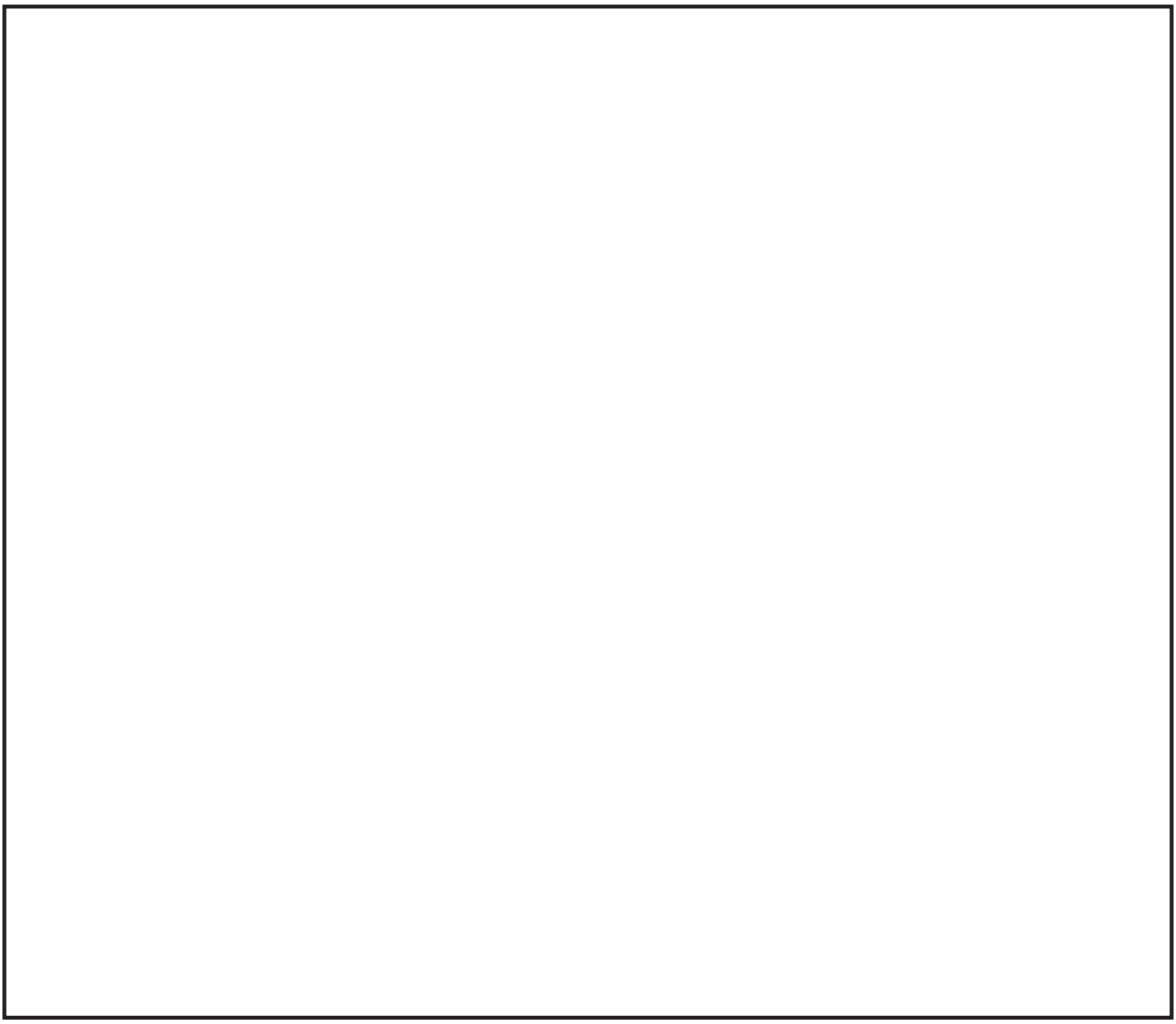
Southwest Florida
Water Management District

Well Construction at the Eagle Lake Well Site in Polk County, Florida

Southwest Florida Water Management District
Geohydrologic Data Section

February 2024



Cover Photo: Permanent monitor wells at the Eagle Lake well site in Polk County, Florida. In order from left to right: Surf Aq Monitor, U Fldn Aq Monitor. Photograph by Jay Mitchell.

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By Kristina D. Mallams

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Southwest Florida Water Management District
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Southwest Florida Water Management District

Operations, Lands and Resource Monitoring Division
Brian Starford, P.G., Director

Data Collection Bureau
Sandie Will, P.G., Bureau Chief

Geohydrologic Data Section
M. Ted Gates, P.G., Manager

Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34604-6899

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Telephone: 1-800-423-1476 (FL only)

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The hydrogeologic evaluations and interpretations contained in *Well Construction at the Eagle Lake Well Site in Polk 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.

Kristina D. Mallams
Professional Geologist
State of Florida License No. PG 2922
Date: Feb. 6, 2024

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

Contents

Foreword iv
Introduction 1
Acknowledgments 1
Site Location 1
Methods 1
Well Construction 2
Surficial Aquifer Monitor Well 5
Upper Floridan Aquifer Monitor Well 5
Geology 8
Hydrogeology 9
Summary 13
Selected References 13
Appendix A. Scanned Daily Drilling Logs Taken During Well Construction at the Eagle Lake Well Site in Polk County, Florida 15
Appendix B. Lithologic Logs for the Samples Collected at the Eagle Lake Well Site in Polk County, Florida 37
Appendix C. Digital Photographs of Samples Retrieved from the Eagle Lake Well Site in Polk County, Florida 49
Appendix D. Correlation Charts 62

Figures

1. Central Florida Water Initiative minimum lake level well sites. 2
2. Location of the Eagle Lake well site in Polk County, Florida. 3
3. Well site layout for the Eagle Lake well site in Polk County, Florida. 4
4. Well as-built diagram for the *Surf Aq Monitor* at the Eagle Lake well site in Polk County, Florida 6
5. Well as-built diagram for the *U Fldn Aq Monitor* at the Eagle Lake well site in Polk County, Florida 7
6. Stratigraphic column detailing the hydrogeologic setting at the Eagle Lake well site in Polk County, Florida 9
7. Geophysical log suite from land surface to 272.4 feet bls conducted at the Eagle Lake well site in Polk County, Florida 10
8. Geophysical log suite from land surface to 324.2 feet bls conducted at the Eagle Lake well site in Polk County, Florida. 11
9. Hydrograph of the permanent monitor wells at the Eagle Lake well site in Polk County, Florida. 12

Tables

1. Summary of well construction details at the Eagle Lake well site in Polk County, Florida 5
2. Summary of geophysical logs collected at the Eagle Lake well site in Polk County, Florida 8

Conversion Factors and Datums

Multiply	By	To obtain
	Length	
inch (in)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
acre	0.004047	square kilometer (km^2)
square foot (ft^2)	0.09290	square meter (m^2)
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
gallon (gal)	3.785	liter (L)
gallon (gal)	0.003785	cubic meter (m^2)
cubic foot (ft^3)	0.02832	cubic meter (m^3)
	Flow Rate	
foot per day (ft/d)	0.3048	meters per day (m/d)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
cubic foot per day (ft^3/d)	0.02832	cubic meter per day (m^3/d)
gallon per day (gal/d)	0.003785	cubic meter per day (m^3/d)

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

als	above land surface
aq	aquifer
bls	below land surface
CFWI	Central Florida Water Initiative
Const.	construction
DMIT	Data, Monitoring, and Investigations Team
EDP	Environmental Data Portal
FGS	Florida Geological Survey
fig.	figure
Fldn	Floridan
ft	feet
gpm	gallon per minute
gpm/ft	gallons per minute per foot
HQ	3.06-inch internal diameter steel coring rods
Inc.	Incorporated
LLC	Limited Liability Company

Abbreviations and Acronyms continued

Mendez	Mendez Drilling, Incorporated
MM/DD/YYYY	Month/Day/Year
NAVD 88	North American Vertical Datum of 1988
No.	number
PVC	polyvinyl chloride
SCH	schedule
SID	station identification
District	Southwest Florida Water Management District
S/T/R	Section/Township/Range
Suncoast	Suncoast Drilling, Limited Liability Company
Surf	surficial
U	upper
WCP	Well Construction Permit

Well Construction at the Eagle Lake Well Site in Polk County, Florida

By Kristina D. Mallams

Introduction

The Eagle Lake well site is part of the Data, Monitoring, and Investigations Team (DMIT) Work Plan, which supports the Central Florida Water Initiative (CFWI) activities. Groundwater level data collected from 18 sites within the Southwest Florida Water Management District (District) portion of the CFWI boundary will support minimum-level research for selected lakes and aquifers (fig. 1). Data collected at this well site will be used to reevaluate and revise the minimum lake levels for Eagle Lake in accordance with Section 373.042, Florida Statutes, and to help establish the hydraulic connection between Eagle Lake and the surficial aquifer and upper Floridan aquifer. Additionally, long-term water level data collected from these wells will be used for permitting or planning decisions, to help improve model calibrations for various District projects.

Work at the former Eagle Lake well site began in February of 2018, but was halted in March 2018 due to unsafe conditions following drilling-induced subsidence surrounding the 12-inch primary casing and drill rig. Details of work completed at the former site are summarized in the file of record technical memo (Zydek, 2018). A new location for the well site was acquired approximately 0.6 miles southwest of the former site. This report details the well construction, the stratigraphy, and the hydrogeology of the relocated Eagle Lake well site. Data collected 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 October 2023). Data including well site reports, hydrostratigraphy, and geophysical logs are available to view and download from the Geohydrologic Data Map Viewer: http://swfwmd.maps.arcgis.com/apps/webappviewer/index.html?id=5cfe38abbae84d1fadfdf0953c3126bc (accessed October 2023).

Acknowledgments

Special thanks to Mendez Drilling, Incorporated (Mendez), Suncoast Drilling, Limited Liability Company (Suncoast), and Eagle Lake Elementary for their continued professionalism and cooperation.

Site Location

The Eagle Lake well site is in central Polk County off U.S. Route 17 near Lake McLeod and Eagle Lake (fig. 2). It is in the northeast quarter of the southeast quarter of Section 12, Township 29 South, Range 25 East at latitude 27° 58' 28.94" north and longitude 81° 45' 47.51" west. The land surface elevation is approximately 161 feet above the North American Vertical Datum of 1988 (NAVD 88). The Eagle Lake well site is located on a 150 square feet (ft^2) permanent easement granted to the District by the Polk County School District. Figure 3 presents the layout for the Eagle Lake well site.

The Eagle Lake well site can be found by taking Interstate 4 east from Tampa for 20 miles. Take exit 27 for Florida State Road 570 East towards Lakeland/Winter Haven for 14 miles. Take exit 14 for Florida State Road 540 East for 1.3 miles. Turn south onto Thornhill Road and continue for 3.5 miles. Thornhill Road will turn into Crystal Beach Road. Continue south on Crystal Beach Road for 0.8 miles. Crystal Beach Road will turn into West Crystal Beach Road. Continue for 0.4 miles and the well site is located on the south side of the road, near the intersection of West Crystal Beach Road and US Highway 17.

The Eagle Lake well site is located in the Lake Wales Ridge Complex Province (Williams et al., 2022). The Lake Wales Ridge Complex Province is the southernmost and largest province in the Lakes District, ranging from southern Lake County to southern Highlands County (Williams et al., 2022). It is often referred to as the "backbone of Florida" because of its unique geomorphic features of consecutive northwest-to-southeast trending high ridges separated by low lying valleys, which contain numerous sinkholes and sinkhole lakes caused by the dissolution of limestone. The Eagle Lake well site is in the northern portion of the Peace River drainage basin, which eventually drains into Charlotte Harbor and to the Gulf of Mexico.

Methods

From July 13 through August 6, 2020, Suncoast collected lithologic samples from 3 to 322 feet below land surface (bls) using a Diedrich D-50 drill rig mounted on a Morooka track

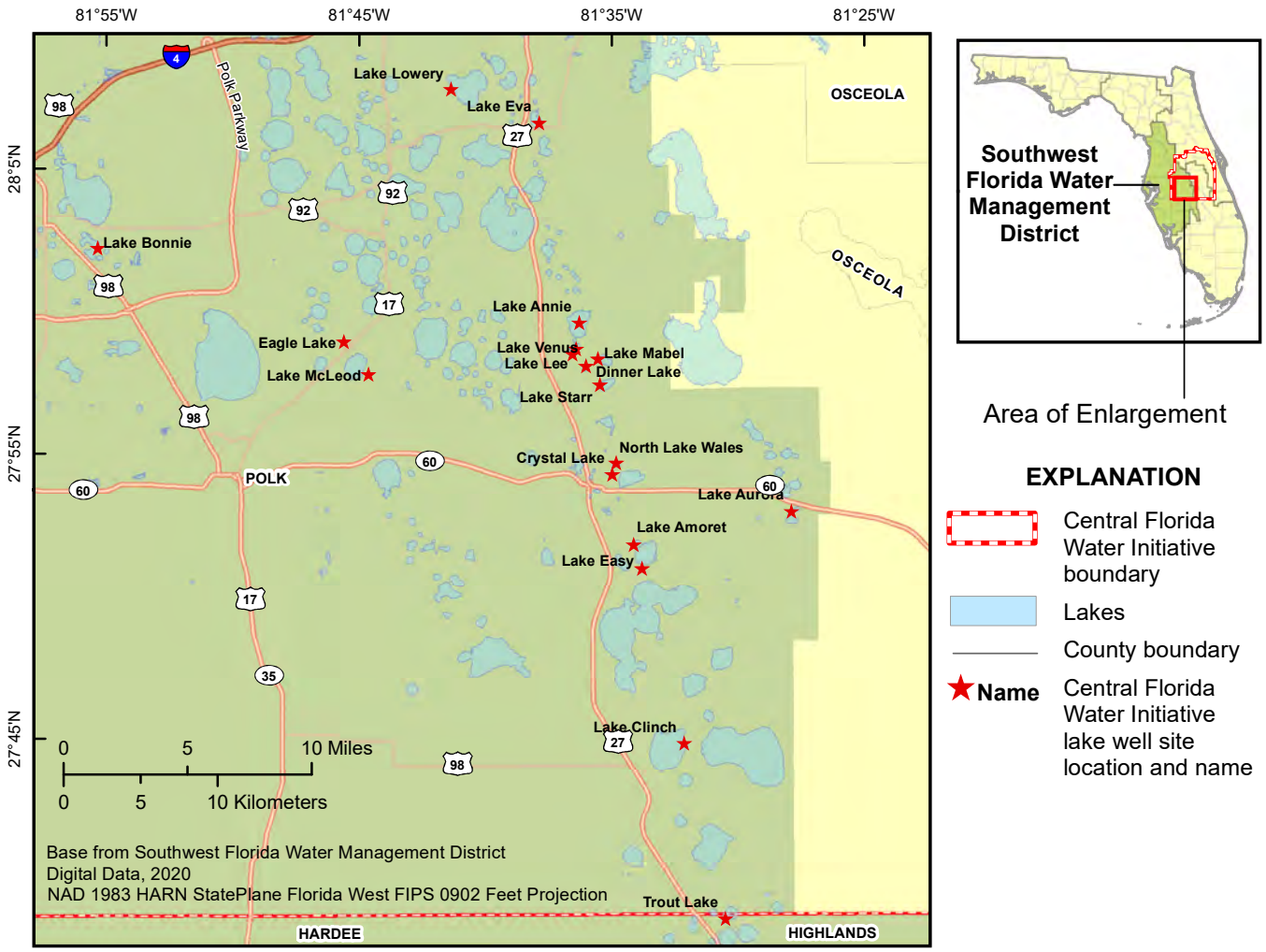


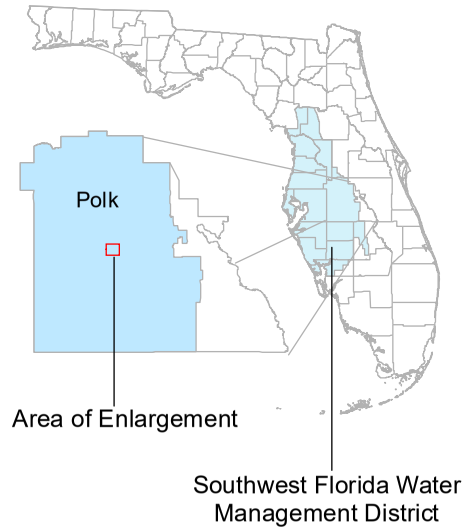
Figure 1. Central Florida Water Initiative minimum lake level well sites.

carrier. Starting on July 13, 2020, Suncoast used a 3-inch roller bit to drill a pilot hole at the surficial aquifer monitor well location from land surface to 3 feet bls. Suncoast performed continuous split-spoon sampling from 3 to 71 feet bls on July 13, and two-foot intervals for every 5 feet drilled from 83 to 123 feet bls from July 20 to July 21, 2020. The split-spoon sampler was advanced using a 140-pound hammer through 4.5-inch inside diameter hollow-stem augers, which acted as temporary casing and held the borehole open. Split-spoon sample collection ceased at 123 feet bls, where limestone was encountered, and the split-spoon sampler could not advance.

Lithologic sampling continued from 127 to 322 feet bls using the hydraulic-rotary core drilling method with drilling mud, HQ (3.06-inch internal diameter) steel coring rods, and the wireline retrieval method. The samples were boxed, labeled, described, photographed, and transported to the Florida Geological Survey (FGS) for further analysis and storage.

Well Construction

The Eagle Lake well site consists of two permanent monitor wells located on the permanent easement (fig. 3). Permanent monitor wells (Station Names *italicized* herein refer to table 1) were constructed in the surficial aquifer (*Surf Aq Monitor*) and the upper Floridan aquifer (*U Fldn Aq Monitor*). Monitor well construction at the Eagle Lake well site was completed by Mendez and Suncoast and supervised by District staff between July 13 and August 7, 2020. After construction of the *Surf Aq Monitor* and the *U Fldn Aq Monitor* wells were complete, 6-inch locking well covers were installed over the 4-inch polyvinyl chloride (PVC) casings and 2-feet by 2-feet by 4-inch concrete pads were installed around the well covers at land surface. A summary of the Eagle Lake well construction specifications are presented in table 1. The well as-built diagrams for the Eagle Lake *Surf Aq Monitor* well and Eagle Lake *U Fldn Aq Monitor* well are depicted in figures 4 and 5, respectively. Daily logs for exploratory core drilling and well construction operations are presented in appendix A. Additional well



EXPLANATION

Eagle Lake Well Site
Section/Township/Range: S12/T29S/R25E
Latitude: 27° 58' 28.94" N
Longitude: 81° 45' 47.51" W

Directions

From Interstate 4 in Lakeland, take exit 27 for Florida State Road 570 East towards Lakeland/Winter Haven for 14 miles. Take exit 14 for Florida State Road 540 E for 1.3 miles. Turn south onto Thornhill Road and continue for 3.5 miles. Thornhill Road will turn into Crystal Beach Road. Continue south on Crystal Beach Road for 0.8 miles. Crystal Beach Road will turn into West Crystal Beach Road. Continue for 0.4 miles on West Crystal Beach Road and the well site is located on the south side of the road, near the intersection of West Crystal Beach Road and US Highway-17.

