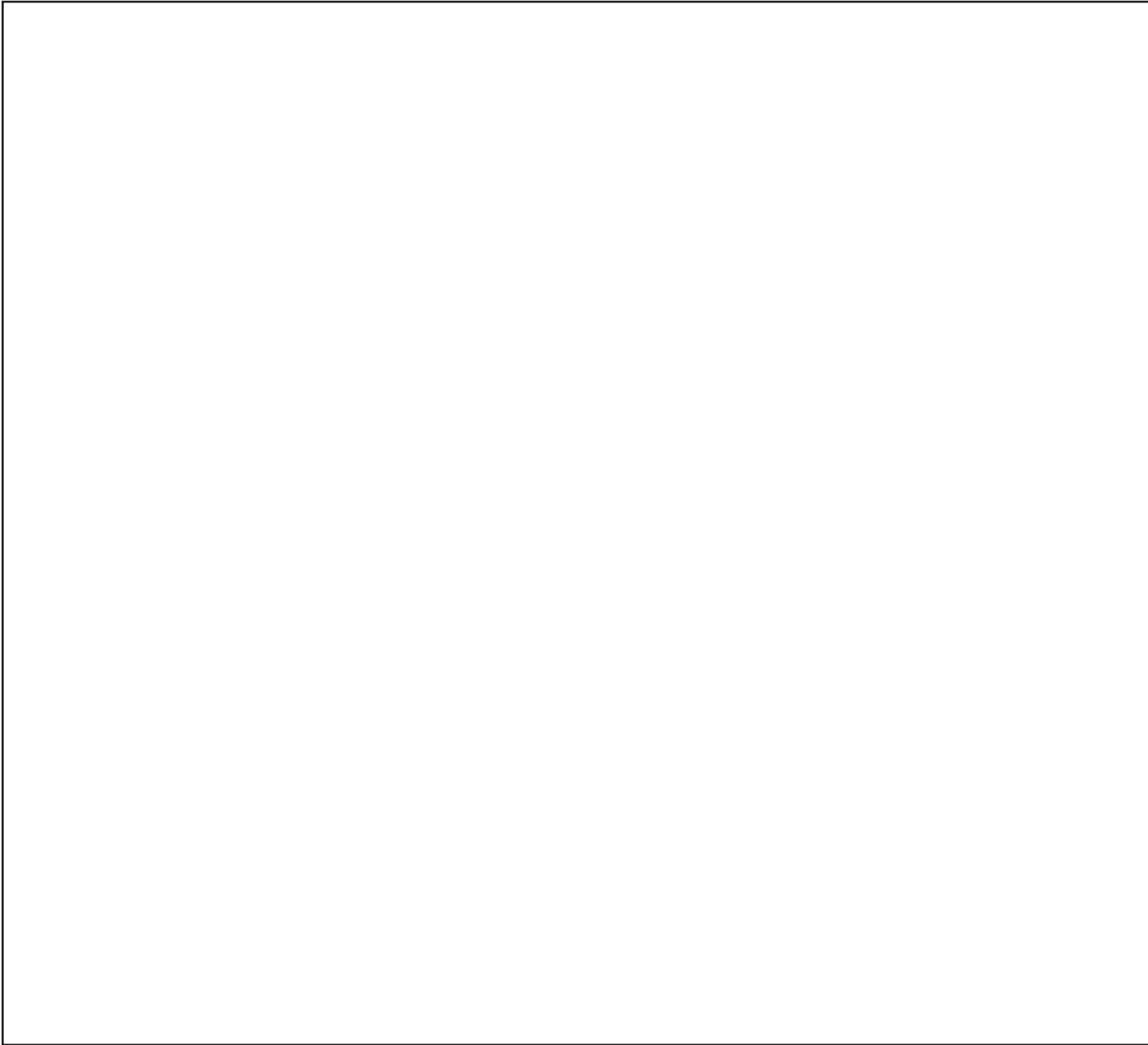


## Well Construction at the Lake Aurora Well Site in Polk County, Florida





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

# **Well Construction at the Lake Aurora Well Site in Polk County, Florida**

By Julia Zydek

January 2024

# **Southwest Florida Water Management District**

## **Operations, Lands and Resource Monitoring Division**

Brian Starford, P.G., Director

## **Data Collection Bureau**

Sandie Will, P.G., Chief

## **Geohydrologic Data Section**

M. Ted Gates, P.G., Manager

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

For ordering information:

World Wide Web: <http://www.watermatters.org/documents>

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

For more information on the Southwest Florida Water Management District and its mission to manage and protect water and related resources:

World Wide Web: <http://www.watermatters.org>

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

The Southwest Florida Water Management District (District) does not discriminate on the basis of disability. This nondiscrimination policy involves every aspect of the District's functions, including access to and participation in the District's programs, services, and activities. Anyone requiring reasonable accommodation, or who would like information as to the existence and location of accessible services, activities, and facilities, as provided for in the Americans with Disabilities Act, should contact the Human Resources Office Chief, at 2379 Broad St., Brooksville, FL 34604-6899; telephone (352) 796-7211 or 1-800-423-1476 (FL only); or email [ADACoordinator@WaterMatters.org](mailto:ADACoordinator@WaterMatters.org). If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1-800-955-8771 (TDD) or 1-800-955-8770 (Voice). If requested, appropriate auxiliary aids and services will be provided at any public meeting, forum, or event of the District. In the event of a complaint, please follow the grievance procedure located at [WaterMatters.org/ADA](http://WaterMatters.org/ADA).

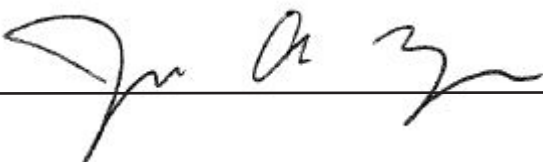
Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the Southwest Florida Water Management District.

Although this report is in the public domain, permission must be secured from the individual copyright owners to reproduce any copyrighted material contained within this report.

Suggested citation:

Zydek, J.A., 2024, Well Construction at the Lake Aurora Well Site in Polk County, Florida: Southwest Florida Water Management District, 64 p.

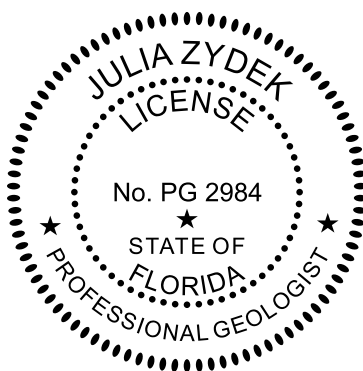
The hydrogeologic evaluations and interpretations contained in *Well Construction at the Lake Aurora Well Site in Polk County, Florida* have been prepared by or approved by a licensed Professional Geologist in the State of Florida, in accordance with Chapter 492, Florida Statutes.



---

Name  
Professional Geologist  
State of Florida License No. PG 2984

Date: October 17, 2023



# Foreword

The Geohydrologic Data Section (GEO) administers the Regional Observation and Monitor-well Program (ROMP) at the Southwest Florida Water Management District (District). The ROMP was started in 1974 in response to the need for hydrogeologic information by the District. The focus of the ROMP is to quantify the flow characteristics and water quality of the groundwater systems that serve as the primary source of water supply within southwest Florida. The original design of the ROMP consisted of an inland 10-mile grid network composed of 122 well sites and a coastal transect network composed of 24 coastal monitor transects of two to three well sites each. The number of wells at a well site varies with specific regional needs; usually two to five permanent monitor wells are constructed at each site. The numbering system for both networks generally increases from south to north with ROMP-labeled wells representing the inland grid network and TR-labeled wells representing the coastal transect network.

