali*.

From 995.5 feet to 1,600 feet bls, dolostone with moderate to good induration dominates the rock type (95 percent). Gypsum, interstitial gypsum, and gypsum filled pinpoint vugs and nodules begin to appear within the dolostone from 1,560 to 1,600 feet bls. The formation transitions from moderate yellowish brown to grayish brown and grayish orange with depth. Grain size becomes finer with depth, suggesting sea regression during deposition. Dolomite alteration ranges from high to complete with anhedral and subhedral crystallinity. Induration is moderate to good. The observable porosity, based on visual inspection of the core, is primarily intergranular, with thin layers of pin-point vugs and intercrystalline porosity throughout. From 906 to 1,170 feet bls, a large interval of fractured rock was identified, increasing the average discharge rate to 37.5 gpm. The resistivity logs in appendix B, figure B2 show an increase in resistance between 1,345 to 1,450 feet bls in response to the complete dolomitization (90 to 100 percent altered) of the rock and a dolomitic cement. Accessory minerals include organics, calcite, calcilutite, and quartz. The average core recovery of the Avon Park Formation was 90 percent.

Ocala Limestone (Late Eocene)

The Ocala Limestone extends from 649 to 905.9 feet bls at the ROMP 38 well site. The Ocala Limestone disconformably overlies the Avon Park Formation (Arthur and others, 2008). The contact between the Ocala Limestone and the overlying Suwannee Limestone is based on decreased core recovery and an increase of fossiliferous wackestone and mudstone with well to moderate induration. The first occurrence of limestone containing the benthic foraminifera *Nummulites vanderstoki* was observed at 710 feet bls and *Lepidocyclina ocalana* at 750 feet bls. These fossils are characteristic of the Ocala Limestone (Miller, 1986; Arthur and others, 2008).

The general lithology of the Ocala Limestone at this location consists of very light orange to grayish orange, fossiliferous, chalky, moderate to well-indurated wackestone and mudstone. The grain size of the limestone is predominately microcrystalline. Observable porosity ranges from 1 to 20 percent (6 percent average) and is intercrystalline and intergranular. A sharp transition to dolostone starts at 870 feet bls. The grayish brown to moderate yellowish brown dolostone is completely altered from limestone and has good induration. The porosity is intercrystalline to moldic and based on the measured core hole purge, the apparent permeability is very low, with an average purge discharge rate of 14.5 gpm. The gamma-ray log shows reduced activity compared to the underlying Avon Park Formation because there is less organic material within the Ocala Limestone (appendix B, figs. B3 and B5, and appendix D). The average core recovery in the Ocala Limestone was 79 percent.

Suwannee Limestone (Oligocene)

At the ROMP 38 well site, the Suwannee Limestone extends from 440 to 649 feet bls. The contact between the Suwannee Limestone and the overlying Tampa Member of the Arcadia Formation is gradational and difficult to distinguish based on lithologic characteristics at this site (appendix D). The disappearance of siliciclastics and phosphatic packstone and wackestone marks the top of the Suwannee Limestone. In response to the disappearance of phosphates in the Suwannee Limestone, reduced gamma-ray activity is observed at the top of the formation (appendix B, fig. B4). The unit consists of fossiliferous, interbedded, and laminated limestone that is very light orange to grayish brown. Grainstone and packstone with medium grain size are observed at the top of the formation and transition to wackestone and mudstone with fine to microcrystalline grain size with depth. The sediments getting coarser with depth suggests the deposition processes occurred during the Oligocene sea regression. Induration is good throughout much of the formation. Mollusks and foraminifera, such as cones and miliolid fragments and molds, were observed throughout the formation. *Sorites sp.* was identified in the core between 474.9 and 476.7 feet bls. *Sorites sp.* is identified as an index fossil of the Miocene Epoch, which suggests this fossil may have fallen from the formation above. The observed porosity ranges from less than 1 percent to 25 percent (the average is 6 percent) and is intergranular and moldic. The apparent permeability, based on the measured core hole purge discharge rate is low, with an average purge discharge rate of 17 gpm. The higher porosity percentage was observed near the top of the unit. The approximate core recovery of the Suwanee Limestone was 70 percent.

Hawthorn Group (early Pliocene to late Oligocene)

The Hawthorn Group extends from 7.4 to 440 feet bls at the ROMP 38 well site. The Hawthorn Group unconformably overlies the Suwannee Limestone (Arthur and others, 2008). In west-central Florida, the Hawthorn Group consists of several formations and formational members. At the ROMP 38 well site, the formations and members encountered are, in ascending order: the Tampa Member of the Arcadia Formation, the undifferentiated Arcadia Formation, and the Peace River Formation.

The Tampa Member of the Arcadia Formation extends from 309.6 to 440 feet bls. The top of the member is marked by a decrease in phosphatic content and corresponds to a decrease in gamma-ray response (appendix B, figs. B1 and B5). The lithology is predominantly very light orange to grayish brown, moderate to well indurated packstone to wackestone with dolostone and mudstone beds. The limestone porosity ranges from 1 to 10 percent and has an average of 5 percent. Apparent permeability based on core hole discharge was not measured within the Tampa Member of the Arcadia Formation. Porosity is primarily intergranular and moldic. Quartz sand is an accessory mineral and ranges from 3 to 40 percent from 310 to 424 feet bls. The limestone within the Tampa Member contains fossil molds, mollusks, fossil fragments, and benthic foraminifera remnants. Between 329.3 and 347.3 feet, fossils and fossil fragments of *Sorites sp.* and *Archaias sp.* were identified within the core. The average core recovery within the Tampa Member was 90 percent.

The undifferentiated Arcadia Formation extends from 106.5 to 309.6 feet bls. The term undifferentiated Arcadia is used to describe the Arcadia Formation where the Nocatee and Tampa Members are absent (Scott, 1988). The Nocatee Member was not present at the ROMP 38 well site. The top of the undifferentiated Arcadia Formation is marked by a sharp transition from sand, clay, and silt to moderately indurated, highly altered dolostone containing 20 percent phosphatic sands. A thin bed of phosphatic and quartz sand in micritic matrix was identified from 110.8 to 111 feet bls. The remaining lithology is predominantly highly altered dolostone that is very light orange to grayish brown with intergranular and intercrystalline porosity. The observed porosity ranges from 1 to 15 percent, having an average of 4 percent. The gamma-ray response is active between 170 to 302 feet bls (appendix B, fig. B6). Clay and phosphatic sands are abundant within the core samples, ranging from 2 to 35 percent. The formation contains an assortment of fossil molds and fossil fragments, and large echinoids and mollusk molds were identified at 229 feet bls. At the base of the undifferentiated Arcadia Formation, a 1.6-foot bed of very light orange to moderate dark gray fossiliferous chert was identified. The average core recovery within the undifferentiated Arcadia Formation was 77 percent.

The Peace River Formation extends from 7.4 to 106.5 feet bls. The top of the unit is delineated by the first appearance of phosphatic sand and gravel within the sand and clay. A sharp increase in gamma-ray activity can be seen at the top of this interval in appendix B, figs. B3 and B5. The lithology of the Peace River Formation is primarily grayish brown, medium to fine grained phosphatic sand, with increasing clay and silt beds with depth. Phosphatic sand content ranges from 1 to 35 percent. Silicic and dolomitic cement and clay form the matrix. Induration decreases with depth. Intergranular porosity was observed throughout most of the Peace River Formation. From 89.5 to 100 feet bls, olive gray to light olive gray dolomitic clay containing trace minerals of pyrite and sulfur was identified. Very few fossils were identified within the Peace River Formation. Phosphatized fossils and fragments were identified from 3.9 to 5.2 feet bls and from 101 to 106 feet bls. The porosity observed within the Peace River Formation is intergranular and ranges from less than one percent up to 15 percent (having an average of 5 percent). The average core recovery in the Peace River Formation was 56 percent.

Undifferentiated Sand, Clay, and Shell Sediments (Pleistocene-Holocene)

At the ROMP 38 well site, the undifferentiated sand, clay, and shell sediments are present from land surface to 7.4 feet bls. These sediments are composed of brownish gray, poorly indurated sand with accessory minerals of clay, organics, and shell fragments. The sand grains are medium to fine and are angular to rounded in shape. The source of porosity is intergranular. Clay and organic minerals are present as grains and within the matrix. The clay percentage within this interval ranges from 3 to 5 percent. Organic material makes up 5 percent of the lithology at land surface and decreases with depth. Shell minerals were observed near the bottom of the undifferentiated sand, clay, and shell sediments estimated at 5 percent. Highly weathered white phosphate grains were present from 3.1 to 3.75 feet bls. The recovery using a post hole digger was 100 percent in the undifferentiated sand, clay, and shell sediments.

Hydrogeology

The hydrogeologic units at the ROMP 38 well site were delineated based on the results of 12 slug tests collected during exploratory core drilling and testing, as well as from APTs, lithologic descriptions, water levels, water quality data, discharge flow rates, and geophysical log data. The hydrogeologic units include, in descending order: the surficial aquifer, a confining unit, the upper Arcadia aquifer, a confining unit, the Upper Floridan aquifer, and the middle confining unit II (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 (North American Commission on Stratigraphic Nomenclature, 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.

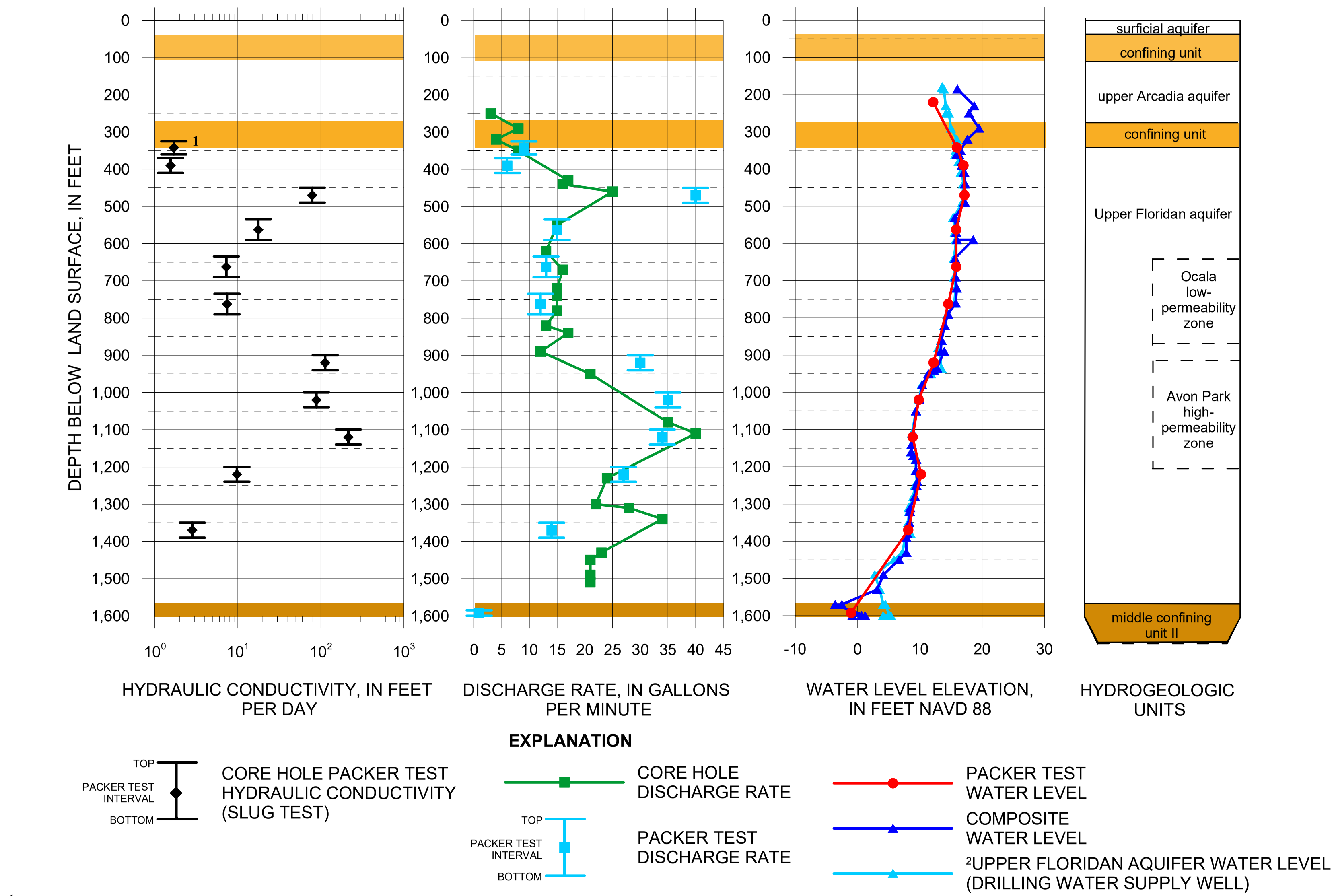
As discussed in appendix A, the hydraulic conductivity estimates obtained from slug testing may be underestimated because of unavoidable sources of testing error and limitations of the analyses (Butler, 1998). Consequently, the values should be used as an approximation of the relative differences between permeable and confining intervals. Slug test results are summarized in table 3. A graph profiling hydraulic conductivity, drilling discharge flow rates, and static water level elevations versus depth is presented in figure 4. All the hydraulic conductivity estimates at the ROMP 38 well site are within the expected ranges for the lithology types encountered (Freeze and Cherry, 1979). The slug test data acquisition forms are presented in appendix G and the slug test curve-match analyses are shown in appendix H.

A strong storm event occurred the weekend before core drilling and testing began, causing the water table to elevate to

Table 3. Results from the core hole slug tests performed during exploratory core drilling and testing at the ROMP 38 – Parrish well site in Manatee County, Florida

[No., number; MM/DD/YYYY, month/day/year; ft, feet; bls, below land surface; K, hydraulic conductivity; KGS, Kansas Geological Survey; LPZ, low-permeability zone; Avpk HPZ, Avon Park high-permeability zone; All slug tests were conducted using the pneumatic test method; 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 (feet bls)	Visual Lithologic Characterization	Aquifer or Confining Unit Tested	Analytical Method	Estimated K (ft/day)	Comments
--	08/09/2011	190-250	Mudstone, wackestone, and dolostone, with phosphatic and quartz sand, moderate to well indurated	confining unit	--	--	Water levels did not equilibrate. Did not conduct the test.
1	08/18/2011	325 - 360	Packstone, wackestone, and mudstone with quartz sand, well indurated	confining unit and Upper Floridan aquifer	KGS (Hyder and others, 1994)	2	Spacer not used - transducer malfunctioned. Packer suspected to be leaky (or formation). Water movement in annulus during test.
2	08/23/2011	370 - 410	Wackestone and dolostone with quartz sand, moderate to well indurated	Upper Floridan aquifer	KGS (Hyder and others, 1994)	2	
3	08/29/2011	450 - 490	Fossilferous grainstone and packstone, high permeability, well indurated	Upper Floridan aquifer	Butler (1998)	79	No spacer (broken).
4	10/12/2011	535 - 590	Fossiliferous limestone, well indurated, pearmeability decreases with depth	Upper Floridan aquifer	Butler (1998)	18	Spacer fixed. Program using actual offset/multipliers for each transducer now (not generic). Reading in air much improved.
5	10/17/2011	635 - 690	microcrystalline limestone, well indurated	Ocala LPZ in the Upper Floridan aquifer	Butler (1998)	7	Less than 60 percent core recovery from 640 to 680 feet bls.
6	10/24/2011	735 - 790	mudstone with one 10-foot packstone bed, moderate induration	Ocala LPZ in the Upper Floridan aquifer	Butler (1998)	7	Poor recovery from 740 to 750 feet bls.
7	11/08/2011	900 - 940	Completely altered dolostone with thin beds of limestone, decrease induration with depth	Avpk HPZ of the Upper Floridan aquifer	Butler (1998)	110	Analysis on second peaks - translated.
8	11/16/2011	1,000 - 1,040	Completely altered dolostone, moderate to well indurated	Avpk HPZ of the Upper Floridan aquifer	Butler (1998)	89	
9	11/22/2011	1,100 - 1,140	Highly fractured, well-indurated dolostone	Avpk HPZ of the Upper Floridan aquifer	Butler (1998)	210	
10	12/05/2011	1,200 - 1,240	Completely altered dolostone, heterogeneous mix of moderate and good induration	Upper Floridan aquifer	Butler (1998)	10	
11	12/15/2011	1,350 - 1,390	Completely altered dolostone, moderate to good induration, low permeability	Upper Floridan aquifer	Butler (1998)	3	Butler fits better - reanalyzed.
12	01/17/2012	1,585 - 1,600	Completely altered dolostone and gypsum, well-indurated, gypsum filled vugs and nodules	Middle confining unit II	Butler (1998)	--	Regional trend interfered with test

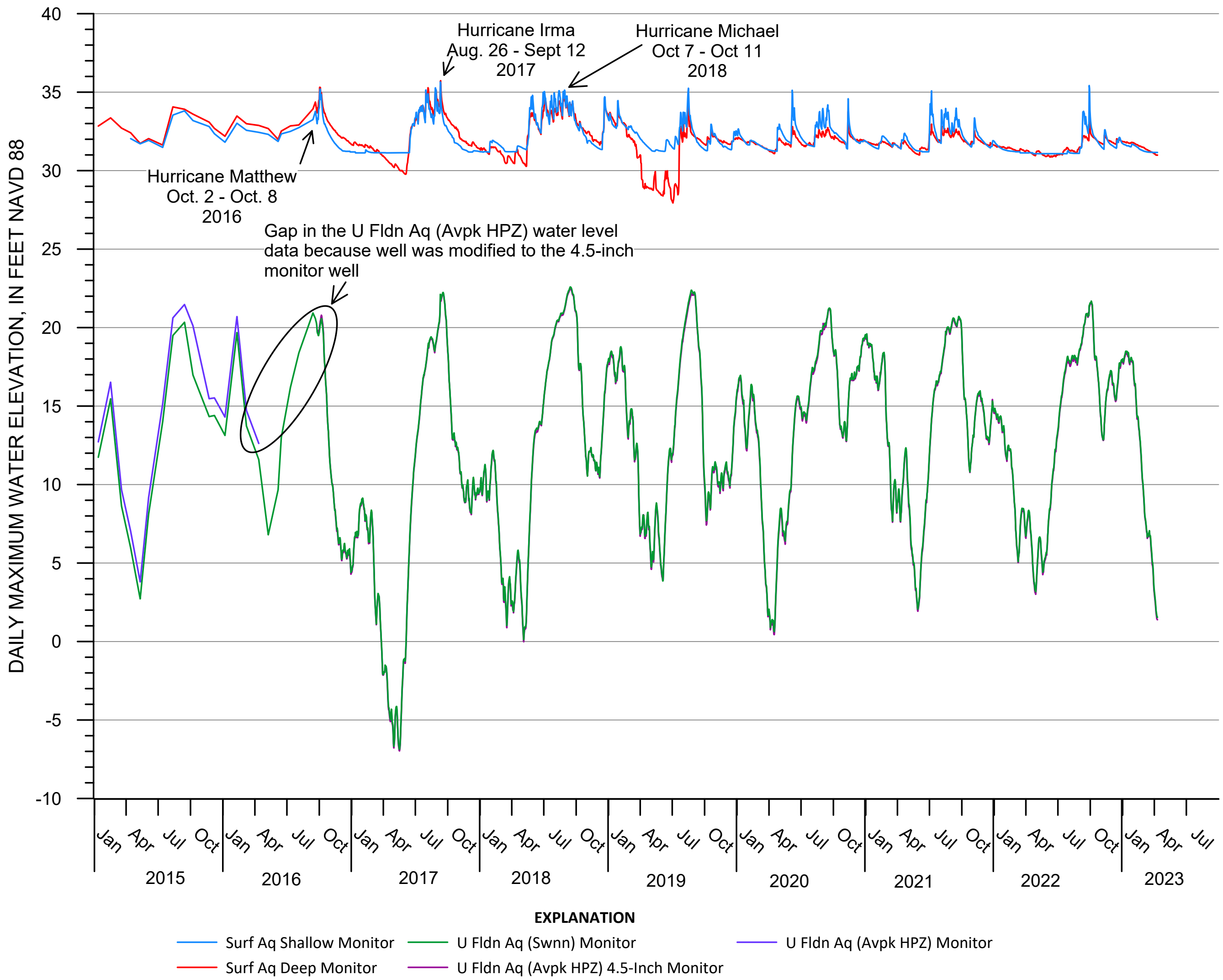


[1] Slug test 1 did not use spacer during test and the packer was suspected to be leaky. The test results may be underestimated.

[2] The Drilling Water Supply well was open from 156 to 340 feet during exploratory coring and testing, so it was considered open to the Upper Floridan aquifer. It was back-plugged to 280 feet prior to the Aquifer Performance Testing, representing an upper Arcadia aquifer observation well.

[NAVD 88, North American Vertical Datum of 1988]

Figure 4. Horizontal hydraulic conductivity estimates, discharge rates, and static water levels collected during core drilling at the ROMP 38 – Parrish well site in Manatee County, Florida. Note the airline lengh is 120 feet from 250 to 760 feet bls, 200 feet from 780 to 950 feet bls, and 360 feet from 1,000 to 1,530 feet bls. Dpacker test discharge rate represents the middle of the discrete open interval at the time of sampling. The packer test water levels represent the middle of the descrete open interval at the time the packer is set. The composite water level represents the core hole water level preceding daily site activity.



[NAVD 88, North American Vertical Datum of 1988; Jan, January; Apr, April; Jul, July; Aug, August; Sept, September; Oct, October; Surf, surficial; Aq, aquifer; U, upper; Fldn, Floridan; Swnn, Suwannee; Avpk HPZ, Avon Park high-permeability zone]

Figure 5. Hydrograph of the permanent monitor wells at the ROMP 38 – Parrish Well Site in Manatee County, Florida.

land surface. Near daily water level data collected during the exploratory core drilling and testing phase from the composite (non-isolated) core hole and the *Drilling Water Supply* are presented in appendix I. Additionally, the core hole water level data measured within isolated test intervals provided a relative profile of water level change with depth within the Upper Floridan aquifer and the middle confining unit II. The composite and test interval core hole water level data recorded during exploratory core drilling and testing 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 and testing is presented in figure 5. Constant-rate APTs were conducted to estimate the hydraulic parameters of the Upper Floridan aquifer within the Suwannee Limestone and the Avon Park high-permeability zone. Diagnostic radial flow plots, derivative analyses, and hydrographs of the drawdown and recovery data were used to help characterize the Upper Floridan aquifer. The APT data collection sheets are presented in appendix J. The APT curve-match analyses are presented in appendix K.

Surficial Aquifer

The surficial aquifer is the uppermost hydraulic unit at the ROMP 38 well site and extends from the top of the water table to 40 feet bls. It is contained in the undifferentiated sand, clay, and shell sediments and the upper portion of the Peace River Formation. From land surface to 5 feet bls, fine to medium grained sand with intergranular porosity is present. During exploratory coring and testing, this unit was presumed to be a thin confining unit between the surficial aquifer and the Peace River aquifer, justifying the installation of two shallow monitor wells (at that time named the ROMP 38 Surf Aq Monitor and the ROMP 38 Pcrv Aq Monitor).

Long-term water levels collected from the two monitor wells are nearly coincident (fig. 5), verifying no confining unit is present. Additionally, the ROMP 38 well site is beyond the estimated extent of the Peace River aquifer (Knochenmus, 2006). Because of the hydraulic connection between the two monitor wells, the Peace River Aq monitor changed to the *Surf Aq Deep Monitor*, and the Surf Aq Monitor changed to the *Surf Aq Shallow Monitor* in November 2021. From 5.2 to 7.2 feet bls, iron staining in the clayey sand suggests slower vertical movement of water where recharge from the shallow to the deep surficial aquifer is delayed, allowing redoximorphic features to develop in the sediment (appendix D). Poorly sorted grains observed from 7.4 to 8 feet bls may also slow the vertical movement of water throughout the aquifer. Poor core recovery from 28 to 30 feet bls (less than 25 percent) and from 35 to 40 feet bls (between 15 and 20 percent) may contribute to higher permeability; however, mud drilling fluid was used during exploratory core drilling in the surficial aquifer, which made it difficult to visually estimate permeability. Long-term water level data (fig. 5) show the *Surf Aq Shallow Monitor* and the *Surf Aq Deep Monitor* water levels frequently elevate to or above land surface. In 2016, 2017, and 2018, Hurricanes Matthew, Irma, and Michael impacted Florida. Large rainfall events such as Hurricanes can elevate the water levels at ROMP 38, causing the surficial aquifer to rise above land surface (fig. 5). No slug testing was performed in the surficial aquifer because drilling mud was used during exploratory core drilling and testing in unconsolidated sediments is difficult.

Confining Unit

A confining unit was delineated from 40 to 107 feet bls at the ROMP 38 well site. It is contained in the middle and lower portion of the Peace River Formation and the upper six inches of the undifferentiated Arcadia Formation. The clay and clayey sand and silt beds throughout the unit are sufficient to form a low permeability unit that impedes the vertical movement of water. No slug testing was performed in the confining unit because drilling mud was used during exploratory core drilling, and testing in unconsolidated sediments is difficult.

Upper Arcadia Aquifer

The upper Arcadia aquifer was delineated from 107 to 260 feet bls at the ROMP 38 well site. The top of the aquifer was identified when drilling fluid circulation was lost at 107 feet bls at the top of the Arcadia Formation. The lithology changed from sand and silt in the confining unit above to a mixture of phosphatic mudstone and dolostone. This interval coincides with an increase in resistivity, which is common for water-yielding zones (Freeze and Cherry, 1979) (appendix B, fig. B7). The bottom of the aquifer corresponds to dolomite containing calcite and aragonite crystals. Precipitation of these minerals can occur when the groundwater has low velocity. No slug testing was performed in the upper Arcadia aquifer because drilling mud was used during exploratory core drilling through the unconsolidated sediments and testing unconsolidated sediments is difficult.

Confining Unit

A confining unit that separates the upper Arcadia aquifer and the Upper Floridan aquifer is present from 260 to 340 feet bls at the ROMP 38 well site. Overall, this confining unit consists of highly and completely altered dolostone, with limestone, clay, sand, and chert of the undifferentiated Arcadia Formation and the upper portion of the Tampa Member of the Arcadia Formation. At 185 feet bls, District staff switched to water as the drilling fluid while core drilling and began collecting daily static water level data from the core hole. From 185 to 320 feet bls, the composite core hole water level elevation does not align with the *Drilling Water Supply* well water level elevations (presumably open to the Upper Floridan aquifer) (fig. 4, appendix I), ranging from 0.6 to 3 feet apart. During air-lifting events using a 120-foot airline, the discharge rates are very low, ranging from 3 and 8 gpm. These data suggest the confining unit has apparent low permeability, limiting equilibrium between the upper Arcadia aquifer and the Upper Floridan aquifer. One slug test was attempted between 190 and 250 feet bls but was unsuccessful. The water level in the test interval did not equilibrate after twenty-two hours of setting the packer, therefore District staff decided to terminate the slug test.

Upper Floridan Aquifer

The Upper Floridan aquifer extends from 340 to 1,560 feet bls at the ROMP 38 well site. The Upper Floridan aquifer includes the lower portion of the Tampa Member, all of the Suwannee and Ocala Limestones, and the upper portion of the Avon Park Formation. The bottom of the Upper Floridan aquifer corresponds to the depth where the low permeability middle confining unit II begins.

During exploratory coring and testing, drilling circulation diminished between 340 and 350 feet bls and was completely lost at 425 feet bls. At 340 feet bls, the water levels in the *Drilling Water Supply* well, the composite core hole, and the packer test intervals from the core hole begin to align with depth, until 1,570 feet bls (fig. 4 and appendix I).

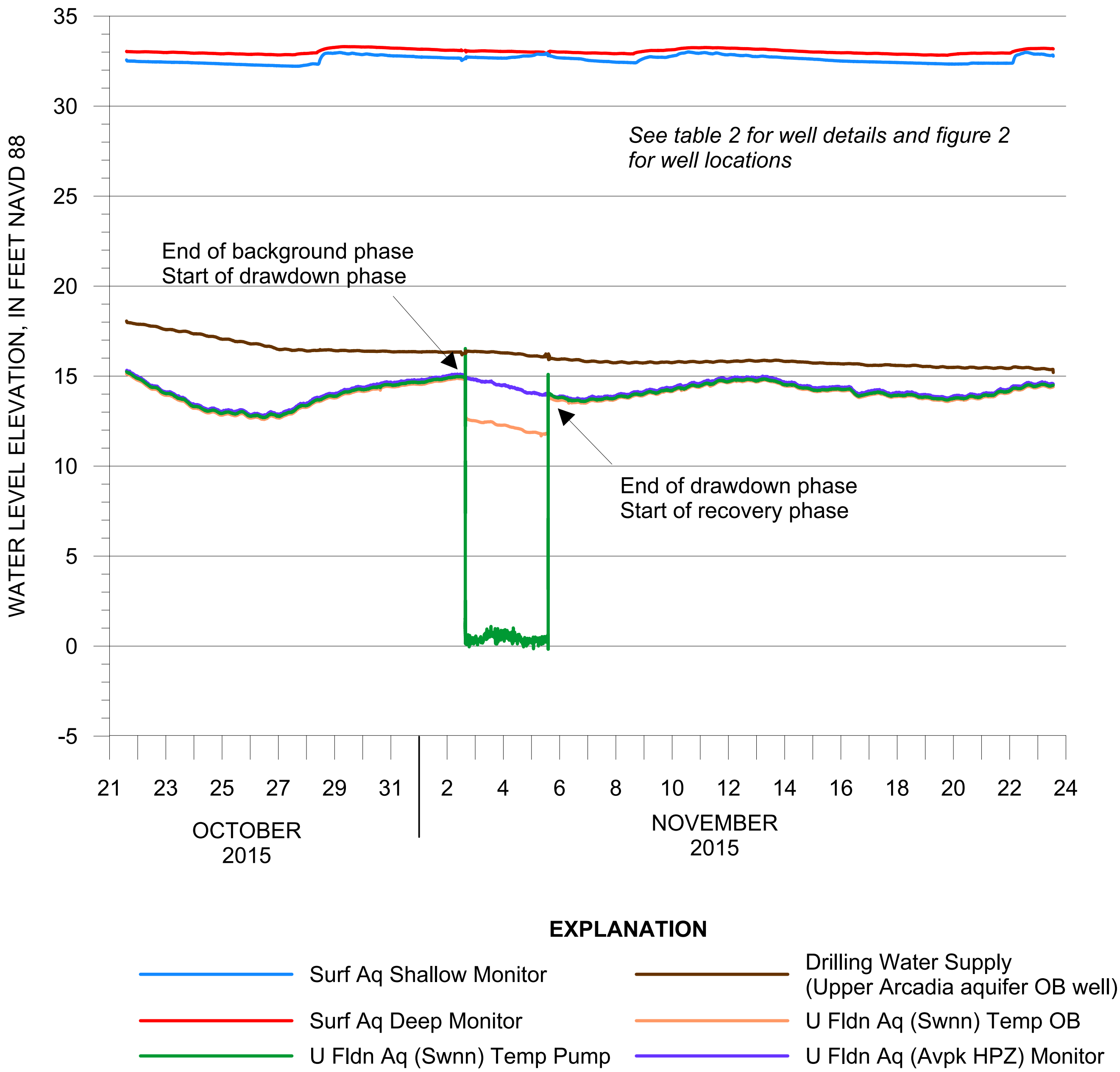
Although the Upper Floridan aquifer is a single aquifer, it can be subdivided based on local variations of hydraulic properties. Mappable intervals where permeability is not characteristic of the entire aquifer, whether substantially higher or lower, are referred to as zones (Laney and Davidson, 1986). Two zones are often identified within the Upper Floridan aquifer within the District: the Ocala low-permeability zone and the Avon Park high-permeability zone. Both the Ocala low-permeability zone and the Avon Park high-permeability zone are present at the ROMP 38 well site. The Ocala low-permeability zone extends from 640 to 860 feet bls and the Avon Park high-permeability zone extends from 905.9 to 1,170 feet bls.

Ten slug tests were conducted in the Upper Floridan aquifer, and one slug test was performed at the boundary of the Upper Floridan aquifer and the above confining unit. The average hydraulic conductivity was estimated at 49 feet per day (ft/day). Slug test 1 was performed from 325 to 360 feet bls, isolating the lower portion of the confining unit (separating the upper Arcadia aquifer and the Upper Floridan aquifer) and the upper portion of the Upper Floridan aquifer, yielding a hydraulic conductivity estimate of 2 ft/day (table 3, fig. 4). The estimated hydraulic conductivity from slug test 1 may be underestimated because the spacer was not used during the test due to a malfunction of the pressure transducer. The packer test discharge rate from 325 to 360 feet bls was 9 gpm. Slug test 2 was performed from 370 to 410 feet bls in the lower portion of the Tampa Member of the Arcadia Formation and the upper portion of the Suwannee Limestone of the Upper Floridan aquifer. The estimated hydraulic conductivity yielded 2 ft/day. The packer test discharge rate was 6 gpm. Slug tests 3 (450 to 490 feet bls) and 4 (535 to 590 feet bls) were conducted in the Suwannee Limestone and yielded hydraulic conductivities of 79 and 18 ft/day, respectively. The estimated hydraulic conductivity value for slug test 3 is likely underestimated because the spacer was not used during the test due to an inoperable transducer. The decrease in hydraulic conductivity from slug test 3 to slug test 4 may be attributed to a change in lithology from packstone and grainstone in slug test 3 to well-indurated mudstone and dolostone beds stratified in packstone and grainstone in slug test 4 (appendix D). The packer test discharge rates for slug test 3 and slug test 4 were 40 and 15 gpm, respectively (fig. 4).

A constant rate APT was conducted from November 2 to 5, 2015, within the Suwannee Limestone portion of the Upper Floridan aquifer. Background water level data were collected before the drawdown phase (from October 21 to November 2, 2015) and during the recovery phase (from November 5 to 23, 2015) to determine the regional water level trend. Prior to the collection of background water level data, the exploratory core hole was converted to the Upper Floridan aquifer Suwannee observation well (U Fldn Aq [Swnn] Temp Ob) (appendix C, fig. C4). The *U Fldn Aq (Swnn) Temp Ob* was the primary observation well and was located approximately 100 feet from the pumped well (*U Fldn Aq [Swnn] Temp Pump*) (appendix C, fig. C10). The *U Fldn Aq (Avpk HPZ) Monitor* (located 160 feet from the pumped well), the *Drilling Water Supply* well back-plugged to the upper Arcadia aquifer (located 170 feet from the pumped well), the *Surf Aq Deep monitor* (located 185 feet from the pumped well), and the *Surf Aq Shallow monitor* (located 200 feet from the pumped well) were used as observation wells (fig. 2). The *U Fldn Aq (Avpk HPZ) monitor* was used to evaluate any effects below the pumped interval. All observation well water levels were recorded using Level Troll pressure transducers in conjunction with an In-Situ Virtual Hermit datalogger (fig. 6). The *U Fldn Aq (Swnn) Temp Pump* well was pumped with a 6-inch 30 horsepower submersible pump at an average rate of 500 gpm for approximately 71 hours (from November 2, 2015, at 15:31 to November 5, 2015, at 13:46). The pumping rate in the pumped well was recorded using a Campbell® CR1000 datalogger. The water was discharged through a temporary 10-inch aluminum discharge pipe to a small depression approximately 800 feet to the northeast to avoid recharge to the Upper Floridan aquifer near the test wells. The discharge water will drain into ditches that flow westward, then north under Erie Road, then west eventually discharging into Cedar Drain. A manometer tube connected to the end of the discharge pipe equipped with a machined orifice plate monitored the pumping rate entering the depression area.

Prior to starting the drawdown phase on November 2, 2015, the static water level in the pumped well and the *U Fldn Aq (Swnn) Temp Ob* well was 14.9 feet NAVD 88. Fifty-eight hours after the drawdown test began, the maximum drawdown was 15.4 feet in the *U Fldn Aq (Swnn) Temp Pump* well and approximately 3.4 feet in the *U Fldn Aq (Swnn) Temp Ob* well. Approximately 36 hours after pumping began, a slight drawdown began in the *Drilling Water Supply* well (back-plugged to the upper Arcadia aquifer). The upper Arcadia aquifer water levels continued to decline until the pump was shut off and the recovery stage began. The drawdown seen in the upper Arcadia aquifer supports the higher leakance in the analyses. There is a slight variation in the water level data recorded in the *Surf Aq Shallow Monitor*, the *Surf Aq Deep Monitor*, and the *Drilling Water Supply* wells when the submersible pump in the *U Fldn Aq (Swnn) Temp Pump* well was turned on and off. These small disturbances are the aquifer response to the activation of the pump and dissipate after a couple of minutes. No drawdown was observed in the *U Fldn Aq (Avpk HPZ) monitor* well. A hydrograph of water levels before, during, and after the APT are presented in figure 6. One water quality sample was collected from the *U Fldn Aq (Swnn) Temp Pump* well on November 5, 2015, prior to ending the drawdown phase of the APT. Results are discussed in the groundwater quality section.

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 and post-recovery water level data. The derivative signature of the *U Fldn Aq (Swnn) Temp Ob* well indicates a slightly leaky response for the Suwannee Limestone portion of the Upper Floridan aquifer at the ROMP 38 well site. Curve-match analysis of the drawdown and recovery data using the Hantush-Jacob (1955)/Hantush (1964) without aquitard storage leaky confined aquifer solution (table 4 and appendix K, fig. K1) yielded an estimated transmissivity value of 60,000 square feet per day (ft^2/day), a storativity estimate of 0.0003, and a leakance value of 0.07 feet per day per foot (day^{-1}) within the Suwannee Limestone portion of the Upper Floridan aquifer. The leakance value may be underestimated because the regional water level trend reversed during the APT testing phase; from inclining during the background data collection to declining during the recovery data collection. The recovery data trend could not be corrected due to the reversal; therefore,



[NAVD 88, North American Vertical Datum of 1988; Surf, surficial; Aq, aquifer; U Fldn Aq, Upper Floridan aquifer; Temp, temporary; Pump, pumped well; OB, observation; Swnn, Suwannee; Avpk, Avon Park; HPZ, high-permeability zone]

Figure 6. Hydrograph of the wells monitored before, during, and after the Suwannee Limestone portion of the Upper Floridan aquifer APT conducted at the ROMP 38 – Parrish well site in Manatee County, Florida.

the leakance estimation does not fully fit the late time type curve in the analyses (appendix K, fig. K1).

Slug test 5 was performed between 635 and 690 feet bls, at the Suwannee Limestone and the Ocala Limestone boundary. Slug test 6 was performed between 735 and 790 feet bls, within the Ocala low-permeability zone within the Upper Floridan aquifer. Both slug tests had an estimated hydraulic conductivity of 7 ft/day. The packer test discharge rates were similar at 12 and 13 gpm.

The next three slug tests were completed within the Avon Park high-permeability zone within the Upper Floridan aquifer. Slug test 7 was performed between 900 and 940 feet bls and yielded a hydraulic conductivity estimate of 110 ft/day. The packer test discharge rate was estimated at 30 gpm. Slug test 8 was performed between 1,000 and 1,040 feet bls and yielded a hydraulic conductivity estimate of 89 ft/day. The test interval contained consistent dolostone with intergranular, intercrystalline, and fracture porosity, which can be seen as an increase in resistivity in appendix B, figure B5. The packer

Table 4. Results from the aquifer performanace tests conducted at the ROMP 38 – Parrish well site in Manatee County, Florida.

[b, thickness; ft, feet; gpm, gallons per minute; ft^2/d, square feet per day; ft/day^{-1}, feet per day per foot; Swnn LS, Suwannee Limestone; U Fldn Aq, Upper Floridan aquifer; Temp, temporary; Ob, observation well; Appx, appendix; Fig., figure]

Aquifer Tested	Aquifer Saturated Thickness (b) (ft)	Average Pump Rate (gpm)	Pumping Duration (hours)	Analyzed Observation Well	Distance to pumped well (ft)	Analyzed Test Phase	Analysis Plot	Analytical Solution	Analytical Model	Transmissity (ft2/d)	Storativity (dimensionless)	Leakance (day-1)
Swnn LS of the U Fldn Aq	1,220	500	70.6	U Fldn Aq (Swnn) Temp Ob	100	Drawdown/ Recovery	Appx. K, Fig. K1	Hantush-Jacob (1955)/ Hantush (1964) w/o aquitard storage	leaky	60,000	0.000	0.07
Avpk HPZ of the U Fldn Aq	1,220	2,836	51	U Fldn Aq (Avpk HPZ) Temp Ob	160	Drawdown/ Recovery	Appx. K, Fig. K2	Theis (1935)/ Hantush (1961)	confined	920,000	0.007	--

test discharge rate was 35 gpm. Slug test 9 was conducted in the Avon Park high-permeability zone between 1,100 and 1,140 feet bls and resulted in a hydraulic conductivity estimate of 220 ft/day. This estimate was the highest at the ROMP 38 well site and is likely due to the persistent fractures observed in the lithologic samples. The packer test discharge rate was 34 gpm. The composite water levels collected from the core hole throughout the Avon Park high-permeability zone follow the shallower *Drilling Water Supply* (presumably open to the Upper Floridan aquifer) water levels confirming the Ocala low-permeability zone above is not a confining unit (fig. 4).

A constant rate APT was conducted from December 3 through 5, 2014, within the Avon Park high-permeability zone of the Upper Floridan aquifer. Background water level data were collected before the drawdown phase (from November 13 through December 3, 2014) and after the recovery phase (from December 5 through 15, 2014). The *U Fldn Aq (Avpk HPZ) Temp* Ob was the primary observation well and was located approximately 160 feet from the pumped well. The *U Fldn Aq (Swnn) Monitor* well (located approximately 25 feet from the pumped well), the *Surf Aq Shallow monitor* well (located approximately 36 feet from the pumped well), and the *Surf Aq Deep monitor* well (located approximately 20 feet from the pumped well) were used as additional observation wells (fig. 2). All observation well water levels were recorded using Level Troll pressure transducers in conjunction with an In-Situ Virtual Hermit datalogger. Before the APT drawdown phase began, a second Level Troll pressure transducer was installed in the U Fldn Aq (Avpk) Temp Ob well in case the first transducer failed during the test. The *U Fldn Aq (Avpk HPZ) Monitor* well was pumped with a 10-inch line shaft diesel pump at an average rate of 2,836 gpm for approximately 51 hours (December 3, 2014, at 10:15 to December 5, 2014, at 13:00). The pumping rate in the pumped well was recorded using a Campbell® CR1000 datalogger. The water was directed through a temporary 10-inch aluminum discharge pipe into a small depression approximately 800 feet to the northeast to avoid recharge to the Upper Floridan aquifer near the test wells. A manometer tube connected to the end of the discharge pipe equipped with a machined orifice plate monitored the pumping rate entering the depression area.

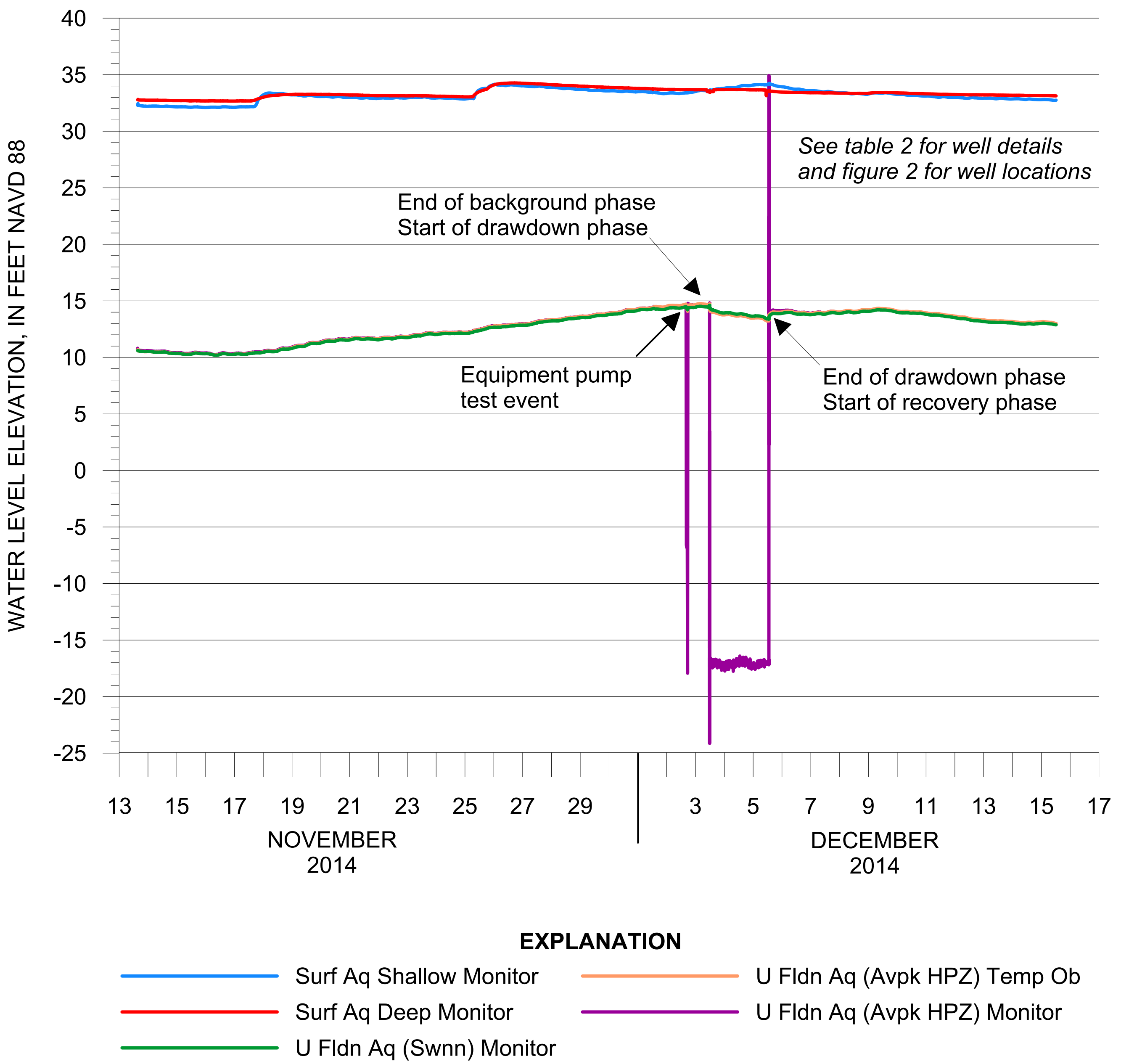
Prior to starting the drawdown phase on December 3, 2014, the static water level in the pumped well was 78.9 feet bls. Forty-seven hours after the beginning of the test, the maximum drawdown was 32 feet in the *U Fldn Aq (AVPK HPZ) Monitor* well and approximately 1.5 feet in the *U Fldn Aq (AVPK HPZ) Temp Ob* well. The maximum drawdown observed in the *U Fldn Aq (Swnn) Monitor* was 1.2 feet, similar to the drawdown in the *U Fldn Aq (AVPK HPZ) Temp Ob* well, indicating these two observation wells are open to the same aquifer. No drawdown was observed in the *Surf Aq Deep monitor* during the pumping test. The *Surf Aq Shallow monitor* water levels began to increase approximately five hours into the pumping test and peaked at 0.6 feet above initial water levels. This implies the discharge location may have been too close to the *Surf Aq Shallow Monitor* during the Avon Park APT, recharging the surficial aquifer after the pumping test began. Disturbances to the water level data were recorded in the *Surf Aq Shallow Monitor* and the *Surf Aq Deep Monitor* wells when the pump in the *U Fldn Aq (Avpk HPZ) Monitor* well was turned on and off. These small disturbances are the aquifer response to the activation of the pump and dissipate after a couple of minutes. A hydrograph of water levels before, during, and after the APT is presented in figure 7.

Prior to the analysis, all observation well data were corrected for a declining regional water level trend (0.0002 ft/day) determined from linear extrapolation of background water level data collected after pumping. The derivative signature of the *U Fldn Aq (Avpk HPZ) Temp Ob* well indicates a confined response for the Upper Floridan aquifer (appendix K, fig. K2). Curve-match analysis using the Theis (1935)/Hantush (1961) confined aquifer solution of the drawdown and recovery data observed in the U Fldn Aq (Avpk) Temp Ob well yielded an estimated transmissivity value of 920,000 ft^2/day and a storativity value of 0.007 (table 4 and appendix K, fig. K2). Vertical leakance was not estimated within the Avon Park high-permeability zone because the hydraulic gradient between the Avon Park high-permeability zone and the confining unit above is too small.

The final two slug tests were performed in the dolostone-dominated Avon Park Formation, below the Avon Park high-permeability zone. The estimated hydraulic conductivity for slug test 10, tested between 1,200 and 1,240 feet bls, was 10 ft/day and the packer test discharge rate was 27 gpm. The estimated hydraulic conductivity for slug test 11, collected between 1,350 and 1,390 feet bls, was 3 ft/day, with a packer test discharge rate of 14 gpm. The reduced permeability from the test interval of slug test 11 is likely caused by the reduction in grain size and the presence of gypsum within the formation.

Middle Confining Unit II

At the ROMP 38 well site, the middle confining unit II extends from 1,560 to beyond the total depth of exploration at 1,600 feet bls. The top of the middle confining unit II is comparable with the isopach map completed by Miller (1986), which estimates the top at approximately -1,625 feet NAVD 88 (1,661 feet bls). The top of the unit was chosen at the appearance of persistent gypsum-filled nodules within the Avon Park Formation that substantially decreases the permeability of the formation. The water level elevation in figure 4 shows composite core hole water levels diverting from the *Drilling Water Supply* well water levels at 1,570 feet bls. The top was also picked based on the degradation of the groundwater quality, which is consistent with evaporite influence (fig. 8). Slug test 12 was attempted in the middle confining unit II from 1,585 to 1,600 feet bls but was terminated after 4 hours because the background regional water level trend began to interfere with data collection. Also, the datalogger reached maximum storage capacity before the test could be completed. The packer test discharge rate was estimated at 1 gpm.



[NAVD, North American Vertical Datum of 1988; Surf Aq, surficial aquifer; U Fldn Aq, Upper Floridan aquifer; Swnn, Suwannee; Avpk HPZ, Avon Park high-permeability zone; Temp, temporary; Ob, observation well]

Figure 7. Hydrograph of the wells monitored before, during, and after the Avon Park high-permeability portion of the Upper Floridan aquifer APT conducted at the ROMP 38 – Parrish well site in Manatee County, Florida.

Groundwater Quality

The ROMP 38 well site groundwater quality characterization is based on laboratory results from 12 discrete groundwater samples. Eleven samples were collected from the core hole from the surface discharge during exploratory core drilling and testing from 325 to 1,390 feet bls. The last sample was collected with a nested bailer between 1,585 and 1,600 feet bls. Additionally, one groundwater quality sample was collected from the *U Fldn Aq (Swnn) Temp Pump* well during the Suwannee Limestone portion of the Upper Floridan APT approximately 70 hours into the test. The water quality collection field sheets are presented in appendix L. Field measurements, laboratory analyses, equivalent weights and water types, and molar ratios for the samples are presented in appendix M, tables M1, M2, M3, and M4, respectively. The U.S. Environmental Protection Agency's National Secondary Drinking Water Regulations (herein referred to as secondary drinking water standards) ion concentrations for total dissolved solids (TDS), sulfate, chloride, and iron are 500 mil-

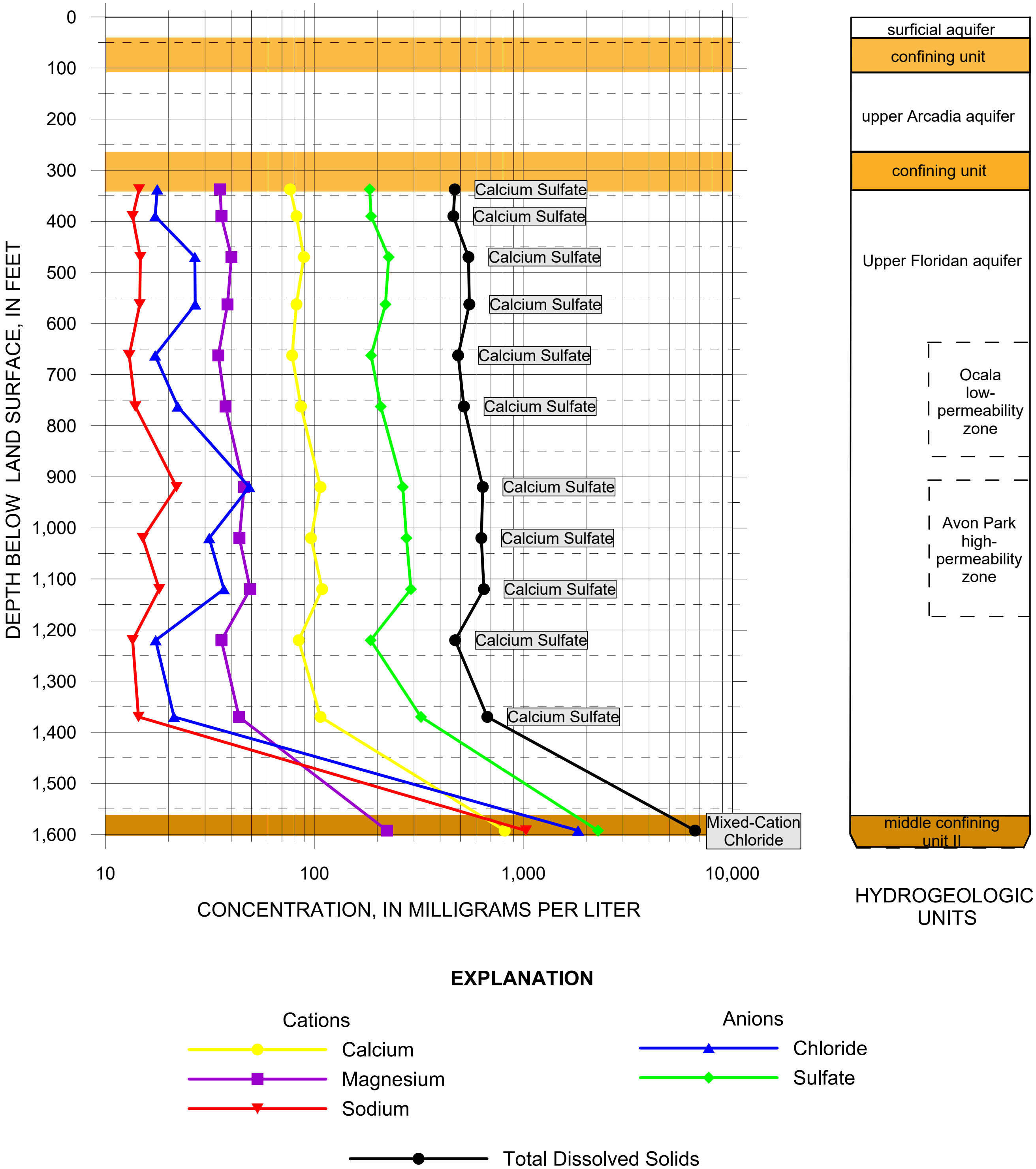


Figure 8. Select cations and anions, and total dissolved solids concentrations for groundwater quality samples collected at the ROMP 38 – Parrish well site in Manatee County, Florida. Depths represent the middle of the discrete open interval at the time of sampling.

ligrams per liter (mg/L), 250 mg/L, 250 mg/L, and 0.3 mg/L, respectively (Hem, 1985; U.S. Environmental Protection Agency, 2012). Groundwater is classified as freshwater based on the concentration of TDS. Freshwater has a TDS of less than 1,000 mg/L (Fetter, 2001). The results for all laboratory water quality samples are shown in figure 8, and appendix M, table M2.

The results of water quality sample 1, collected between 325 to 360 feet bls, indicate the groundwater within the lower portion of the confining unit between the upper Arcadia aquifer and the upper portion of the Upper Floridan aquifer is fresh (TDS concentration is 470 mg/L) but exceeds the iron concentration of the secondary drinking water standards (0.61 mg/L) (fig. 8, and appendix M, table M2). All other constituents are below the secondary drinking water standards.

Water quality samples 2, 3, and 4 were collected within the Suwannee Limestone within the Upper Floridan aquifer and are considered fresh (TDS concentrations ranging from 463 to 552 mg/L) but exceed the secondary drinking water standards. In water quality sample 2 (collected between 370 and 410 feet bls), the iron concentration is 0.598 mg/L. The results of water quality sample 3, collected between 450 and 490 feet bls, the iron concentration is 3.54 mg/L, and the TDS concentration is 547 mg/L. In water quality sample 4, collected between 535 and 590 feet bls, the TDS concentration is 552 mg/L, exceeding the secondary drinking water standards (fig. 8, and appendix M, table M2). All other constituents meet the secondary drinking water standards in the Suwannee Limestone within the Upper Floridan aquifer.

The results of water quality samples 5 and 6 were collected within the lower portion of the Suwannee Limestone and the Ocala low-permeability zone within the Upper Floridan aquifer. The TDS values in water quality samples 5 and 6 were fresh but exceeded the secondary drinking water standards. Water quality sample 5, collected between 635 and 690 feet bls, had an iron concentration of 0.633 mg/L. In water quality sample 6 (collected between 735 and 790 feet bls), the iron and TDS concentrations were 0.504 and 520 mg/L, respectively. All other constituents meet the secondary drinking water standards in the Ocala low-permeability zone (fig. 8, and appendix M, table M2).

The results of water quality samples 7 through 9, collected in the Avon Park high-permeability zone within the Upper Floridan aquifer, indicate the groundwater is fresh and does not meet the secondary drinking water standards. The TDS concentrations range from 630 to 648 mg/L, the sulfate concentrations range from 265 to 290 mg/L, and the iron concentrations range from 0.553 to 0.965 mg/L (fig. 8, and appendix M, table M2).

Water quality samples 10 and 11 were collected below the Avon Park high-permeability zone in the Upper Floridan aquifer and above the middle confining unit II. Both water quality samples are fresh but do not meet the secondary drinking water standards. Water quality sample 10 was collected between 1,200 and 1,240 feet bls and the iron concentration is 0.565 mg/L. Water quality sample 11 (collected between 1,350 and 1,390 feet bls) indicates the TDS concentration (673 mg/L) and sulfate concentration (324 mg/L) exceeded the secondary drinking water standards. All other constituents meet the secondary drinking water standards. The degraded water quality from the middle confining unit II influences the Upper Floridan aquifer water quality above.

The results of water quality sample 12, collected in the middle confining unit II between 1,585 and 1,600 feet bls, indicate that groundwater is neither fresh nor meets the secondary drinking water standards. The TDS concentration is 6,640 mg/L, the chloride concentration is 1,830 mg/L, the sulfate concentration is 2,280 mg/L, and the iron concentration is 13.4 mg/L. Nearly all ion concentrations increase substantially within this sampling interval. Water quality sample 12 was collected in dense dolostone with gypsum-filled vugs and nodules, which substantially degrade the water quality (fig. 8, and appendix M, table M2).

Generally, the water quality with the lowest ion concentration and TDS is from water quality sample 2; collected within the top of the Suwannee Limestone in the Upper Floridan aquifer. The water quality sample collected in the middle confining unit II has the highest ion concentrations and TDS (water quality sample 12). Water in the deep parts of the Upper Floridan aquifer, nearing a confining unit, will generally be of poor water quality. The dissolution of sulfate-bearing minerals, such as gypsum or anhydrite, or connate seawater in the system, will quickly degrade water quality.

Equivalent weights are often used in groundwater quality analyses to evaluate relative ion dominances and to determine a specific water type. Water type is determined using 50 percent dominance criteria for percent milliequivalents of major cations (sodium [Na^+], potassium [K^+], calcium [Ca^{2+}], magnesium [Mg^{2+}]) and major anions (chloride [Cl^-], bicarbonate [HCO_3^-], sulfate [SO_4^{2-}]) (Hem, 1985). The equivalent weights and water types were determined for each groundwater quality sample and are presented in appendix M, table M3. The water types are also depicted in figure 8. The results of water quality samples 1 through 11 indicate the water type is calcium sulfate in the Upper Floridan aquifer (fig. 8, appendix M, table M3). An increase in sodium, calcium, and chloride in water quality sample 12 (fig. 8, and appendix M, tables M2 and M3) resulted in a mixed-cation chloride water type in the middle confining unit II. This is likely the influence of connate and/or the dissolution of gypsum or anhydrite.

Trends of the relative abundance of each major cation and anion species analyzed in the groundwater quality samples collected at the ROMP 38 well site are presented on a Piper (1944) diagram in figure 9 as percent milliequivalents. With increasing depth, the groundwater samples collected from the Upper Floridan aquifer (water quality samples 1 through 11) plot along the freshwater/deepwater mixing line, near the deepwater end member (fig. 9). The groundwater sample representing the middle confining unit II (water quality sample 12) plots along the deepwater/seawater mixing line, near the 10 percent seawater and deepwater mixing member.

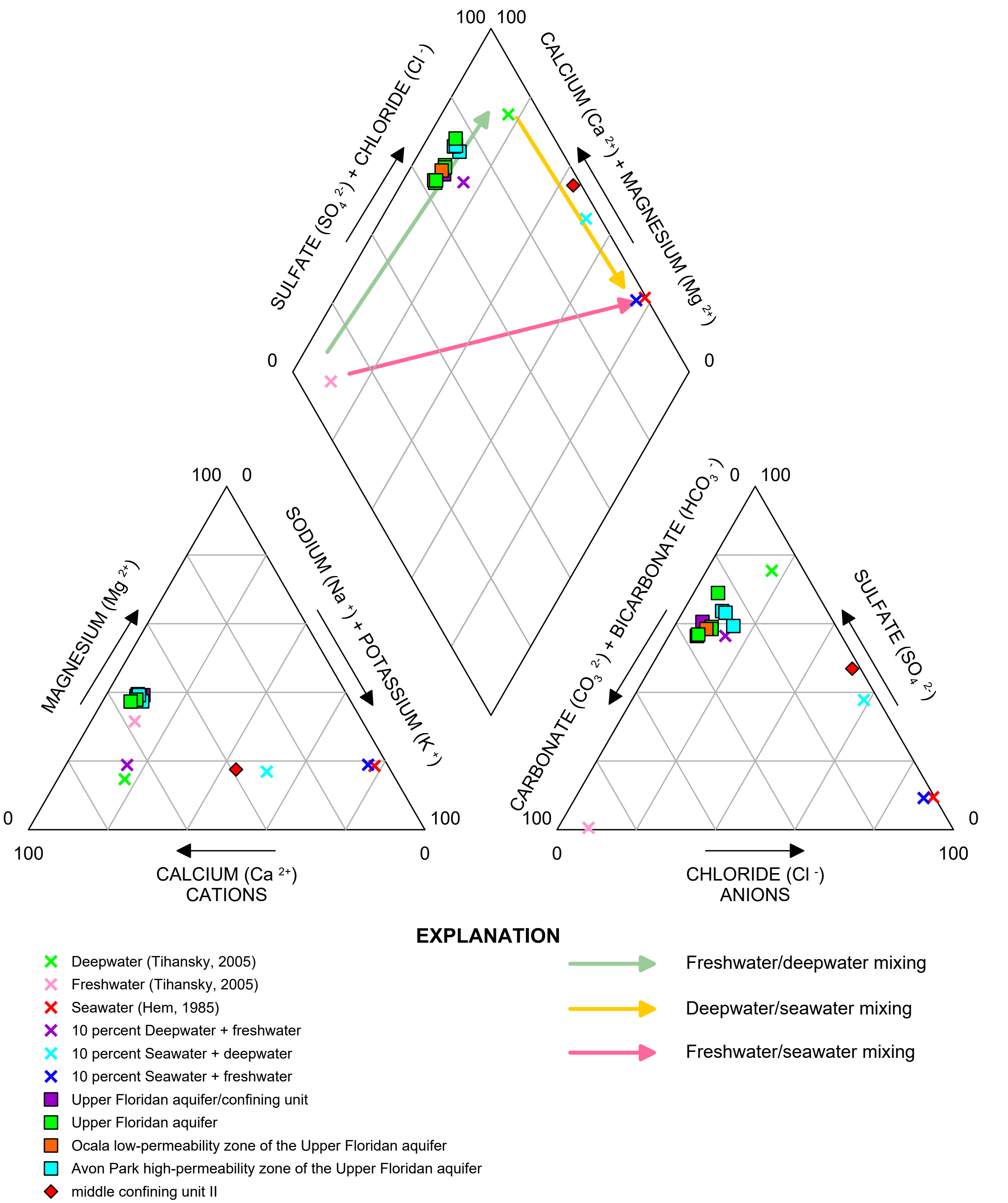
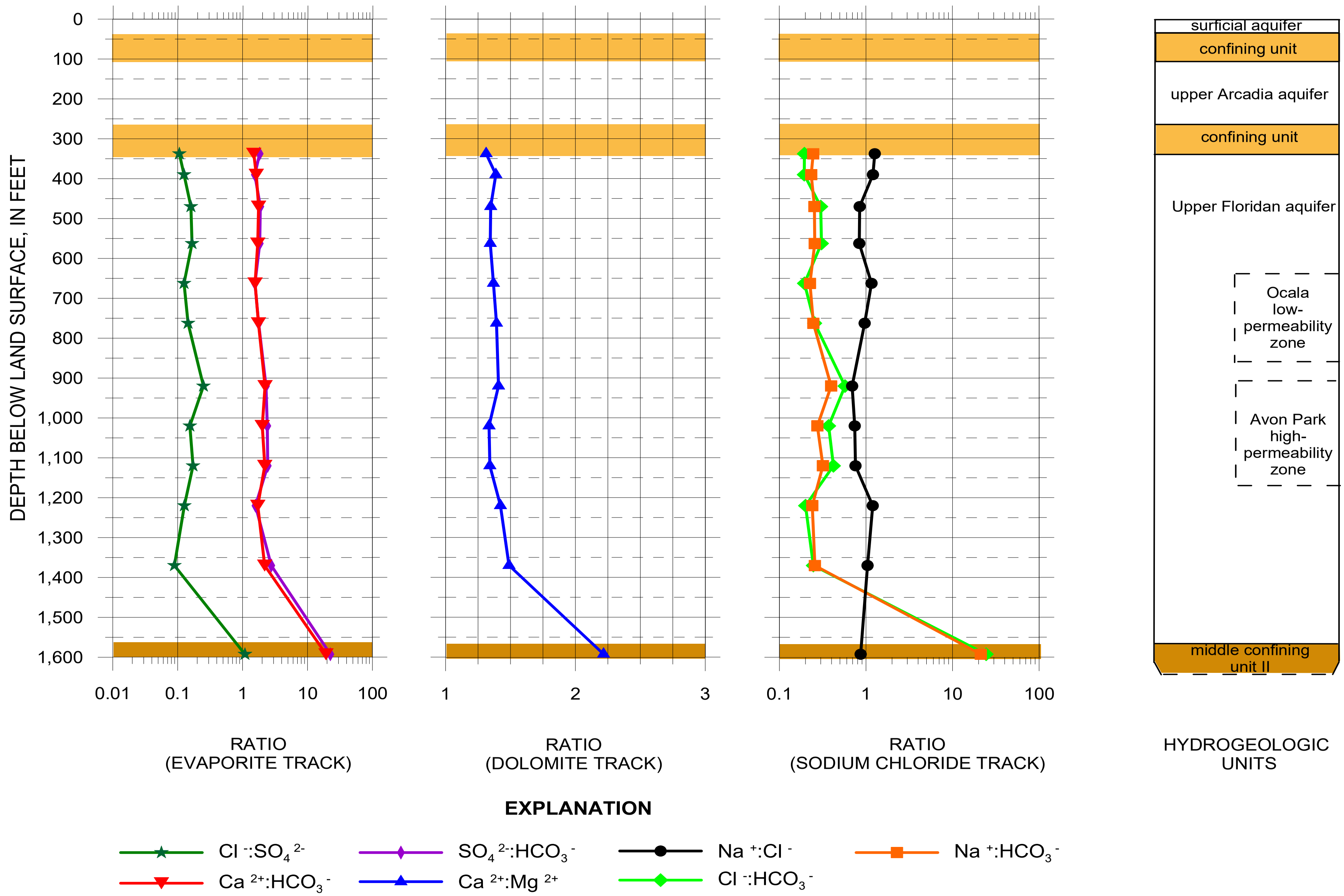


Figure 9. Piper diagram of the groundwater quality samples collected at the ROMP 38 – Parrish well site in Manatee County, Florida.



[Cl^-, chloride; SO_4^{2-}, sulfate; Ca^{2+}, calcium; HCO_3^-, bicarbonate; Mg^{2+}, magnesium; Na^+, sodium]

Figure 10. Select molar ratios with depth for groundwater quality samples collected at the ROMP 38 – Parrish well site in Manatee County, Florida. Depth represents the middle of the discrete open interval at the time of sampling.

Select molar ratios were calculated and plotted to further investigate water quality changes with depth (fig. 10 and appendix M, table M4). The evaporite track illustrates the interaction between fresh water and evaporites (gypsum and anhydrite). The dolomite track primarily identifies freshwater affected by dolomite. The sodium chloride track depicts effects from connate or seawater. The chloride to sulfate molar ratio on the evaporite track in figure 10 is less than 1 throughout the Upper Floridan aquifer (water quality samples 1 through 11) because of the influence of sulfate with depth (appendix M tables M2, and M4). At 900 feet bls, the chloride to sulfate molar ratio increases because the chloride concentration increases at the top of the Avon Park high-permeability zone. The chloride to sulfate ratio increases at 1,585 feet bls because of the substantial increase in chloride. The calcium to bicarbonate molar ratio and the sulfate to bicarbonate molar ratio on the evaporite track generally do not vary in samples 1 through 11 (fig. 10), suggesting there is limited influence from evaporites on the groundwater. At 1,585 feet bls, the calcium to bicarbonate ratio and sulfate to bicarbonate ratio increases because of the presence of the evaporites in the middle confining unit II. The calcium to magnesium molar ratio in the dolomite track is between 1.2 and 1.6 within the Upper Floridan aquifer (water quality samples 1 through 11). A slight decrease in the calcium to magnesium ratio at the top of the Upper Floridan aquifer (water quality sample 1) suggests the influence of dolostone in the confining unit above. From water quality samples 2 through 7, the calcium to magnesium ratio does not vary, suggesting there is a balance from both cations. The magnesium to calcium ratio begins to increase from water quality samples 8 through 11 because dolostone is more prevalent in this portion of the Avon Park Formation. The chloride to bicarbonate molar ratio and sodium to bicarbonate molar ratio on the sodium chloride track show minimal change from 325 to 790 ft bls. An increase in chloride and sodium and a decrease in bicarbonate in the Avon Park high-permeability zone (water quality samples 7 through 9) produce an increase in the chloride to bicarbonate and sodium to bicarbonate ratios. The chloride to bicarbonate and the sodium to bicarbonate in the lower portion of the Upper Floridan aquifer (water quality samples 10 and 11) resemble the same ratio values in the upper portion of the Upper Floridan aquifer (water quality samples 1 through 6). A decrease is observed in the sodium to chloride ratio in the Suwannee Limestone of the Upper Floridan aquifer and the Avon Park high-permeability zone because the increase in chloride has more influence than the increase in sodium in the groundwater.

Water quality sample 12, collected within the middle confining unit II (from 1,585 feet to 1,600 feet bls), shows a substantial increase in nearly all ratios in each track (fig. 10). The increase in calcium to bicarbonate ratio and sulfate to bicarbonate ratio in the evaporite track, and the increase in calcium to magnesium ratio in the dolomite track, are likely caused by the dissolution of gypsum and anhydrite, identified in the middle confining unit II. The increase in the sodium to bicarbonate ratio and chloride to bicarbonate ratio (the sodium chloride track) may be caused by the influence of connate seawater. The sodium to chloride ratio shows a slightly higher influence of chloride than sodium in the middle confining unit II.