Figure 2. Location of the Eagle Lake well site in Polk County, Florida.

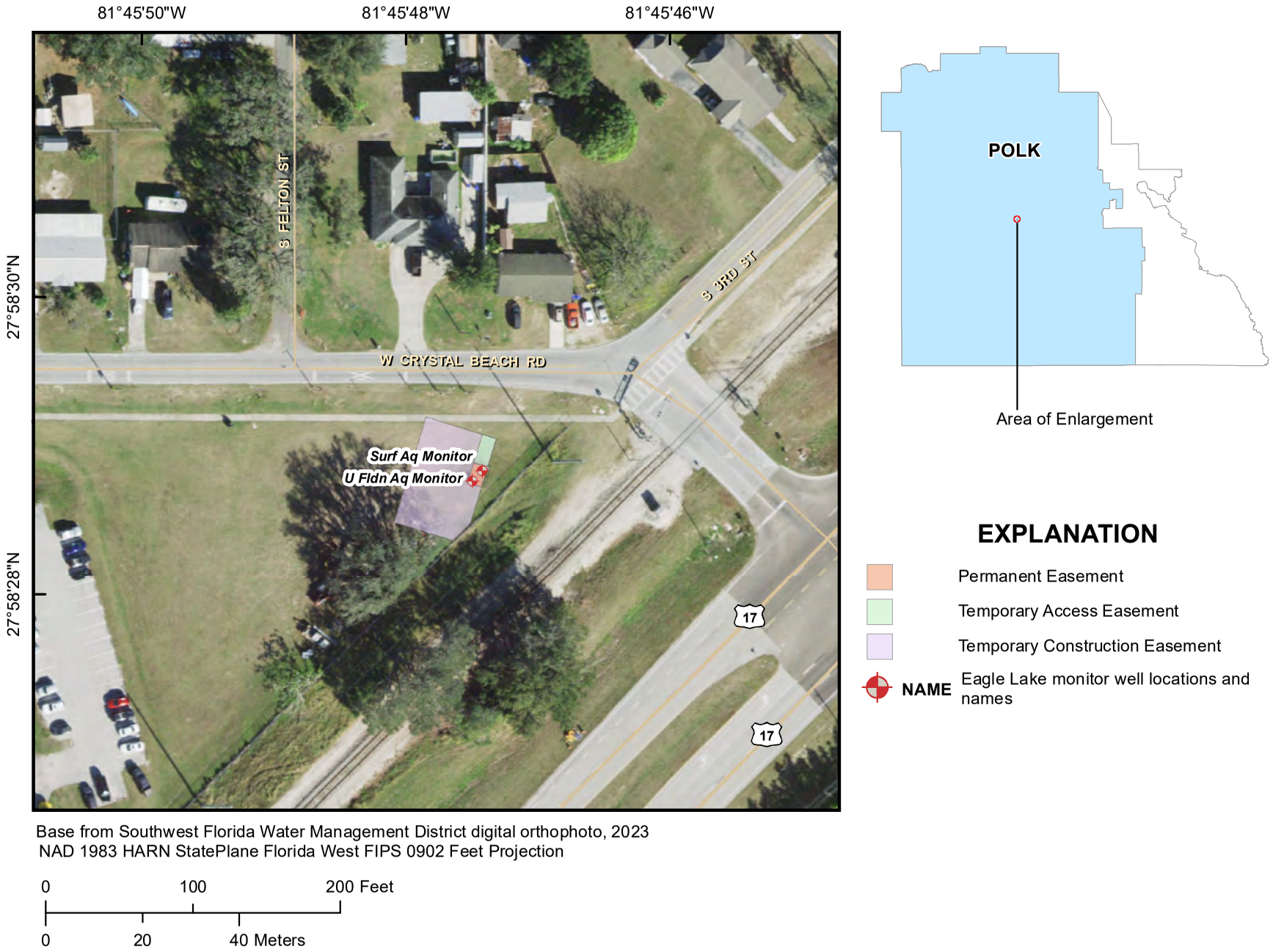


Figure 3. Well site layout for the Eagle Lake well site in Polk County, Florida.

construction details can be found in the District's EDP and the Geohydrologic Data Map Viewer. The groundwater level in each well was measured after well development using a Solinst electric water level meter. Each well has been surveyed, benchmarked, and equipped with pressure transducers for daily water level monitoring.

Surficial Aquifer Monitor Well

From July 13 to July 15, 2020, Suncoast constructed the *Surf Aq Monitor* well (Station Identification [SID] 943701) on the permanent easement using a Diedrich D-50 drill rig mounted on a Morooka track carrier. The exploratory core hole was converted into the *Surf Aq Monitor* well after exploration was complete. Suncoast used a custom-made 7 7/8-inch step bit to drill an 8-inch nominal hole from land surface to 72 feet bls. Four-inch, schedule 40, threaded, PVC screen (0.010-inch slot) was installed between 52 and 72 feet bls. Then, 4-inch schedule 40, threaded, PVC casing was installed from 3 feet above land surface (als) to 52 feet bls. No obstructions were encountered during the installation of the casing string and the contractor was able to rotate the casing freely prior to the casing seal. Eighteen bags of 20-30 silica sand filter pack were installed from 48 to 72 feet bls, a half bag of 30-65 silica sand filter pack was installed from 46 to 48 feet bls, and eight bags of Type II Portland cement grout were mixed and installed from land surface to 46 feet bls (table 1 and fig. 4). The well was developed for approximately 62 minutes at 3 gallons per minute (gpm). The specific capacity of the *Surf Aq Monitor* well was 0.2 gallons per minute per foot (gpm/ft). The *Surf Aq Monitor* well was intended to be used as a temporary water supply well during the *U Fldn Aq Monitor* well exploratory core drilling and construction but did not yield enough water. The contractor applied for and received a permit from the City of Eagle Lake to use a nearby fire hydrant to supply water for the exploratory core drilling and well construction of the *U Fldn Aq Monitor* well.

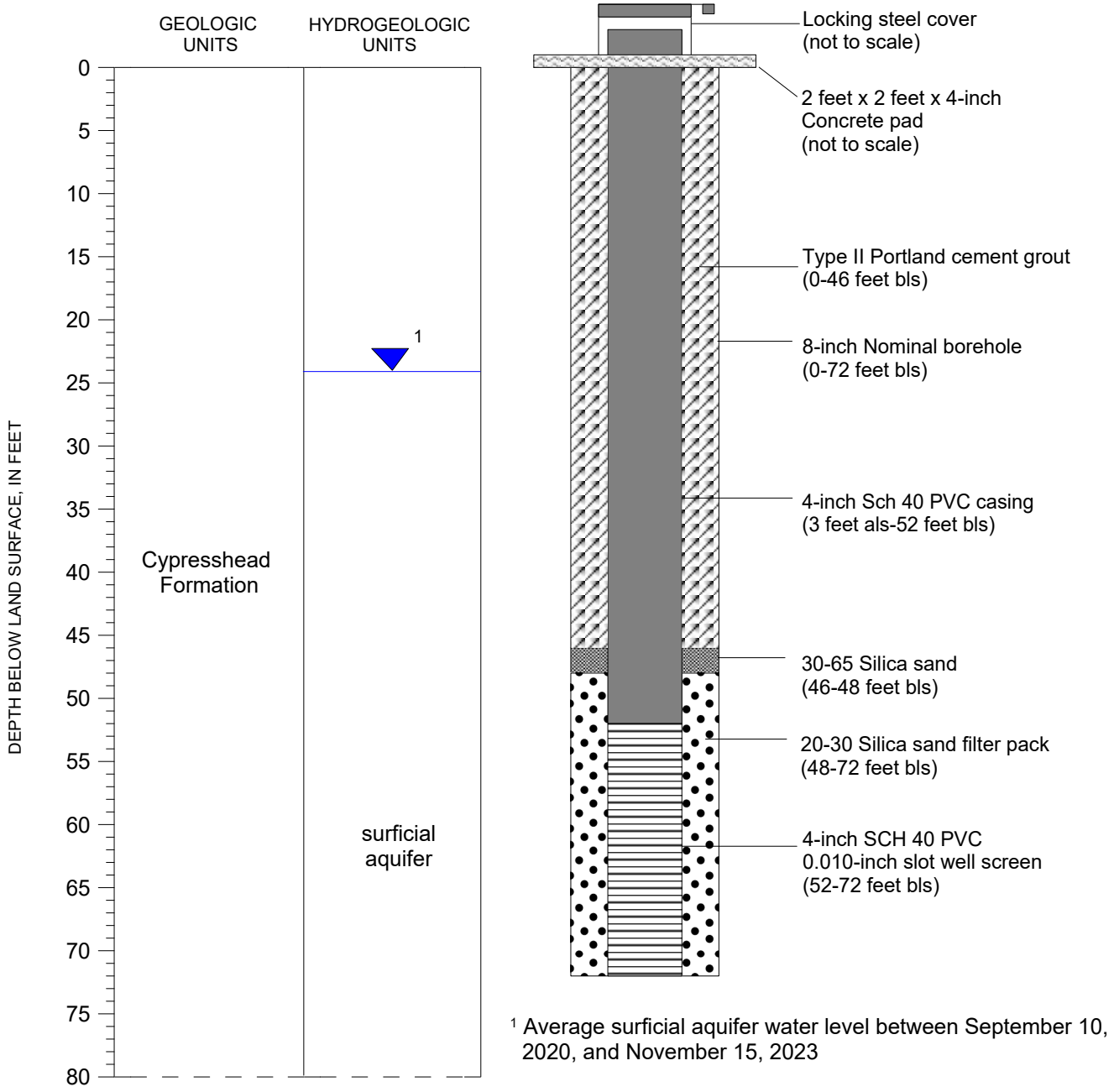
Upper Floridan Aquifer Monitor Well

The Eagle Lake *U Fldn Aq Monitor* well (SID 943702) was constructed from July 15 to August 7, 2020, on the permanent easement using a Failing 1250 drill rig mounted on a Kenworth tractor and a Diedrich D-50 drill rig mounted on a Morooka track carrier. Using the Failing 1250 drill rig, Mendez used a custom-made 17.5-inch stair step bit to drill from land surface to 82 feet bls. Twelve-inch schedule 40, PVC casing was solvent-welded and installed to 82 feet bls. During installation, Mendez had difficulty getting the 12-inch PVC casing past the silt and clay that was identified from 12 to 14 feet bls during drilling. Mendez used the split-spoon sampling hammer to advance the 12-inch surface casing to 82 feet bls. The surface casing was pressure grouted with Type II Portland cement grout from 82 feet bls to land surface. Mendez reamed the existing exploratory core hole with an 11 3/4-inch rock bit from 82 to 117 feet bls. During the installation of the solvent-welded 8-inch, schedule 40, PVC casing, Mendez had difficulty getting the casing past the clay layer identified at 89 feet bls during split-spoon sample collection. Mendez used the split-spoon sampling hammer to advance the PVC casing but was only able to advance it to 110 feet bls. The 8-inch PVC casing was pressure grouted from 110 feet bls to land surface using 34.5 bags of Portland Type II cement grout. Mendez used a 7 7/8-inch step bit to ream the exploratory core hole from 110 to 200 feet bls. A temporary 4-inch casing was installed from land surface to 200 feet bls and was hammered in an additional 5 feet into the formation to 205 feet bls to support the borehole wall during exploratory core drilling. After exploratory core drilling from 240 to 280 feet bls, the temporary 4-inch casing was removed, and Mendez reamed the exploratory core hole with a 7 7/8-inch step bit from 200 to 270 feet bls. On August 4, 2020, District staff ran the District-owned Century® 9165C caliper/gamma-ray geophysical tool from land surface to 272.4 feet bls to verify the total depth of the 8-inch intermediate casing and to estimate the grout volume for the final casing installation. Mendez installed a solvent-welded, 4-inch, schedule 40, PVC casing (containing two 4-inch by 8-inch cement packers at 267 and 269 feet bls surrounded with Visqueen streamers) from 3 feet als to 270

Table 1. Summary of well construction details at the Eagle Lake well site in Polk County, Florida

[SID, station identification; ft, feet; bls, below land surface; MM/DD/YYYY, month/day/year; No., number; U Fldn Aq, upper Floridan aquifer; Surf Aq, surficial aquifer; PVC, polyvinyl chloride; LLC, Limited Liability Company; Inc., Incorporated; WCP, well construction permit]

SID	Well Name	Open Interval (ft bls)	Casing Type	Casing Diameter (inches)	Constructed by	Start Date (MM/DD/YYYY)	Completion Date (MM/DD/YYYY)	Status	WCP No.
943701	Eagle Lake Surf Aq Monitor	52 - 72	PVC and PVC Screen	4	Suncoast Drilling, LLC	07/13/2020	07/14/2020	Active	890972
943702	Eagle Lake U Fldn Aq Monitor	270 - 322	PVC	4	Mendez Drilling, Inc.	07/15/2020	08/07/2020	Active	890970



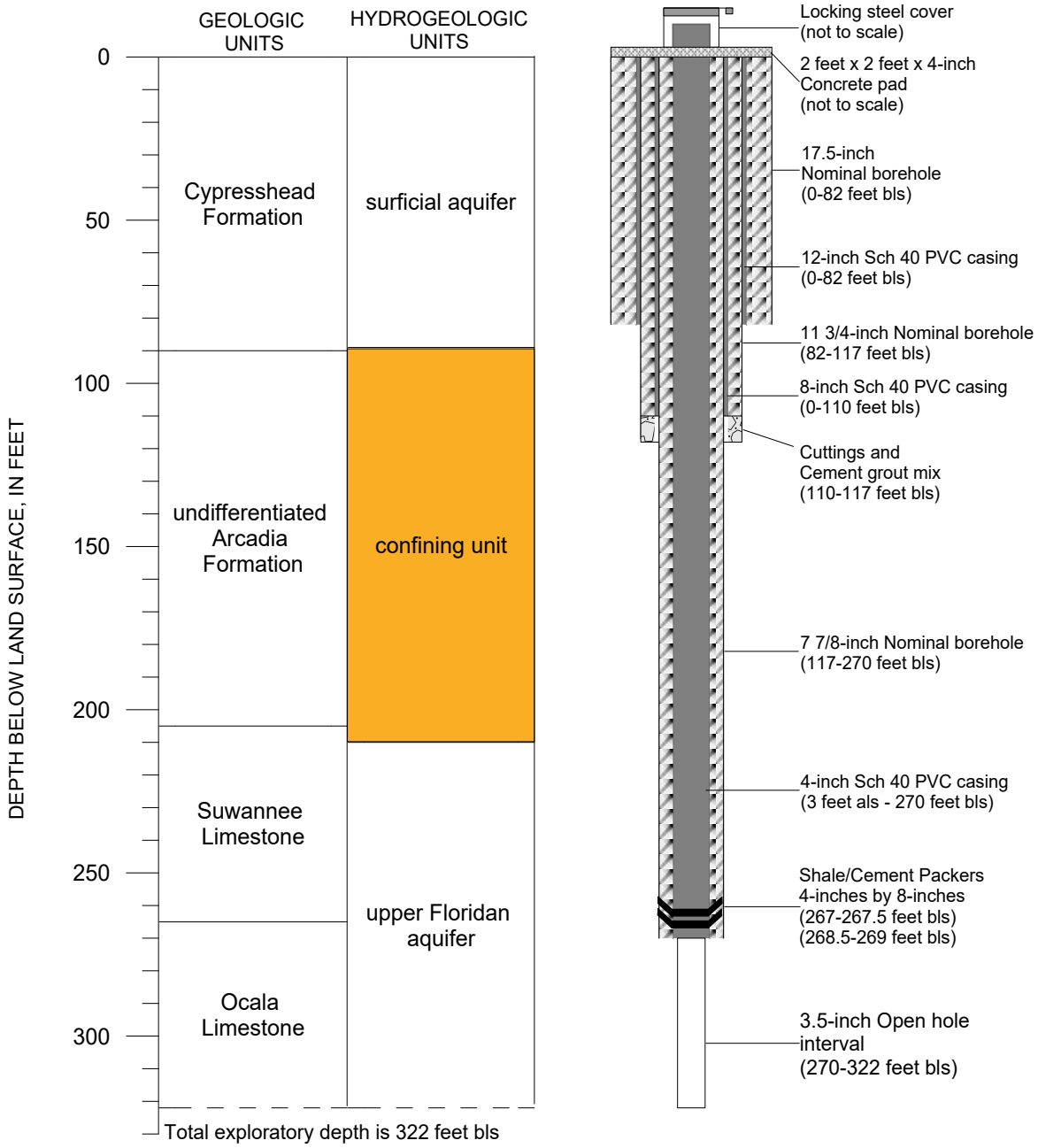
Well Name:	Eagle Lake Surf Aq Monitor
SID:	943701
WCP:	890972
S/T/R:	12/29/25
Latitude:	27 58' 28.94" N
Longitude:	81 45' 47.51 W
Reporting Category:	EAG2
Const. Began:	07/13/2020
Const. Complete:	07/15/2020

EXPLANATION

20-30 Sand	30-65 Sand
Cement grout	Locking steel cover
PVC casing	Concrete Pad
Screen	

[Surf, surficial; Aq, aquifer; SID, station identification; WCP, well construction permit; S/T/R, Section/Township/Range; Const., construction; PVC, polyvinyl chloride; SCH, schedule; als, above land surface; bls, below land surface]

Figure 4. Well as-built diagram for the *Surf Aq Monitor* at the Eagle Lake well site in Polk County, Florida.