In addition to the ROMP, the GEO section oversees construction of monitor wells and performs aquifer testing activities for other District programs and projects. The broad objectives at each well site are to determine the hydrogeology, water quality, and hydraulic properties of the units present, and to install wells for long-term monitoring. Site activities include exploratory coring and testing, well construction, and aquifer performance testing. These activities provide data for the hydrogeologic and groundwater quality characterization of the well sites. These characterizations are used to ensure the monitor wells are properly designed for intended hydrologic targets. At the completion of each well site, a summary report is generated and can be found at the District's website at [www.watermatters.org/data](http://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 .....	6
Hydrogeology .....	10
Summary .....	10
References .....	12
Appendix A. Scanned Daily Drilling Logs Taken During Well Construction at the Lake Aurora Well site in Polk County, Florida .....	13
Appendix B. Lithologic Logs for the Samples Collected at the Lake Aurora Well Site in Polk County, Florida.....	47
Appendix C. Digital Photographs of Samples Retrieved at the Lake Aurora Well Site in Polk County, Florida.....	59

## Figures

1. Data, Monitoring, and Investigations Team Minimum Lake Level well sites. ....	2
2. Location of the Lake Aurora well site in Polk County, Florida. ....	3
3. Layout of the Lake Aurora well site in Polk County, Florida. ....	4
4. Well as-built diagram for the Surf Aq Monitor at the Lake Aurora well site in Polk County, Florida. ....	7
5. Well as-built diagram for the U Fldn Aq Monitor at the Lake Aurora well site in Polk County, Florida. ....	8
6. Caliper log for the U Fldn Aq Monitor from land surface to 293.5 feet below land surface collected at the Lake Aurora well site in Polk County, Florida. ....	9
7. Stratigraphic column detailing the hydrogeologic setting at the Lake Aurora well site in Polk County, Florida.....	10
8. Hydrograph of the maximum daily water levles for the permanent monitor wells at the Lake Aurora well site and the daily mean water level for Lake Aurora in Polk County, Florida. ....	11

## Tables

1. Summary of well construction details at the Lake Aurora well site in Polk County, Florida .....	6
---	---

## Conversion Factors and Datums

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

bls	below land surface
CFWI	Central Florida Water Initiative
District	Southwest Florida Water Management District
fig.	figure
gpm	gallons per minute
gpm/ft	gallons per minute per foot
HQ	3.06-inch internal diameter core drilling rod
Mendez	Mendez Drilling, Incorporated
NAVD 88	North American Vertical Datum of 1988
PVC	polyvinyl chloride
SID	station identification
Surf Aq	surficial aquifer
U Fldn Aq	upper Floridan aquifer
WCP	well construction permit



# Well Construction at the Lake Aurora Well Site in Polk County, Florida

By Julia Zydek

## Introduction

Eighteen well construction sites were planned to investigate lake and groundwater interactions for the adoption of minimum lake level protocols within the boundary of the Central Florida Water Initiative (CFWI) in Polk County, Florida. The sites are part of the Data, Monitoring, and Investigations Team Work Plan that support the CFWI activities. The well sites will provide lithologic descriptions from land surface to the top of limestone and will provide long-term monitor wells. Two wells will be installed at seven sites, one to monitor the surficial aquifer and the other to monitor the upper Floridan aquifer. The remaining 11 well sites will only have a surficial aquifer monitor well installed. Groundwater level data collected from these wells will help assess the hydraulic connection between the lakes and the surficial and upper Floridan aquifers in the east-central part of the Southwest Florida Water Management District (District). Data collected from the wells will be used to assess the minimum lake levels in accordance with Section 373.042, Florida Statutes and improve model calibration for various District projects.

The sites targeted for investigation are Crystal Lake, Diner Lake, Eagle Lake, Lake Annie, Lake Amoret, Lake Aurora, Lake Bonnie, Clinch Lake, Lake Easy, Lake Eva, Lake Lee, Lake Lowery, Lake McLeod, Lake Mabel, Lake Starr, Lake Venus, North Lake Wales, and Trout Lake (fig. 1). This report details the well construction and hydrogeology of the Lake Aurora well site.

## Acknowledgments

Special thanks to Mendez Drilling, Incorporated for their continued professionalism.

## Site Location

The Lake Aurora well site is in east-central Polk County approximately one mile west of the District boundary (fig. 2). It is in the northwest quarter of the northwest quarter of Section 18, Township 30 South, and Range 29 East at latitude  $27^{\circ} 52' 46.76''$  north and longitude  $81^{\circ} 27' 53.50''$  west (fig.

2). The land surface elevation is approximately 109 feet above the North American Vertical Datum of 1988 (NAVD 88).

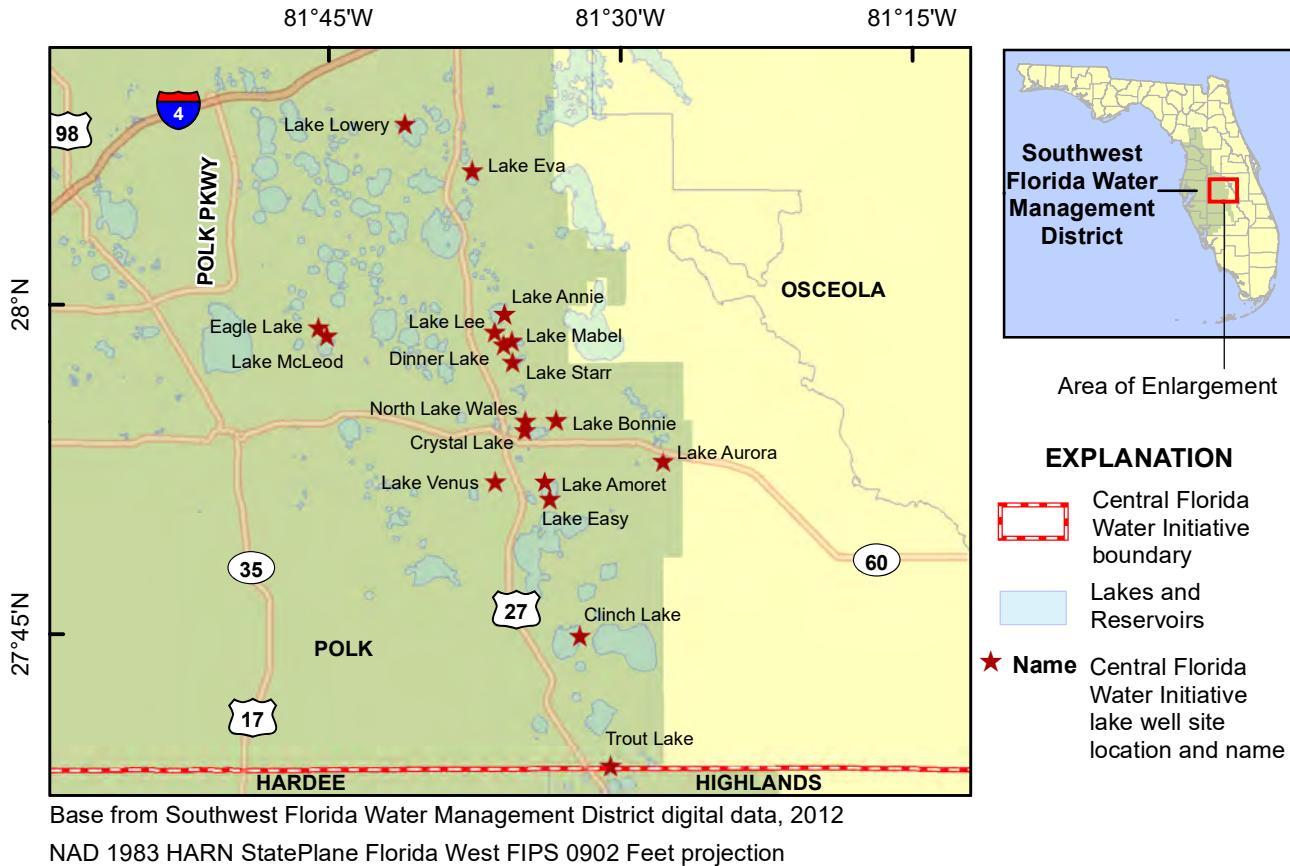
The Lake Aurora well site is located on a perpetual easement granted to the District by the Lake Aurora Christian Assembly, Incorporated. Figure 3 presents the layout for the Lake Aurora well site. The Lake Aurora well site can be found by taking State Road 60 E/Hesperides Road east in Lake Wales for 7.2 miles, turning south onto Breen Road S for 0.2 miles, turning south onto Acacia Walk, and proceeding for 0.4 miles to the well site.