During the Suwannee Limestone portion of the Upper Floridan APT, field measurements of specific conductance, pH, and temperature of the discharge were monitored (appendix M, table M5). The purpose was to ensure the water quality of the intermittent tributary of Cedar Drain 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 surface discharge from the *U Fldn Aq (Swnn) Temp Pump* well (appendix M, table M2) during the Suwannee Limestone of the Upper Florida aquifer APT. The purpose of this sample was to evaluate the potential effects of changes to water quality from pumping. The results from the *U Fldn Aq (Swnn) Temp Pump* well groundwater sample (sample 13, open interval between 420 and 640 feet bls) correlate to water quality samples 3 and 4, which were also collected from the Upper Floridan aquifer during exploratory core drilling and testing. Each of the constituents tested indicates the water is fresh but the TDS concentration exceeds secondary drinking water standards (appendix M, table M2). There were no changes to water quality because of pumping.

Summary

The ROMP 38 – Parrish well site, located in northwestern Manatee County, was developed in three phases from July 2011 through November 2015. The phases included exploratory core drilling and testing, monitor well construction, and aquifer performance testing. The well site was selected to support the SWUCA and SDWRAP and to fill in a gap in the ROMP 10-mile grid network. This site also provided data on the saltwater/freshwater interface and the elevation of the middle confining unit II in this region. Geohydrologic data including core samples, slug testing, aquifer performance testing, groundwater quality sampling, and geophysical logging were collected at the site during the three phases. The four permanent monitor wells constructed are the *Surf Aq Shallow Monitor*, *Surf Aq Deep Monitor*, *U Fldn Aq (Swnn) Monitor*, and the *U Fldn Aq (Avpk HPZ) Monitor*, which was later modified to the *U Fldn Aq (Avpk HPZ) 4.5-Inch Monitor* in 2016.

The geologic units encountered at the well site include, in ascending order: the Avon Park Formation, Ocala Limestone, Suwannee Limestone, Tampa member of the Arcadia Formation, undifferentiated Arcadia Formation, Peace River Formation, and undifferentiated sand, clay, and shell sediments. The Avon Park Formation extends from 905.9 to beyond the total depth of exploration of 1,600 feet bls and is predominately dolostone with thin beds of packstone, wackestone, and mudstone near the top of the unit. The Ocala Limestone extends from 649 to 905.9 feet bls and is predominately very light orange, fossiliferous wackestone and mudstone, transitioning to moderate yellow brown dolostone containing fossil molds near the contact with the Avon Park Formation. The Suwannee Limestone extends from 440 to 649 feet bls and is largely composed of very light orange layers of intergranular grainstone, packstone, wackestone, and mudstone. Fossil fragments and molds prevail throughout the unit. The Tampa member of the Arcadia Formation extends from 309.6 to 440 feet bls and is generally composed of very light orange wackestone and packstone with quartz sand and minor layers of mudstone. The undifferentiated Arcadia Formation extends from 106.5 to 440 feet bls with layers of very light orange to grayish brown dolostone, wackestone, and mudstone, with clay and phosphatic sands. The Peace River Formation extends from 7.4 to 106.5 feet bls and is predominately angular, medium to fine-grained quartz and phosphatic sand, with interbeds of silt and clay. The undifferentiated sand, clay, and shell sediments extend from land surface to 7.4 feet bls, and consist of sand with clay, shell, and organics.

The hydrogeologic units encountered at the well site include, in descending order: a surficial aquifer, a confining unit, the upper Arcadia aquifer, a confining unit, the Upper Floridan aquifer including the Ocala low-permeability zone and the Avon Park high-permeability zone, and the middle confining unit II. The surficial aquifer extends from the water table to 40 feet bls. A confining unit extends from 40 to 107 feet bls. The upper Arcadia aquifer extends from 107 to 260 feet bls. A confining unit extends from 260 to 340 feet bls. No hydraulic testing was conducted from land surface to 340 feet bls. The Upper Floridan aquifer extends from 340 to 1,560 feet bls and consists of the lower portion of the Tampa Member of the Arcadia Formation, the Suwannee Limestone, the Ocala Limestone, and the upper portion of the Avon Park Formation. The Ocala low-permeability zone extends from 640 to 860 feet bls and the Avon Park high-permeability zone extends from 906 to 1,170 feet bls. One slug test was attempted within the lower portion of the confining unit (from 190 to 250 feet bls) but was unsuccessful because the water level was rising very slowly while waiting for equilibration to start the test, suggesting the interval was not productive. Ten slug tests were conducted within the Upper Floridan aquifer. The hydraulic conductivity estimates vary from 2 to 210 ft/day. Two constant rate APTs were conducted within the Upper Floridan aquifer, one within the Suwannee Limestone and the other within the Avon Park high-permeability zone. The constant-rate APT within the Suwannee Limestone was conducted from October 21 to November 23, 2015. Diagnostic radial flow plots and derivative analysis from the APT indicate the Suwannee Limestone portion of the Upper Floridan aquifer has a slightly leaky response. Curve-match analysis yielded a transmissivity of 60,000 ft^2/day, a storativity estimate of 0.0003, and a leakance value of 0.07 day^{-1} using the Hantush-Jacob (1955)/Hantush (1964) without aquitard storage leaky confined aquifer solution. The constant-rate APT within the Avon Park high-permeability zone of the Upper Floridan aquifer was conducted from November 13 through December 15, 2014. Diagnostic radial flow plots and derivative analysis from the APT indicate the Avon Park high-permeability zone of the Upper Floridan aquifer is non-leaky and confined. Curve match analysis yielded a transmissivity of 920,000 ft^2/day and a storativity value of 0.007 using the Theis (1935)/Hantush (1961) confined aquifer solution. The vertical leakance value could not be estimated because the hydraulic gradient between the Avon Park high-permeability zone and the confining unit above is too small.

Twelve groundwater quality samples were collected and analyzed at the ROMP 38 well site. The groundwater quality results for samples 1 and 2 indicate the Upper Floridan aquifer is fresh but does not meet the U.S. Environmental Protection Agency's secondary drinking water standards to 410 feet bls (iron concentration exceeds the standards). From 450 feet to 490590 feet bls (water quality sample 3), the groundwater quality sample results indicate the groundwater is fresh but do not meet the secondary drinking water standards (iron and TDS concentration exceed the standards). From 535 to 590 feet bls (water quality sample 4), the groundwater quality sample results indicate the groundwater is fresh but do not meet the secondary drinking water standards (TDS concentration exceeds the standards). Water quality samples 5 and 6, collected from the Ocala Limestone (from 635 to 790 feet bls), are fresh and does not meet the secondary drinking water standards (iron concentration exceeds the standards in both samples and TDS concentrations exceed in sample 6). Water quality samples 7 through 9, collected in various intervals between 900 to 1,140 feet bls, are fresh but do not meet the secondary drinking water standards (sulfate, iron, and TDS exceed the standards). Water quality samples 10 and 11, collected in the lower portion of the Upper Floridan aquifer (from 1,200 to 1,390 feet bls) are fresh and do not meet the secondary drinking water standards (sulfate, iron, and TDS concentrations exceed the standards). Water quality sample 12 was collected within the upper portion of the middle confining unit II and is neither fresh (TDS concentration is 6,640 mg/L) nor does it meet secondary drinking water standards (chloride, sulfate, iron, and TDS concentrations exceed the secondary standards). The water type is calcium sulfate within the Upper Floridan aquifer and transitions to mixed-cation chloride within middle confining unit II. The Piper diagram shows the results of the Upper Floridan aquifer plot midway along the freshwater/deepwater mixing trend line near the 10 percent deepwater/freshwater mixing member, following a trend typical of bicarbonate water types influenced by deepwater mixing, approaching the deepwater endmember. The result of middle confining unit II plots midway along the deepwater/seawater mixing trendline near the 10 percent seawater/deepwater mixing member. This water quality is likely affected from the dissolution of evaporites, or the influence of connate water, or both.. The calcium to bicarbonate and sulfate to bicarbonate molar ratios on the evaporite track increase in the middle confining unit II because of the increased calcium concentration likely from the dissolution of gypsum and anhydrite. The chloride to sulfate ratio in the evaporite track increases at similar rates in the middle confining unit II because of the increase in gypsum and anhydrite, and the influence of seawater. The influence of seawater in the middle confining unit II is also seen in the sodium chloride track. The chloride to bicarbonate and the sodium to bicarbonate ratios on the sodium chloride track increase at similar rates. One water quality sample was collected during the Suwannee Limestone portion of the Upper Floridan APT to evaluate the potential effects of changes to water quality from pumping. This sample was to ensure the water quality of the intermittent tributary of Cedar Drain 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. There were no changes to water quality because of pumping.

Selected References

Arthur, J.D., Fischler, C., Kromhout, C., Clayton, J.M., Kelley, M., Lee, R.A., O'Sullivan, M., Green, R.C., and Werner, C.L., 2008, Hydrogeologic Framework of the Southwest Florida Water Management District: Florida Geological Survey Bulletin No. 68, 104 p.

Barr, G.L., 1996, Hydrogeology of the Surficial and Intermediate Aquifer Systems in Sarasota and Adjacent Counties, Florida: U.S. Geological Survey Water-Resources Investigations Report 96-4063, 87 p.

Butler, J.J., Jr., 1998, The Design, Performance, and Analysis of Slug Tests: Boca Raton, Florida, Lewis Publishers, 252 p.

Boggess, D.M., and Watkins, F.A., Jr., 1986, Surficial aquifer system in eastern Lee County, Florida: U.S. Geological Survey Water-Resources Investigations Report 85-4161, 59 p.

Bush, P. W., 1982, Predevelopment Flow in the Tertiary limestone aquifer, southeastern United States; A Regional Analysis from Digital Modeling: U.S. Geological Survey Water-Resources Investigations Report 82-905, 56 p.

Chen, C.S., 1965, The Regional Lithostratigraphic Analysis of Paleocene and Eocene Rocks of Florida: Florida Geological Survey Bulletin No. 45, 105 p.

Clarke, WE., Musgrove, R.M., Menke, G.C., and Cagle, J.W., Jr., 1964, Water resources of Alachua, Bradford, Clay, and Union Counties, Florida: Florida Geological Survey Report of Investigations 35, 170 p.

Cooke, C. W., 1945, Geology of Florida, Florida Geological Survey Bulletin 29.

Fetter, C.W., 2001, Applied Hydrogeology: Upper Saddle River, New Jersey, Prentice Hall, 598 p. Freeze, R.A., and Cherry, J.A. (1979) Groundwater. Prentice-Hall Inc., Englewood Cliffs, Vol. 7632, 604.

Hantush, M.S., and Jacob, C.E., 1955, Non-steady radial flow in an infinite leaky aquifer, American Geophysical Union Transactions, v. 36, p. 95-100.

Hem, J.D., 1985, Study and Interpretation of the Chemical Characteristics of Natural Water (3rd ed.): U.S. Geological Survey Water-Supply Paper 2254, 264, p.

Hyder, Z., Butler Jr., J.J., McElwee, C.D., and Liu, W., 1994, Slug tests in partially penetrating wells: Water Resources Research, v. 30, no. 11, p. 2945-2957.

Joyner, B.F., and Sutcliffe, H. Jr., 1976, Water Resources of the Myakka River Basin Area, Southwest Florida: U.S. Geological Survey Water-Resources Investigation 76-58, 87 p.

Knochenmus, L.A., 2006, Regional Evaluation of the Hydrogeologic Framework, Hydraulic Properties, and Chemical Characteristics of the Intermediate Aquifer System Underlying Southern West-Central Florida: U.S. Geological Survey Scientific Investigations Report 2006-5013, 40 p.

Laney, R.L., and Davidson, C.B., 1986, Aquifer-nomenclature guidelines: U.S. Geological Survey, Open-File Report 86-534, 60 p.

Leve, G.L., 1966, Ground water in Duval and Nassau Counties, Florida: Florida Geological Survey Report of Investigations 43, 91 p.

Lichtler, W.F., 1960, Geology and ground-water resources of Martin County, Florida: Florida Geological Survey Report of Investigations 23, 149 p.

Miller, W.L., 1980, Geologic aspects of the surficial aquifer in the Upper East Coast planning area, southeast Florida: U.S. Geological Survey Water-Resources Investigations Report 80-586, scale 1:62,500, 2 sheets.

Miller, J. A., 1982, Geology and configuration of the base of the Tertiary limestone aquifer system, southeastern United States: U.S. Geological Survey Water-Resources Investigations 81-1176, 1 map sheet.

Miller, J.A., 1986, Hydrogeologic Framework of the Floridan Aquifer System in Florida in Parts of Georgia, Alabama, and South Carolina: U.S. Geological Survey Professional Paper 1403-B, 91 p., 33 pls.

North American Stratigraphic Code (2005), North American Commission on Stratigraphic Code: American Association of Petroleum Geologists Bulletin, v. 89, no. 11, p. 1547-1591.

Parker, G.G., and others, 1955, Water resources of southeastern Florida: U.S. Geological Survey Water-Supply Paper 1255, 965 p.

Piper, A.M., 1944, A graphic procedure in the geochemical interpretation of water analyses: American Geophysical Union Transactions, v. 25, p. 914-923.

Reese, R.S., and Richardson, Emily, 2008, Synthesis of the Hydrogeologic Framework of the Floridan Aquifer System and Delineation of a Major Avon Park Permeable Zone in Central and Southern Florida: U.S. Geological Survey Scientific Investigations Report 2007-5207, 60 p., 4 pls., plus apps. (on CD).

Scott, T.M., 1988, The Lithostratigraphy of the Hawthorn Group (Miocene) of Florida: Florida Geological Survey, Bulletin No. 59, 148 p.

Southwest Florida Water Management District, 1998, Southern Water Use Caution Area Information Report: Brooksville, Florida, Southwest Florida Water Management District, 17 p.

Southwest Florida Water Management District, 2006, Southern Water Use Caution Area Recovery Strategy: Brooksville, Florida, Southwest Florida Water Management District, 306 p.

Southwest Florida Water Management District, 2020, Quality Control for Southwest Florida Water Management District: Brooksville, Florida, Southwest Florida Water Management District, 125 p.

Sproul, C.R., Boggess, D.H., and Woodward, H.J., 1972, Saline-water intrusion from deep artesian sources in the McGregor Isles area of Lee County, Florida: Florida Bureau of Geology Information Circular 75, 30 p.

Stringfield, V.T., 1936, Artesian water in the Floridan peninsula: U.S. Geological Survey Water-Supply Paper 773-C, p. C115-C195.

Stringfield, V. T., 1966, Artesian water in Tertiary limestone in the Southeastern States: U.S. Geological Survey Professional Paper 517, 226 p.

Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Am. Geophys. Union Trans., vol. 16, pp. 519-524.

Tihansky, A.B., 2005, Effects of Aquifer Heterogeneity on Groundwater Flow and Chloride Concentrations in the Upper Floridan Aquifer near and within an Active Pumping Well Field, West-Central Florida: U.S. Geological Survey Scientific Investigations Report 2004-5268, 75 p.

Tihansky, A.B., and Knochenmus, L.A., in Kuniansky, E.L., ed., 2001, U.S. Geological Survey Karst Interest Group Proceedings: U.S. Geological Survey Water-Resources Investigations Report 01-4011, p. 198-211.

Torres, A.E., Sacks, L.A., Yobbi, D.K., Knochenmus, L.A., and Katz, B.G., 2001, Hydrogeological Framework and Geochemistry of the Intermediate Aquifer System in Parts of Charlotte, De Soto, and Sarasota Counties, Florida: U.S. Geological Survey Water-Resources Investigations Report 01-4015, 81 p.

U.S. Environmental Protection Agency, 2012, 2012 Edition of the Drinking Water Standards and Health Advisories: U.S. Environmental Protection Agency Office of Water Publication no. EPA 822-S-12-011, 18 p. Wedderburn, L.A., Knapp, M.S., Waltz, D.P., and Burns, W.S., 1982, Hydrogeologic Reconnaissance of Lee County, Florida: South Florida Water Management District Technical Publication 82-1, pts. 1, 2, and 3, 192 p.

White, W.A. 1970, The Geomorphology of the Florida Peninsula: Florida Geological Survey Geological Bulletin no. 51, 164 p.

Williams, L.J., and Kuniansky, E.L., 2015, Revised Hydrogeologic Framework of the Floridan Aquifer System in Florida and Parts of Georgia, Alabama, and South Carolina (ver. 1.1, March 2016): U.S. Geological Survey Professional Paper 1807, 140 p., 23 pls., http://dx.doi.org/10.3133/pp1807.

Wolansky, R.M., 1978, Feasibility of water-supply development from the unconfined aquifer in Charlotte County, Florida: U.S. Geological Survey Water-Resources Investigations Report 78-26, 34 p.

Wolansky, R.M., 1983, Hydrogeology of the Sarasota-Port Charlotte Area, Florida: U.S. Geological Survey Water-Resources Investigations Report 82-4089, 54 p.

Wyrick, G.G., 1960, Ground-water resources of Volusia County, Florida: Florida Geological Survey Report of Investigations 22, 65 p.

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 to the District's Environmental Data Portal (EDP) or the Geohydrologic Data Map Viewer.

Collection of Lithologic Samples

The District conducts hydraulic rotary core drilling, referred to as diamond drilling, with a Central Mine Equipment (CME) 85 core drilling rig and an Universal Drilling Rigs (UDR) 200D LS core drilling rig. 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.

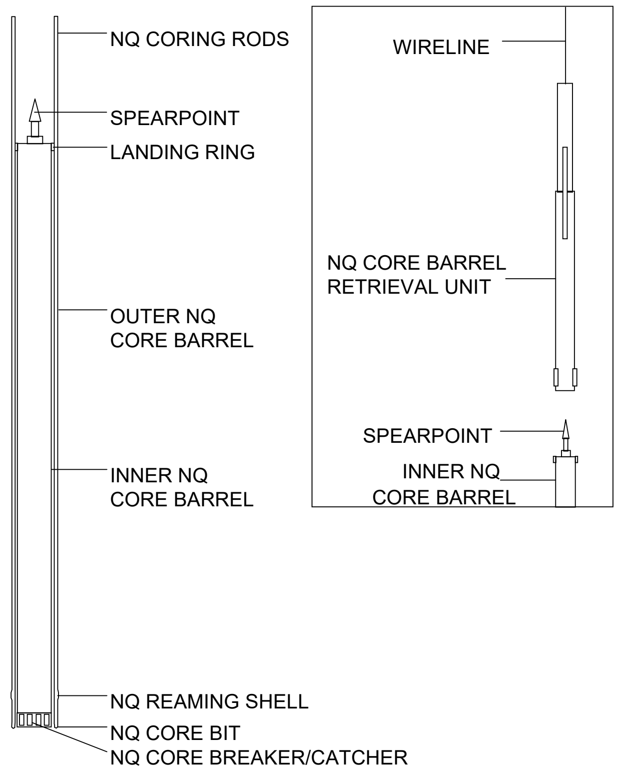


Figure A1. Boart Longyear® NQ Wireline Coring Apparatus.

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 casings 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

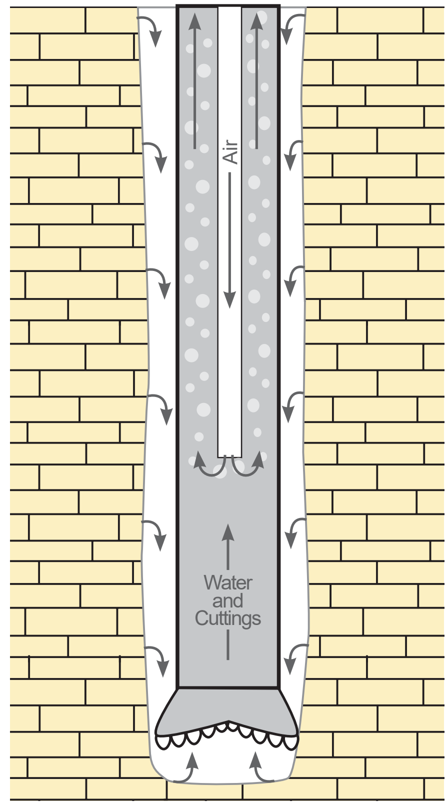
Formation (off-bottom) packer testing allows discrete testing of water levels, water quality, and hydraulic parameters. A competent core hole is necessary for packer testing, meaning unconsolidated sediments and some of the shallow weathered limestone cannot be tested using this technique. The packer 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, 2020). 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 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



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.

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, 2020). 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

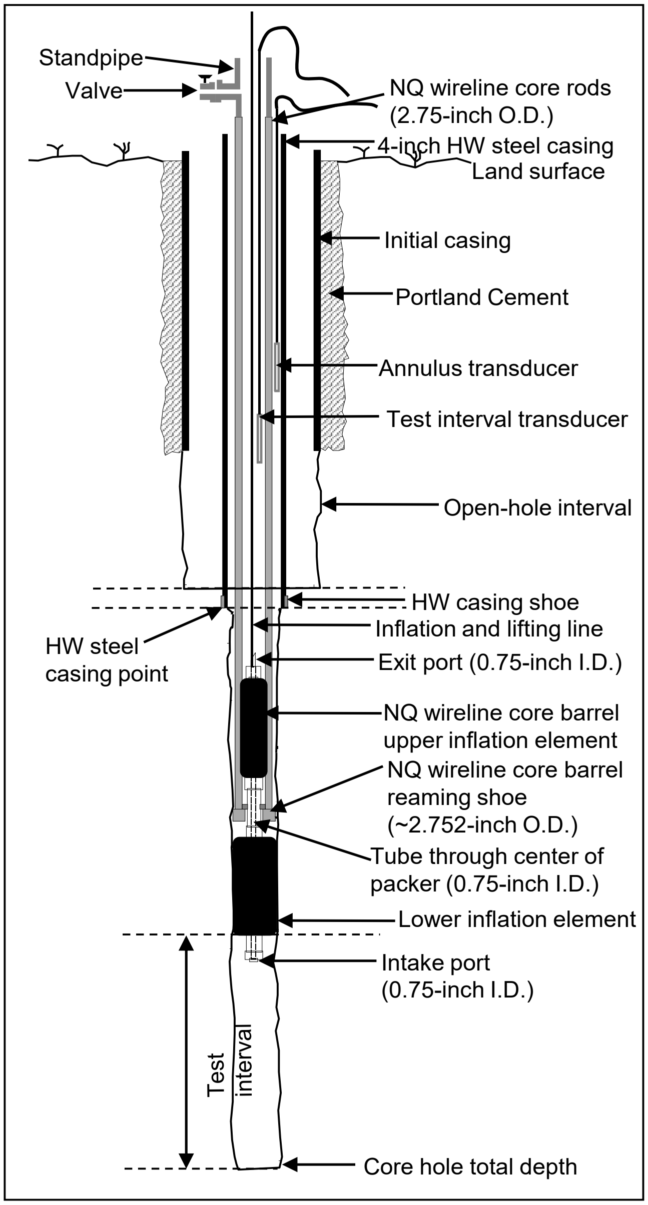


Figure A3. Formation (off-bottom) packer assembly deployed in the core hole.

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® 9300 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, 2020). Chain of Custody forms are used to track

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.

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 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

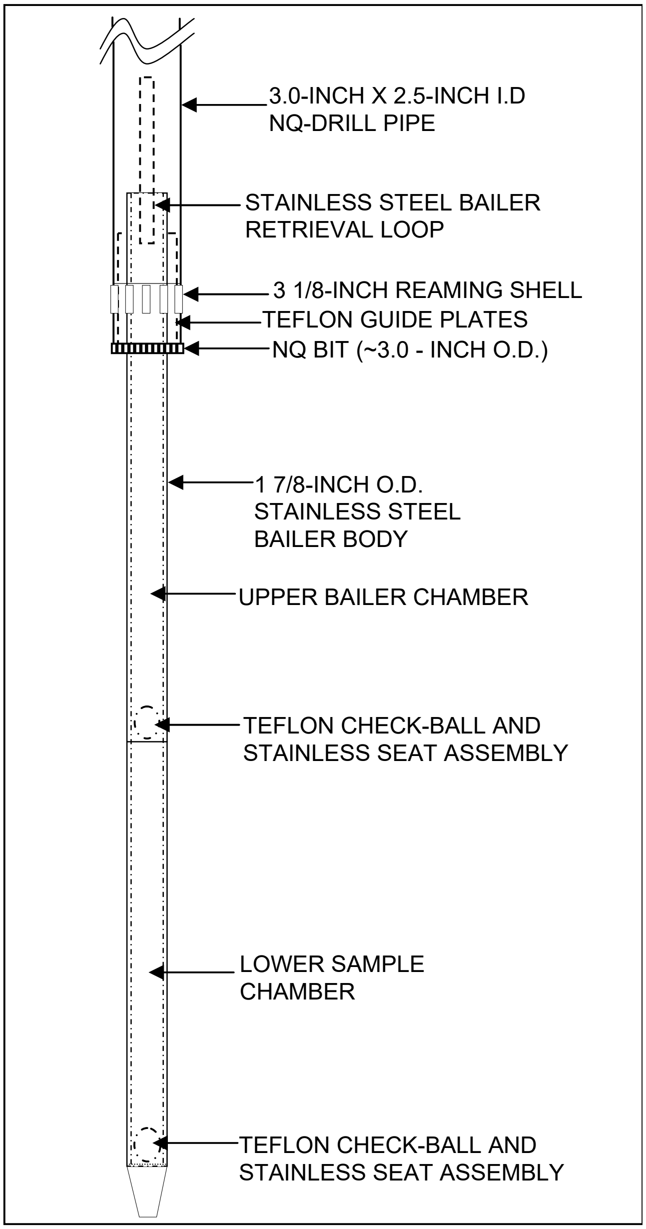


Figure A4. Diagram of the wireline retrievable bailer.

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® and Mount Sopris 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.

References

Butler, J.J., 1998, The Design, Performance, and Analysis of Slug Testing: Boca Raton, Florida, Lewis Publishers, 252 p.

Domenico, P.A., and Schwartz, F.A., 1998, Physical and Chemical Hydrogeology (2d ed.): New York, John Wiley & Sons, Inc., 528 p.

Driscoll, Fletcher G., 1986, Groundwater and Wells (2d ed.): St. Paul, Minnesota, Johnson Division, 1089 p.

Duffield, G. M., 2007, AQTESOLV for Windows, Professional Version 4.5 [software]: Reston, VA, HydroSOLV, Inc.

Dunham, R. J., 1962, Classification of carbonate rocks according to depositional texture, in Ham, W. E. ed., Classification of carbonate rocks: American Association of Petroleum Geologists Memoir 1, p. 108-121.

Fetter, C.W., 2001, Applied Hydrogeology: Upper Saddle River, New Jersey, Prentice Hall, 598 p.

Goddard, E.N., and others, 1948, Rock-Color Chart: Washington, D.C., National Research Council, 6 p. (Republished by Geological Society of America, 1951; reprinted 1963, 1970, 1975).

Hem, J. D., 1985, Study and interpretation of the chemical characteristics of natural water (3d ed.): U.S. Geological Survey Water-Supply Paper 2254.

Keys, W. S., and MacCary, L. M., 1971, Application of Borehole Geophysics to Water-Resources Investigations: U.S. Geological Survey Techniques of Water-Resources Investigations Report, Chapter E1, Book 2, 126 p.

Piper, A.M., 1944, A graphic procedure in the geochemical interpretation of water analyses: American Geophysical Union Transactions, v. 25, p. 914-923.

Shuter, E., and Teasdale, W.E., 1989, Application of Drilling, Coring, and Sampling Techniques to Test Holes and Wells: U.S. Geological Survey Techniques of Water-Resources Investigations Report, Chapter F1, Book 2, 97 p.

Southwest Florida Water Management District (SWFWMD), 2020, Quality Control for Southwest Florida Water Management District (rev. 23): Brooksville, Florida, Southwest Florida Water Management District, 61 p.

Stallman, R.W., 1976, Aquifer-Test Design, Observation and Data Analysis: U.S. Geological Survey Techniques of Water-Resources Investigations Report, Chapter B1, Book 3, 26 p.

Water Quality Monitoring Program, 2020, Standard Operating Procedures for the Collection of Water Quality Samples (rev. 12): Brooksville, FL., Southwest Florida Water Management District. 116 p.

Appendix B. Geophysical Log Suites for the ROMP 38 – Parrish Well Site in Manatee County, Florida

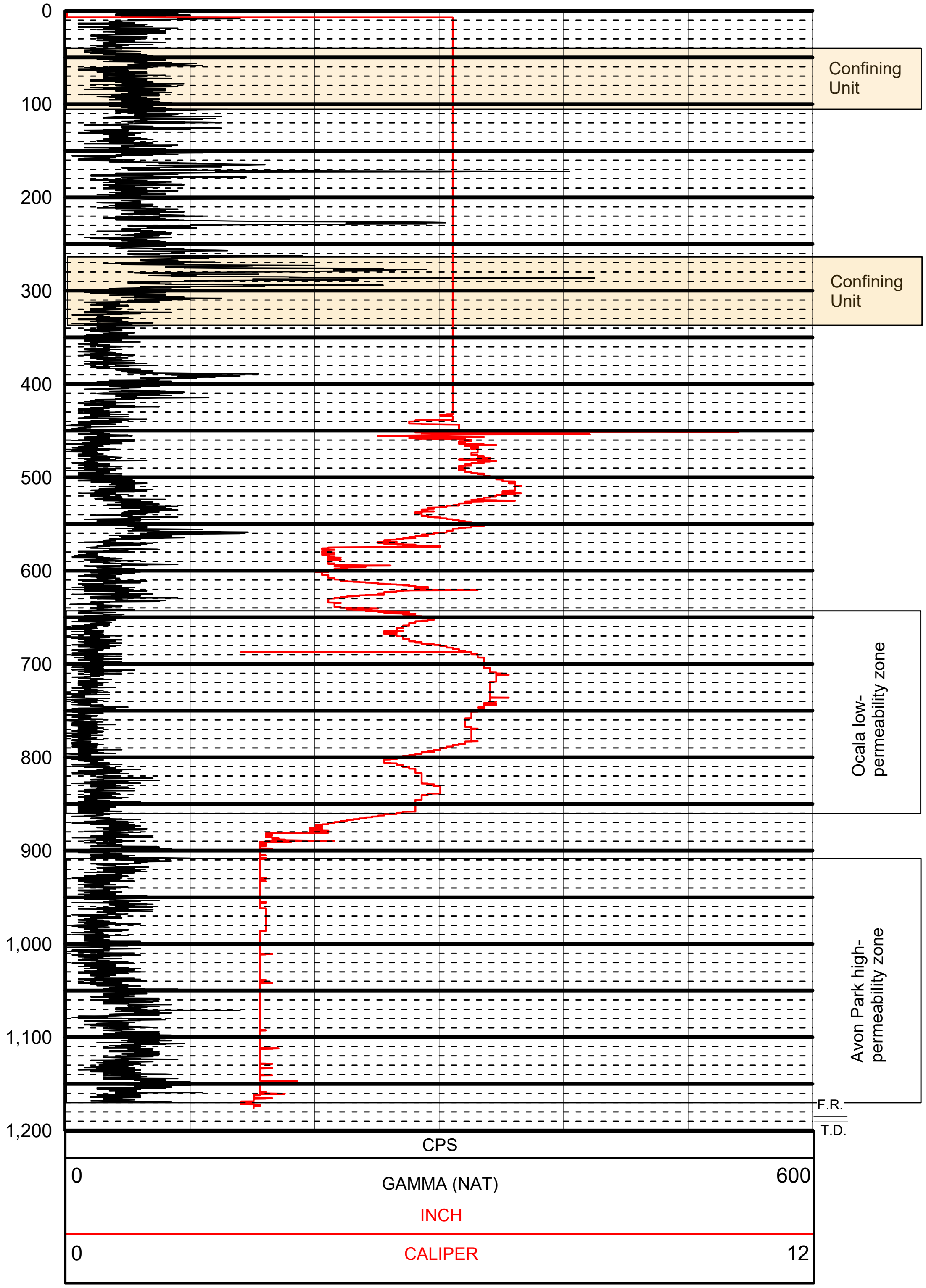


Figure B1. Geophysical log suite for *Corehole* from land surface to 1,184.3 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on March 6, 2012, using the 9165C (caliper/gamma-ray) tool. Six-inch steel casing was installed from land surface to 450 feet below land surface at the time of logging. The log scale is 1-inch per 200 feet and is linearly scaled. The FR is 1,178 feet below land surface. Depths of hydrostratigraphic units depicted are from the exploratory core hole, not the logged well.

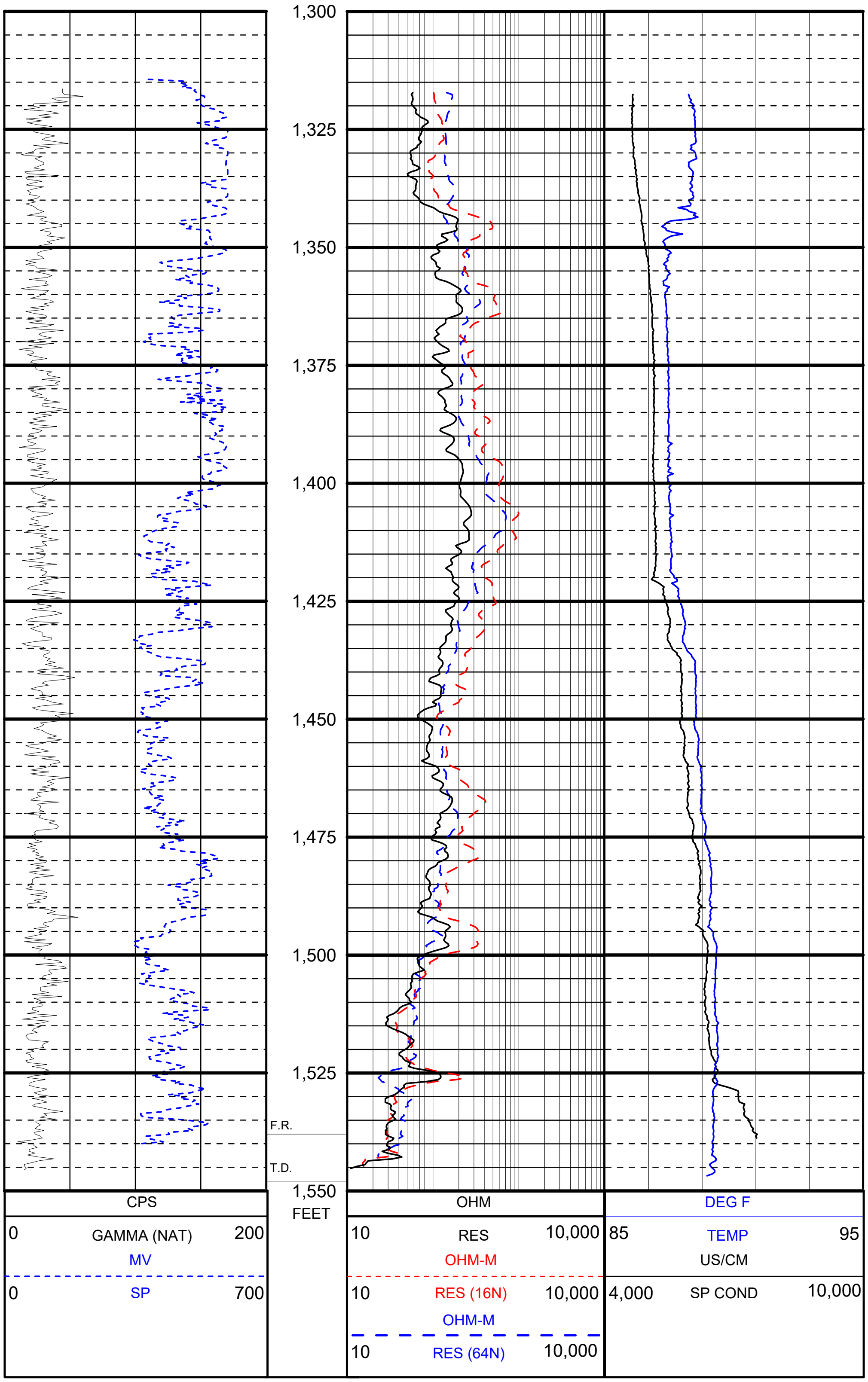


Figure B2. Geophysical log suite for the *Corehole* from 1,314.4 to 1,546.8 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on January 23, 2012, using the 8044C (multi-function) tool. The log scale is 4-inch to 100 feet bls. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 1,538 feet below land surface. The geophysical logging tool encountered an obstruction and got stuck at 1,314.4 feet bls, preventing data collection completion.

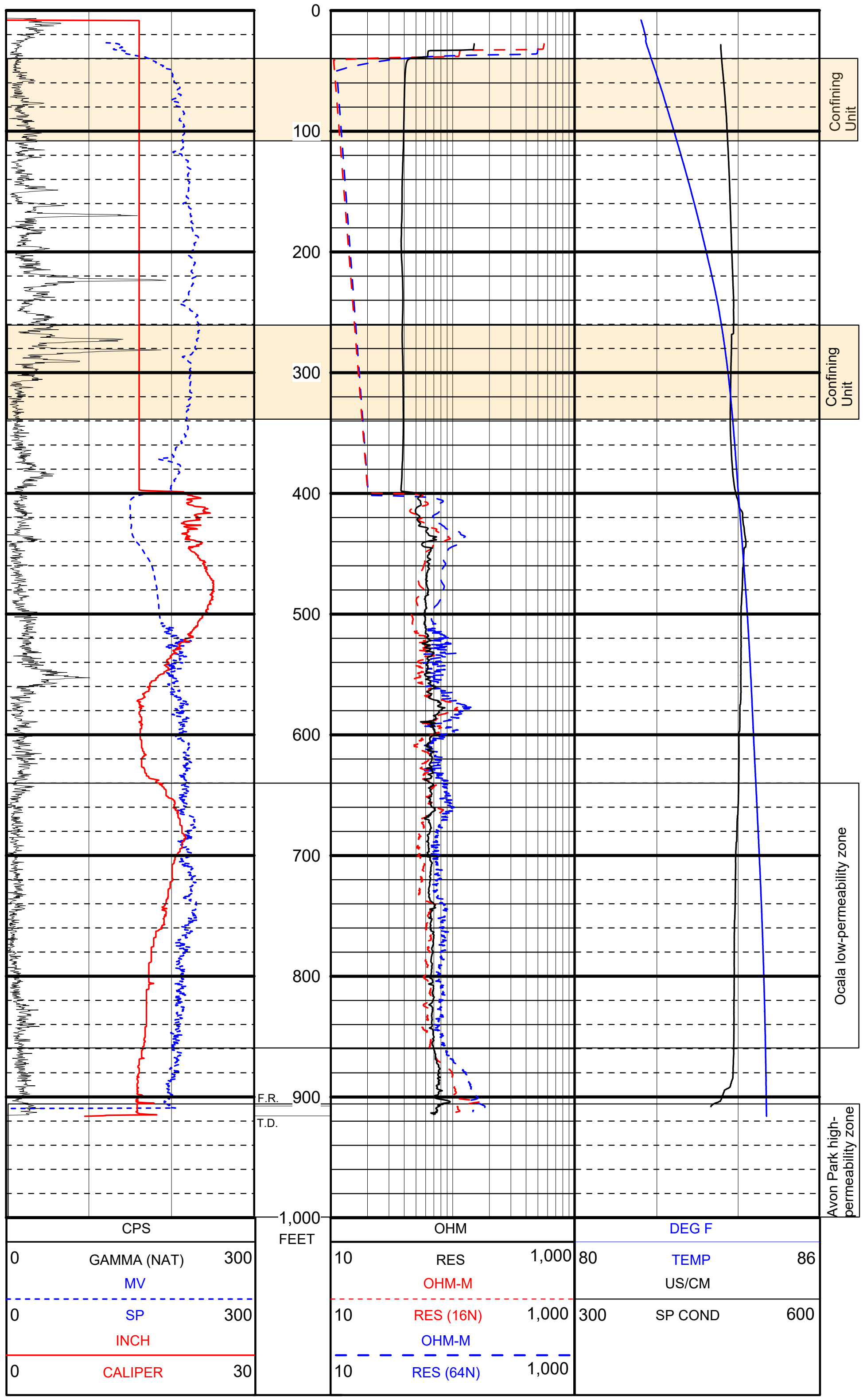


Figure B3. Geophysical log suite for the *U Fldn Aq (Avpk HPZ)* monitor from land surface to 916 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on January 22, 2013, using the 8144C (multi-function) and 9165C (caliper/gamma-ray) tools. 16-inch steel casing was installed to 399 feet below land surface. The log scale is 1-inch to 150 feet. The FR is 908 feet below land surface. Depths of hydrostraticgraphic units depicted are from the exploratory core hole, not the logged well.

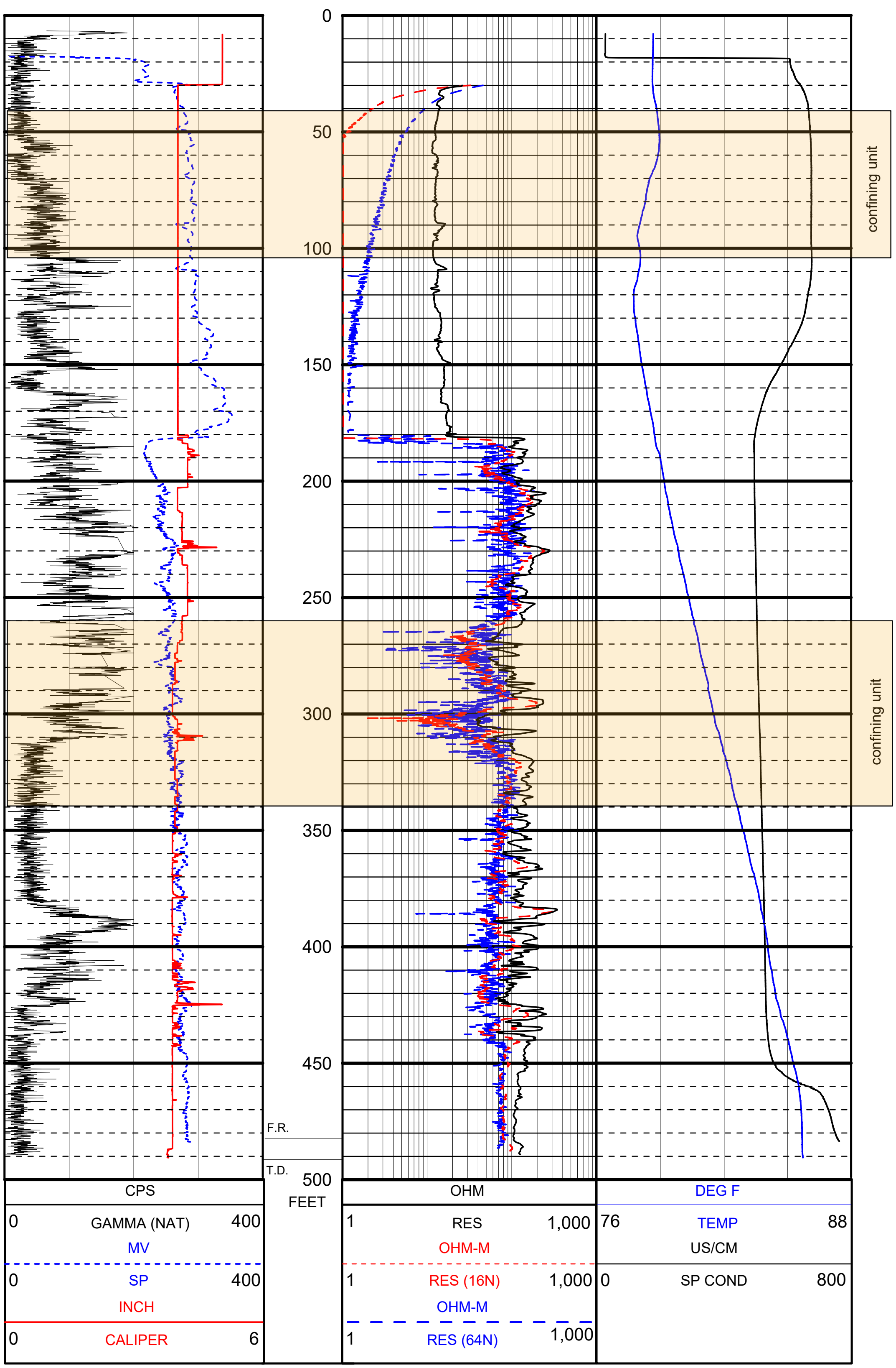


Figure B4. Geophysical log suite for the *Corehole* from 1 foot to 490.6 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on August 30, 2011, using the 8144C (multifunction) and 9165C (caliper/gamma-ray) tools. A temporary HWT casing (4.5-inch) was installed to 180 feet below land surface at the time of logging. The log scale is 2-inch to 100 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 483.5 feet below land surface.

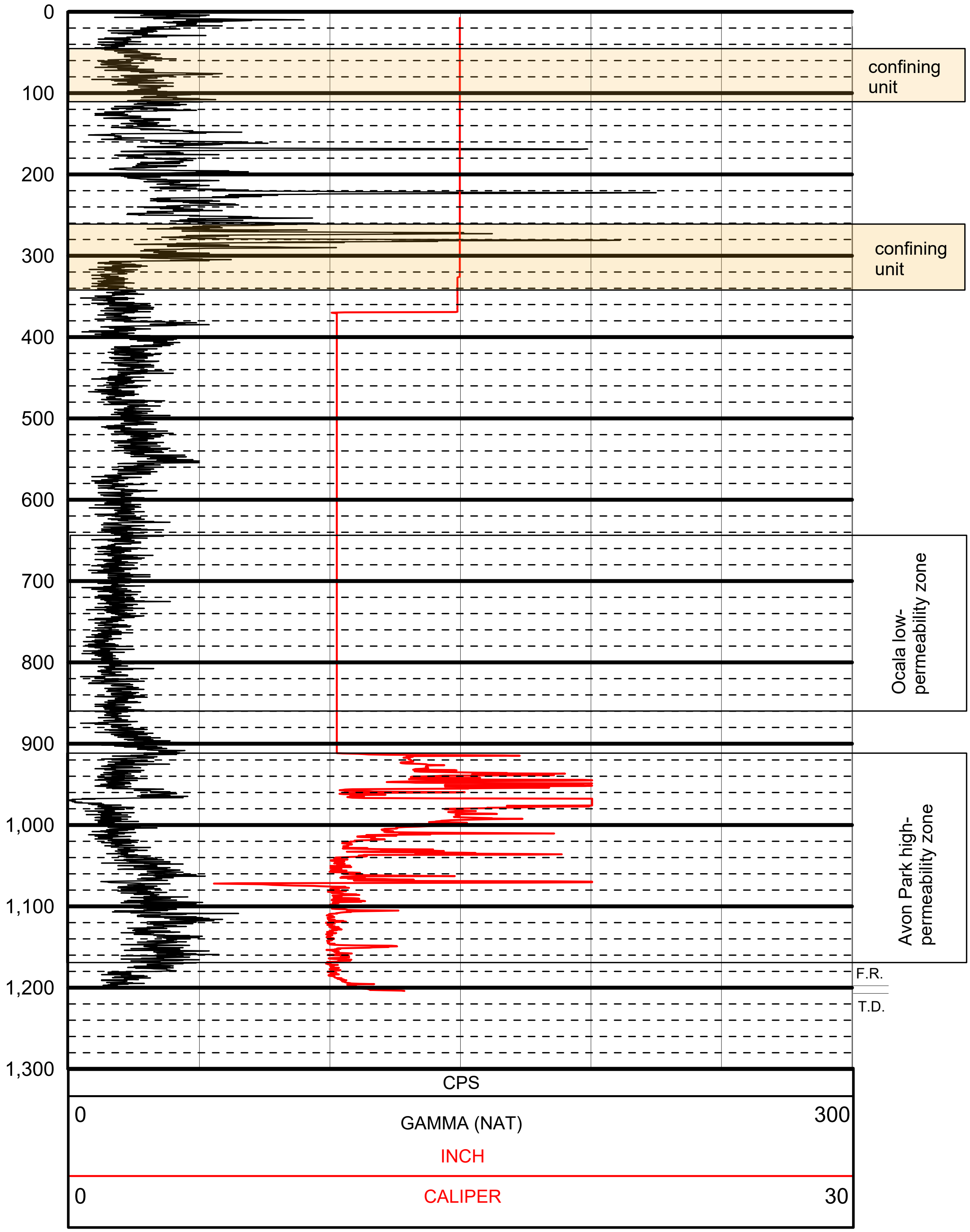


Figure B5. Geophysical log suite for the *U Fldn Aq (Avpk HPZ) monitor* well from land surface to 1,204 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on February 19, 2013, using the 9165C (caliper/gamma-ray) tool. Sixteen-inch steel casing was installed from land surface to 399 feet below land surface, and 10-inch casing was installed from 369 to 912 feet bls at the time of logging. The log scale is 1-inch per 100 feet and is linearly scaled. The FR is 1,197.6 feet below land surface. Depths of hydrostraticgraphic units depicted are from the exploratory core hole, not the logged well.

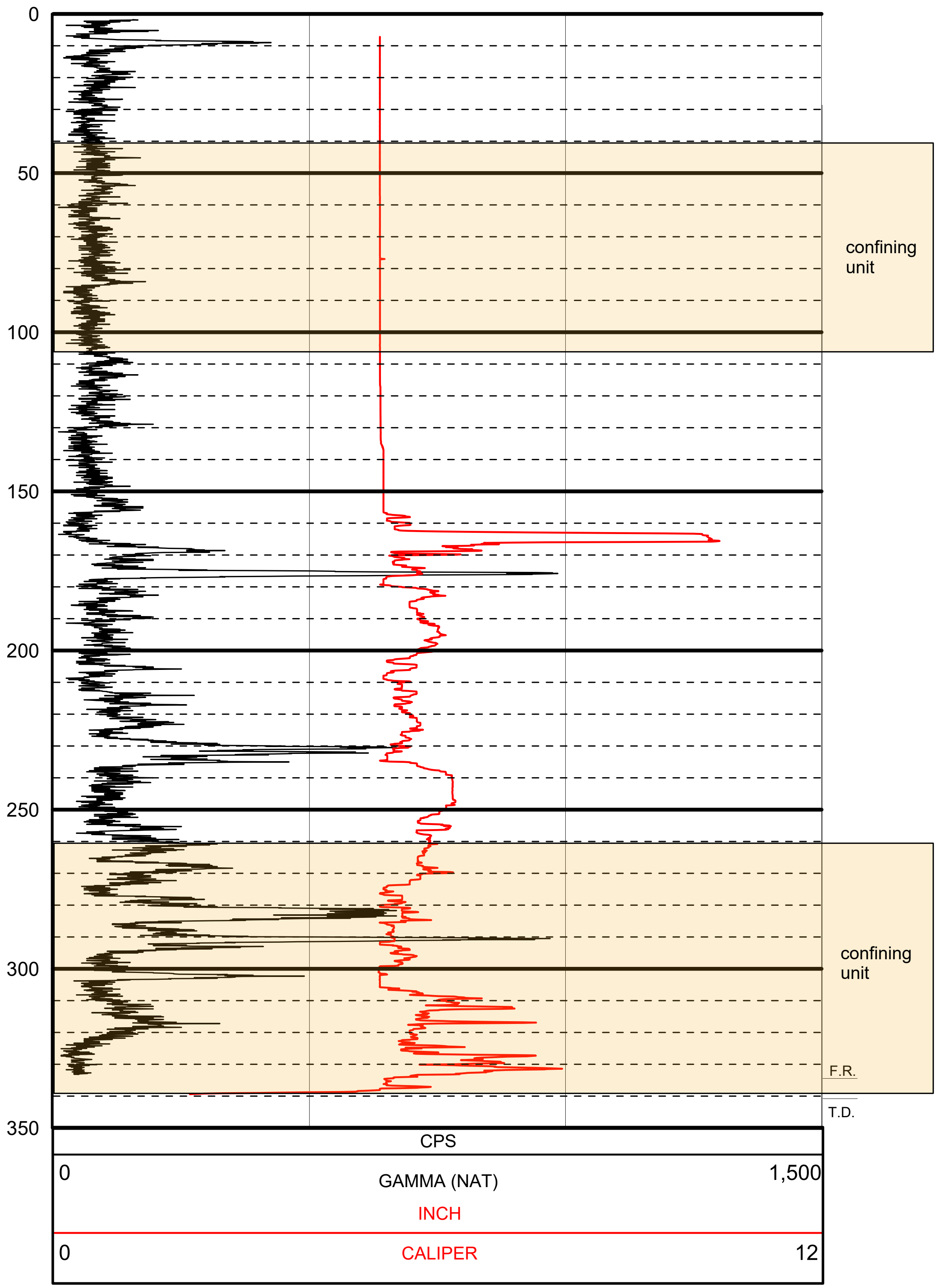


Figure B6. Geophysical log suite for the *Drilling Water Supply* well from land surface to 339.5 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on July 20, 2011, using the 9165C (caliper/gamma-ray) tool. Five-inch steel casing was installed from land surface to 156 feet below land surface at the time of logging. The log scale is 2-inches per 100 feet and is linearly scaled. The FR is 339.4 feet below land surface. Depths of hydrostraticgraphic units depicted are from the exploratory core hole, not the logged well.

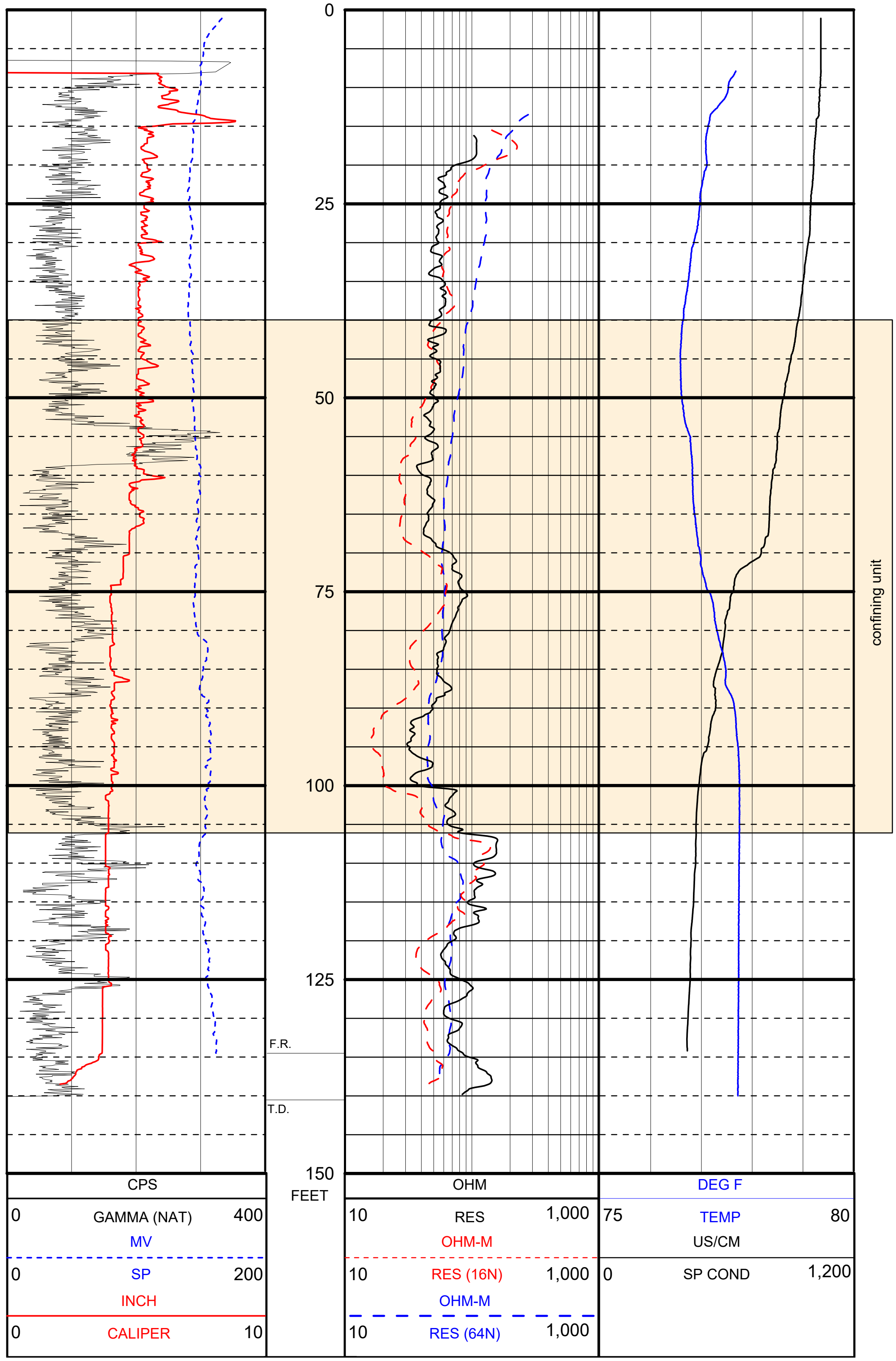


Figure B7. Geophysical log suite for the *Corehole* from 1 foot to 141.3 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on July 26, 2011, using the 8144C (multifunction) and 9165C (caliper/gamma-ray) tools. Seventy-two feet of temporary HWT casing was tripped out of the core hole before logging commenced. The log scale is 6-inches to 100 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 134.2 feet below land surface.

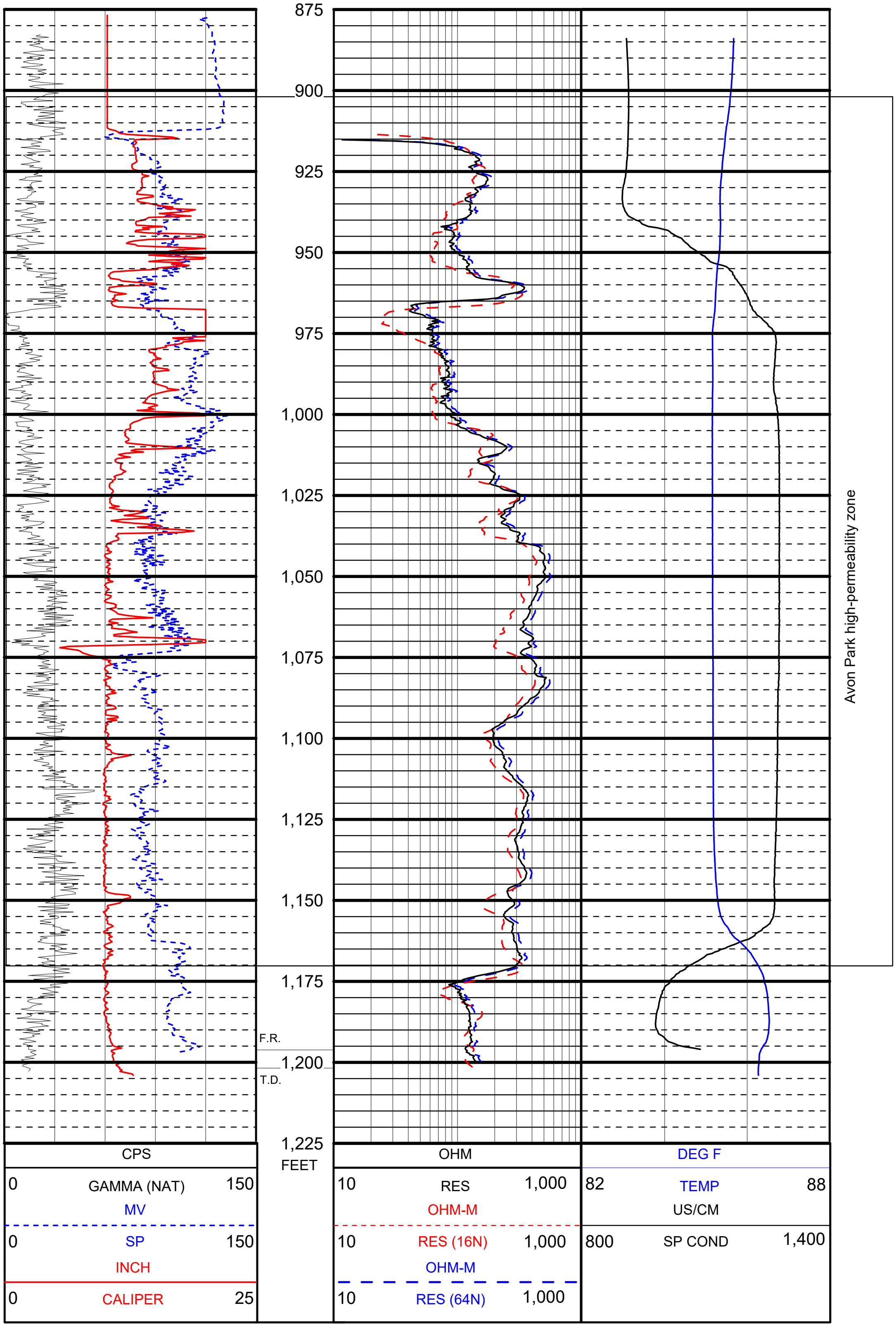


Figure B8. Geophysical log suite for the *U Fldn Aq (Avpk HPZ) monitor* from 876.8 to 1,204 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on February 19, 2013, using the 8144C (multifunction) and 9165C (caliper/gamma-ray) tools. Ten-inch steel casing was installed from 369 to 912 feet bls at the time of logging. The log scale is 2-inches to 100 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 1,196 feet below land surface.

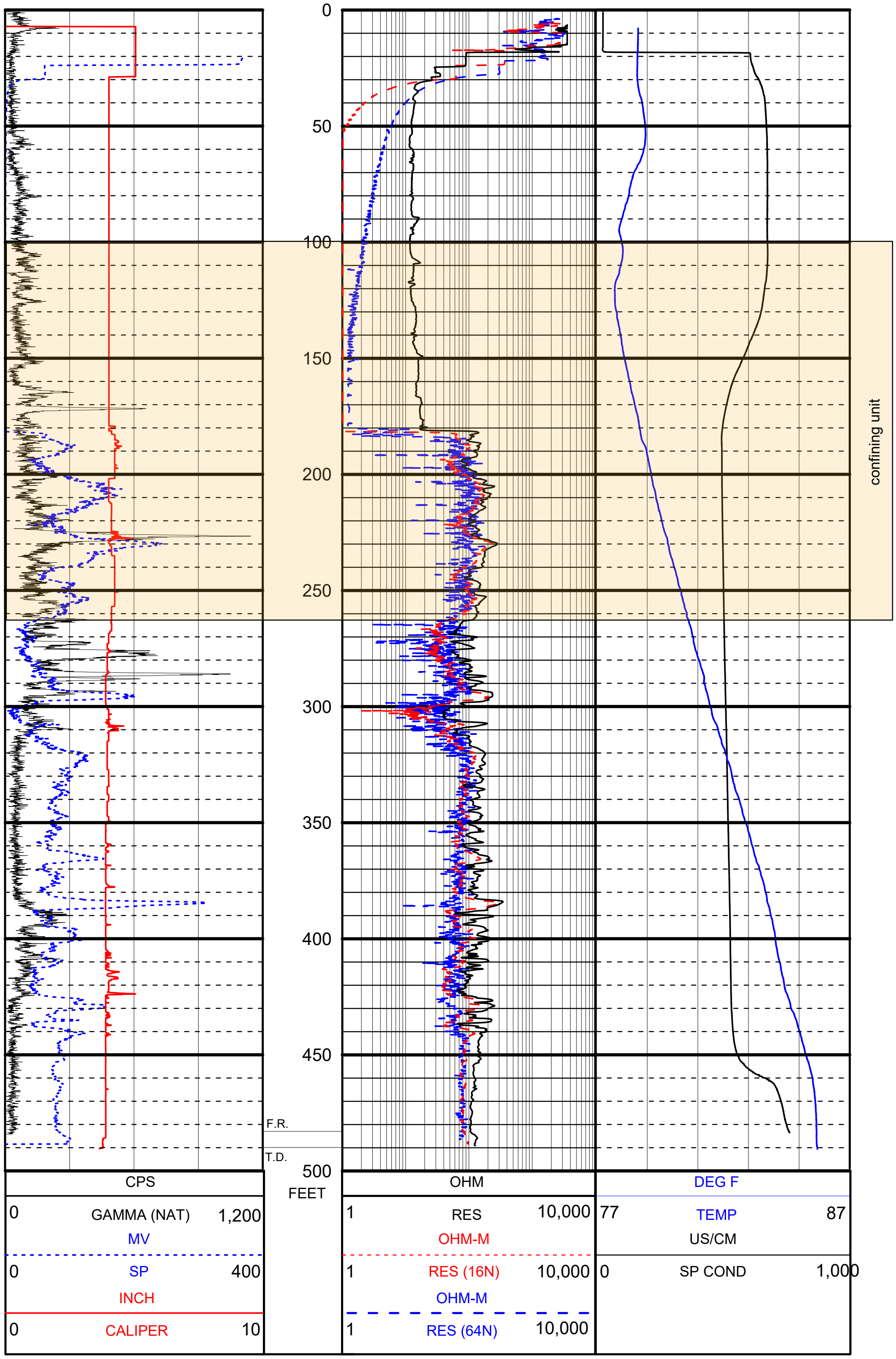


Figure B9. Geophysical log suite for the *Corehole* from land surface to 190 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on August 30, 2011, using the 8144C (multifunction) and 9165C (caliper/gamma-ray) tools. Ten-inch steel casing was installed from land surface to 74 feet bls at the time of logging. The log scale is 2-inches to 100 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 183 feet below land surface.

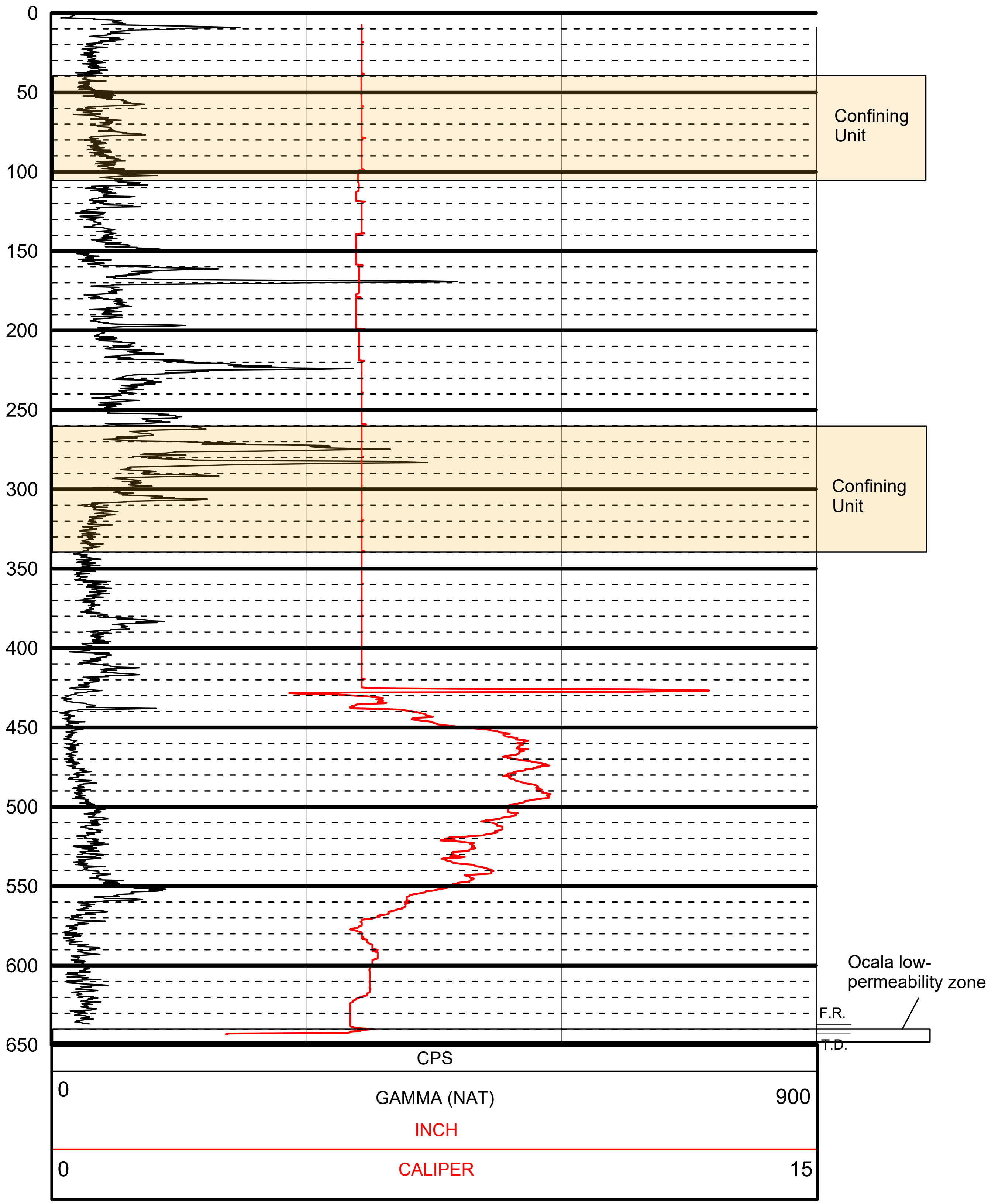


Figure B10. Geophysical log suite for the *U Fldn Aq (Swnn) monitor* well from land surface to 643.2 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on March 28, 2013, using the 9165C (caliper/gamma-ray) tool. Six-inch Schedule 40 PVC casing was installed from land surface to 425 feet bls at the time of logging. The log scale is 1-inches per 100 feet and is linearly scaled. The FR is 636.8 feet below land surface. Depths of hydrostraticgraphic units depicted are from the exploratory core hole, not the logged well.