Well Name:	Eagle Lake U Fldn Aq Monitor
SID:	943702
WCP:	890970
S/T/R:	12/29/25
Latitude:	27 58' 28.55" W
Longitude:	81 45' 47.61 N
Reporting Category:	EAG2
Const. Began:	07/15/2020
Const. Complete:	08/07/2020

EXPLANATION

- Open hole
- Concrete pad
- Cement grout
- Nominal borehole
- PVC casing
- Cuttings and Cement grout mix
- Locking steel cover

[U, upper; Fldn, Floridan; Aq, aquifer; SID, station identification; WCP, well construction permit; S/T/R, Section/Township/Range; Const., construction; bls; below land surface; als, above land surface]

Figure 5. Well as-built diagram for the *U Fldn Aq Monitor* at the Eagle Lake well site in Polk County, Florida.

feet bls. Exploratory core drilling continued through the 4-inch PVC casing from 280 to 322 feet bls to create the 3.5-inch open hole interval for the *U Fldn Aq Monitor* well. The final well construction specifications and details for the *U Fldn Aq Monitor* are in table 1 and figure 5. The well was developed for approximately 4 hours and 25 minutes at 7.5 gpm. The specific capacity of the *U Fldn Aq Monitor* well was 4 gpm/ft. After well completion, District staff performed a full suite of geophysical logs on August 10, 2020 (table 2 and fig. 8). During data collection using the 8144C multifunction tool, the tool became obstructed at 319.2 feet bls, preventing logging to a total depth of 322 feet bls. After the tool was brought to land surface, cuttings were found on the bottom of the tool, indicating the well was not properly developed. The 9074C caliper/gamma-ray and the 9511C induction tools collected data from land surface to 324.2 bls, and from land surface to 318.4 feet bls, respectively. Lastly, the well was video logged from land surface to 280.3 feet bls to confirm the integrity of the 4-inch casing after core drilling inside the casing from 270 feet to 322 feet bls.

Geology

The geology of the Eagle Lake well site is based on lithologic samples collected from split-spoon sampling from 3 to 123 feet bls and hydraulic rotary wireline core drilling from 127 to 322 feet bls. The geologic units encountered at the Eagle Lake well site include, in ascending order: the Ocala Limestone, the Suwannee Limestone, the undifferentiated Arcadia Formation, and the Cypresshead Formation. A stratigraphic column detailing the lithostratigraphy encountered at the well site is presented in figure 6. The lithologic log described in detail by the FGS is presented in appendix B. Digital photographs of the core samples are presented in appendix C.

At the Eagle Lake well site, the late Eocene Ocala Limestone extends from 265 feet bls to beyond the total depth of exploration of 322 feet bls. The contact between the Ocala Limestone and the overlying Suwannee Limestone is based on reduced core recovery and an increase in mudstone. The Ocala Limestone transitions from white to very light orange packstone to white mudstone with depth. Good to moderate induration was observed throughout the unit. Porosity is primarily intergranular, with moldic and vugular as secondary. Grain size is fine to very fine. General fossil molds and fragments include bryozoa, coral, and benthic foraminifera. Although the top of the Ocala Limestone was identified at 265 feet bls, *Lepidocyclina ocalana*, an index fossil of the Ocala Limestone, was not identified until 295 feet bls. From 295 to 300 feet bls, the formation becomes increasingly more fossiliferous. Very fine-grained mudstone dominates and *Lepidocyclina ocalana* is abundant. This combination may decrease effective porosity, increasing the normal resistivity shown in figure 8. Fossil fragments of the foraminifera *Nummulites ocalanus* were identified from 307 to 309 feet bls. The average core recovery in the Ocala Limestone was approximately 76 percent.

The Oligocene age Suwannee Limestone extends from 205 to 265 feet bls at the Eagle Lake well site. A decrease in phosphatic siliciclastics and lower gamma-ray activity demarcates the top of the Suwannee Limestone (fig. 7). The Suwannee Limestone transitions from white wackestone to very light gray grainstone with depth. The porosity is intergranular to pinpoint. Induration is moderate to good with calcilutite matrix throughout the formation. Mollusks including gastropods, and miliolids were the fossil fragments and molds identified within the Suwannee Limestone. Index fossils commonly found in the Suwannee Limestone were not identified at the Eagle Lake well site. The average core recovery in the Suwannee Limestone was approximately 52 percent.

The Miocene to Oligocene age undifferentiated Arcadia Formation extends from 90 to 205 feet bls at the Eagle Lake

Table 2. Summary of geophysical logs collected at the Eagle Lake well site in Polk County, Florida

[SID, station identification; MM/DD/YYYY, month/day/year; ft, feet; bls, below land surface; U Fldn Aq, upper Floridan aquifer; PVC, polyvinyl chloride; --, not applicable]

SID	Well Name	Date Logged (MM/DD/YYYY)	Logged Interval (ft bls)	Casing Type	Casing Depth (ft bls)	Casing Diameter (inches)	Tool Type	Tool Number
943702	Eagle Lake U Fldn Aq Monitor	08/04/2020	0 - 272.4	PVC	110	8	caliper/gamma-ray	9165C
943702	Eagle Lake U Fldn Aq Monitor	08/10/2020	0 - 324.2	PVC	270	4	caliper/gamma-ray	9074C
943702	Eagle Lake U Fldn Aq Monitor	08/10/2020	0 - 318.4	PVC	270	4	induction	9511C
943702	Eagle Lake U Fldn Aq Monitor	08/10/2020	0 - 319.2	PVC	270	4	multifunction	8144C
943702	Eagle Lake U Fldn Aq Monitor	08/10/2020	0 - 280.3	PVC	270	4	video camera	--

well site. Poorly indurated white to light gray sandy, phosphatic clay cap the formation from 90 to 110 feet bls. The top of the formation is also marked by an increase in gamma-ray activity, which is characteristic of the top of the undifferentiated Arcadia Formation (fig. 7). Well-indurated, yellowish gray mudstone containing phosphatic sand was identified from 113 to 150 feet bls. Large chert nodules (up to 6 centimeters in diameter) were identified between 140 and 142 feet bls. Beds of packstone, wackestone, and mudstone stratify the lower undifferentiated Arcadia Formation from 150 to 205 feet bls. The foraminifera *Sorites sp.* were identified intermittently from 150 to 170 feet bls. The porosity types observed in the undifferentiated Arcadia Formation were intergranular, moldic, vugular, and pinpoint. Grain size ranges from microcrystalline to fine. Mollusks including gastropods, benthic foraminifera, shark teeth, fossil fragments, and molds were identified within the undifferentiated Arcadia Formation. The average core recovery in the undifferentiated Arcadia Formation was approximately 85 percent.

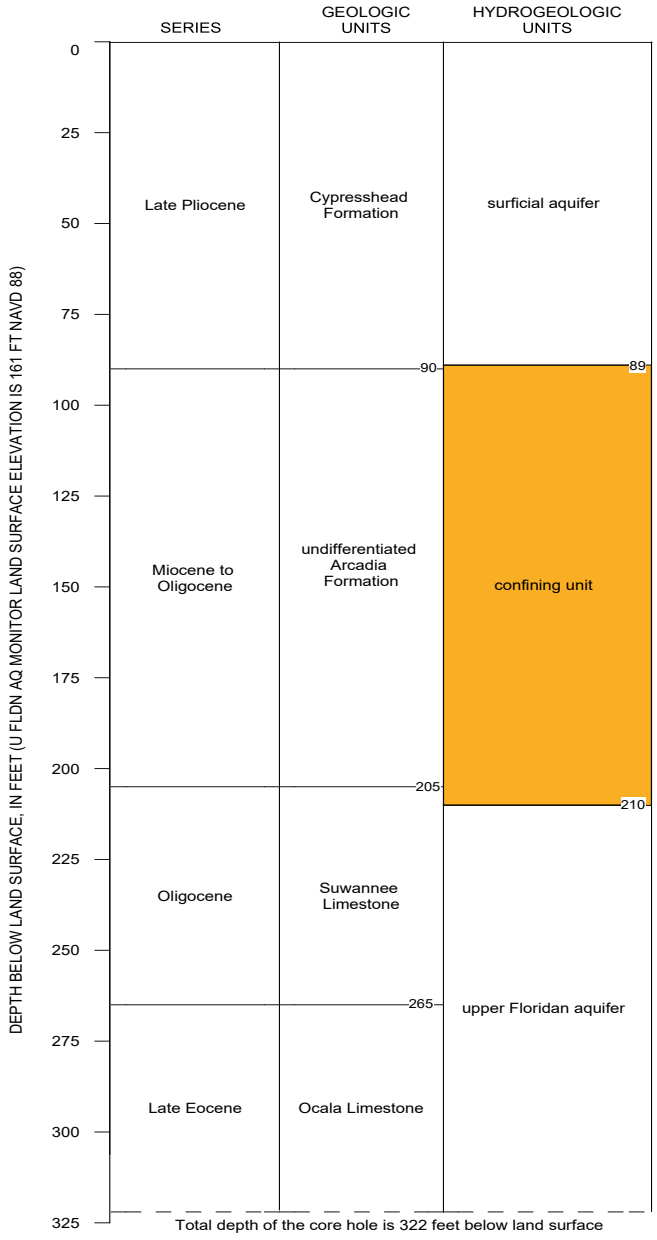


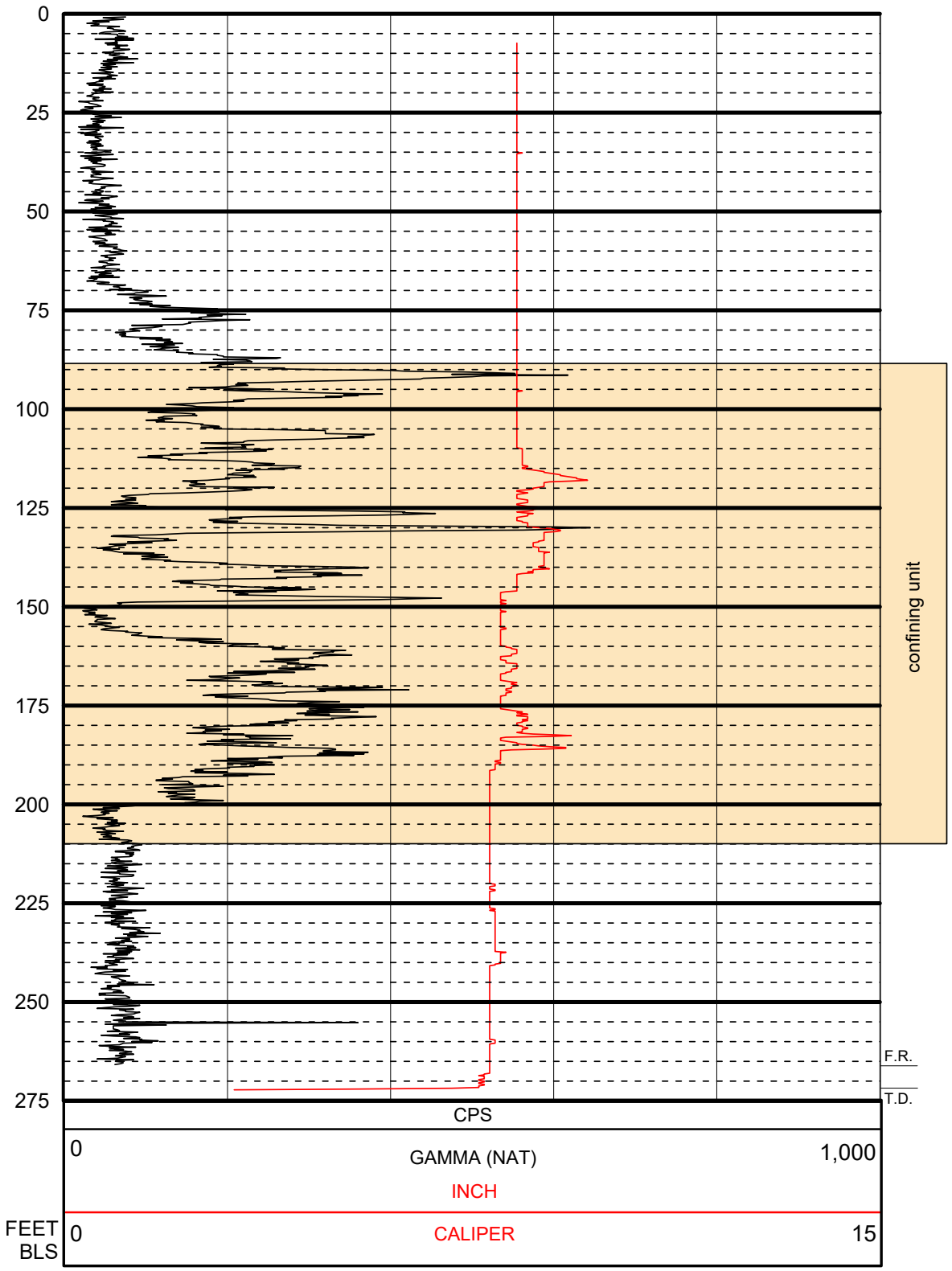
Figure 6. Stratigraphic column detailing the hydrogeologic setting at the Eagle Lake well site in Polk County, Florida.

The late Pliocene age Cypresshead Formation extends from land surface to 90 feet bls. This formation is entirely composed of non-fossiliferous, sub-angular to sub-rounded, medium sphericity sand at the Eagle Lake well site. The Cypresshead Formation is characteristically oxidized and mottled, exhibiting shades of red, orange, and white (Scott, 1988). From land surface to 27 feet bls, the sand transitions from fine to medium size grains and is grayish orange pink to very light orange. Samples containing 3 percent clay were identified from 3 to 11 feet bls. Organic material increases with depth, from less than 1 percent (from 3 to 47 feet bls) to 3 percent (from 47 to 71 feet bls). Heavy minerals are present from 39 to 59 feet bls.

Hydrogeology

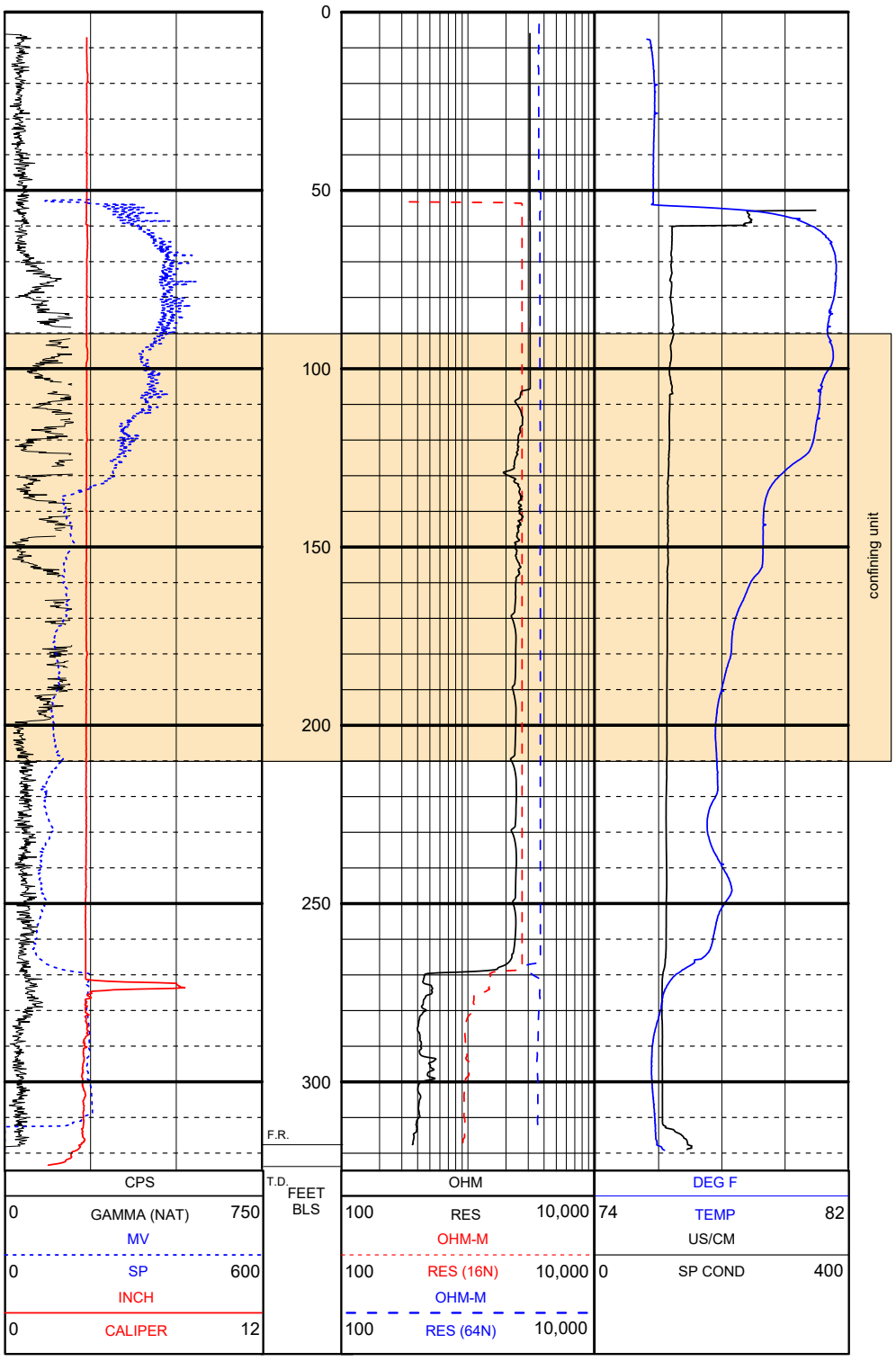
The hydrogeology of the Eagle Lake well site was delineated based on the lithology encountered during continuous split-spoon sampling and core sample collection, and comments made by the drilling contractor during core collection. Drilling mud was used during the split-spoon sampling and exploratory core drilling operation, which can disguise the amount of drilling fluid lost to the formation to estimate permeability. Two aquifers were identified at the Eagle Lake well site: the surficial aquifer and the upper Floridan aquifer. A confining unit separates the two aquifers (fig. 6). 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, 2021). A comparison of the nomenclature used in this report (District nomenclature that is not site-specific) and previously published reports is presented in appendix D.