The Lake Aurora well site is in the Lake Wales Ridge Complex Province in the Lakes District of west-central Florida, which extends from southern Lake County to southern Highlands County (Williams et al, 2022). The Lake Wales Ridge Complex is between the Hardee Upland, and the Osceola Plain to the east. The Lake Wales Ridge Complex Province is primarily made of sand ridges separated by valleys that trend north to south. These sand ridges are underlain by a karstic terrain (Yobbi, 1996). Approximately 200 lakes, ponds, swamps, and sinkholes occur along the Lake Wales Ridge and adjacent areas (Yobbi, 1996). The carbonate materials of the ridge were dissolved, collapsing into sinkholes, and subsequently forming these lakes and ponds (Yobbi, 1996). The Lake Wales Ridge is an area of interest due to the hydrologic connection between surface water systems and groundwater systems via sinkholes and other features characterized by karstic terrain. The Lake Aurora well site is in the Kissimmee River Drainage Basin.

## Methods

Mendez Drilling, Incorporated (Mendez) collected lithologic samples using a Diedrich D-50 drill rig mounted on a Morooka track platform equipped for split-spoon sampling and hydraulic-rotary core drilling and a Failing 1500 drill rig equipped for split-spoon sampling and mud-rotary drilling. Split-spoon sampling occurred between January 21 and 24, 2020, at the surficial aquifer monitor well location. 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.

## 2 Well Construction at the Lake Aurora Well Site in Polk County, Florida



[NAD, North American Datum; HARN, High Accuracy Reference Network; FIPS, Federal Information Processing Standards; N, north; W, west; PKWY, Parkway]

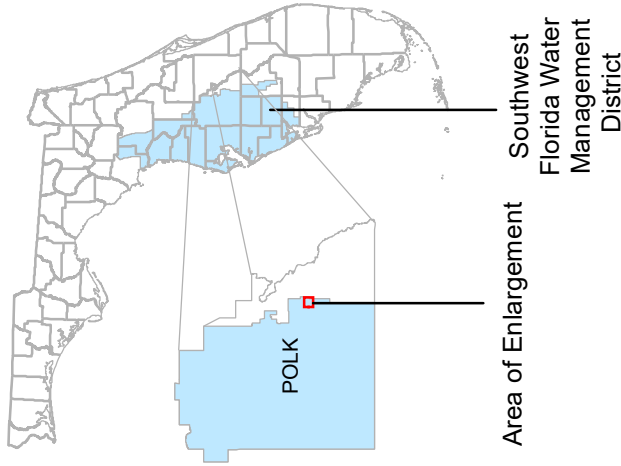
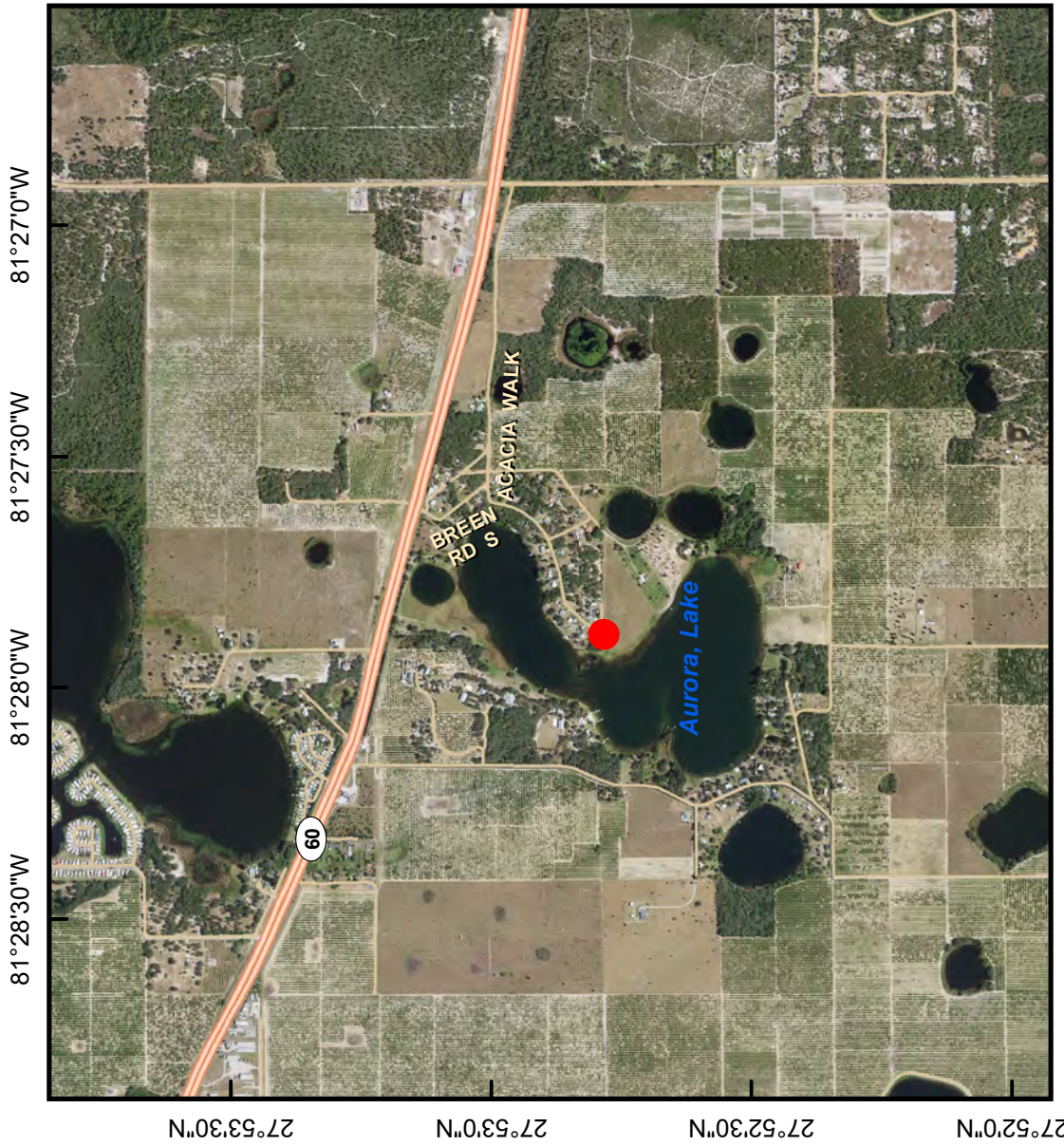
**Figure 1.** Data, Monitoring, and Investigations Team Minimum Lake Level well sites.

Mendez collected samples in two-foot intervals for every five feet drilled from land surface to 30 feet below land surface (bls). Then, continuous lithologic samples were collected in two-foot intervals from 30 to 60 feet bls. Mendez relocated the Diedrich D-50 drill rig to the upper Floridan aquifer (U Fldn Aq) monitor well location and drilled to 63 feet bls to resume the collection of split-spoon samples in two-foot intervals for every five feet drilled from 63 to 140 feet bls. Then, Mendez moved the Failing 1500 drill rig over the exploratory borehole to construct the U Fldn Aq Monitor well. From January 27 to 30, 2020, grab samples of drill cuttings were collected at five to 10-foot intervals from 120 to 148 feet bls during construction of the U Fldn Aq Monitor well. Mendez switched back to the split-spoon sampling method between 148 and 160 feet bls to collect lithologic samples where green clay containing shell fragments was identified. On January 31, 2020, Mendez drilled from 160 to 168 feet bls. At 168 feet bls, limestone was identified in the drill cuttings; therefore, Mendez switched back to the split-spoon sampling method from 168 to refusal at 170 feet bls. Mendez moved the Diedrich D-50 drill rig mounted on a Morooka track platform back over the borehole

to collect continuous core samples in 5-foot increments using the wireline core drilling method from 170 to 292 feet bls. The samples were boxed, labeled, described, and transported to the Florida Geological Survey for further analysis and storage.