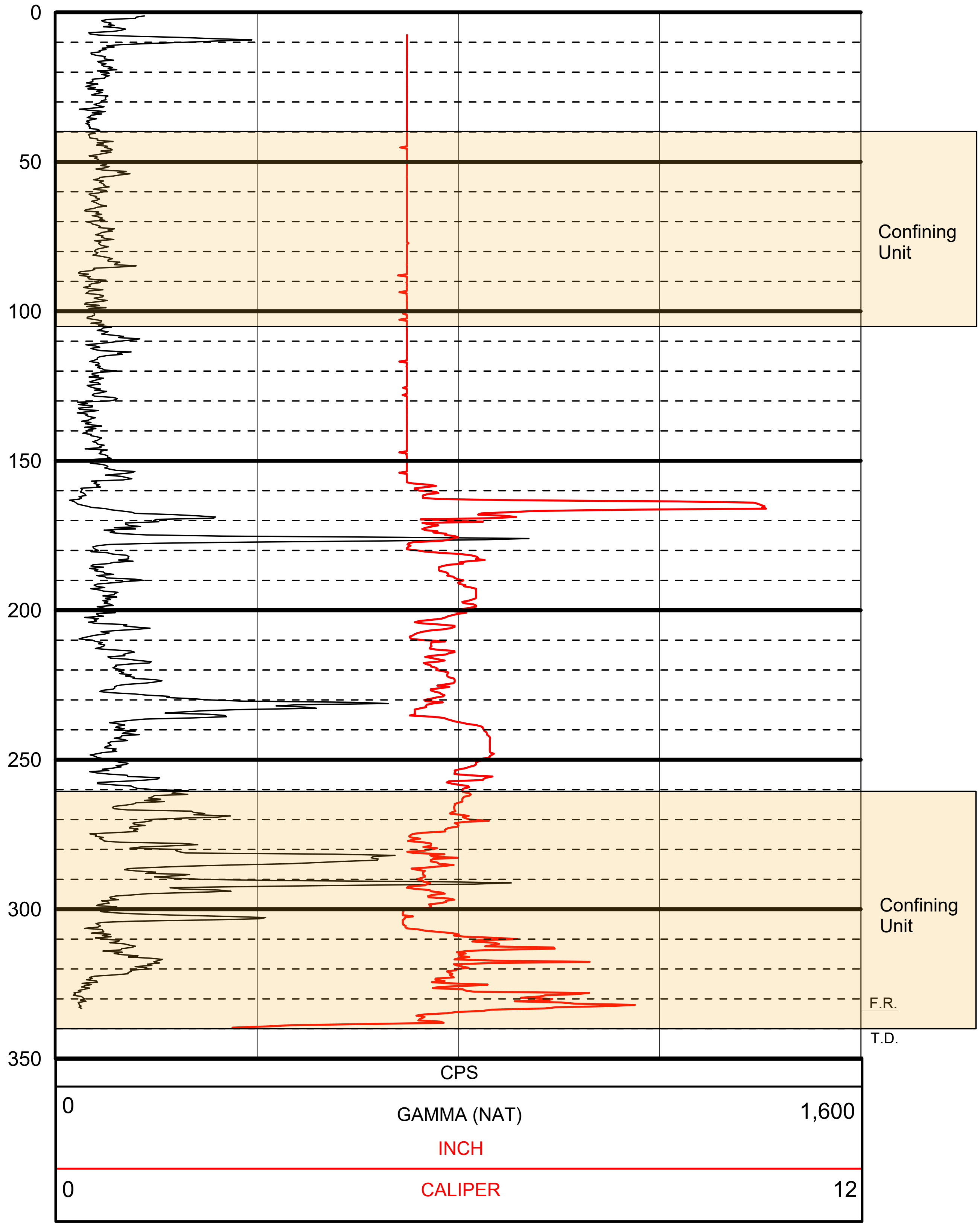


Figure B11. Geophysical log suite for the *Drilling Water Supply* well from land surface to 339.6 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on August 28, 2013, using the 9165C (caliper/gamma-ray) tool. Five-inch PVC casing was installed from land surface to 156 feet bls at the time of logging. The log scale is 3-inches per 100 feet and is linearly scaled. The FR is 333.2 feet below land surface. Depths of hydrostraticgraphic units depicted are from the exploratory core hole, not the logged well.

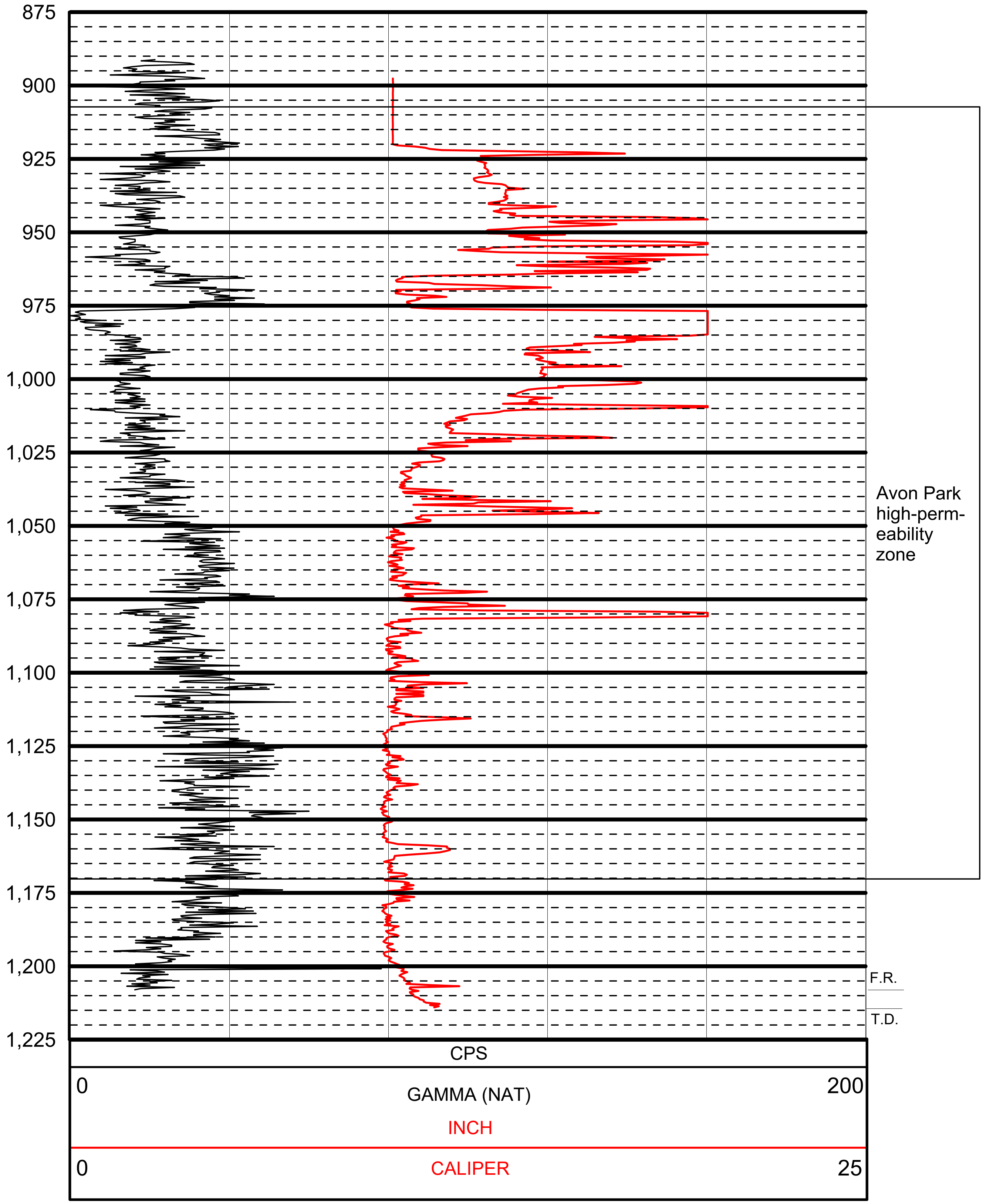


Figure B12. Geophysical log suite for the *U Fldn Aq (AVPK HPZ) monitor* well from 890 to 1,214 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on January 6, 2016, using the 9165C (caliper/gamma-ray) tool. Ten-inch steel casing was installed from 369 to 910 feet bls at the time of logging. The log scale is 2-inches per 100 feet and is linearly scaled. The FR is 1,208 feet below land surface. Depths of hydrostraticgraphic units depicted are from the exploratory core hole, not the logged well.

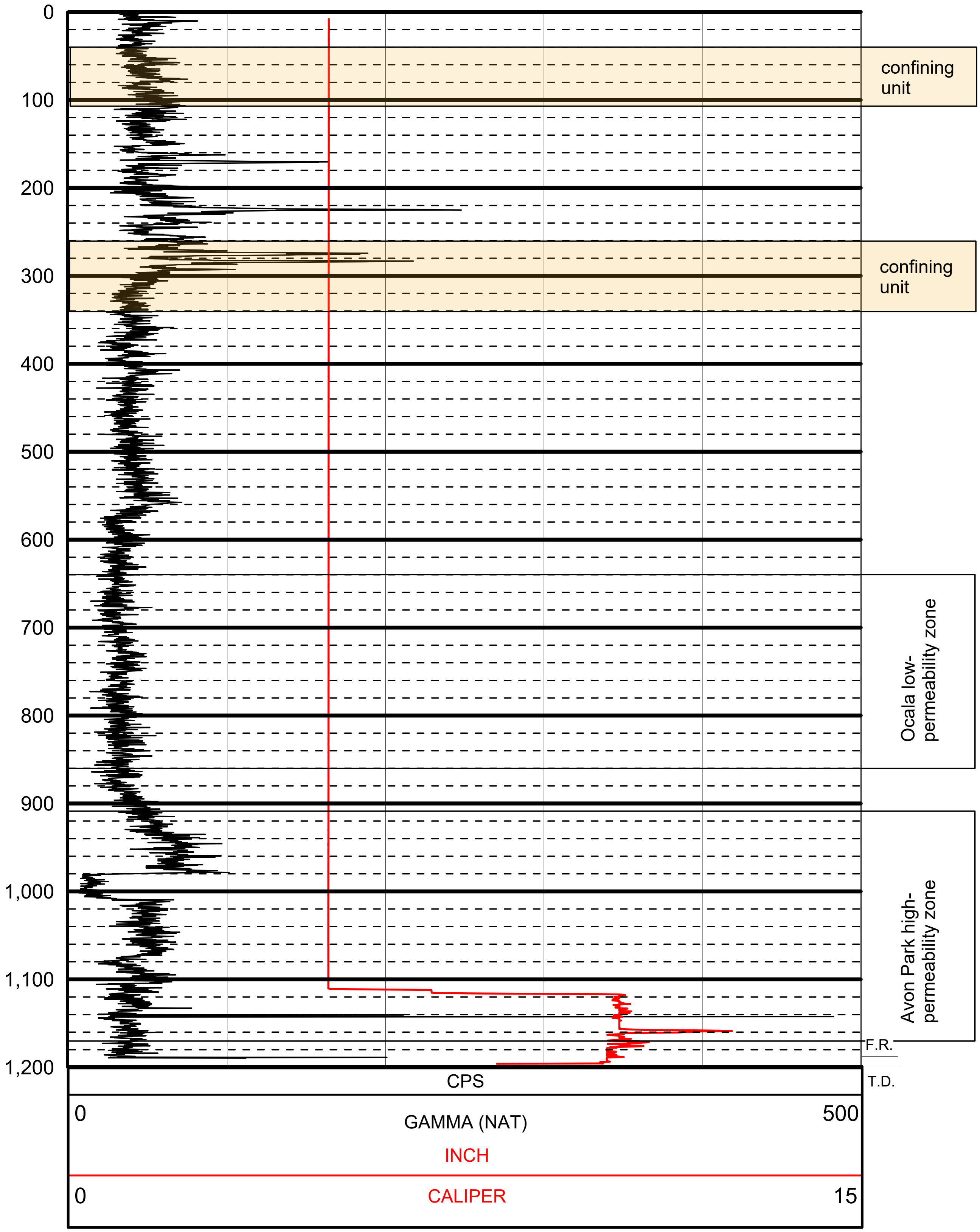


Figure B13. Geophysical log suite for the *U Fldn Aq (AVPK HPZ) 4.5-Inch monitor* well from land surface to 1,196 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on May 24, 2016, using the 9165C (caliper/gamma-ray) tool. A 4.5-inch SDR-17 PVC casing was installed from 3 feet als to 1,110 feet bls at the time of logging. The log scale is 4-inches per 500 feet and is linearly scaled. The FR is 1,189.6 feet below land surface. Depths of hydrostraticgraphic units depicted are from the exploratory core hole, not the logged well.

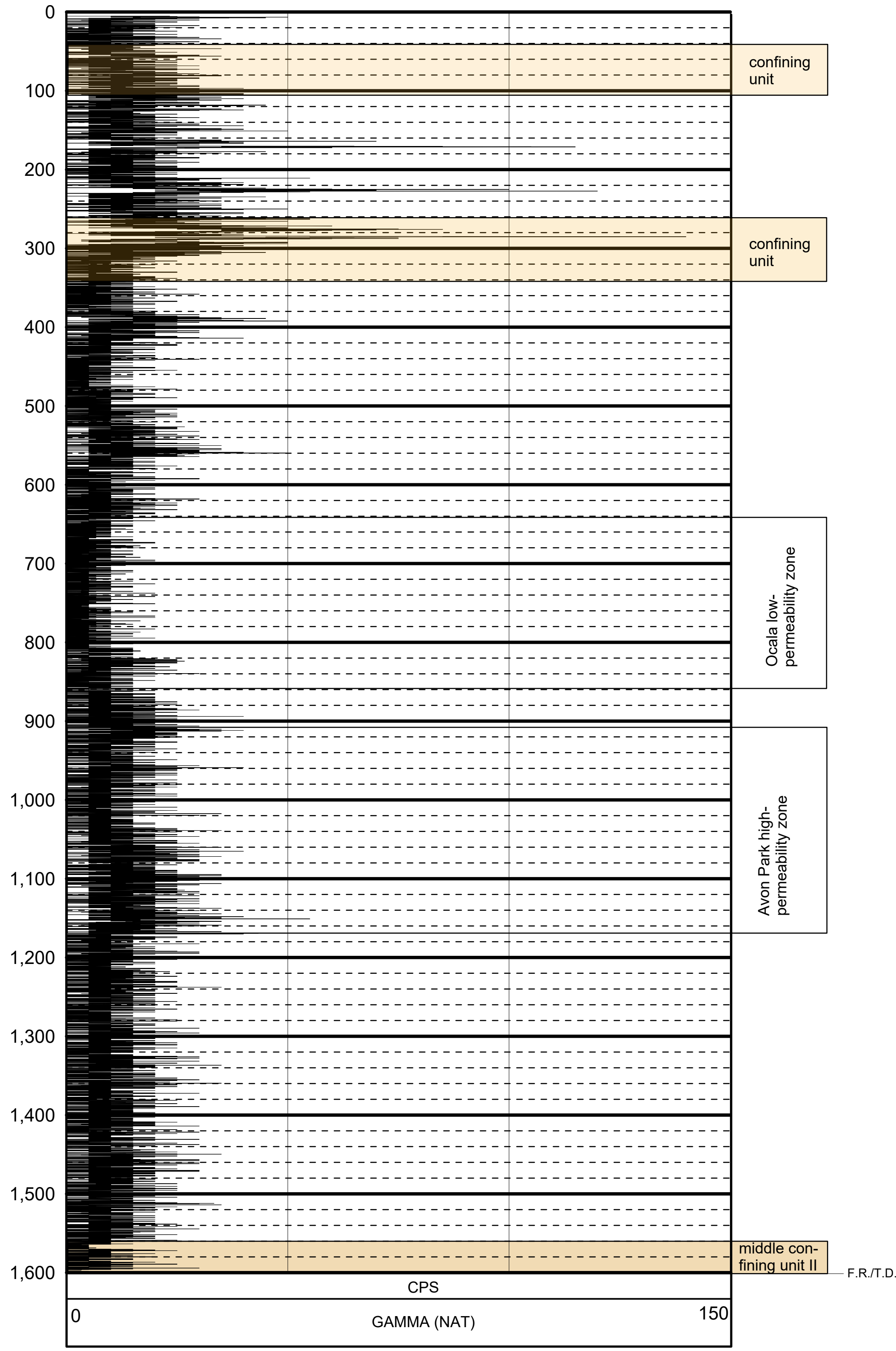
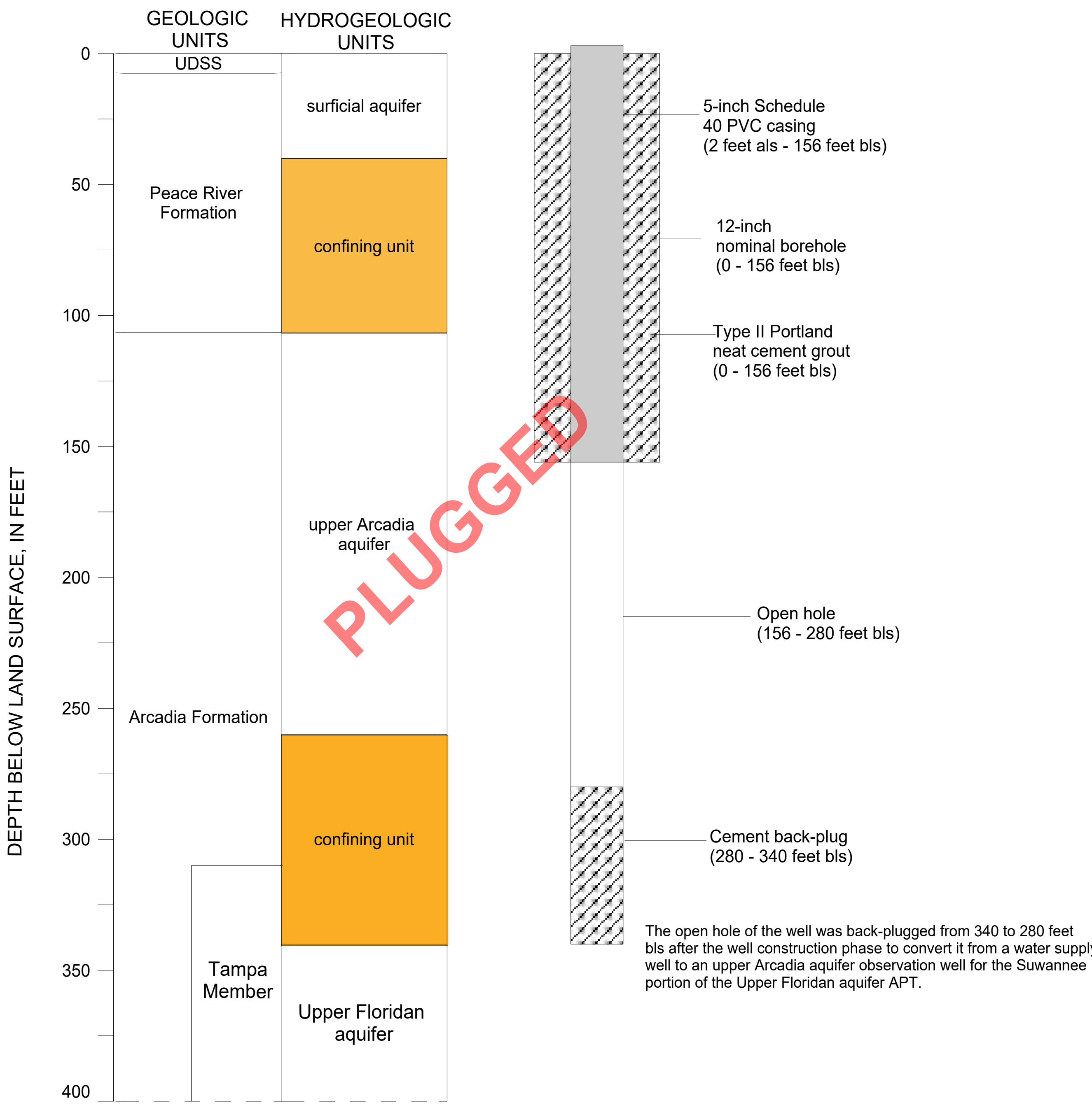
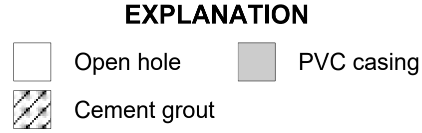


Figure B14. Geophysical log suite for the *Corehole* from land surface to 1,600 feet below land surface conducted at the ROMP 38 – Parrish well site in Manatee County, Florida. The log was collected on January 19, 2012, using the 9060C (induction) tool. The tool was run inside steel core rods (2.38-inch NQ) set on core hole bottom at a total depth of 1,600 feet bls at the time of logging. The log scale is 1-inch per 100 feet and is linearly scaled. The FR is 1,600 feet below land surface.

Appendix C. Well As-built Diagrams for the ROMP 38 – Parrish Well Site in Manatee County, Florida

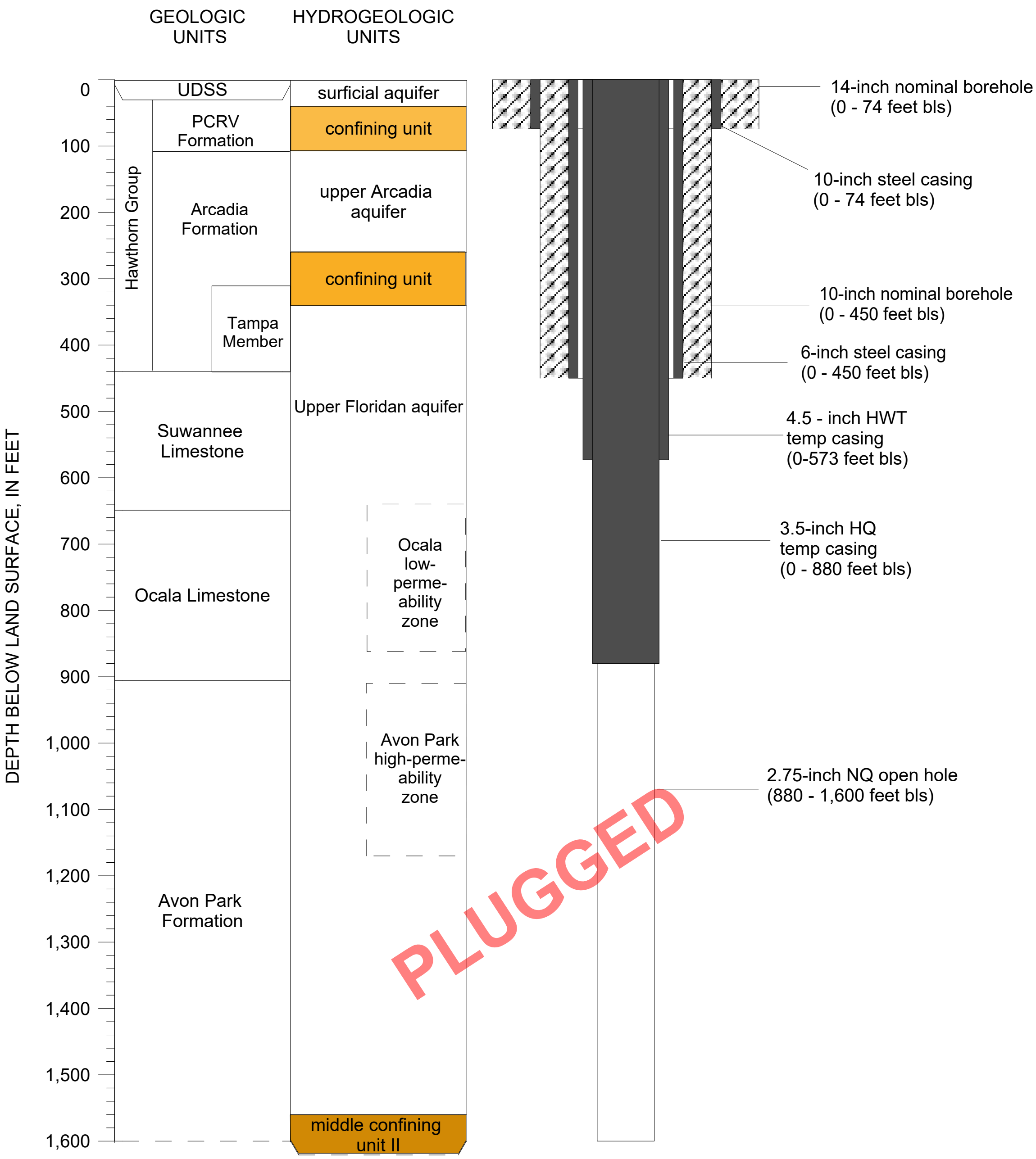


Well Name:	ROMP 38 Drilling Water Supply Well
SID:	786375
WCP:	814003, 842057, 849447
S/T/R:	30/33/19
Latitude:	27° 34’ 51.02” N
Longitude:	82° 26’ 09.61” W
Reporting Category:	LWPA
Const. Began:	07/12/2011
Const. Complete:	07/19/2011



[UDSS, undifferentiated and, clay, and shell; PVC, polyvinyl chloride; als, above land surface; bls, below land surface; SID, Station Identification; WCP, well construction permit; S/T/R, Section/Township/Range; Const., Construction]

Figure C1. Well as-built diagram for the *Drilling Water Supply* well at the ROMP 38 – Parrish well site in Manatee County, Florida.



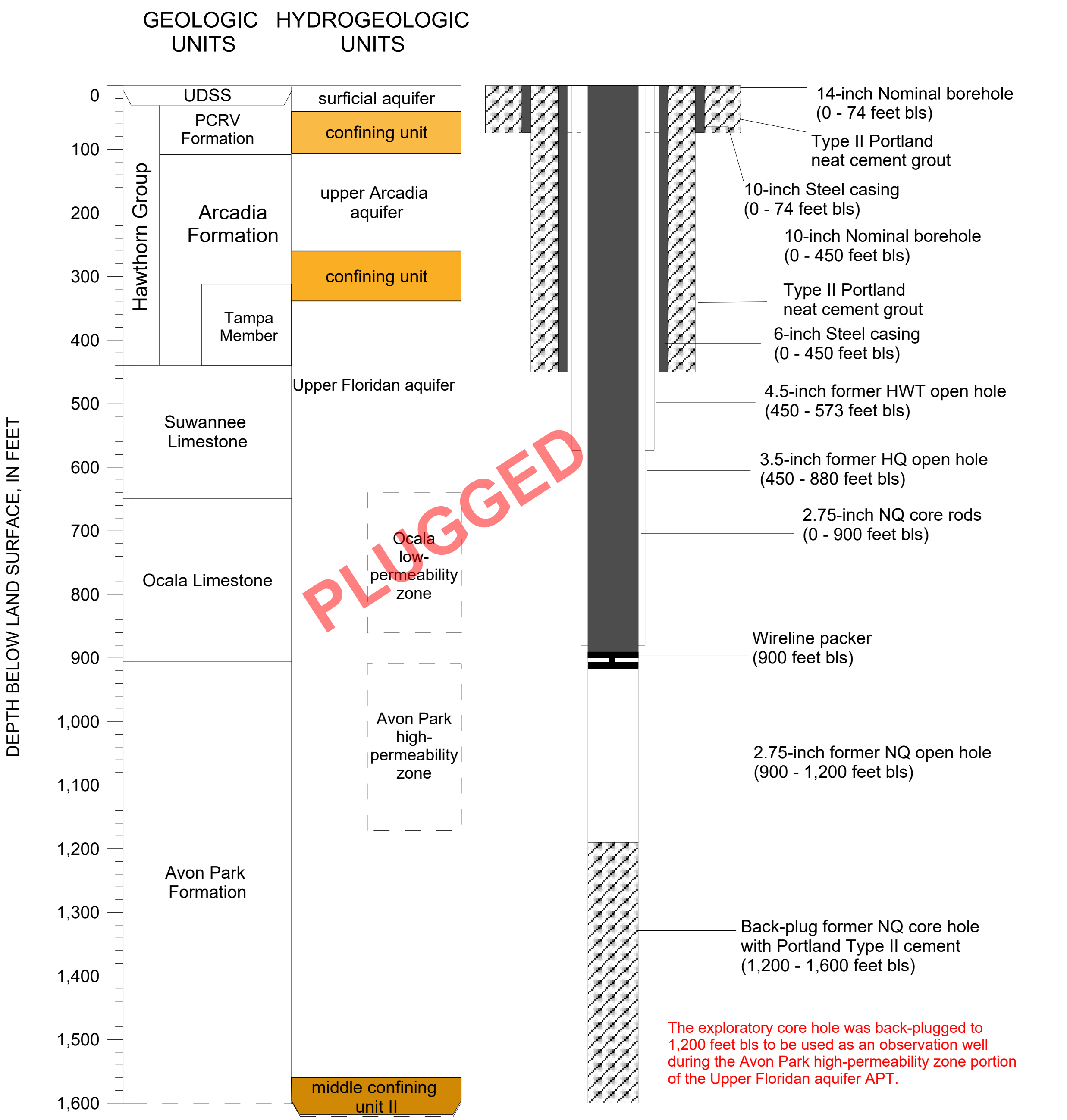
Well Name:	ROMP 38 Corehole
SID:	780144
WCP:	814147, 841995
S/T/R:	30/33/19
Latitude:	27° 34' 52.02" N
Longitude:	82° 26' 11.13" W
Reporting Category:	LWPA
Const. Began:	07/11/2011
Const. Complete:	01/13/2016

EXPLANATION

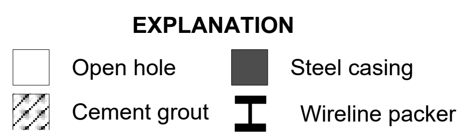
Open hole
Steel casing
Cement grout

[UDQS, undifferentiated Quaternary sediments; PCRV, Peace River; bls below land surface; HWT, 4-inch internal diameter drill rod; HQ, 3.06-inch internal diameter drill rod; NQ, 2.38-inch internal diameter drill rod; U Fldn Aq, Upper Floridan aquifer; Swnn, Suwannee; SID, Station Identification; WCP, well construction permit; Temp, temporary; S/T/R; Section/Township/Range; Const., Construction]

Figure C2. Well as-built diagram for the *Corehole* at the ROMP 38 – Parrish well site in Manatee County, Florida.

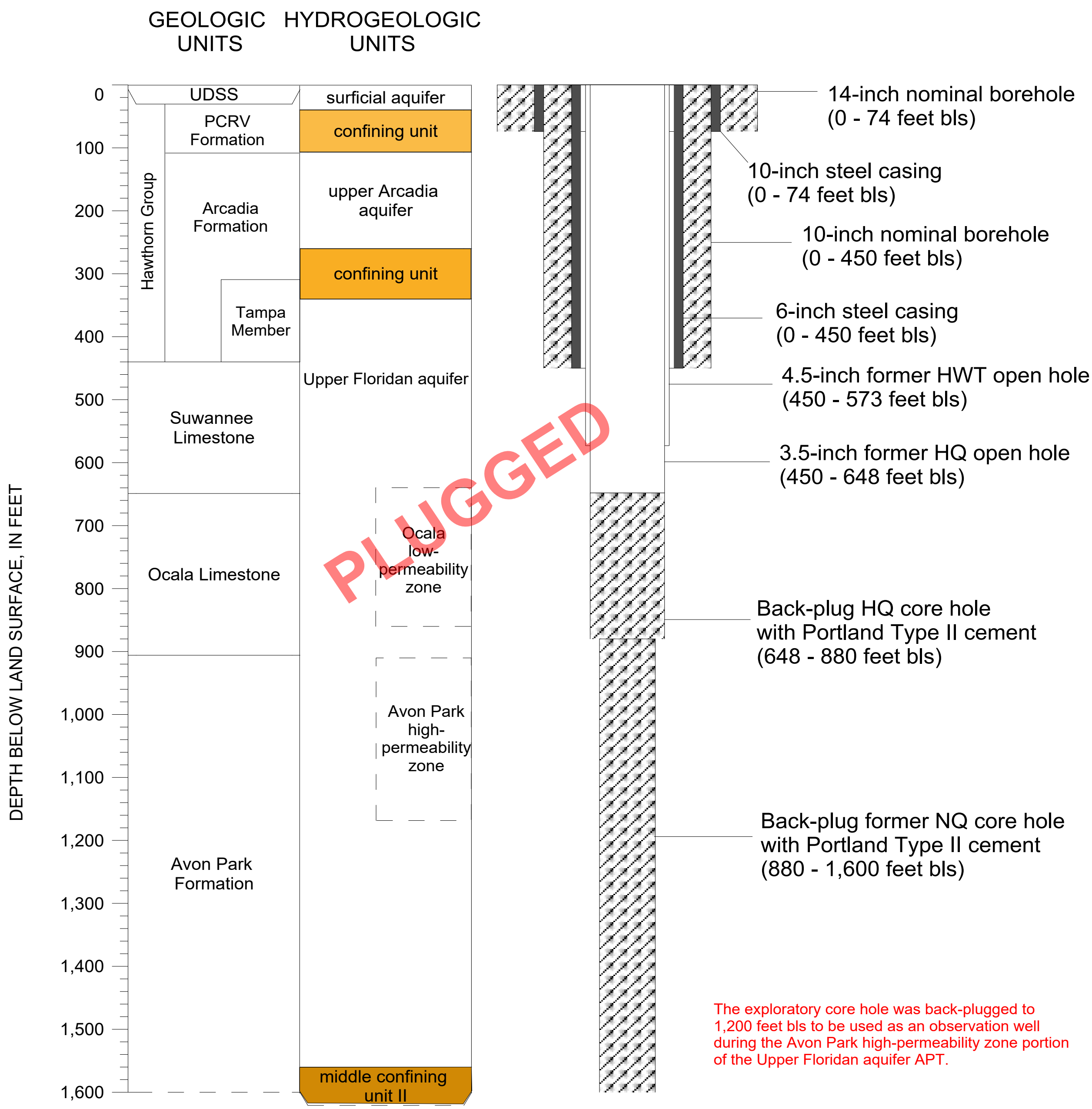


Well Name:	ROMP 38 U Fldn Aq (Avpk HPZ) Temp Ob
SID:	--
WCP:	817440, 814147, 825125, 847317
S/T/R:	30/33/19
Latitude:	27° 34' 52.02" N
Longitude:	82° 26' 11.19" W
Reporting Category:	LWPA
Const. Began:	07/11/2011
Const. Complete:	02/18/2013



[UDQS, undifferentiated Quaternary sediments; U Fldn Aq, Upper Floridan aquifer; Avpk, Avon Park; HPZ, high-permeability zone; PCRV, Peace River; HQ, 3.06-inch internal diameter core drilling rod; NQ, 2.38-inch internal diameter core drilling rod; SID, Station Identification; WCP, well construction permit; bls, below land surface; Const., Construction]

Figure C3. Well as-built diagram for the U Fldn Aq (Avpk HPZ) Temp Ob well at the ROMP 38 – Parrish well site in Manatee County, Florida.



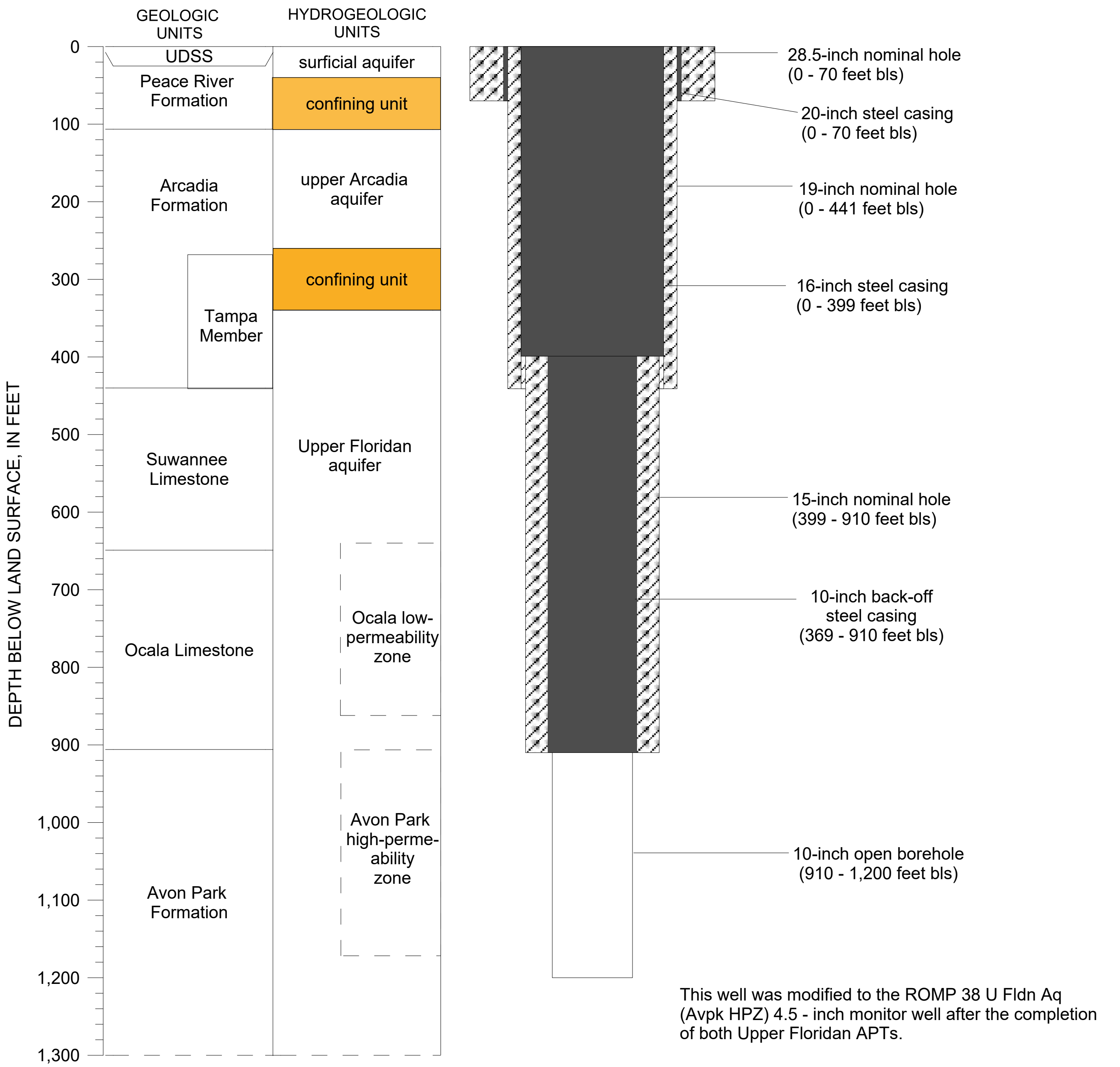
Well Name:	ROMP 38 U Fldn Aq (Swnn) Temp Ob
SID:	--
WCP:	814147, 841995, 817440, 847317
S/T/R:	30/33/19
Latitude:	27° 34' 52.02" N
Longitude:	82° 26' 11.19" W
Reporting Category:	LWPA
Const. Began:	07/11/2011
Const. Complete:	04/14/2015

EXPLANATION

Open hole
Steel casing
Cement grout

[UDQS, undifferentiated Quaternary sediments; PCRV, Peace River; bl below land surface; HWT, 4-inch internal diameter drill rod; HQ, 3.06-inch internal diameter drill rod; NQ, 2.38-inch internal diameter drill rod; U Fldn Aq, Upper Floridan aquifer; Swnn, Suwannee; SID, Station Identification; WCP, well construction permit, S/T/R; Section/Township/Range; Const., construction]

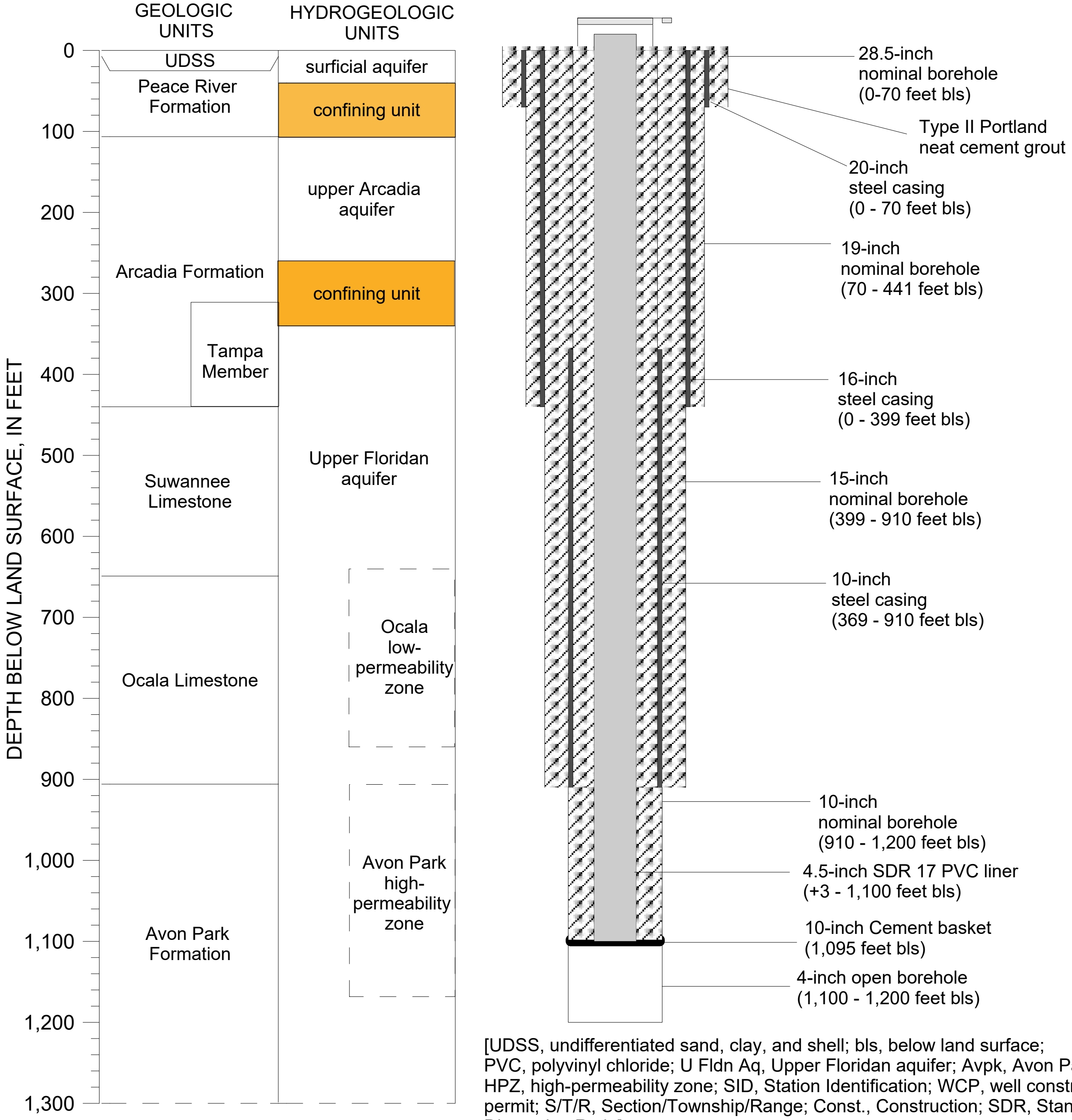
Figure C4. Well as-built diagram for the U Fldn Aq (Swnn) Temp Ob well at the ROMP 38 – Parrish well site in Manatee County, Clorida.



Well Name:	ROMP 38 U Fldn Aq (Avpk HPZ) Monitor
SID:	833274
WCP:	825125
S/T/R:	30/33/19
Latitude:	27° 34' 53.62" N
Longitude:	82° 26' 10.73" W
Reporting Category:	LWPA
Const. Began:	11/29/2012
Const. Complete:	02/18/2013

[UDSS, undifferentiated sand, clay, and shell; bls, below land surface; U Fldn Aq; Upper Floridan aquifer; Avpk, Avon Park; HPZ, high-permeability zone; SID, Station Identification; WCP, well construction permit; S/T/R, Section/Township/Range; Const., Construction]

Figure C5. Well as-built diagram for the *U Fldn Aq (Avpk HPZ) Monitor* well at the ROMP 38 – Parrish well site in Manatee County, Florida.



[UDSS, undifferentiated sand, clay, and shell; bls, below land surface; PVC, polyvinyl chloride; U Fldn Aq, Upper Floridan aquifer; Avpk, Avon Park; HPZ, high-permeability zone; SID, Station Identification; WCP, well construction permit; S/T/R, Section/Township/Range; Const., Construction; SDR, Standard Dimension Ratio]

Well Name:	ROMP 38 U Fldn Aq (Avpk HPZ) 4.5-Inch Monitor
SID:	863048
WCP:	849449
S/T/R:	30/33/19
Latitude:	27° 34' 53.62" N
Longitude:	82° 26' 10.73" W
Reporting Category:	LWPA
Const. Began:	03/01/2016
Const. Complete:	05/17/2016

EXPLANATION

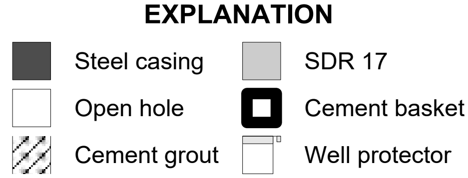
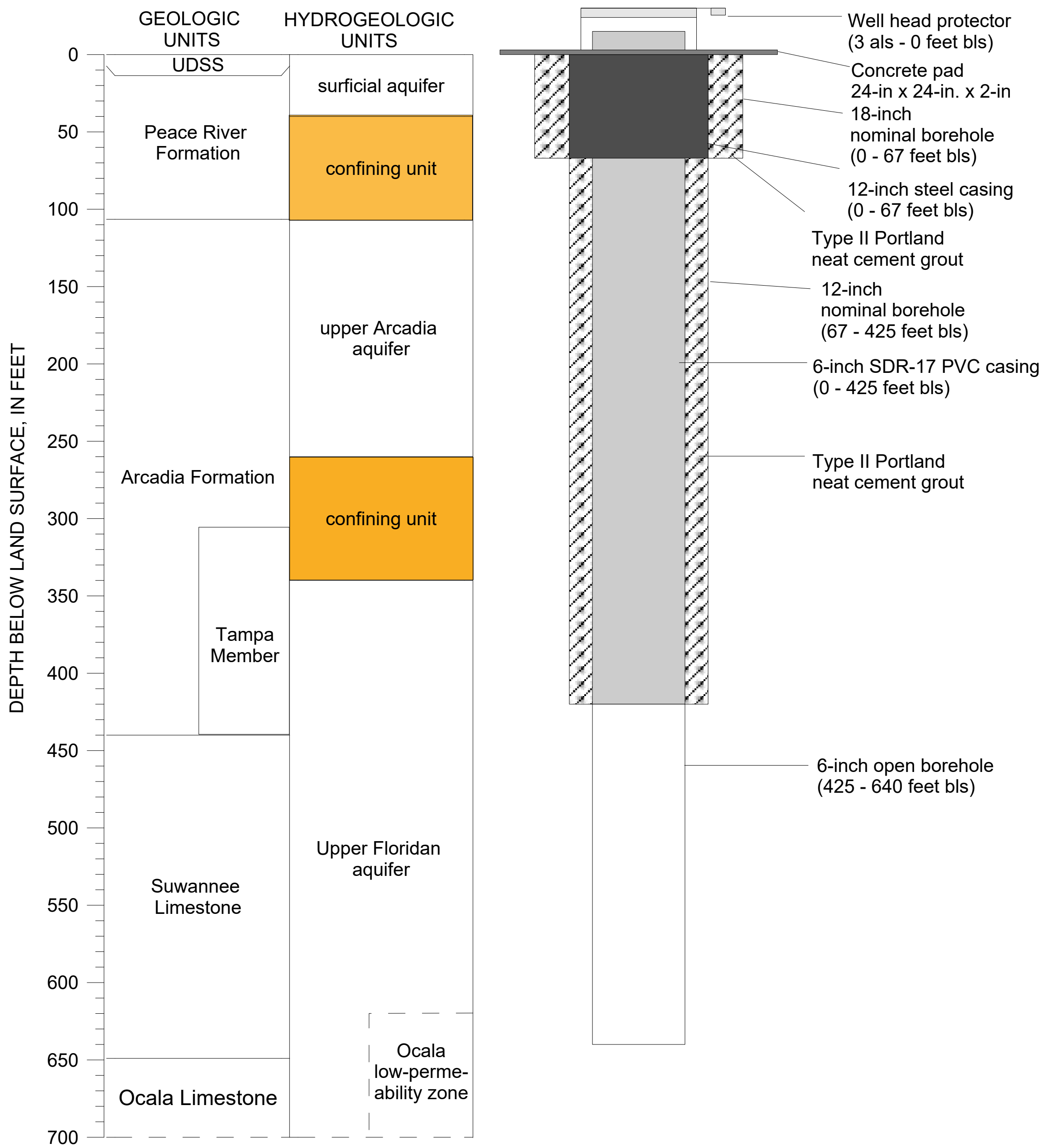


Figure C6. Well as-built diagram for the *U Fldn Aq (Avpk HPZ) 4.5-Inch Monitor* well at the ROMP 38 – Parrish well site in Manatee County, Florida.



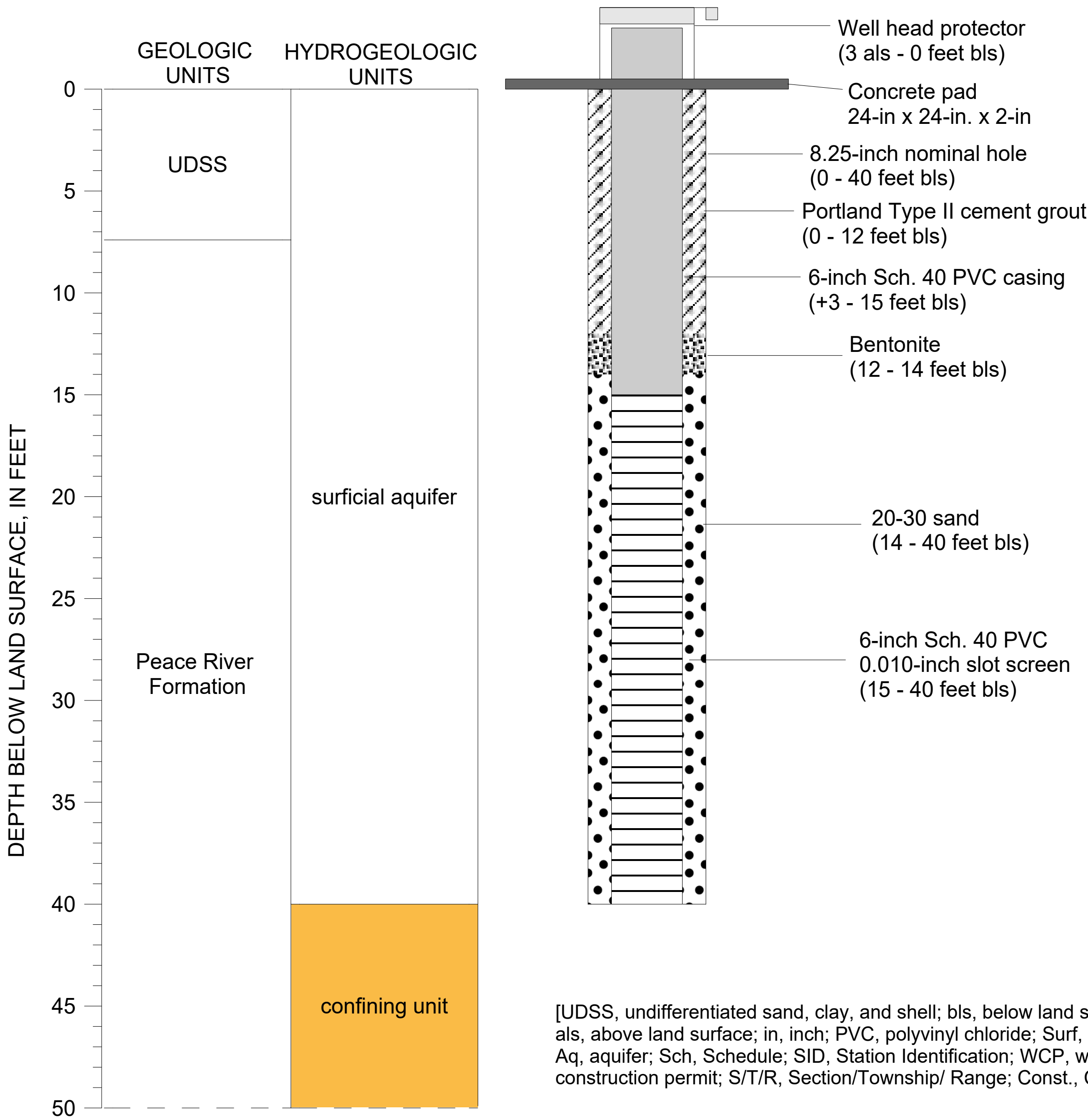
Well Name:	ROMP 38 U Fldn Aq (Swnn) Monitor
SID:	833271
WCP:	827322
S/T/R:	30/33/19
Latitude:	27° 34' 53.39" N
Longitude:	82° 26' 10.80" W
Reporting Category:	LWPA
Const. Began:	03/04/2013
Const. Complete:	03/26/2013

EXPLANATION

- Concrete
- Open hole
- Cement grout
- SDR 17
- Well protector
- Steel casing

[USAA, undifferentiated sand, clay, and shell; als, above land surface; bls, below land surface; PVC, polyvinyl chloride; U Fldn Aq, Upper Floridan aquifer; Swnn, Suwannee; SID, Station Identification; WCP, well construction permit; S/T/R, Section/Township/Range; Const., Construction; SDR, Standard Dimension Ratio]

Figure C7. Well as-built diagram for the *U Fldn Aq (Swnn) Monitor* well at the ROMP 38 – Parrish well site in Manatee County, Florida.



[UDSS, undifferentiated sand, clay, and shell; bls, below land surface; als, above land surface; in, inch; PVC, polyvinyl chloride; Surf, surficial; Aq, aquifer; Sch, Schedule; SID, Station Identification; WCP, well construction permit; S/T/R, Section/Township/ Range; Const., Construction]

Well Name:	ROMP 38 Surf Aq Deep Montior
SID:	833361
WCP:	828057
S/T/R:	30/33/19
Latitude:	27° 34' 53.818" N
Longitude:	82° 26' 10.71" W
Reporting Category:	LWPA
Const. Began:	04/11/2013
Const. Complete:	04/11/2013

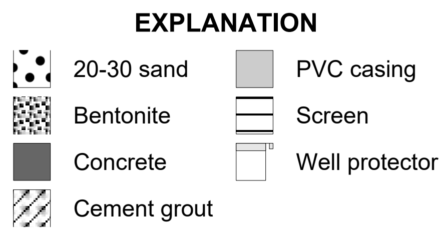
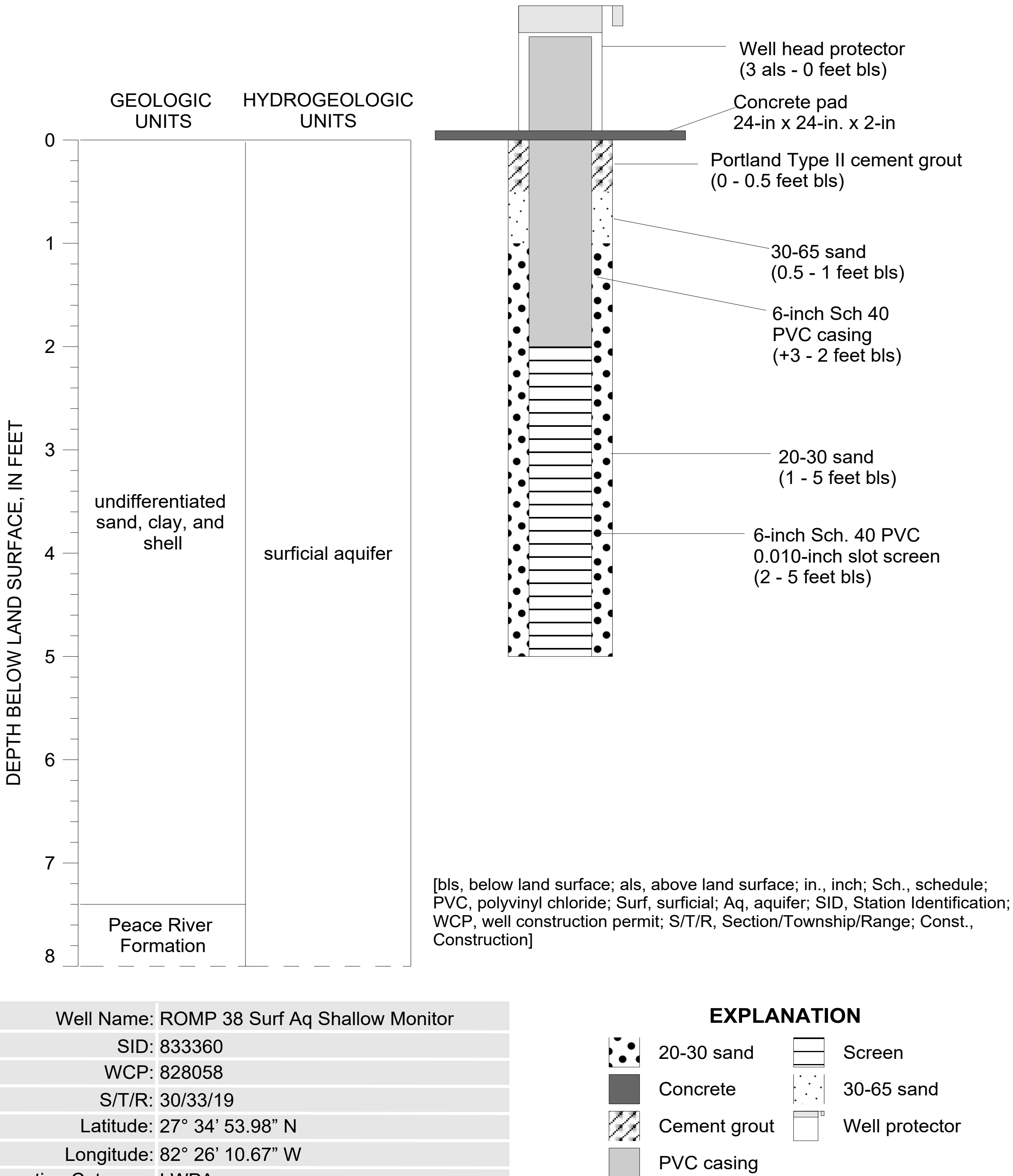
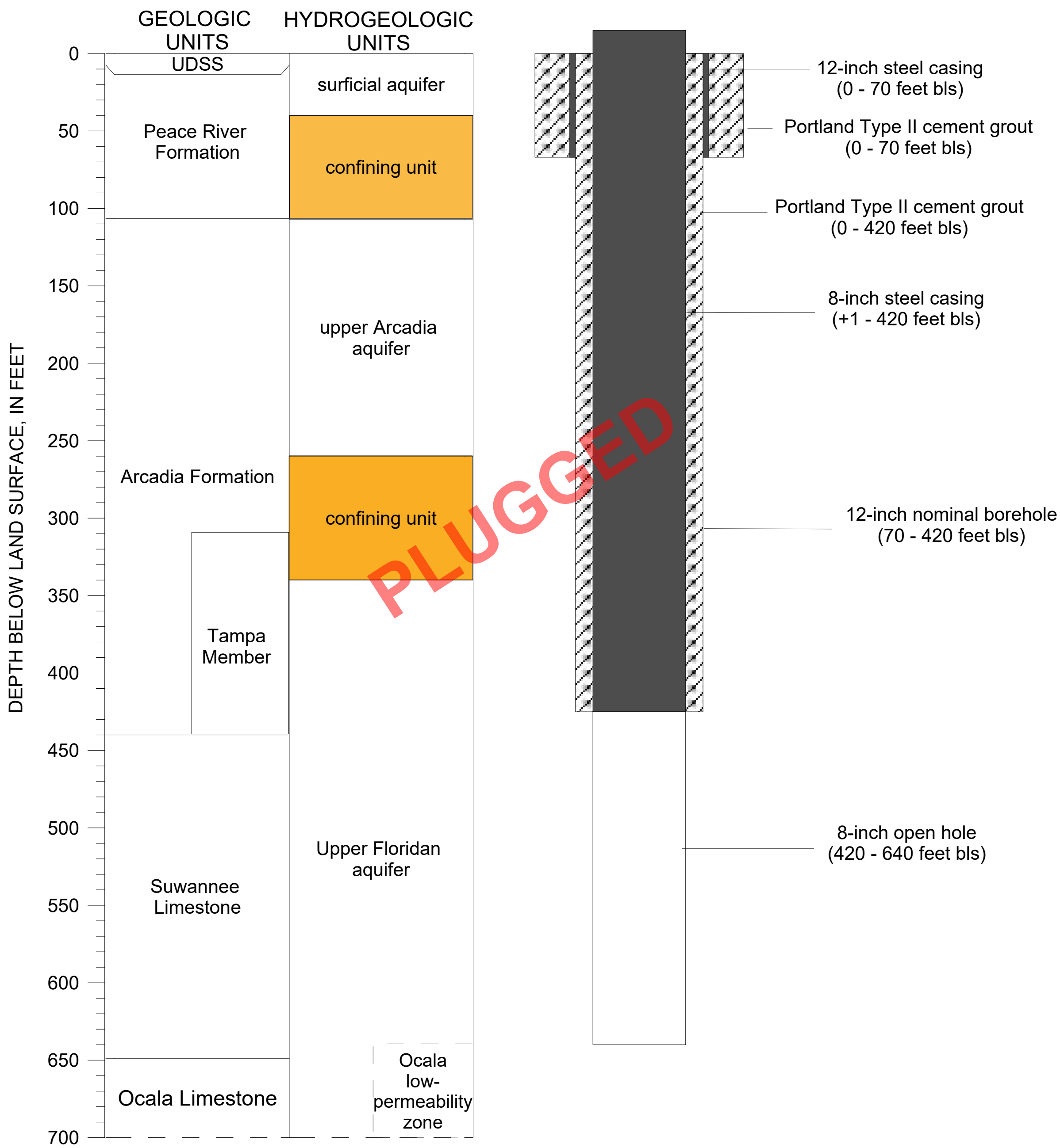


Figure C8. Well as-built diagram for the *Surf Aq Deep Monitor* well at the ROMP 38 – Parrish well site in Manatee County, Florida.



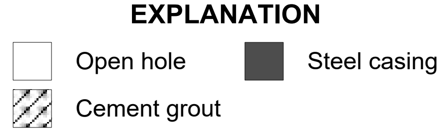
Well Name:	ROMP 38 Surf Aq Shallow Monitor
SID:	833360
WCP:	828058
S/T/R:	30/33/19
Latitude:	27° 34’ 53.98” N
Longitude:	82° 26’ 10.67” W
Reporting Category:	LWPA
Const. Began:	04/11/2013
Const. Complete:	04/11/2013

Figure C9. Well as-built diagram for the *Surf Aq Shallow Monitor* well at the ROMP 38 – Parrish well site in Manatee County, Florida.



Well Name:	ROMP 38 U Fldn Aq (Swnn) Temp Pump
SID:	857425
WCP:	845696, 847319
S/T/R:	30/33/19
Latitude:	27° 34' 52.655" N
Longitude:	82° 26' 10.049" W
Reporting Category:	LWPA
Const. Began:	09/16/2015
Const. Complete:	09/21/2015

EXPLANATION



[UDSS, undifferentiated sand, clay, and shell; bls, below land surface; U Fldn Aq, Upper Floridan aquifer; Swnn, Suwannee; Temp, temporary; SID, Station Identification; WCP, well construction permit; S/T/R, Section/Township/Range; Const., Construction]

Figure C10. Well as-built diagram for the *U Fldn Aq (Swnn) Temp Pump* well at the ROMP 38 – Parrish well site in Manatee County, Florida

Appendix D. Lithologic Logs for the Samples Collected at the ROMP 38 – Parrish Well Site in Manatee County, Florida

LITHOLOGIC WELL	LOG PRINTOUT	SOURCE - FGS

WELL NUMBER: W-19338
TOTAL DEPTH: 1600 FT. LOCATION: T.33S R.19E S.30
SAMPLES #NAME? LAT = 27D 34M 52S
LON = 82D 26M 11S
COMPLETION DATE: 01/10/12 ELEVATION: 39 FT
OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER: ROMP-38 PARRISH, SWFWMD

WORKED BY: Michelle Ladle (0-905.9') & Scott Barrett Dyer (905.9'-1600')
Describibed 07/13/2012 - 08/09/2012
Formation picks made with the assistance of Clint Kromhout
Ocala Limestone, not Ocala Group

0	-	7.4	090UDSS	UNDIFFERENTIATED SAND, CLAY, AND SHELLS
7.4	-	106.5	122PCRV	PEACE RIVER FM.
106.5	-	440	122ARCA	ARCADIA FM.
309.6	-	440	122TAMP	TAMPA MEMBER OF ARCADIA FM.
440	-	649	123SWNN	SUWANNEE LIMESTONE
649	-	905.9	124OCAL	OCALA GROUP
905.9	-	1600	124AVPK	AVON PARK FM.