The surficial aquifer is the uppermost hydraulic unit at the Eagle Lake well site and extends from the top of the water table to 89 feet bls. It is contained in the unconsolidated clastic deposits of the Cypresshead Formation. The water table was first encountered at approximately 50 feet bls during split-spoon sample collection. The split-spoon blow count was higher (average of 36 blow counts) in the vadose zone than below the top of the water table (average of 17.5 blow counts). The surficial aquifer is recharged by the precipitation that falls in this region, maintaining the water table between 13 and 28 feet bls (fig. 9). Long-term water level data in the surficial aquifer responds to significant rain events, such as Hurricane Elsa (July 7, 2021) and Hurricane Ian (September 28, 2022). Battery malfunction resulted in insufficient data gathering from January 27 to February 2, 2022. District staff replaced the pressure transducer and battery on February 2, 2022. From



[BLS, below land surface; CPS, counts per second; NAT, natural; F.R., first reading above the total depth a geophysical tool makes a measurement; T.D. total depth of well]

Figure 7. Geophysical log suite for the *U Fldn Aq Monitor* well from land surface to 272.4 feet bls conducted at the Eagle Lake well site in Polk County, Florida. The log was collected on August 4, 2020, using the 9165C (caliper/gamma-ray) tool. Eight-inch PVC casing was installed from land surface to 110 feet bls at the time of logging. The log scale is 2-inches per 75 feet and is linearly scaled. The FR is 265.8 feet bls.



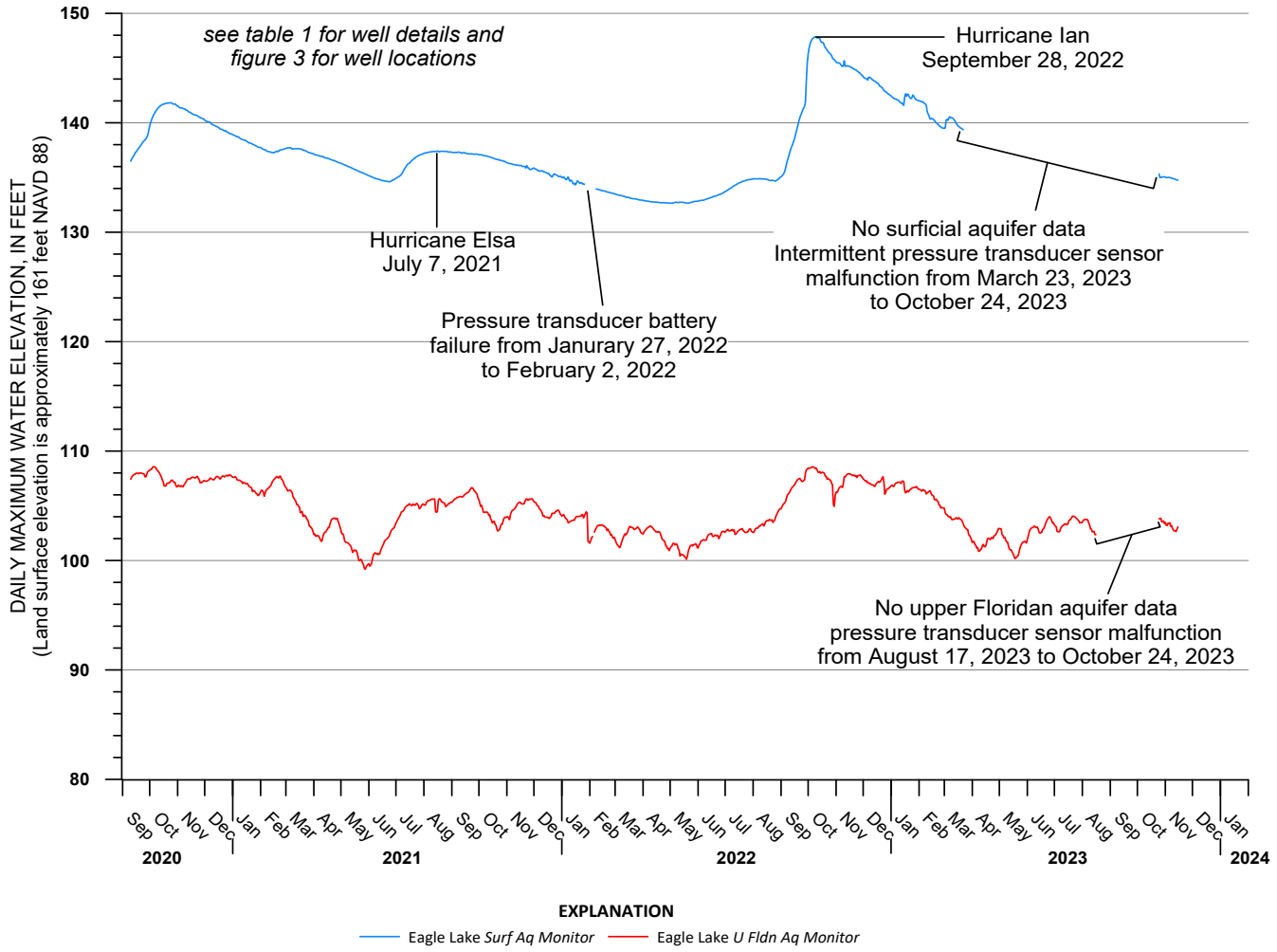
[CPS, counts per second; NAT, natural; MV, millivolt; SP, spontaneous potential; OHM-M, ohm-meter; RES, resistivity; DEG, degree; F, fahrenheit; TEMP, temperature; US/CM, microsiemens per centimeter; SP COND, specific conductance; F.R., first reading above the total depth a geophysical tool makes a measurement; T.D. total depth of well]

Figure 8. Geophysical log suite for the *U Fldn Aq Monitor* well from land surface to 324.2 feet bls conducted at the Eagle Lake well site in Polk County, Florida. The suite was collected on August 10, 2020, using the 8144C (multifunction) and 9074C (caliper/gamma-ray) tools. The tools were run inside a 4-inch Sch 40 PVC casing, set to 270 feet bls. The log scale is 1-inch per 50 feet. Tracks 1 and 3 are linearly scaled and track 2 is in logarithmic scale. The FR is 312.4 feet bls.

March 23, 2023, to October 24, 2023, the pressure transducer that was installed in the *Surf Aq Monitor* well malfunctioned intermittently, leading to errors in the water level data. On October 25, 2023, District staff replaced the surficial aquifer monitor well pressure transducer to mitigate the issue.

A confining unit was delineated from 89 to 210 feet bls in the low permeability, phosphatic clays, mudstones, and fossiliferous limestone of the undifferentiated Arcadia Formation and the top portion of the fossiliferous Suwannee Limestone. The confining unit is based on the lithologic characteristics of the core and the slow advancement of the split-spoon sampler from 90 to 127 feet bls. Many of the blow counts exceeded 50 blows per 6 inches of advancement because of the transition from sand to clay and mudstone with depth. The confining unit separates the surficial aquifer from the underlying upper Floridan aquifer.

The upper Floridan aquifer extends from 210 feet bls to beyond the total depth of exploration at 322 feet bls. The upper Floridan aquifer is contained in the Suwannee and Ocala Limestones at the Eagle Lake well site. The top of the upper Floridan aquifer is consistent with the isopach map completed by Miller (1986), which estimates the top at approximately -50 feet NAVD 88 (211 feet bls). The top of the upper Floridan aquifer was chosen at the depth drilling fluid circulation loss began. Complete loss of circulation was noted at 237 feet bls. Groundwater level data have been collected from the *Surf Aq Monitor* and the *U Fldn Aq Monitor* wells since September 10, 2020 (fig. 9). From August 17, 2023, to October 24, 2023, the pressure transducer in the *U Fldn Aq Monitor* malfunctioned, causing erroneous data, and was replaced on October 25, 2023. A comparison between the *Surf Aq Monitor* water levels and the *U Fldn Aq Monitor* water levels indicates a downward, recharging head gradient from the surficial aquifer to the upper Floridan aquifer, with an average head difference of 33.5 feet from September 10, 2020, to February 20, 2023.



[NAVD 88, North American Vertical Datum of 1988; Surf, surficial; U Fldn, upper Floridan; Aq, aquifer]

Figure 9. Hydrograph of the permanent monitor wells at the Eagle Lake well site in Polk County, Florida.

Summary

Two monitor wells were constructed at the Eagle Lake well site in Polk County, Florida. The Eagle Lake *Surf Aq Monitor* was completed on July 15, 2020, and the Eagle Lake *U Fldn Aq Monitor* was completed on August 7, 2020. The wells were constructed as part of the CFWI to monitor groundwater levels in the surficial and upper Floridan aquifers near Eagle Lake. The *Surf Aq Monitor* well has a casing depth of 52 feet bls and a total depth of 72 feet bls, and the *U Fldn Aq Monitor* well has a casing depth of 270 feet bls and a total depth of 322 feet bls. Both wells are secured with lockable metal well covers. As of September 10, 2020, long-term water levels of the *Surf Aq Monitor* and the *U Fldn Aq Monitor* wells have been collected at one-hour intervals.

Prior to well construction, the geology and hydrogeology of the well site were determined using split-spoon and core samples from land surface to 322 feet bls. The geologic units encountered at the well site are: the Ocala Limestone from 265 feet bls to beyond the total depth of exploration at 322 feet bls, the Suwannee Limestone from 205 to 265 feet bls, the undifferentiated Arcadia Formation from 90 to 205 feet bls, and the Cypresshead Formation from land surface to 90 feet bls. The hydrogeologic units encountered at the well site are: the surficial aquifer from the water table to 89 feet bls, a confining unit from 89 to 210 feet bls, and the upper Floridan aquifer from 210 feet bls to beyond the depth of exploration of 322 feet bls.

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Appendix A. Scanned Daily Drilling Logs Taken During Well Construction at the Eagle Lake Well Site in Polk County, Florida

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
1	K Mallams	6/10/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez				

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
1000	1200		K Mallams arrive on site. Chris T, Clinton S + Jay M. are already on site. Frank Myszewski from Florida Midland Railroad just arrived. Tony Hudson, Delia Mendez + Roy ? arrived shortly after us (10 min). We also met the Principle (Connie Loutzenhiser) + the Assistant Principle (Brad Hardesty) ~~out of the site~~ and Dwight Marsh (Grounds Manager) of the Elementary School on site.
			Discussed the Project w/ everyone so everyone knew what we were doing. Connie L. + Brad H. mentioned the Kids may come back to school 8/10, so if we are still constructing the wells, then we will have to check into the office everyday. If there are no Kids @ the school (like during the Summer time) then we just need to wear our badges or have ID on us.
			We found all the pins for the temp construction easement, the Permant + Entry easement will need to put up temp Fence around site per the Principle's request. Chris uses USA Fence.
			Need to Call TECO for overhead lines above Sidewalk. They are close to where the Derek will be. Possibly get them to Install Boots or decommission those lines temp.
			Called TECO order # 22602163
			* 48-72 hrs to be assigned to a Field Tech. Field tech will Call Me.

District Representative		Contra Represe	

REGIONAL RAIL, LLC
Florida Central Railroad
Florida Midland Railroad
Florida Northern Railroad
Frank Myszewski
Roadmaster
3001 West Orange Ave
Apopka, FL 32703
fmyszewski@fcrr.com
Office: 407 880 8500 x1115
Mobile: 407 466 0806
www.regional-rail.com

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
2.0	K Mallams	7/13/2020	06/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Matt Herron, Roy, Chance	35'	90	90

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement Surf Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
			District 50 lb Split Spoon Used
900			CT arrived Mounted on Mobile Track
920			KM arrived.
			Discussed where we want to put the first SA well on the permanent easement. Put on NE Corner
945			Mass up
			N ↑ [•] ← SA well
1015			Mixing Mud - 1/2 bag
		0-3	Drill
		3-5	Split spoon (1, 1, 1, 3) Continuous split spoon from 3'-71'
		~~5-7~~	~~Drill~~
1020		~~5-7~~	Split Spoon (8, 16, 19, 16) 59
		~~7-9~~	Split Spoon (12, 14, 16, 17) 59
1035		9-11	Split Spoon (11, 10, 12, 11) 44
		11-13	Split Spoon (9, 9, ~~11~~, 13) 42
		13-15	Split spoon (7, 6, 7, 7) 27
		15-17	Split Spoon (7, 7, 8, 9) 31
		17-19	Split Spoon (7, 7, 7, 9) 30
		19-21	Split Spoon (8, 8, 14, 16) 46
		21-23	Split Spoon (11, 10, 16, 20) 57
		23-25	Split spoon (13 11 11 10) 45
1110		25-27	Split Spoon (6, 6, 7, 9) 28
		27-29	Split Spoon (6, 6, 8, 9) 29
		29-31	Split Spoon (6, 6, 8, 10) 30
		31-33	Split Spoon (7, 9, 9, 11) 36
		33-35	Split Spoon (6, 7, 9, 9) 31
1147		35-37	Split Spoon (6, 6, 8, 8) 28
		37-39	Split Spoon (5, 8, 9, 12) 34
1204		39-41	Split Spoon (9, 12, 18, 18) 57
		41-43	Split Spoon (8, 9, 10, 12) 39

District Representative		Contractor Representative	

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
2.1	K. Mallams	7/13	06/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Matt Heron, Roy, Chance	35	90	90

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement Surf Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
1215		43-45	Split Spoon (6, 6, 7, 9) 28
		45-47	Split Spoon (5 4 5 7) 21
		47-49	Split Spoon (4, 3, 4, 4) 15
		49-51	Split Spoon (2, 3, 3 4) 12 WL. 49'-51'
		51-53	Split Spoon (2, 3, 4, 6) 15
1300		53-55	Split Spoon (3, 3, 4, 6) 16
		55-57	Split Spoon (3, 3, 4, 6) 16
		57-59	Split Spoon (2, 3, 4, 6) 15
		59-61	Split Spoon (2, 3, 4, 5) 14
		61-63	Split Spoon (2, 1, 5, 6) 14
		63-65	Split Spoon (3, 2, 5, 7) 17
		65-67	Split Spoon (4, 5, 5, 9) 23
1415			Dumpster Arrived
		67-69	Split Spoon (3, 6, 8, 9) 26
1450		69-71	Split Spoon (3, 4, 7, 7) 21
			Proposed well diagram Blank +3 to 51' bls.
			10 slot screen 51 to 71' bls
1500		71-73	Drill
1505		73-75	Split Spoon (3, 3, 5, 6) 17 → non continuous SS 73-
		75-78	Drill (5, 3, 4, 8) 20
1520		[illegible]	Drillers went to get Selant to pump mud into Dumpster
		78-80	Split Spoon
		83-85	(2, 2, 6, 10) 20
		88-90	6, 50-3" Stop
			KDM leave - 1600
			CS - Drillers left 2 open

District Representative		Contractor Representative	

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
3.0	K Mallams	7/14/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez Drilling	Matt Herron, Roy, Chance	~~70~~	72'	72'

WELL SITE NUM-NAME	Eagle Lake Replacement ~~Monitor~~	WELL NAME/ID	Eagle Lake Replacement Surf Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS SA Construction
~~700~~			~~CS~~ CS arrived
730			Drillers arrived
830		~~0-5~~	Begin drilling 8" nominal hole
		~~5-10~~	
900		~~10-15~~	KDM arrived
		13.5-18.5	Drill
0930			CS Checking mud weight 9 lbs/ft - CS is keeping track of mud data
0930	0938	18.5-23.5	Drill
0940		23.5-28.5	Drill
0947	0955	28.5-33.5	Drill
0959	1003	33.5-38.5	Drill
1008		38.5-43.5	Drill
1016	1020	43.5-48.5	Drill
		48.5-53.5	Drill
1024		53.5-58.5	Drill
1041	~~1050~~	58.5-63.5	Drill
1050	1056	63.5-~~68.5~~	Drill
1057	1100	68.5-~~70~~72	Drill Adding mud ½ bag - got down to 72'
1100			Circulating hole
1115	1124		Tripping out Rods
			Trimmie pipe in 68' total = 5 Crew together
1150			Flushing well w/ Fresh water
			PVC in Screen - 10 ft section - 11 lock in - screw together
			Blank - 5 ft section - 11
			10 ft Section - 1111
			15 ft Section - 1 ← welded together 5 ft
			* ~~Coupling~~ Coupling between last 10 ft + 15 Ft section
			PVC Casing went down to bottom Freely
			Bags of Sand - ~~18~~ ← Calculated 12 bags for Annulus
			Bags of 30/65 - ½ bags

District Representative		Contractor Representative	

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
3.1	JCMallams	7/14/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson, Matt Herron, Roy Chance			

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement Sur Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
			Driller told us the sand came up to ~~48'~~ 46'
1310			Preparing grout Total bags - 8 bags 14.5 lbs/ft
1342			Grout came to surface
1400			Site Clean up
1435			Drillers + JCM off site
			CS staying

District Representative		Contractor Representative	

75.2
3'1"
9:00
WL - 27.9'

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
4	K McNams	7/15/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson, Matt Herron, Roy Chunde	280'	10	10

25 sec per ft

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement UFldn Ag Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
700			CS arrived
845			KM arrived w/ Failing 1250 on Kenworth tractor Rig
			CT + KM tagged bottom of SA well - 75.2' Stick up 3.08'
			72.12' TD
900			Mendez arrived
			W.L.= 27.9' bls
920			Position Rig over hole
0950			Mast up
0950			On SA well grout 5' bls → Mixing grout + pouring into
			Annulus to bring to surface - used 1/2 bag
			Site Prep
1052			Start pumping SA well - using 10 gpm - pumping ~5 gpm
			Well went dry after pumping a while - turned pump off
			Calculated recovery 25 sec/Ft w/ in well
1130			Mendez called Eagle Lake Utilities to see if ~~he~~ they can
			put a meter on Fire hydrant for water supply. Mendez
			went down to Fill out Application
1200			Mixing Mud in Mud tub
1230	~~1400~~ 1400		Lunch -
1400	1445		Waiting on Eagle Lake Utilities to install a meter on the
			Fire hydrant for water Supply well. Tony went to get a hose
1445			Meter Installation
1505			Check W.L in SA = 31' bTOC = ~28' bls ← Static W.L
1515			Turn SA pump on + hydrant valve on to Fill tank (4,000 gal)
			Pump Capacity of SA pump = 1 min 15 sec = ~~155 sec~~ 75 sec
			Recovery W.L =
			Retook Pump Capacity - lowered H_2O pressure = 1 min 20 sec = 80 sec
1530			Begin drilling w/ 17.5" stair step bit Add 1/2 bag mud
1545			KDM leave - CS stays @ site. Thunderstorm @ 1630 - drilled to 10' bls

District Representative		Contractor Representative	

Drill bit + 2 ft extension = 3.5 ft

WL 30.97 ft TOC

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
5	K Mallams	7/17/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson, Matt Herron, Roy Chance	280	70	80'

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement U Fldn Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
845			KM on site - Mendez already drilling w/ Failing 1250 SA W.L. 30.97' btoc 27.89' bLS
700			CS showed up
715	730		Mendez arrived 32.02
845	1057	15-22	Drilling - 17½ stair step bit Added Quick Trol to Mud
1040			~~Waiting pad~~ preparing ground near SA well for pad. Install pad/box
1057	1130		Circulating
1140	1346	22-42	Drill
1200	~~1346~~		Adding Mud
1346		*	Circulating
1400	1600	42-62	Drill 43 ft → hit Cemented Sands
@1605			Added Quick Trol to Mud to lighten it up
			Circulating
1615			KM off site
			CS Stays, Contractors Keep working
			*Clinton noted they got down to 80'!