## Well Construction

Monitor well construction at the Lake Aurora well site was completed by Mendez and supervised by District staff. Permanent monitor wells were constructed for long-term water level monitoring. Two monitor wells were constructed, including one permanent surficial aquifer monitor well and one permanent upper Floridan aquifer monitor well (fig. 3). Mendez constructed the two wells between January 21 and February 25, 2020. The exploratory borehole was converted into the upper Floridan aquifer monitor well after exploration was complete. Each well was developed by pumping at least three well volumes until the discharge water was free of sediment and clear, unless otherwise stated. The 4-inch polyvinyl chloride (PVC) casing for each well was raised to three feet



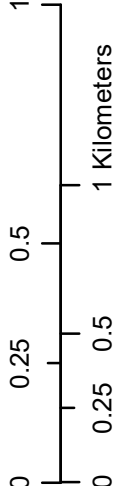
**EXPLANATION**

● Lake Aurora Monitor Well Site  
 Section/Township/Range: S18/T30S/R29E  
 Latitude: 27° 52' 46.76" N  
 Longitude: 81° 27' 53.50" W

**Directions**

From Lake Wales, take State Road 60 E/Hesperides Road east for 7.2 miles. Turn south onto Breen Road S for 0.2 miles. Turn south onto Acacia Walk and proceed for 0.4 miles to the well site.

Base from Southwest Florida Water Management District digital orthophoto, 2023  
 NAD 1983 HARN StatePlane Florida West FIPS 0902 Feet Projection



[NAD, North American Datum; HARN, High Accuracy Reference Network; FIPS, Federal Information Processing Standards; N, north; S, south; E, east; W, west; Rd, Road]

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

4 Well Construction at the Lake Aurora Well Site in Polk County, Florida

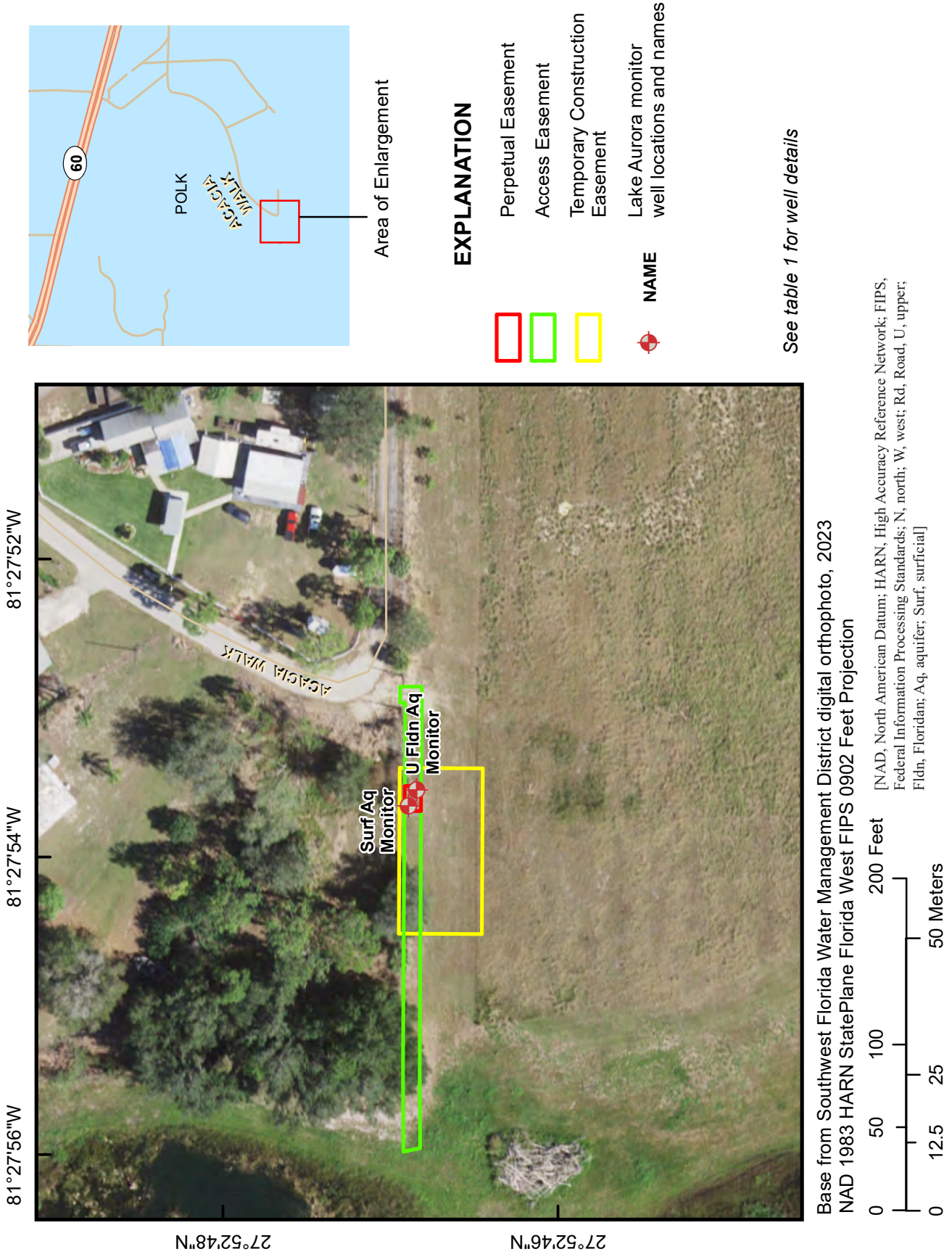


Figure 3. Layout of the Lake Aurora well site in Polk County, Florida.

above land surface. Sand was installed inside a lockable metal well cover around the casing. Concrete pads were installed around the finished wells. 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 for daily water level monitoring.

## Surficial Aquifer Monitor Well

The Surf Aq Monitor well (District station ID [SID] 934533) was installed between January 21 and 24, 2020, using well construction permit (WCP) number 885476. The final well specifications can be found in table 1 and figure 4. The well is contained within the undifferentiated sand and clay sediments and will be used to monitor the groundwater level in the surficial aquifer.

Mendez constructed the Surf Aq Monitor well using a Diedrich D-50 drill rig mounted on a Morooka track platform equipped for hollow-stem auguring to drill an 8-inch hole from land surface to 60 feet bls. Next, 4-inch, schedule 40, threaded, PVC screen (0.010-inch slot) was installed between 10.5 and 50.5 feet bls. Then, 4-inch, schedule 40, threaded, PVC casing was installed from land surface to 10.5 feet bls. A 20-30 silica sand filter pack was installed from six to 50.5 feet bls, a 30-65 fine silica sand seal was installed from four to six feet bls, and cement grout was installed from land surface to four feet bls. The well was developed for approximately 35 minutes at 42.85 gallons per minute (gpm). The specific capacity of the well was nine gallons per minute per foot (gpm/ft) and the approximate measurement of the drawdown was recorded at 4.69 feet. The Surf Aq Monitor well was used as the water supply well for the remainder of the core drilling and well construction operations.

## Upper Floridan Aquifer Monitor Well

The U Fldn Aq Monitor well (District SID 934534) was installed between January 23 and February 25, 2020, under WCP number 885295. The final well specifications can be found in table 1 and figure 5. The well will be used to monitor the water levels in the upper Floridan aquifer.