0	-	3.1	ft	SAND; MODERATE DARK GRAY TO BROWNISH GRAY; 15% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY; GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE; ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY; POOR INDURATION; CEMENT TYPE(S): CLAY MATRIX, ORGANIC MATRIX; ACCESSORY MINERALS: CLAY-O5%, ORGANICS-05%; HEAVY MINERALS-02%; FOSSILS: PLANT REMAINS; Less organics with depth
3.1	-	3.7	ft	SAND; BROWNISH GRAY TO OLIVE GRAY; 05% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY; GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE; ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY; POOR INDURATION; CEMENT TYPE(S): CLAY MATRIX, ORGANIC MATRIX; SILICIC CEMENT; ACCESSORY MINERALS: CLAY-03%, SHELL-02%; HEAVY MINERALS-01%; FOSSILS: FOSSIL FRAGMENTS
3.7	-	3.9	ft	SAND; BROWNISH GRAY TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR; GRAIN SIZE: MEDIUM; RANGE: FINE TO VERY COARSE; ROUNDNESS: ANGULAR TO ROUNDED; LOW SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, ORGANIC MATRIX; SILICIC CEMENT; ACCESSORY MINERALS: CLAY-30%, ORGANICS-02%; Citrine ~3%; Clays: both dark organic and lighter clay; mineral
3.9	-	5.2	ft	SAND; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 05% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY; GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT; ACCESSORY MINERALS: CLAY-03%, SHELL-02%; PHOSPHATIC SAND-01%, HEAVY MINERALS-01%; FOSSILS: FOSSIL FRAGMENTS, PLANT REMAINS; Some phosphatized fossils; Decrease in clays with depth
5.2	-	7.4	ft	SAND; GRAYISH ORANGE TO MODERATE LIGHT GRAY; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): SILICIC CEMENT; ACCESSORY MINERALS: IRON STAIN-01%, HEAVY MINERALS-01%; IRON STAIN- %; FOSSILS: FOSSIL FRAGMENTS; Change in color of sands from above

7.4	-	8	ft	SAND; GRAYISH BROWN TO DARK YELLOWISH BROWN; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL; ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-05%, DOLOMITE-03%; “Sands” are bimodal: medium (primary) and granular/gravel; size (secondary); Top of Peace River Formation;
8	-	9.5	ft	SAND; GRAYISH BROWN TO DARK YELLOWISH ORANGE; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL; ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT; CALCILUTITE MATRIX; ACCESSORY MINERALS: LIMESTONE-10%, CLAY-03%; PHOSPHATIC GRAVEL-03%;
9.5	-	9.9	ft	SAND; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; POSSIBLY HIGH PERMEABILITY; GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE; ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY; POOR INDURATION; CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-10%, CALCARENITE-03%; LIMONITE-<1%; Decrease in induration with depth
9.9	-	20	ft	SAND; GRAYISH BROWN TO DARK YELLOWISH ORANGE; 15% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; POSSIBLY HIGH PERMEABILITY; GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; POOR INDURATION; CEMENT TYPE(S): SILICIC CEMENT, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-08%; HEAVY MINERALS-02%, CALCARENITE-<1%;
20	-	24.9	ft	SAND; GRAYISH BROWN TO MODERATE GRAY; 10% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; POSSIBLY HIGH PERMEABILITY; GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; POOR INDURATION; CEMENT TYPE(S): SILICIC CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-20%; HEAVY MINERALS-05%, CALCARENITE-<1%;
24.9	-	30	ft	SAND; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; LOW SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT, IRON CEMENT; ACCESSORY MINERALS: CLAY-15%, PHOSPHATIC SAND-15%; HEAVY MINERALS-01%; Variable phosphate and clays; less induration with depth; Poor Recovery 28-30’ (<25%)
30	-	32.5	ft	SAND; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 10% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY; GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; POOR INDURATION; CEMENT TYPE(S): SILICIC CEMENT, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-20%
32.5	-	38	ft	SAND; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 05% POROSITY: INTERGRANULAR; GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, CLAY-05%; Poor Recovery 35-40’ (15-20%); ; SAND; GRAYISH BROWN
38	-	40	ft	SAND; GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): SILICIC CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, CALCARENITE-03%
40	-	47	ft	CLAY; OLIVE GRAY TO DARK GREENISH GRAY; 03% POROSITY: INTERGRANULAR; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX; ACCESSORY MINERALS: QUARTZ SAND-35%, PHOSPHATIC SAND-03%; Poor Recovery 40-50’ (28%)
47	-	50	ft	SAND; LIGHT OLIVE GRAY TO MODERATE GRAY; 0F% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN SIZE: COARSE; RANGE: MEDIUM TO VERY COARSE; ROUNDNESS: SUB-ANGULAR TO ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): SILICIC CEMENT, CLAY MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, CALCARENITE-01%

50	-	57	ft	CLAY; GRAYISH BROWN TO MODERATE GRAY; 10% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; MODERATE INDURATION; CEMENT TYPE(S): SILICIC CEMENT, CLAY MATRIX, IRON CEMENT; SEDIMENTARY STRUCTURES: MOTTLED; ACCESSORY MINERALS: QUARTZ SAND-25%, PHOSPHATIC SAND-10%; Variable sand amounts; Only 38” recovery for 50-59’
57	-	69	ft	CLAY; MODERATE YELLOWISH BROWN TO MODERATE LIGHT GRAY; 02% POROSITY: INTERGRANULAR; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX; IRON CEMENT; ACCESSORY MINERALS: QUARTZ SAND-20%, PHOSPHATIC SAND-10%; LIMESTONE-05%; Variable sand amounts; Areas of increased sand are less; indurated
69	-	70.9	ft	CLAY; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX, IRON CEMENT; ACCESSORY MINERALS: QUARTZ SAND-10%, PHOSPHATIC SAND-10%; FOSSILS: PLANT REMAINS; Rubble in upper 1.0’
70.9	-	71.7	ft	SAND; GRAYISH BROWN TO MODERATE LIGHT GRAY; 03% POROSITY: INTERGRANULAR; GRAIN SIZE: COARSE; RANGE: MEDIUM TO VERY COARSE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; LOW SPHERICITY; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX, IRON CEMENT; ACCESSORY MINERALS: CLAY-25%, PHOSPHATIC SAND-15%
71.7	-	75	ft	SAND; VERY LIGHT ORANGE TO LIGHT GRAY; 05% POROSITY: INTERGRANULAR; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO MEDIUM; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCARENITE-25%, PHOSPHATIC SAND-10%; Decrease in carbonate material with depth and increase in; phosphates and heavies; Marker at 74.0’ should be 74.3’
75	-	75.6	ft	CLAY; MODERATE DARK GRAY TO OLIVE GRAY; 02% POROSITY: INTERGRANULAR; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX; ACCESSORY MINERALS: QUARTZ SAND-20%, PHOSPHATIC SAND-15%; LIMESTONE-03%; Poor recovery 75-80’ (60%)
75.6	-	81.5	ft	SAND; VERY LIGHT ORANGE TO LIGHT GRAY; 02% POROSITY: INTERGRANULAR; POOR INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, IRON CEMENT; CLAY MATRIX; ACCESSORY MINERALS: CALCILUTITE-25%, PHOSPHATIC SAND-20%; CLAY-10%;Increased phosphate and clay with depth; Phosphate ranges from 15 to 35%
81.5	-	84.5	ft	SILT; VERY LIGHT GRAY TO YELLOWISH GRAY; 02% POROSITY: INTERGRANULAR; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX; IRON CEMENT; ACCESSORY MINERALS: QUARTZ SAND-10%, PHOSPHATIC SAND-03%; Slight reaction to Alizarin Red and HCl; Increase in grain; size with depth (increase in sands)
84.5	-	89.2	ft	SAND; VERY LIGHT GRAY TO YELLOWISH GRAY; 05% POROSITY: INTERGRANULAR, FRACTURE; POSSIBLY HIGH PERMEABILITY; GRAIN SIZE: FINE; RANGE: FINE TO MEDIUM; ROUNDNESS: ANGULAR TO SUB-ANGULAR; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-35%; Well-sorted sands; Poor recovery 85-90’ (40%); Depths estimated
89.2	-	89.5	ft	SILT; MODERATE LIGHT GRAY TO LIGHT OLIVE GRAY; 02% POROSITY: INTERGRANULAR; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT, IRON CEMENT; SEDIMENTARY STRUCTURES: FISSILE; ACCESSORY MINERALS: QUARTZ SAND-40%, PHOSPHATIC SAND-10%; CLAY-05%
89.5	-	92	ft	CLAY; LIGHT GRAY TO LIGHT OLIVE GRAY; <1% POROSITY: INTERGRANULAR, LOW PERMEABILITY; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX, IRON CEMENT; SEDIMENTARY STRUCTURES: FISSILE; ACCESSORY MINERALS: QUARTZ SAND-05%, PHOSPHATIC SAND-04%; Change in clay composition with depth; Darker in color with; depth; Poor recovery 90-95’ (40%)
92	-	99	ft	CLAY; MODERATE GRAY TO OLIVE GRAY; <1% POROSITY: INTERGRANULAR, LOW PERMEABILITY; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX; SEDIMENTARY STRUCTURES: FISSILE; ACCESSORY MINERALS: QUARTZ SAND-02%, PHOSPHATIC SAND-01%; OTHER FEATURES: PLASTIC; Change in clay composition at end of the interval (lighter; in color); Traces of pyrite and sulfur at 99.0’; Recovery; 70%; Estimated depths

99	-	100	ft	CLAY; YELLOWISH GRAY TO LIGHT GRAY; <1% POROSITY: INTERGRANULAR, FRACTURE, LOW PERMEABILITY; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX, IRON CEMENT; SEDIMENTARY STRUCTURES: FISSILE; ACCESSORY MINERALS: QUARTZ SAND-06%, PHOSPHATIC SAND-04%; FOSSILS: FOSSIL FRAGMENTS; Sands are larger grained than above (medium-coarse)
100	-	101	ft	SAND; LIGHT GRAY TO DARK YELLOWISH ORANGE; 05% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY; GRAIN SIZE: FINE; RANGE: VERY FINE TO COARSE; ROUNDNESS: ANGULAR TO SUB-ANGULAR; LOW SPHERICITY; GOOD INDURATION; CEMENT TYPE(S): SILICIC CEMENT, IRON CEMENT, CLAY MATRIX; ACCESSORY MINERALS: SILT-20%, CLAY-05%; PHOSPHATIC SAND-25%; Increase in grain size with depth and increase in clays
101	-	105.7	ft	SAND; LIGHT OLIVE GRAY TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR; GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE; ROUNDNESS: ANGULAR TO SUB-ANGULAR; LOW SPHERICITY; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-25%, CLAY-20%; Lower 1.0’: traces of fossil fragments and larger; phosphatized fossils including a possible barnacle
105.7	-	106	ft	SILT; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY; 01% POROSITY: INTERGRANULAR; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX; SILICIC CEMENT; SEDIMENTARY STRUCTURES: FISSILE; ACCESSORY MINERALS: QUARTZ SAND-10%, PHOSPHATIC SAND-10%; CLAY-10%, CALCILUTITE-05%; Slight reaction to Alizarin Red and HCl.
106	-	106.5	ft	SAND; LIGHT OLIVE GRAY TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR; GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; POOR INDURATION; CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX; IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-15%, CLAY-05%; FOSSILS: FOSSIL FRAGMENTS; End of Peace River Formation
106.5	-	110.2	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: MOLDIC, INTERCRYSTALLINE, LOW PERMEABILITY; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-20%; FOSSILS: FOSSIL MOLDS; Increase in clay and silt with depth and becoming less; indurated; Top of Arcadia Formation
110.2	-	110.8	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; LOW PERMEABILITY; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, CLAY-05%; FOSSILS: FOSSIL FRAGMENTS
110.8	-	111	ft	PHOSPHATE; VERY LIGHT ORANGE TO MODERATE GRAY; 05% POROSITY: INTERGRANULAR; ACCESSORY MINERALS: QUARTZ SAND-30%, CALCILUTITE-25%; Phosphatic and quartz sands in micritic matrix
111	-	115.8	ft	MUDSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 03% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-10%, QUARTZ SAND-08%; OTHER FEATURES: DOLOMITIC, FOSSILIFEROUS; Some dissolved grain boundaries of larger relict allochems; Variable phosphate grains; nodules and thin beds of medium to course phosphate and quartz sands; Poor recovery 110-115’ (82%) and 115-120’ (51%)
115.8	-	117	ft	DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 02% POROSITY: MOLDIC, INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-04%; OTHER FEATURES: CALCAREOUS; FOSSILS: FOSSIL MOLDS

117	-	120	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 03% POROSITY: INTERGRANULAR, FRACTURE; GRAIN TYPE: CRYSTALS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT; IRON CEMENT; SEDIMENTARY STRUCTURES: FISSILE, INTERBEDDED; ACCESSORY MINERALS: PHOSPHATIC SAND-10%, DOLOMITE-10%; QUARTZ SAND-05%; OTHER FEATURES: DOLOMITIC; Upper 4”: increase in phosphate sands; Interbedded with calcareous dolomite
120	-	125	ft	CLAY; LIGHT OLIVE GRAY TO MODERATE LIGHT GRAY; <1% POROSITY: INTERGRANULAR, LOW PERMEABILITY; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT; CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: FISSILE; ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-03%; OTHER FEATURES: DOLOMITIC; Increase in induration and more dolomitic at bottom of interval
125	-	126.7	ft	DOLOSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: LIMESTONE-15%, PHOSPHATIC SAND-20%; QUARTZ SAND-10%; OTHER FEATURES: CALCAREOUS; FOSSILS: FOSSIL FRAGMENTS
126.7	-	141.3	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-10%, QUARTZ SAND-05%; OTHER FEATURES: CALCAREOUS; FOSSILS: FOSSIL MOLDS; Poor Permeability
141.3	-	142.5	ft	CLAY; GRAYISH BROWN TO LIGHT OLIVE GRAY; 02% POROSITY: INTERGRANULAR, FRACTURE, LOW PERMEABILITY; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: FISSILE; ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-03%; OTHER FEATURES: DOLOMITIC
142.5	-	146.5	ft	DOLOSTONE; GRAYISH BROWN TO OLIVE GRAY; 01% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; LOW PERMEABILITY; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX; CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: PHOSPHATIC SAND-08%, CALCARENITE-07%; QUARTZ SAND-06%; OTHER FEATURES: CALCAREOUS; FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS; Interbedded with phosphatic and quartz sands and calcarenite
146.5	-	150	ft	DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 02% POROSITY: INTERGRANULAR, FRACTURE, INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-05%, LIMESTONE-03%; OTHER FEATURES: CALCAREOUS; Increase in phosphatic sands and limestone with depth
150	-	151	ft	DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 08% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-04%, QUARTZ SAND-03%; PHOSPHATIC GRAVEL-03%; OTHER FEATURES: CALCAREOUS; FOSSILS: FOSSIL MOLDS
151	-	152.1	ft	DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 05% POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, QUARTZ SAND-15%; CALCARENITE-10%; OTHER FEATURES: CALCAREOUS

152.1	-	152.8	ft	DOLOSTONE; VERY LIGHT ORANGE TO VERY LIGHT GRAY; 02% POROSITY: INTERGRANULAR, FRACTURE; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-05%; CALCARENITE-03%; OTHER FEATURES: CALCAREOUS
152.8	-	153.5	ft	DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 05% POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; IRON CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, QUARTZ SAND-15%; CALCARENITE-10%; OTHER FEATURES: CALCAREOUS; Interbedded with layer of phosphatic and quartz sands and calcarenite
153.5	-	157.5	ft	DOLOSTONE; VERY LIGHT ORANGE TO VERY LIGHT GRAY; 02% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX; CALCILUTITE MATRIX; ACCESSORY MINERALS: CLAY-25%, PHOSPHATIC SAND-02%; ORGANICS-01%; FOSSILS: FOSSIL MOLDS, PLANT REMAINS, FOSSIL FRAGMENTS; BENTHIC FORAMINIFERA; Variable clay content throughout
157.5	-	159	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 01% POROSITY: INTERGRANULAR, PIN POINT VUGS; LOW PERMEABILITY; GRAIN TYPE: CALCILUTITE, CRYSTALS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-02%; OTHER FEATURES: DOLOMITIC
159	-	160.6	ft	CLAY; VERY LIGHT GRAY TO LIGHT OLIVE GRAY; 01% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; LOW PERMEABILITY; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-02%; Little to no reaction to Alizarin Red; Increased dolomite with depth
160.6	-	161.9	ft	DOLOSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE; 02% POROSITY: INTERGRANULAR, PIN POINT VUGS; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; CLAY MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-01%; OTHER FEATURES: CALCAREOUS
161.9	-	163	ft	DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 02% POROSITY: INTERGRANULAR, FRACTURE, PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; CLAY MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-10%, QUARTZ SAND-08%; OTHER FEATURES: CALCAREOUS
163	-	163.2	ft	CLAY; LIGHT GRAY TO GREENISH GRAY; <1% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX; ACCESSORY MINERALS: QUARTZ SAND-03%, PHOSPHATIC SAND-02%; CALCILUTITE-02%; Mold and casts of mollusks; Moderate permeability
163.2	-	163.6	ft	MUDSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-08%, PHOSPHATIC SAND-05%; OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS
163.6	-	164.3	ft	SAND; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 05% POROSITY: INTERGRANULAR; GRAIN SIZE: COARSE; RANGE: FINE TO COARSE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; LOW SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-30%, LIMESTONE-25%; FOSSILS: FOSSIL FRAGMENTS; Increased limestone with depth

164.3	-	165	ft	WACKESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 35% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CLAY MATRIX; IRON CEMENT; ACCESSORY MINERALS: CLAY-25%, PHOSPHATIC SAND-07%; QUARTZ SAND-05%; OTHER FEATURES: LOW RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS; Decrease in grain size and sands with depth; some recrystallization at bottom of interval
165	-	171	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 10% POROSITY: INTERCRYSTALLINE, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 07% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-03%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS
171	-	171.2	ft	MUDSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 10% POROSITY: INTERGRANULAR, FRACTURE; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX; SPARRY CALCITE CEMENT; SEDIMENTARY STRUCTURES: FISSILE; ACCESSORY MINERALS: CLAY-25%, PHOSPHATIC SAND-15%; QUARTZ SAND-10%; OTHER FEATURES: LOW RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS
171.2	-	171.6	ft	CLAY; MODERATE LIGHT GRAY TO GRAYISH BROWN; 10% POROSITY: INTERGRANULAR, FRACTURE; POSSIBLY HIGH PERMEABILITY; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX; IRON CEMENT; ACCESSORY MINERALS: LIMESTONE-15%, PHOSPHATIC SAND-10%; QUARTZ SAND-05%; OTHER FEATURES: DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS
171.6	-	177	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-03%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Variable recrystallization
177	-	179.4	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, VUGULAR; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-25%, PHOSPHATIC SAND-15%; OTHER FEATURES: LOW RECRYSTALLIZATION
179.4	-	180	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 01% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS; GRAIN TYPE: CRYSTALS, INTRACLASTS, CALCILUTITE; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-05%, PHOSPHATIC SAND-03%; OTHER FEATURES: HIGH RECRYSTALLIZATION; Recrystallized mudstone with vugs/veins of quartz phosphatic sand and calcarenite
180	-	185	ft	MUDSTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 03% POROSITY: INTERCRYSTALLINE, VUGULAR, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-08%, QUARTZ SAND-05%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILIFEROUS; FOSSILS: FOSSIL MOLDS; Poor recovery 180-185’ (13”); Increased dolomite with depth becoming massive

185	-	187.4	ft	CLAY; MODERATE DARK GRAY TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; POOR INDURATION; CEMENT TYPE(S): CLAY MATRIX; ACCESSORY MINERALS: CALCARENITE-25%, PHOSPHATIC SAND-07%; QUARTZ SAND-05%; FOSSILS: FOSSIL FRAGMENTS
187.4	-	190	ft	WACKESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 20% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CLAY MATRIX; ACCESSORY MINERALS: QUARTZ SAND-15%, CLAY-10%; PHOSPHATIC SAND-07%; OTHER FEATURES: LOW RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Lower half of interval is rubble
190	-	193	ft	MUDSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-15%, QUARTZ SAND-12%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; Less recrystallized after 192.5’
193	-	194.3	ft	DOLOSTONE; LIGHT GRAY TO GRAYISH BROWN; <1% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: LIMESTONE-10%, PHOSPHATIC SAND-01%; QUARTZ SAND-01%; OTHER FEATURES: CALCAREOUS; Interbedded with dolomitic mudstone
194.3	-	194.7	ft	DOLOSTONE; LIGHT GRAY TO GRAYISH BROWN; 10% POROSITY: INTERCRYSTALLINE, VUGULAR, MOLDIC; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED; ACCESSORY MINERALS: LIMESTONE-25%, PHOSPHATIC SAND-20%; QUARTZ SAND-15%; OTHER FEATURES: CALCAREOUS; Moderate permeability
194.7	-	196	ft	WACKESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS, VUGULAR; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 07% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX; DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: FISSILE, INTERBEDDED, MOTTLED; ACCESSORY MINERALS: QUARTZ SAND-20%, PHOSPHATIC SAND-15%; OTHER FEATURES: DOLOMITIC; Multiple cast-mold pairs; Mudstone interbedded with phosphatic and quartz sandy wackestone
196	-	197	ft	DOLOSTONE; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX; CALCILUTITE MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-03%; OTHER FEATURES: CALCAREOUS, MUDDY; Becomes more micritic with depth
197	-	200	ft	MUDSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 07% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: QUARTZ SAND-20%, PHOSPHATIC SAND-15%; OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION; Interbedded with dolomitic clays

200	-	201.5	ft	WACKESTONE; GRAYISH BROWN TO LIGHT OLIVE GRAY; 10% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO COARSE; POOR INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX; DOLOMITE CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-35%, QUARTZ SAND-20%; OTHER FEATURES: DOLOMITIC, MUDDY; FOSSILS: FOSSIL FRAGMENTS, MILIOLIDS
201.5	-	215	ft	MUDSTONE; YELLOWISH GRAY TO GRAYISH BROWN; 15% POROSITY: INTERCRYSTALLINE, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-15%, QUARTZ SAND-05%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL MOLDS; Variable molds and phosphate throughout
215	-	220	ft	MUDSTONE; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; CLAY MATRIX; SEDIMENTARY STRUCTURES: NODULAR; ACCESSORY MINERALS: CLAY-20%, PHOSPHATIC SAND-10%; QUARTZ SAND-08%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; Nodules of clay and clayey phosphatic and quartz sands recrystallized mudstone with less sands than above
220	-	221.3	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT; IRON CEMENT; SEDIMENTARY STRUCTURES: NODULAR, INTERBEDDED; ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC SAND-05%; QUARTZ SAND-03%; OTHER FEATURES: DOLOMITIC
221.3	-	224.2	ft	MUDSTONE; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-15%, QUARTZ SAND-10%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
224.2	-	226	ft	MUDSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 03% POROSITY: INTERCRYSTALLINE, VUGULAR, LOW PERMEABILITY; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; CHALCEDONY CEMENT; ACCESSORY MINERALS: CHERT-35%, PHOSPHATIC SAND-02%; QUARTZ SAND-01%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC; Variable recrystallization; poor recovery, largely rubble; Approximated depths
226	-	232	ft	MUDSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 10% POROSITY: INTERCRYSTALLINE, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; DOLOMITE CEMENT; ACCESSORY MINERALS: DOLOMITE-15%, PHOSPHATIC SAND-03%; QUARTZ SAND-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL MOLDS, PLANT REMAINS; Large echinoid and mollusk molds at 229’
232	-	240.6	ft	WACKESTONE; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY; 05% POROSITY: INTERGRANULAR, VUGULAR; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; IRON CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-15%, QUARTZ SAND-05%; OTHER FEATURES: LOW RECRYSTALLIZATION; Phosphate grains - brown in color; Poor recovery; 232.4-240.0’ (50%), mostly rubble; Bottom of interval is highly recrystallized with less phosphatic sands

240.6	-	242.4	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; CLAY MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-15%, QUARTZ SAND-10%; CALCILUTITE-05%; OTHER FEATURES: CALCAREOUS; Decrease in sands with depth
242.4	-	243.3	ft	DOLOSTONE; GRAYISH BROWN; 01% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-02%, QUARTZ SAND-01%; OTHER FEATURES: MUDDY; Few nodules and thin layers of phosphatic and quartz sands
243.3	-	245	ft	DOLOSTONE; GRAYISH BROWN TO OLIVE GRAY; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX; CALCILUTITE MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-05%, LIMESTONE-03%; QUARTZ SAND-02%
245	-	247	ft	DOLOSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; CLAY MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-10%, LIMESTONE-08%; QUARTZ SAND-04%; OTHER FEATURES: CALCAREOUS; Lighter in color with less sands with depth; increase in induration
247	-	250	ft	DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 03% POROSITY: INTERCRYSTALLINE, MOLDIC, VUGULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: NODULAR, MOTTLED; ACCESSORY MINERALS: PHOSPHATIC SAND-10%, QUARTZ SAND-05%; OTHER FEATURES: CALCAREOUS; FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS; Phosphatized shell fragments; Decrease in dolomitization with depth; Increase in phosphatic and quartz sands with depth
250	-	251	ft	WACKESTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 05% POROSITY: INTERGRANULAR, VUGULAR; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO COARSE; POOR INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT; CLAY MATRIX; ACCESSORY MINERALS: PHOSPHATIC SAND-30%, DOLOMITE-20%; QUARTZ SAND-20%; OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION
251	-	258.8	ft	DOLOSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 02% POROSITY: INTERCRYSTALLINE, VUGULAR, MOLDIC; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: NODULAR, MOTTLED; ACCESSORY MINERALS: LIMESTONE-20%, PHOSPHATIC SAND-20%; QUARTZ SAND-10%; OTHER FEATURES: CALCAREOUS; Increase in phosphatic sands with depth (larger granule sized phosphatized fossil fragments)
258.8	-	263	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERCRYSTALLINE, MOLDIC, PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-10%, QUARTZ SAND-05%; OTHER FEATURES: CALCAREOUS

263	-	264	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 20% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; DOLOMITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-15%, PHOSPHATIC SAND-07%; DOLOMITE-05%; OTHER FEATURES: DOLOMITIC; Dolomite present along with calcite crystals and possibly some aragonite-difficult to distinguish between these and brown phosphatic and quartz sands; Only 54% recovery 260-270'; Estimated depths
264	-	269	ft	SAND; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 05% POROSITY: INTERGRANULAR, VUGULAR; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX; SILICIC CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-10%, CLAY-08%; DOLOMITE-05%, ORGANICS-02%
269	-	271.6	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 01% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, QUARTZ SAND-05%; FOSSILS: FOSSIL MOLDS
271.6	-	272.2	ft	SAND; GRAYISH BROWN TO DARK YELLOWISH BROWN; 03% POROSITY: INTERGRANULAR; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; ROUNDNESS: ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY; GOOD INDURATION; CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT; ORGANIC MATRIX; ACCESSORY MINERALS: CLAY-30%, PHOSPHATIC SAND-25%; OTHER FEATURES: DOLOMITIC
272.2	-	275.1	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, QUARTZ SAND-05%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
275.1	-	278.8	ft	DOLOSTONE; GRAYISH BROWN TO GREENISH BLACK; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; POOR INDURATION; CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT; CHALCEDONY CEMENT; SEDIMENTARY STRUCTURES: MOTTLED, NODULAR; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, QUARTZ SAND-10%; CHERT-05%; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Variable structures and amounts of sands and clays though out; Large nodules of chert at 277.2-277.4'
278.8	-	280.5	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-03%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; Increase in dolomite with depth
280.5	-	285.2	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; SEDIMENTARY STRUCTURES: NODULAR; ACCESSORY MINERALS: PHOSPHATIC SAND-20%, QUARTZ SAND-15%; OTHER FEATURES: CALCAREOUS

285.2 - 286.2 ft DOLOSTONE; GRAYISH BROWN TO GREENISH BLACK; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CHALCEDONY CEMENT; SEDIMENTARY STRUCTURES: NODULAR, MOTTLED; ACCESSORY MINERALS: PHOSPHATIC SAND-25%, QUARTZ SAND-30%; CHERT-05%; OTHER FEATURES: CALCAREOUS

286.2 - 287.5 ft MUDSTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; IRON CEMENT; SEDIMENTARY STRUCTURES: NODULAR; ACCESSORY MINERALS: DOLOMITE-20%, PHOSPHATIC SAND-03%; QUARTZ SAND-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; Dolomite nodules; Phosphatic sands primarily in dolomite

287.5 - 288.4 ft SAND; GRAYISH BROWN TO DARK YELLOWISH BROWN; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE; ROUNDNESS: ANGULAR TO SUB-ANGULAR; MEDIUM SPHERICITY; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT; IRON CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: LIMESTONE-30%, PHOSPHATIC SAND-25%; DOLOMITE-10%; FOSSILS: FOSSIL FRAGMENTS; Interbedded with dolostone and dolarenite

288.4 - 292.7 ft DOLOSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: NODULAR; ACCESSORY MINERALS: QUARTZ SAND-30%, PHOSPHATIC SAND-15%; OTHER FEATURES: CALCAREOUS

292.7 - 293.2 ft DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; <1% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CHALCEDONY CEMENT; SEDIMENTARY STRUCTURES: MASSIVE; Partially silicified; chert filled vugs

293.2 - 296.4 ft WACKESTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN; 02% POROSITY: INTERCRYSTALLINE, INTERGRANULAR, VUGULAR; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 30% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; CHALCEDONY CEMENT; SEDIMENTARY STRUCTURES: NODULAR; ACCESSORY MINERALS: CHERT-20%, DOLOMITE-25%; OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS; Increase in dolomite with depth

296.4 - 298.3 ft DOLOSTONE; GRAYISH BROWN TO MODERATE GRAY; 02% POROSITY: INTERCRYSTALLINE, VUGULAR, LOW PERMEABILITY; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CHALCEDONY CEMENT; SEDIMENTARY STRUCTURES: MASSIVE; FOSSILS: FOSSIL FRAGMENTS

298.3 - 299.8 ft DOLOSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 03% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; OTHER FEATURES: CALCAREOUS; Dolomitized packstone/wackestone; Phosphatic grains lighter in color

299.8 - 308 ft CLAY; YELLOWISH GRAY TO LIGHT OLIVE GRAY; 02% POROSITY: INTERGRANULAR; MODERATE INDURATION; CEMENT TYPE(S): CLAY MATRIX, SPARRY CALCITE CEMENT; DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MOTTLED, LAMINATED; ACCESSORY MINERALS: LIMESTONE-15%, HEAVY MINERALS-03%; Flecks of iron minerals

308	-	309.6	ft	CHERT; VERY LIGHT ORANGE TO MODERATE DARK GRAY; 02% POROSITY: VUGULAR, FRACTURE, LOW PERMEABILITY; GOOD INDURATION; CEMENT TYPE(S): CHALCEDONY CEMENT, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: LIMESTONE-35%, PHOSPHATIC SAND-03%; QUARTZ SAND-02%; FOSSILS: FOSSIL FRAGMENTS
309.6	-	310.8	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-30%, DOLOMITE-20%; PHOSPHATIC SAND-02%; OTHER FEATURES: DOLOMITIC, HIGH RECRYSTALLIZATION; Top of Tampa Limestone
310.8	-	313	ft	MUDSTONE; VERY LIGHT ORANGE; 04% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE; GRAIN SIZE: CRYPTOCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-25%, PHOSPHATIC SAND-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION; Dissolved grain boundaries
313	-	320	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 30% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-15%, PHOSPHATIC SAND-02%; OTHER FEATURES: LOW RECRYSTALLIZATION
320	-	323.6	ft	WACKESTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-10%, HEAVY MINERALS-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION; Dissolved grain boundaries
323.6	-	327.1	ft	PACKSTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 08% POROSITY: INTERGRANULAR, VUGULAR, MOLDIC; GRAIN TYPE: INTRACLASTS, SKELETAL, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; DOLOMITE CEMENT; ACCESSORY MINERALS: DOLOMITE-05%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS, MOLLUSKS, FOSSIL FRAGMENTS; Fossil casts; Increased recrystallization with depth
327.1	-	329.3	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 10% POROSITY: MOLDIC, INTERCRYSTALLINE, VUGULAR; GRAIN TYPE: CRYSTALS, INTRACLASTS, SKELTAL CAST; 70% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-05%, HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, FOSSIL MOLDS; Dissolved grain boundaries
329.3	-	333.2	ft	PACKSTONE; VERY LIGHT ORANGE; 08% POROSITY: MOLDIC, VUGULAR, INTERGRANULAR; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 60% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-15%, HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; BENTHIC FORAMINIFERA; Variable sands and recrystallization; Sorites sp. and Archaias sp. at 331.3’
333.2	-	334.2	ft	WACKESTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 05% POROSITY: VUGULAR, INTERCRYSTALLINE, INTERGRANULAR; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 15% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: VARIEGATED

334.2	-	336.7	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 10% POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE; GRAIN TYPE: CRYSTALS, SKELTAL CAST, CALCILUTITE; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-15%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; FOSSIL MOLDS, MOLLUSKS
336.7	-	338.7	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE; GRAIN TYPE: CRYSTALS, CALCILUTITE; 40% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-25%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; BENTHIC FORAMINIFERA; Sorites sp. fragments; Presence of calcite crystals that are difficult to distinguish from quartz sands; Area of increased molds at 337.5-338.2
338.7	-	340.8	ft	WACKESTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 35% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-10%, HEAVY MINERALS-02%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS
340.8	-	343.1	ft	PACKSTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-03%, HEAVY MINERALS-<1%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Variable micrite
343.1	-	344.2	ft	LIMESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; GRAIN TYPE: CRYSTALS, INTRACLASTS, CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-10%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL MOLDS; Recrystallized wackestone/packstone becoming more dolomitic with depth; Dissolved grain boundaries
344.2	-	345.1	ft	WACKESTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 20% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-20%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; BENTHIC FORAMINIFERA; Forams at 344.3;: Archaias sp. or Elphidium sp.; Increase in micrite with depth
345.1	-	347.3	ft	MUDSTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-15%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; BENTHIC FORAMINIFERA; Multiple forams at 345.7': Sorites sp. and Archaias sp.
347.3	-	350.1	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 20% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-15%, HEAVY MINERALS-01%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Variable allochems and calcite crystals

350.1	-	350.7	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 10% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, SKELTAL CAST, CALCILUTITE; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-03%, HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, FOSSIL MOLDS, BENTHIC FORAMINIFERA
350.7	-	352.3	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 20% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-15%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION
352.3	-	354.2	ft	MUDSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 02% POROSITY: INTERGRANULAR, FRACTURE, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; DOLOMITE CEMENT; ACCESSORY MINERALS: DOLOMITE-30%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC; Areas of massive (slightly silicified) dolomite with fractures
354.2	-	358.6	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 05% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 20% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: QUARTZ SAND-35%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Increase in recrystallization with depth
358.6	-	359.1	ft	MUDSTONE; VERY LIGHT ORANGE TO MODERATE LIGHT GRAY; 01% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; GRAIN TYPE: CRYSTALS, CALCILUTITE; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; CHALCEDONY CEMENT; SEDIMENTARY STRUCTURES: MASSIVE; ACCESSORY MINERALS: QUARTZ SAND-10%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
359.1	-	369.8	ft	LIMESTONE; VERY LIGHT ORANGE TO LIGHT GREENISH YELLOW; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE, SKELTAL CAST; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, SILICIC CEMENT; SEDIMENTARY STRUCTURES: NODULAR, MOTTLED; ACCESSORY MINERALS: QUARTZ SAND-30%, CHERT-05%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; BENTHIC FORAMINIFERA, MOLLUSKS; Dissolved grain boundaries; Nodules/veins of greenish medium grained sands
369.8	-	375.1	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 15% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, INTERBEDDED; ACCESSORY MINERALS: QUARTZ SAND-35%, CHERT-03%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS; Moderate permeability
375.1	-	377.3	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 10% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, INTERBEDDED; ACCESSORY MINERALS: QUARTZ SAND-10%, HEAVY MINERALS-01%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS; Increased recrystallization with depth

377.3	-	382.7	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERCRYSTALLINE, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; SILICIC CEMENT; SEDIMENTARY STRUCTURES: MOTTLED, NODULAR; ACCESSORY MINERALS: QUARTZ SAND-35%, HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS; Variable recrystallization; dissolved grain boundaries; Some possibly reworked grains; Increase in dolomite and quartz with depth
382.7	-	394	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CHALCEDONY CEMENT; SEDIMENTARY STRUCTURES: MASSIVE; OTHER FEATURES: CALCAREOUS; FOSSILS: FOSSIL MOLDS; Variable crystal sizes and silicification throughout; 388.5-389.1: less massive crystalline calcareous dolostone
394	-	395	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERCRYSTALLINE, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 15% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MOTTLED, NODULAR, INTERBEDDED; ACCESSORY MINERALS: DOLOMITE-15%, QUARTZ SAND-10%; HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Interbedded and mottled, mottled massive non-porous highly recrystallized fractured limestone and more porous sandy moldic limestone
395	-	405.1	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 10% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 30% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-30%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Variable recrystallization
405.1	-	408.2	ft	LIMESTONE; GRAYISH BROWN TO LIGHT OLIVE GRAY; 05% POROSITY: INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-40%, HEAVY MINERALS-05%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; CRYSTALLINE; FOSSILS: FOSSIL MOLDS; Heavies primarily iron minerals; Dissolved grain boundaries
408.2	-	420	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 10% POROSITY: INTERCRYSTALLINE, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 40% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; CHALCEDONY CEMENT; SEDIMENTARY STRUCTURES: MOTTLED, NODULAR; ACCESSORY MINERALS: QUARTZ SAND-10%, HEAVY MINERALS-03%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS, BENTHIC FORAMINIFERA, MILIOLIDS; Remnant grain boundaries; Variable allochems; Poor recovery; 410-420 (36%); Nodules of quartz sands with 5% phosphate
420	-	421.8	ft	PACKSTONE; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY; 05% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Less recrystallized wackestone at 421.6-421.8’

421.8	-	423.6	ft	LIMESTONE; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY; 02% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; GRAIN TYPE: CRYSTALS, CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MOTTLED, NODULAR; ACCESSORY MINERALS: DOLOMITE-40%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS; BENTHIC FORAMINIFERA; Dissolved grain boundaries
423.6	-	424	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 01% POROSITY: INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 15% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CHALCEDONY CEMENT; ACCESSORY MINERALS: QUARTZ SAND-25%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS
424	-	426.7	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 08% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; SEDIMENTARY STRUCTURES: MASSIVE; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL MOLDS; Large calcite crystals infilling molds; multiple mollusk molds
426.7	-	430.2	ft	GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH ORANGE; 03% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; GRAIN TYPE: CRYSTALS, INTRACLASTS, SKELETAL; 92% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS; BENTHIC FORAMINIFERA, MILIOLIDS; 426.7-427.1’: Transitional wackestone-packstone
430.2	-	433.2	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-03%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Dissolved grain boundaries; variable allochems, some areas of wackestone; Good permeability
433.2	-	434.7	ft	PACKSTONE; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY; 02% POROSITY: INTERGRANULAR, FRACTURE, MOLDIC; GRAIN TYPE: CRYSTALS, INTRACLASTS, CALCILUTITE; 60% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; CLAY MATRIX; SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED; ACCESSORY MINERALS: CLAY-10%, HEAVY MINERALS-03%; OTHER FEATURES: HIGH RECRYSTALLIZATION; Greenish-gray clay beds at 433.4 & 434.2; Dissolved grain boundaries
434.7	-	440	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 15% POROSITY: INTERGRANULAR, FRACTURE, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 70% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CLAY-01%, HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS, MILIOLIDS; Erosional surface at 440.0
440	-	442.3	ft	GRAINSTONE; VERY LIGHT ORANGE; 15% POROSITY: INTERGRANULAR, VUGULAR; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, SKELETAL, CRYSTALS; 92% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BENTHIC FORAMINIFERA; Top of Suwannee Limestone

442.3	-	448.8	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 25% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CRYSTALS, SKELTAL CAST, INTRACLASTS; 95% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS, MOLLUSKS; BENTHIC FORAMINIFERA; Variable recrystallization; Increased micrite with depth
448.8	-	451.6	ft	PACKSTONE; VERY LIGHT ORANGE; 15% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CRYSTALS, SKELTAL CAST, INTRACLASTS; 85% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS, MOLLUSKS
451.6	-	460.1	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 15% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CRYSTALS, SKELTAL CAST, INTRACLASTS; 95% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Darker in color with depth
460.1	-	461.5	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 25% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CRYSTALS, SKELTAL CAST, INTRACLASTS; 98% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA
461.5	-	462.7	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 08% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELTAL CAST, INTRACLASTS, CALCILUTITE; 95% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MILIOLIDS, MOLLUSKS
462.7	-	464.1	ft	PACKSTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELTAL CAST, INTRACLASTS, CALCILUTITE; 80% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS; Iron/organic layer at 4363.3
464.1	-	467.3	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 08% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELTAL CAST, INTRACLASTS, CALCILUTITE; 92% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS, BENTHIC FORAMINIFERA
467.3	-	469.3	ft	GRAINSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 20% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELTAL CAST, PELLET, INTRACLASTS; 98% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, MILIOLIDS

469.3	-	474.9	ft	GRAINSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, PELLET, CRYSTALS; 95% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS; Decrease is grain size with depth
474.9	-	476.7	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 10% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Sorites sp.
476.7	-	482.4	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Increase in micrite with depth - grading to a wackestone
482.4	-	483.7	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 10% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELTAL CAST, CALCILUTITE, INTRACLASTS; 75% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, FOSSIL MOLDS
483.7	-	490	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 25% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELTAL CAST, CALCILUTITE, INTRACLASTS; 92% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, FOSSIL MOLDS
490	-	493	ft	PACKSTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, CRYSTALS, CALCILUTITE; 60% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: MEDIUM RECRYSTALLIZATION
493	-	500	ft	PACKSTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, CALCILUTITE; 75% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS; Poor recovery; Mostly rubble; Depths estimated
500	-	502	ft	GRAINSTONE; VERY LIGHT ORANGE; 10% POROSITY: INTERGRANULAR, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, SKELTAL CAST, CRYSTALS; 95% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS; Poor recovery 500-502; Depths estimated

502	-	520	ft	WACKESTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 35% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-<1%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CHALKY; FOSSILS: FOSSIL MOLDS; Increase in micrite with depth; Poor recovery
520	-	522	ft	PACKSTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Poor recovery 520-530; Depths estimated
522	-	524	ft	WACKESTONE; VERY LIGHT ORANGE; 10% POROSITY: VUGULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELTAL CAST, CALCILUTITE, CRYSTALS; 45% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Dissolved grain boundaries
524	-	530	ft	PACKSTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 55% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION
530	-	533.2	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 10% POROSITY: VUGULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELETAL, INTRACLASTS, CRYSTALS; 92% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS
533.2	-	534.2	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELETAL, INTRACLASTS, CALCILUTITE; 92% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS
534.2	-	536.5	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, SKELETAL, CRYSTALS; 55% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: CRYPTOCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, MILIOLIDS; FOSSIL MOLDS; Dissolved grain boundaries; Fossils in more crystalline matrix
536.5	-	540	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, SKELTAL CAST, CRYSTALS; 92% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, MILIOLIDS; FOSSIL MOLDS; Dissolved grain boundaries; Increase in recrystallization; with depth

540	-	542	ft	WACKESTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: CONES, FOSSIL FRAGMENTS; Increase in allochems with depth; Poor recovery 540-550; (32%); Depth Estimated
542	-	550	ft	PACKSTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELTAL CAST, INTRACLASTS, CRYSTALS; 75% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS
550	-	559	ft	WACKESTONE; VERY LIGHT ORANGE TO LIGHT GRAY; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 35% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION, CHALKY; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Some areas more of a packstone; Poor recovery 550-560 (25%); Mostly rubble; Estimated depth
559	-	564.7	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; GRAIN TYPE: CALCILUTITE, INTRACLASTS, CRYSTALS; 08% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; DOLOMITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION, CHALKY, DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; BENTHIC FORAMINIFERA; Poor recovery 560-565 (31%); Estimated depth; Variable recrystallization and dolomite throughout
564.7	-	573	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: INTRACLASTS, CRYSTALS, CALCILUTITE; 92% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA
573	-	575	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 04% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: INTRACLASTS, CRYSTALS, CALCILUTITE; 85% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS; Interbedded with micritic layers
575	-	576	ft	DOLOSTONE; GRAYISH ORANGE TO DARK YELLOWISH BROWN; 08% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; OTHER FEATURES: CALCAREOUS; FOSSILS: FOSSIL MOLDS; Organic laminae present
576	-	578.5	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: INTRACLASTS, CRYSTALS, SKELTAL CAST; 95% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; FOSSILS: FOSSIL FRAGMENTS

578.5	-	579.5	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; <1% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; SEDIMENTARY STRUCTURES: LAMINATED; ACCESSORY MINERALS: ORGANICS-05%; OTHER FEATURES: CALCAREOUS; Organic laminae present
579.5	-	580	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 03% POROSITY; GRAIN TYPE: INTRACLASTS, CRYSTALS, SKELTAL CAST; 40% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; FOSSILS: FOSSIL FRAGMENTS
580	-	580.4	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 01% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
580.4	-	580.8	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: INTRACLASTS, CALCILUTITE; 95% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-10%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION
580.8	-	584	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 01% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION; Organic laminae at 580.9-581.1'; Increased recrystallization with depth through 584'
584	-	587.9	ft	MUDSTONE; VERY LIGHT ORANGE; 02% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: ORGANICS-01%, QUARTZ SAND-<1%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CHALKY; Poor recovery (7")
587.9	-	588.5	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; <1% POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: LAMINATED; ACCESSORY MINERALS: ORGANICS-10%; OTHER FEATURES: CALCAREOUS; Organic laminae present
588.5	-	590.5	ft	MUDSTONE; VERY LIGHT ORANGE; 01% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; GRAIN TYPE: CRYSTALS, CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL MOLDS
590.5	-	592	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; LOW PERMEABILITY; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 15% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-05%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; Increase in allochems with depth

592	-	598.5	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 85% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%, HEAVY MINERALS-01%; QUARTZ SAND-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Dissolved grain boundaries becoming less defined with depth; Grainstone in some areas; Organic laminae at bottom of interval
598.5	-	600	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-01%, HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; Increased dolomitization with depth
600	-	610.9	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 02% POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%, HEAVY MINERALS-01%; OTHER FEATURES: CALCAREOUS, FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS; Top of interval is very fine grained dolarenite; Grades to; cryptocrystalline dolostone at bottom of interval
610.9	-	612	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN TYPE: INTRACLASTS, CRYSTALS, CALCILUTITE; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%, HEAVY MINERALS-01%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; Increase in micrite and recrystallization with depth Organic laminae at top of interval
612	-	615.5	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%, ORGANICS-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Recrystallized wackestone-packstone with dissolved grain boundaries becoming a mudstone; flecks and striations of organics
615.5	-	617.8	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN TYPE: CRYSTALS, INTRACLASTS, CALCILUTITE; 85% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Dissolved grain boundaries
617.8	-	620.5	ft	WACKESTONE; GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: ORGANICS-05%; OTHER FEATURES: HIGH RECRYSTALLIZATION; Variable allochems
620.5	-	630	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 01% POROSITY: INTERCRYSTALLINE, INTERGRANULAR; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-03%, HEAVY MINERALS-02%; QUARTZ SAND-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC

630	-	631	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 01% POROSITY: INTERCRYSTALLINE, FRACTURE, PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 15% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; IRON CEMENT; SEDIMENTARY STRUCTURES: LAMINATED, MOTTLED; ACCESSORY MINERALS: DOLOMITE-15%, ORGANICS-05%; HEAVY MINERALS-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
631	-	635	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 45% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; ACCESSORY MINERALS: QUARTZ SAND-15%, DOLOMITE-05%; HEAVY MINERALS-03%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC, CHALKY; Dissolved grain boundaries
635	-	640	ft	MUDSTONE; VERY LIGHT ORANGE; 01% POROSITY: INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CRYSTALS, CALCILUTITE; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-01%, QUARTZ SAND-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION, CRYSTALLINE; CHALKY; FOSSILS: FOSSIL MOLDS
640	-	640.7	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, PIN POINT VUGS, FRACTURE; GRAIN TYPE: CRYSTALS, INTRACLASTS, CALCILUTITE; 75% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-03%, HEAVY MINERALS-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION; Dissolved grain boundaries; Organic laminae in top 3”
640.7	-	646	ft	LIMESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 03% POROSITY: INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CRYSTALS, INTRACLASTS, CALCILUTITE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-02%, QUARTZ SAND-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL MOLDS; Recrystallized wackestone-packstone with remnant grain boundaries
646	-	648	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 02% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-03%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; FOSSIL MOLDS; Remnant grain boundaries; Poor recovery 640-650 (46%); Depth estimated
648	-	649	ft	WACKESTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 02% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT; ORGANIC MATRIX; SEDIMENTARY STRUCTURES: LAMINATED, MOTTLED; ACCESSORY MINERALS: QUARTZ SAND-20%, ORGANICS-15%; GYPSUM-02%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS; Dissolved grain boundaries; Ripped up and deformed interclasts; Organic laminae and gypsum beds

649	-	654	ft	MUDSTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR, MOLDIC; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 08% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: HEAVY MINERALS-02%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Interbedded with grainstone; Poor recovery 650-660 (38%); Top of Ocala Limestone
654	-	659.5	ft	PACKSTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: INTRACLASTS, CALCILUTITE, CRYSTALS; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: MEDIUM RECRYSTALLIZATION
659.5	-	660.5	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 01% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CHALKY
660.5	-	670	ft	GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: INTRACLASTS, CRYSTALS, CALCILUTITE; 95% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS; Terrible recovery 660-670 (6”)
670	-	674	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CRYSTALS, INTRACLASTS, CALCILUTITE; 30% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION, CRYSTALLINE; FOSSILS: FOSSIL MOLDS
674	-	680	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 10% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; GRAIN TYPE: CRYSTALS, INTRACLASTS, CALCILUTITE; 55% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION, CRYSTALLINE; FOSSILS: FOSSIL MOLDS; Poor recovery
680	-	696	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 05% POROSITY: INTERCRYSTALLINE, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CRYSTALS; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION, CRYSTALLINE; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS
696	-	696	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 10% POROSITY: INTERCRYSTALLINE, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CRYSTALS, SKELETAL, CALCILUTITE; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION, CRYSTALLINE; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS; Multiple mollusk fragments
696	-	710	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 05% POROSITY: INTERCRYSTALLINE, MOLDIC; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CRYSTALS, INTRACLASTS, CALCILUTITE; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION, CRYSTALLINE; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS; BENTHIC FORAMINIFERA; Poor recovery

710	-	718	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 10% POROSITY: INTERCRYSTALLINE, VUGULAR; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CRYSTALS, INTRACLASTS, SKELETAL; 15% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO GRANULE; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION, CRYSTALLINE; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Multiple Nummulites vanderstoki; Poor recovery; Estimated depth
718	-	720	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 10% POROSITY: INTERGRANULAR, VUGULAR; POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: CRYSTALS, INTRACLASTS, SKELETAL; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO GRANULE; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CHALKY; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Nummulites vanderstoki; Poor recovery
720	-	721.5	ft	WACKESTONE; VERY LIGHT ORANGE; 10% POROSITY: INTERCRYSTALLINE, VUGULAR, MOLDIC; GRAIN TYPE: CRYSTALS, INTRACLASTS, SKELETAL; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION, CRYSTALLINE; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Nummulites vanderstoki
721.5	-	726	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 05% POROSITY: INTERCRYSTALLINE, MOLDIC, PIN POINT VUGS; GRAIN TYPE: CRYSTALS, INTRACLASTS, SKELETAL; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION, CRYSTALLINE; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, MOLLUSKS; FOSSIL MOLDS; Nummulites vanderstoki
726	-	735.5	ft	MUDSTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS; fewer fossils than above; Some remnant grain boundaries
735.5	-	740	ft	MUDSTONE; VERY LIGHT ORANGE; 01% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION, CHALKY; Poor recovery
740	-	750	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 20% POROSITY: VUGULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: SKELETAL, CALCILUTITE, INTRACLASTS; 55% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: CRYPTOCRYSTALLINE TO GRANULE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, ECHINOID; MOLLUSKS, FOSSIL MOLDS; Poor recovery 740-750 (27%)
750	-	784.5	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 07% POROSITY: INTERCRYSTALLINE, MOLDIC, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, SKELETAL, INTRACLASTS; 07% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO GRANULE; GOOD INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; FOSSIL MOLDS; Nummulites vanderstoki and other fossil fragments make up primary allochems; Variable molds and porosity; Moderate permeability; Visible Lepidocyclina ocalana at 779.6’

784.5	-	808.9	ft	MUDSTONE; VERY LIGHT ORANGE; 04% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: HIGH RECRYSTALLIZATION, CHALKY; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Fewer fossils and more friable than above; Some remnant grain boundaries; Variable recrystallization; Up to 25% fossils 789.2-789.7'; Nummulites vanderstoki and Lepidocyclina ocalana
808.9	-	814.3	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 02% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Lepidocyclina ocalana
814.3	-	817	ft	MUDSTONE; VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, SKELETAL; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CHALKY; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Remnant grain boundaries; Lepidocyclina ocalana
817	-	824.3	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS; Dolomitic with low permeability at 822.2-822.5
824.3	-	829.9	ft	WACKESTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR; GRAIN TYPE: CALCILUTITE, CRYSTALS, SKELETAL; 20% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CHALKY; FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Nummulites vanderstoki and Lepidocyclina ocalana
829.9	-	838.2	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, INTRACLASTS, SKELETAL; 40% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; OTHER FEATURES: HIGH RECRYSTALLIZATION, CHALKY; FOSSILS: FOSSIL FRAGMENTS; Nummulites vanderstoki; Variable allochems throughout; Some areas of v. fine packstone with dissolved grain boundaries
838.2	-	844.5	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 07% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS; Remnant grain boundaries

844.5	-	846.6	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR; GRAIN TYPE: CALCILUTITE, CRYSTALS, SKELETAL; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-<1%, HEAVY MINERALS-<1%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Nummulites vanderstoki
846.6	-	852.2	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 07% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-02%, HEAVY MINERALS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS; Fewer fossils; Remnant grain boundaries
852.2	-	860	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, CRYSTALS, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: HEAVY MINERALS-01%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CHALKY; FOSSILS: FOSSIL FRAGMENTS; Poor recovery 850-860 (57%); Friable; Rubble
860	-	870	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; GRAIN TYPE: CRYSTALS, CALCILUTITE, INTRACLASTS; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX; DOLOMITE CEMENT; ACCESSORY MINERALS: DOLOMITE-20%, HEAVY MINERALS-01%; ORGANICS-01%; OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Remnant grain boundaries; Increased dolomite with depth
870	-	874	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 02% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CALCILUTITE MATRIX; ACCESSORY MINERALS: LIMESTONE-20%; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA; Increase in dolomite (decrease in micritic matrix) with depth; ~5% fossils
874	-	879.6	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 10% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: VERY FINE; RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; OTHER FEATURES: SUCROSIC; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS
879.6	-	903.3	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 07% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SPARRY CALCITE CEMENT; CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MASSIVE, INTERBEDDED; ACCESSORY MINERALS: CALCILUTITE-02%; FOSSILS: FOSSIL MOLDS; Interbedded with v. fine dolarenite layers (<2” thick) Preserved fossil at 293.4’
903.3	-	904.5	ft	DOLOSTONE; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN; 03% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: LIMESTONE-02%; OTHER FEATURES: SUCROSIC; FOSSILS: FOSSIL MOLDS; Remnant nodular structures
904.5	-	905.4	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 15% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MASSIVE; FOSSILS: FOSSIL MOLDS

905.4	-	905.9	ft	DOLOSTONE; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN; 05% POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: SUCROSIC; FOSSILS: FOSSIL MOLDS
905.9	-	906.3	ft	DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN; 09% POROSITY: INTERGRANULAR; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, ORGANIC MATRIX; ACCESSORY MINERALS: ORGANICS-20%; OTHER FEATURES: VARVED, SUCROSIC; Top of Avon Park
906.3	-	906.9	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 18% POROSITY: MOLDIC, VUGULAR, INTERGRANULAR; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-04%; OTHER FEATURES: SUCROSIC; FOSSILS: FOSSIL MOLDS
906.9	-	908.2	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 12% POROSITY: MOLDIC, VUGULAR, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; FOSSILS: FOSSIL MOLDS
908.2	-	909.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 08% POROSITY: FRACTURE, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; FOSSILS: FOSSIL MOLDS
909.3	-	909.6	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-04%; OTHER FEATURES: VARVED
909.6	-	910.9	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 12% POROSITY: FRACTURE, MOLDIC, INTERGRANULAR; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; FOSSILS: FOSSIL MOLDS
910.9	-	911.3	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 10% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, SKELETAL; 08% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: DOLOMITE-03%, ORGANICS-01%; OTHER FEATURES: VARVED
911.3	-	914.5	ft	PACKSTONE; VERY LIGHT ORANGE; 08% POROSITY: INTERGRANULAR, INTRAGRANULAR; GRAIN TYPE: SKELETAL, CALCILUTITE; 70% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: DOLOMITE-03%; OTHER FEATURES: DOLOMITIC; DOLOMITIC LAST COUPLE INCHES
914.5	-	915.2	ft	DOLOSTONE; GRAYISH BROWN; 10% POROSITY: INTERGRANULAR, MOLDIC; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; OTHER FEATURES: SUCROSIC; FOSSILS: ORGANICS, FOSSIL MOLDS
915.2	-	917	ft	DOLOSTONE; GRAYISH BROWN; 10% POROSITY: MOLDIC, INTERGRANULAR; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: SUCROSIC; FOSSILS: FOSSIL MOLDS, ORGANICS
917	-	917.9	ft	DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCILUTITE-04%, ORGANICS-04%; OTHER FEATURES: CALCAREOUS, SPECKLED, SUCROSIC; FOSSILS: FOSSIL MOLDS, ORGANICS; CALCAREOUS NATURE AND MICRITE INCREASE WITH DEPTH

917.9	-	920	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 07% POROSITY: INTERGRANULAR, MOLDIC; GRAIN TYPE: CALCILUTITE, CRYSTALS, SKELETAL; 06% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: DOLOMITE-10%, ORGANICS-02%; OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, ECHINOID, ORGANICS, ECHINOID MOLDS BELIEVED TO BE NEOLAGANUM DALI
920	-	922.1	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 10% POROSITY: INTERGRANULAR, MOLDIC; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCILUTITE-10%, ORGANICS-06%; OTHER FEATURES: CALCAREOUS, SUCROSIC, SPECKLED; FOSSILS: FOSSIL MOLDS, ORGANICS
922.1	-	923.1	ft	MUDSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 07% POROSITY: INTERGRANULAR; GRAIN TYPE: CALCILUTITE, CRYSTALS; 08% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT; ACCESSORY MINERALS: DOLOMITE-15%, ORGANICS-04%; OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION; FOSSILS: ORGANICS
923.1	-	925.7	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, MOLDIC; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: SUCROSIC; FOSSILS: FOSSIL MOLDS
925.7	-	927.8	ft	WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; GRAIN TYPE: CALCILUTITE, SKELETAL, CRYSTALS; 30% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT; ACCESSORY MINERALS: DOLOMITE-15%, ORGANICS-02%; OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION; FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, ECHINOID, BENTHIC FORAMINIFERA, ECHINOID MOLDS BELIEVED TO BE NEOLAGANUM DALI
927.8	-	930	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 07% POROSITY: INTERGRANULAR, FRACTURE, VUGULAR; 50-90% ALTERED; SUBHEDRAL; GRAIN SIZE: COARSE; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCILUTITE-12%, ORGANICS-01%; OTHER FEATURES: CALCAREOUS
930	-	932	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
932	-	933.1	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 10% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
933.1	-	941.4	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 07% POROSITY: INTERGRANULAR, FRACTURE, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; SAMPLE MOSTLY SHARDS AND RUBBLE LIKELY DUE TO FRACTURES
941.4	-	946.7	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 08% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT

946.7	-	948.4	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%; OTHER FEATURES: VARVED
948.4	-	953.8	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-04%
953.8	-	956.5	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 07% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
956.5	-	958.4	ft	DOLOSTONE; DARK YELLOWISH BROWN; 05% POROSITY: INTERCRYSTALLINE, INTERGRANULAR; PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%
958.4	-	960.1	ft	PACKSTONE; VERY LIGHT ORANGE; 07% POROSITY: INTERGRANULAR; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 70% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-03%; FOSSILS: FOSSIL FRAGMENTS
960.1	-	960.3	ft	MUDSTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR; GRAIN TYPE: CALCILUTITE; 03% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; FOSSILS: NO FOSSILS
960.3	-	962.1	ft	PACKSTONE; VERY LIGHT ORANGE; 07% POROSITY: INTERGRANULAR; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 70% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; FOSSILS: FOSSIL FRAGMENTS
962.1	-	963	ft	PACKSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 09% POROSITY: INTERGRANULAR; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 70% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; FOSSILS: FOSSIL FRAGMENTS, CONES, BENTHIC FORAMINIFERA
963	-	963.1	ft	MUDSTONE; VERY LIGHT ORANGE; 06% POROSITY: INTERGRANULAR; GRAIN TYPE: CALCILUTITE; 05% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX
963.1	-	964.7	ft	PACKSTONE; VERY LIGHT ORANGE; 10% POROSITY: INTERGRANULAR, INTRAGRANULAR; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 75% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-01%; OTHER FEATURES: FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES
964.7	-	965.9	ft	PACKSTONE; VERY LIGHT ORANGE; 08% POROSITY: INTERGRANULAR, INTRAGRANULAR; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 50% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-08%; OTHER FEATURES: VARVED, FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES

965.9	-	970.6	ft	PACKSTONE; VERY LIGHT ORANGE; 10% POROSITY: INTERGRANULAR, INTRAGRANULAR, MOLDIC; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 75% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCITE-01%; OTHER FEATURES: FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES; ECHINOID; ECHINOID MOLDS BELIEVED TO BE NEOLAGANUM DALI
970.6	-	970.9	ft	WACKESTONE; VERY LIGHT ORANGE; 07% POROSITY: INTERGRANULAR, INTRAGRANULAR; GRAIN TYPE: CALCILUTITE, SKELETAL, BIOGENIC; 25% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; FOSSILS: FOSSIL FRAGMENTS
970.9	-	973.7	ft	MUDSTONE; VERY LIGHT ORANGE; 10% POROSITY: INTERGRANULAR, INTRAGRANULAR, PIN POINT VUGS; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 80% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCITE-01%; OTHER FEATURES: FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES, ECHINOID, ECHINOID MOLDS BELIEVED TO BE NEOLAGANUM DALI
973.7	-	974	ft	WACKESTONE; VERY LIGHT ORANGE; 10% POROSITY: INTERGRANULAR, FRACTURE; GRAIN TYPE: CALCILUTITE, SKELETAL, BIOGENIC; 30% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS; POSSIBLE SLICKENSIDES ALONG FRACTURED PIECES
974	-	975.4	ft	PACKSTONE; VERY LIGHT ORANGE; 08% POROSITY: INTERGRANULAR, FRACTURE; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 60% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-08%; OTHER FEATURES: FOSSILIFEROUS, VARVED, MUDDY; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES, ORGANICS
975.4	-	982.5	ft	PACKSTONE; VERY LIGHT ORANGE; 10% POROSITY: INTERGRANULAR, INTRAGRANULAR, PIN POINT VUGS; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 85% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: VERY FINE TO GRANULE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-02%, CALCITE-02%; OTHER FEATURES: FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES, MOLLUSKS
982.5	-	987.7	ft	MUDSTONE; VERY LIGHT ORANGE; 09% POROSITY: INTERGRANULAR, INTRAGRANULAR, PIN POINT VUGS; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 85% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: CALCITE-02%, SPAR-03%; OTHER FEATURES: FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES, ECHINOID, ECHINOID MOLDS BELIEVED TO BE NEOLAGANUM DALI
987.7	-	988.8	ft	PACKSTONE; VERY LIGHT ORANGE; 08% POROSITY: INTERGRANULAR, INTRAGRANULAR, FRACTURE; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 75% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: SPAR-02%; OTHER FEATURES: FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES, BROKEN SHARDS AND RUBBLE OF LOW PERCENTAGE PACKSTONE
988.8	-	990	ft	PACKSTONE; VERY LIGHT ORANGE; 09% POROSITY: INTERGRANULAR, INTRAGRANULAR; GRAIN TYPE: SKELETAL, BIOGENIC, CALCILUTITE; 70% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; ACCESSORY MINERALS: SPAR-04%; OTHER FEATURES: FOSSILIFEROUS; FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES

990	-	993	ft	WACKESTONE; GRAYISH ORANGE TO GRAYISH BROWN; 08% POROSITY: INTERGRANULAR; GRAIN TYPE: CALCILUTITE, CRYSTALS, SKELETAL; 50% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT; ACCESSORY MINERALS: DOLOMITE-35%; OTHER FEATURES: DOLOMITIC, HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS, HIGHLY DOLOMITIC RECRYSTALLIZED MUDSTONE; RHOMBS THROUGHOUT
993	-	995	ft	PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 08% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS; 65% ALLOCHEMICAL CONSTITUENTS; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT; DOLOMITE CEMENT; ACCESSORY MINERALS: SPAR-08%, DOLOMITE-09%; OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION; FOSSILS: FOSSIL FRAGMENTS
995	-	995.5	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH ORANGE; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCILUTITE-03%; OTHER FEATURES: SUCROSIC
995.5	-	997.4	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 06% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO COARSE; ACCESSORY MINERALS: ORGANICS-02%
997.4	-	999.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: CRYPTOCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; OTHER FEATURES: VARVED, GRAIN SIZE FINES AND DARKENS DOWN DEPTH
999.3	-	1000.3	ft	DOLOSTONE; DARK YELLOWISH BROWN; 04% POROSITY: INTERCRYSTALLINE, INTERGRANULAR; PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; FOSSILS: FOSSIL MOLDS
1000.3	-	1003.7	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: CRYSTALLINE, SUCROSIC; FOSSILS: FOSSIL MOLDS
1003.7	-	1006.5	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 12% POROSITY: INTERGRANULAR, VUGULAR, MOLDIC; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: SUCROSIC
1006.5	-	1007	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 07% POROSITY: INTERCRYSTALLINE, INTERGRANULAR, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1007	-	1008.5	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 10% POROSITY: INTERGRANULAR; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: SUCROSIC, POOR SAMPLE, ONLY 4 INCHES OF CORE FOR AN 1.5 FOOT INTERVAL
1008.5	-	1009.5	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 12% POROSITY: INTERGRANULAR, VUGULAR, FRACTURE; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: SUCROSIC

1009.5	-	1010	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 08% POROSITY: INTERCRYSTALLINE, INTERGRANULAR; PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1010	-	1011	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 06% POROSITY: FRACTURE, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1011	-	1018	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 10% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: SUCROSIC; FOSSILS: FOSSIL MOLDS
1018	-	1020.1	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 12% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: SUCROSIC
1020.1	-	1023.5	ft	DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN; 06% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; FOSSILS: FOSSIL MOLDS
1023.5	-	1025.6	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 14% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: SUCROSIC
1025.6	-	1028.7	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 08% POROSITY: INTERCRYSTALLINE, INTERGRANULAR; PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: CRYSTALLINE, SUCROSIC
1028.7	-	1029.5	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 12% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: SUCROSIC; FOSSILS: FOSSIL MOLDS
1029.5	-	1032.9	ft	DOLOSTONE; DARK YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1032.9	-	1034.4	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 10% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: SUCROSIC, CRYSTALLINE; FOSSILS: FOSSIL MOLDS
1034.4	-	1039.2	ft	DOLOSTONE; DARK YELLOWISH BROWN; 04% POROSITY: FRACTURE, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1039.2	-	1040	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: SUCROSIC; FOSSILS: FOSSIL MOLDS
1040	-	1045.4	ft	DOLOSTONE; DARK YELLOWISH BROWN; 04% POROSITY: FRACTURE, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT

1045.4	-	1045.9	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 09% POROSITY: INTERGRANULAR; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-08%; OTHER FEATURES: SUCROSIC
1045.9	-	1051.5	ft	DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN; 06% POROSITY: FRACTURE, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1051.5	-	1061.3	ft	DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN; 10% POROSITY: FRACTURE, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-04%, ORGANICS-01%; EUHEDRAL CALCITE RHOMBS ALONG FRACTURES AND INSIDE VUGS
1061.3	-	1061.8	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-02%, ORGANICS-02%; OTHER FEATURES: SUCROSIC
1061.8	-	1066.1	ft	DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN; 12% POROSITY: FRACTURE, MOLDIC, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-04%, ORGANICS-02%; FOSSILS: FOSSIL MOLDS
1066.1	-	1066.6	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 09% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%, CALCITE-01%; OTHER FEATURES: SUCROSIC
1066.6	-	1071.1	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 10% POROSITY: FRACTURE, VUGULAR, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-06%, CALCILUTITE-01%; ORGANICS-01%; OTHER FEATURES: CALCAREOUS
1071.1	-	1074.8	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 09% POROSITY: FRACTURE, VUGULAR, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-03%
1074.8	-	1085.5	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 08% POROSITY: FRACTURE, VUGULAR, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-10%; OTHER FEATURES: CALCAREOUS; CALCITE RHOMBS LINE THE VUGS AND FRACTURES
1085.5	-	1089	ft	DOLOSTONE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE; 09% POROSITY: FRACTURE, VUGULAR, INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-20%, CALCITE-10%; OTHER FEATURES: CALCAREOUS
1089	-	1097.9	ft	DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN; 10% POROSITY: FRACTURE, VUGULAR, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-12%, ORGANICS-07%; OTHER FEATURES: CALCAREOUS; FOSSILS: FOSSIL MOLDS, FRACTURES AND VUGS LINED WITH FINE TO VERY COARSE; EUHEDRAL, CALCITE RHOMBS; ORGANICS IN FRACTURES AND PARTINGS

1097.9	-	1098.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 09% POROSITY: INTERGRANULAR; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: GRADED BEDDING; ACCESSORY MINERALS: ORGANICS-10%; OTHER FEATURES: VARVED; FOSSILS: ORGANICS, DOLOMITE GRAINS FINE WITH DEPTH; DOMINANCE OF ORGANICS AND, VARVES AT BASE OF INTERVAL
1098.3	-	1101.7	ft	DOLOSTONE; DARK YELLOWISH BROWN; 16% POROSITY: VUGULAR, FRACTURE; POSSIBLY HIGH PERMEABILITY; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-07%, CALCITE-02%, ORGANICS IN CRYSTALLINE STRUCTURE, SOME VUGS; AND IN VARVES, @1100.1 SUBHEDRAL DOLOMITE GRAINS LINE THE VUGS AND THERE, ARE A LIMITED NUMBER OF EUHEDRAL CALCITE GRAINS IN VUGS
1101.7	-	1110	ft	DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN; 12% POROSITY: VUGULAR, FRACTURE, INTERGRANULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-15%, CALCITE-04%; LIMESTONE-03%; OTHER FEATURES: LOW RECRYSTALLIZATION, CALCAREOUS, FINE GRAINED CALCAREOUS CARBONATES ARE ALONG THE SUTURED, FRACTURES AND BRECCIATED CORE; EUHEDRAL CALCITE CRYSTALS PRESENT IN FRACTURES AND VUGS
1110	-	1120	ft	DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN; 16% POROSITY: FRACTURE, VUGULAR; POSSIBLY HIGH PERMEABILITY; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-25%, CALCITE-15%; LIMESTONE-03%, ORGANICS-03%; OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION, HIGHLY BRECCIATED AND MOTTLED; MANY FRACTURES ARE SEALED WITH RECRYSTALLIZED CALCAREOUS; CARBONATES OR LINED WITH FINE TO COARSE EUHEDRAL CALCITE; VUGS CONTAIN FINE TO VERY COASE EUHEDRAL CALCITE
1120	-	1123.2	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 07% POROSITY: VUGULAR, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCITE-10%, ORGANICS-03%; OTHER FEATURES: CALCAREOUS, BRECCIATION LIMITED COMPARED TO PREVIOUS INTERVAL
1123.2	-	1124.5	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 03% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MOTTLED; ACCESSORY MINERALS: CALCITE-02%, ORGANICS-01%
1124.5	-	1127.6	ft	DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN; 12% POROSITY: FRACTURE, VUGULAR, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO GRANULE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-15%, CALCITE-10%; LIMESTONE-03%; OTHER FEATURES: CALCAREOUS FRACTURES AND VUGS LINED WITH EUHEDRAL CALCITE RHOMBS, BRECCIATED PICES ARE RECRYSTALLIZED CALCAEROUS CARBONATE
1127.6	-	1130.6	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: FRACTURE, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-05%, ORGANICS-04%; OTHER FEATURES: CALCAREOUS

1130.6	-	1135.3	ft	DOLOSTONE; GRAYISH BROWN; 12% POROSITY: FRACTURE, VUGULAR, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO GRANULE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-15%, CALCITE-10%; ORGANICS-08%; OTHER FEATURES: CALCAREOUS FRACTURES AND VUGS LINED WITH EUHEDRAL CALCITE RHOMBS, BRECCIATED PICES ARE RECRYSTALLIZED CALCAEROUS CARBONATE
1135.3	-	1144.9	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 16% POROSITY: FRACTURE, VUGULAR; POSSIBLY HIGH PERMEABILITY; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO GRANULE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-25%, CALCITE-15%; ORGANICS-08%; OTHER FEATURES: CALCAREOUS FRACTURES AND VUGS LINED WITH EUHEDRAL CALCITE RHOMBS, BRECCIATED PICES ARE RECRYSTALLIZED CALCAEROUS CARBONATE
1144.9	-	1149.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN; 12% POROSITY: FRACTURE, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-10%, ORGANICS-07%; OTHER FEATURES: CALCAREOUS FRACTURES AND VUGS LINED WITH EUHEDRAL CALCITE RHOMBS
1149.3	-	1152.5	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 14% POROSITY: FRACTURE, VUGULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-25%, CALCITE-15%; ORGANICS-05%; OTHER FEATURES: CALCAREOUS FRACTURES AND VUGS LINED WITH EUHEDRAL CALCITE RHOMBS
1152.5	-	1156.8	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 16% POROSITY: VUGULAR, FRACTURE; POSSIBLY HIGH PERMEABILITY; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO GRANULE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-30%, CALCITE-15%; ORGANICS-05%; OTHER FEATURES: CALCAREOUS FRACTURES AND VUGS LINED WITH EUHEDRAL CALCITE RHOMBS
1156.8	-	1160	ft	DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN; 11% POROSITY: INTERCRYSTALLINE, FRACTURE, VUGULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%, CALCAREOUS NATURE; EUHEDRAL CALCITE RHOMBS AND BRECCEIATED CHARACTERISTICS ADBRUPTLY ABSENT FROM THIS INTERVAL
1160	-	1163.6	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 10% POROSITY: FRACTURE, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: BRECCIATED; ACCESSORY MINERALS: ORGANICS-04%
1163.6	-	1168.7	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 08% POROSITY: FRACTURE, VUGULAR, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-05%
1168.7	-	1169.8	ft	DOLOSTONE; GRAYISH BROWN; 08% POROSITY: VUGULAR, FRACTURE, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: QUARTZ-02%

1169.8	-	1170	ft	DOLOSTONE; DARK YELLOWISH BROWN; 06% POROSITY: FRACTURE, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1170	-	1172.8	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: QUARTZ-03%, ORGANICS-02%, CLAY-01%
1172.8	-	1174.9	ft	DOLOSTONE; OLIVE GRAY; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%
1174.9	-	1179.3	ft	DOLOSTONE; GRAYISH ORANGE; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE; ACCESSORY MINERALS: ORGANICS-01%
1179.3	-	1186.8	ft	DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: BRECCIATED; ACCESSORY MINERALS: ORGANICS-08%
1186.8	-	1188.3	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: ORGANICS-12%; OTHER FEATURES: VARVED
1188.3	-	1189.3	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 09% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: POOR SAMPLE, SAMPLE IS RUBBLE, DEPTH APROXIMATED
1189.3	-	1190	ft	DOLOSTONE; GRAYISH BROWN; 08% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: POOR SAMPLE, DEPTH/LENGTH OF INTERVAL APROXIMATED DUE TO POOR RECOVERY
1190	-	1190.2	ft	DOLOSTONE; VERY LIGHT ORANGE; 04% POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, SEDIMENTARY STRUCTURES: INTERBEDDED
1190.2	-	1191	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: ORGANICS-08%; OTHER FEATURES: VARVED, POOR SAMPLE, INTERBEDDED WITH FINES AND ORGANIC VARVES
1191	-	1200	ft	DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: POOR SAMPLE, LOW RECOVERY ONLY 4 FEET OF CORE FOR A 9 FOOT INTERVAL
1200	-	1202	ft	DOLOSTONE; VERY LIGHT ORANGE; 04% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT

1202	-	1203.6	ft	DOLOSTONE; VERY LIGHT ORANGE; 08% POROSITY: MOLDIC, INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: ORGANICS-04%; OTHER FEATURES: VARVED, FINES AND ORGANIC VARVES INTERBEDDED AT BASE OF INTERVAL
1203.6	-	1204.7	ft	DOLOSTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN; 07% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; FOSSILS: FOSSIL MOLDS
1204.7	-	1205.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO VERY LIGHT ORANGE; 09% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1205.3	-	1206.4	ft	DOLOSTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN; 04% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: BANDED; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: VARVED, ORGANIC VARVES AT BASE OF INTERVAL
1206.4	-	1207.4	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1207.4	-	1209.7	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: SUCROSIC
1209.7	-	1209.9	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 02% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1209.9	-	1212.2	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1212.2	-	1219.3	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 06% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; FOSSILS: FOSSIL MOLDS, SAMPLE IS HIGHLY FRACTURED MORE LIKE RUBBLE THAN CORE
1219.3	-	1220	ft	DOLOSTONE; GRAYISH BROWN; 04% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1220	-	1220.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 04% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1220.3	-	1221.2	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 08% POROSITY: PIN POINT VUGS, INTERGRANULAR, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; FOSSILS: FOSSIL MOLDS
1221.2	-	1223.4	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: MOLDIC, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; FOSSILS: FOSSIL MOLDS

1223.4	-	1227	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: MOLDIC, INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; FOSSILS: FOSSIL MOLDS
1227	-	1230.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 06% POROSITY: INTERGRANULAR, MOLDIC, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; FOSSILS: FOSSIL MOLDS
1230.3	-	1231.3	ft	DOLOSTONE; GRAYISH BROWN; 04% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-10%; OTHER FEATURES: VARVED, MUDDY
1231.3	-	1234.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: MOLDIC, INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-04%; FOSSILS: FOSSIL MOLDS
1234.3	-	1234.8	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-08%; OTHER FEATURES: VARVED
1234.8	-	1255	ft	WACKESTONE; GRAYISH RED TO GRAYISH YELLOW; 8I% POROSITY: PIN POINT VUGS, MOLDIC; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1255	-	1239.2	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: MOLDIC, PIN POINT VUGS, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-04%; FOSSILS: FOSSIL MOLDS, CONE AND ECHINOID MOLDS ARE PLENTIFUL
1239.2	-	1239.5	ft	DOLOSTONE; OLIVE GRAY TO GRAYISH BROWN; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-05%; OTHER FEATURES: VARVED
1239.5	-	1240	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: MOLDIC, PIN POINT VUGS, INTERGRANULAR; 0-10% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; FOSSILS: FOSSIL MOLDS
1240	-	1244.3	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 09% POROSITY: MOLDIC, PIN POINT VUGS, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%; FOSSILS: FOSSIL MOLDS, CONE AND ECHINOID MOLDS ARE PLENTIFUL
1244.3	-	1244.7	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%
1244.7	-	1251	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 08% POROSITY: MOLDIC, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-04%; OTHER FEATURES: POOR SAMPLE; FOSSILS: FOSSIL MOLDS; ONLY 2 FEET OF CORE FOR A 4 FOOT INTERVAL