District Representative		Contractor Representative	

WL 7:30
30.95'
Top of Casing

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
4	K Mallams	7/17/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson, Rory	280	2'	82

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement UFA Monitor Construction

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
0900			KDM on site
0700			CS on site
0715			Mendez on site
0730			Dumpster Co on site to pick up full dumpster. Dumpster Co spilled
			some Sand & Fluid on ground. Tony is planning to bring bob
			Cat to site to clean up
900	1005	80-82	Bit has not advanced since last night. Drilled down to
			80' last night until dark (6:45)
930			Looked @ Cuttings - Phosphate, quartz Sand + Limestone @
0950			Added Mud
1005			Preparing to pressure grout 12" PVC Casing in - gluing 20' PVC Pipe together.
1030	1044		Tripping pipe
1050			Cutting 12" PVC Casing - Shoe @ bottom
1100	1240		Installing 12" PVC Pipe - PVC is getting jammed up @ clay layer ↑ using Hammer to get past Clay (14016)
			20' PVC pipe in = 1111 + 3.2' piece
1240			Preparing to Pressure Grout
			1" PVC Pipe down middle of 12" to 70' bls
1320			Pumping Mud down
1400	1440		Begin Mixing Cement No of Bags - 20 weigh Cement = 13.2 lbs/Ft
			Add 2 bag weigh Grout = 13.5 lbs/Ft
			weigh again = 13.9 lbs/Ft = Good --
1440			Pumping grout down ~300 gals
			Cap leaked a bit -
			Added Chase water down
			Begin Mixing Grout - 2nd batch - No of bags - 19 weight 14.0 lbs/Ft
1540			Pumping grout down - Grout Came to surface ~600 gal for 2nd batch
1545			KDM off site CS & Mendez remain @ site

District Representative		Contractor Representative	

W.L.
30.81'
TOC

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
7	K Malkms	7/20/2020	4/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson, Matt Herron, Roy Chance	280	33'	115

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement UFA Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
730			CS on site
900			Mendez on site
910			KM on site
930			Moving Failing 1250 off hole - Cutting Top 12" PVC off
945			Moving Detrict 50 Rig on hole -
			Tagged inside of 12" @ 75' → 7' of grout inside hole
			Drill through grout - ~~75-85~~ using 3 7/8 drill bit - tri-cone
1015			Mast up & tripping in Rods
			Mixing Mud
1055	1115	75-83	Drilling
1120		~~80-85~~	Trip Rods out
1145		83-85	Split Spoon - (2, 3, 10, 14) 29" *using Manual 140lb hammer
	1210	85-88	Drill
		88-90	Split Spoon - (8, 24, 44, 47) 123 total
1300		90-92	Split Spoon (8, 19, 50-4") hit refusal
1320	1343	92-98	Drill * Collected Cutting Sample - Gray chert + phosphate @ 94'6"s
1400	1500		Weather delay - Thunderstorm - Lunch
			Tripping rods
1515		98-98.1	Split Spoon - (50 blows-1") Refusal
1530	1600	98.1-103	Drill
1615			KDM off Site
			Notes from Clinton Smith
		103-105	Split Spoon (31, 48, 50 (3½"))
		108-110	Split Spoon (87, 50 (6"))
		113-115	Split Spoon (24, 25, 50 (5"))

District Representative		Contractor Representative	

W.L. - 30.78' ~~A~~TOC

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
8	K Mallams	7/21/2020	4/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez Drilling	Tony Hudson, Matt Herron, Roy Chance	280	12'	127'

WELL SITE NUM-NAME		WELL NAME/ID	
	Eagle Lake Replacement		Eagle Lake Replacement UFldn Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
0830			KDM on site
			Talked w/ Tony - got down to 115' yesterday. Will
			ream hole now down to 110' to set temp 4" Casing.
			Then will drill down to 118' + split spoon From
			118'-120'. Keep split spooning down till we hit
			limestone. Tony is going to go to home depot right
			now to Find something to stabelize the 4" @ temp Casing
			in 12" PVC Casing
0900	1045	82-107'	Ream out pilot hole w/ 4" bit (tri-cone)
1050	1125	WSI to ~~110~~ 108'	Install temp Casing (4") - Hammer in Last 3 ft (107 - ~~110~~ 108) - 10 ft sections
1145			Drive temp Casing From 107' - ~~110~~ 108'
1150			Installing wooden 'stabelizer' on 12" PVC - See backe for diagram
1220			Trip in Rods - ~~Started~~ @ 100' - had to drill out cuttings
1253	1305	115-118'	Drill / Ream hole
1320		118-~~118.8~~	Split Spoon - (50, 50" blows-4") Refusal
	1400	118.8-123	Drill
		123-123.1	Split Spoon - (100 blows-1") Refusal
1430	1500	123.1-~~128~~ 127	Drill *hard Formation @ 125' - ~~125~~ 127' cuttings indicate dolostone
			Going to Core - wireline Coring - 5 ft Core Runs
1520	1530		Cleaning Mud out of hole - 1" PVC pipe down hole + ~~A~~ Flush out mud
1600			KDM leave site
			CS Stays to collect Core

District Representative		Contractor Representative	

Print Audit Form -

9:38
150-155
WL-30.78

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
9	K Mallams	7/22/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mondez Drilling	Tony Hudson, Matt Herron, Roy Chance	280	73'	200'

WELL SITE NUM-NAME	Eagle Lake ~~Elem~~ Replacement	WELL NAME/ID	Eagle Lake Replacement U Fldn Ag Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
845			KDM on site
			Worked until 645 last night -
			reamed ~~Hole~~ From
			Cored From 127' to 140'
	8:50	145-150	Core
	9:33	150-155	Core
9:48	1007	155-160	Core
1020	1046	160-165	Core
1100	1135	165-170	Core
1145	1330		Rain delay - Lunch
1330			Fix a pump seal on Rig - Rain Continues (light rain)
1400	~~1430~~ 1452	170-175	Core - clogged up 2-174 - needed to go back down to retrieve 1 ft
1500	1520	175-180	Core
1525	1600	180-185	Core
			KDM leave
			Notes from Clinton:
			180-185 20 min
			185-190 45 min 1600-1700
			190-195 15 min 1700-1715
			195-200 20 min 1740-1800

District Representative		Contractor Representative	

4-430 175-185 930 and 200-220
430-5 190-195
5-520 185-190

W.L.- 30.71

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
10	KMallams	7/23/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez Drilling	Tony Hudson, Matt Heron, Rory Chance	280	40'	240

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement UFLdn Aq

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
845			KDM arrive
	850	205-210	Core
0857	0910	210-215	Core No change in head pressure - Ø sand yet
0935	0940	215-220	Core
0952	1000	220-225	Core Formation is starting to take on more H2O @ 220'
1015		225-230	Core
1055	1115	230-235	Core
1135	1150	235-240	Core 237' change in H2O pressure - loss of Circulation @ 237' -> no return
11:50	1315		Rain delay/Lunch
1320	1415		Tripping out Core Rods - going to Set 8" Casing to Stabelize the hole - will go back to coring once 8" is set
			Going to ~~pour~~ Pea gravel down hole From 240-210 to Isolate loss of Circulation zone. Then he will start drilling the 12" nominal hole For the 8" - propose depth of 8" = 130 ish
1330			Mixing Mud for ~~drilling~~ getting Core Rods out - Shrink
1420			Putting Pea gravel down hole - #9 size 16 bags
1515	1545		removing temp Casing
1350			KDM off site

District Representative		Contractor Representative	

W.L.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
11	K Mallams	7/27/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson, Roy, Chance	280	—	240

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement U Fldn Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
845			KDM on site - CS + Mendez already on site
			Mendez Cleaning up spill from dumpster folks.
			- Mendez got down to 80' on Friday w/ 12" bit
0945			Mixing Mud - preparing to ~~duct~~ Ream hole from 80' to 115'
0950	1120	80-~~115~~100	Ream hole w/ ~~12"~~ bit 11 3/4"
1120			Circulate
1140	1350	100-117	Ream hole w/ 11 3/4" bit
1415			Port-o-let guy Finally Came out to clean port-o-let, Ulmet
			Services has not come out since they delivered on 7/9/2020.
1350			Circulating mud trying to get the mud cake thickness down
1500			Thunderstorm delay - Tripped ~~8~~ Most rods out of hole before
			Storm hit
1555			KDM leave site - Still raining
			CS + drillers still here - Still want to install 8" PVC
			Casing from L.S. to 117' bls - last checked, wall cake
			was still too thick
			- Dumpster was full - could not pump old mud w/
			Clay into it to make new mud. Wait until tomorrow when
			dumpster people will trade out dumpsters to refresh mud.
			- CS said because storm moved not let up, Contractors
			were off site @ 4:30 ~~yesterday~~

District Representative		Contractor Representative	

W.L.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
12	K Mallams	4/28/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tom Hudson, Ray & Chance	280	–	240

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement UFldn Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
830			KDM onsite
			CS + Contractors on site – dumpster trade out ~~occured~~ occured.
845			Mix new batch of Mud – Circulating mud through hole
900	1030		EDP Training – KDM in trailer
			Tripping Rods
1000	1045	LS-117'	Installing 8" PVC – Solvent welded – PVC is getting stuck @ clay layer (89'-117') – the Contractor just wiggles the PVC to get it unstuck using 140 lb hammer to get past clay layer
1100			Preparing to pressure grout 8" PVC Casing in 1" PVC down to 110'
1145			Mixing grout – 1st batch
			# of Bags used – ~~X~~ 20.5 ~~Estimated bags=31~~
			300 gal tub 14.0 lbs/Ft
			Pressure on gauge is 20 psi – on PVC Cap
1238			Mixing Grout – 2nd batch
			# of bags used – 14 bags ~~#~~ 14 lbs/Ft ~200gal
1310			Pumping grout (Pressure Grout) – grout came up to surface after ~~300~~ 100 gal
			Hose got clogged – had to take hose off PVC Cap to unclog it. May have more grout in Casing than expected tomorrow
			Ran clean water down – 18 gallons
1330			Cleaning up site – Mendez said he's going to come back here in a couple hrs to remove PVC Cap
1400			KDM off site

District Representative		Contractor Representative	

W.L.-

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
13	K Mallams	7/29/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson, Matt Herron, Roy Chance	280	-	240

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement U Flda Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
845			KDM on site
730			Mendez arrives
			Tag-Annulus- land surface
			Tag-In 8" PVC - 117' @ bottom of 8" Casing
			Mixing Mud to drill out Cement & go down to either 200' or 240'
920	0950	117-120	Drill
1000	1235	120-140	Drill
1245	1500	140-160	Drill
1515		160-180	Drill
1545			KDM off site
			CS + drillers stay on site - Mendez wants to drill until dark or until he reaches 200 ft
			*From 1330 to 1600 KDM had Supervising class - Sat in trailer

District Representative		Contractor Representative	

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
14	K Mallams	7/30/2020	4/20/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson	280	-	240

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement U Floridan Aq Monitor

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
900			KDM arrived
			Drillers Started ~830 - depth @ 180' - worked until 1645 last night
830	1145	180-200	Ream/drill
1110			Added quick Trol to mud - 1140 - Added More Quick Trol
1200	1230		Tripping out Rods
1235	1250		Moving Failing Rig off hole - moving Detrict Rig on hole
1300	1330	0-205'	Tripping in 4" Temp Casing - got down to 200' - 5' hammered in
1330	1400		Break for Contractors - Hot out
1400	1520		ICDM in Training - In Trailer
1530			Trip rods in - using 3 7/8 tri-cone Rock bit
1550			Ream existing Core hole from 200-240
1555			KDM off site
			CS + Contractors remain on site

District Representative		Contractor Representative	

East Homosassa - Appendix ~~H5~~ H2 + H3 need Attention

W.L. -

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
15	K Mallams	7/31/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Matt Herron, Roy, Chance	280		

WELL SITE NUM-NAME		WELL NAME/ID	

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
0900			KDM on site - left house @ 8am
			Reamed hole from 200-240 w/ Core barrel
0920			Lost circulation @ 237
0925	0945	240-245	Coring
1000	1040		Dumpster Folks have to suck out dumpster here
1045	1052	245-250	Coring - Driller Comment is that material is soft or void - cant tell if its void because its a hydraulic Rig - Still no circulation
1115	1122	250-255	Coring
1050		255-259	Coring - didnt get last 1' section
	1209	259-265	Coring
1234	1243	265-270	Coring - Did not recover Core - try to recover it - circulation back
	1306	270-275	Coring - hoping to recover last 10' (265-270') in this core run
			Driller has a 10' barrel that can collect 10' of core
1320	1330	275-280	Coring - 280 is close to Sumter - Ocala boundry - possibly saw a lens
1340	1418		Tripping Rods out
1450			KDM off sik
			Contractors Cleaning up - CS remains on sik

District Representative		Contractor Representative	

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
16	KMallams	8/4/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson,			

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement UFA Mw

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
8:45			KDM on site
			Yesterday - reamed hole to 8" down from 200' to 270'
			- ~~#~~ tripped out temp 4" Casing
830			Destin Arrived to geophysical log hole - just running Caliper/gamma
			Mendez drilling was flushing hole when I got here
0900	0915		Tripping Rods out -
0920			Tripping in Caliper/gamma - using 48" long Arms
			Bottom 273' 8"
0935	0945		Bringing tool up 8" Casing bottom 110' & 117'
			Clinton Measured ~~Piece~~ 8" Piece that was cut off, it measured no more than 36"
			20' 4" PVC - 14 = 280'
1040			Tripping in ~~#~~ 4" PVC
1115			Tripping in Tremmie
1135			Pouring pea gravel in - Need 2 Ft off Top Packer
1220			KDM off site - CS remains on site

Caliper/gamma 9165C
LS- 272.4

District Representative		Representative	

WL 10am
29.95

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
17	K Mallams	8/6/2020		

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez				

WELL SITE NUM-NAME		WELL NAME/ID	

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
0945			KDM arrived @ site – Stopped @ Tpa office to calibrate Trimble
730			Mendez arrived – CS already on site – Switched Rigs off of hole – had Failing in hole for grouting 4" – change Rig to District to Core rest of hole
1000		270	Flushing hole – ground 120', Core Rods got stuck in 4" hole – had to wiggle them past that depth
1020			having trouble locking in Core barrel
1028			Specific Capacity of SA well – Static WL – 29.95'
			DD WL – 43.87' (11:18); 93.87' (11:25)
			Pump Capacity – 1 min 28 sec = 88 sec / 5 gallons (5 gallons / 1.46 min = 3.41 gpm)
			3.41 gpm / (43.87' – 29.55') = 0.2449 gpm/Ft
~~1031~~ 1040	~~1035~~ 1044	273 – 275	Cleaning existing Core hole out w/ Core rods
1050	1100	275 – 280	" " " " " " "
1105	1116	280' – 285'	Coring
1145	1157	285 – 290	Coring
1215	1230	290 – 295	Coring
1253	1324	295 – 300	Coring } In one run – did not send catcher to retrieve core barrel
1328	1343	300 – 305	Coring }
1405		305 – 310	Coring }
		310 – 315	Coring } In one run
1435	1450	315 – 320	Coring – TD of UFA well
	1500	320 – 322	Core 2 extra ft in case of Fall in
1530	1830		Airlift UFA well PVC – ~~100~~ 120 ft bls
~~1600~~			KDM off site
1830	1900		Tripod out HQ

District Representative		Contractor Representative	

WL SA - 29.85' TOC
WL UFA - 57.65'
2.3" stick up

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
18	KMallams	8/7/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez	Tony Hudson,			

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement UFA

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
0850			KDM Arrived
			Mendez cleaning up site. Plan today is to develop well, Specific Capacity test, GPS both wells,
			Install Pad on UFA well.
0915			Cutting 12" Casing down to below L.S.
0925			Cutting 8" Casing down to below LS
0915	0930		Loading up District Rig onto Semi-trailer
0946			UFA WL 58.3' Stick up = 3.05' 10gpm pump
0958			Develop well - pump 30 min, let rest 15 min, Pump 30 min
			let rest 15 min, Pump 60 min
0958	1029		1st 30 min Pump 60.65' WL bTOC (10:29)
1029	1045		15 min Rest 58.61' WL bTOC (10:43)
1045	1115		2nd 30 min Pump 60.5' WL bTOC (11:15)
			Collecting GPS data Points on SA & UFA well
1115	1130		15 min Rest 58.60' WL bTOC (1130)
1130	1230		60 min pump 60.6' WL bTOC (1230)
1230			30 min Rest
1310			Initial Water Level - 58.49' bTOC
1310	1423		Turn pump on/off
			min After pumping / DD
			1 / 60.4 ft
			3 / 60.46 ft
			6 / 60.47 ft
			10 / 60.5 ft } Average 60.49'
			30 / 60.56 ft.
			60 / 60.55 ft
			Pumping rate - 40 sec (13:48), 40 sec (14:04), 39.5 sec -> Average 39.8 sec = 0.6638 min
			recovery W.L. = 58.54 ft bTOC
			Specific Capacity - 7.5 gpm / (60.49 - 58.49) = 3.76 gpm/Ft

District Representative		Contractor Representative	

1450 KDM off site - CS remains on site. Mendez is constructing Pad/well Cover

[redacted]

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
GEOHYDROLOGIC DATA SECTION
DAILY CORE DRILLING LOG

REPORT #	SITE GEOLOGIST	DATE	DATE ON-SITE	SID
19	K Mallams	8/10/2020	6/10/2020	

CONTRACTOR	CREW	PROPOSED T.D.	PROGRESS	DEPTH
Mendez				

WELL SITE NUM-NAME	Eagle Lake Replacement	WELL NAME/ID	Eagle Lake Replacement U Floridan Aq Monitor well

TIME LOG FROM	TIME LOG TO	DEPTH	DETAILS OF OPERATIONS
0900			KDM on site. Clinton, Destin, Reed, Corey onsite
			UFA - 58.22 ft bTOC
			SA - 29.71 ft bTOC
0930	1035		Sending Camera down UFA well
1145	1205		Multi-tool - collected data going down + coming back up
1230			Caliper/gamma
			TD - 324 Slug from bottom to ~315' (325-315 ~~225-215~~)
			Induction log
	1425		Sonic log - open hole + Cement bond sonic data collection
			KDM has meeting from 1pm-3pm - Teams meeting
			Tagging bottom of well - 324', 321" thick - muck
1445			KDM leave site
			Clinton, Reed, Corey remain on site to wrap up

Caliper 9074C LS-324.20
Induction 9511C LS-318.4
Multi 8144C LS-319.6
Sonic - 9320C LS-316.4
Video - L.S. -280.3

District Representative		Contractor Representative	

Appendix B. Lithologic Logs for the Samples Collected at the Eagle Lake Well Site in Polk County, Florida

Well Number: W-19799 (Eagle Lake SA)

Total Depth: 90 Elevation: 160.7 feet. County: Polk

Location: Sec T..,R.. Drill Completion Date: 08/27/2020 Other Logs:

USGS Quad: BARTOW Lat/Long: 27° 58’ 28.94” N; 81° 45’ 47.51” W

Owner/Driller: SWFWMD

Described By: WILLIAM C. GLADWIN Verified By PG: KROMHOUT_C Comments: Box #1 (0’-15.2’) was shifted during transport and dividers separating core collapsed. All core was mixed with 9’-15.2’ interval falling into other intervals and each other. Tried to reconstruct as best as possible but use caution.