On January 27, 2020, Mendez used the Failing 1500 drill rig to widen the exploratory borehole to 18 inches in diameter, from land surface to 114 feet bls. Next, 12-inch, schedule 40, threaded, PVC casing was installed and grouted from 114 feet bls to land surface. The cement was left to harden overnight. On February 3, 2020, Mendez drilled a nominal 12-inch open hole using the mud-rotary method from 114 to 160 feet bls. Next, 8-inch, schedule 40, threaded, PVC casing was installed and grouted from land surface to 160 feet bls. The cement was left to harden overnight.

Between February 5 and 13, 2020, the Failing 1500 drill rig was removed, and the Diedrich D-50 drill rig was set up on the borehole. Mendez drilled a nominal 8-inch open hole using the mud-rotary method from 160 to 240 feet bls. Next, 4-inch,

schedule 40, Certa-Lok PVC casing was installed and grouted from land surface to 240 feet bls. The cement was left to harden overnight. On February 14, 2020, the annulus was tagged at 235 feet bls. Mendez installed 40 bags of ¼-inch gravel and 200 gallons of cement grout in the annulus. The cement grout was left to harden overnight. On February 17, 2020, the annulus was tagged at 233 feet bls. Mendez installed 76 bags of pea gravel and 300 gallons of cement grout in the annulus. The annulus was tagged at 218 feet bls. On February 18, 2020, Mendez tagged the annulus at 231 feet bls, which is a 13 feet loss from the initial tag. Next, Mendez installed 30 bags of pea gravel and 11 bags of cement grout in the annulus and let the cement harden. The annulus was still tagged at 231 feet bls. A well construction variance was approved to use sections of ½-inch PVC pipe of varying lengths (not to exceed six feet) and gravel to create a bridge. On February 19, 2020, Mendez installed the sections of ½-inch PVC pipe (ranging from one to five feet in length) through a 1-inch PVC pipe placed at the bottom of the borehole. After several pieces of ½-inch PVC pipe were installed at the bottom of the borehole, 20 five-gallon buckets of gravel were also installed at the bottom of the borehole to create the bridge. The gravel was tagged at 227 feet bls. The bridge process was repeated by installing varying lengths of ½-inch PVC pipe through the 1-inch PVC pipe at the bottom of the borehole. One five-gallon bucket of gravel was installed in the annulus and the annulus was tagged at 225 feet bls. Next, fifteen bags of cement were installed in the annulus. The cement was left to harden overnight. Mendez encountered intermittent cavities between 189 and 232 feet bls during core drilling. These cavities were noted as circulation losses on the daily drilling logs in appendix A. Therefore, cement loss is likely attributed to the cavities.

On February 20, 2020, the annulus was tagged at 218 feet bls. Mendez installed 10 five-gallon buckets of gravel. Another ½-inch PVC bridge was installed but the annulus was still tagged at 218 feet bls. Mendez installed seven five-gallon buckets of gravel in the annulus and tagged it at 216.5 feet bls. Another ½-inch PVC bridge was installed and topped with seven five-gallon buckets of gravel. The annulus was tagged at 215 feet bls. A third ½-inch PVC bridge was installed and topped with 5.5 five-gallon buckets of gravel. The annulus was tagged at 213 feet bls. Sixteen bags of cement grout were installed in the annulus. After the cement grout hardened, the annulus was tagged at 213 feet bls. Mendez installed 4.5 five-gallon buckets of gravel in the annulus and tagged it at 207 feet bls. Next, Mendez installed 135 gallons of cement grout in the annulus. After the cement grout hardened, the annulus was tagged at 68 feet bls. Mendez installed 21 bags of cement grout in the annulus. The cement was left to harden overnight. On February 21, 2020, Mendez tagged the annulus at 60 feet bls. Mendez installed 107 gallons of cement grout, which made a visible return at land surface.

Between February 24 and 25, 2020, Mendez performed wireline core drilling through the 4-inch PVC casing from 240 feet bls to a total depth of 292 feet bls. Twenty feet of

## 6 Well Construction at the Lake Aurora Well Site in Polk County, Florida

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

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

SID	Station Name	Open Interval (ft bls)	Casing Type	Casing Diameter (inches)	Constructed By	Start Date (MM/DD/YYYY)	Complete Date (MM/DD/YYYY)	Status	WCP No.
934533	Lake Aurora Surf Aq Monitor	10.5-50.5	PVC screen	4	Mendez Drilling, Inc.	01/21/2020	01/24/2020	Active	885476
934534	Lake Aurora U Fldn Aq Monitor	240-292	PVC	4	Mendez Drilling, Inc.	01/23/2020	02/25/2020	Active	885295

the temporary HQ working casing was tripped out and the borehole was airlifted for 30 minutes. Next, Mendez tripped out 30 more feet of the temporary HQ working casing and airlifted for 30 more minutes. The remainder of the temporary HQ working casing was tripped out of the hole. The well was developed for approximately 57 minutes at 8.82 gpm. The specific capacity of the well was 0.9 gpm/ft, and the approximate measurement of the drawdown was recorded at 10.07 feet. After well construction was completed, a caliper log of the U Fldn Aq Monitor well was collected on February 25, 2020 (fig. 6).

## Geology

The geology of the Lake Aurora well site is based on lithologic samples collected from split-spoon sampling, interpretation of drill cuttings collected during well construction, and lithologic samples collected from hydraulic-rotary core drilling. The geologic units encountered at the well site include, in ascending order: the Ocala Limestone, the Suwannee Limestone, the undifferentiated Arcadia Formation, the Peace River Formation, the Cypresshead Formation, and the undifferentiated sand and clay deposits. A stratigraphic column detailing the lithostratigraphy encountered at the well site is presented in figure 7. The lithologic log is presented in appendix B. Digital photographs of the lithologic core samples are presented in appendix C.

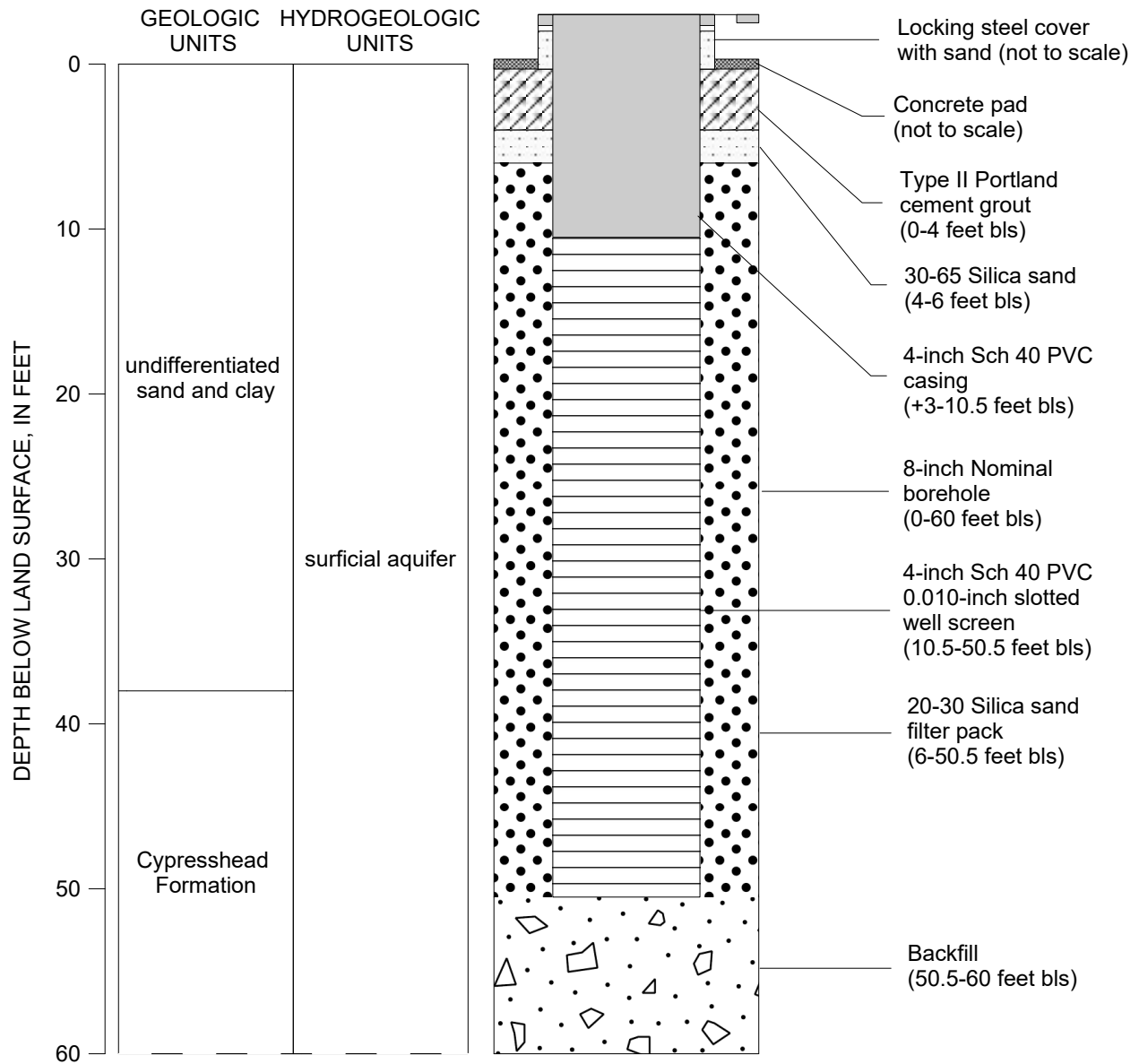
The late Eocene age Ocala Limestone extends from 240 feet bls to beyond the total depth of exploration at 292 feet bls at the Lake Aurora well site. The top of the Ocala Limestone was picked at the top of the very first grab sample interval where the diagnostic benthic foraminifera, *Lepidocyclina ocalana* was identified. The general lithology of the Ocala Limestone at this location consists of very light orange to yellowish gray, fossiliferous, very fine to fine grained limestone