1251	-	1251.6	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%
1251.6	-	1253.1	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 07% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; FOSSILS: FOSSIL MOLDS
1253.1	-	1254	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%
1254	-	1256.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 07% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%
1256.3	-	1260	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 10% POROSITY: MOLDIC, PIN POINT VUGS, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%; FOSSILS: FOSSIL MOLDS
1260	-	1265.8	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 07% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE; INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%
1265.8	-	1266.6	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 10% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; FOSSILS: FOSSIL MOLDS
1266.6	-	1269	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 07% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%
1269	-	1269.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 02% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1269.3	-	1269.7	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 04% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-08%; OTHER FEATURES: VARVED
1269.7	-	1270	ft	DOLOSTONE; GRAYISH BROWN; 04% POROSITY: INTERCRYSTALLINE, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1270	-	1271.3	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%, CALCILUTITE-01%
1271.3	-	1274.8	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT

1274.8	-	1279	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 08% POROSITY: PIN POINT VUGS, MOLDIC, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%
1279	-	1280	ft	DOLOSTONE; GRAYISH BROWN; 04% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1280	-	1281.3	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%
1281.3	-	1282.6	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 08% POROSITY: PIN POINT VUGS, MOLDIC, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1282.6	-	1288.6	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 08% POROSITY: PIN POINT VUGS, MOLDIC, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%; OTHER FEATURES: VARVED, POOR SAMPLE, ONLY 2.5 FEET OF RUBBLE FOR A 6 FOOT INTERVAL
1288.6	-	1290	ft	DOLOSTONE; GRAYISH BROWN; 05% POROSITY: PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; FOSSILS: FOSSIL MOLDS
1290	-	1290.8	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-05%; OTHER FEATURES: POOR SAMPLE, SAMPLE IS RUBBLE NOT CORE
1290.8	-	1296.6	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: PIN POINT VUGS, MOLDIC, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: ORGANICS-06%; OTHER FEATURES: VARVED; FOSSILS: FOSSIL MOLDS, INTERBEDDED FINES AND ORGANICS AT 1293.8 AND 1295.9
1296.6	-	1300	ft	DOLOSTONE; GRAYISH BROWN; 02% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1300	-	1301.1	ft	DOLOSTONE; GRAYISH BROWN; 05% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%; OTHER FEATURES: VARVED
1301.1	-	1301.6	ft	DOLOSTONE; GRAYISH BROWN; 04% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1301.6	-	1302	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%; OTHER FEATURES: VARVED
1302	-	1312	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 07% POROSITY: PIN POINT VUGS, MOLDIC, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: POOR SAMPLE; FOSSILS: FOSSIL MOLDS, DEPTH APROXIMATED FROM POORLY MARKED CORE INTERVAL

1312	-	1320	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 10% POROSITY: FRACTURE, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: POOR SAMPLE; FOSSILS: FOSSIL MOLDS, ONLY 4.3 FEET OF CORE FOR AN 8 FOOT INTERVAL
1320	-	1330	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: PIN POINT VUGS, MOLDIC, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, NEAR BOTTOM OF INTERVAL BECOMES MORE FINE GRAINED
1330	-	1338	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: POOR SAMPLE, ONLY 2.1 FEET OF CORE FOR AN 8 FOOT INTERVAL
1338	-	1346	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 09% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: POOR SAMPLE, HIGH RECRYSTALLIZATION; FOSSILS: FOSSIL MOLDS
1346	-	1346.4	ft	DOLOSTONE; DARK YELLOWISH BROWN TO DARK YELLOWISH BROWN; 10% POROSITY: PIN POINT VUGS, MOLDIC, INTERGRANULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-15%; FOSSILS: FOSSIL MOLDS
1346.4	-	1347.1	ft	DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE; 10% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: COARSE; RANGE: VERY FINE TO VERY COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-04%
1347.1	-	1349.2	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 07% POROSITY: PIN POINT VUGS, INTERGRANULAR; INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%; OTHER FEATURES: MEDIUM RECRYSTALLIZATION
1349.2	-	1350	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 08% POROSITY: PIN POINT VUGS, MOLDIC, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-04%; FOSSILS: FOSSIL MOLDS
1350	-	1354.7	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 05% POROSITY: INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1354.7	-	1355.3	ft	DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE; 08% POROSITY: PIN POINT VUGS, INTERGRANULAR; INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-05%
1355.3	-	1359.3	ft	DOLOSTONE; VERY LIGHT ORANGE; 08% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%
1359.3	-	1359.4	ft	DOLOSTONE; DARK YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO COARSE; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-08%, GYPSUM-01%; FOSSILS: FOSSIL MOLDS

1359.4	-	1362.6	ft	DOLOSTONE; GRAYISH ORANGE; 06% POROSITY: PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; FOSSILS: FOSSIL MOLDS
1362.6	-	1364.4	ft	DOLOSTONE; GRAYISH ORANGE; 07% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%
1364.4	-	1369.3	ft	DOLOSTONE; GRAYISH ORANGE; 06% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%, GYPSUM-01%; FOSSILS: FOSSIL MOLDS
1369.3	-	1369.4	ft	DOLOSTONE; GRAYISH ORANGE; 08% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%; OTHER FEATURES: VARVED
1369.4	-	1373.3	ft	DOLOSTONE; GRAYISH ORANGE; 04% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1373.3	-	1381.3	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 06% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-04%, QUARTZ-01%; OTHER FEATURES: POOR SAMPLE; ONLY 6 FEET OF CORE FOR AN 8 FOOT INTERVAL; MIDDLE OF INTERVAL TRENDS TOWARD MEDIUM INDURATION
1381.3	-	1383.6	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 08% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1383.6	-	1385.9	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 06% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1385.9	-	1386	ft	DOLOSTONE; GRAYISH ORANGE TO DARK YELLOWISH BROWN; 05% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-15%, GYPSUM-03%; OTHER FEATURES: VARVED
1386	-	1397.1	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 05% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: ORGANICS-07%; SOME THIN INTERBEDS OF FINE DOLOSTONE OVER INTERVAL
1397.1	-	1400.4	ft	DOLOSTONE; GRAYISH ORANGE; 08% POROSITY: MOLDIC, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: FROSTED; EXTENSIVE SUBHEDRAL FINE CRYSTALS OVER INTERVAL
1400.4	-	1400.7	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-05%; OTHER FEATURES: VARVED

1400.7	-	1404.8	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 08% POROSITY: MOLDIC, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%
1404.8	-	1406.2	ft	DOLOSTONE; GRAYISH BROWN; 04% POROSITY: FRACTURE, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-06%, GYPSUM-01%, ORGANICS-01%; OTHER FEATURES: CALCAREOUS
1406.2	-	1411.3	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 04% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: BRECCIATED, MOTTLED; ACCESSORY MINERALS: CALCILUTITE-25%, ORGANICS-15%; CALCITE-08%, GYPSUM-01%; OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, CALCITE CRYSTALS SEAL MOST FRACTURES; BRECCIATED CALCAEROUS CARBONATES THROUGHOUT THE INTERVAL
1411.3	-	1415.6	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCITE-12%, CALCILUTITE-05%; OTHER FEATURES: CALCAREOUS
1415.6	-	1416.5	ft	DOLOSTONE; VERY LIGHT ORANGE; 08% POROSITY: PIN POINT VUGS, INTERGRANULAR, MOLDIC; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCILUTITE-25%, CALCITE-15%; OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION
1416.5	-	1416.7	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: INTERGRANULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO FINE; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: ORGANICS-15%, CALCILUTITE-05%; OTHER FEATURES: CALCAREOUS
1416.7	-	1421.2	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 05% POROSITY: PIN POINT VUGS, FRACTURE, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-20%, ORGANICS-02%; OTHER FEATURES: CALCAREOUS CALCITE SEALS MOST FRACTURES
1421.2	-	1421.6	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 08% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-15%; OTHER FEATURES: VARVED
1421.6	-	1428.6	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 09% POROSITY: INTERGRANULAR, PIN POINT VUGS, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCITE-10%, CALCILUTITE-05%; OTHER FEATURES: CALCAREOUS
1428.6	-	1431.7	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 10% POROSITY: VUGULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-05%, ORGANICS-04%
1431.7	-	1434.7	ft	DOLOSTONE; GRAYISH BROWN; 05% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-02%

1434.7	-	1439.7	ft	DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCILUTITE-05%; OTHER FEATURES: CALCAREOUS
1439.7	-	1440.6	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1440.6	-	1441.9	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 08% POROSITY: VUGULAR, FRACTURE, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1441.9	-	1444.7	ft	DOLOSTONE; GRAYISH BROWN; 12% POROSITY: VUGULAR, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1444.7	-	1445.3	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-10%; OTHER FEATURES: VARVED
1445.3	-	1448	ft	DOLOSTONE; GRAYISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%
1448	-	1450.3	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-12%; OTHER FEATURES: VARVED
1450.3	-	1451.6	ft	DOLOSTONE; GRAYISH ORANGE; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1451.6	-	1454.4	ft	DOLOSTONE; GRAYISH ORANGE; 08% POROSITY: PIN POINT VUGS, MOLDIC, INTERGRANULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCILUTITE-05%; OTHER FEATURES: CALCAREOUS
1454.4	-	1454.7	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 04% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-15%; OTHER FEATURES: VARVED
1454.7	-	1460	ft	DOLOSTONE; GRAYISH BROWN; 04% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-10%
1460	-	1461.6	ft	DOLOSTONE; GRAYISH BROWN; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: VERY FINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MOTTLED; ACCESSORY MINERALS: ORGANICS-10%
1461.6	-	1462.4	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 04% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-10%; OTHER FEATURES: VARVED

1462.4	-	1468.3	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 08% POROSITY: VUGULAR, INTERGRANULAR, INTRAGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-07%, CALCILUTITE-03%; OTHER FEATURES: CALCAREOUS
1468.3	-	1468.5	ft	DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-25%; OTHER FEATURES: VARVED
1468.5	-	1470.4	ft	DOLOSTONE; GRAYISH ORANGE; 09% POROSITY: VUGULAR, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1470.4	-	1470.5	ft	DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-25%; OTHER FEATURES: VARVED
1470.5	-	1471.9	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 07% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1471.9	-	1472.6	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 07% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-10%
1472.6	-	1473.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 08% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%, CALCITE-02%
1473.3	-	1473.7	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN; 10% POROSITY: FRACTURE, INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-07%
1473.7	-	1474.8	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 10% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-03%
1474.8	-	1476.6	ft	DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE; 06% POROSITY: PIN POINT VUGS, INTERGRANULAR; INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-04%
1476.6	-	1480.1	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 08% POROSITY: MOLDIC, PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-10%, CALCITE-04%
1480.1	-	1480.6	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 06% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-12%; OTHER FEATURES: VARVED
1480.6	-	1481.6	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: VARVED

1481.6	-	1483.2	ft	DOLOSTONE; MODERATE YELLOWISH BROWN TO VERY LIGHT ORANGE; 08% POROSITY: PIN POINT VUGS, MOLDIC, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MOTTLED; ACCESSORY MINERALS: ORGANICS-05%, CALCILUTITE-05%; OTHER FEATURES: VARVED, CALCAREOUS
1483.2	-	1484.3	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1484.3	-	1490.6	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 07% POROSITY: PIN POINT VUGS, FRACTURE, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-15%, GYPSUM-05%; OTHER FEATURES: VARVED, ORGANICS AND GYPSUM CONCENTRATED AT 1485.5 AND 1489
1490.6	-	1491.8	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-03%; OTHER FEATURES: VARVED;
1491.8	-	1492.8	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 08% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1492.8	-	1494.6	ft	DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE; 06% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-10%; OTHER FEATURES: VARVED
1494.6	-	1495.8	ft	DOLOSTONE; VERY LIGHT ORANGE; 07% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1495.8	-	1497.1	ft	DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE; 08% POROSITY: PIN POINT VUGS, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-05%; OTHER FEATURES: VARVED
1497.1	-	1499.1	ft	DOLOSTONE; VERY LIGHT ORANGE; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%, CALCILUTITE-02%; OTHER FEATURES: CALCAREOUS
1499.1	-	1500	ft	DOLOSTONE; VERY LIGHT ORANGE; 08% POROSITY: PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1500	-	1500.6	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: VERY FINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCILUTITE-10%; OTHER FEATURES: CALCAREOUS
1500.6	-	1501.3	ft	DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE; 06% POROSITY: PIN POINT VUGS, MOLDIC, INTERGRANULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCILUTITE-15%; OTHER FEATURES: CALCAREOUS

1501.3	-	1507.4	ft	DOLOSTONE; GRAYISH ORANGE; 04% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; SEDIMENTARY STRUCTURES: INTERBEDDED; ACCESSORY MINERALS: CALCILUTITE-25%, CALCITE-02%; OTHER FEATURES: CALCAREOUS, INTERBEDDED CALCAREOUS FINE AND CRYSTALLINE DOLOSTONE
1507.4	-	1508	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 10% POROSITY: PIN POINT VUGS, MOLDIC, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-02%
1508	-	1509.2	ft	DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-06%, GYPSUM-05%; CALCILUTITE-03%; OTHER FEATURES: CALCAREOUS
1509.2	-	1510.6	ft	DOLOSTONE; MODERATE YELLOWISH BROWN; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCILUTITE-05%; OTHER FEATURES: SUCROSIC, CALCAREOUS
1510.6	-	1511.6	ft	DOLOSTONE; VERY LIGHT ORANGE; 06% POROSITY: INTERGRANULAR; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX; ACCESSORY MINERALS: CALCILUTITE-10%; OTHER FEATURES: CALCAREOUS
1511.6	-	1512	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 05% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1512	-	1515.2	ft	DOLOSTONE; GRAYISH ORANGE; 08% POROSITY: PIN POINT VUGS, MOLDIC, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCILUTITE-06%; OTHER FEATURES: CALCAREOUS
1515.2	-	1516.3	ft	DOLOSTONE; GRAYISH BROWN; 08% POROSITY: PIN POINT VUGS, MOLDIC, INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1516.3	-	1517.6	ft	DOLOSTONE; VERY LIGHT ORANGE; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCILUTITE-10%; OTHER FEATURES: CALCAREOUS
1517.6	-	1519	ft	DOLOSTONE; VERY LIGHT ORANGE; 06% POROSITY: PIN POINT VUGS, MOLDIC, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-08%, CALCILUTITE-04%
1519	-	1532.8	ft	DOLOSTONE; VERY LIGHT ORANGE; 08% POROSITY: PIN POINT VUGS, INTERGRANULAR, MOLDIC; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: ORGANICS-08%, CALCILUTITE-03%
1532.8	-	1535.8	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, PIN POINT VUGS; INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO COARSE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-20%, CALCITE-10%; ORGANICS-06%, GYPSUM-04%; OTHER FEATURES: CALCAREOUS
1535.8	-	1538.6	ft	DOLOSTONE; VERY LIGHT ORANGE; 08% POROSITY: INTERGRANULAR, PIN POINT VUGS, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT

1538.6	-	1543.4	ft	DOLOSTONE; VERY LIGHT ORANGE; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1543.4	-	1544.9	ft	DOLOSTONE; VERY LIGHT ORANGE; 06% POROSITY: INTERGRANULAR; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1544.9	-	1546	ft	DOLOSTONE; VERY LIGHT ORANGE; 09% POROSITY: INTERGRANULAR, PIN POINT VUGS, FRACTURE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: POOR SAMPLE; 2.5 FEET OF CORE FOR A 5 FOOT INTERVAL; LENGTH OF INTERVAL APROXIMATED
1546	-	1550	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 07% POROSITY: INTERGRANULAR, PIN POINT VUGS, FRACTURE; 90-100% ALTERED; SUBHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: CALCITE-04%, ORGANICS-02%; OTHER FEATURES: POOR SAMPLE, 2.5 FEET OF CORE FOR A 5 FOOT INTERVAL; LENGTH OF INTERVAL APROXIMATED
1550	-	1554	ft	DOLOSTONE; VERY LIGHT ORANGE; 06% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: POOR SAMPLE, 2.5 FEET OF CORE FOR A 5 FOOT INTERVAL; LENGTH OF INTERVAL APROXIMATED; VUGULAR CRYSTALLINE TO COARSE CALCITE NODULE
1554	-	1555.1	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 05% POROSITY: PIN POINT VUGS, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT
1555.1	-	1556	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 05% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; SEDIMENTARY STRUCTURES: MOTTLED, BRECCIATED; ACCESSORY MINERALS: CALCILUTITE-08%, CALCITE-03%; OTHER FEATURES: CALCAREOUS, POOR SAMPLE, LENGTH OF INTERVAL APROXIMATED
1556	-	1560	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN; 06% POROSITY: PIN POINT VUGS, INTERGRANULAR; INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; OTHER FEATURES: POOR SAMPLE, DEPTH AND LENGTH APROXIMATED FROM POOR SAMPLE
1560	-	1566.1	ft	GYPSUM; WHITE TO VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE, FRACTURE; ACCESSORY MINERALS: DOLOMITE-20%, ORGANICS-05%
1566.1	-	1570.4	ft	DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: GYPSUM-15%, ORGANICS-03%, GYPSUM FILLED PINPOINT VUGS AND NODULES
1570.4	-	1577.2	ft	DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: GYPSUM-18%, ORGANICS-05%, GYPSUM FILLED PINPOINT VUGS AND NODULES
1577.2	-	1581	ft	DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: GYPSUM-15%, ORGANICS-03%, GYPSUM FILLED PINPOINT VUGS, NODULES AND INTERSTITIAL

1581	-	1584	ft	DOLOSTONE; GRAYISH ORANGE; 03% POROSITY: INTERGRANULAR, PIN POINT VUGS; INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: GYPSUM-20%; GYPSUM FILLED PINPOINT VUGS, NODULES AND INTERSTITIAL
1584	-	1586.8	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 03% POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT; ACCESSORY MINERALS: GYPSUM-08%, ORGANICS-02%, GYPSUM IN NODULES AROUND 1586.0
1586.8	-	1593.5	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 02% POROSITY: PIN POINT VUGS, INTERGRANULAR; INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, GYPSUM CEMENT; ACCESSORY MINERALS: GYPSUM-20%, GYPSUM FILLED PINPOINT VUGS, NODULES AND INTERSTITIAL
1593.5	-	1597.9	ft	GYPSUM; DARK YELLOWISH BROWN TO GRAYISH BROWN; 01% POROSITY: INTERCRYSTALLINE; ACCESSORY MINERALS: DOLOMITE-15%, ORGANICS-10%
1597.9	-	1600	ft	DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE; 02% POROSITY: PIN POINT VUGS, INTERGRANULAR; INTERCRYSTALLINE; 90-100% ALTERED; ANHEDRAL; GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, GYPSUM CEMENT; ACCESSORY MINERALS: GYPSUM-20%; GYPSUM FILLED PINPOINT VUGS, NODULES AND INTERSTITIAL
1600			ft	TOTAL DEPTH

Appendix E. Digital Photographs of Core Samples Retrieved from the ROMP 38 – Parrish Well Site in Manatee County, Florida


GSA
IN
CM
74
70
R38
59
60


GSA
IN
CM
59
50
40
35
R38
30


GSA
IN
CM
102
100
95'
90'
85


GSA
IN
CM
85'
80'
75'
HQ BTM


GSA
CM
IN
125
126.5
120
ROMP 38
113
115


GSA
CM
IN
113
110
105
ROMP 38
102


147.7
R38
137.1
140


137.1
135'
130'
Run 38
126.5


GSA
IN
CM
166.6
BTM
160
R38
156.6


GSA
IN
CM
156.6
150
R38
147.7


GSA
IN
CM
R38
201.9
210.4


GSA
IN
CM
200
201.4
R38
191


GSA
IN
CM
R38
219.6
220
230
232.9


GSA
IN
CM
R38
210.4
219.6

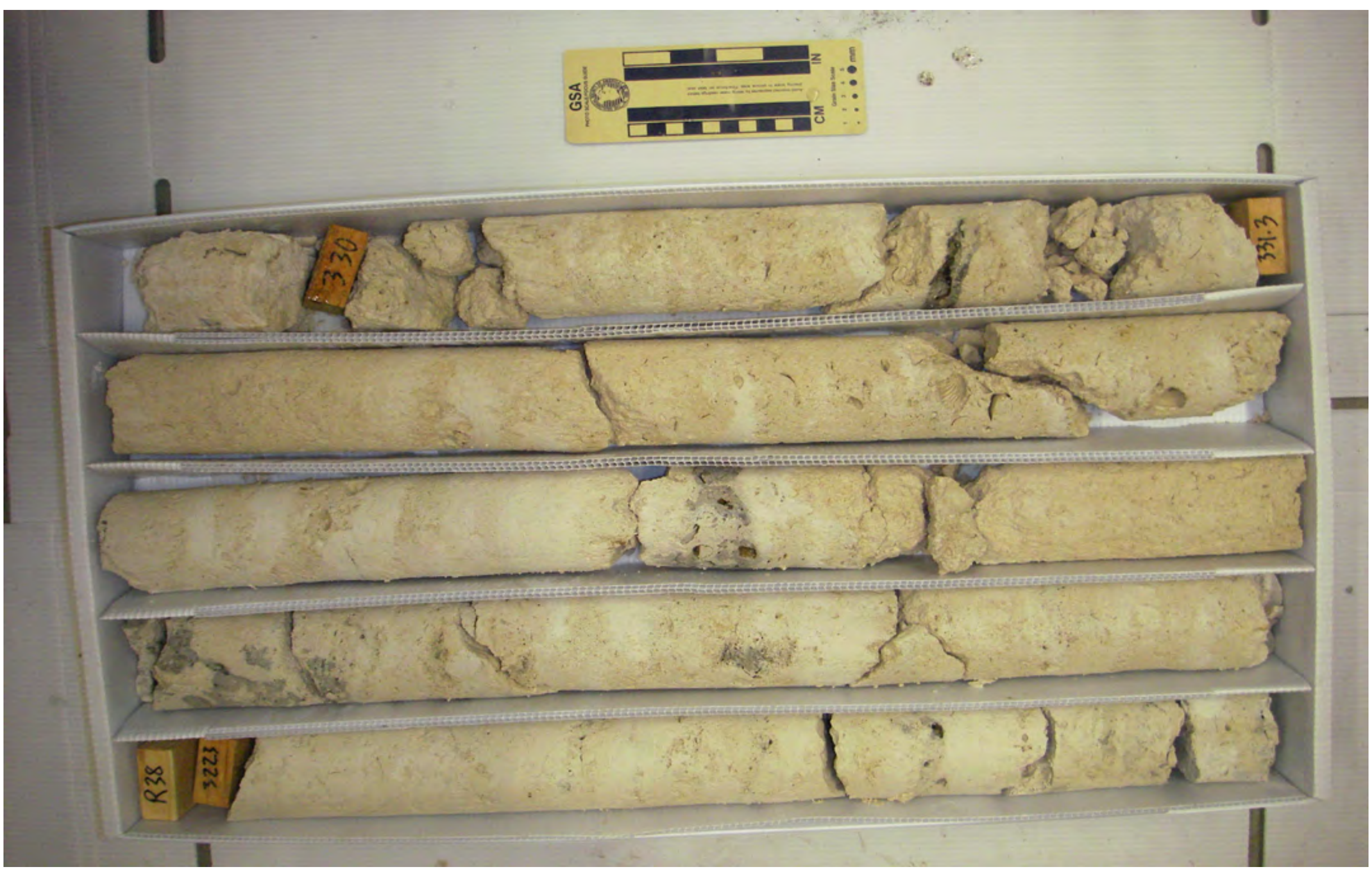

GSA
CM
IN
300
HQ BTM
R38

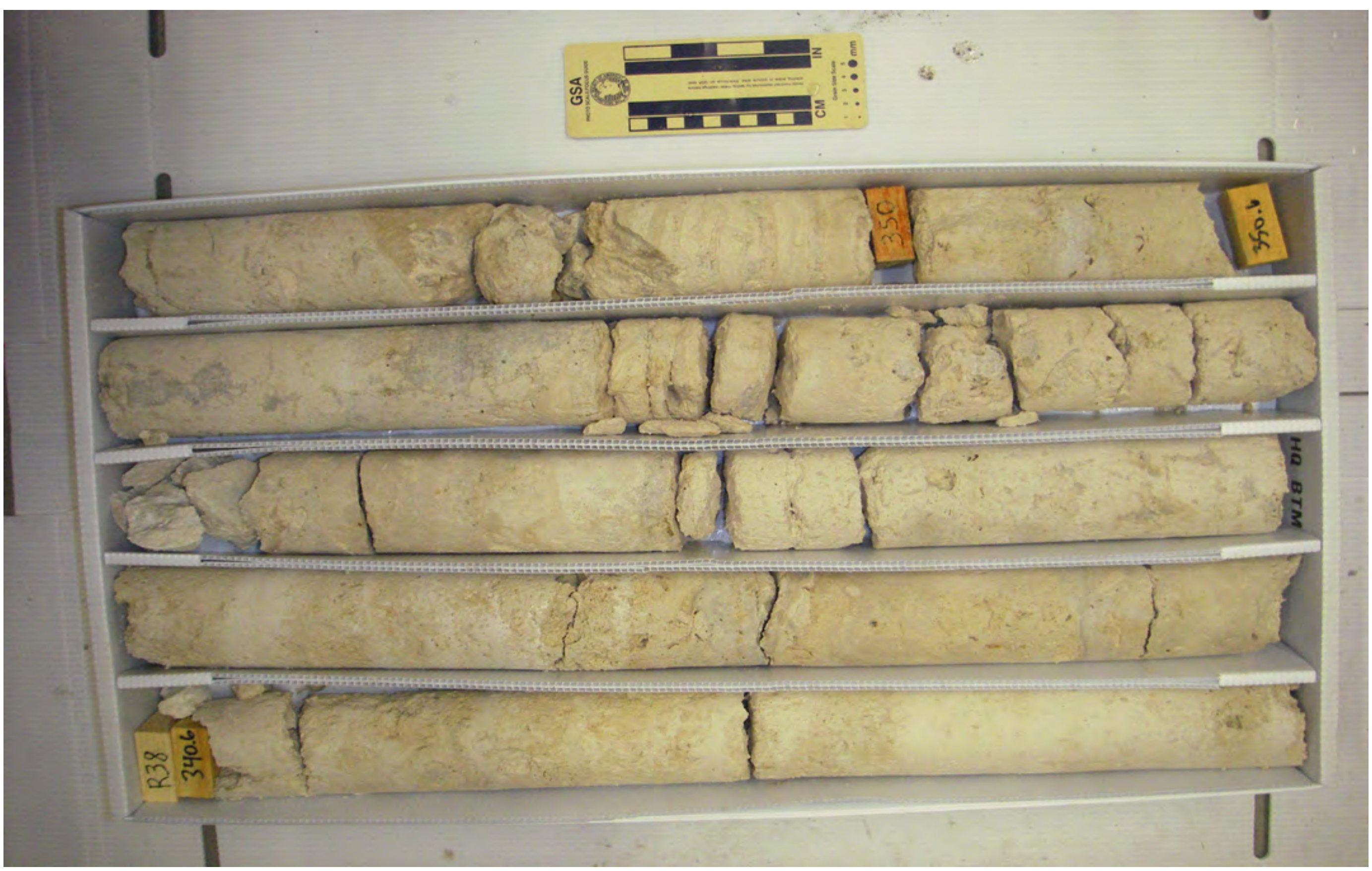

GSA
CM
IN
290
291.1
R38
281.7


GSA
IN
CM
322.3
320'
R38
310.8


GSA
IN
CM
310
R38
300

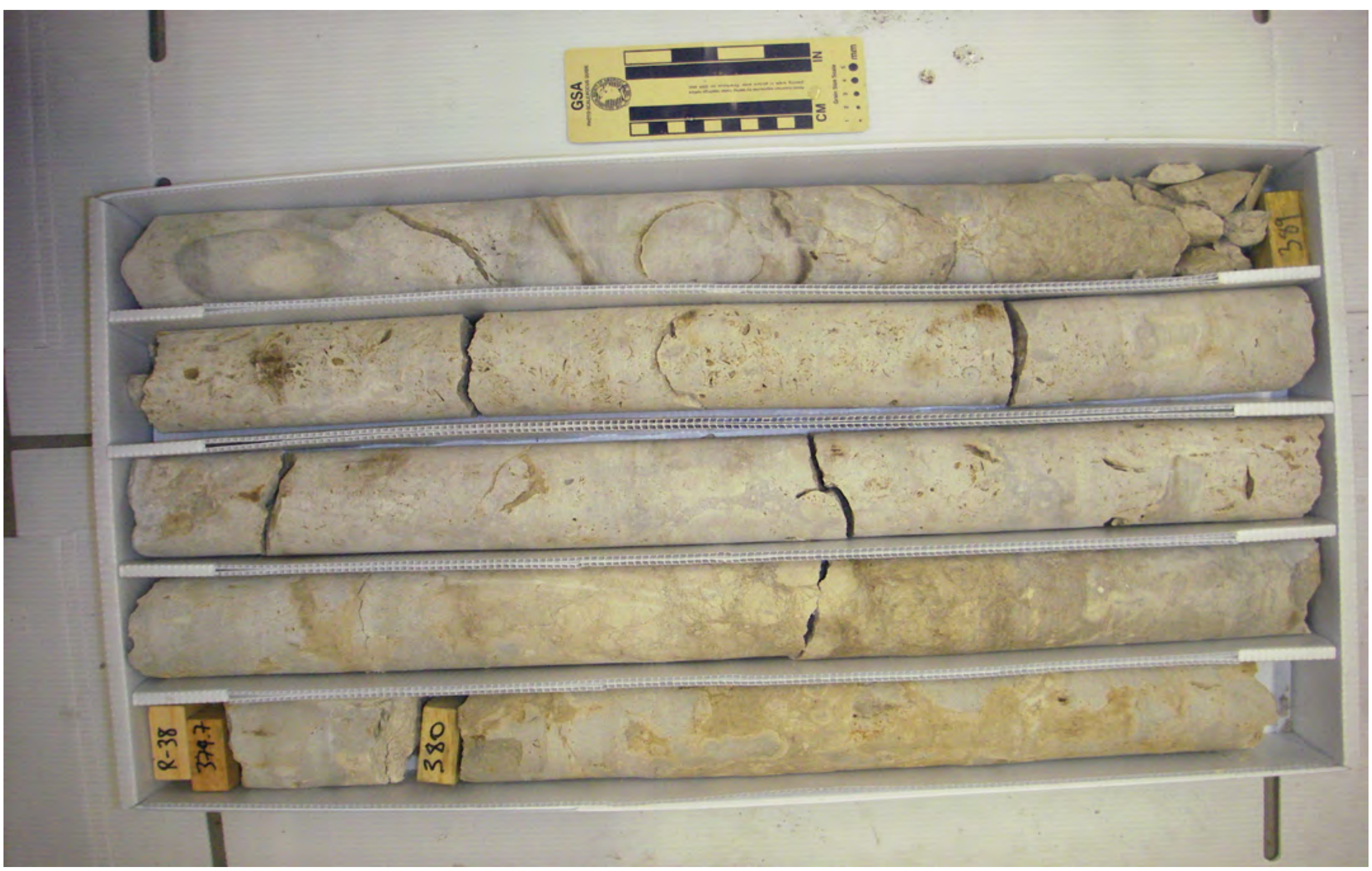

GSA
IN
CM
340.6
340
R38
331.5


GSA
IN
CM
330
331.3
R38



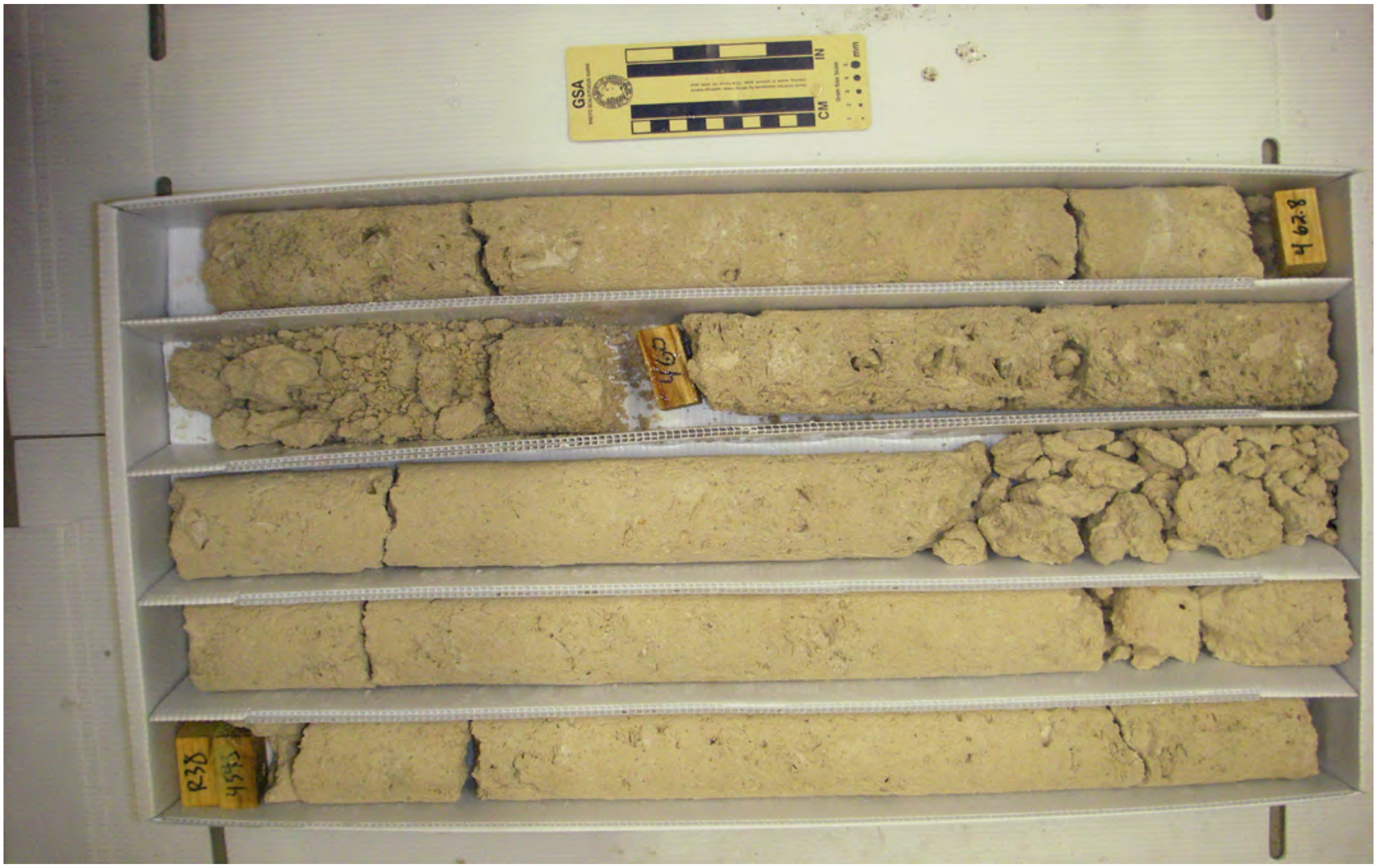

GSA
IN
CM
379.7
R-38
370

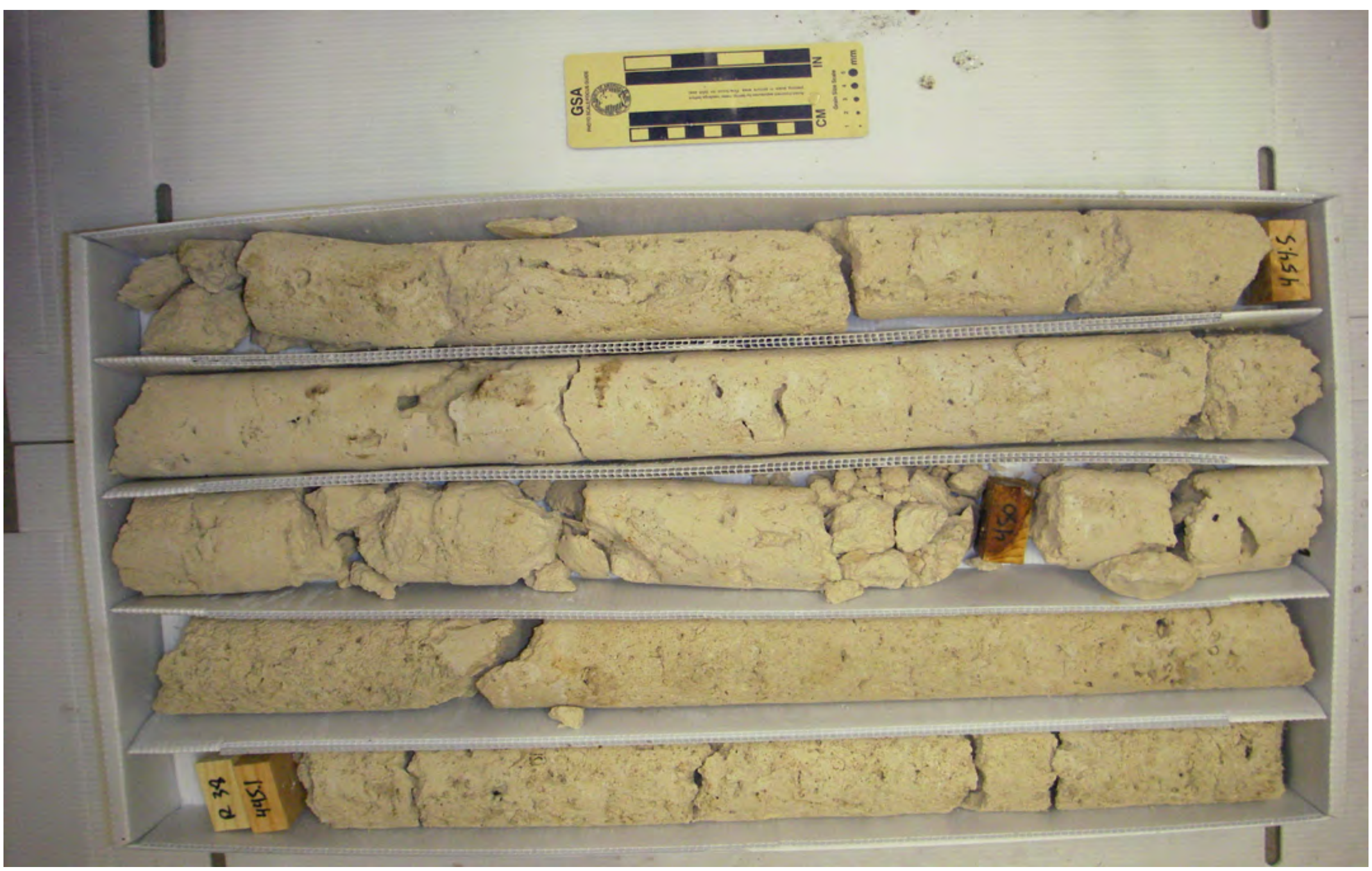

GSA
IN
CM
370
HQ BTM
R38
360

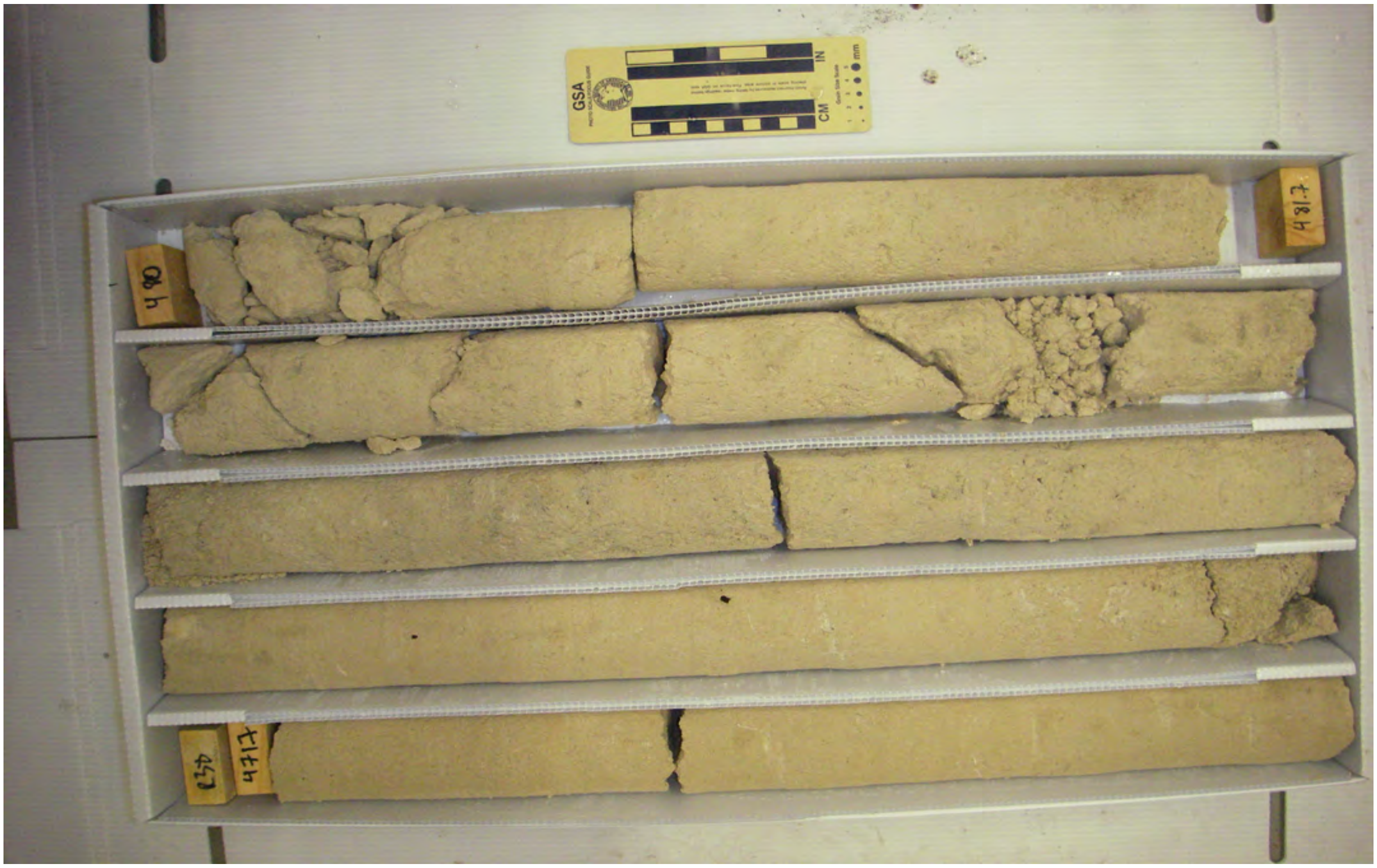



GSA
IN
CM
423.8
420
R-38
408.2
410'


GSA
IN
CM
406.2
400
R 38

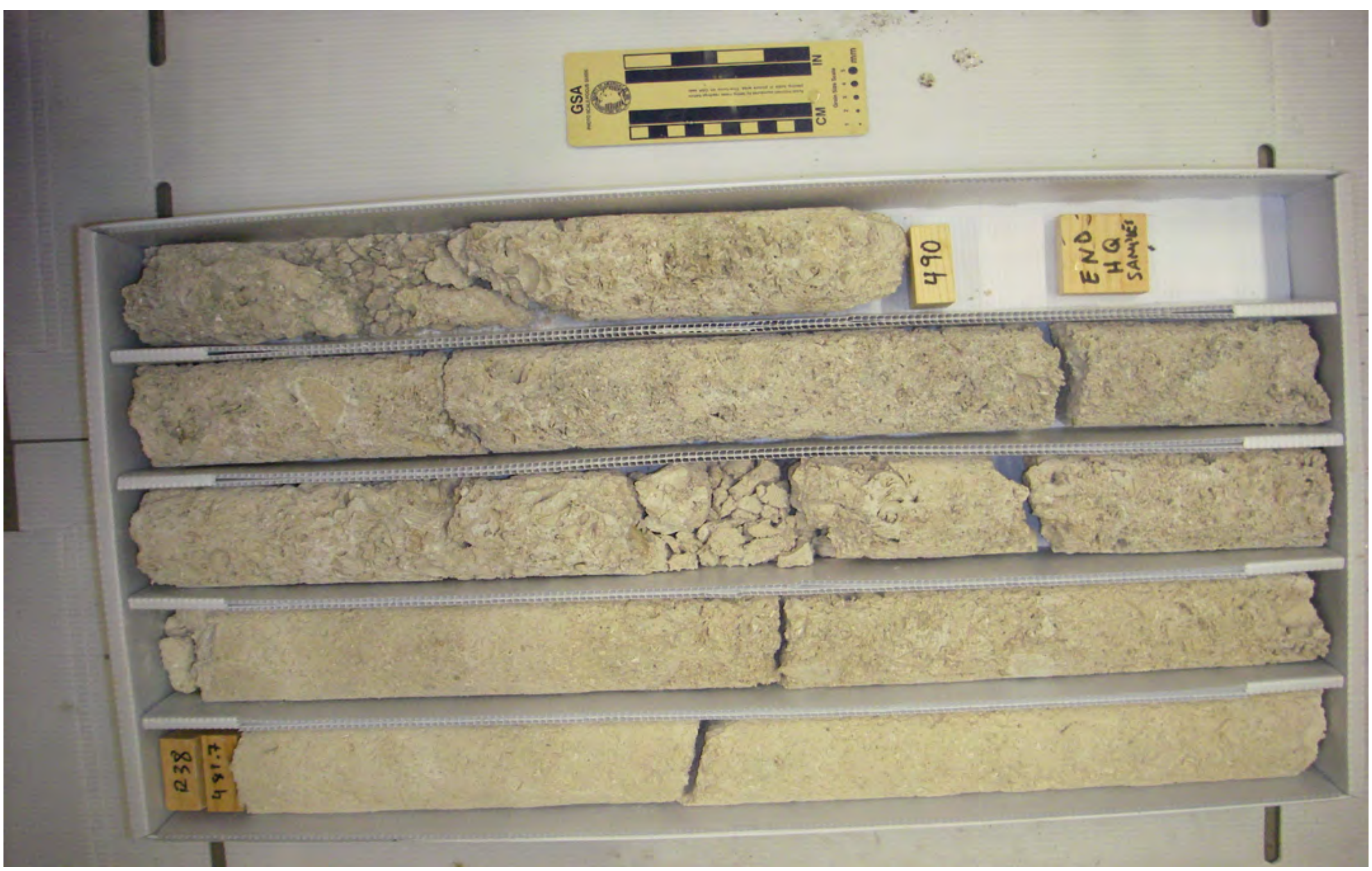

GSA
IN
CM
462.8


GSA
IN
CM
454.5


GSA
IN
CM
480
481.7
471.7


GSA
IN
CM
470
471.7
R38
462.3


GSA
CM
IN
513.2
510'
500'
ROMP 38
490'