Verification: Is Verified

Geological Formation Picks

0	-	3	No Samples
3	-	90	CYPR Cypresshead Formation

0	-	3	No Sample; Comments: No sample. 0-3 labelled “Drill”
3	-	5	Sand; Color: Moderate Yellowish Brown (10YR 5/4) to Grayish Orange (10YR 7/4); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Clay - 3%, Organics - <1%; General Fossils: No Fossils
5	-	7	Sand; Color: Grayish Orange Pink (10R 8/2) to Moderate Reddish Orange (10R 6/6); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Clay - 3%, Organics - <1%; General Fossils: No Fossils
7	-	9	Sand; Color: Grayish Orange Pink (10R 8/2) to Moderate Orange Pink (10R 7/4); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Clay - 3%, Organics - <1%; General Fossils: No Fossils; Comments: Thin bed of organics near top of interval (2cm thick). Outside of rind is 10YR 6/2, contrast in color to rest of unit.
9	-	11	Sand; Color: Grayish Orange Pink (10R 8/2) to Moderate Reddish Orange (10R 6/6); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Clay - 3%, Organics - <1%; General Fossils: No Fossils; Comments: 10 R 8/2 (grayish orange pink) tapers out and disappears to a 10YR 7/4 (grayish orange) around 9.7’.
11	-	13	Sand; Color: Very Light Orange (10YR 8/2); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils; Comments: Interval all uniform color.
13	-	15	Sand; Color: Grayish Orange (10YR 7/4) to Very Light Orange (10YR 8/2); Grain Size: Fine; Range: Fine to Medium; Roundness: Subangular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils; Comments: Most all interval was made indistinguishable when box was upended. Only 6 inches of sample remains to describe, rest is present but cannot be determined because of mixing with other samples. (See main well comments)
15	-	15.2	Sand; Color: Grayish Orange (10YR 7/4) to Very Light Orange (10YR 8/2); Grain Size: Fine; Range: Fine to Medium; Roundness: Subangular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
15.2	-	17	Sand; Color: Very Light Orange (10YR 8/2); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
17	-	19	Sand; Color: Very Light Orange (10YR 8/2) to Grayish Orange (10YR 7/4); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
19	-	21	Sand; Color: Very Light Orange (10YR 8/2) to Light Yellowish Orange (10YR 8/6); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils

21	-	23	Sand; Color: Light Yellowish Orange (10YR 8/6) to Very Light Orange (10YR 8/2); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - 3%; General Fossils: No Fossils; Comments: Grayish orange (10 YR 7/4) starts appearing more prominently towards base of interval
23	-	25	Sand; Color: Dark Yellowish Orange (10YR 6/6) to Very Light Orange (10YR 8/2); Grain Size: Coarse; Range: Medium to Coarse; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils; Comments: Start color change at 24.6', dark yellowish orange (10 YR 6/6) hits definable boundary with very pale orange (10 YR 8/2). Lithology remains the same.
25	-	27	Sand; Color: Very Light Orange (10YR 8/2) to White (N9); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Subrounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
27	-	29	Sand; Color: White (N9); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
29	-	31	Sand; Color: White (N9) to Light Brown (5YR 5/6); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Subrounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
31	-	33	Sand; Color: White (N9); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
33	-	33.3	Sand; Color: Very Light Orange (10YR 8/2) to White (N9); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Subrounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
33.3	-	35	Sand; Color: White (N9) to Light Yellowish Orange (10YR 8/6); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
35	-	37	Sand; Color: White (N9) to Light Yellowish Orange (10YR 8/6); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
37	-	39	Sand; Color: White (N9) to Very Light Orange (10YR 8/2); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
39	-	41	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - <1%; General Fossils: No Fossils; Comments: Heavy minerals present react to a magnet.
41	-	43	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - <1%; General Fossils: No Fossils; Comments: Heavy minerals react to a magnet
43	-	45	Sand; Color: White (N9) to Light Yellowish Orange (10YR 8/6); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - <1%; General Fossils: No Fossils; Comments: Heavy minerals react to a magnet
45	-	47	Sand; Color: White (N9) to Grayish Orange (10YR 7/4); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - <1%; General Fossils: No Fossils; Comments: Heavy minerals react to a magnet
47	-	47.3	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - 2%; General Fossils: No Fossils; Comments: Heavy minerals react to a magnet
47.3	-	49	Sand; Color: White (N9) to Light Yellowish Orange (10YR 8/6); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - 2%; General Fossils: No Fossils; Comments: Heavy minerals react to a magnet

49	-	51	Sand; Color: White (N9) to Light Yellowish Orange (10YR 8/6); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - 2%; General Fossils: No Fossils
51	-	53	Sand; Color: White (N9) to Light Brown (5YR 6/4); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Subrounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - 2%; General Fossils: No Fossils
53	-	55	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - 2%; General Fossils: No Fossils
55	-	57	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - 2%; General Fossils: No Fossils
57	-	59	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Heavy Minerals - <1%, Organics - 2%; General Fossils: No Fossils
59	-	60.3	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - 2%; General Fossils: No Fossils
60.3	-	61	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - 3%; General Fossils: No Fossils
61	-	63	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - 3%; General Fossils: No Fossils
63	-	65	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - 3%; General Fossils: No Fossils
65	-	67	Sand; Color: Very Light Orange (10YR 8/2) to Light Yellowish Orange (10YR 8/6); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - 3%; General Fossils: No Fossils
67	-	69	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - 3%; General Fossils: No Fossils; Comments: Only ~1.0# of sample present in interval.
69	-	71	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - 3%; General Fossils: No Fossils
71	-	73	No Sample; Comments: No sample. Labelled “Drill”
73	-	75	Sand; Color: White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
75	-	78	No Sample; Comments: No sample. Labelled “Drill”
78	-	80	Sand; Color: Light Yellowish Orange (10YR 8/6) to White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Clay - <1%, Organics - <1%; General Fossils: No Fossils; Comments: Clay clusters range in thickness from 0.5cm - 3.0cm.
80	-	83	No Sample; Comments: No sample
83	-	84	Sand; Color: Grayish Orange (10YR 7/4) to White (N9); Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Clay - <1%, Organics - <1%; General Fossils: No Fossils
84	-	85	Sand; Color: White (N9) to Light Yellowish Orange (10YR 8/6); Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Clay - <1%, Mica - <1%, Organics - 2%; General Fossils: No Fossils
85	-	88	No Sample; Comments: No sample. Labelled “Drill”
88	-	90	Sand; Color: Grayish Orange (10YR 7/4) to Very Light Orange (10YR 8/2); Grain Size: Medium; Range: Fine to Medium; Roundness:

Florida Department of Environmental Protection

Well Number: W-19798 (Eagle Lake UFA)

Total Depth: 322 Elevation: 159.81 feet. County: Polk

Location: Sec 12 T.29S.,R.25E. Drill Completion Date: 08/27/2020 Other Logs:

USGS Quad: BARTOW Lat/Long: 27° 58’ 28.55” N; 81° 45’ 47.61” W

Owner/Driller: SWFWMD

Described By: WILLIAM C. GLADWIN Verified By PG: KROMHOUT_C Comments: No sample from 0’-83’.

Begins in Cypresshead sands similar to the sister well Eagle Lake SA - 19799. Suwannee Limestone/Ocala Limestone contact is based on the occurrence of Ocala index fossils.

Verification: Is Verified

Geological Formation Picks

0	-	83	No Sample
83	-	90	CYPR Cypresshead Formation
90	-	205	ARCA Arcadia Formation
205	-	265	SWNN Suwannee Limestone
265	-		OCAL Ocala Limestone

0	-	83	No Sample
83	-	85	Sand; Color: Dark Yellowish Orange (10YR 6/6) to Grayish Yellow (5Y 8/4); Porosity: Intergranular; Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Clay - <1%, Mica - <1%
85	-	88	No Sample
88	-	90	Sand; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 7/2); Porosity: Intergranular; Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Accessory Minerals: Clay - <1%, Mica - <1%
90	-	92	Clay; Color: Yellowish Gray (5Y 7/2) to Very Light Orange (10YR 8/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Poor Induration; Accessory Minerals: Mica - <1%, Phosphatic Sand - <1%, Silt-Size Dolomite - <1%; Other Features: Calcareous
92	-	98	No Sample
98	-	98.1	Mudstone; Color: White (N9) to Very Light Gray (N8); Porosity: Intergranular; Grain Type: Calcilutite; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Poor Induration; Accessory Minerals: Clay - <1%, Phosphatic Sand - <1%, Quartz Sand - <1%; Other Features: Calcareous
98.1	-	103	No Sample
103	-	105	Clay; Color: Very Light Gray (N8) to Light Gray (N7); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Poor Induration; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 10%, Quartz Sand - 8%, Silt-Size Dolomite - <1%; Other Features: Calcareous
105	-	108	No Sample
108	-	110	Clay; Color: White (N9) to Very Light Gray (N8); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Poor Induration; Accessory Minerals: Organics - <1%, Phosphatic Sand - 15%, Quartz Sand - 3%, Silt-Size Dolomite - <1%; Other Features: Calcareous
110	-	113	No Sample
113	-	115	Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Poor Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 8%, Quartz Sand - <1%; Other Features: Calcareous; General Fossils: Mollusks
115	-	118	No Sample
118	-	120	Mudstone; Color: Yellowish Gray (5Y 8/1) to White (N9); Porosity: Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - <1%; Other Features: Calcareous
120	-	123	No Sample

123	-	123.1	Mudstone; Color: Yellowish Gray (5Y 8/1) to White (N9); Porosity: Intergranular; Grain Type: Calcilutite; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - <1%; Other Features: Calcareous
123.1	-	127	No Sample
127	-	128.2	Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Moldic, Vugular, Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 10%, Quartz Sand - 3%; Other Features: Calcareous; General Fossils: No Fossils
128.2	-	129.7	Mudstone; Color: Yellowish Gray (5Y 8/1) to Light Bluish Gray (5B 7/1); Porosity: Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Organics - <1%, Phosphatic Gravel - 5%, Phosphatic Sand - 15%, Quartz Sand - <1%; Other Features: Calcareous
129.7	-	131.7	Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Pinpoint, Vugular, Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - 5%, Phosphatic Sand - 15%, Quartz Sand - 8%; Other Features: Calcareous; General Fossils: Mollusks, Sharks Teeth
131.7	-	133.7	Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 10%, Quartz Sand - <1%; Other Features: Calcareous
133.7	-	135	Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Vugular, Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 10%, Quartz Sand - <1%; Other Features: Calcareous
135	-	136.8	Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular; Grain Type: Calcilutite; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - 3%, Phosphatic Sand - 7%, Quartz Sand - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
136.8	-	140	Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 7%, Quartz Sand - <1%; Other Features: Calcareous; General Fossils: Mollusks, Fossil Molds, Fossil Fragments
140	-	142	Mudstone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Moldic, Vugular, Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Clay - <1%, Phosphatic Gravel - 5%, Phosphatic Sand - 15%, Quartz Sand - <1%; Other Features: Calcareous; Comments: Larger chert nodules present. (2.0cm-6.0cm in length)
142	-	144	Mudstone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Vugular, Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - <1%; Other Features: Calcareous
144	-	145.8	Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Vugular, Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 8%, Quartz Sand - <1%; Other Features: Calcareous
145.8	-	146.8	Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Vugular, Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 5%, Phosphatic Gravel - 2%, Phosphatic Sand - 6%, Quartz Sand - <1%; Other Features: Calcareous
146.8	-	150	Mudstone; Color: White (N9); Porosity: Pinpoint, Vugular, Intergranular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Phosphatic Sand - <1%; Other Features: Calcareous
150	-	155	Wackestone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Calcilutite; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - <1%; Other Features: Fossiliferous, Calcareous; General Fossils: Fossil Molds, Fossil Fragments, Mollusks, Benthic Foraminifera, Gastropods; Index Fossils: Sorites sp.; Comments: Only 3.0 ft of sample recovered

155 - 155.7 Wackestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Calcilutite; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 2%, Phosphatic Gravel - <1%, Phosphatic Sand - <1%; Other Features: Fossiliferous, Calcareous; General Fossils: Fossil Molds, Fossil Fragments, Mollusks, Benthic Foraminifera, Gastropods

155.7 - 156.6 Mudstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Calcilutite; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Sand - <1%, Quartz Sand - <1%; Other Features: Calcareous

156.6 - 158.6 Packstone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 5%, Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - <1%; Other Features: Fossiliferous, Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Benthic Foraminifera, Gastropods; Index Fossils: Sorites sp.

158.6 - 160.4 Packstone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 5%, Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - <1%; Other Features: Fossiliferous, Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Benthic Foraminifera, Gastropods, Bryozoa; Index Fossils: Sorites sp.

160.4 - 162.4 Wackestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Calcilutite; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite -5%, Phosphatic Gravel - <1%, Phosphatic Sand - 3%, Quartz Sand - <1%; Other Features: Fossiliferous, Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

162.4 - 165 Wackestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Calcilutite; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 5%, Phosphatic Gravel - <1%, Phosphatic Sand - 3%, Quartz Sand - <1%; Other Features: Fossiliferous, Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

165 - 167.8 Wackestone; Color: Very Light Orange (10YR 8/2) to Light Bluish Gray (5B 7/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - <1%, Phosphatic Sand - <1%; Other Features: Fossiliferous, Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Benthic Foraminifera, Coral, Bryozoa

167.8 - 170 Wackestone; Color: White (N9) to Light Bluish Gray (5B 7/1); Porosity: Intergranular, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - <1%; Other Features: Fossiliferous, Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Benthic Foraminifera, Coral; Index Fossils: Sorites sp.

170 - 174 Wackestone; Color: White (N9) to Light Bluish Gray (5B 7/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 2%, Phosphatic Gravel - <1%, Phosphatic Sand - <1%, Quartz Sand - <1%; Other Features: Fossiliferous, Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Benthic Foraminifera, Gastropods; Comments: Moldic porosity greatly increased compared to previous interval.

174 - 176 Mudstone; Color: Yellowish Gray (5Y 8/1) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Vugular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Phosphatic Gravel - 2%, Phosphatic Sand - 8%, Quartz Sand - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds

176 - 177.6 Mudstone; Color: Yellowish Gray (5Y 8/1) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Vugular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Phosphatic Gravel - 4%, Phosphatic Sand - 8%, Quartz Sand - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds

177.6 - 179 Mudstone; Color: Yellowish Gray (5Y 8/1) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Vugular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - 3%, Phosphatic Sand - 14%, Quartz Sand - <1%; Other Features: Calcareous

179	-	181	Mudstone; Color: Yellowish Gray (5Y 8/1) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 10%, Quartz Sand - <1%; Other Features: Calcareous
181	-	182.4	Mudstone; Color: Yellowish Gray (5Y 8/1) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - 1%, Phosphatic Sand - 10%, Quartz Sand - <1%; Other Features: Calcareous
182.4	-	183.2	Clay; Color: Light Olive (10Y 6/2); Porosity: Intergranular; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Good Induration; Cement Type: Clay Matrix; Accessory Minerals: Calcilutite - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - <1%; General Fossils: No Fossils
183.2	-	184.2	Mudstone; Color: Light Olive (10Y 6/2); Porosity: Intergranular, Vugular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - <1%; Other Features: Calcareous
184.2	-	185	Sand; Color: Yellowish Gray (5Y 8/1) to Light Olive Gray (5Y 6/1); Porosity: Intergranular; Grain Size: Medium; Range: Fine to Medium; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcilutite - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 3%; Other Features: Calcareous; General Fossils: No Fossils
185	-	187.4	Mudstone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - 2%, Phosphatic Sand - 3%, Quartz Sand - <1%; Other Features: Calcareous
187.4	-	190	Mudstone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 2%, Phosphatic Gravel - 3%, Phosphatic Sand - 3%, Quartz Sand - <1%; Other Features: Calcareous; General Fossils: Sharks Teeth; Comments: Interval same as previous but with increase in intermittent beds of sand.
190	-	191.2	Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite; Grain Size: Microcrystalline; Range: Microcrystalline; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 3%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds
191.2	-	193.2	Packstone; Color: White (N9) to Light Bluish Gray (5B 7/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 6%, Phosphatic Gravel - <1%, Phosphatic Sand - 3%, Quartz Sand - 8%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Mollusks, Gastropods
193.2	-	195	Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Clay - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Mollusks, Gastropods; Comments: Clay layers very phosphatic.
195	-	196	Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 2%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Mollusks, Gastropods
196	-	196.8	Packstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Clay - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 3%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Mollusks
196.8	-	198.8	Packstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Clay - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 3%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Mollusks

198.8	-	200	Mudstone; Color: White (N9) to Light Greenish Gray (5GY 8/1); Porosity: Intergranular, Vugular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - <1%, Quartz Sand - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
200	-	205	Mudstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Vugular; Grain Type: Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Phosphatic Gravel - <1%, Phosphatic Sand - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Benthic Foraminifera
205	-	206.7	Wackestone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks
206.7	-	208.7	Wackestone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Quartz Sand - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Benthic Foraminifera, Gastropods
208.7	-	210	No Sample
210	-	215	Wackestone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Medium; Range: Medium to Coarse; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Quartz Sand - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Benthic Foraminifera; Comments: Only 1.5 ft of sample recovered
215	-	217.5	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Medium; Range: Medium to Coarse; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 5%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
217.5	-	220	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Medium; Range: Medium to Coarse; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 3%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
220	-	222.8	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Medium; Range: Medium to Coarse; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
222.8	-	225	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Medium; Range: Medium to Coarse; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
225	-	230	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 2%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods, Benthic Foraminifera; Comments: Fossil content increased compared to recent former intervals
230	-	232	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods, Benthic Foraminifera
232	-	234	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods, Benthic Foraminifera
234	-	236.1	Packstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Clay - <1%; Other Features: Calcareous; General Fossils: Bryozoa, Fossil Fragments, Fossil Molds, Mollusks, Gastropods, Benthic Foraminifera; Comments: Many Bryozoa present. Occur in grey layers throughout.