with good induration. Additional fossil molds and fragments observed are mollusks including gastropods, and brachiopods and benthic foraminifera. The porosity of the limestone is predominantly intergranular, pinpoint, vugular, and moldic.

At the Lake Aurora well site, the early Oligocene age Suwannee Limestone extends from 232 to 240 feet bls. The top of the Suwannee Limestone was difficult to pick because a void was present from approximately 228 to 232 feet bls, resulting in 46 percent recovery of cuttings. No phosphate was observed in the interval between 232.5 and 235 feet bls. The general lithology of the Suwannee Limestone at this location consists of very light orange to grayish orange, fossiliferous, very fine to fine grained limestone with good induration. Fossil molds and fragments observed were mollusks including gastropods, and coral.

At the Lake Aurora well site, the Miocene to Oligocene age undifferentiated Arcadia Formation is present from 168 to 232 feet bls. The undifferentiated Arcadia Formation primarily consists of very light gray to yellowish gray, phosphatic wackestone, mudstone, and dolostone that are generally microcrystalline to fine grained with good induration. Phosphatic gravel and sand is present throughout this unit, with phosphatic sand being dominant. Fossil molds and fragments observed were mollusks including gastropods. Shark teeth were observed in the core samples between 172 and 176 feet bls. Small clay lenses are present between 215.8 and 218 feet bls.

The Miocene age Peace River Formation is present from 83 to 168 feet bls at the Lake Aurora well site. The top of the Formation was picked at a transition from sand to sandy clay. The general lithology of the Peace River Formation at this location consists of yellowish gray to light olive gray, sub-rounded to rounded sand. Clay, mica, and organics are present throughout the Formation. Fossil fragments increase with depth, and a bed of fragmented mollusk shells is present between 133 and 135 feet bls. Between 148 and 150 feet bls, phosphatic limestone was observed. Silt-sized dolomite was



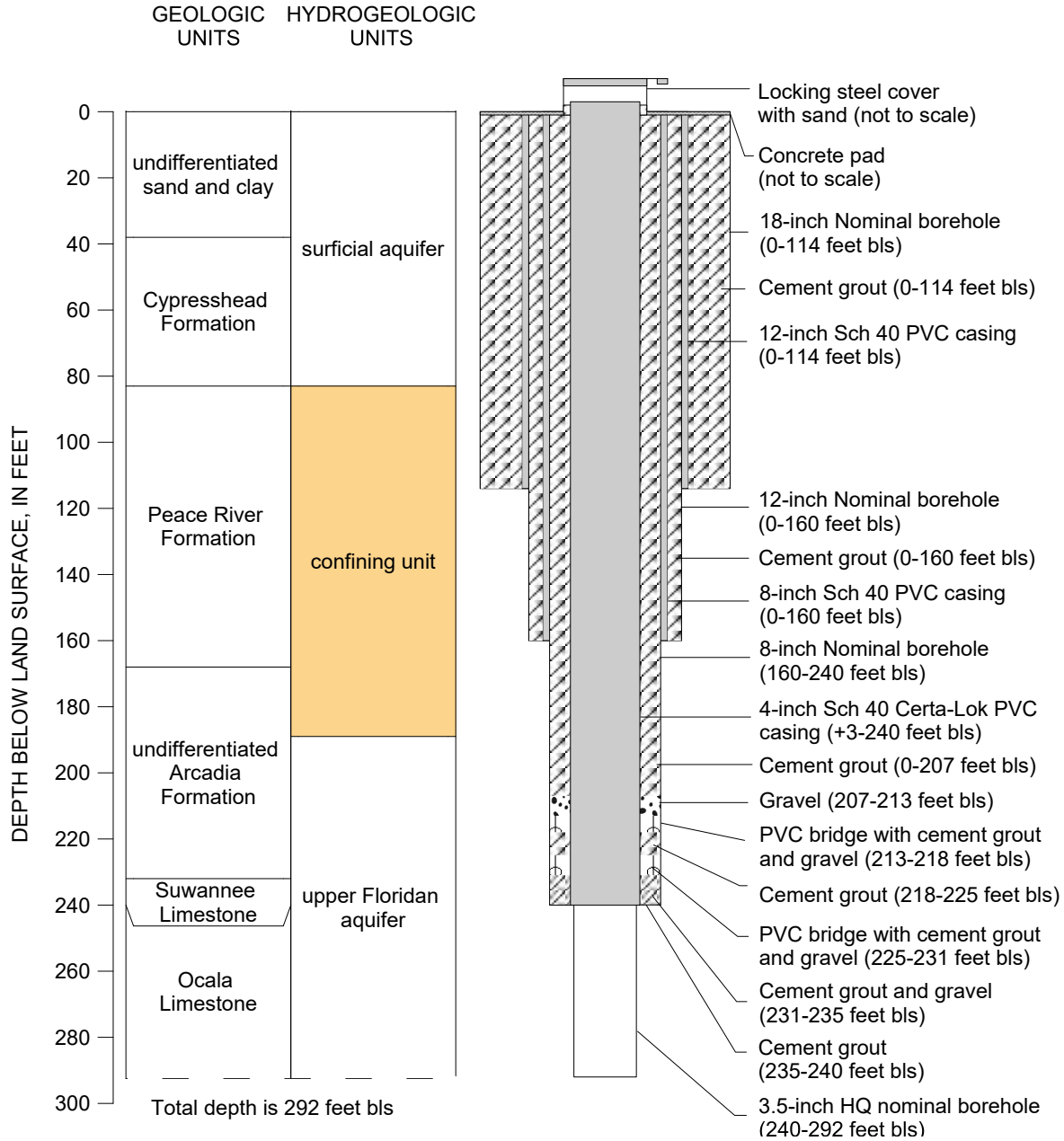
Well Name:	Lake Aurora Surf Aq Monitor
SID:	934533
WCP:	885476
S/T/R:	18/30S/29E
Latitude:	27° 52' 46.84" N
Longitude:	81° 27' 53.73" W
Reporting Category:	AURO
Const. Began:	01/21/2020
Const. Complete:	01/24/2020