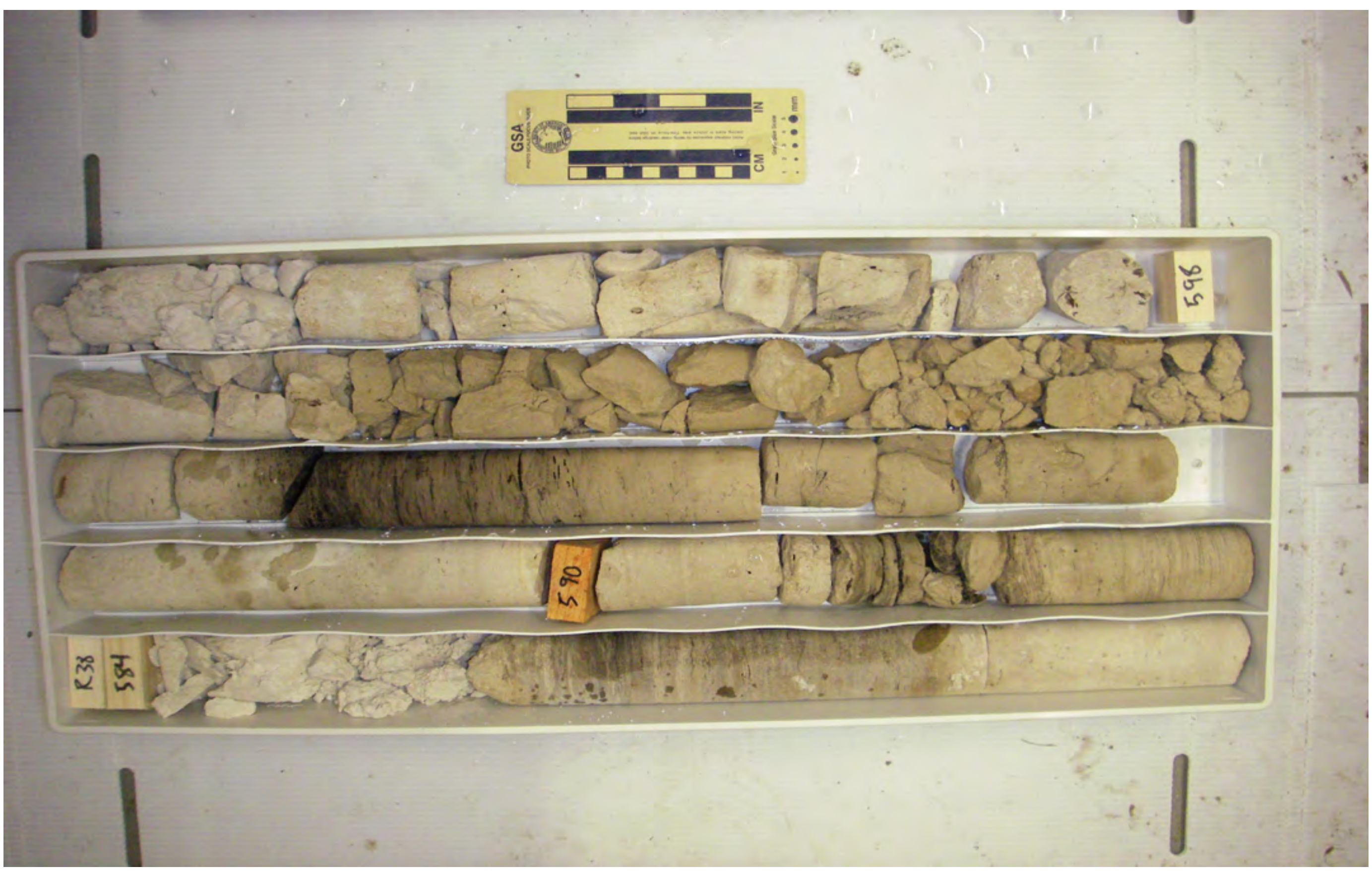

GSA
CM
IN
490
END
HQ


GSA
IN
CM
550'
551.3
540'
R-38
534.2


GSA
IN
CM
534.2
530'
520'
ROMP 38
512.2


GSA
IN
CM
584
580
R 38
573

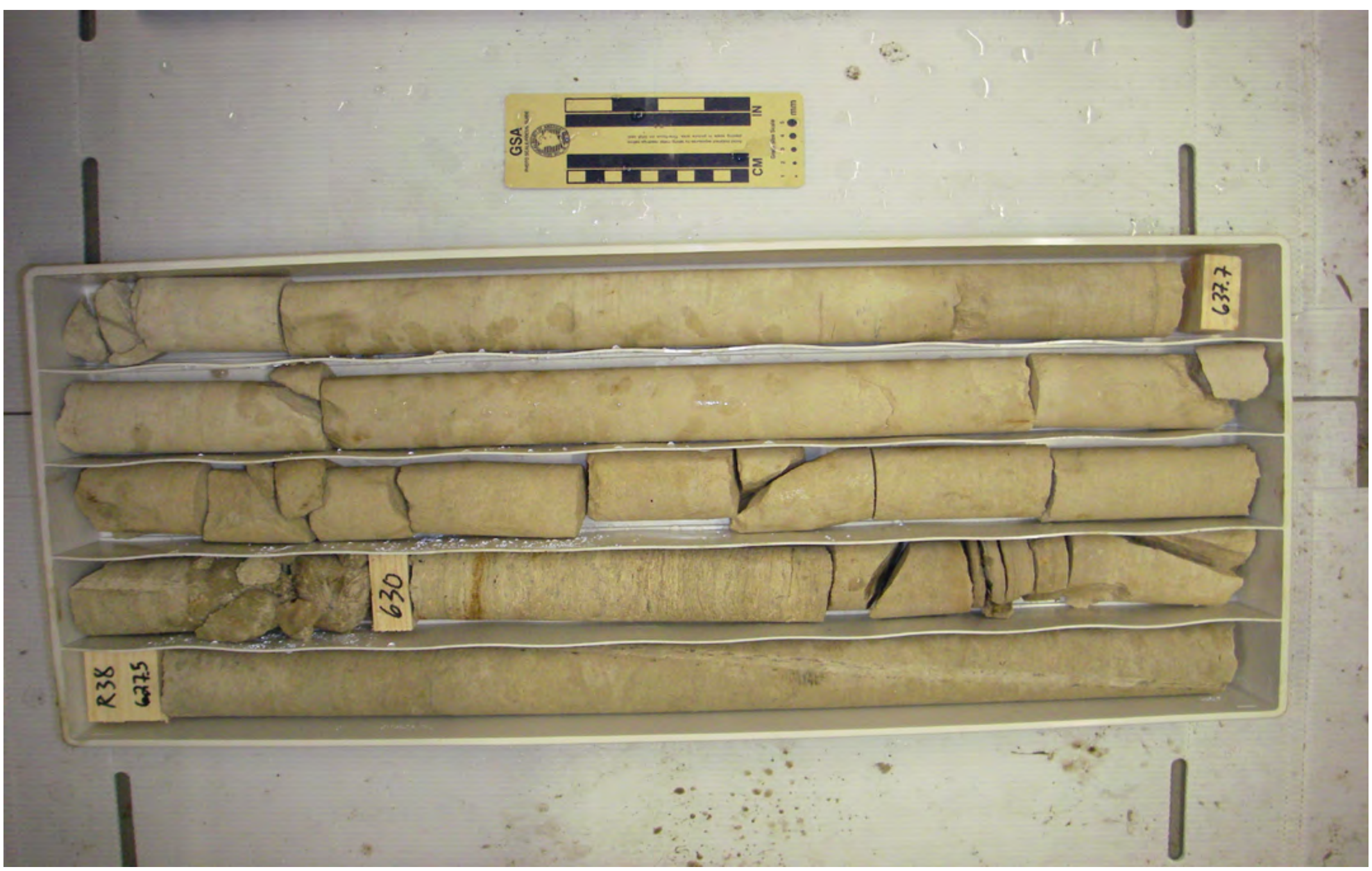

GSA
IN
CM
573
570'
565
R 38
551.5
560




GSA
IN
CM
627.5
620
R38
617.9


GSA
IN
CM
617.9
610
R38
607.6


GSA
IN
CM
649
650'
640'
R-38
637.7


GSA
IN
CM
637.7
630
R38
627.5


GSA
IN
CM
690
691.7
R 38
681.5


GSA
IN
CM
680
681.5
R-38
659
660'
670


GSA
IN
CM
R38
701.4
710
719


GSA
IN
CM
R38
691.7
700
701.4

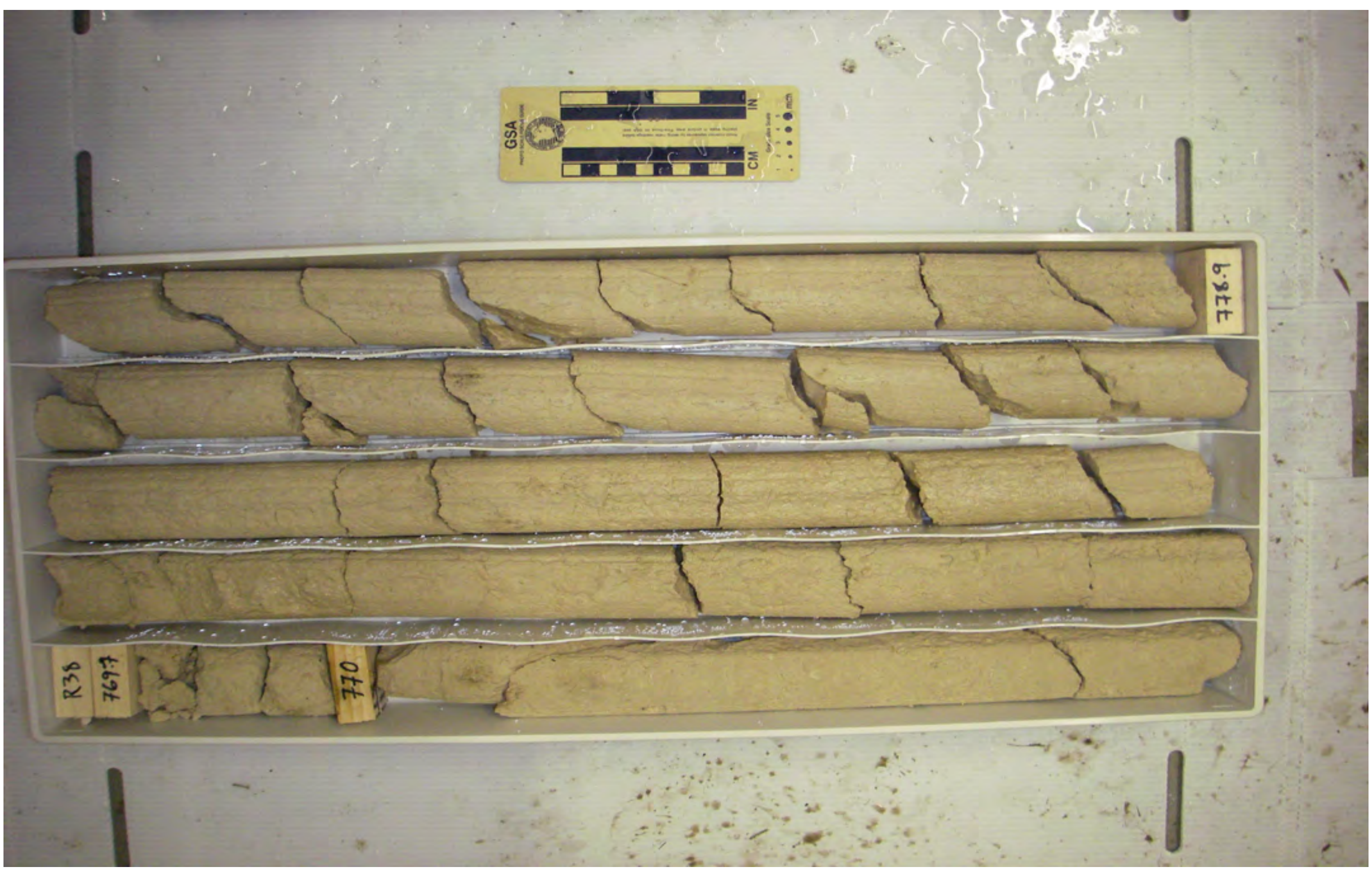

GSA
IN
CM
750
750.6
740
R38
731.7


GSA
IN
CM
730
731.7
R38
719

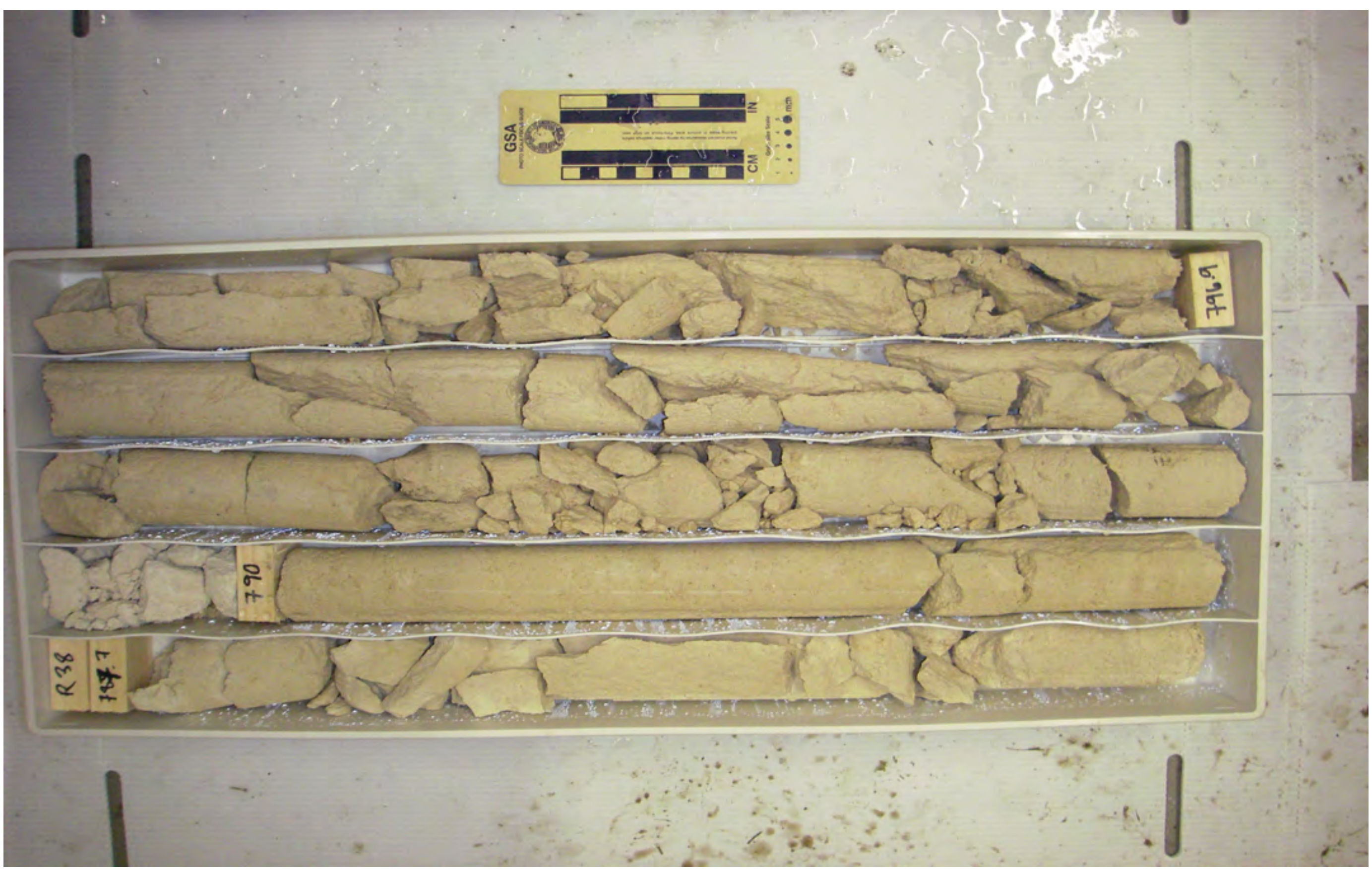

GSA
IN
CM
769.7
R 38
760


GSA
IN
CM
760
R38
750.6


GSA
IN
CM
787.7
R38
777.9
780


GSA
IN
CM
778.9
R38
769.7
770

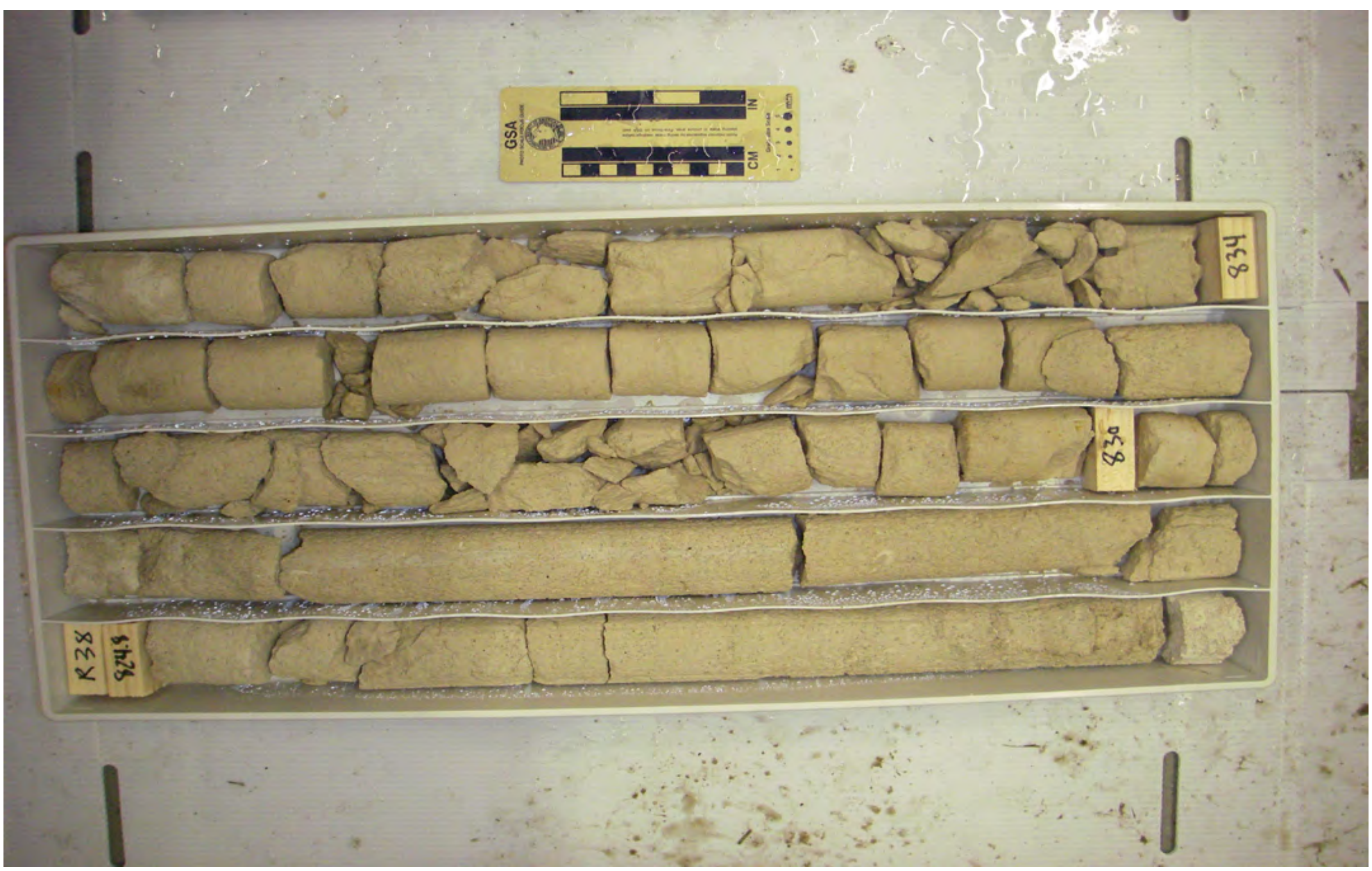

GSA
IN
CM
806.1
800
R38
796.9


GSA
IN
CM
796.9
790
R38

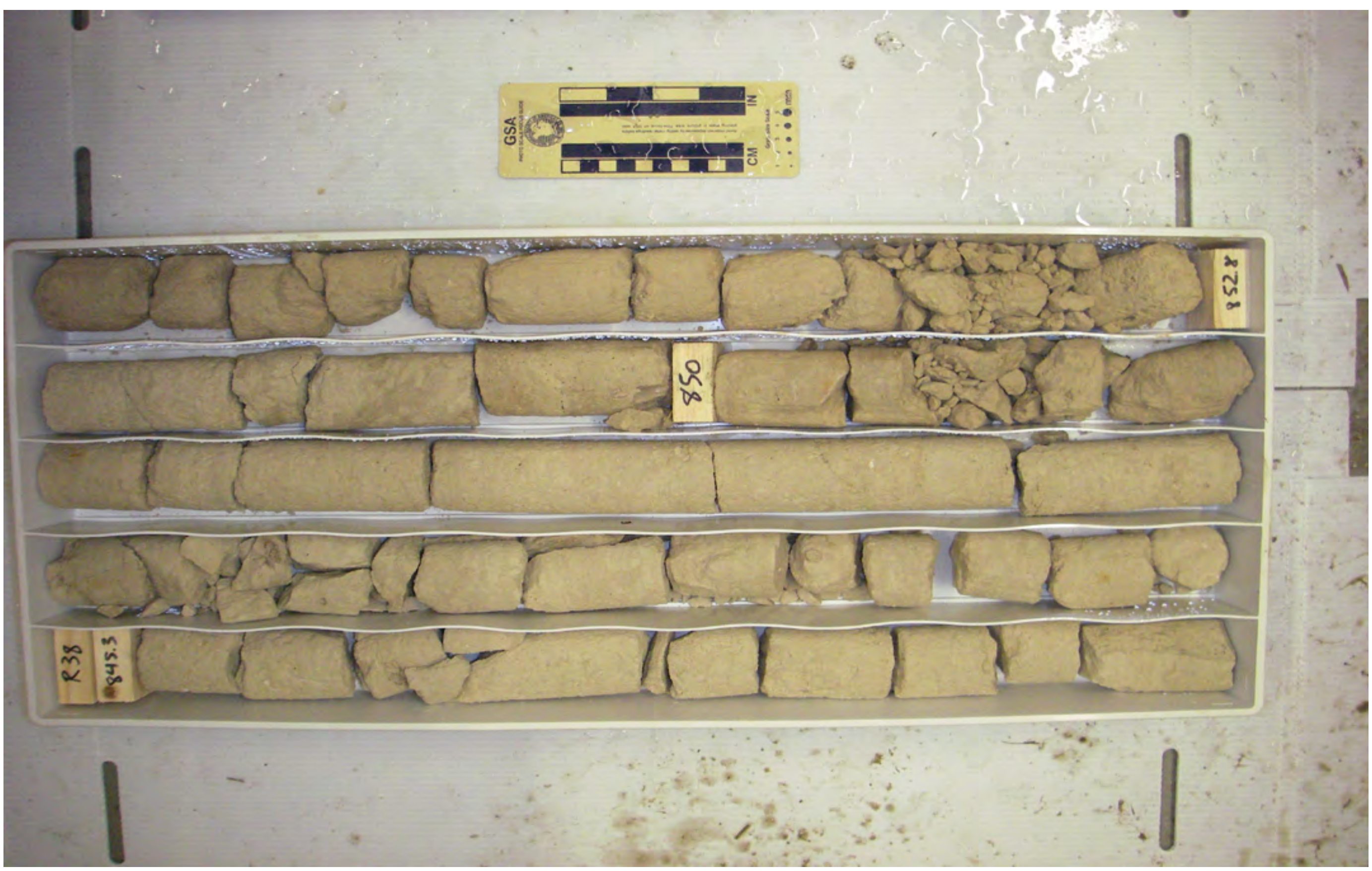

GSA
IN
CM
R38
815.2


GSA
IN
CM
815.2
810
R38
806.1

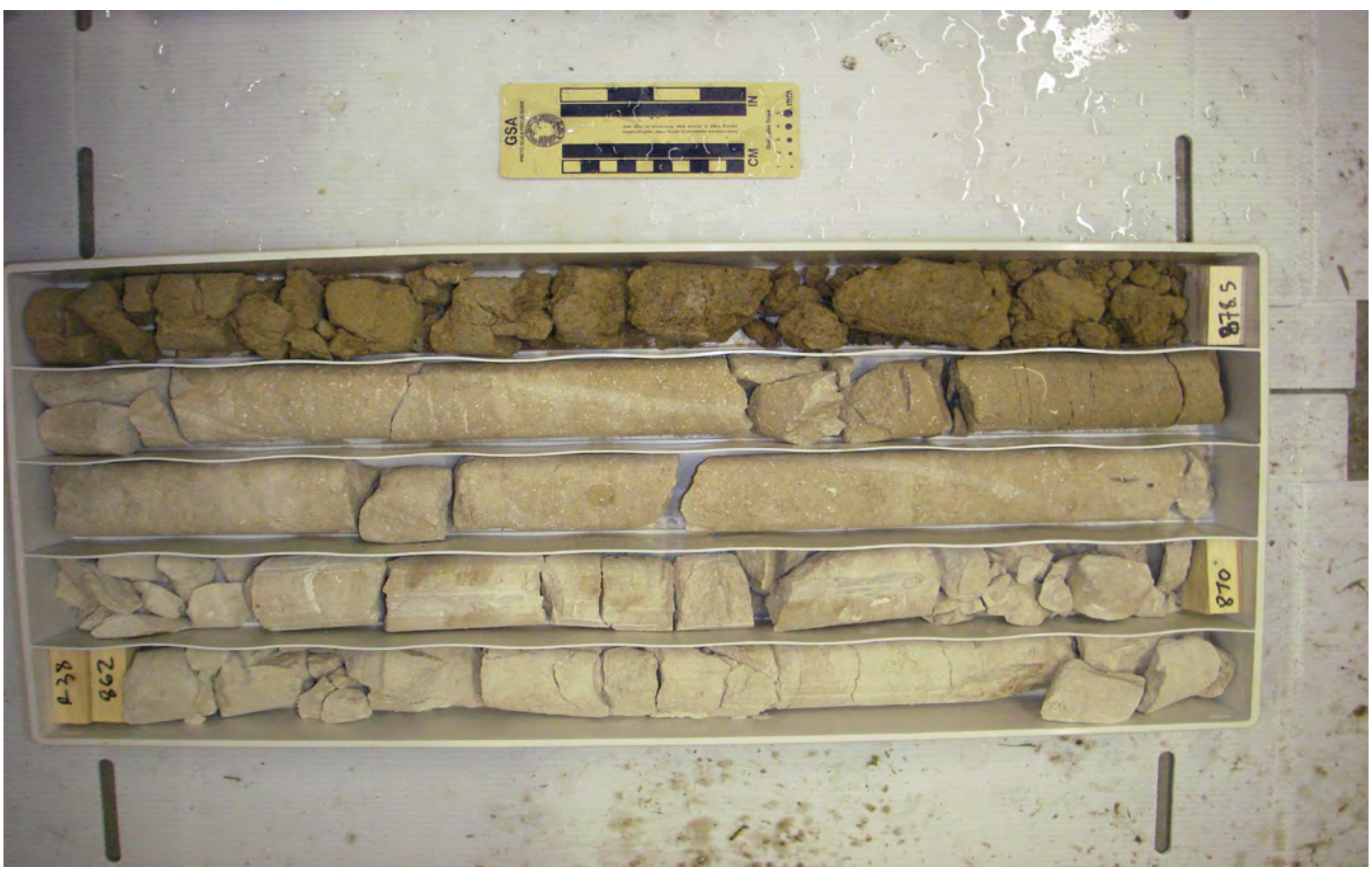

GSA
IN
CM
845.3
840
R38
834


GSA
IN
CM
834
830
R38
824.8


GSA
IN
CM
862
860
R38
852.8


GSA
IN
CM
852.8
850
R38
845.3


890'
891.6
R33
878.5


878.5
870'
R38
862


GSA
IN
CM
912.7
910'
R-38
903.3

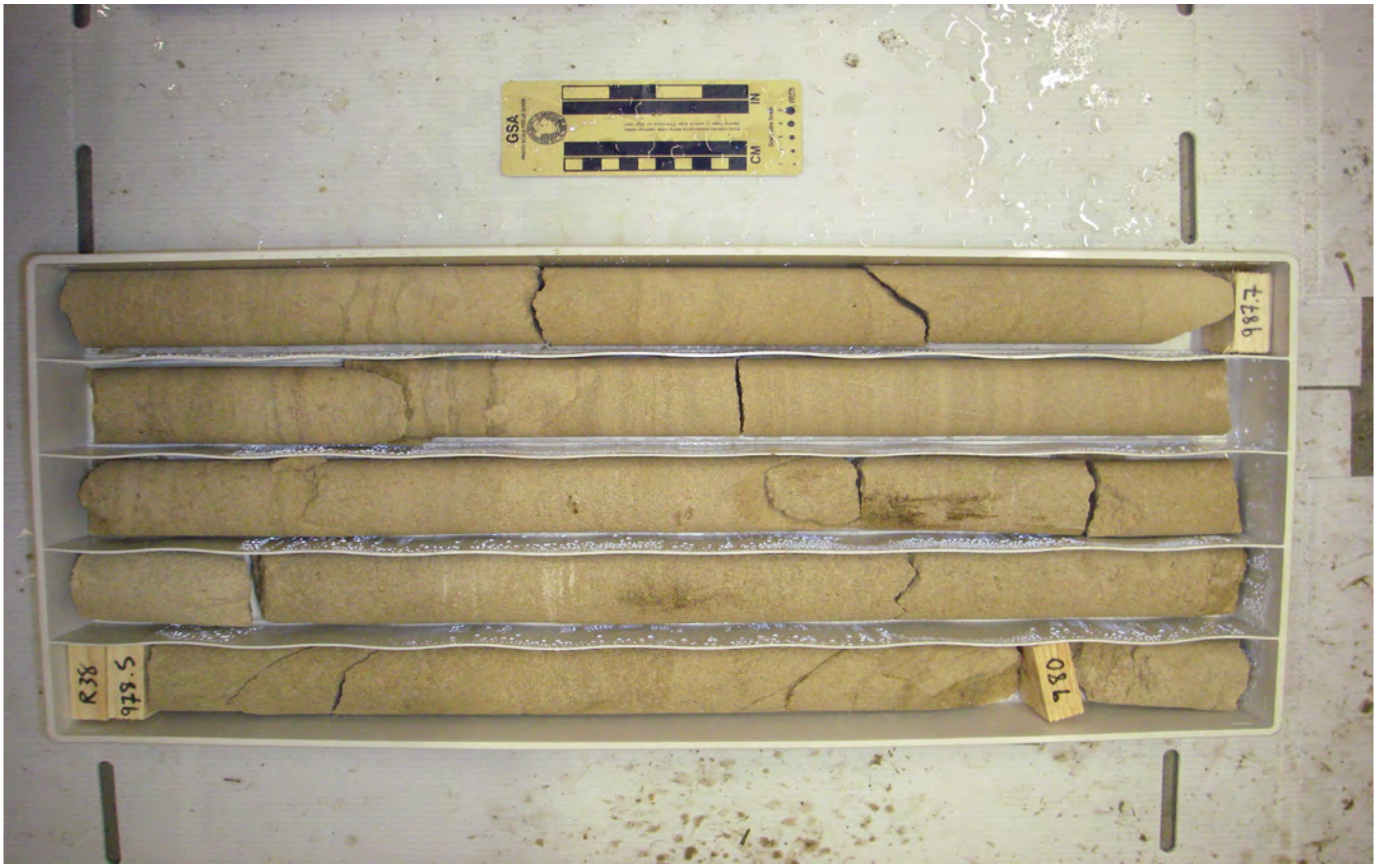

GSA
IN
CM
903.3
900
R38


GSA
IN
CM
950'
950.8
R-38
941.4


GSA
IN
CM
940
941.4
R38
931.3

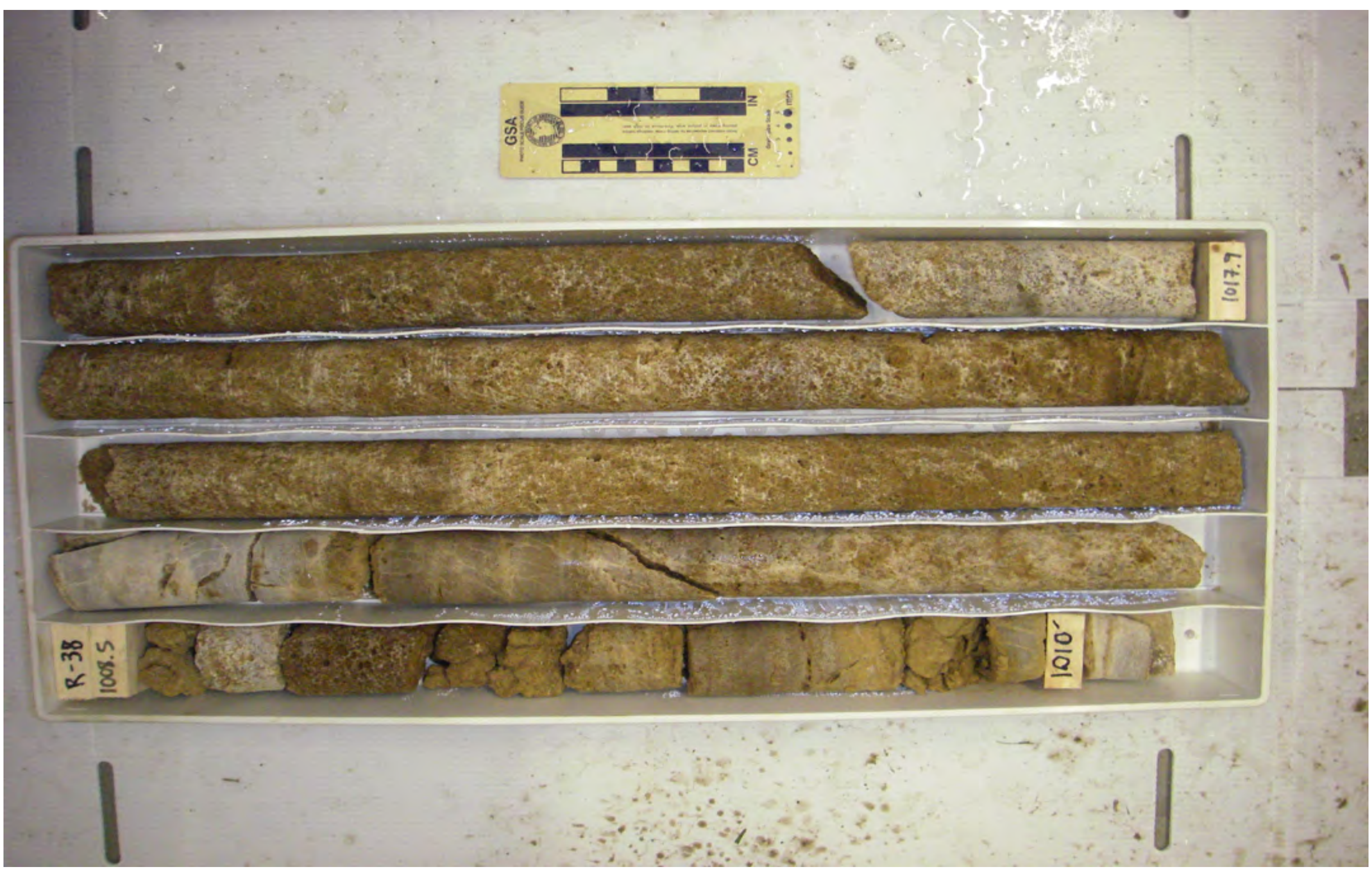

GSA
IN
CM
969
R38
959.6
960


GSA
IN
CM
959.6
R38
950.8


GSA
IN
CM
987.7
R38
978.5
980


GSA
IN
CM
974.5
R38
969
970


GSA
IN
CM
1023.6
1020'
R-38
1017.9


GSA
IN
CM
1017.9
R-38
1008.5
1010'

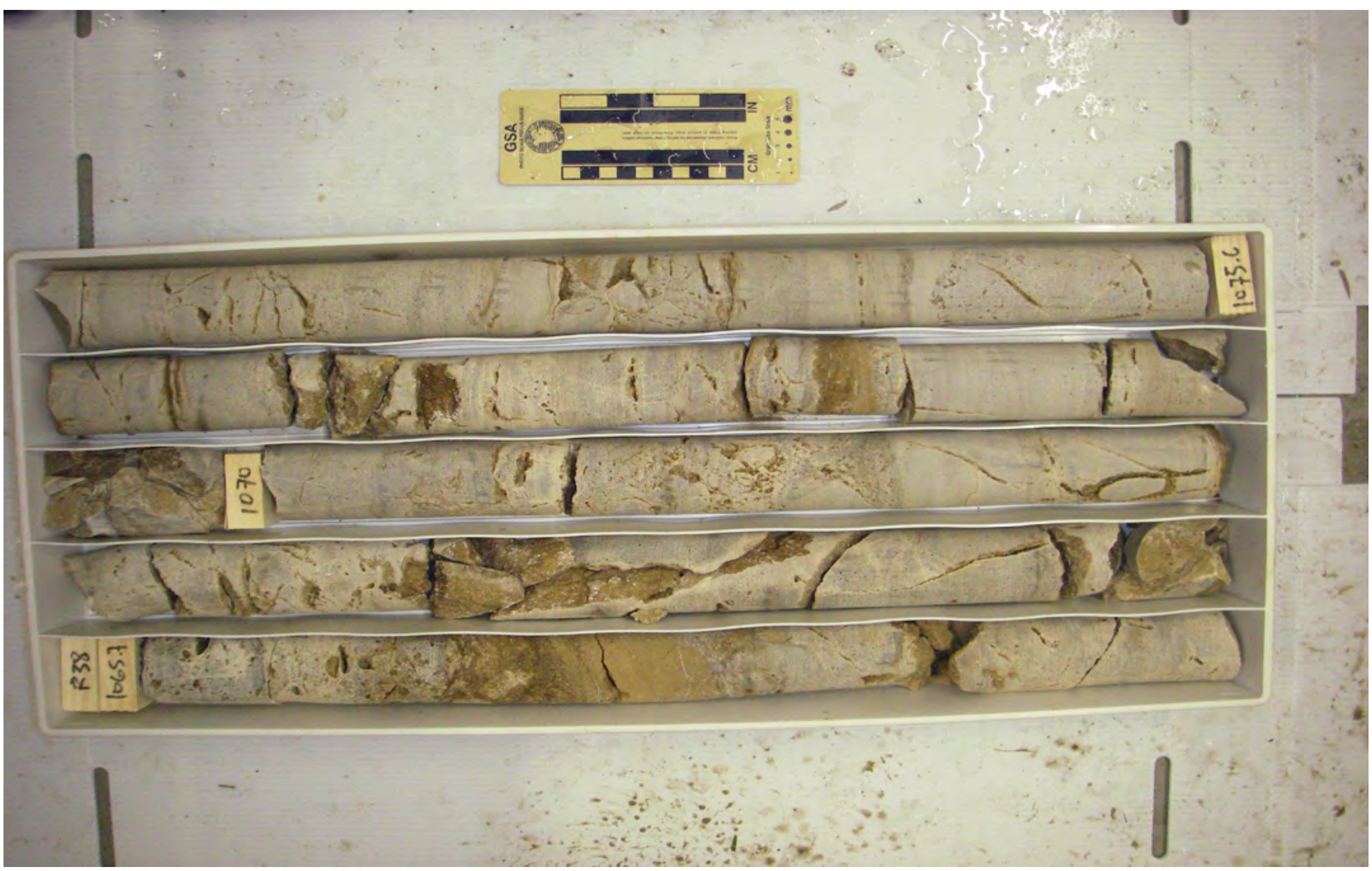

GSA
IN
CM
1047.4
R 38
1038.9
1040


GSA
IN
CM
1038.4
1030
R38
1027.6


GSA
CM
IN
1065.7
1060
R 38
1056.6

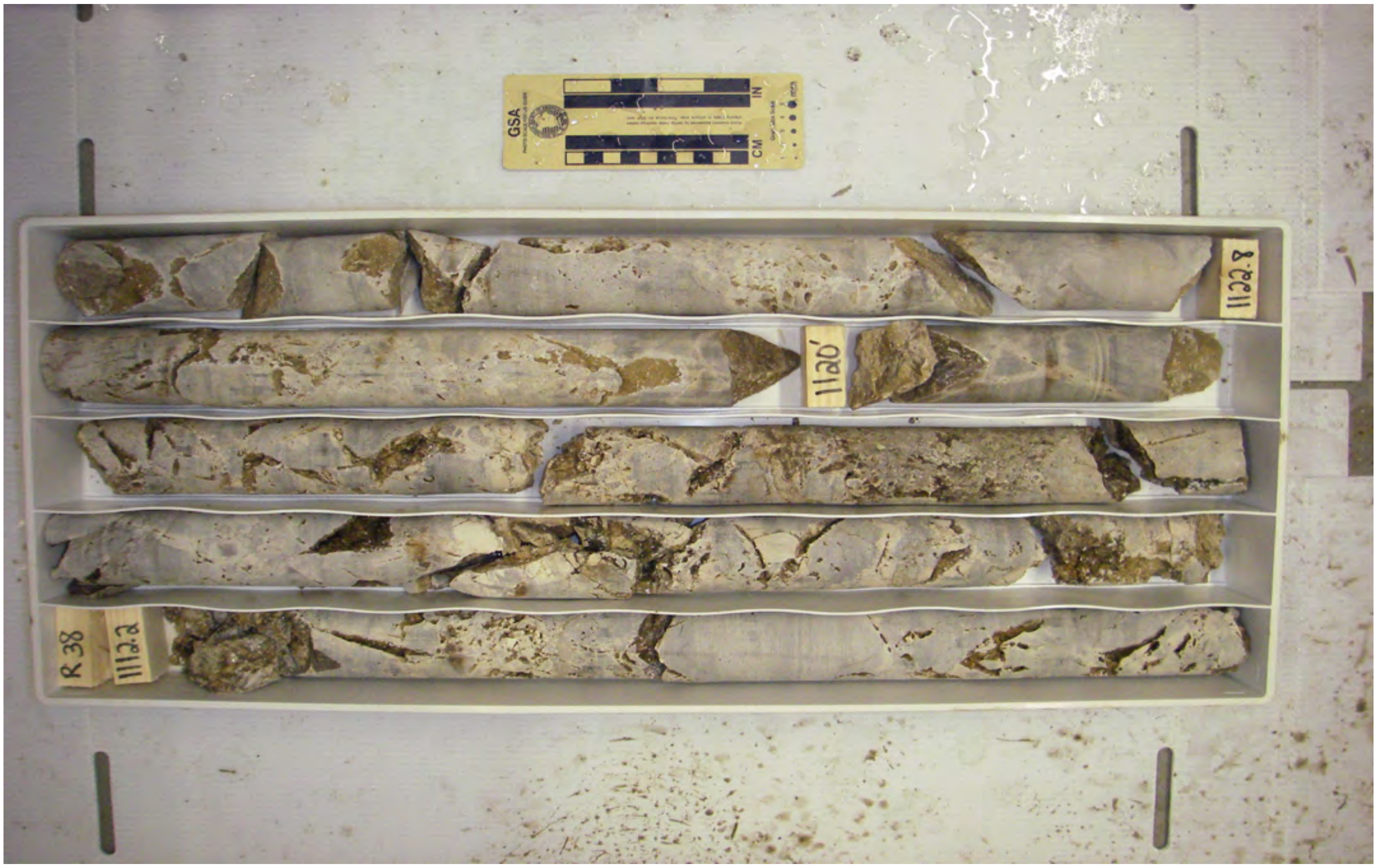

GSA
CM
IN
1056.6
1050'
R 38
1047.4

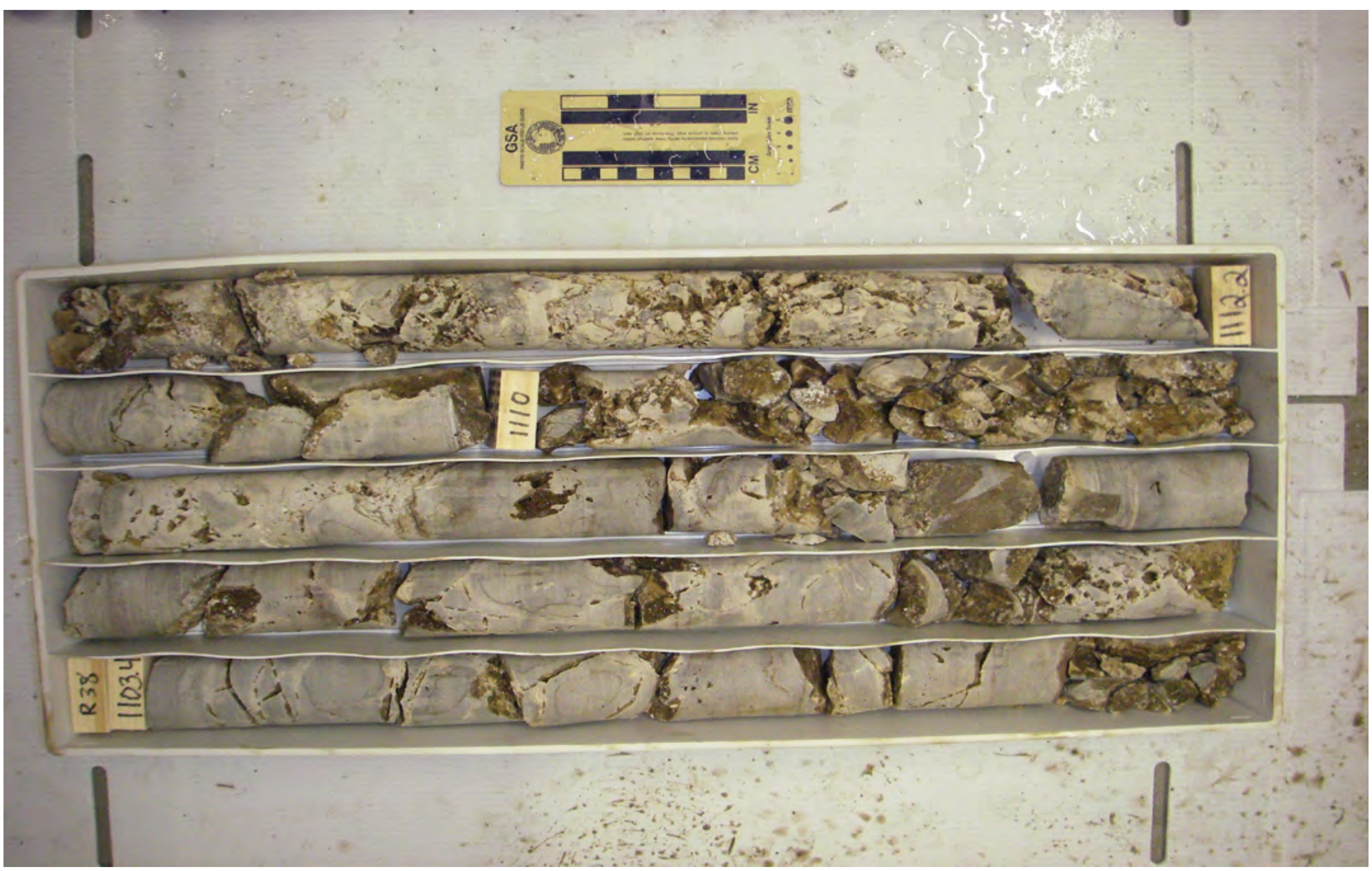

GSA
CM
IN
R38
1075.6
1080
1085.1


GSA
CM
IN
R38
1065.7
1070
1075.6


GSA
IN
CM
1103.4'
1100
R 38
1094

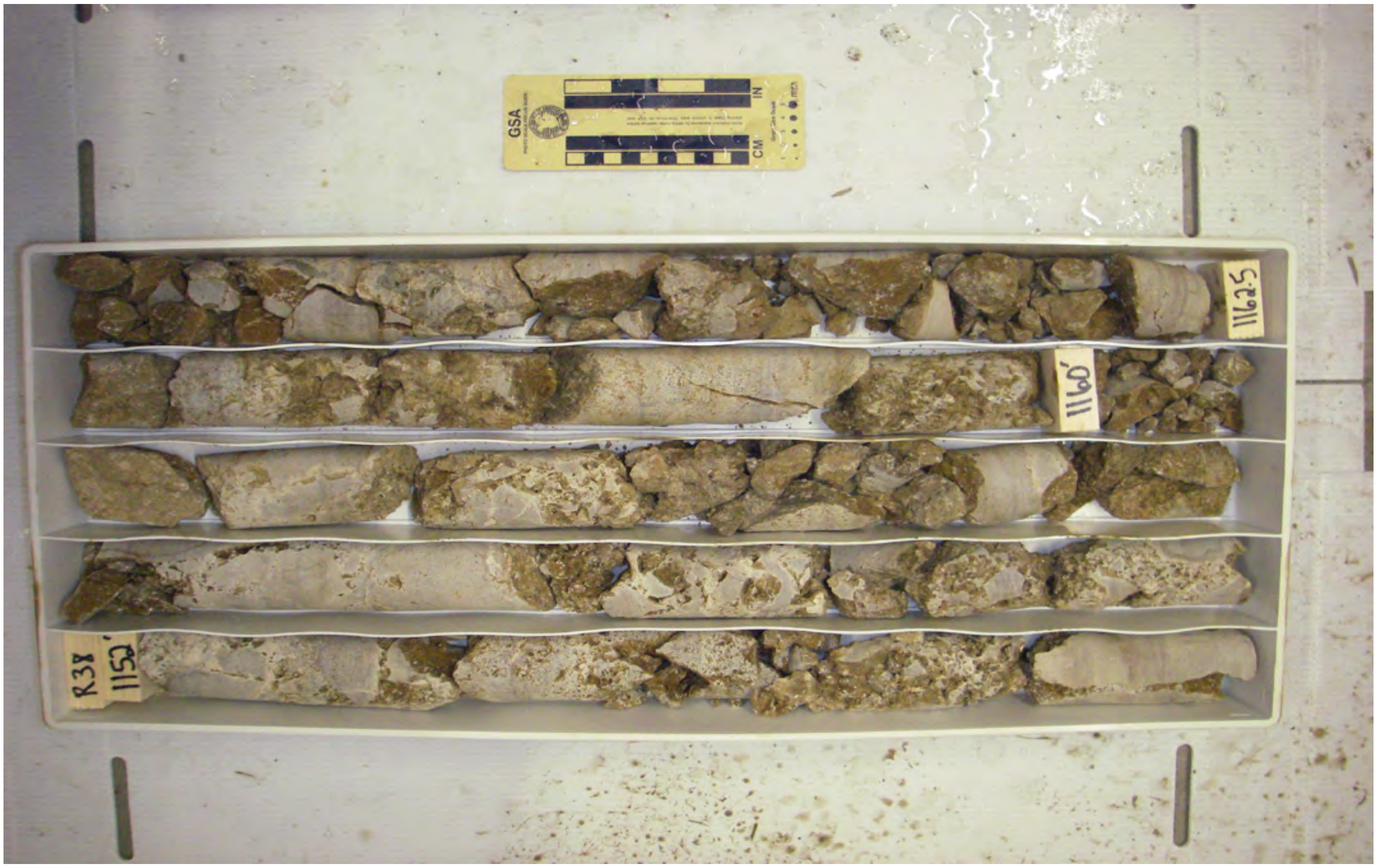

GSA
IN
CM
1094
1090
R 38
1085.1


GSA
IN
CM
1122.8
1120'
R 38
1112.2

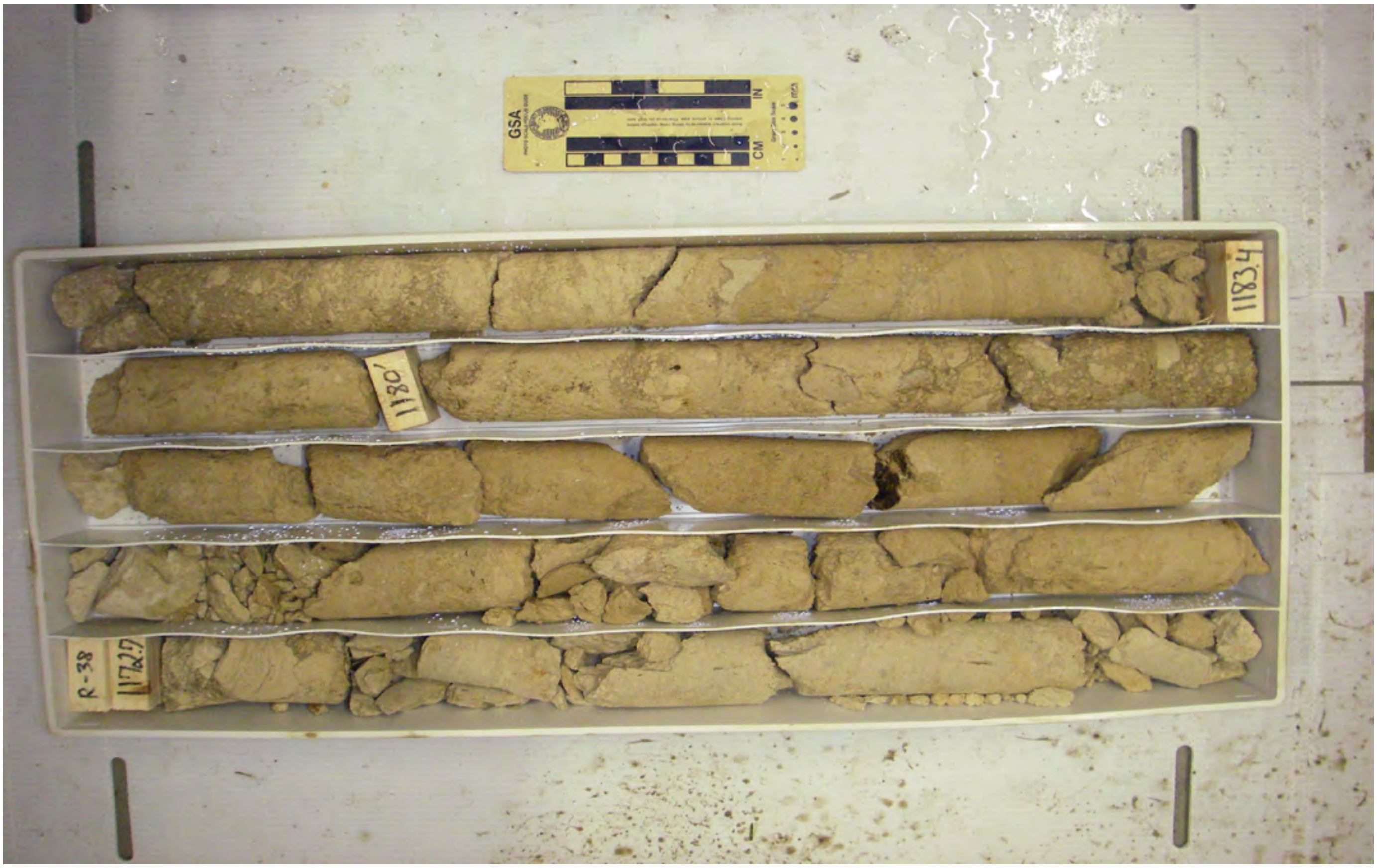

GSA
IN
CM
1112.2
1110
R 38
11034


GSA
IN
CM
1140'
1141.2
R38
1131.5

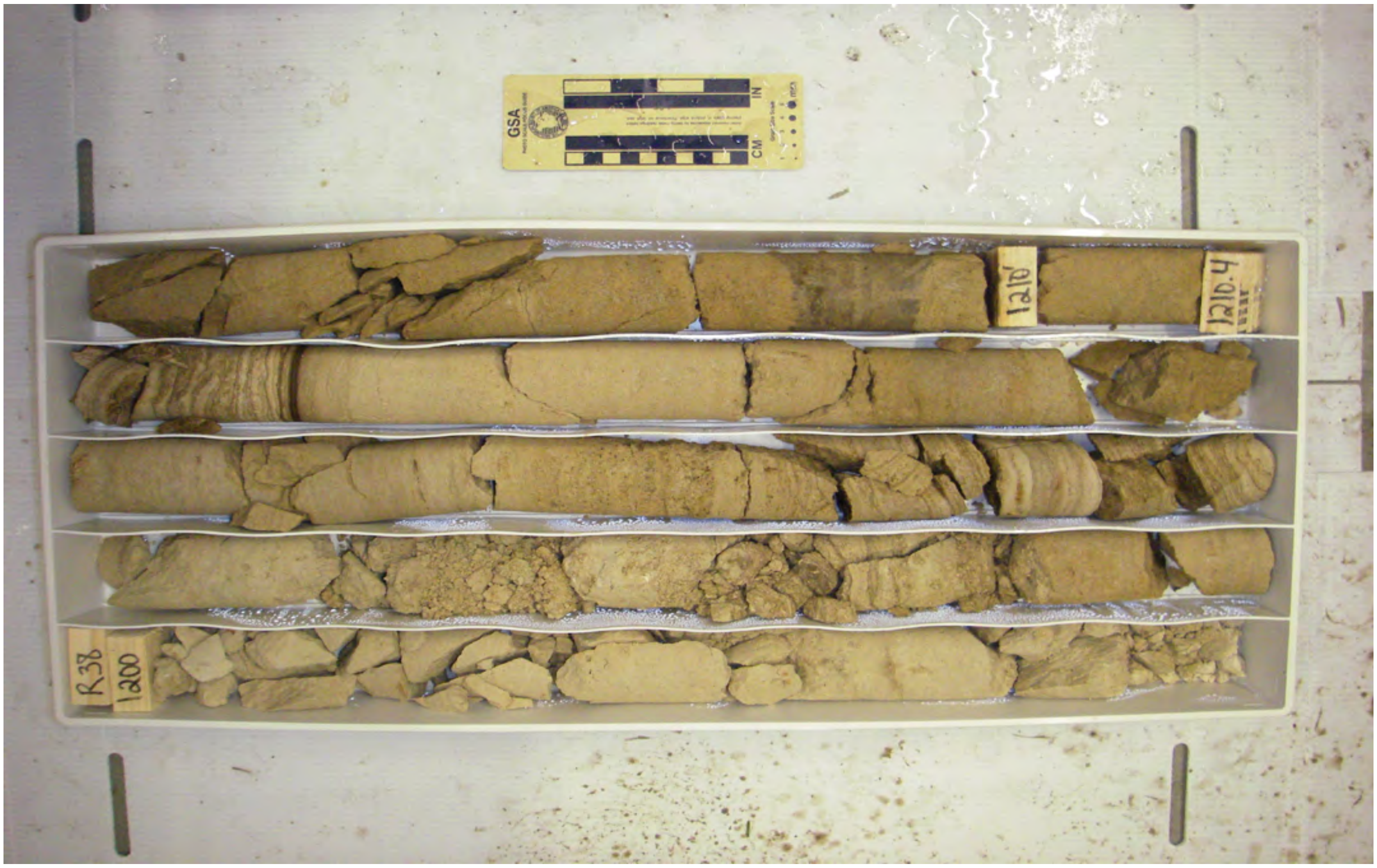

GSA
IN
CM
1130'
1131.5
R38
1122.8

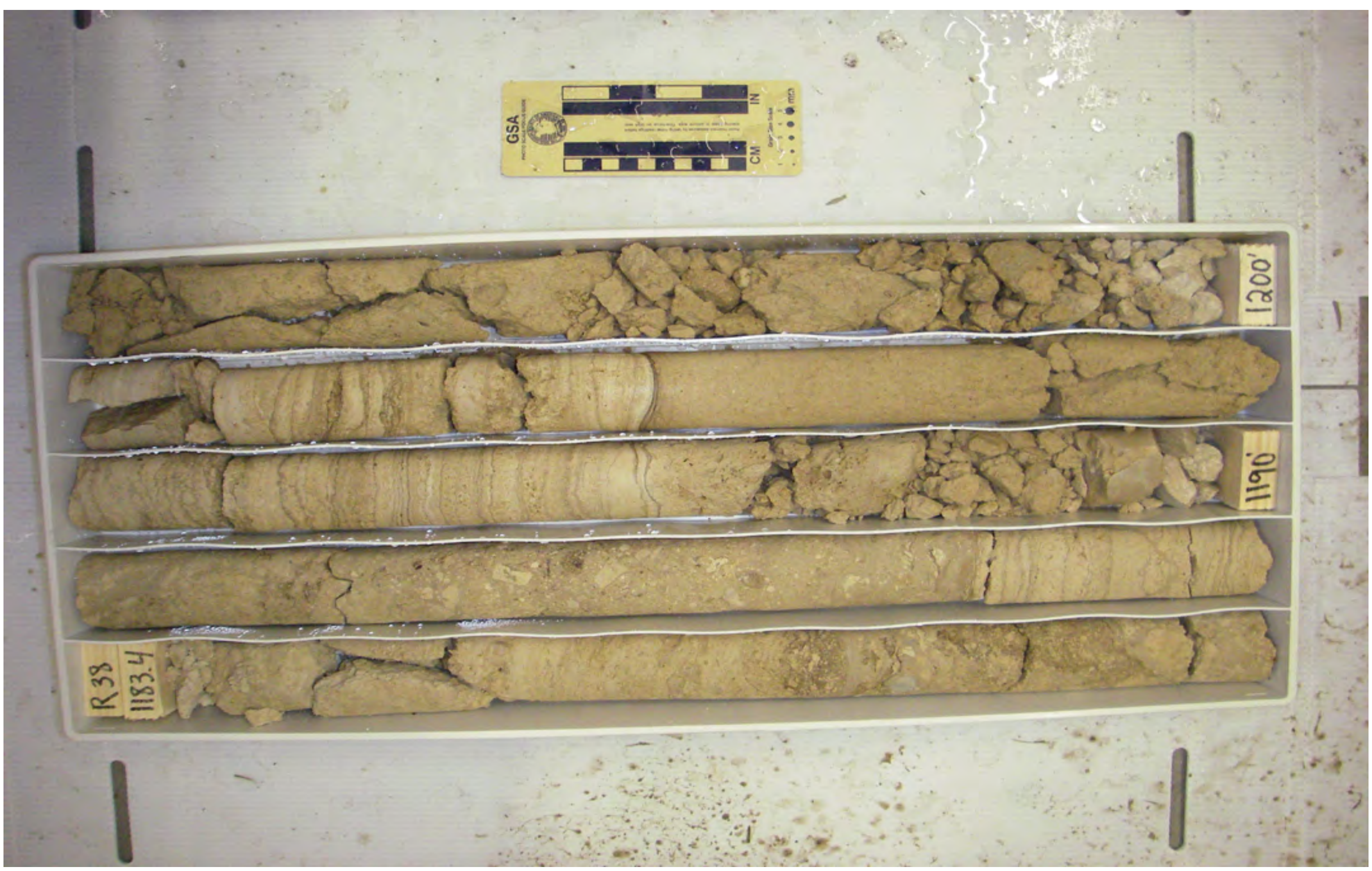

GSA
IN
CM
1162.5
1160'
R38
1152'

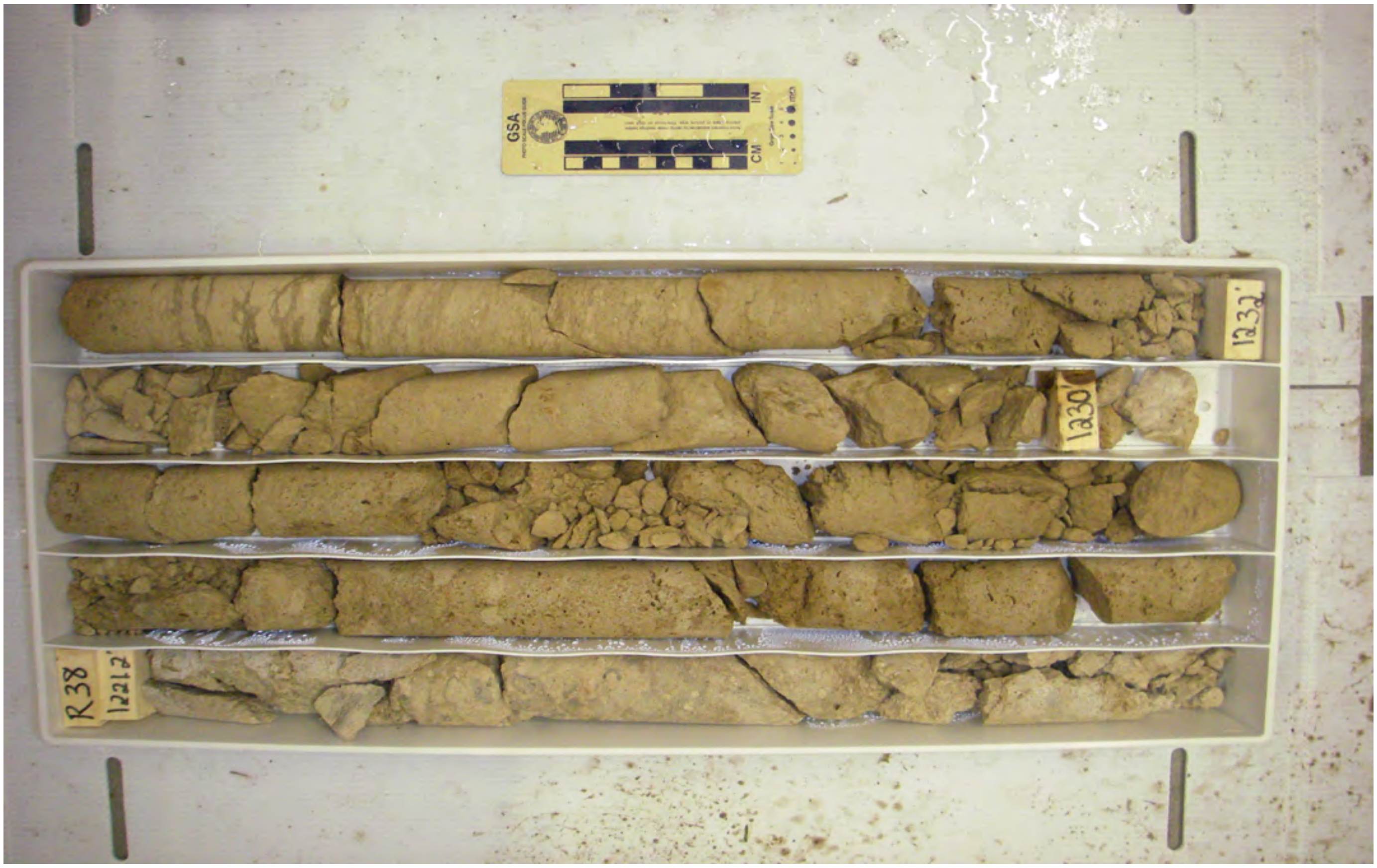

GSA
IN
CM
1152'
1150'
R38
1141.2


GSA
IN
CM
1183.4
1180'
R-38
1172.7


GSA
IN
CM
1172.7
1170'
1165'
R 38
1162.5

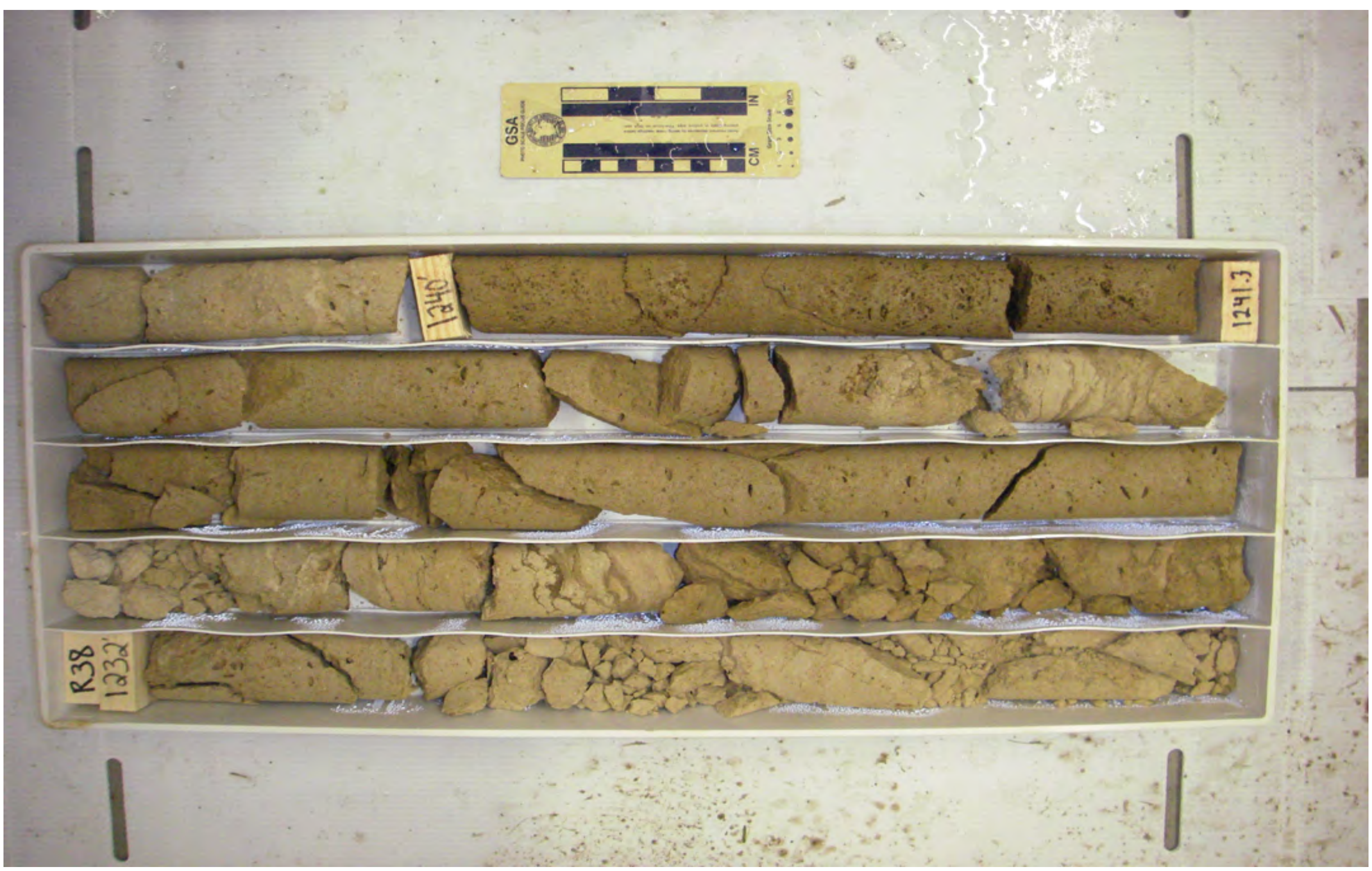

GSA
IN
CM
1210'
1210.4
R 38
1200


GSA
IN
CM
1200'
1190'
R 38
1183.4


GSA
IN
CM
1232'
1230'
R38
1221.2'


GSA
IN
CM
1220'
1221.2'
R38
1210.4


GSA
IN
CM
1255.3
1250
R38
1241.3


GSA
IN
CM
1240'
1241.3
R38
1232'

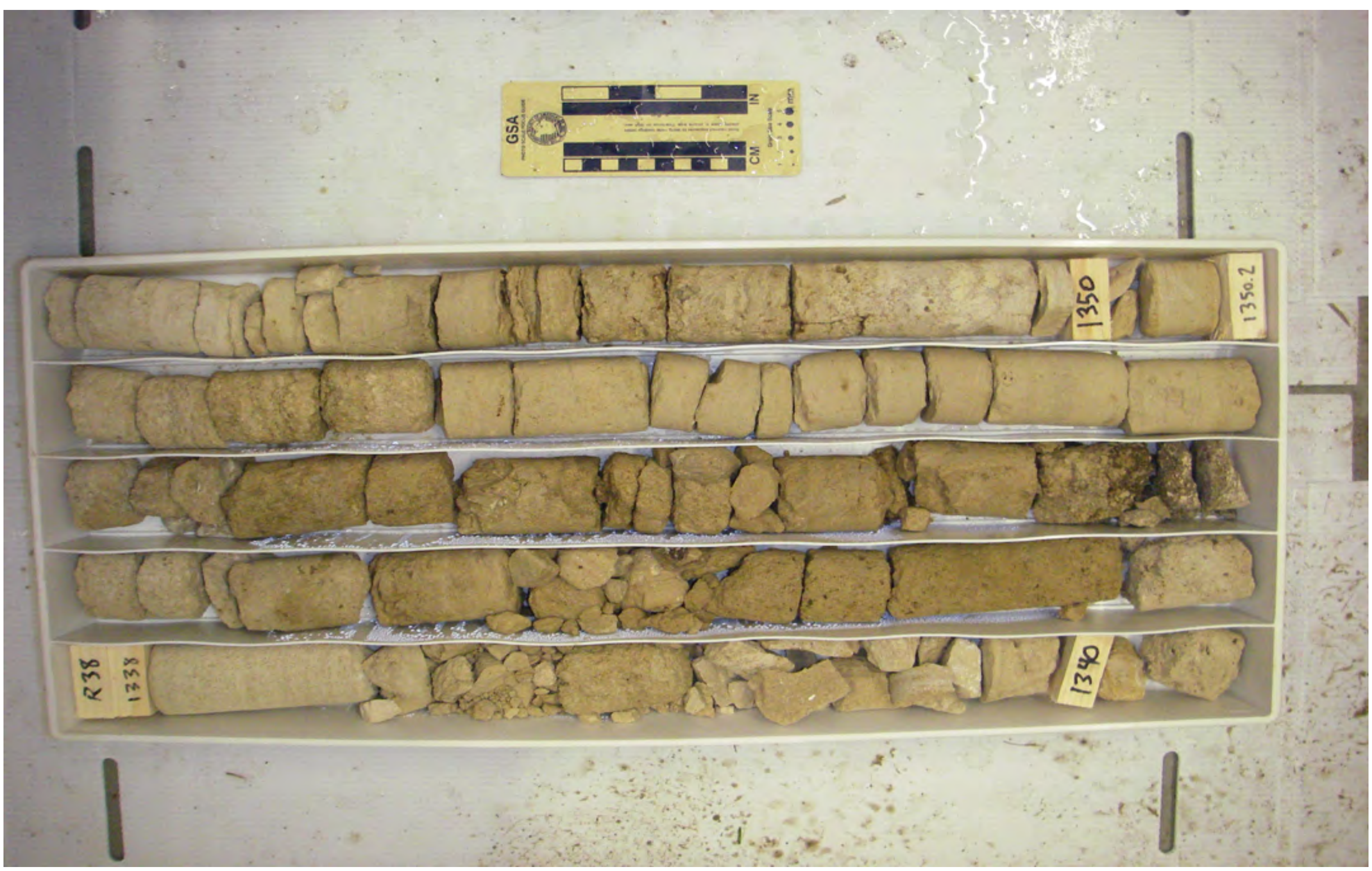

GSA
IN
CM
1275.5
1270'
R-38
1265.5


GSA
IN
CM
1265.5
1260
R-38
1255.3


GSA
IN
CM
1334
1320
1330
R38
1310


GSA
IN
CM
1310'
1300
R38
1296.9


GSA
CM
IN
1360
R38
1350.2


GSA
CM
IN
1350
1350.2
R38
1338
1340


1380
1381.3
R38
1369.4
1370


1369.4
R38
1360


GSA
IN
CM
1400
1401.3
R-38
1391.6


GSA
IN
CM
1390
1391.6
R38
1351.3


1420'
R-38


1410'
R-38


1440
R38


1430'
1430.7
R-38


GSA
CM
IN
1459.1
R38
1448.8
1450

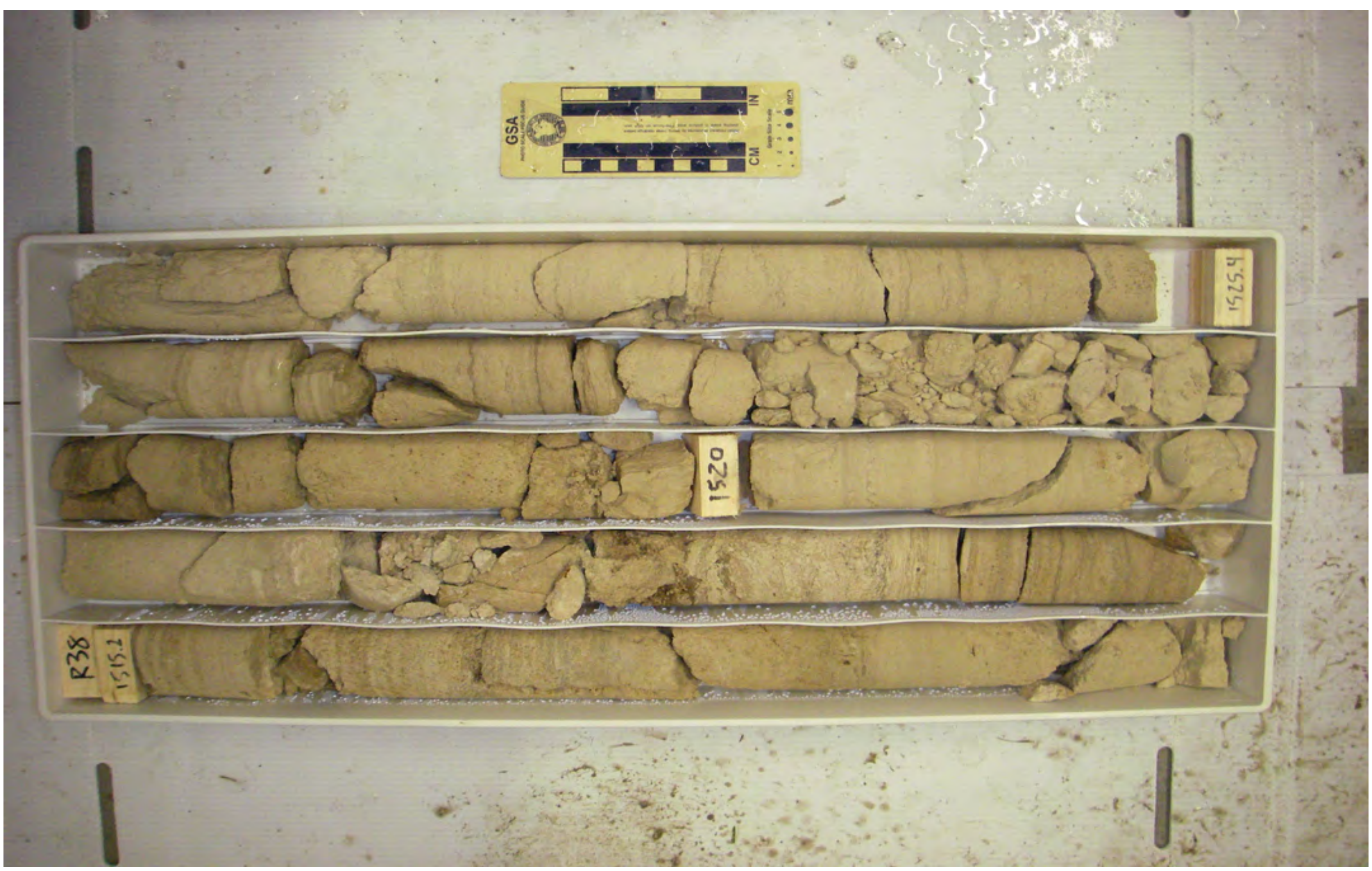

GSA
CM
IN
1448.8
R38
1440


GSA
IN
CM
R38

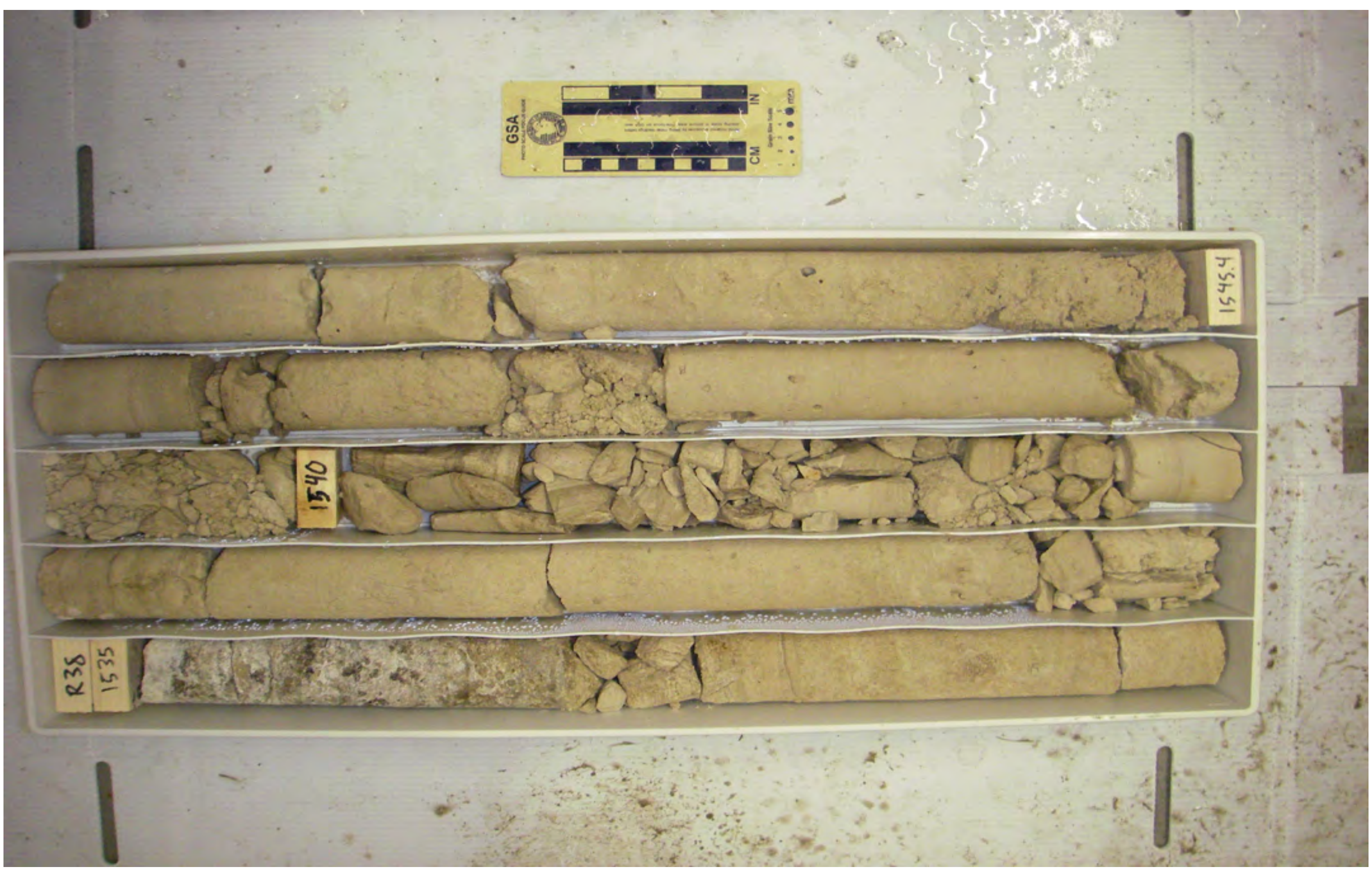

GSA
IN
CM


GSA
CM
IN
1515.2
1510
R38
1505.5


GSA
CM
IN
1505.5
1500
R38
1495.8



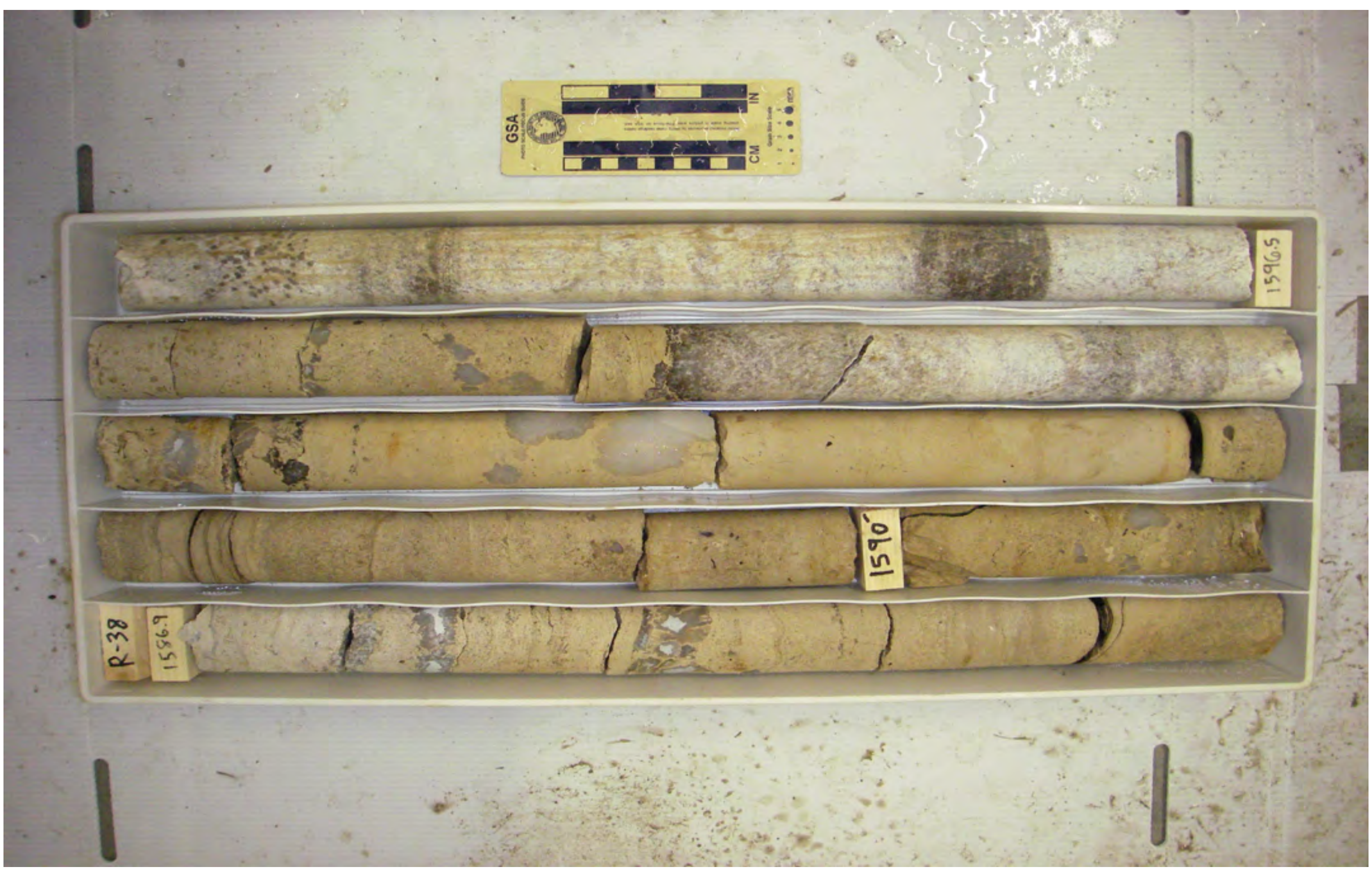

GSA
CM
IN
15676
1560
1550
R38
1545.4


GSA
CM
IN
1545.4
1540
R38
1535


GSA
IN
CM
1586.9
1580'
R-38
1577.2


GSA
IN
CM
1577.2
1570
R38
1567.6


1600'
R-38
1596.5


GSA
1596.5
1590'
R-38
1596.9

Appendix F. Correlation Charts

A

WYRICK 1960	LICHTLER 1960	CLARKE 1964	LEVE 1966	WOLANSKY 1978	MILLER 1980	BOGGESS 1986; ARTHUR AND OTHERS 2008	SWFWMD PRESENT
nonartesian aquifer	Shallow aquifer	water-table aquifer	shallow aquifer system	unconfined aquifer	surficial aquifer	surficial aquifer system	surficial aquifer
confining unit	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*

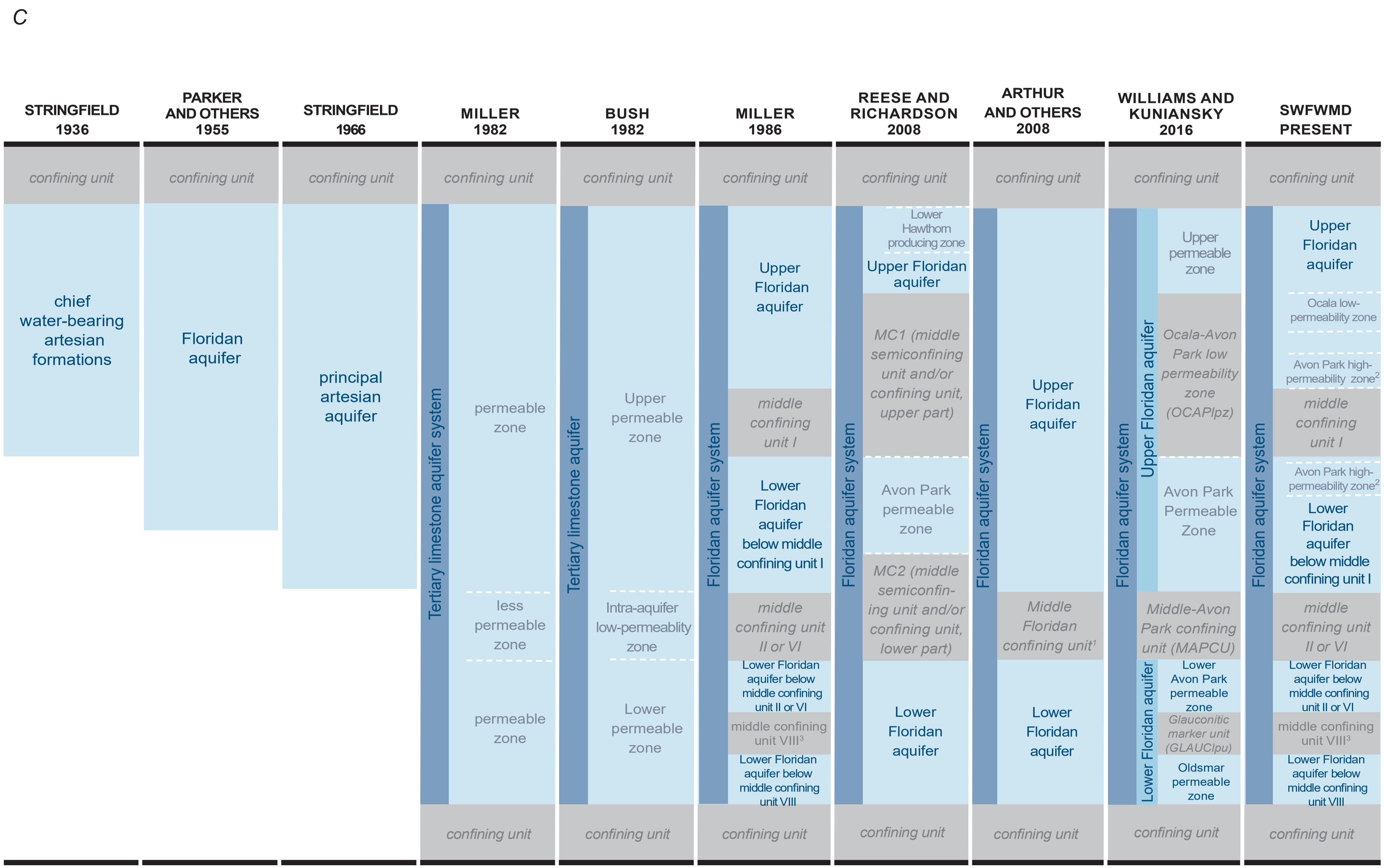
[SWFWMD, Southwest Florida Water Management District]

B

SPROUL AND OTHERS 1972	JOYNER, SUTCLIFFE 1976	WEDDERBURN AND OTHERS 1982	WOLANSKY 1983	BARR 1996	TORRES AND OTHERS 2001	KNOCHENMUS 2006	ARTHUR AND OTHERS 2008	SWFWMD PRESENT
		Hawthorn Aquifer System (upper units); FAS (lower units)	Intermediate aquifers	Intermediate aquifer system	Intermediate aquifer system	Intermediate aquifer system	Intermediate aquifer system / intermediate confining unit	Hawthorn aquifer system
confining unit	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*
sandstone aquifer	Zone 1	Sandstone aquifer	Tamiami - upper Hawthorn aquifer	Permeable Zone 1	Tamiami/ Peace River zone (PZ1)	Zone 1	zones/ aquifers were not delineated	Peace River aquifer
confining unit	*confining unit*	*confining unit*		*confining unit*	*confining unit*	*confining unit*		*confining unit*
upper Hawthorn aquifer	Zone 2	mid-Hawthorn aquifer		Permeable Zone 2	Upper Arcadia zone (PZ2)	Zone 2		upper Arcadia aquifer
confining unit	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*		*confining unit*
lower Hawthorn aquifer	Zone 3	lower Hawthorn / Tampa producing zone	Lower Hawthorn - upper Tampa aquifer	Permeable Zone 3	Lower Arcadia zone (PZ3)	Zone 3		lower Arcadia aquifer
confining unit	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*

[FAS, Floridan aquifer system; PZ, permeable zone; SWFWMD, Southwest Florida Water Management District]

Figure E1. Nomenclature of (A), the surficial aquifer, (B), the Hawthorn aquifer system, and (C), the Floridan aquifer system used for the ROMP 38 – Parrish well site compared to names in previously published reports.



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

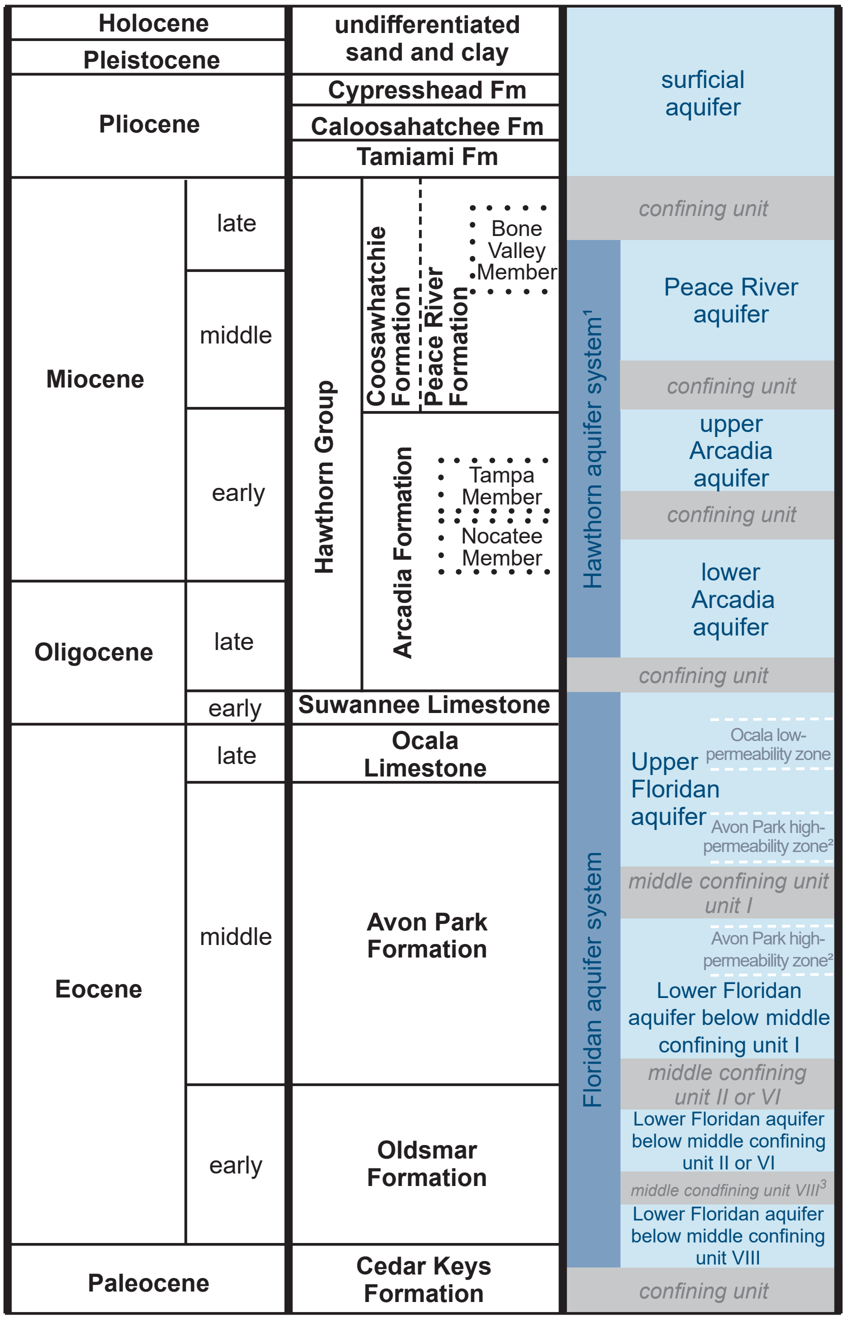
[1]Arthur and others acknowledge existence of the middle confining unit I within the Southwest Florida Water Management but do not map it for Special Publication 68.