236.1	-	238	Packstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 2%, Clay - <1%; Other Features: Calcareous; General Fossils: Bryozoa, Fossil Fragments, Fossil Molds, Gastropods, Benthic Foraminifera
238	-	240	Packstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 2%, Clay - <1%; Other Features: Calcareous; General Fossils: Bryozoa, Fossil Fragments, Fossil Molds, Gastropods, Benthic Foraminifera
240	-	245.4	Packstone; Color: White (N9) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Bryozoa, Fossil Fragments, Fossil Molds, Gastropods, Benthic Foraminifera; Comments: Only 3.0 inches of sample recovered
245.4	-	250	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Coarse; Range: Medium to Coarse; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 4%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Bryozoa, Gastropods, Miliolids; Comments: Only 6.0 inches of sample recovered
250	-	252	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 3%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Bryozoa, Gastropods, Benthic Foraminifera, Miliolids
250	-	252	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint; Grain Type: Calcilutite, Biogenic, Pellet; Grain Size: Coarse; Range: Medium to Coarse; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 3%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Bryozoa, Gastropods, Miliolids
252	-	255	Wackestone; Color: White (N9); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Coarse; Range: Medium to Coarse; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 3%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Miliolids
255	-	257.6	Packstone; Color: White (N9); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 3%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
257.6	-	259.6	Packstone; Color: White (N9); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 3%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera
259.6	-	260	Grainstone; Color: Very Light Gray (N8) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera
260	-	265	Grainstone; Color: Very Light Gray (N8) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera; Comments: Only 1.0 ft of sample recovered.
265	-	265.7	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera
265.7	-	275	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera; Comments: Only 5.0 inches of sample recovered.
275	-	276.2	Packstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera

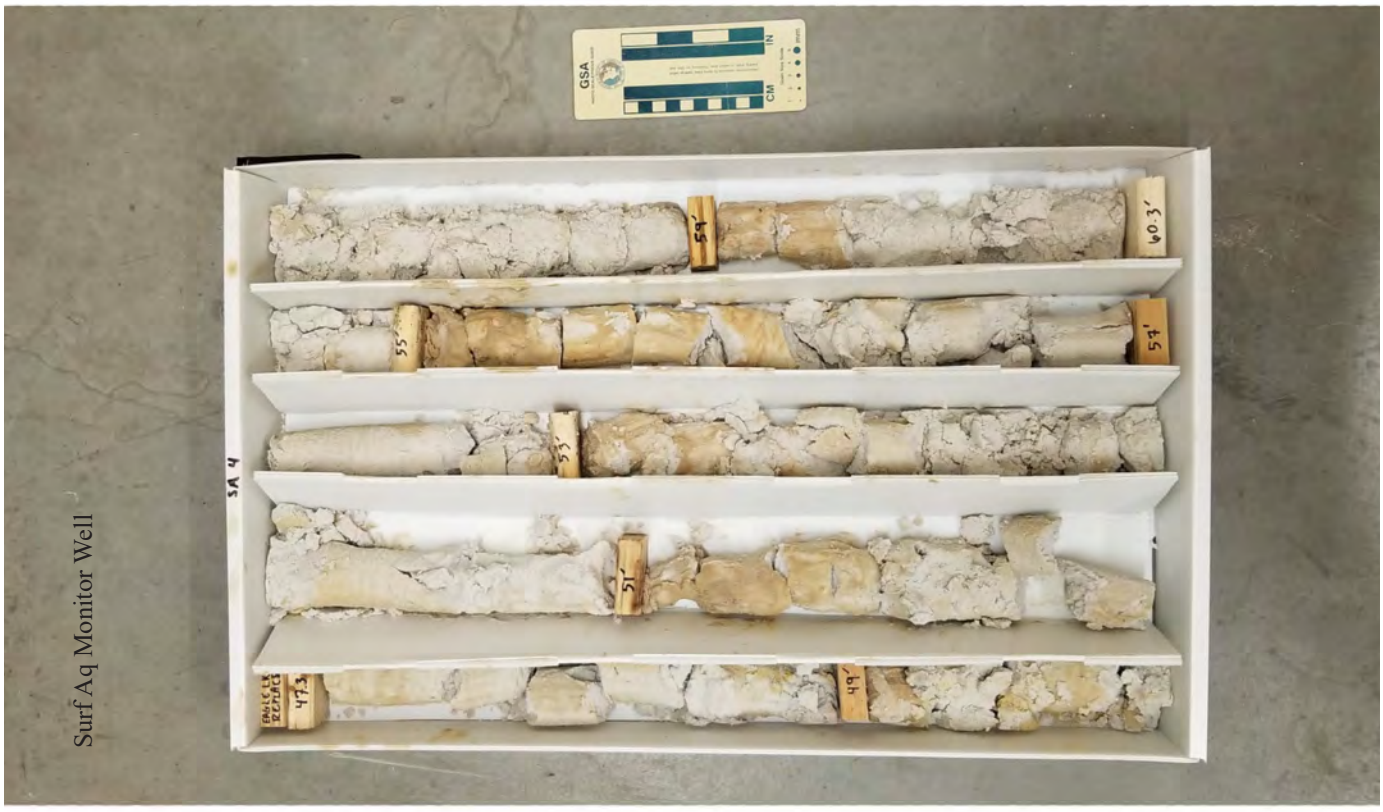
276.2	-	280	Packstone; Color: White (N9); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Medium; Range: Medium to Coarse; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds; Comments: Only 1.5 ft of sample recovered
280	-	283.4	Wackestone; Color: White (N9); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
283.4	-	285	Wackestone; Color: White (N9); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
285	-	287	Wackestone; Color: White (N9); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
287	-	290	Mudstone; Color: White (N9); Porosity: Intergranular, Vugular; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Moderate Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera
290	-	292.9	Mudstone; Color: White (N9); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Bryozoa
292.9	-	295	Mudstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Bryozoa, Coral; Comments: Becomes increasingly more fossiliferous towards last 8.0 inches of interval.
295	-	296.3	Mudstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Bryozoa, Coral; Index Fossils: Lepidocyclina ocalana; Comments: Ocala limestone index fossils are present throughout.
296.3	-	298.3	Wackestone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 5%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Bryozoa, Miliolids; Index Fossils: Lepidocyclina ocalana; Comments: Ocala limestone index fossils are present throughout.
298.3	-	300.3	Wackestone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Fine; Range: Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 5%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera, Bryozoa, Miliolids; Index Fossils: Lepidocyclina ocalana; Comments: Ocala limestone index fossils are present throughout.
300.3	-	301.7	Mudstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Vugular; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Coral, Benthic Foraminifera
301.7	-	303.7	Mudstone; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds; Index Fossils: Lepidocyclina ocalana; Comments: Notable disappearance of large fossils, only fragments and molds. Ocala limestone index fossils are present throughout.
303.7	-	305	Mudstone; Color: Very Light Orange (10YR 8/2) to White (N9); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Bryozoa, Benthic Foraminifera, Coral

305	-	307	Mudstone; Color: Very Light Orange (10YR 8/2) to White (N9); Porosity: Intergranular, Vugular, Pinpoint; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Bryozoa, Benthic Foraminifera, Coral
307	-	309	Mudstone; Color: Very Light Orange (10YR 8/2) to White (N9); Porosity: Intergranular, Vugular, Moldic; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Bryozoa, Benthic Foraminifera, Coral; Index Fossils: Nummulites ocalanus; Comments: Ocala limestone index fossils are present throughout.
309	-	311.1	Mudstone; Color: Very Light Orange (10YR 8/2) to White (N9); Porosity: Intergranular, Vugular, Moldic; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Bryozoa, Benthic Foraminifera, Coral; Index Fossils: Lepidocyclina ocalana; Comments: Ocala limestone index fossils are present throughout.
311.1	-	315	Mudstone; Color: White (N9); Porosity: Intergranular, Vugular, Pinpoint; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera; Index Fossils: Lepidocyclina ocalana; Comments: Only 2.3 feet of sample recovered. Ocala limestone index fossils are present throughout.
315	-	316.3	Mudstone; Color: White (N9); Porosity: Intergranular, Vugular, Pinpoint; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera
316.3	-	318.3	Mudstone; Color: White (N9); Porosity: Intergranular, Vugular, Pinpoint; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Benthic Foraminifera
318.3	-	320.2	Mudstone; Color: White (N9); Porosity: Intergranular, Vugular, Pinpoint; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds
320.2	-	322	Mudstone; Color: White (N9); Porosity: Intergranular, Vugular, Pinpoint; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds

Appendix C. Digital Photographs of Samples Retrieved from the Eagle Lake Well Site in Polk County, Florida

Surf Aq Monitor Well

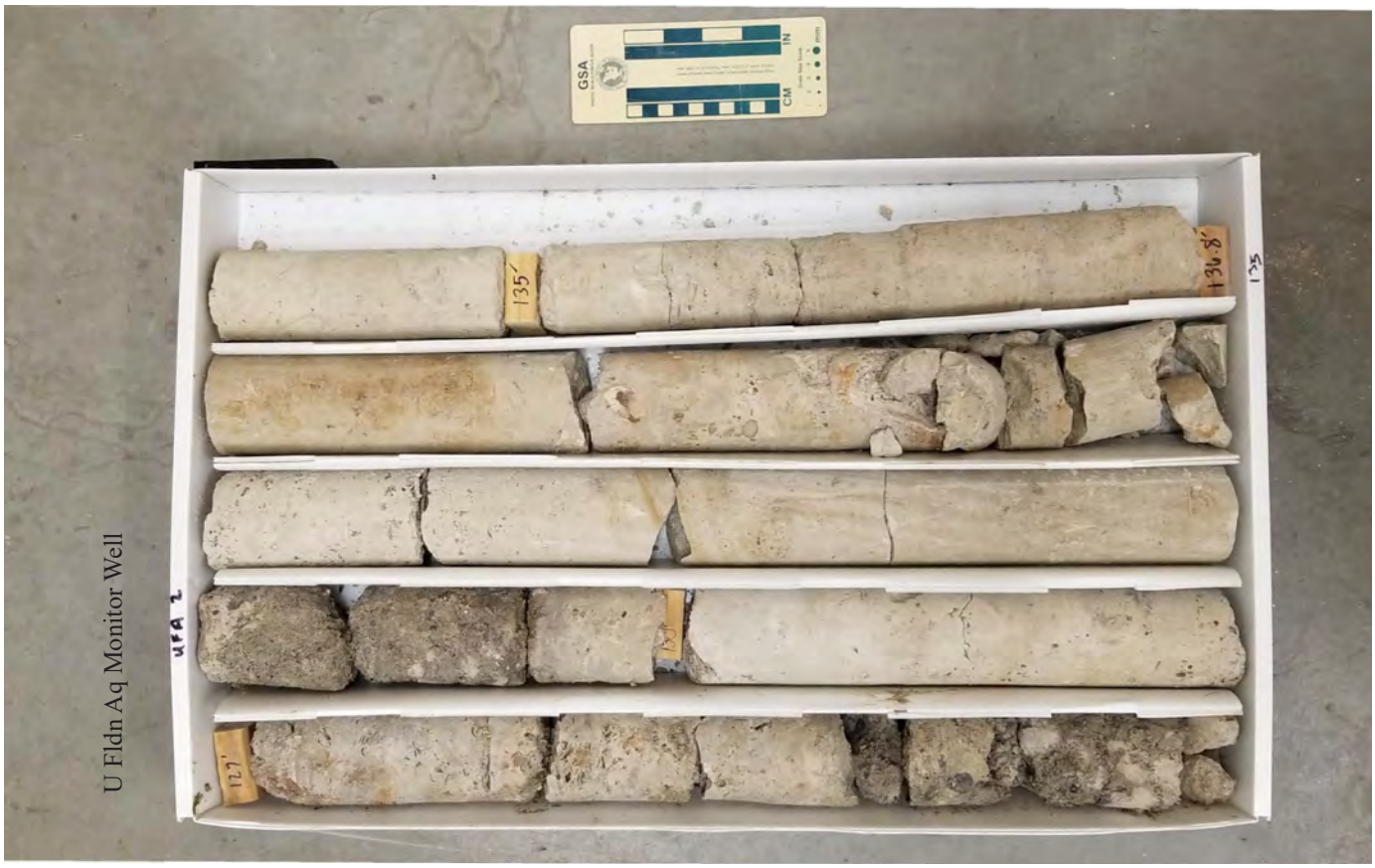
Surf Aq Monitor Well


Surf Aq Monitor Well
GSA
IN
CM
SA 4
54'
40.3'
55'
53'
51'
49'


Surf Aq Monitor Well
GSA
IN
CN
SA 3
33.3
37
41'
45
49.3'
39'
35'


Surf Aq Monitor Well
GSA
IN
CM
SA 6
EAGLE LAKE REPLACE.
84'
Drill 85-87
88
90


Surf Aq Monitor Well
GSA
IN
CM
SA 5
75-79 Drill
78
80'
83
84'
71'
71-73 Drill
73'
75'
67'
69'
63'
65'
EAGLE LK REPLACE
60.5'
61'


U Fldn Aq Monitor Well
GSA
CM
IN
UFA 2
127'
135'
136.8'
135


U Fldn Aq Monitor Well
GSA
CM
IN
UFA 1
83'
92'
93'
98.1'
103'
90'
105'
85'
88'
108'
115'
118'
110'
113'
120'
123'
123.1'

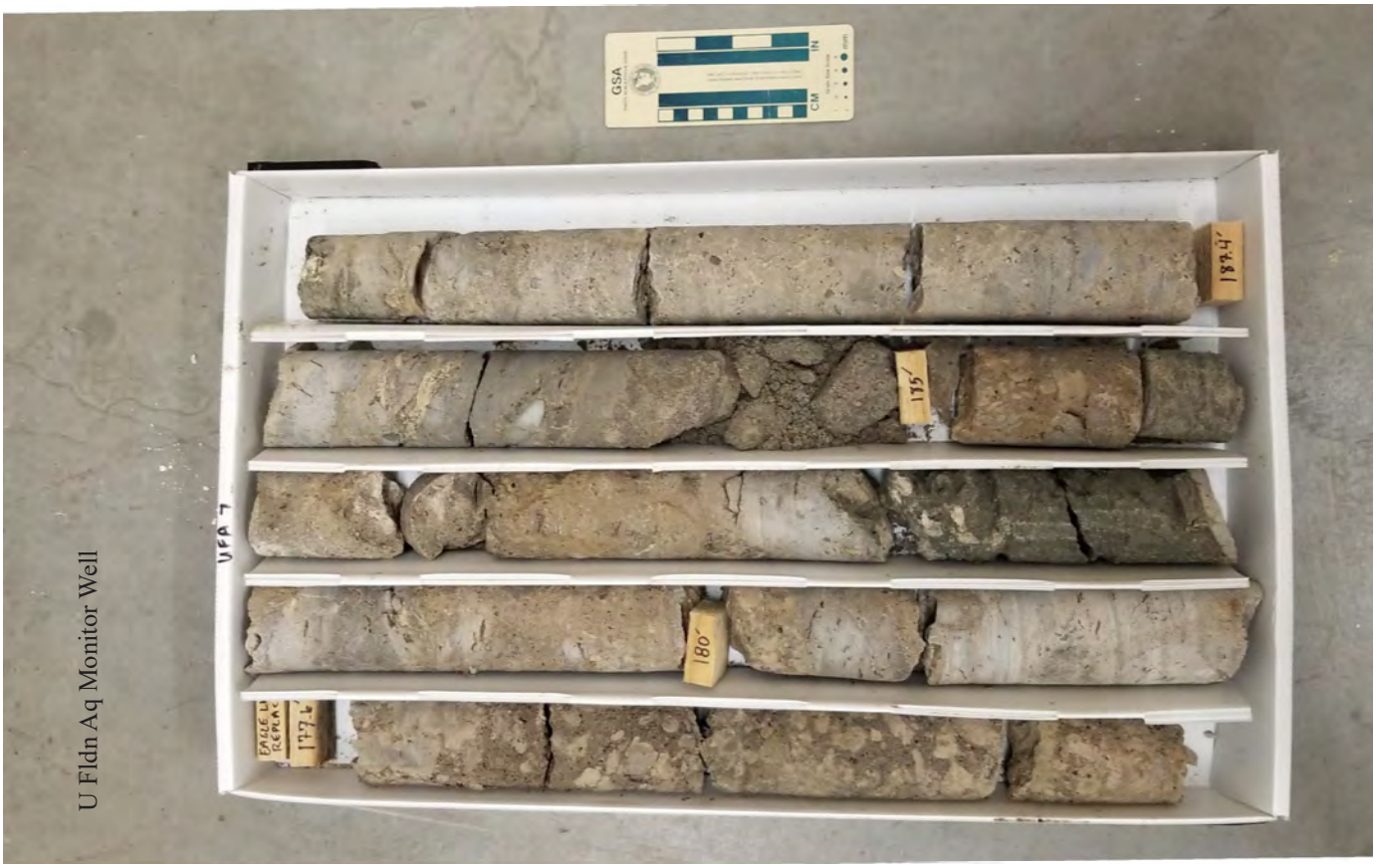

U Fldn Aq Monitor Well
GSA
IN
CM
UFA 4
155'
150'
145'
145.8'
EAGLE LK REPLAC
157.6'


U Fldn Aq Monitor Well
GSA
IN
CM
UFA 3
115'
145.8'
EAGLE LK REPLAC
131.3'