EXPLANATION	
	20-30 sand
	Backfill
	Cement grout
	PVC casing
	Screen
	Locking steel cover
	30-65 sand
	Concrete

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

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

8 Well Construction at the Lake Aurora Well Site in Polk County, Florida



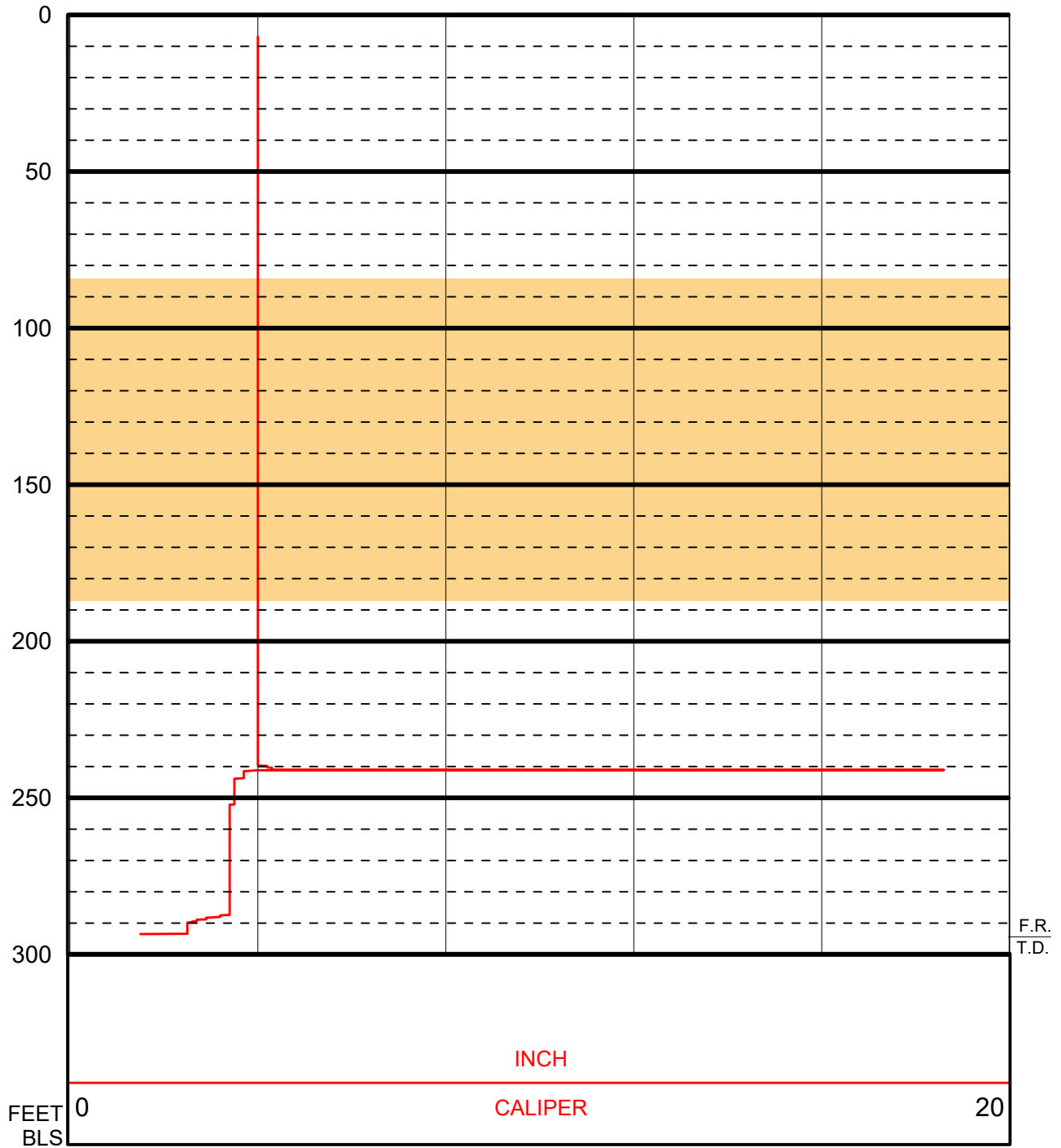
Well Name:	Lake Aurora U Fldn Aq Monitor
SID:	934534
WCP:	885295
S/T/R:	18/30S/29E
Latitude:	27° 52' 46.76" N
Longitude:	81° 27' 53.50" W
Reporting Category:	AURO
Const. Began:	01/23/2020
Const. Complete:	02/25/2020

EXPLANATION			
	Concrete		30-65 sand
	Gravel		Locking steel cover
	Open hole		Bridge
	Cement grout		Cement grout and gravel
	PVC casing		

[bls, below land surface; Sch, schedule; PVC, polyvinyl chloride; U, upper; Fldn, Floridan; Aq, aquifer; SID, station identification; WCP, well construction permit; S/T/R, Section/Township/Range; S, south; E, east; Const., construction]

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





[BLS, below land surface; F.R., first reading above total depth a geophysical tool makes a measurement; T.D., total depth]

**Figure 6.** Caliper log for the U Fldn Aq Monitor from land surface to 293.5 feet below land surface collected at the Lake Aurora well site in Polk County, Florida. The log was performed on February 25, 2020, using the 9064A (caliper/gamma-ray) tool. The tool was run inside 4-inch schedule 40 polyvinyl chloride casing that was set to 240 feet below land surface. The log scale is 2-inches per 100 feet and is linearly scaled. The first reading is 293.5 feet below land surface. Shaded intervals indicate confining units.

## 10 Well Construction at the Lake Aurora Well Site in Polk County, Florida

observed in an interval of sand intermixed with clay between 158 and 160 feet bls.

The Late Pliocene Cypresshead Formation is present at the Lake Aurora well site from 38 to 83 feet bls. The top of the Formation was chosen where moderate brown to moderate yellowish brown sands transition to grayish orange to dark yellowish orange sands. The Cypresshead Formation primarily consists of white to very light orange, very fine to fine grained, sub-rounded to rounded, unconsolidated sand with accessory mica and organics.

At the Lake Aurora well site, the Pliocene to Holocene age undifferentiated sand and clay unit is present from land surface to 38 feet bls. The interval from land surface to 28 feet bls consists of very light orange to yellowish brown, fine to medium grained, sub-rounded to rounded, unconsolidated sand with accessory organics. Mica was observed beginning at 18 feet bls. From 28 to 38 feet bls, the sediments are primarily dark yellowish brown to moderate brown, very fine to fine grained, sub-rounded to rounded, unconsolidated sand with accessory mica and organics.

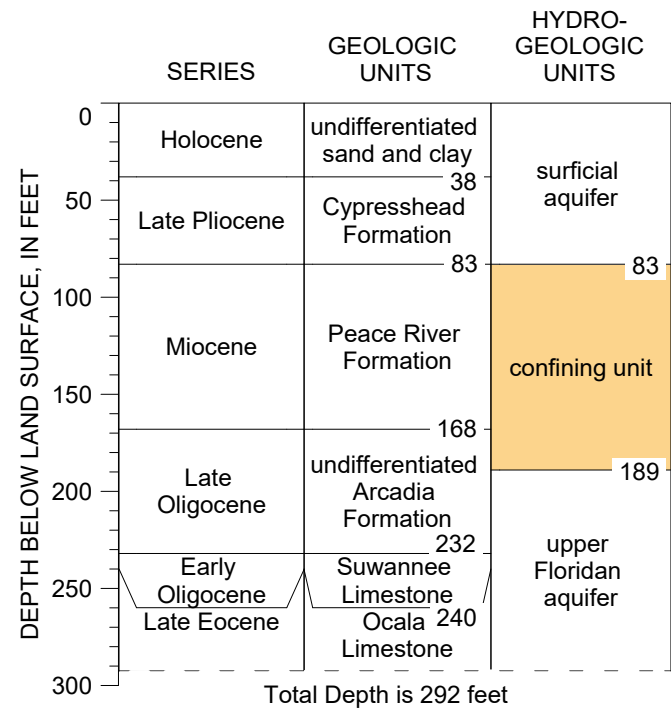
## Hydrogeology

The hydrogeology of the Lake Aurora well site was delineated based on the lithology encountered during split-spoon sampling, core sampling, and rock cuttings collected during well construction, and observed groundwater levels in the wells. Two aquifers were identified at the Lake Aurora well site: the surficial aquifer and the upper Floridan aquifer separated by a confining unit (fig. 7).