[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.

[3]The middle confining unit VIII of Miller (1986) in south Florida was extended across the entire peninsula based on new data in Williams and Kuniansky (2015) and reidentified as the Glauconite marker unit.

Figure E1. (Continued) Nomenclature of (A), the surficial aquifer, (B), the Hawthorn aquifer system, and (C), the Floridan aquifer system used for the ROMP 38 – Parrish well site compared to names in previously published reports.

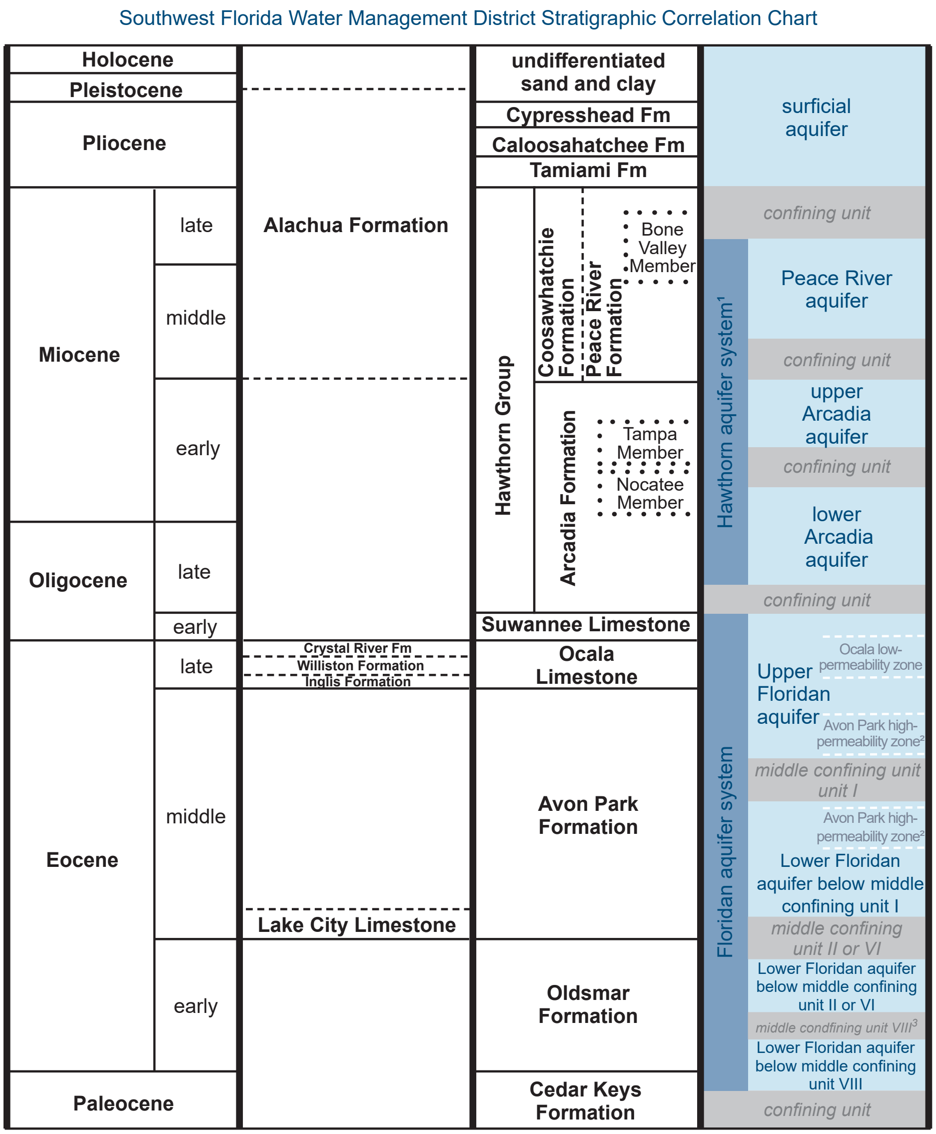
Southwest Florida Water Management District Stratigraphic Correlation Chart



This chart may be used to correlate the chronostratigraphic and lithostratigraphic units of the current 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]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. [3]The middle confining unit VIII of Miller (1986) was extended beyond the original extent in south Florida based on new data.

Figure E2. Chart correlating chronostratigraphic and lithostratigraphic units to the current hydrogeologic framework of the Southwest Florida Water Management District.



This chart may be used to correlate the stratigraphic units in past reports to the current 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]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. [3]The middle confining unit VIII of Miller (1986) was extended beyond the original extent in south Florida based on new data.

Figure E3. Chart correlating lithostratigraphic units used in past reports to current lithostratigraphic units and the current hydrogeologic framework of the Southwest Florida Water Management District.

Appendix G. Slug Test Data Acquisition Sheets for the ROMP 38 – Parrish Well Site in Manatee County, Florida

GEOHYDROLOGIC DATA SECTION

SLUG TEST - DATA ACQUISITION SHEET

General Information

Slug Test No.: 1

Site Name:	ROMP 38 - Parrish	Date:	8/18/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	360	Test Interval (ft - ft bls)	325-360
Test Casing Height (ft als)	3.87	Date of Last Development	8/18/2011
Test Casing Diameter (in)	3 1/16	Initial Static WL (ft btoc)	23.42
Test Casing Type	HQ	Final Static WL (ft btoc)	23.33
Test Interval Length (ft)	35	Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	1.44	Initial Annulus WL (ft btoc)	20.47

Set-up Information

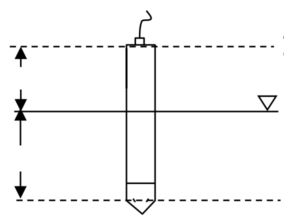
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi		28.4	-0.04	4.98 / 4.91
Pressure Head CH 2 (Red)	15 psi		N/A	-0.06	N/A
Annulus CH 3 (Yellow)	15 psi		30	0.01	9.53 / 9.31

Data Logger: Splinter (CR800-SN 3573)

Spacer Length (ft): 5 feet

Spacer OD. (inches): 1.625 inches

Comments: No spacer used - tranducer malfunctioned



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	~~Test C~~	Test ~~D~~ C
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	4.91	4.92	4.92	4.92
Pre-test Sub. Annulus	9.31	9.34	9.36	9.39
Expected Displacement (P_Head) (ft)	1.98	0.994		1.973
Observed Displacement (Test_Int) (ft)	1.98	1.073		1.973
Slug Discrepancy (%)	0%	8%		0%
Max Rebound above Static	N/A	N/A	N/A	N/A
Post-test Sub. Test_Int	4.92	4.92		4.93
Residual Dev. from H_o (%)	0.20%	0%		
Data Logger File Name	ROMP38_ST1A_325-360.csv	ROMP38_ST1B_325-360.csv	ROMP38_ST1C_325-360.csv	ROMP38_ST1C_325-360.csv
Specific Conductance (uS)	706	706	706	706
Temperature °C	26.2	26.2	26.2	26.2
Lithology	Tampa LS	Tampa LS	Tampa LS	Tampa LS
Other				
K_h (ft/day)	1.813	1.697		1.839

Comments: Packer suspected to be leaky (or formation). Movement in annulus during test.

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

GEOHYDROLOGIC DATA SECTION
SLUG TEST - DATA ACQUISITION SHEET

General Information

		Slug Test No.:	2
Site Name:	ROMP 38 - Parrish	Date:	8/23/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	410	Test Interval (ft - ft bls)	370-410
Test Casing Height (ft als)	3.58	Date of Last Development	8/23/2011
Test Casing Diameter (in)	HQ	Initial Static WL (ft btoc)	22.08
Test Casing Type	HQ	Final Static WL (ft btoc)	22
Test Interval Length (ft)	40	Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)		Initial Annulus WL (ft btoc)	20.15 & moving

Set-up Information

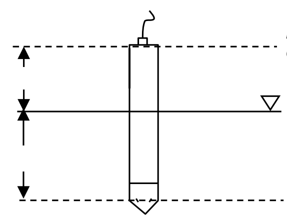
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi		27	-0.1	4.92 / 4.78
Pressure Head CH 2 (Red)	15 psi		N/A	-0.03	N/A
Annulus CH 3 (Yellow)	15 psi		29	-0.08	8.85 / 8.61

Data Logger Splinter (CR800-SN 3573)

Spacer Length (ft) 5 feet

Spacer OD. (inches) 1.625 inches

Comments:



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	4.78	4.78	4.78	4.78
Pre-test Sub. Annulus	8.61	8.67	8.7	8.72
Expected Displacement (P_Head) (ft)	2.139	0.979	0.537	1.987
Observed Displacement (Test_Int) (ft)	2.132	1.044	0.602	2.081
Slug Discrepancy (%)	0%	7%	12%	5%
Max Rebound above Static	N/A	N/A	N/A	N/A
Post-test Sub. Test_Int	4.78	4.78	4.78	4.8
Residual Dev. from H_o (%)	0.00%	0%	0%	0.30%
Data Logger File Name	ROMP38_ST2A_370-410.csv	ROMP38_ST2B_370-410.csv	ROMP38_ST2C_370-410.csv	ROMP38_ST2D_370-410.csv
Specific Conductance (uS)	705	706	706	706
Temperature °C	27.6	26.2	26.2	26.2
Lithology	Tampa LS	Tampa LS	Tampa LS	Tampa LS
Other				
K_h (ft/day)	1.403	1.506	1.55	1.503

Comments

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

GEOHYDROLOGIC DATA SECTION

SLUG TEST - DATA ACQUISITION SHEET

General Information

		Slug Test No.:	3
Site Name:	ROMP 38 - Parrish	Date:	8/29/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	490	Test Interval (ft - ft bls)	450-490
Test Casing Height (ft als)	3.51	Date of Last Development	8/29/2011
Test Casing Diameter (in)		Initial Static WL (ft btoc)	21.85
Test Casing Type	HQ	Final Static WL (ft btoc)	
Test Interval Length (ft)	40	Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	1.25	Initial Annulus WL (ft btoc)	19.42

Set-up Information

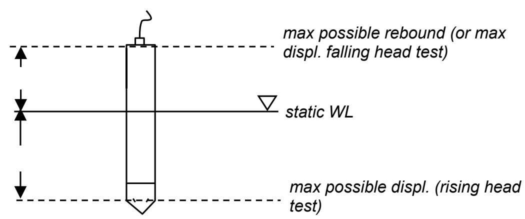
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi		27	-0.06	5.15 / 4.97
Pressure Head CH 2 (Red)	15 psi		N/A	-0.04	N/A
Annulus CH 3 (Yellow)	15 psi		30	0.06	10.58 / 10.38

Data Logger: Splinter (CR800-SN 3573)

Spacer Length (ft): 5 feet

Spacer OD. (inches): 1.625 inches

Comments: no spacer - broken



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	4.97	4.96	4.96	4.95
Pre-test Sub. Annulus	10.38	10.39	10.39	10.39
Expected Displacement (P_Head) (ft)	2.147	1.161	0.588	2.045
Observed Displacement (Test_Int) (ft)	2.408	1.371	0.689	2.256
Slug Discrepancy (%)	12%			
Max Rebound above Static	N/A	N/A	N/A	N/A
Post-test Sub. Test_Int	4.96	4.96	4.95	4.96
Residual Dev. from H_o (%)	0.33%	0%	0%	0.30%
Data Logger File Name	ROMP38_ST3A_450-490.csv	ROMP38_ST3B_450-490.csv	ROMP38_ST3C_450-490.csv	ROMP38_ST3D_450-490.csv
Specific Conductance (uS)	706	706	706	706
Temperature °C	26.2	26.2	26.2	26.2
Lithology	Suwannee LS	Suwannee LS	Suwannee LS	Suwannee LS
Other				
K_h (ft/day)	96.85	77.64	78.68	75.55
Comments				

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

GEOHYDROLOGIC DATA SECTION
SLUG TEST - DATA ACQUISITION SHEET

General Information

		Slug Test No.:	4
Site Name:	ROMP 38 - Parrish	Date:	10/12/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	590	Test Interval (ft - ft bls)	535-590
Test Casing Height (ft als)	4.2	Date of Last Development	10/11/2011
Test Casing Diameter (in)	NQ	Initial Static WL (ft btoc)	23.86
Test Casing Type	NQ	Final Static WL (ft btoc)	
Test Interval Length (ft)	55	Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	0.91	Initial Annulus WL (ft btoc)	20.44

Set-up Information

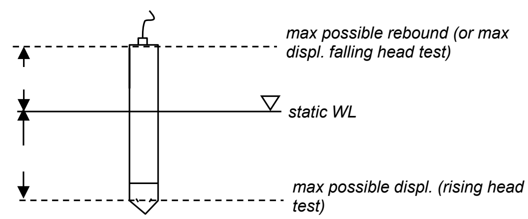
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi	1108430	24	0	3.14 / 3.18
Pressure Head CH 2 (Red)	15 psi	0603325	N/A	0.01	N/A
Annulus CH 3 (Yellow)	15 psi	0603300	30	0.03	9.56 / 9.48

Data Logger: Splinter (CR800-SN 3573)

Spacer Length (ft): 5 feet

Spacer OD. (inches): 1.625 inches

Comments: Spacer fixed. New transducer program using an actual offset/multipliers for each transducer now (not generic). Readings in air much improved.



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	3.19	3.19	3.18	3.19
Pre-test Sub. Annulus	9.5	9.5	9.49	9.49
Expected Displacement (P_Head) (ft)	2.103	1.022	0.592	2.095
Observed Displacement (Test_Int) (ft)	2.405	1.13	0.688	2.079
Slug Discrepancy (%)	14%	4%	16%	0.7%
Max Rebound above Static	0.489	0.335	0.243	0.5
Post-test Sub. Test_Int	3.19	3.18	3.19	3.19
Residual Dev. from H_o (%)	0.00	0	0	0.50
Data Logger File Name	ROMP38_ST4A_535-590.csv	ROMP38_ST4B_535-590.csv	ROMP38_ST4C_535-590.csv	ROMP38_ST4D_535-590.csv
Specific Conductance (uS)	780	780	780	780
Temperature °C	28.3	28.3	28.3	28.3
Lithology	Suwannee LS	Suwannee LS	Suwannee LS	Suwannee LS
Other				
K_h (ft/day)	23.94	24.42	17.66	27.46
Comments				

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

GEOHYDROLOGIC DATA SECTION
SLUG TEST - DATA ACQUISITION SHEET

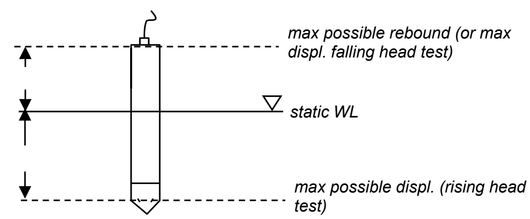
General Information

		Slug Test No.:	5
Site Name:	ROMP 38 - Parrish	Date:	10/18/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	590	Test Interval (ft - ft bls)	635-690
Test Casing Height (ft als)	425	Date of Last Development	10/18/2011
Test Casing Diameter (in)	NQ	Initial Static WL (ft btoc)	23.9
Test Casing Type	NQ	Final Static WL (ft btoc)	
Test Interval Length (ft)		Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)		Initial Annulus WL (ft btoc)	20.51

Set-up Information

Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi	1108430	24	0.02	3.10 / 3.09
Pressure Head CH 2 (Red)	15 psi	0603325	N/A	0.01	N/A
Annulus CH 3 (Yellow)	15 psi	0603300	30	0.05	9.49 / 9.37

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



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	3.09	3.09	3.08	3.08
Pre-test Sub. Annulus	9.37	9.36	9.36	9.36
Expected Displacement (P_Head) (ft)	2.023	0.973	0.483	2.005
Observed Displacement (Test_Int) (ft)	2.387	1.155	0.551	2.228
Slug Discrepancy (%)	15.00%	19.00%	14.00%	11.00%
Max Rebound above Static	0.09%	0.07%	0.05%	0.10%
Post-test Sub. Test_Int	3.09	3.08	3.08	3.08
Residual Dev. from H_o (%)	0.00%	0.30%	0.00%	0.00%
Data Logger File Name	ROMP38_ST5A_635-690.csv	ROMP38_ST5B_635-690.csv	ROMP38_ST5C_635-690.csv	ROMP38_ST5D_635-690.csv
Specific Conductance (uS)	703	703	703	703
Temperature °C	28.3	28.3	28.3	28.3
Lithology	Suwannee LS	Suwannee LS	Suwannee LS	Suwannee LS
Other				
K_h (ft/day)	6.089	6.603	7.288	6.178
Comments				

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

GEOHYDROLOGIC DATA SECTION
SLUG TEST - DATA ACQUISITION SHEET

General Information

		Slug Test No.:	6
Site Name:	ROMP 38 - Parrish	Date:	10/24/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	790	Test Interval (ft - ft bls)	735-790
Test Casing Height (ft als)	3.66	Date of Last Development	10/24/2011
Test Casing Diameter (in)	NQ	Initial Static WL (ft btoc)	24.6
Test Casing Type		Final Static WL (ft btoc)	24.65
Test Interval Length (ft)		Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	21.81	Initial Annulus WL (ft btoc)	

Set-up Information

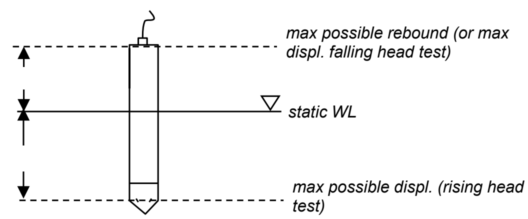
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi	1108430	24.6	0	3.00 / 2.94
Pressure Head CH 2 (Red)	15 psi	0603325	N/A	0.01	N/A
Annulus CH 3 (Yellow)	15 psi	0603300	30	0.04	8.19 / 8.07

Data Logger: Splinter (CR800-SN 3573)

Spacer Length (ft): 5 feet

Spacer OD. (inches): 1.625 inches

Comments:



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	2.95	2.94	2.94	2.94
Pre-test Sub. Annulus	8.07	8.07	8.07	8.07
Expected Displacement (P_Head) (ft)	1.987	0.952	0.552	2.016
Observed Displacement (Test_Int) (ft)	1.923	1.007	0.703	2.38
Slug Discrepancy (%)	3.00%	6.00%	27.00%	18.00%
Max Rebound above Static	0.08%	0.07%	0.05%	0.72%
Post-test Sub. Test_Int	2.94	2.94	2.94	2.93
Residual Dev. from H_o (%)	0.30%	0.00%	0.00%	0.30%
Data Logger File Name	ROMP38_ST6A_735-790.csv	ROMP38_ST6B_735-790.csv	ROMP38_ST6C_735-790.csv	ROMP38_ST6D_735-790.csv
Specific Conductance (uS)	758	758	758	758
Temperature °C	27.9	27.9	27.9	27.9
Lithology	Suwannee LS	Suwannee LS	Suwannee LS	Suwannee LS
Other				
K_h (ft/day)	4.55	6.056	7.41	4.583

Comments:

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

GEOHYDROLOGIC DATA SECTION

SLUG TEST - DATA ACQUISITION SHEET

General Information

Slug Test No.: 7

Site Name:	ROMP 38 - Parrish	Date:	11/8/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	940	Test Interval (ft - ft bls)	900-940
Test Casing Height (ft als)	4.39	Date of Last Development	11/8/2011
Test Casing Diameter (in)	NQ	Initial Static WL (ft btoc)	27.68
Test Casing Type	NQ	Final Static WL (ft btoc)	
Test Interval Length (ft)	40	Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	1.61	Initial Annulus WL (ft btoc)	25.01

Set-up Information

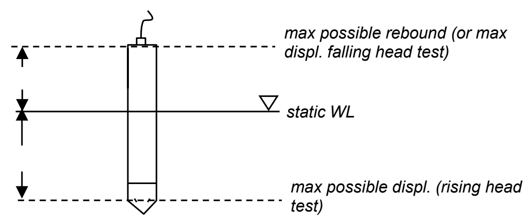
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi	1108430	27.7	0.01	3.02 / 3.16
Pressure Head CH 2 (Red)	15 psi	0603325	N/A	0.03	N/A
Annulus CH 3 (Yellow)	15 psi	0603300	30	0.03	4.99 / 4.95

Data Logger: Splinter (CR800-SN 3573)

Spacer Length (ft): 5 feet

Spacer OD. (inches): 1.625 inches

Comments:



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	3.15	3.13	3.12	3.11
Pre-test Sub. Annulus	4.94	4.94	4.95	4.95
Expected Displacement (P_Head) (ft)	2.005	1.039	0.49	2.074
Observed Displacement (Test_Int) (ft)	2.344	1.232	0.645	2.307
Slug Discrepancy (%)	15.00%	19.00%	24.00%	10.00%
Max Rebound above Static	1.27	0.73	0.38	1.30
Post-test Sub. Test_Int	3.13	3.12	3.11	3.1
Residual Dev. from H_o (%)	0.60%	0.30%	0.30%	0.30%
Data Logger File Name	ROMP38_ST7A_900-940.csv	ROMP38_ST7B_900-940.csv	ROMP38_ST7C_900-940.csv	ROMP38_ST7D_900-940.csv
Specific Conductance (uS)	943	943	943	943
Temperature °C	28.6	28.6	28.6	28.6
Lithology	Avon Park Dolostone	Avon Park Dolostone	Avon Park Dolostone	Avon Park Dolostone
Other				
K_h (ft/day)	94.15	111.7	12.8	95.99

Comments: Analysis on second peaks

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

GEOHYDROLOGIC DATA SECTION
SLUG TEST - DATA ACQUISITION SHEET

General Information

		Slug Test No.:	8
Site Name:	ROMP 38 - Parrish	Date:	11/16/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	1040	Test Interval (ft - ft bls)	1000-1040
Test Casing Height (ft als)	463	Date of Last Development	10/16/2011
Test Casing Diameter (in)	NQ	Initial Static WL (ft btoc)	30.30
Test Casing Type	NQ	Final Static WL (ft btoc)	NM - cant get to wl with spacer
Test Interval Length (ft)	40	Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	1.59	Initial Annulus WL (ft btoc)	27.67

Set-up Information

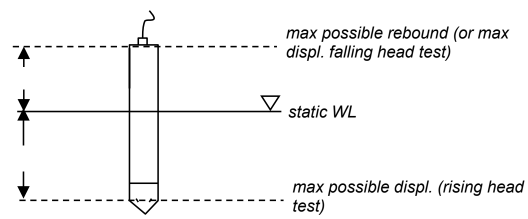
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi	1108430	30.3	0.02	3.0 / 2.98
Pressure Head CH 2 (Red)	15 psi	0603325	N/A	0	N/A
Annulus CH 3 (Yellow)	15 psi	0603300	30	0.02	2.33 / 2.33

Data Logger: Splinter (CR800-SN 3573)

Spacer Length (ft): 5 feet

Spacer OD. (inches): 1.625 inches

Comments:



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	3	2.98	2.96	2.94
Pre-test Sub. Annulus	2.32	2.31	2.32	2.3
Expected Displacement (P_Head) (ft)	1.964	1.024	0.53	2.044
Observed Displacement (Test_Int) (ft)	2.053	1.517	0.844	2.593
Slug Discrepancy (%)	4.00%	32.00%	37.00%	21.00%
Max Rebound above Static	1.23%	0.71%	0.40%	1.264%
Post-test Sub. Test_Int	2.98	2.96	2.94	2.93
Residual Dev. from H_o (%)				
Data Logger File Name	ROMP38_ST8A_1000-1040.csv	ROMP38_ST7B_900-940.csv	ROMP38_ST7C_900-940.csv	ROMP38_ST7D_900-940.csv
Specific Conductance (uS)	891	891	891	891
Temperature °C	28.7	28.7	28.7	28.7
Lithology	Avon Park Dolostone	Avon Park Dolostone	Avon Park Dolostone	Avon Park Dolostone
Other				
K_h (ft/day)	82.24	90.75	88.5	81.43

Comments:

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

GEOHYDROLOGIC DATA SECTION

SLUG TEST - DATA ACQUISITION SHEET

General Information

		Slug Test No.:	9
Site Name:	ROMP 38 - Parrish	Date:	11/22/2011
Well:	Core Hole	Performed by:	T. Horstman
Well Depth (ft bls)	1140	Test Interval (ft - ft bls)	1100-1140
Test Casing Height (ft als)	4.4	Date of Last Development	11/22/2011
Test Casing Diameter (in)	~2.38	Initial Static WL (ft btoc)	31.06 / 26.62
Test Casing Type	NQ	Final Static WL (ft btoc)	31.18
Test Interval Length (ft)	40	Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	1.59	Initial Annulus WL (ft btoc)	28.33

Set-up Information

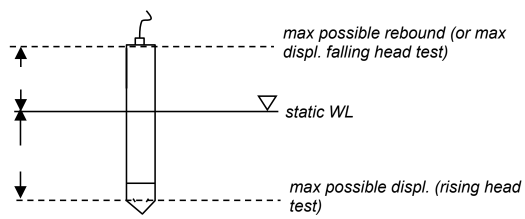
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi	1108430	31.1	0.02	3.04 / 3.10
Pressure Head CH 2 (Red)	15 psi	0603325	N/A	0.01	N/A
Annulus CH 3 (Yellow)	15 psi	0603300	30	0.02	1.64 / 1.66

Data Logger: Splinter (CR800-SN 3573)

Spacer Length (ft): 5 feet

Spacer OD. (inches): 1.625 inches

Comments:



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	3.12	3.11	3.11	3.11
Pre-test Sub. Annulus	1.66	1.67	1.68	1.69
Expected Displacement (P_Head) (ft)	2.016	0.962	0.483	2.012
Observed Displacement (Test_Int) (ft)	2.126	1.076	0.511	2.253
Slug Discrepancy (%)	5.46%	11.85%	5.80%	12.00%
Max Rebound above Static				
Post-test Sub. Test_Int	3.11	3.11	3.11	3.11
Residual Dev. from H_o (%)		0.00%	0.00%	0.00%
Data Logger File Name	ROMP38_ST9A_1100-1140.csv	ROMP38_ST9B_1100-1140.csv	ROMP38_ST9C_1100-1140.csv	ROMP38_ST9D_1100-1140.csv
Specific Conductance (uS)	931	931	931	931
Temperature °C	28.8	28.8	28.8	28.8
Lithology	Avon Park - crystalline	/ fracutred dolostone		
Other				
K_h (ft/day)	137.1	179.5	214.7	141.4
Comments				

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

GEOHYDROLOGIC DATA SECTION
SLUG TEST - DATA ACQUISITION SHEET

General Information

		Slug Test No.:	10
Site Name:	ROMP 38 - Parrish	Date:	12/5/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	1240	Test Interval (ft - ft bls)	1200-1240
Test Casing Height (ft als)	4.45	Date of Last Development	12/5/2011
Test Casing Diameter (in)	NQ	Initial Static WL (ft btoc)	29.76
Test Casing Type	NQ	Final Static WL (ft btoc)	
Test Interval Length (ft)	40	Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	1.59	Initial Annulus WL (ft btoc)	27.24

Set-up Information

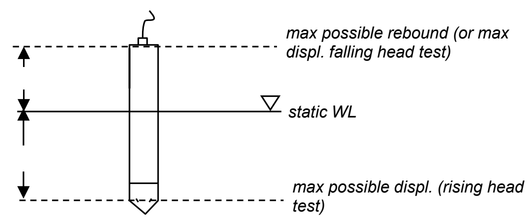
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi	1108430	29.8	0.02	3.04 / 3.11
Pressure Head CH 2 (Red)	15 psi	0603325	N/A	0.01	N/A
Annulus CH 3 (Yellow)	15 psi	0603300	30	0.03	2.76 / 2.71

Data Logger Splinter (CR800-SN 3573)

Spacer Length (ft) 5 feet

Spacer OD. (inches) 1.625 inches

Comments:



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	3.11	3.11	3.11	3.1
Pre-test Sub. Annulus	2.7	2.7	2.7	2.7
Expected Displacement (P_Head) (ft)	2.001	1.02	0.505	1.994
Observed Displacement (Test_Int) (ft)	2.394	1.032	0.583	2.133
Slug Discrepancy (%)	19.60%	1.00%	15.40%	7.00%
Max Rebound above Static	0.27%	0.17%	0.09%	0.28%
Post-test Sub. Test_Int	3.11	3.11	3.1	3.1
Residual Dev. from H_o (%)	0.00%	0.00%	0.33%	0.00%
Data Logger File Name	ROMP38_ST10A_1200-1240.csv	ROMP38_ST10B_1200-1240.csv	ROMP38_ST10C_1200-1240.csv	ROMP38_ST10D_1200-1240.csv
Specific Conductance (uS)	705	705	705	705
Temperature °C	28.7	28.7	28.7	28.7
Lithology	Avon Park dolostone	(granular)		
Other				
K_h (ft/day)	8.415	9.733	9.761	8.608
Comments				

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

GEOHYDROLOGIC DATA SECTION

SLUG TEST - DATA ACQUISITION SHEET

General Information

		Slug Test No.:	11
Site Name:	ROMP 38 - Parrish	Date:	12/15/2011
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	1390	Test Interval (ft - ft bls)	1350-1390
Test Casing Height (ft als)	4.59	Date of Last Development	12/15/2011
Test Casing Diameter (in)	NQ	Initial Static WL (ft btoc)	31.96
Test Casing Type	NQ	Final Static WL (ft btoc)	32.11
Test Interval Length (ft)	40	Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	1.59	Initial Annulus WL (ft btoc)	30.26

Set-up Information

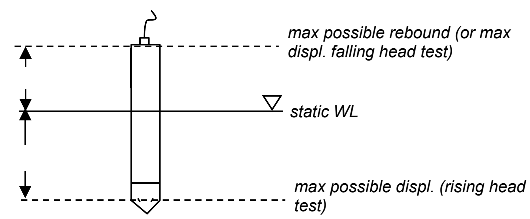
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi	1108430	32	0.02	3.04 / 3.23
Pressure Head CH 2 (Red)	15 psi	0303325	N/A	0.01	N/A
Annulus CH 3 (Yellow)	15 psi	0603300	34	0.03	3.74 / 3.86

Data Logger: Splinter (CR800-SN 3573)

Spacer Length (ft): 5 feet

Spacer OD. (inches): 1.625 inches

Comments:



Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2	1	0.5	2
Initiation method	pneumatic	pneumatic	pneumatic	pneumatic
Rising/Falling head	rising	rising	rising	rising
Pre-test Sub. Test_Int	3.23	3.22	3.22	3.22
Pre-test Sub. Annulus	3.87	3.92	3.93	3.95
Expected Displacement (P_Head) (ft)	1.925	1.002	0.57	2.038
Observed Displacement (Test_Int) (ft)	2.427	1.279	0.753	2.427
Slug Discrepancy (%)	26.00%	27.00%	32.00%	19.00%
Max Rebound above Static	N/A	N/A	N/A	N/A
Post-test Sub. Test_Int	3.22	3.22	3.22	3.22
Residual Dev. from H_o (%)	0.33%	0.00%	0.00%	0.00%
Data Logger File Name	ROMP38_ST11A_1350-1390.csv	ROMP38_ST10B_1200-1240.csv	ROMP38_ST10C_1200-1240.csv	ROMP38_ST10D_1200-1240.csv
Specific Conductance (uS)	910	910	910	910
Temperature °C	28.2	28.2	28.2	28.2
Lithology	Avon Park dolostone			
Other				
K_h (ft/day)	2.466	2.67	2.828	2.444

Comments: Butler fits better, reanalyze.

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

GEOHYDROLOGIC DATA SECTION

SLUG TEST - DATA ACQUISITION SHEET

General Information

		Slug Test No.:	12
Site Name:	ROMP 38 - Parrish	Date:	1/17/2012
Well:	Core Hole	Performed by:	A. Janosik
Well Depth (ft bls)	1600	Test Interval (ft - ft bls)	1585-1600
Test Casing Height (ft als)	4.44	Date of Last Development	1/17/2012-1/18/2012
Test Casing Diameter (in)		Initial Static WL (ft btoc)	40.98 (sat over night)
Test Casing Type	NQ	Final Static WL (ft btoc)	
Test Interval Length (ft)		Slot Size & Filter Pack Type	none
Annulus Casing Height (ft als)	1.59	Initial Annulus WL (ft btoc)	32.85

Set-up Information

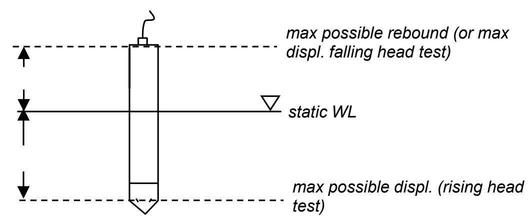
Transducer	Type	Serial No.	Depth(ft btoc)	Reading in Air (ft)	Exp/Obsvd Sub. (ft)
Test Interval CH 1 (Blue)	15 psi		51	0.02	10.02 / 10.02
Pressure Head CH 2 (Red)	15 psi		N/A	0.01	N/A
Annulus CH 3 (Yellow)	15 psi		35	0.05	2.15 / 2.18

Data Logger: Splinter (CR800-SN 3573)

Spacer Length (ft): 5 feet

Spacer OD. (inches): 1.625 inches

Comments: No spacer used



**In loger file, "p-head" data equals "test-int" data (that transducer was used in test internal)

Note: Reading in Air of the Transducer should be < +/-0.05% of the Full Scale of the Transducer (KPSI 735 and 335 series)

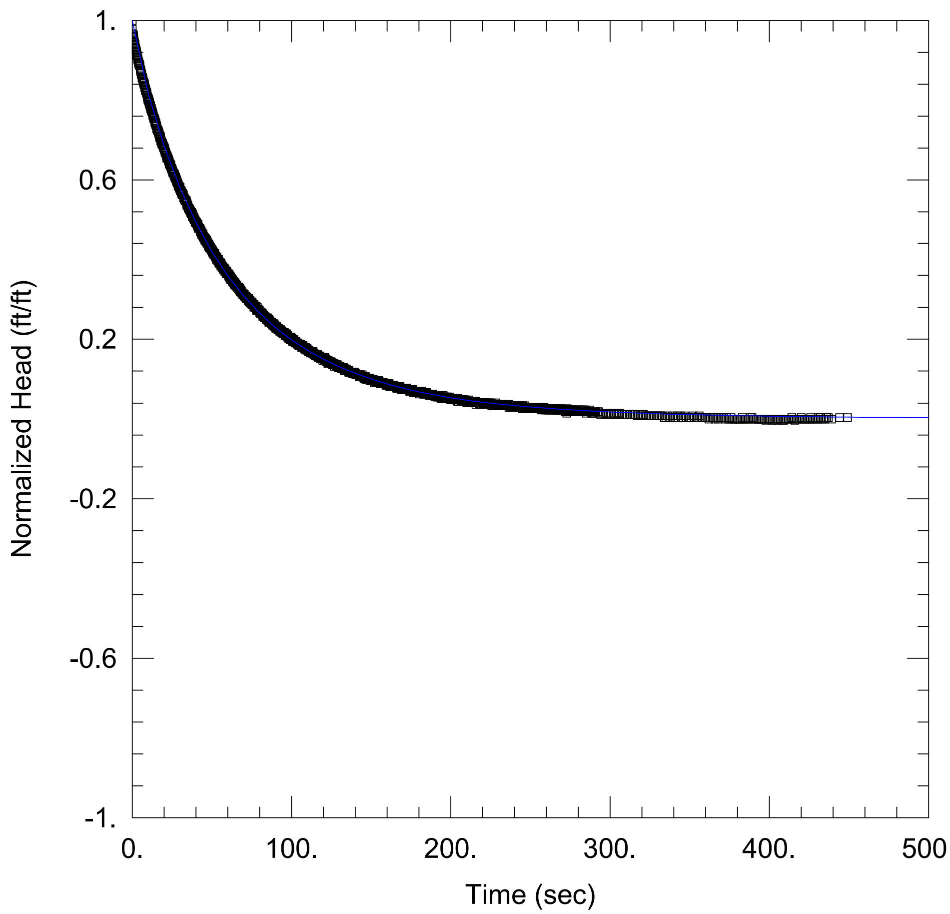
Test Data

	Test A	Test B	Test C	Test D
Target Displacement (ft)	2.3 ft (2 L of water)			
Initiation method	Pour in slug			
Rising/Falling head	falling			
Pre-test Sub. Test_Int	10.02			
Pre-test Sub. Annulus	2.17			
Expected Displacement (P_Head) (ft)	2.3			
Observed Displacement (Test_Int) (ft)	2			
Slug Discrepancy (%)	13.00%			
Max Rebound above Static	N/A			
Post-test Sub. Test_Int	N/A - also, logger didn't record. Time variable incorrect type. Ran out of space. Was fixed in program file now.			
Residual Dev. from H_o (%)				
Data Logger File Name	ROMP38_ST12A_1585-1600.csv			
Specific Conductance (uS)				
Temperature °C				
Lithology				
Other				
K_h (ft/day)				

Comments: Ended test after regional trend started to interfer (4 hrs into 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 38 – Parrish Well Site in Manatee County, Florida



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST1C_325-360.aqt
Date: 03/29/21 Time: 14:16:24

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Manatee County

AQUIFER DATA

Saturated Thickness: 1235. ft

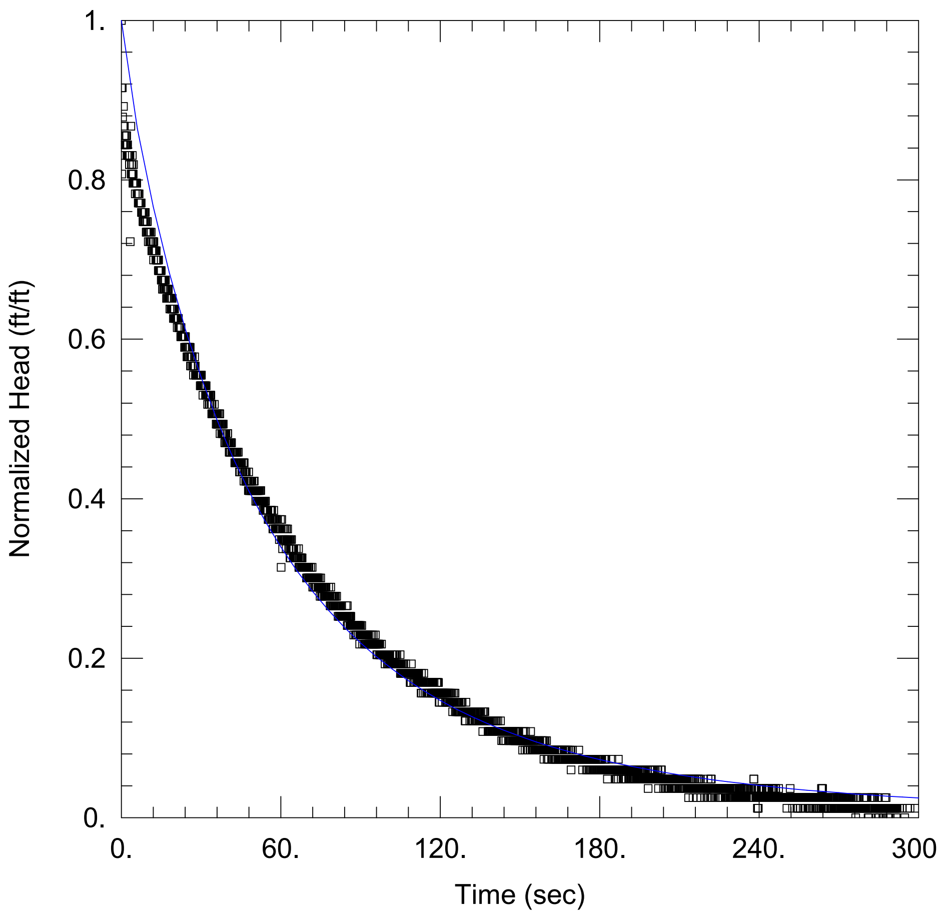
WELL DATA (Core Hole)

Initial Displacement: -1.973 ft
Total Well Penetration Depth: 360. ft
Casing Radius: 0.1245 ft
Static Water Column Height: 340.4 ft
Screen Length: 35. ft
Well Radius: 0.1458 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

K_r = 1.839 ft/day
S_s = 4.702E-7 ft^{-1}
K_z/K_r = 0.1



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST2C_370-410.aqt
Date: 03/29/21 Time: 14:17:42

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Manatee County

AQUIFER DATA

Saturated Thickness: 1235. ft

WELL DATA (Core Hole)

Initial Displacement: -0.602 ft
Total Well Penetration Depth: 410. ft
Casing Radius: 0.1245 ft

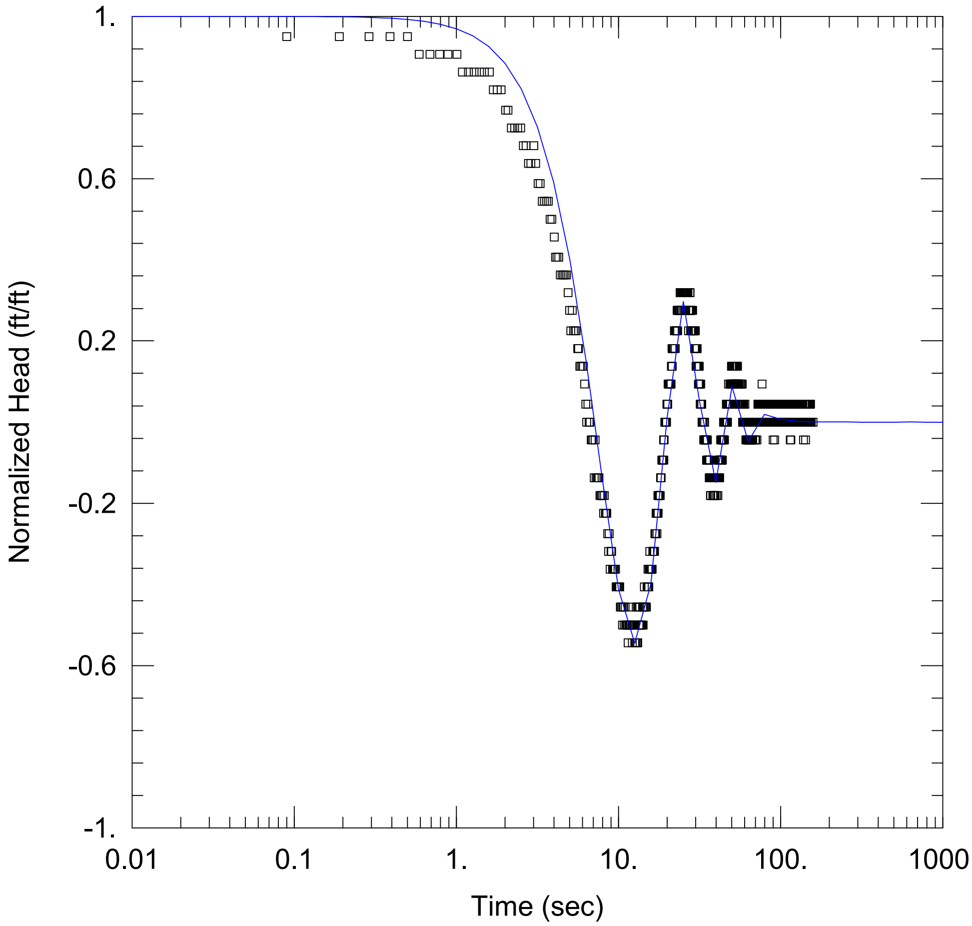
Static Water Column Height: 391.5 ft
Screen Length: 40. ft
Well Radius: 0.1458 ft

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 1.55 ft/day
Kz/Kr = 0.1

Ss = 2.038E-6 ft^{-1}



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST3C_450-490.aqt
Date: 03/29/21 Time: 14:18:43

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Manatee County

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

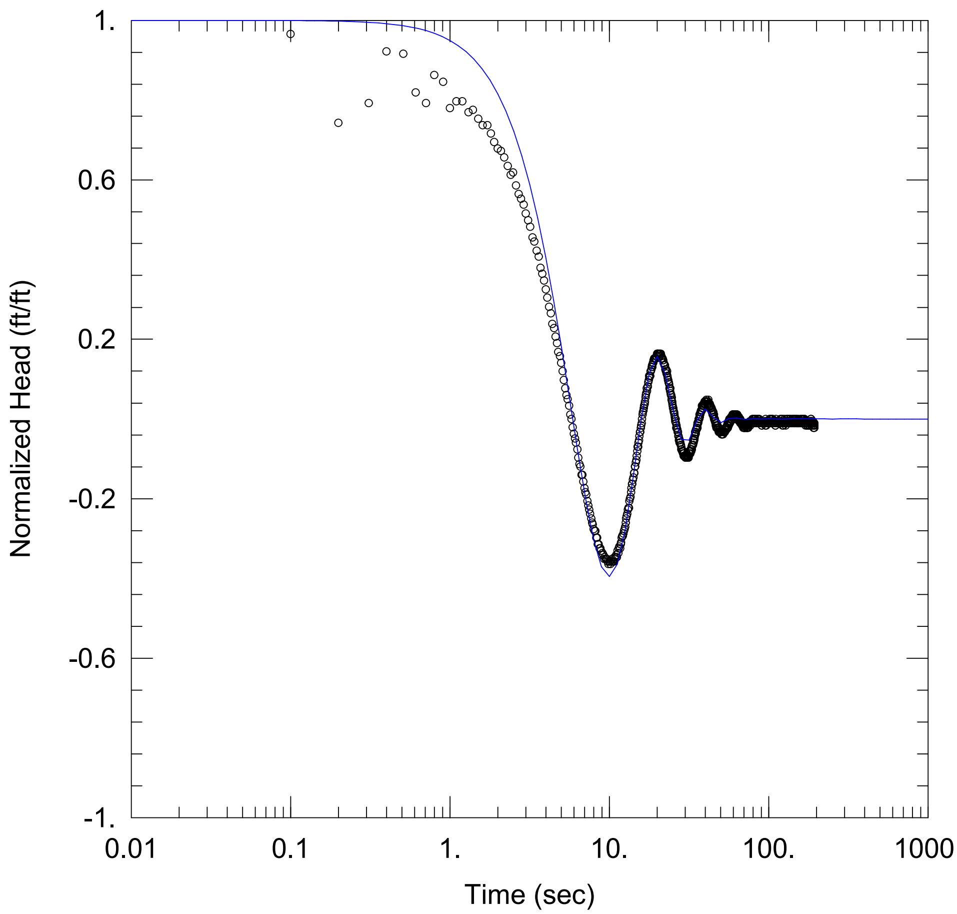
WELL DATA (Core Hole)

Initial Displacement: -0.16 ft Static Water Column Height: 471.7 ft
Total Well Penetration Depth: 490. ft Screen Length: 40. ft
Casing Radius: 0.1245 ft Well Radius: 0.1458 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 78.68 ft/day Le = 507.3 ft



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST4C_535-590.aqt
Date: 03/29/21 Time: 14:20:12

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Parrish
Test Well: CH

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

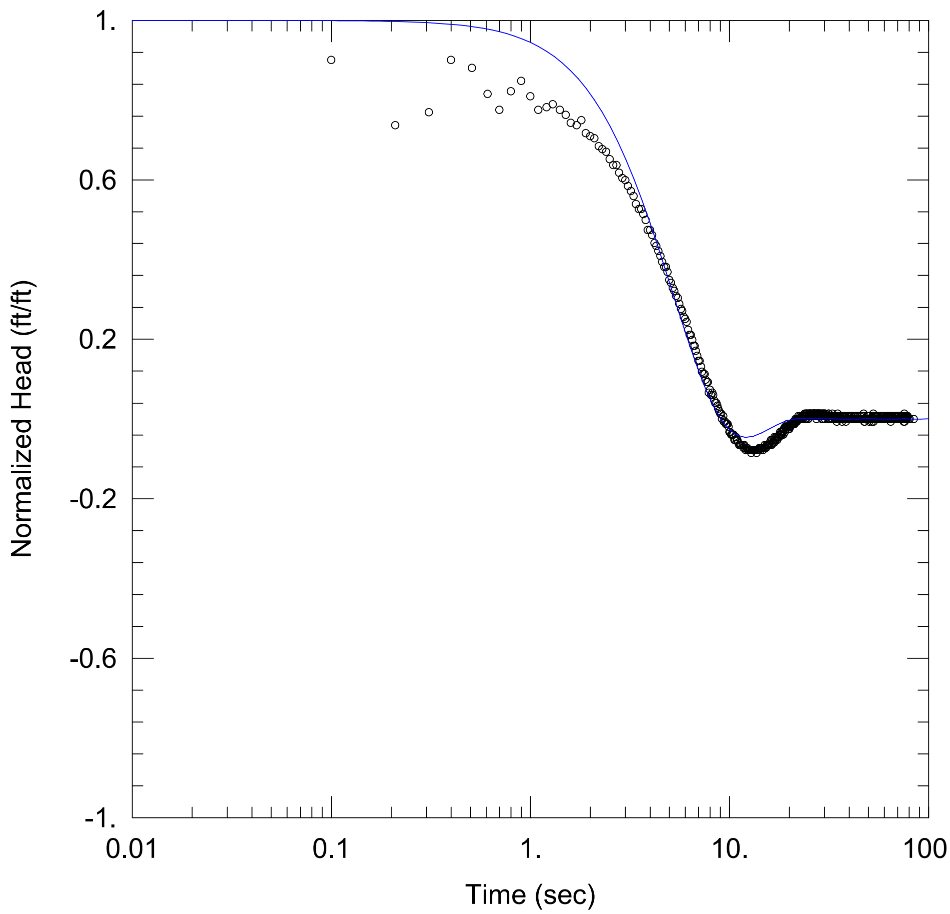
WELL DATA (CH)

Initial Displacement: -0.668 ft Static Water Column Height: 570.3 ft
Total Well Penetration Depth: 570.3 ft Screen Length: 55. ft
Casing Radius: 0.06751 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 17.66 ft/day Le = 296.9 ft



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST5c_635-690.aqt
Date: 03/29/21 Time: 14:21:21

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Parrish
Test Well: CH

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

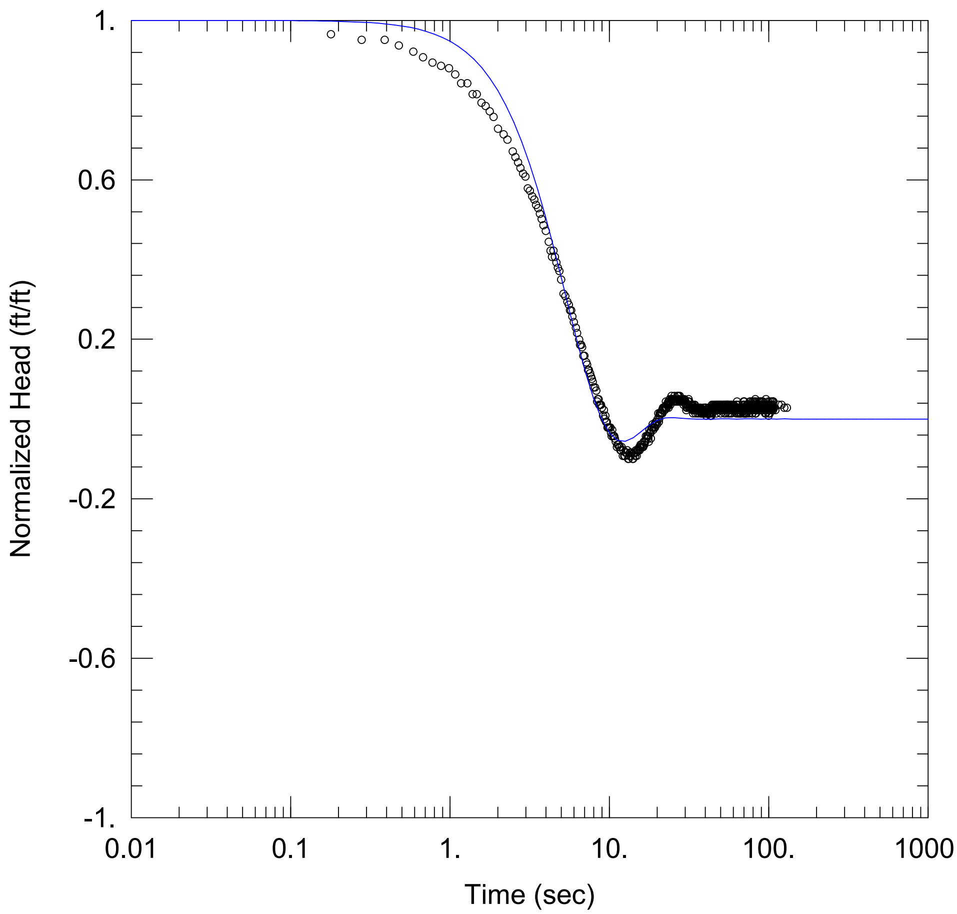
WELL DATA (CH)

Initial Displacement: -0.551 ft Static Water Column Height: 670.4 ft
Total Well Penetration Depth: 670.4 ft Screen Length: 55. ft
Casing Radius: 0.06751 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 7.288 ft/day Le = 244.5 ft



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST6c_735-790.aqt
Date: 03/29/21 Time: 14:22:03

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Parrish
Test Well: CH

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

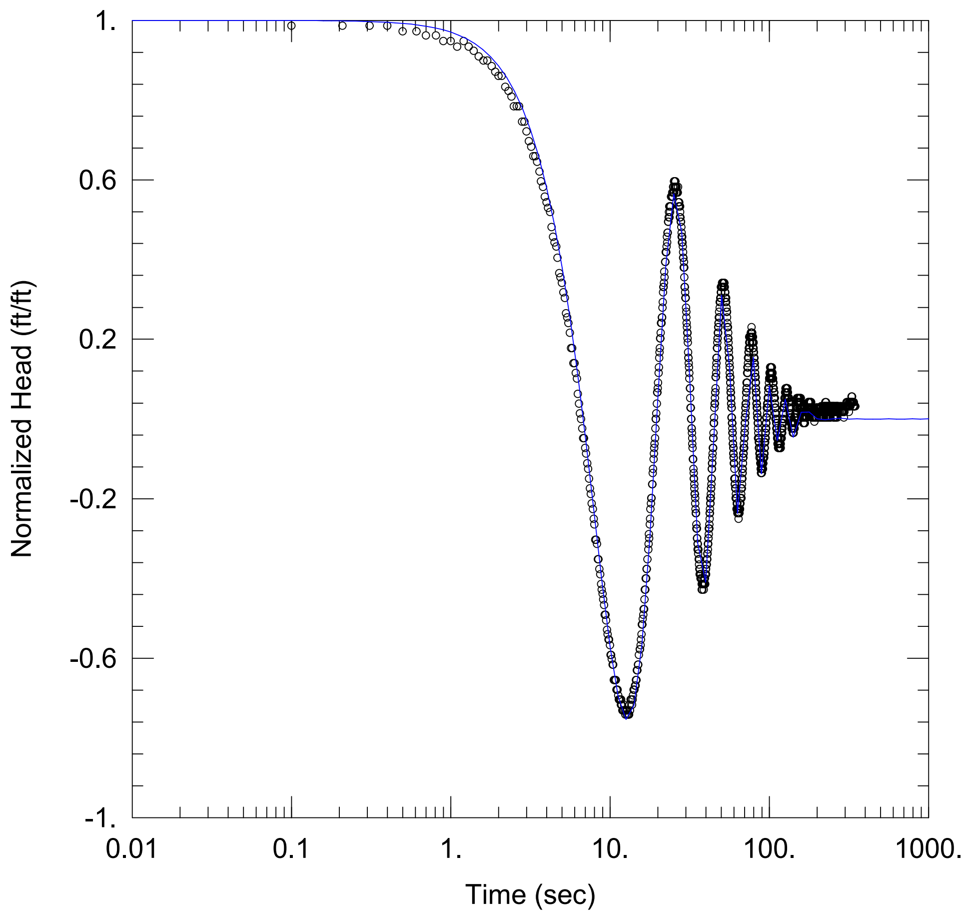
WELL DATA (CH)

Initial Displacement: -0.507 ft Static Water Column Height: 769.1 ft
Total Well Penetration Depth: 769.1 ft Screen Length: 55. ft
Casing Radius: 0.06751 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 7.41 ft/day Le = 261.6 ft



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST7c_900-940.aqt
Date: 03/30/21 Time: 06:06:02

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Parrish
Test Well: CH

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

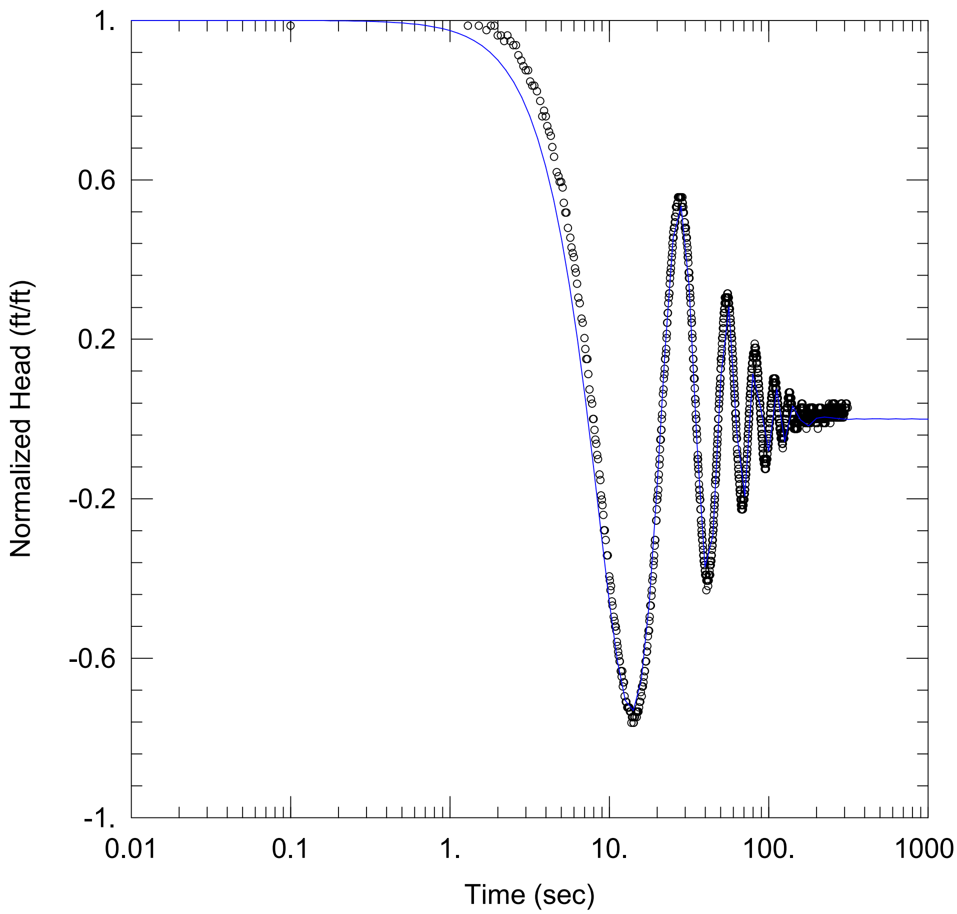
WELL DATA (CH)

Initial Displacement: -0.287 ft
Total Well Penetration Depth: 916.7 ft
Casing Radius: 0.06751 ft
Static Water Column Height: 916.7 ft
Screen Length: 40. ft
Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 112.8 ft/day Le = 532.8 ft



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST8c_1000-1040.aqt
Date: 03/31/21 Time: 14:48:19

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Parrish
Test Well: CH

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

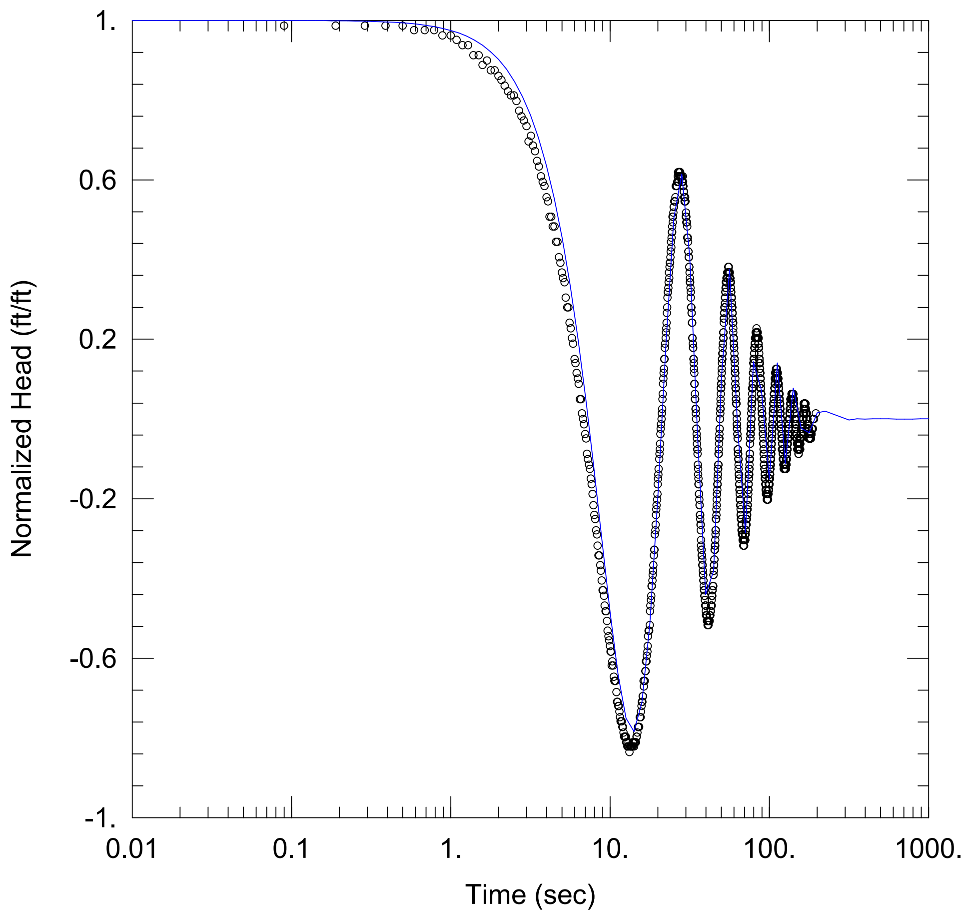
WELL DATA (CH)

Initial Displacement: -0.286 ft Static Water Column Height: 1014.3 ft
Total Well Penetration Depth: 1014.3 ft Screen Length: 40. ft
Casing Radius: 0.06751 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 88.5 ft/day Le = 612.9 ft



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST9c_1100-1140.aqt
Date: 03/31/21 Time: 14:50:13

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Parrish
Test Well: CH

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

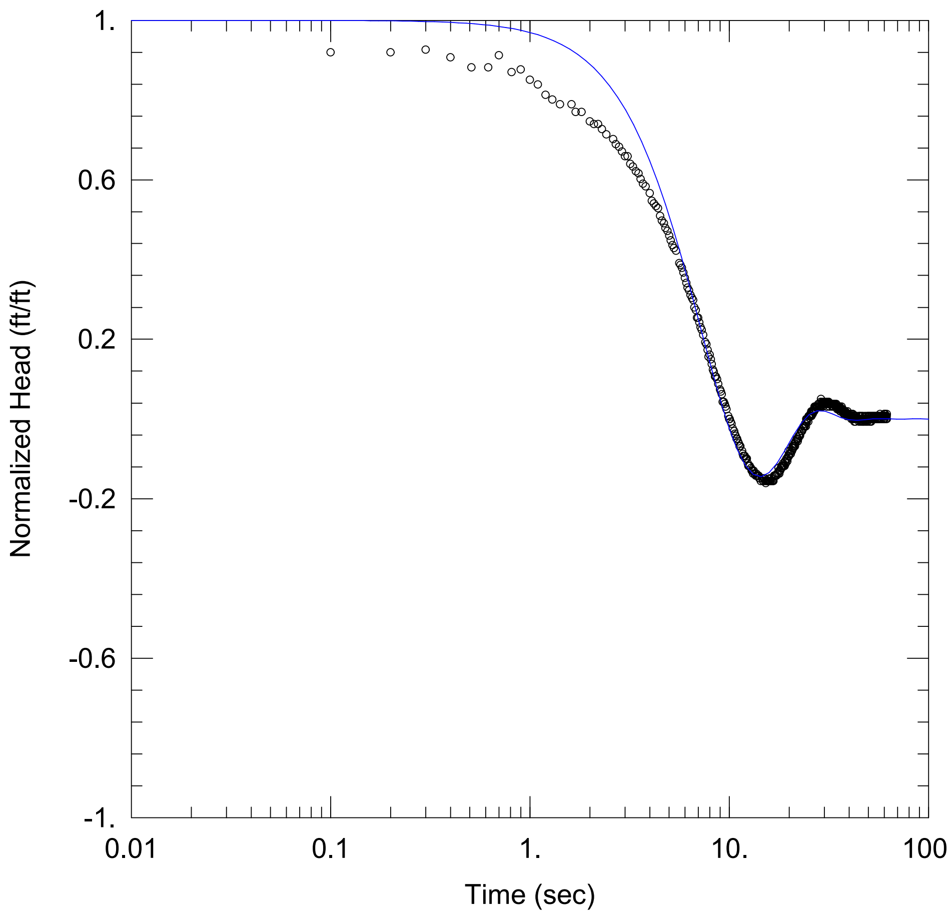
WELL DATA (CH)

Initial Displacement: -0.286 ft Static Water Column Height: 1113.3 ft
Total Well Penetration Depth: 1113.3 ft Screen Length: 40. ft
Casing Radius: 0.06751 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 214.7 ft/day Le = 625.6 ft



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST10c_1200-1240.aqt
Date: 03/31/21 Time: 14:50:52

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Parrish
Test Well: CH

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

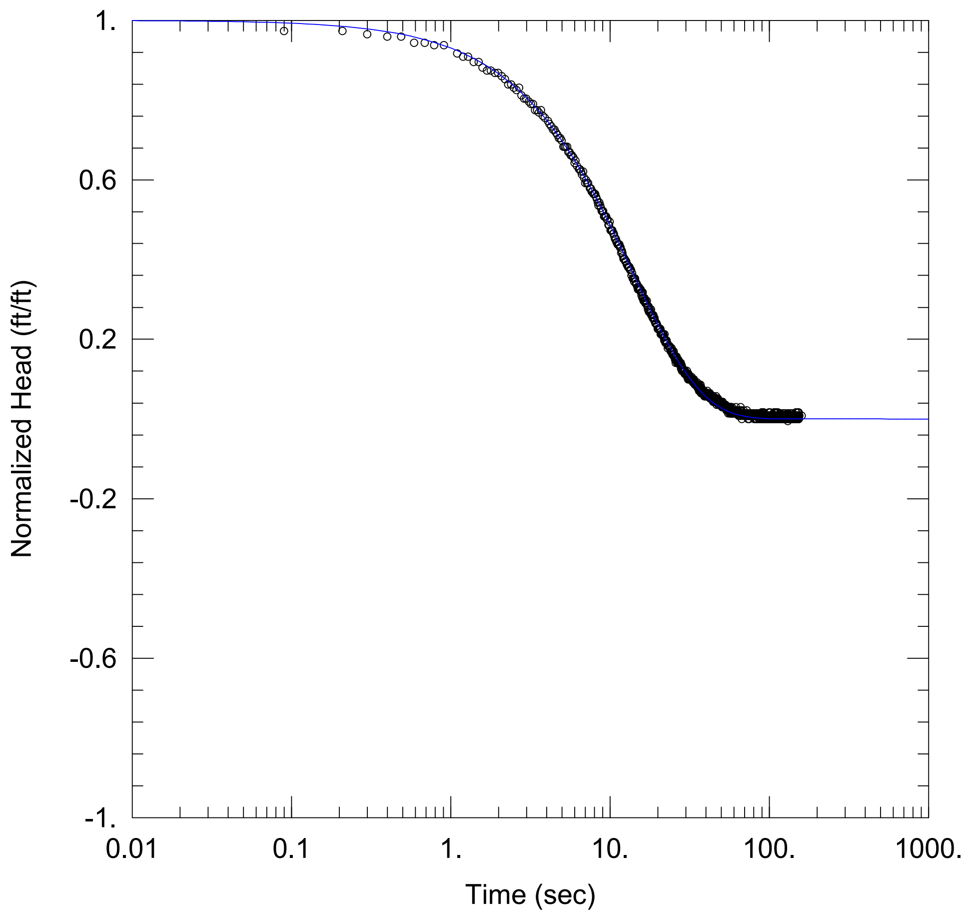
WELL DATA (CH)

Initial Displacement: -0.583 ft Static Water Column Height: 1214.7 ft
Total Well Penetration Depth: 1214.7 ft Screen Length: 40. ft
Casing Radius: 0.06751 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 9.761 ft/day Le = 481.6 ft



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST11c_1350-1390.aqt
Date: 03/31/21 Time: 14:51:22

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Parrish
Test Well: CH

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

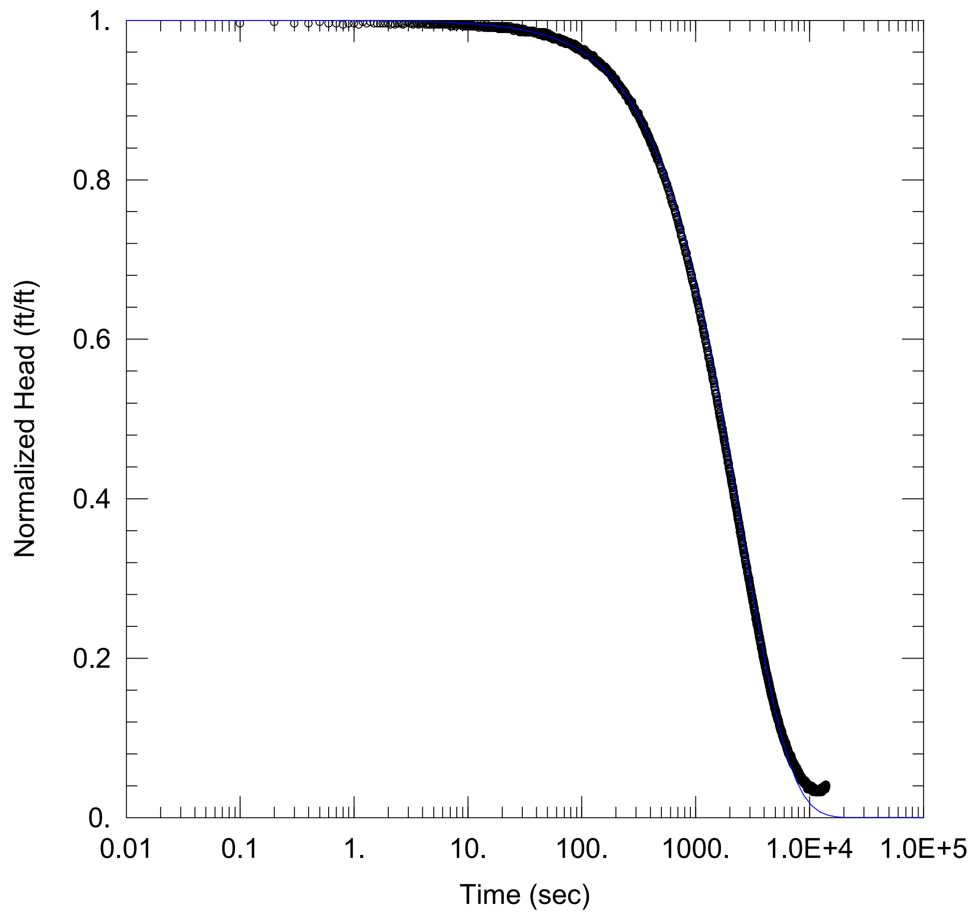
WELL DATA (CH)