U Fldn Aq Monitor Well

U Fldn Aq Monitor Well


U Fldn Aq Monitor Well
GSA
CM
IN
195'
190'
196.8'


U Fldn Aq Monitor Well
GSA
CM
IN
180'
175'
187.4'


U Fldn Aq Monitor Well
UFA 10
GSA
CM
IN
191.9'
205'
206.9'


U Fldn Aq Monitor Well
UFA 9
GSA
CM
IN
201.9'
215'
220'
222.9'


U Fldn Aq Monitor Well
GSA
IN
CM
UFA 12
255'
250'
240'
245
230.1'


U Fldn Aq Monitor Well
GSA
IN
CM
UFA 11
235'
230.1'
230'
225'

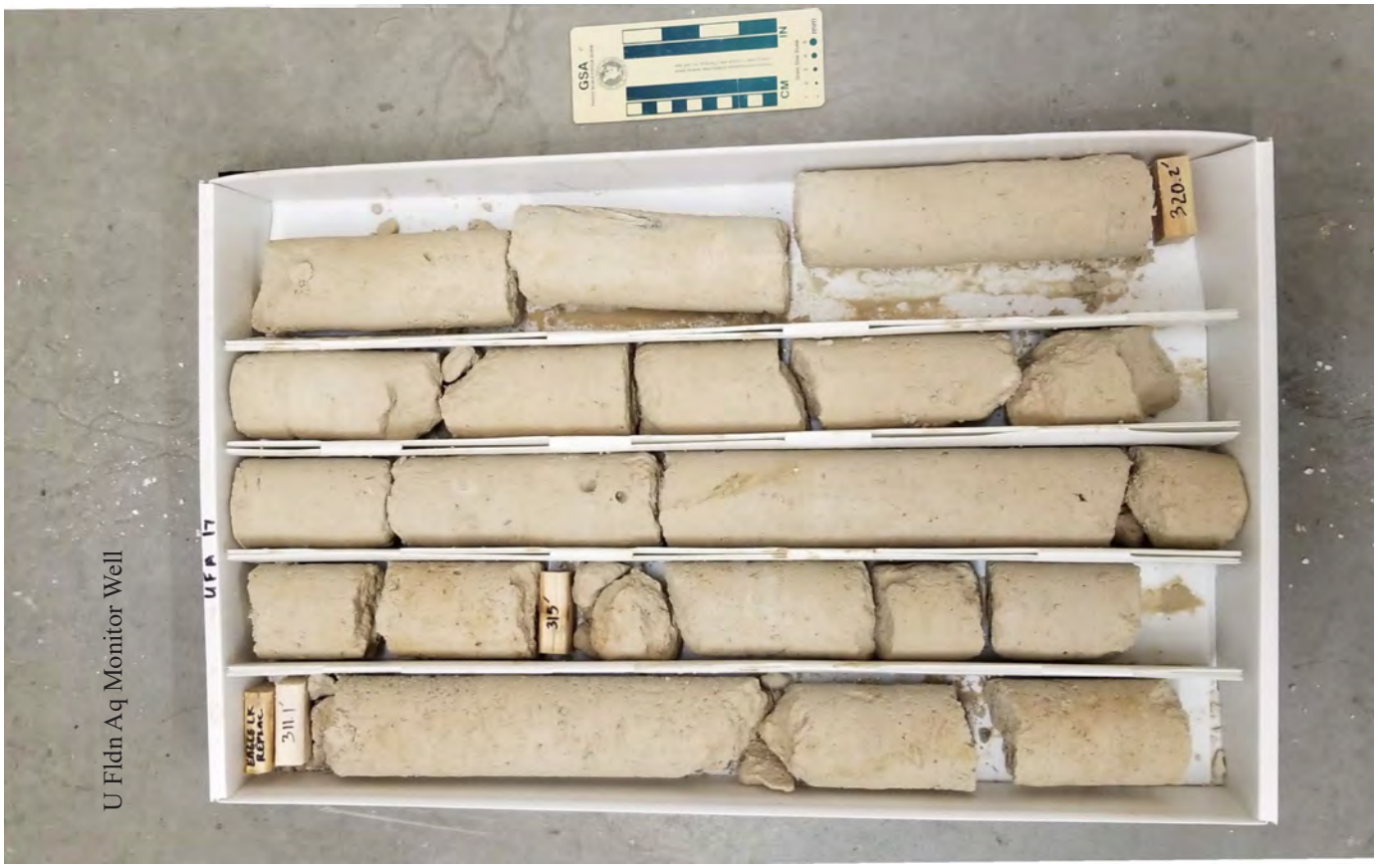

U Fldn Aq Monitor Well
UFA 14
GSA
IN
CM
MM
293.4
290'
285'
292.9'


U Fldn Aq Monitor Well
UFA 13
GSA
IN
CM
MM
240'
275'
265'
280'
273.4


U Fldn Aq Monitor Well
UFA 16
GSA
IN
CM
EAGLE LK REPLAC.
301.7'
305'
311.1'


U Fldn Aq Monitor Well
UFA 15
GSA
IN
CM
EAGLE LK REPLAC.
292.3'
295'
301.7'


U Fldn Aq Monitor Well
GSA
CM
IN
UFA 17
320'
322'
TD of UFA well 322'


U Fldn Aq Monitor Well
GSA
CM
IN
UFA 17
311'
315'
320.2'

Appendix D. 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]

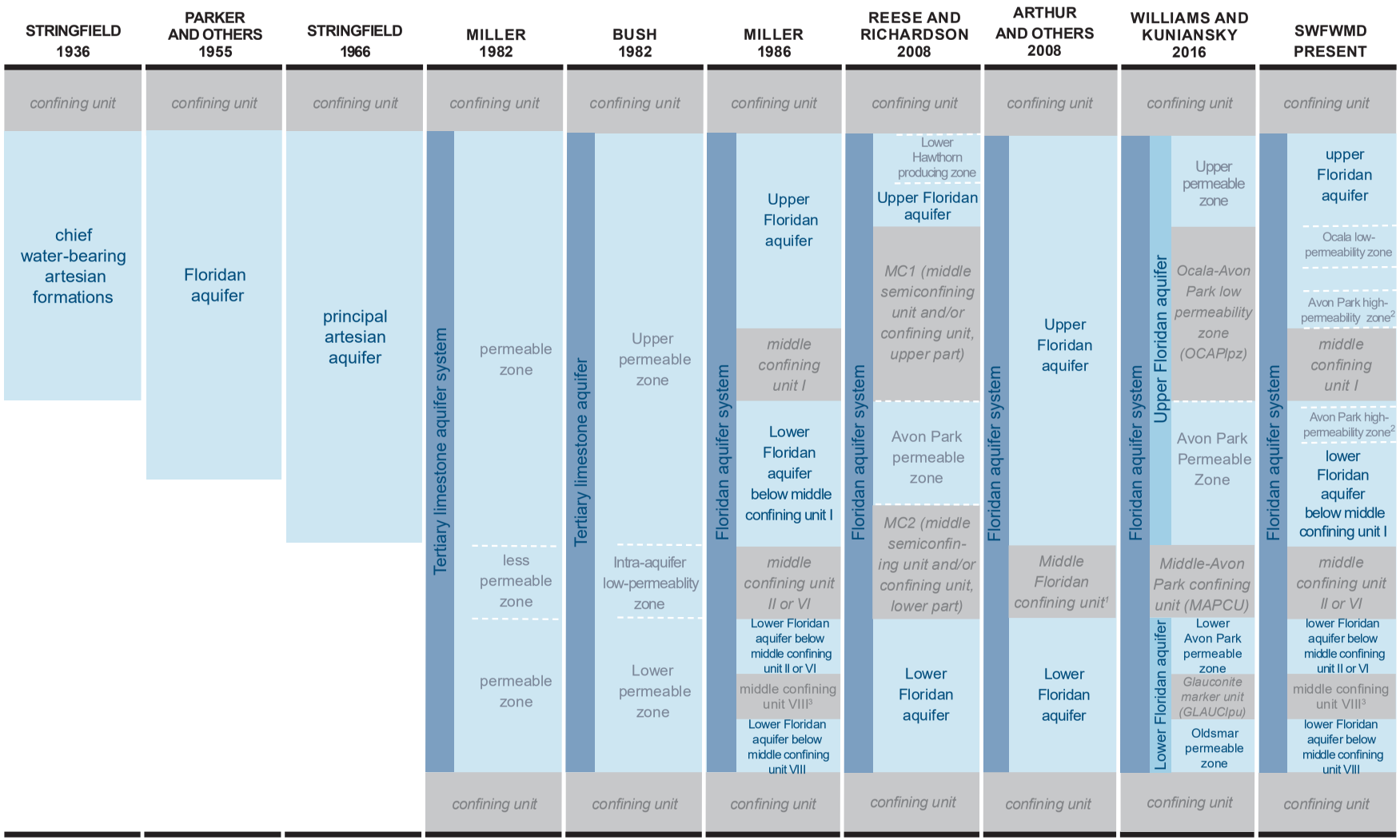
B

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
confining unit	*confining unit*	Hawthorn Aquifer System: *confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*
sandstone aquifer	Zone 1	Hawthorn Aquifer System: Sandstone aquifer	Intermediate aquifers: Tamiami - upper Hawthorn aquifer	Intermediate aquifer system: Permeable Zone 1	Intermediate aquifer system: Tamiami/ Peace River zone (PZ1)	Intermediate aquifer system: Zone 1	Intermediate aquifer system / intermediate confining unit: zones/ aquifers were not delineated	Hawthorn aquifer system: Peace River aquifer
confining unit	*confining unit*	Hawthorn Aquifer System: *confining unit*		*confining unit*	*confining unit*	*confining unit*		*confining unit*
upper Hawthorn aquifer	Zone 2	Hawthorn Aquifer System: mid-Hawthorn aquifer		Permeable Zone 2	Upper Arcadia zone (PZ2)	Zone 2		upper Arcadia aquifer
confining unit	*confining unit*	Hawthorn Aquifer System: *confining unit*	*confining unit*	*confining unit*	*confining unit*	*confining unit*		*confining unit*
lower Hawthorn aquifer	Zone 3	FAS: 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*	FAS: *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 F1. Nomenclature of (A), the surficial aquifer, (B), the Hawthorn aquifer system, and (C), the Floridan aquifer system used for the Eagle Lake well site compared to nomenclature in previously published reports.

C



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

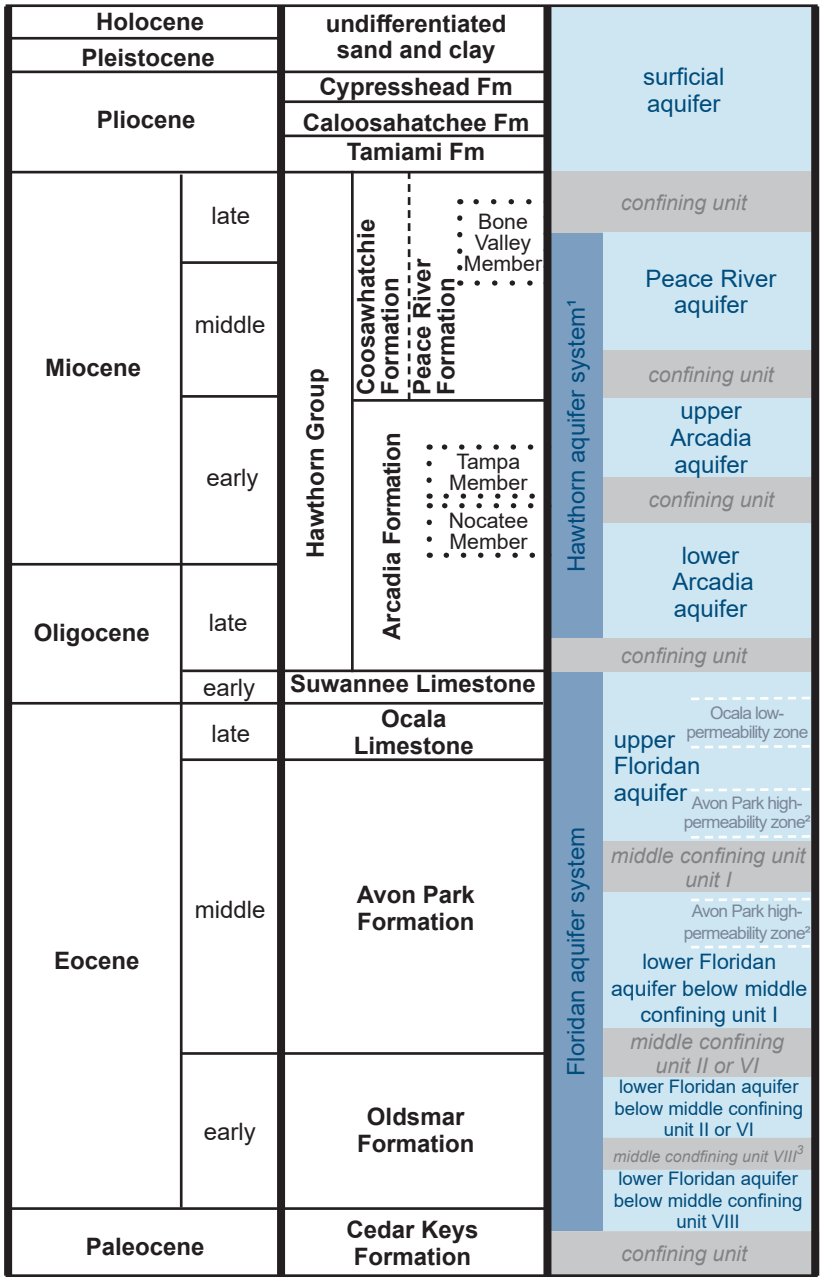
[1]Arthur and others acknowledge existence of the middle confining unit I within the Southwest Florida Water Management but do not map it for Special Publication 68.

[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 as the Glauconite marker unit based on new data in Williams and Kuniansky (2016).

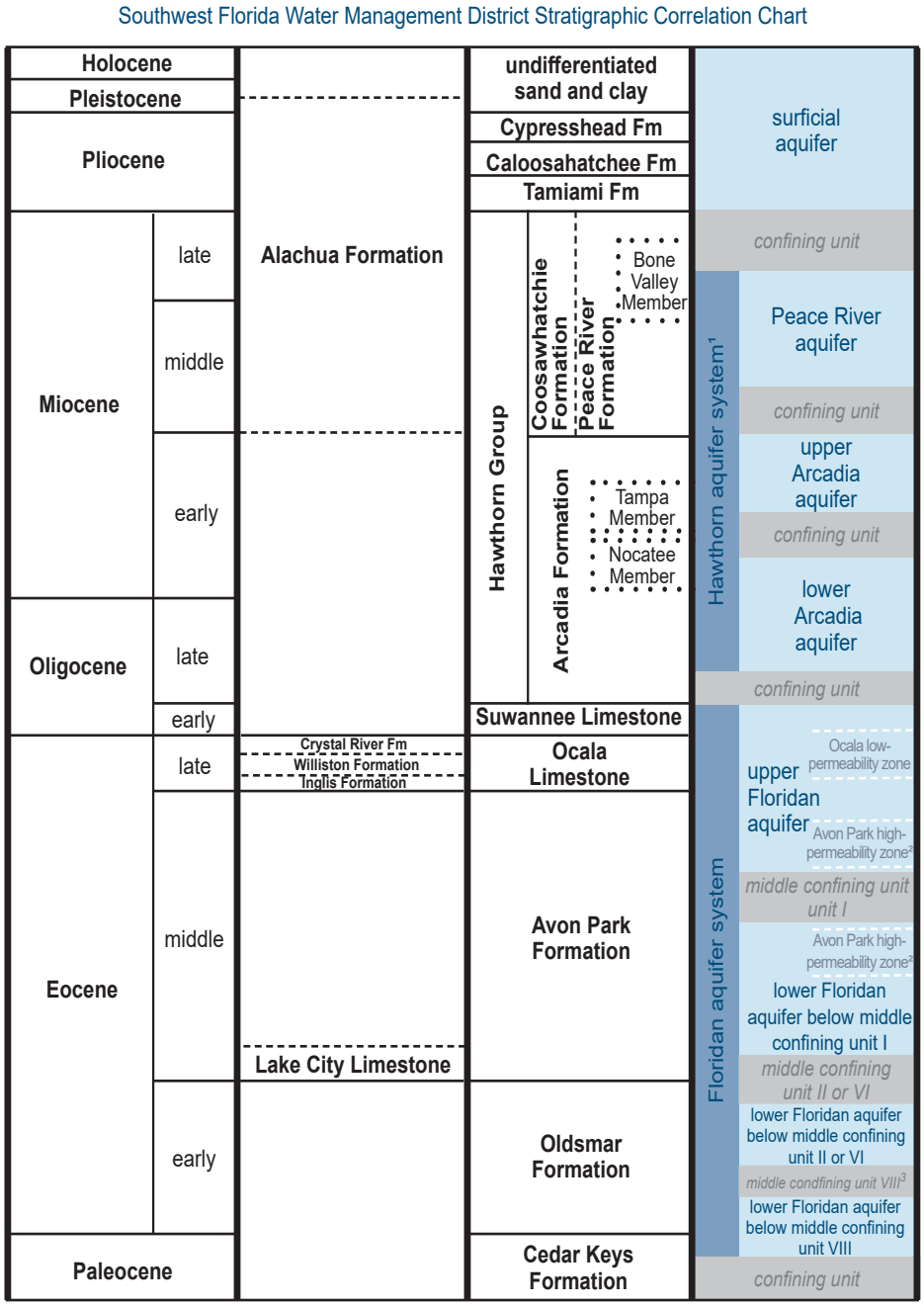
Figure F1. (Continued) Nomenclature of (A), the surficial aquifer, (B), the Hawthorn aquifer system, and (C), the Floridan aquifer system used for the Eagle Lake well site compared to nomenclature in previously published reports.

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: ¹The Hawthorn aquifer system was previouly referred to as the intermediate aquifer system. ²The 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. ³The middle confining unit VIII of Miller (1986) was extended beyond the original extent in south Florida based on new data.

Figure F2. 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: ¹The Hawthorn aquifer system was previouly referred to as the intermediate aquifer system. ²The 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. ³The middle confining unit VIII of Miller (1986) was extended beyond the original extent in south Florida based on new data.

Figure F3. Chart correlating lithostratigraphic units used in past reports to current lithostratigraphic units and the current hydrogeologic framework of the Southwest Florida Water Management District.

Southwest Florida
Water Management District