Initial Displacement: -0.514 ft Static Water Column Height: 1362.6 ft
Total Well Penetration Depth: 1362.6 ft Screen Length: 40. ft
Casing Radius: 0.06751 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 2.828 ft/day Le = 0.1 ft



WELL TEST ANALYSIS

Data Set: C:\...\ROMP38_ST12_1585-1600.aqt
Date: 03/31/21 Time: 14:51:58

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Parrish
Test Well: CH

AQUIFER DATA

Saturated Thickness: 1235. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH)

Initial Displacement: -2. ft Static Water Column Height: 1563.5 ft
Total Well Penetration Depth: 1563.5 ft Screen Length: 15. ft
Casing Radius: 0.09561 ft Well Radius: 0.1263 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 0.06996 ft/day Le = 0.1 ft

Appendix I. Daily Water Levels Recorded During Exploratory Core Drilling and Testing at the ROMP 38 – Parrish Well Site in Manatee County, Florida

Appendix I. Daily water levels recorded during exploratory core drilling and testing at the ROMP 38 – Parrish well site in

[MM/DD/YYYY, month/day/year; HWT, 4.0-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of casing; NAVD 88, well locations are shown in figure 2; well as-built diagrams are in appendix C]

Date (MM/DD/YYYY)	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)	4--inch HWT Temporary Casing Static Water Level (ft NAVD 88)	HQ Core Hole Total Depth (ft bls)	HQ Core Hole Static Water Level (ft btoc)	HQ Core Hole Static Water Level (ft bls)	HQ Core Hole Static Water Level (ft NAVD 88)
07/12/2011	--	--	--	--	25	--	--	--
07/13/2011	--	--	--	--	60	--	--	--
07/14/2011	--	--	--	--	75	--	--	--
07/19/2011	--	--	--	--	100	--	--	--
08/01/2011	--	--	--	--	180	--	--	--
08/02/2011	--	--	--	--	180	--	--	--
08/03/2011	--	--	--	--	180	--	--	--
08/04/2011	180	5.81	4.31	30.87	185	22.69	19.46	15.72
08/08/2011	180	16.12	14.62	20.56	230	19.8	16.77	18.41
08/09/2011	180	16.02	14.52	20.66	250	20.75	17.61	17.57
08/10/2011	180	15.3	13.8	21.38	250	27.91	23.36	11.82
08/11/2011	180	18.54	17.04	18.14	290	19.38	16	19.18
08/15/2011	180	19.25	17.75	17.43	320	21.08	17.87	17.31
08/16/2011	180	20.42	18.95	16.23	350	21.92	18.98	16.2
08/17/2011	180	20.59	19.15	16.03	360	22.42	19.24	15.94
08/18/2011	180	20.47	19.03	16.15	360	23.42	19.55	15.63
08/22/2011	180	20.19	18.76	16.42	380	22.2	18.76	16.42
08/22/2011	180	20.7	19.27	15.91	390	21.84	18.75	16.43
08/23/2011	180	19.91	18.53	16.65	410	21.8	18.47	16.71
08/24/2011	180	19.65	18.27	16.91	410	21.44	18.33	16.85
08/25/2011	180	19.46	18.14	17.04	440	21	18.23	16.95
08/29/2011	180	19.57	18.32	16.86	490	21.59	18.44	16.74
08/30/2011	180	19.49	18.24	16.94	490	21.1	18.26	16.92
09/13/2011	--	--	--	--	490	--	--	--
09/14/2011	--	--	--	--	490	--	--	--

Manatee County, Florida

North American Vertical Datum of 1988; HQ, 3.06-inch internal diameter tempoary casing; NRQ, 2.38-inch internal diameter core drilling rod; --, not recorded;

NRQ Core Hole Total Depth (ft bls)	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 Supply Static Water Level (ft btoc)	Drilling Water Supply Static Water Level (ft bls)	Drilling Water Supply Static Water Level (ft NAVD 88)	Rain Gauge (inches)	Comments
--	--	--	--	--	--	--	--	mud, water level above land surface
--	--	--	--	--	--	--	0	mudded hole
--	--	--	--	--	--	--	0	mudded hole
--	--	--	--	--	--	--	3.1	mudded hole
--	--	--	--	25.68	24.03	14.79	--	setting casing
--	--	--	--	25.69	24.04	14.78	--	setting casing
--	--	--	--	25.67	24.02	14.8	--	setting casing
--	--	--	--	25.41	23.76	15.06	0.28	HWT: +1.50, HQ: +3.23
--	--	--	--	25.11	23.46	15.36	2.95	HWT: +1.50, HQ: +3.03
--	--	--	--	25.05	23.4	15.42	0.24	HWT: +1.50, HQ: +3.14
--	--	--	--	24.6	22.95	15.87	3.4	HWT: +1.50, HQ: +4.55, packer set
--	--	--	--	24.28	22.63	16.19	0.44	HWT: +1.50, HQ: +3.38
--	--	--	--	23.51	21.86	16.96	0.16	HWT: +1.50, HQ: +3.21
--	--	--	--	23.5	21.85	16.97	0	HWT: +1.47, HQ: +2.94
--	--	--	--	23.5	21.85	16.97	1.1	HWT: +1.44, HQ: +3.18
--	--	--	--	23.54	21.89	16.93	0.05	HWT: +1.44, HQ: +3.87
--	--	--	--	23.03	21.38	17.44	3	HWT: +1.43, HQ: +3.44
--	--	--	--	--	--	--	nm	HWT: +1.43, HQ: +3.09
--	--	--	--	22.71	21.06	17.76	0.06	HWT: +1.38, HQ: +3.33
--	--	--	--	22.49	20.84	17.98	1.05	HWT: +1.38, HQ: +3.11
--	--	--	--	22.28	20.63	18.19	0.05	HWT: +1.32, HQ: +2.77
--	--	--	--	22.45	20.8	18.02	0.15	HWT: +1.32, HQ: +2.77
--	--	--	--	22.32	20.67	18.15	0.28	HWT: +1.25, HQ: +3.15
--	--	--	--	20.71	19.06	19.76	--	HWT: +1.25, HQ: +2.84
--	--	--	--	20.83	19.18	19.64	--	setting casing

Appendix I. Daily water levels recorded during exploratory core drilling and testing at the ROMP 38 – Parrish well site in

[MM/DD/YYYY, month/day/year; HWT, 4.0-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of casing; NAVD 88, well locations are shown in figure 2; well as-built diagrams are in appendix C]

Date (MM/DD/YYYY)	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)	4--inch HWT Temporary Casing Static Water Level (ft NAVD 88)	HQ Core Hole Total Depth (ft bls)	HQ Core Hole Static Water Level (ft btoc)	HQ Core Hole Static Water Level (ft bls)	HQ Core Hole Static Water Level (ft NAVD 88)
09/15/2011	--	--	--	--	490	--	--	--
09/19/2011	--	--	--	--	490	--	--	--
09/20/2011	--	--	--	--	490	--	--	--
09/21/2011	--	--	--	--	490	--	--	--
09/22/2011	--	--	--	--	490	--	--	--
09/26/2011	--	--	--	--	490	--	--	--
09/27/2011	--	--	--	--	490	--	--	--
09/28/2011	--	--	--	--	490	--	--	--
09/29/2011	--	--	--	--	490	--	--	--
10/03/2011	--	--	--	--	490	--	--	--
10/04/2011	--	--	--	--	490	--	--	--
10/05/2011	--	--	--	--	490	--	--	--
10/06/2011	--	--	--	--	490	--	--	--
10/10/2011	491	20.93	19.87	15.31	--	--	--	--
10/11/2011	491	20.83	19.86	15.32	--	--	--	--
10/12/2011	491	20.42	19.51	15.67	--	--	--	--
10/13/2011	491	20.25	19.34	15.84	--	--	--	--
10/17/2011	491	20.75	19.87	15.31	--	--	--	--
10/18/2011	491	20.63	19.76	15.42	--	--	--	--
10/19/2011	491	20.4	19.53	15.65	--	--	--	--
10/20/2011	491	20.68	19.82	15.36	--	--	--	--
10/24/2011	491	21.82	20.97	14.21	--	--	--	--
10/25/2011	491	22.35	21.5	13.68	--	--	--	--
10/26/2011	491	22.9	22.07	13.11	--	--	--	--
10/27/2011	--	--	--	--	--	--	--	--
10/31/2011	573	23.6	22.19	12.99	--	--	--	--
11/01/2011	--	--	--	--	--	--	--	--
11/02/2011	--	--	--	--	--	--	--	--
11/03/2011	879	23.22	21.62	13.56	--	--	--	--

Manatee County, Florida

North American Vertical Datum of 1988; HQ, 3.06-inch internal diameter tempoary casing; NRQ, 2.38-inch internal diameter core drilling rod; --, not recorded;

NRQ Core Hole Total Depth (ft bls)	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 Supply Static Water Level (ft btoc)	Drilling Water Supply Static Water Level (ft bls)	Drilling Water Supply Static Water Level (ft NAVD 88)	Rain Gauge (inches)	Comments
--	--	--	--	21.14	19.49	19.33	--	setting casing
--	--	--	--	22.9	21.25	17.57	--	setting casing
--	--	--	--	23.1	21.45	17.37	--	setting casing
--	--	--	--	23.3	21.65	17.17	--	setting casing
--	--	--	--	23.45	21.8	17.02	--	setting casing
--	--	--	--	22.31	20.66	18.16	--	setting casing
--	--	--	--	21.9	20.25	18.57	--	setting casing
--	--	--	--	21.7	20.05	18.77	--	setting casing
--	--	--	--	21.55	19.9	18.92	--	setting casing
--	--	--	--	22.36	20.71	18.11	--	setting casing
--	--	--	--	22.45	20.8	18.02	--	setting casing
--	--	--	--	22.81	21.16	17.66	--	setting casing
				23.28	21.63	17.19	--	setting casing
530	22.28	19.84	15.34	23.9	22.25	16.57	6	HWT: +1.06, NQ: +2.44
570	22.19	19.65	15.53	23.64	21.99	16.83	0.19	HWT: +0.97, NQ: +2.54
590	23.92	19.57	15.61	23.51	21.86	16.96	0.09	HWT: +0.91, NQ: +4.35
590	19.42	16.94	18.24	23.4	21.75	17.07	0	HWT: +0.91, NQ: +2.48
640	22.46	19.84	15.34	23.8	22.15	16.67	0	HWT: +0.88, NQ: +2.62
690	21.71	19.76	15.42	23.74	22.09	16.73	0	HWT: +0.87, NQ: +1.95
720	22.1	19.57	15.61	23.5	21.85	16.97	0.26	HWT: +0.87, NQ: +2.53
760	22.4	19.73	15.45	23.73	22.08	16.74	0	HWT: +0.86, NQ: +2.67
790	22.95	20.97	14.21	24.83	23.18	15.64	0	HWT: +0.85, NQ: +1.98
820	24.32	21.51	13.67	25.31	23.66	15.16	0	HWT: +0.85, NQ: +2.81
860	24.78	22.02	13.16	25.87	24.22	14.6	0	HWT: +0.83, NQ: +2.76
880	--	--	--	26.32	24.67	14.15	--	fishing HWT
890	25.1	22.14	13.04	26.1	24.45	14.37	0.5	HWT: +1.41, NQ: 2.96
--	--	--	--	25.73	24.08	14.74	--	
--	--	--	--	25.56	23.91	14.91	--	
890	24.61	21.59	13.59	25.53	23.88	14.94	0	HQ: +1.60, NQ: +3.02

Appendix I. Daily water levels recorded during exploratory core drilling and testing at the ROMP 38 – Parrish well site in

[MM/DD/YYYY, month/day/year; HWT, 4.0-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of casing; NAVD 88, well locations are shown in figure 2; well as-built diagrams are in appendix C]

Date (MM/DD/YYYY)	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)	4--inch HWT Temporary Casing Static Water Level (ft NAVD 88)	HQ Core Hole Total Depth (ft bls)	HQ Core Hole Static Water Level (ft btoc)	HQ Core Hole Static Water Level (ft bls)	HQ Core Hole Static Water Level (ft NAVD 88)
11/07/2011	879	24.35	22.75	12.43	--	--	--	--
11/08/2011	879	25.02	23.42	11.76	--	--	--	--
11/09/2011	879	25.82	24.22	10.96	--	--	--	--
11/14/2011	879	26.65	25.06	10.12	--	--	--	--
11/16/2011	879	27.12	25.53	9.65	--	--	--	--
11/17/2011	879	27.81	26.22	8.96	--	--	--	--
11/21/2011	879	28.22	26.63	8.55	--	--	--	--
11/22/2011	879	28.45	26.86	8.32	--	--	--	--
11/28/2011	879	28.18	26.59	8.59	--	--	--	--
11/29/2011	879	27.93	26.34	8.84	--	--	--	--
11/30/2011	879	27.72	26.13	9.05	--	--	--	--
12/01/2011	879	27.75	26.16	9.02	--	--	--	--
12/05/2011	879	27.45	25.86	9.32	--	--	--	--
12/06/2011	879	27.85	26.26	8.92	--	--	--	--
12/07/2011	879	28.19	26.6	8.58	--	--	--	--
12/12/2011	879	28.99	27.4	7.78	--	--	--	--
12/13/2011	879	28.96	27.37	7.81	--	--	--	--
12/14/2011	879	29.32	27.73	7.45	--	--	--	--
12/15/2011	879	29.89	28.3	6.88	--	--	--	--
12/19/2011	879	29.26	27.67	7.51	--	--	--	--
12/21/2011	879	30.18	28.59	6.59	--	--	--	--

Manatee County, Florida

North American Vertical Datum of 1988; HQ, 3.06-inch internal diameter tempoary casing; NRQ, 2.38-inch internal diameter core drilling rod; --, not recorded;

NRQ Core Hole Total Depth (ft bls)	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 Supply Static Water Level (ft btoc)	Drilling Water Supply Static Water Level (ft bls)	Drilling Water Supply Static Water Level (ft NAVD 88)	Rain Gauge (inches)	Comments
935	26.05	22.74	12.44	25.8	24.15	14.67	0.04	HQ: +1.61, NQ: +3.31, barrel in NQ
940	26.4	23.31	11.87	26.98	25.33	13.49	0	HQ: +1.61, NQ: +3.09
950	27.16	24.13	11.05	27.48	25.83	12.99	0	HQ: +1.60, NQ: +3.03
980	28.88	25.13	10.05	28.97	27.32	11.5	--	HQ: +1.59, NQ: +3.75
1,020	28.63	25.54	9.64	29.37	27.72	11.1	0	HQ: +1.59, NQ: +3.09
1,050	29.21	26.13	9.05	29.88	28.23	10.59	0	HQ: +1.59, NQ: +3.08
1,110	29.51	26.56	8.62	30.52	28.87	9.95	0	HQ: +1.59, NQ: +2.95
1,140	29.84	26.82	8.36	30.59	28.94	9.88	0	HQ: +1.59, NQ: +3.02
1,160	29.81	26.88	8.3	30.63	28.98	9.84	0	HQ: +1.59, NQ: +2.93
1,170	29.48	26.52	8.66	30.08	28.43	10.39	0.76	HQ: +1.59, NQ: +2.96, rained 11/28/2011
1,180	30.04	26.08	9.1	29.91	28.26	10.56	0	HQ: +1.59, NQ: +3.96
1,210	29.87	26.13	9.05	29.92	28.27	10.55	0	HQ: +1.59, NQ: +3.74
1,240	28.75	25.88	9.3	29.72	28.07	10.75	0.03	HQ: +1.59, NQ: +2.87, rain from weekend
1,250	29.01	26.05	9.13	30.04	28.39	10.43	0	HQ: +1.59, NQ: +2.96
1,280	29.31	26.29	8.89	30.31	28.66	10.16	0	HQ: +1.59, NQ: +3.02
1,310	29.97	27.04	8.14	31.07	29.42	9.4	0.1	HQ: +1.59, NQ: +2.93
1,320	30.25	27.12	8.06	30.98	29.33	9.49	0	HQ: +1.59, NQ: +3.13
1,350	30.34	27.19	7.99	31.14	29.49	9.33	0	HQ: +1.59, NQ: +3.15
1,380	30.67	27.52	7.66	31.53	29.88	8.94	0	HQ: +1.59, NQ: +3.15
1,390	30.69	27.68	7.5	31.64	29.99	8.83	0	HQ: +1.59, NQ: +3.01
1,430	30.85	27.67	7.51	32.04	30.39	8.43	0	HQ: +1.59, NQ: +3.18

Appendix I. Daily water levels recorded during exploratory core drilling and testing at the ROMP 38 – Parrish well site in

[MM/DD/YYYY, month/day/year; HWT, 4.0-inch internal diameter temporary casing; ft, feet; bls, below land surface; btoc, below top of casing; NAVD 88, well locations are shown in figure 2; well as-built diagrams are in appendix C]

Date (MM/DD/YYYY)	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)	4--inch HWT Temporary Casing Static Water Level (ft NAVD 88)	HQ Core Hole Total Depth (ft bls)	HQ Core Hole Static Water Level (ft btoc)	HQ Core Hole Static Water Level (ft bls)	HQ Core Hole Static Water Level (ft NAVD 88)
01/03/2012	879	31.08	29.49	5.69	--	--	--	--
01/04/2012	879	34.24	32.65	2.53	--	--	--	--
01/05/2012	879	33.68	32.09	3.09	--	--	--	--
01/09/2012	879	32.82	31.23	3.95	--	--	--	--
01/10/2012	879	32.69	31.1	4.08	--	--	--	--
01/11/2012	879	32.21	30.62	4.56	--	--	--	--
01/12/2012	879	31.8	30.21	4.97	--	--	--	--
01/17/2012	879	33.04	31.45	3.73	--	--	--	--
01/18/2012	879	32.85	31.26	3.92	--	--	--	--
01/19/2012	879	32.59	31	4.18	--	--	--	--
01/23/2012	879	34.19	32.6	2.58	--	--	--	--
01/24/2012	879	32.61	31.02	4.16	--	--	--	--
01/25/2012	879	33.39	31.8	3.38	--	--	--	--

Manatee County, Florida

North American Vertical Datum of 1988; HQ, 3.06-inch internal diameter tempoary casing; NRQ, 2.38-inch internal diameter core drilling rod; --, not recorded;

NRQ Core Hole Total Depth (ft bls)	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 Supply Static Water Level (ft btoc)	Drilling Water Supply Static Water Level (ft bls)	Drilling Water Supply Static Water Level (ft NAVD 88)	Rain Gauge (inches)	Comments
1,450	31.86	28.85	6.33	33.41	31.76	7.06	0.06	HQ: +1.59, NQ: +3.01
1,490	34.24	31.35	3.83	36.51	34.86	3.96	0	HQ: +1.59, NQ: +2.89, hard freeze tonight 1/3/2012. probably a lot of pumping in area
1,530	35.44	32.35	2.83	35.69	34.04	4.78	0	HQ: +1.59, NQ: +3.09, froze last night 1/4/2012
1,570	40.93	38.02	-2.84	35.15	33.5	5.32	0	HQ: +1.59, NQ: +2.91, rods plugged off
1,570	42.32	39.11	-3.93	34.79	33.14	5.68	0	HQ: +1.59, NQ: +3.21
1,600	37.29	34.3	0.88	34.13	32.48	6.34	0.03	HQ: +1.59, NQ: +2.99
1,600	39.45	36.33	-1.15	33.92	32.27	6.55	0.02	HQ: +1.59, NQ: +3.12
1,600	38.77	34.86	0.32	35.15	33.5	5.32	0	HQ: +1.59, NQ: +3.91
1,600	40.98	36.54	-1.36	34.98	33.33	5.49	0	HQ: +1.59, NQ: +4.44, packer set
1,600	38.77	35.54	-0.36	34.61	32.96	5.86	0.16	HQ: +1.59, NQ: +3.23
1,600	--	--	--	34.58	32.93	5.89	0	HQ: +1.59
1,600	--	--	--	34.58	32.93	5.89	0	HQ: +1.59
1,600	--	--	--	35.11	33.46	5.36	0	HQ: +1.59

Appendix J. Aquifer Performance Test Data Acquisition Sheets for the ROMP 38 – Parrish Well Site in Manatee County, Florida

AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

General Information:

Site Name: ROMP 38 Parrish
Date: 12/3/2014
Reporting Code: LWPA
Performed by: M.T. Gates
County: Manatee
S/T/R: 30/33S/19E
Pumped Well: 16-inch Avon Park
Pumped Zone OB(s): Avon Park PZ
Pump Type: Diesel Turbine
Test Rate/Duration:
Non-Pumped Zone OB(s): Swnn, Surf, PcRv
Pump Set Depth: 100 feet bls

Setup Information:

Datalogger: Virtual hermit, Campbell CR1000 for Flowmeter reley
Time Synchronized:
Datalogger SN:
Time Datum:
Program Name: ROMP 38 AVPK_Flowmeter
Program Start Date: 12/2/2014
Program End Date:

Test Information:

Pump On Time: 12/3/2014 11:44:00
Flow Meter Totalizer Start: 08372
Pump Off Time:
Flow Meter Totalizer End:

		CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	
Well		AvPk	3-in NQ	3-in NQ#2	SWNN	PcRv	Surf	3-in NQ#2	Baro	12/3/2014 Start 10:15 Campbel data logger to collect flow
Riser ht.	***als ft***									
TOC elev	***elev ft***	36.96	40.73	40.73	38.68	39.21	39.03	40.73		<- Elev Ref. Survey
static W/L	***btoc ft***	22.59	26.33	26.33	24.4	5.46	5.6	26.33		<- Date 12/1/2014
static W/L	***elev ft***	14.37	14.4	14.4	14.28	33.75	33.45	14.4		TOC elev - static WL(btoc)
XD Rating	***psi***	100	30	30						
Serial No.		324089	324733	164147	324569	324740	194005		323512	
Reading in Air	***ft***									
XD depth	***btoc ft***	69.92	70	49.69	49.92	29.86	7.34			
XD elev	***elev ft***	-32.96	-29.27	-8.96	11.24	9.35	31.69			TOC elev - XD depth(btoc)
XD subm.	***wl tape ft***	47.71	43.67	23.67	25.52	24.54	1.9			WL tape value of submergence
XD subm.	***XD read ft***	47.33	43.67	23.36	25.52	24.4	1.74			XD value of submergence
XD Diff.	***ft***									$Subm._{WL\ tape}$ - $Subm._{XD}$

Date	Time	CH 1 AvPk	CH 2 3-in NQ	CH 3 3-in NQ#2	CH 4 Swnn	CH 5 PcRv	CH 6 Surf	CH 7 6-in annulas	CH 8 5-in WS	Totalizer (g x 1000)	Notes
Units	----------->		BTOC	BTOC	BTOC			BTOC	BTOC		BTOC
12/3/14	10:26	22.21	26.2	26.2	24.14	5.54	5.37	22.29	24.39		WL - Std
static W/L	XD's	H_2O	above	XD's					BARO		
12/3/14	11:33	47.59	45.93	23.1	25.75	24.12	1.94	76.88	766.183		Static
Start	Started DD --->								Dial CR1000 ------------------------------->		
12/3/14	11:50	16.23	43.43	23.18	25.62	24.12	1.93	76.61	2950		4.1
12/3/14	13:47	15.96	43.27	23.01	25.43	24.18	1.97	76.46	2900		
12/3/14	14:45	15.66	43.24	22.98	25.4	24.19	1.98	76.43		3847	
12/4/14	11:07	15.68	42.92	22.66	25.06	24.36	2.28	76.13	3950	40.75	4.14

AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

General Information:

Site Name: ______________________ Date: ______________________

Reporting Code: ______________________ Performed by: ______________________

County: S/T/R:

Pumped Well: ______________________ Pumped Zone OB(s): ______________________

Pump Type: ______________________

Test Rate/Duration: ______________________ Non-Pumped Zone OB(s): ______________________

Pump Set Depth:

Setup Information:

Datalogger: ______________________ 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		AvPk	3-in NQ	3-in NQ#2	SWNN	PcRv	Surf	6-in annulas	Baro	
Riser ht.	***als ft***									
TOC elev	***elev ft***	36.96	40.73	40.73	38.68	39.21	39.03	37.05		<- Elev Ref. ___________
static W/L	***btoc ft***	22.21	26.2	26.2	24.14			22.29		<- Date 12/3/2014 10:26
static W/L	***elev ft***	14.75	14.53	14.53	14.54			14.76		TOC elev - static WL(btoc)
XD Rating	***psi***	100	30							
Serial No.										
Reading in Air	***ft***									
XD depth	***btoc ft***	69.92	70	49.69	49.92			99		
XD elev	***elev ft***	-32.96	-29.27	-8.96	-111.24			-61.95		TOC elev - XD depth(btoc)
XD subm.	***wl tape ft***	47.71	43.8		25.78			76.71		WL tape value of submergence
XD subm.	***XD read ft***	47.59	43.93		25.75			76.88		XD value of submergence
XD Diff.	***ft***	0.12	0.13		0.03			-0.17		$\text{Subm.}_{\text{WL tape}}$ - Subm._{XD}

Date	Time	CH 1 AvPk	CH 2 3-in NQ	CH 3 3-in NQ#2	CH 4 Swnn	CH 5 PcRv	CH 6 Surf	CH 7 6-in annulas	CH 8	Totalizer (g x 1000)	Notes
Units	----------->										
12/8/14	11:05	15.69	42.48	22.22	24.68	24.21	2.42	75.72	Tape	Troll	Data Logger
12/5/14	11:10	54.15	27.46	27.46	25.25	5.5	4.8	23.51	DTW		WL Tape
12/5/1421	11:20	15.67	42.48	22.25	24.65	24.18	2.45	75.69	Tape	Troll	
12/5/14	12:52	16.13	42.48	22.22	24.64	24.23	2.54	75.7			
12/5/14	12:52	Stop DD Phase --->									
12/5/14	13:07	Start Recovery Phase --->									
12/5/14	13:10	47.64	62.7	22.65	24.72	24.22	2.53	75.98			
Static											
12/15/14	12:17	24.03	27.74		25.79	5.94	6.17	24.03			WL Tape
12/15/14	12:31	45.87	42.26	22.04	24.09	23.8	1.11	75.32			Troll
12/15/14	12:59	Removing xd's									

GEOHYDROLOGIC DATA SECTION

AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

BACKGROUND DATA

General Information:

Site Name: ROMP 38 Parrish
Date: 10/21/2015
Reporting Code: LWPA
Performed by: TG, TF, JZ
County: Manatee
S/T/R:

Pumped Well: Swnn Temp
Pumped Zone OB(s): 6-inch Swnn Permanent
Pump Type:
Test Rate/Duration:
Non-Pumped Zone OB(s):
Pump Set Depth:

Setup Information:

Datalogger: In-Situ virtual hermit
Time Synchronized:
Datalogger SN: virtual hermit
Time Datum:
Program Name:
Program Start Date: Background 10/21/2015 14:15
Need female end to wire 6-in flowmeter
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		Swnn Pump	Swnn OB	AvPk	PcRv	Surf	5-in DWS	CH 7	Baro	
Riser ht.	***als ft***									
TOC elev	***elev ft***									<- Elev Ref. ___________
static W/L	***btoc ft***	22.67	23.57	22.4	6.15	6.49	20.89			<- Date _______________
static W/L	***elev ft***	15.17	15.11	15.3	33	32.52	17.92			TOC elev - static WL(btoc)
XD Rating	***psi***									
Serial No.		324089	324740	396485	324733	393760	324737		323512	Stopped DD at 13:48. Stop pump and started recovery at 14:16
Reading in Air	***ft***									
XD depth	***btoc ft***	80	50	80	20	5.7	50			
XD elev	***elev ft***									TOC elev - XD depth(btoc)
XD subm.	***wl tape ft***	57.33	26.43	57.6	13.85	1.01	29.11			WL tape value of submergence
XD subm.	***XD read ft***	57.2	26.15	57.12	13.63	0.72	28.72			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	----------->										
10/21/15	14:16	15.18	15.11	15.31	33.01	32.53	17.95				
											Rainfall
10/28/15		13.74	13.65	13.84	33.14	32.82	16.47				1.25 inches
11/2/15	12:30	14.916	14.86	15.08	33.07	32.57	16.23				

GEOHYDROLOGIC DATA SECTION

AQUIFER PERFORMANCE TEST - DATA ACQUISITION SHEET

DRAWDOWN

General Information:

Site Name: ROMP 38 Parrish
Date: 11/2/2015
Reporting Code: LWPA
Performed by: M. Ted Gates and Julie Zydek
County: Manatee
S/T/R:
Pumped Well: Swnn Temp
Pumped Zone OB(s): 6-inch Swnn Permanent
Pump Type: 6-inch submersible
Test Rate/Duration:
Non-Pumped Zone OB(s): Surf, PcRv, AvPk, U Arca
Pump Set Depth:

Setup Information:

Datalogger: In-Situ
Time Synchronized:
Datalogger SN:
Time Datum:
Program Name: Win Situ 5
Program Start Date:
Program End Date:

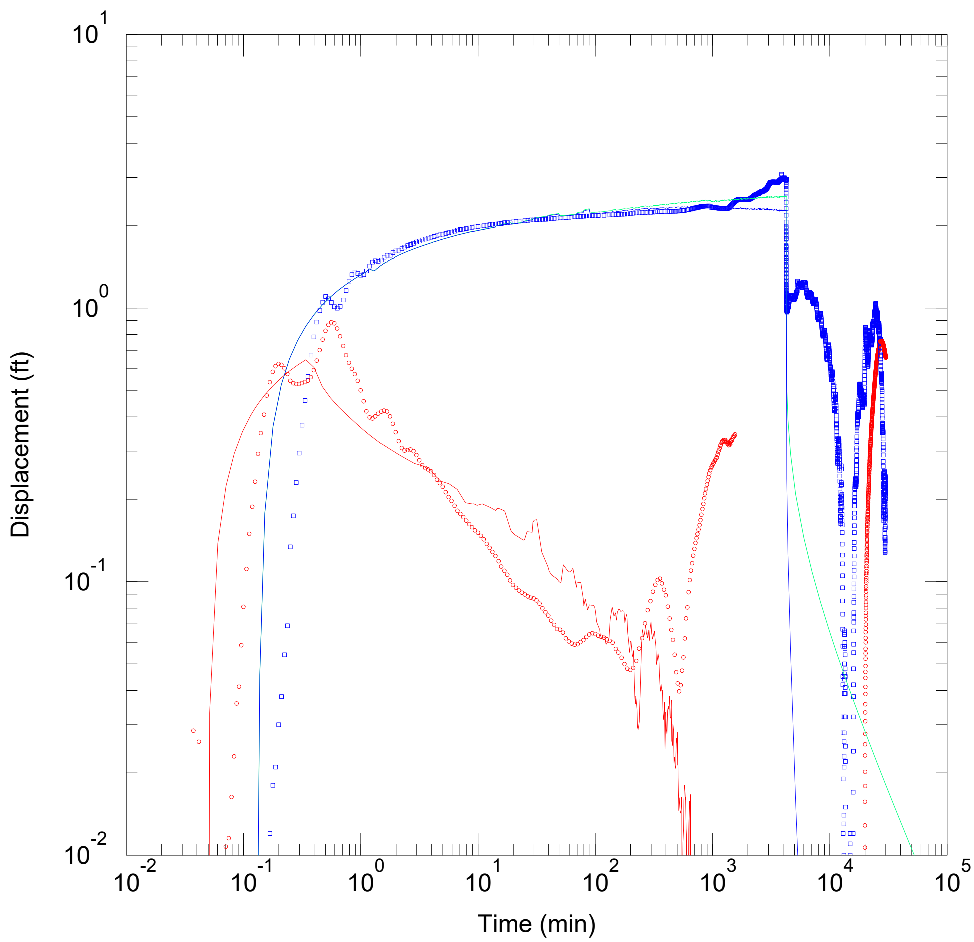
Test Information:

Pump On Time: 15:32
Flow Meter Totalizer Start: 141
Pump Off Time:
Flow Meter Totalizer End:

		CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	
Well		Swnn Pump	Swnn OB	AvPk	PcRv	Surf	U Arc	Flow Baro		
Riser ht.	*als ft*									
TOC elev	*elev ft*	37.9	38.68	37.78	39.21	39.03	38.84			<- Elev Ref.
static W/L	*btoc ft*	23.03	23.88	22.76	6.14	6.39	22.57			<- Date 13:30
static W/L	*elev ft*	14.87	14.8	15.02	33.07	32.64	16.27			TOC elev - static WL(btoc)
XD Rating	*psi*									
Serial No.		324085	324740	396485	324733	393760	324737	32456	323512	Stopped DD at 13:48. Stop pump and started recovery at 14:16
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*									$Subm._{WL\ tape}$ - $Subm._{XD}$

Date	Time	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	Totalizer (g x 1000)	Notes
Units	----------->									gpm	inch
11/2/15	15:33	0.691	12.85	14.97	33.075	32.65	16.25	2.33	14.697	515	65
11/2/15	15:45	0.54	12.74	14.94	33.07	32.65	16.29	2.35	14.967	510	64
11/2/15	15:50								Cambell 510		
11/5/15	10:45	0.14	11.77	13.98	32.9	32.88	16.07	4.74	14.8	483	57
11/5/15	13:19	37.69	26.9	23.82	6.24	6.2	22.84				WL btoc
11/5/15	13:49	0.21	11.78	13.96	32.97	32.83	16				WL Elevation
11/5/15	14:12	0.091	11.8	13.95	32.97	32.83	16.05	4.75	14.76	2238 gal data logger read	

Appendix K. Aquifer Performance Test Curve-Match Analyses for the ROMP 38 – Parrish Well Site in Manatee County, Florida



ROMP 38 U FLDN AQ (SWNN) APT

Data Set: C:\...\SWNN_dd-rec_Hantush_KDM_JJL.aqt
Date: 05/30/23 Time: 10:50:59

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Manatee County
Test Well: Swnn
Test Date: 11/02/2015

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Swnn Pumped	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
U Fldn Aq (Swnn) Temp	100	0

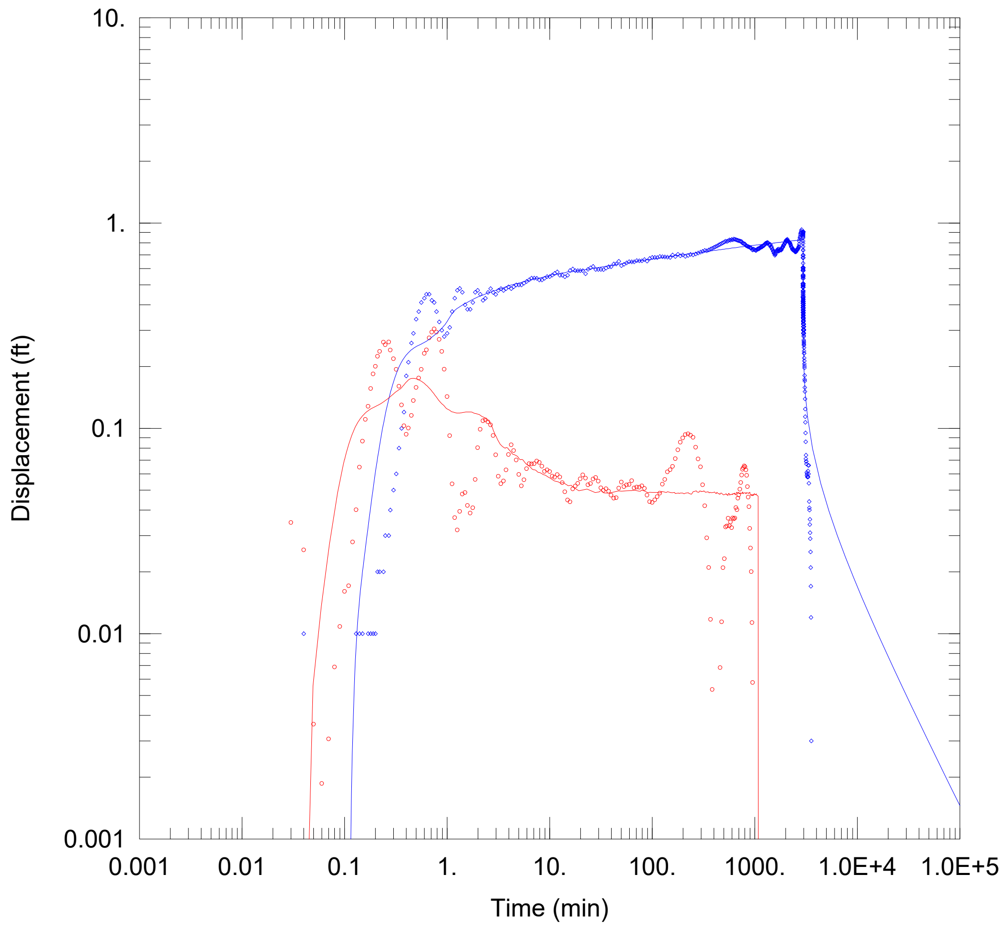
SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 6.382E+4 ft^2/day
r/B = 0.01
b = 1220. ft

S = 0.0002968
Kz/Kr = 0.1072

Figure K1. AQTESOLV© curve match solution (Hantush-Jacob) of drawdown and recovery data collected from the U Fldn Aq (Swnn) Temp Ob well during the Suwannee portion of the Upper Floridan aquifer pump test conducted at the ROMP 38 – Parrish well site in Manatee County, Florida.



ROMP 38 U FLDN AQ (AVPK) APT

Data Set: C:\...\AVPK_dd-rec_Theis_KDM_JJL.aqt
Date: 05/25/23 Time: 16:34:45

PROJECT INFORMATION

Company: SWFWMD
Project: ROMP 38
Location: Manatee County
Test Well: AV PK
Test Date: 12/3/2014

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
AVPK	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
U Fldn Aq (Avpk HPZ) T	160	0

SOLUTION

Aquifer Model: Confined

Solution Method: Theis

T = 8.99E+5 ft^2/day
Kz/Kr = 0.1

S = 0.005434
b = 1220. ft

Figure K2. AQTESOLV© curve match solution (Theis) of drawdown and recovery data collected from the U Fldn Aq (Avpk HPZ) Temp Ob well during the Avon Park high-permeability zone portion of the Upper Floridan aquifer pump test conducted at the ROMP 38 – Parrish well site in Manatee County, Florida.

Appendix L. Water Quality Sample Data Acquisition Sheets for the ROMP 38 – Parrish Well Site in Manatee County, Florida

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 1

Site Name: ROMP 38 - Parrish Date: 8/18/2011
Well Name: Core Hole Performed by: A. Janosik
SID: 780144

Well Depth (ft bls) 360 Packed Interval (ft-ft bls) 325-350
Test Casing Depth (ft bls) Packed Interval (m-m bls)
Test Casing Type/Diameter (in.) / Initial Test Interval WL (ft bls)
Hole Diameter (in.) 3.5 Initial Annulus WL (ft bls)

Purge Volume (gallons)

HQ	1	325	g/ft	X	0.3823	ft (interval)	=	125 gallons
Hole	2	35	g/ft	X	0.4998	ft (interval)	=	18 gallons
						TOTAL PURGE VOLUME (one) =		144 gallons

Pump Method Airlift
Airline Length 120 feet
Discharge Rate (gpm) 9 gpm
Volume (one)/Discharge minutes **X THREE =** minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments: interval not entirely sealed. Set packer three times and still had interconnection

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH
9:32	656	26.6	
9:40	699	26.4	
9:50	702	26.2	
10:00	699	26.8	

Purge Start Time: 9:14

Purge End Time: 10:10

Sample Time: 10:15

Shipping Batch ID: ___________

Sample Field Analysis

YSI Multimeter Serial # _____________ YSI 9300 Photometer Serial # _____________

Spec.Cond. (uS)	706	Chloride (mg/L)	15.0
Temperature (°C)	26.2	Sulfate (mg/L)	195
pH (SU)	7.81	pH (SU)	8.1

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 2

Site Name: ROMP 38 - Parrish Date: 8/23/2011
Well Name: Core Hole Performed by: A. Janosik
SID: 780144

Well Depth (ft bls) 410 Packed Interval (ft-ft bls) 370-410
Test Casing Depth (ft bls) Packed Interval (m-m bls) 112.8-125.0
Test Casing Type/Diameter (in.) / Initial Test Interval WL (ft bls)
Hole Diameter (in.) Initial Annulus WL (ft bls)

Purge Volume (gallons)

HQ 1	0.3828	g/ft X	370	ft (interval)	=	142	gallons
Hole 2	0.4998	g/ft X	40	ft (interval)	=	20	gallons
			TOTAL PURGE VOLUME (one) =			162	gallons

Pump Method Airlift
Airline Length 120 feet
Discharge Rate (gpm) 6 gpm
Volume (one)/Discharge minutes **X THREE =** 1 hr 21 min minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air
Comments:

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

Test Information

Water Quality During Purge

Time	Specific Cond.	Temp.	pH
15:35	667	27.3	6.57
15:45	698	27.3	7.45
15:55	701	27.5	7.47
16:05	705	27.6	7.69

Purge Start Time: 14:55
Purge End Time: N/A
Sample Time: 16:15
Shipping Batch ID: ___________

Sample Field Analysis

YSI Multimeter Serial # _____________ YSI 9300 Photometer Serial # _____________

Spec.Cond. (uS)	705	Chloride (mg/L)	12.5
Temperature (°C)	27.6	Sulfate (mg/L)	218
pH (SU)	7.91	pH (SU)	8.1

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information

Water Quality No.: 3

Site Name: ROMP 38 - Parrish
Date: 8/29/2011
Well Name: Core Hole
Performed by: A. Janosik
SID: 780144

Well Depth (ft bls)	490	Packed Interval (ft-ft bls)	450-490
Test Casing Depth (ft bls)		Packed Interval (m-m bls)	112.8-125.0
Test Casing Type/Diameter (in.)	/	Initial Test Interval WL (ft bls)	
Hole Diameter (in.)		Initial Annulus WL (ft bls)	

Purge Volume (gallons)

HQ 1	0.3828	g/ft X	350	ft (interval) =	134	gallons
Hole 2	0.4998	g/ft X	40	ft (interval) =	20	gallons
				TOTAL PURGE VOLUME (one) =	154	gallons

Pump Method: Airlift
Airline Length: 120 feet
Discharge Rate (gpm): 40 gpm
Volume (one)/Discharge: minutes **X THREE =** 12 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments: YSI meter broken (pin pulled out of cord at start of test). Couldn't monitor for parameter stabilization but ran purge much longer than normal

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH

Broken Meter

Purge Start Time: 14:20

Purge End Time: 15:00

Sample Time: 15:00

Shipping Batch ID: ___________

Sample Field Analysis

YSI Multimeter Serial # ______________
YSI 9300 Photometer Serial # _____________

Spec.Cond. (uS)	Broken	Chloride (mg/L)	15.5
Temperature (°C)		Sulfate (mg/L)	279
pH (SU)		pH (SU)	7.95

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 4

Site Name: ROMP 38 - Parrish   Date: 10/12/2011
Well Name: Core Hole   Performed by: A. Janosik
SID: 780144

Well Depth (ft bls) 590   Packed Interval (ft-ft bls) 535-590
Test Casing Depth (ft bls)   Packed Interval (m-m bls) 163.07-179.83
Test Casing Type/Diameter (in.) /   Initial Test Interval WL (ft bls)
Hole Diameter (in.)   Initial Annulus WL (ft bls)

Purge Volume (gallons)

1	535	g/ft	X	0.2301	ft (interval)	=	123 gallons
2	55	g/ft	X	0.3623	ft (interval)	=	20 gallons
					TOTAL PURGE VOLUME (one) =		143 gallons

Pump Method Reverse Air
Airline Length 120 feet
Discharge Rate (gpm) 15 gpm
Volume (one)/Discharge   minutes **X THREE =** 30 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments:

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH
15:00	774	28.1	8.08
15:10	778	28.3	8.21
15:30	780	28.3	8.23

Purge Start Time: 14:40

Purge End Time:

Sample Time: 15:20

Shipping Batch ID:

Sample Field Analysis

YSI Multimeter Serial #   YSI 9300 Photometer Serial #

Spec.Cond. (uS)	780	Chloride (mg/L)	14.0
Temperature (°C)	28.3	Sulfate (mg/L)	254
pH (SU)	8.23	pH (SU)	8.05

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 5

Site Name: ROMP 38 - Parrish Date: 10/18/2011
Well Name: Core Hole Performed by: A. Janosik
SID: 780144

Well Depth (ft bls) 690
Test Casing Depth (ft bls)
Test Casing Type/Diameter (in.) /
Hole Diameter (in.)

Packed Interval (ft-ft bls) 635-690
Packed Interval (m-m bls) 193.55-210.31
Initial Test Interval WL (ft bls)
Initial Annulus WL (ft bls)

Purge Volume (gallons)

1	635	g/ft	X	0.2301	ft (interval)	=	146 gallons
2	55	g/ft	X	0.3623	ft (interval)	=	20 gallons

TOTAL PURGE VOLUME (one) = 166 gallons

Pump Method Reverse Air
Airline Length 120 feet
Discharge Rate (gpm) 13 gpm
Volume (one)/Discharge minutes **X THREE =** 38 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments:

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH
11:20	703	28	8.14
11:30	703	28.3	8.28
11:40	702	28.3	8.29

Purge Start Time: 11:05

Purge End Time:

Sample Time: 11:50

Shipping Batch ID: ___________

Sample Field Analysis

YSI Multimeter Serial # _____________ YSI 9300 Photometer Serial # _____________

Spec.Cond. (uS)	703	Chloride (mg/L)	9.5
Temperature (°C)	28.3	Sulfate (mg/L)	227
pH (SU)	8.30	pH (SU)	8.10

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 6

Site Name: ROMP 38 - Parrish Date: 10/24/2011
Well Name: Core Hole Performed by: A. Janosik
SID: 780144

Well Depth (ft bls) 790 Packed Interval (ft-ft bls) 735-790
Test Casing Depth (ft bls) Packed Interval (m-m bls) 193.55-240.79
Test Casing Type/Diameter (in.) / Initial Test Interval WL (ft bls)
Hole Diameter (in.) Initial Annulus WL (ft bls)

Purge Volume (gallons)

1	735	g/ft	X	0.2301	ft (interval)	=	169 gallons
2	55	g/ft	X	0.3623	ft (interval)	=	19.92 gallons
					TOTAL PURGE VOLUME (one) =		189 gallons

Pump Method Reverse Air
Airline Length 120 feet
Discharge Rate (gpm) 12 gpm
Volume (one)/Discharge minutes **X THREE =** 48 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments:

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH
12:15	731	27.6	8.25
12:25	757	27.9	8.38
12:35	758	27.9	8.39

Purge Start Time: 11:40

Purge End Time:

Sample Time: 12:40

Shipping Batch ID:

Sample Field Analysis

YSI Multimeter Serial # YSI 9300 Photometer Serial #

Spec.Cond. (uS)	758	Chloride (mg/L)	16.0
Temperature (°C)	27.9	Sulfate (mg/L)	254
pH (SU)	8.39	pH (SU)	8.3

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information

Water Quality No.: 7

Site Name: ROMP 38 - Parrish
Date: 11/8/2011
Well Name: Core Hole
Performed by: A. Janosik
SID: 780144

Well Depth (ft bls) 940
Packed Interval (ft-ft bls) 900-940
Test Casing Depth (ft bls)
Packed Interval (m-m bls) 274.32-286.51
Test Casing Type/Diameter (in.) /
Initial Test Interval WL (ft bls)
Hole Diameter (in.)
Initial Annulus WL (ft bls)

Purge Volume (gallons)

NQ	1	0.2301	g/ft	X	900	ft (interval)	=	208.0 gallons
Hole	2	0.3623	g/ft	X	40	ft (interval)	=	15.0 gallons

TOTAL PURGE VOLUME (one) = 223 gallons

Pump Method Reverse Air
Airline Length 260 feet
Discharge Rate (gpm) 30 gpm
Volume (one)/Discharge minutes **X THREE =** 22 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments:

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

Test Information

Water Quality During Purge

Time	Specific Cond.	Temp.	pH
13:40	941	28.3	8.06
13:50	945	28.5	8.19
14:00			

Purge Start Time: 13:15

Purge End Time:

Sample Time: 14:02

Shipping Batch ID: ___________

Sample Field Analysis

YSI Multimeter Serial # _____________ YSI 9300 Photometer Serial # ____________

Spec.Cond. (uS)	943	Chloride (mg/L)	40.0
Temperature (°C)	28.6	Sulfate (mg/L)	316
pH (SU)	8.19	pH (SU)	8.05

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 8

Site Name: ROMP 38 - Parrish Date: 11/16/2011
Well Name: Core Hole Performed by: A. Janosik
SID: 780144

Well Depth (ft bls) 1040 Packed Interval (ft-ft bls) 1000-1040
Test Casing Depth (ft bls) Packed Interval (m-m bls) 304.8-316.992
Test Casing Type/Diameter (in.) / Initial Test Interval WL (ft bls)
Hole Diameter (in.) Initial Annulus WL (ft bls)

Purge Volume (gallons)

NQ	1	1000	g/ft	X	0.2301	ft (interval)	=	230.1 gallons
Hole	2	40	g/ft	X	0.3623	ft (interval)	=	14.49 gallons

TOTAL PURGE VOLUME (one) = 245 gallons

Pump Method Reverse Air
Airline Length 120 feet
Discharge Rate (gpm) 35 gpm
Volume (one)/Discharge minutes **X THREE =** 21 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments:

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH
14:20	891	28.6	8.19
14:30	890	28.8	8.23

Purge Start Time: 14:00

Purge End Time:

Sample Time: 14:40

Shipping Batch ID:

Sample Field Analysis

YSI Multimeter Serial # YSI 9300 Photometer Serial #

Spec.Cond. (uS)	891	Chloride (mg/L)	16.0
Temperature (°C)	28.7	Sulfate (mg/L)	337
pH (SU)	8.23	pH (SU)	8.05

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 9

Site Name: ROMP 38 - Parrish Date: 11/22/11 12:27

Well Name: Core Hole Performed by: A. Janosik

SID: 780144

Well Depth (ft bls)	1140	Packed Interval (ft-ft bls)	1100-1140
Test Casing Depth (ft bls)	897	Packed Interval (m-m bls)	335.3-347.5
Test Casing Type/Diameter (in.)	/	Initial Test Interval WL (ft bls)	
Hole Diameter (in.)		Initial Annulus WL (ft bls)	

Purge Volume (gallons)

NQ	1	0.2301	g/ft X	1100	ft (interval)	=	253.11	gallons
Hole	2	0.3623	g/ft X	40	ft (interval)	=	14.5	gallons
					TOTAL PURGE VOLUME (one) =		268	gallons

Pump Method Reverse Air

Airline Length 360 feet

Discharge Rate (gpm) 34 gpm

Volume (one)/Discharge 8 minutes **X THREE =** 24 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments:

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH
12:35	930	28.6	8.26
12:45	933	28.5	8.25
12:55	931	28.9	8.23
13:10	934	28.9	8.23

Purge Start Time: 12:27

Purge End Time: 13:15

Sample Time: 13:15

Shipping Batch ID: ___________

Sample Field Analysis

YSI Multimeter Serial # _____________ YSI 9300 Photometer Serial # ____________

Spec.Cond. (uS)	931	Chloride (mg/L)	25.5
Temperature (°C)	28.8	Dilution 4x → Sulfate (mg/L)	342
pH (SU)	8.23	pH (SU)	8.1

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 10

Site Name: ROMP 38 - Parrish Date: 12/05/11

Well Name: Core Hole Performed by: A. Janosik

SID: 780144

Well Depth (ft bls) 1240 Packed Interval (ft-ft bls) 1200-1240

Test Casing Depth (ft bls) 897 Packed Interval (m-m bls) 365.76-377.95

Test Casing Type/Diameter (in.) / Initial Test Interval WL (ft bls)

Hole Diameter (in.) Initial Annulus WL (ft bls)

Purge Volume (gallons)

NQ	1	0.2301	g/ft	X	1200	ft (interval)	=	276.12 gallons
Hole	2	0.3623	g/ft	X	40	ft (interval)	=	14.492 gallons

TOTAL PURGE VOLUME (one) = 291 gallons

Pump Method Reverse Air

Airline Length 360 feet

Discharge Rate (gpm) 27 gpm

Volume (one)/Discharge minutes **X THREE =** 33 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments:

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH
14:15	720	28.7	8.21
14:25	707	28.8	8.31
14:35	709	28.8	8.31

Purge Start Time: 14:05

Purge End Time:

Sample Time: 14:43

Shipping Batch ID: ___________

Sample Field Analysis

YSI Multimeter Serial # _____________ YSI 9300 Photometer Serial # ____________

Spec.Cond. (uS)	705	Chloride (mg/L)	15.0
Temperature (°C)	28.7	Sulfate (mg/L)	224
pH (SU)	8.31	pH (SU)	7.95

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 11

Site Name: ROMP 38 - Parrish Date: 12/15/11
Well Name: Core Hole Performed by: A. Janosik
SID: 780144

Well Depth (ft bls) ______ Packed Interval (ft-ft bls) 1350-1390
Test Casing Depth (ft bls) ______ Packed Interval (m-m bls) 411.48-423.67
Test Casing Type/Diameter (in.) / Initial Test Interval WL (ft bls) ______
Hole Diameter (in.) ______ Initial Annulus WL (ft bls) ______

Purge Volume (gallons)

NQ	1	1350	g/ft	X	0.2301	ft (interval)	=	311 gallons
Hole	2	40	g/ft	X	0.3623	ft (interval)	=	15.0 gallons

TOTAL PURGE VOLUME (one) = 326 gallons

Pump Method Reverse Air
Airline Length ______ feet
Discharge Rate (gpm) 14 gpm
Volume (one)/Discharge ______ minutes **X THREE =** 82 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments: ______

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH
16:10	899	27.6	8.08
16:20	907	28.3	8.22
16:30	908	28.3	8.22

Purge Start Time: 15:30

Purge End Time:

Sample Time: 16:40

Shipping Batch ID: ______

Sample Field Analysis

YSI Multimeter Serial # ______ YSI 9300 Photometer Serial # ______

Spec.Cond. (uS)	910	Chloride (mg/L)	11.0
Temperature (°C)	28.2	Sulfate (mg/L)	372
pH (SU)	8.21	pH (SU)	8.05

Density (atm) ______

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: 12

Site Name: ROMP 38 - Parrish Date: 01/18/12
Well Name: Corehole Performed by: A. Janosik
SID: 780144

Well Depth (ft bls) 1,600 Packed Interval (ft-ft bls) 1,585-1,600
Test Casing Depth (ft bls) Packed Interval (m-m bls) 483.11-487.68
Test Casing Type/Diameter (in.) / Initial Test Interval WL (ft bls)
Hole Diameter (in.) Initial Annulus WL (ft bls)

Purge Volume (gallons)

Hole	1	0.3623	g/ft X	15	ft (interval)	=	5.4345	gallons
Bailer	2	0.0408	g/ft X	20	ft (interval)	=	0.816	gallons
					TOTAL PURGE VOLUME (one) =		6.25	gallons

Pump Method Reverse Air
Airline Length 360 feet
Discharge Rate (gpm) 0.932 gpm
Volume (one)/Discharge 7 minutes **X THREE =** 21 minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments: Dishcarge rate measured with jug, 2 liters/34 sec.

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH

Purge Start Time: 14:23

Purge End Time: 14:45

Sample Time: 15:17

bailer = 1" PVC
1" = 0.08333 ft
$\pi \left(\frac{d}{2}\right)^2 = 0.00545\ ft^2$
$= 0.00545\ ft^2 * 1\ ft$
$= 0.00545\ ft^3/ft$
= 0.0408 gal/ft

2L / 34 sec = 0.0588 L/sec
= 0.932 gpm

Sample Field Analysis

YSI Multimeter Serial # ______ YSI 9300 Photometer Serial # ______

Spec.Cond. (uS)	8720	x10 dilution -	Chloride (mg/L)	277.5
Temperature (°C)	27.1	x20 dilution -	Sulfate (mg/L)	2770
pH (SU)	7.20		pH (SU)	7.75

Density (atm)

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

Revised 08/26/2019

WATER QUALITY SAMPLE ACQUISITION

General Information Water Quality No.: Swnn APT

Site Name: ROMP 38 - Parrish Date: 11/05/15

Well Name: Swnn Pumped (Temp) Performed by: Julie Zydek

SID: 857425

Well Depth (ft bls)	640	Packed Interval (ft-ft bls)	420-640
Test Casing Depth (ft bls)		Packed Interval (m-m bls)	
Test Casing Type/Diameter (in.)	/	Initial Test Interval WL (ft bls)	
Hole Diameter (in.)		Initial Annulus WL (ft bls)	

Purge Volume (gallons)

Hole	1		g/ft X		ft (interval)	=		gallons
Bailer	2		g/ft X		ft (interval)	=		gallons
			TOTAL PURGE VOLUME (one) =					gallons

Pump Method

Airline Length feet

Discharge Rate (gpm) gpm

Volume (one)/Discharge minutes **X THREE =** minutes

Collection Method: Submersible Pump or Wireline Bailer or Nested Bailer or Reverse-air

Comments:

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

Test Information

Water Quality During Purge			
Time	Specific Cond.	Temp.	pH
12:45	820	29.8	7.31
12:49	801	29.3	7.32
12:54	820	29.3	7.34

Purge Start Time:

Purge End Time:

Sample Time: 12:56

Shipping Batch ID:

Sample Field Analysis

YSI Multimeter Serial # YSI 9300 Photometer Serial #

Spec.Cond. (uS)	820	Chloride (mg/L)	
Temperature (°C)	29.3	Sulfate (mg/L)	
pH (SU)	7.34	pH (SU)	

Density (atm)

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

Revised 08/26/2019

Appendix M. Water Quality Data for the Groundwater Quality Samples Collected at the ROMP 38 – Parrish Well Site in Manatee County, Florida

Table M1. Field analyses results of the groundwater quality samples collected during exploratory core drilling at the ROMP 38 – Parrish well site in Manatee County, Florida

[No., number; SID, Station Identification; MM/DD/YYYY, month/day/year, HH:MM, hour:minute; ft, feet; bls, below land surface; °C, degrees celsius; SU, standard units; µmhos/cm micromhos per centimeter; Cl^-, chloride; $SO4^{2-}$, sulfate; mg/L, milligrams per liter; --, not recorded; shaded records indicate packer tests of confining units]

Water Quality Sample No.	SID	Station Name	Date (MM/DD/YYYY)	Time (HH:MM)	Sample Interval (ft bls)	Temperature (°C)	pH (SU)	Specific Conductance (µmhos/cm)	Major Anions Cl^- (mg/L)	Major Anions SO_4^{2-} (mg/L)	Sample Collection Methods/ Remarks
1	780144	ROMP 38 Corehole	08/18/2011	10:15	325-350	26.2	7.81	706	15.0	195	Surface Discharge
2	780144	ROMP 38 Corehole	08/23/2011	16:15	370-410	27.6	7.91	705	12.5	218	Surface Discharge
3	780144	ROMP 38 Corehole	08/29/2011	15:00	450-490	--	--	--	15.5	279	Surface Discharge, YSI meter broken
4	780144	ROMP 38 Corehole	10/12/2011	15:20	535-590	28.3	8.23	780	14.0	254	Surface Discharge
5	780144	ROMP 38 Corehole	10/18/2011	11:50	635-690	28.3	8.30	703	9.5	227	Surface Discharge
6	780144	ROMP 38 Corehole	10/24/2011	12:40	735-790	27.9	8.39	758	16.0	254	Surface Discharge
7	780144	ROMP 38 Corehole	11/08/2011	14:02	900-940	28.6	8.19	943	40.0	316	Surface Discharge
8	780144	ROMP 38 Corehole	11/16/2011	14:40	1,000-1,040	28.7	8.23	891	16.0	337	Surface Discharge
9	780144	ROMP 38 Corehole	11/22/2011	13:15	1,100-1,140	28.8	8.23	931	25.5	342	Surface Discharge; Sulfate was four times diluted
10	780144	ROMP 38 Corehole	12/05/2011	14:45	1,200-1,240	28.7	8.31	705	15.0	224	Surface Discharge
11	780144	ROMP 38 Corehole	12/15/2011	16:40	1,350-1,390	28.2	8.21	910	11.0	372	Surface Discharge
12	780144	ROMP 38 Corehole	01/18/2012	15:17	1,585-1,600	27.1	7.20	8,720	277.5	2,770	Nested Bailer; Chloride was ten times diluted and Sulfate was 20 times diluted

Table M2. Laboratory analyses results of the groundwater quality samples collected during exploratory core drilling and

[No., number; SID, Station Identification; MM/DD/YYYY, month/day/year; HH:MM, hour:minute; ft, feet; bls, below land surface; SU, standard unit; Fe^{2+}, iron; Sr^{2+}, strontium; Si, silica; SiO_2, silicon dioxide; $CaCO_3$, calcium carbonate; APT, aquifer performance test; Swnn, Suwannee; shaded records indicate

Water Quality Sample No.	SID	Date (MM/DD/YYYY)	Time (HH:MM)	Sample Interval (ft bls)	pH (SU)[Q]	Specific Conductance (µmhos/cm)	MAJOR ANIONS	
							Cl^- (mg/L)	SO_4^{2-} (mg/L)
1	780144	08/18/2011	10:15	325-350	8.28	682.8	17.7	184
2	780144	08/23/2011	16:15	370-410	8.21	684.2	17.3	187
3	780144	08/29/2011	15:00	450-490	8.28	809.3	26.8	227
4	780144	10/12/2011	15:20	535-590	8.18	764.8	26.9	219
5	780144	10/18/2011	11:50	635-690	8.32	689.4	17.3	187
6	780144	10/24/2011	12:40	735-790	8.22	753.2	22.2	208
7	780144	11/08/2011	14:02	900-940	8.14[N1]	942.1[N1]	48.8	265
8	780144	11/16/2011	14:40	1,000-1,040	8.14[N1]	872.2[N1]	31.4	276
9	780144	11/22/2011	13:15	1,100-1,140	8.20[N1]	922.4[N1]	36.9	290
10	780144	12/05/2011	14:45	1,200-1,240	8.18[N1]	708.6[N1]	17.4	186
11	780144	12/15/2011	16:40	1,350-1,390	8.07[N1]	916.1[N1]	21.3	324
12	780144	01/18/2012	15:17	1,585-1,600	7.93[N1]	10,284.6[N1]	1,830	2,280
13	857425	01/05/2015	12:56	450-650	8.22	800.3	25.9	231

[Q] Sample was held beyond holding time. Field pH is used in analyses due to a 15 minute holding time.

[N]1 Test is not NELAC certified by this laboratory. Certification was not requested.

[J]3 Estimated value, value not accurate. The reported value failed to meet the established quality control criteria for either precision or accuracy.

Table M3. The equivalent weight and percent equivalent weight for select ions and the water type for groundwater quality Florida

[No., number; ft, feet; bls, below land surface; meq/L, milliequivalents per liter; %, percent; Ca^{2+}, calcium; Mg^{2+}, magnesium; K^+, potassium; Na^+, sodium; Cl^-, hydroxyl ions are insignificat in groundwater and carbonate ions are typically not present if pH is less than 8.3 standard units (SU) (Hem, 1985); see tables M1

Water Quality Sample No.	Sample Interval (ft bls)	CATIONS							
		Ca^{2+}		Mg^{2+}		K^+		Na^+	
		meq/L	%	meq/L	%	meq/L	%	meq/L	%
1	325 - 350	3.82	51.43	2.91	39.18	0.07	0.90	0.63	8.48
2	370 - 410	4.10	53.24	2.95	38.38	0.06	0.75	0.59	7.63
3	450 - 490	4.45	52.64	3.30	39.06	0.06	0.74	0.64	7.57
4	535 - 590	4.25	52.40	3.16	38.99	0.06	0.78	0.63	7.83
5	635 - 690	3.91	53.28	2.85	38.93	0.01	0.08	0.57	7.71
6	735 - 790	4.31	53.40	3.09	38.36	0.06	0.75	0.60	7.49
7	900 - 940	5.34	52.63	3.79	37.38	0.06	0.61	0.95	9.39
8	1,000 - 1,040	4.81	52.70	3.60	39.47	0.06	0.64	0.66	7.19
9	1,100 - 1,140	5.44	52.57	4.06	39.20	0.07	0.63	0.79	7.61
10	1,200 - 1,240	4.20	53.87	2.95	37.87	0.06	0.73	0.59	7.53
11	1,350 - 1,390	5.34	55.56	3.59	37.33	0.06	0.59	0.63	6.52
12	1,585 - 1,600	40.67	38.88	18.35	17.54	0.81	0.77	44.78	42.81

aquifer performance testing at the ROMP 38 – Parrish well site in Manatee County, Florida

µmhos/cm micromhos per centimeter; mg/L, milligrams per liter; Cl^-, chloride; SO_4^{2-}, sulfate; Ca^{2+}, calcium; Mg^{2+}, magnesium; Na^+, sodium; K^+, potassium; packer tests of confining units]

MAJOR CATIONS									
Ca^{2+} (mg/L)	Mg^{2+} (mg/L)	Na^+ (mg/L)	K^+ (mg/L)	Fe^{2+} (mg/L)	Sr^{2+} (mg/L)	Si as SiO	Total Dissolved Solids (mg/L)	Total Alkalinity CaCO	Sample Collection Method/ Remarks
76.6	35.4	14.5	2.63	0.606	6.41	28.99	470	156.8	Surface Discharge
82.1	35.9	13.5	2.25	0.598	8.27	22.9	463	153.8	Surface Discharge
89.1	40.1	14.7	2.44	3.540	11.4	22.7	547	153.8	Surface Discharge
85.1	38.4	14.6	2.46	0.288	10.7	23	552	151.4[J3]	Surface Discharge
78.3	34.7	13	2.21	0.633	9.4	22.5	488	153.1	Surface Discharge
86.3	37.6	13.9	2.35	0.504	10.4	22.4	520	149.6	Surface Discharge
107	46.1	21.9	2.4	0.965	13.4[N1]	22.6	640	146.8	Surface Discharge
96.4	43.8	15.1	2.28	0.930	13.3[N1]	22.6	630	146	Surface Discharge
109	49.3	18.1	2.55	0.553	13.7[N1]	23.2	648	151.1	Surface Discharge
84.2	35.9	13.5	2.22	0.565	11.1[N1]	23	472	149.5	Surface Discharge
107	43.6	14.4	2.22	0.131[I]	20.4[N1]	22.3	673	148.8	Surface Discharge
815	223	1,030	31.6	13.400	14.8[N1]	20.4	6,640	128.8	Wireline Bailer
87.7	39.9	14	2.1	0.287	11.4	22.4	548	157.1	Surface Discharge during Swnn APT

samples collected during exploratory core drilling and testing at the ROMP 38 – Parrish well site in Manatee County,

chloride; SO_4^{2-}, sulfate; total alkalinity is used as HCO_3^- because it is assumed $CO3_2^-$ and H_2CO_3 are negligible based on groundwater pH at this site because and M2 for sample station identification (SID) numbers; shaded records indicate packer tests of confining units]

ANIONS						
Cl^-		SO_4^{2-}		HCO_3^-		Water Type
meq/L	%	meq/L	%	meq/L	%	
0.50	6.42	4.71	60.53	2.57	33.05	Calcium Sulfate
0.49	7.07	3.89	56.41	2.52	36.52	Calcium Sulfate
0.76	9.45	4.73	59.06	2.52	31.50	Calcium Sulfate
0.76	9.73	4.56	58.46	2.48	31.81	Calcium Sulfate
0.49	7.08	3.89	56.50	2.51	36.41	Calcium Sulfate
0.63	8.45	4.33	58.45	2.45	33.09	Calcium Sulfate
1.38	14.80	5.52	59.33	2.41	25.87	Calcium Sulfate
0.89	9.81	5.75	63.67	2.39	26.51	Calcium Sulfate
1.04	10.89	6.04	63.19	2.48	25.92	Calcium Sulfate
0.49	7.20	3.87	56.84	2.45	35.96	Calcium Sulfate
0.60	6.14	6.75	68.94	2.44	24.92	Calcium Sulfate
51.62	51.01	47.47	46.91	2.11	2.09	Mixed-cation chloride

Table M4. Select molar ratios for groundwater quality samples collected during exploratory core drilling and testing at the ROMP 38 – Parrish well site in Manatee County, Florida

[No., number; ft, feet; bls, below land surface; Cl^-, chloride; SO_4^{2-}, sulfate; Ca^{2+}, calcium; HCO_3^-, bicarbonate; Mg^{2+}, magnesium; Na^+, sodium; total alkalinity is used as HCO_3^- because it is assumed CO_3^{2-} and H_2CO_3 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); all water quality samples were collected from Station Identification No. 780144. Shaded records indicate packer tests of confining units]

Water Quality Sample No.	Open Interval (ft bls)	Cl^-:SO_4^{2-}	Ca^{2+}:HCO_3^-	Ca^{2+}:Mg^{2+}	Cl^-:HCO_3^-	Na^+:HCO_3^-	Na^+:Cl^-	SO_4^{2-}:HCO_3^-
1	325 - 350	0.11	1.49	1.31	0.19	0.25	1.26	1.83
2	370 - 410	0.13	1.63	1.39	0.19	0.23	1.20	1.54
3	450 - 490	0.16	1.76	1.35	0.30	0.25	0.85	1.88
4	535 - 590	0.17	1.71	1.34	0.31	0.26	0.84	1.84
5	635 - 690	0.13	1.56	1.37	0.19	0.23	1.16	1.55
6	735 - 790	0.14	1.76	1.39	0.26	0.25	0.97	1.77
7	900 - 940	0.25	2.22	1.41	0.57	0.40	0.69	2.29
8	1,000 - 1,040	0.15	2.01	1.33	0.37	0.27	0.74	2.40
9	1,100 - 1,140	0.17	2.20	1.34	0.42	0.32	0.76	2.44
10	1,200 - 1,240	0.13	1.71	1.42	0.20	0.24	1.20	1.58
11	1,350 - 1,390	0.09	2.19	1.49	0.25	0.26	1.04	2.77
12	1,585 - 1,600	1.09	19.27	2.22	24.46	21.22	0.87	22.49

Table M5. Field water quality readings during the aquifer performance tests conducted at the ROMP 38 – Parrish well site in Manatee County, Florida

[MM/DD/YYYY, month/day/year; HH:MM, hour:minute; µmhos/cm micromhos per centimeter; °C, degrees celsius; SU, standard unit; U Fldn Aq, Upper Floridan aquifer; Swnn, Suwannee; Temp, temporary]

Aquifer Performance Test	Date (MM/DD/YYYY)	Time (HH:MM)	Specific Conductance (µmhos/cm)	Temperature (°C)	pH (SU)
U Fldn Aq (Swnn) Temp Pump	11/05/2012	10:08	821	29.7	7.38
U Fldn Aq (Swnn) Temp Pump	11/05/2012	10:23	818	29.8	7.4
U Fldn Aq (Swnn) Temp Pump	11/05/2012	10:37	816	29.7	7.4
U Fldn Aq (Swnn) Temp Pump	11/05/2012	10:52	818	29.6	7.45
U Fldn Aq (Swnn) Temp Pump	11/05/2012	11:21	820	29.6	7.36
U Fldn Aq (Swnn) Temp Pump	11/05/2012	11:51	814	30	7.4
U Fldn Aq (Swnn) Temp Pump	11/05/2012	12:45	820	29.8	7.31
U Fldn Aq (Swnn) Temp Pump	11/05/2012	12:49	801	29.3	7.32
U Fldn Aq (Swnn) Temp Pump	11/05/2012	12:56	820	29.3	7.34

Southwest Florida
Water Management District