The surficial aquifer is the shallowest hydrogeologic unit present at the Lake Aurora well site. It extends from the water table to 83 feet bls and is unconfined. The aquifer is contained within the undifferentiated sand and clay unit and the Cypresshead Formation. The sediments were wet at eight feet bls during sample collection. On December 20, 2021, the groundwater elevation in the Surf Aq Monitor well was measured at 95.59 feet NAVD 88 (fig. 8).

A confining unit is present between 83 and 189 feet bls in the low-permeability mixed clays and limestones of the Peace River Formation and the upper portion of the undifferentiated Arcadia Formation. The confining unit separates the surficial aquifer from the underlying upper Floridan aquifer.

The portion of the upper Floridan aquifer encountered during well construction extends from 189 feet to beyond the depth of exploration and includes the lower portion of the undifferentiated Arcadia Formation, all the Suwannee Limestone, and the Ocala Limestone (fig. 7). The top of the unit occurs near the top of the undifferentiated Arcadia Formation and was chosen within persistent, well indurated, fossiliferous wackestones, where drilling fluid circulation was lost. The base of the unit was not reached during well construction but is predicted to occur around 600 feet bls at this location, at the top of middle confining unit I (Miller, 1986). On December



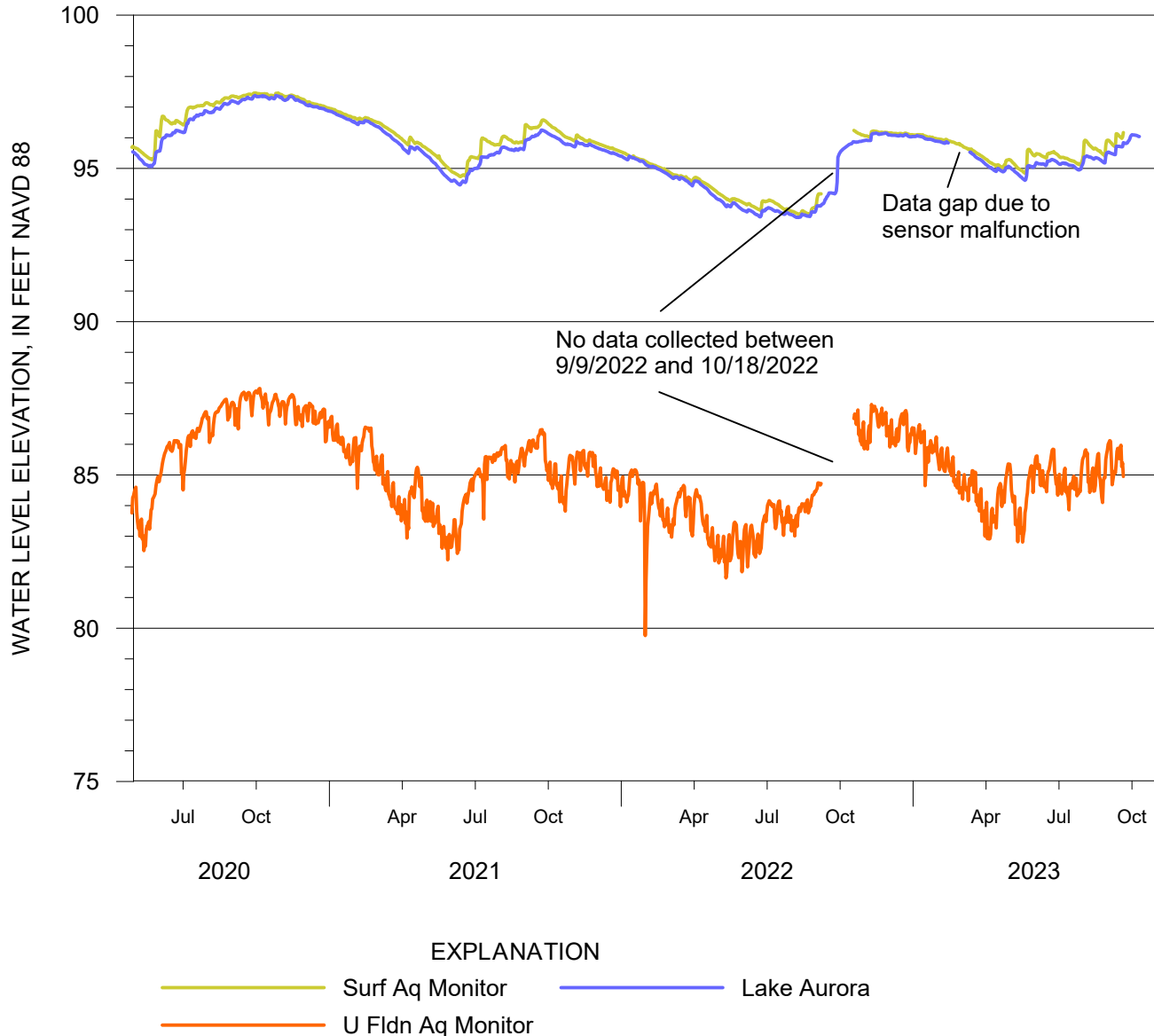
[Land surface elevation is approximately 108.6 feet above the North American vertical datum of 1988 at the U Fldn Aq Monitor well]

**Figure 7.** Stratigraphic column detailing the hydrogeologic setting at the Lake Aurora well site in Polk County, Florida.

20, 2021, the groundwater elevation in the U Fldn Aq Monitor well was measured at 84.75 feet NAVD 88, which was 10.84 feet below the Surf Aq Monitor well water level. Figure 8 presents a hydrograph of the maximum daily water levels for the monitor wells and the daily mean water level for Lake Aurora. The surficial aquifer and Lake Aurora water levels are shallower relative to the upper Floridan aquifer water levels indicating a downward head gradient and suggests the Lake Aurora well site is in a recharge area for the upper Floridan aquifer (fig. 8).

## Summary

Two monitor wells were constructed at the Lake Aurora well site in Polk County, Florida between January and February 2020. The wells were constructed as part of the CFWI to monitor groundwater levels in the surficial and upper Floridan aquifers near Lake Aurora. The casing and total depth of the Surf Aq Monitor well are 10.5 and 50.5 feet bls, respectively. The casing and total depth of the U Fldn Aq Monitor well are 240 and 292 feet bls, respectively. The groundwater levels in the two wells differed by 10.84 feet on December 20, 2021. Both wells are secured with lockable metal well covers and equipped for long-term groundwater level monitoring.



[Apr, April; Aq, aquifer; Fldn, Floridan; Jul, July; NAVD 88, North American Vertical Datum of 1988; Oct, October; Surf, surficial; U, upper]

**Figure 8.** Hydrograph of the maximum daily water levels for the permanent monitor wells at the Lake Aurora well site and the daily mean water level for Lake Aurora in Polk County, Florida.

The hydrogeology of the well site was determined from split-spoon samples collected prior to well construction and core samples and drill cuttings collected during well construction of the upper Floridan aquifer monitor well. The geologic units encountered at the site are: Ocala Limestone from 240 feet bls to beyond the total depth of exploration at 292 feet bls, the Suwannee Limestone from 232 to 240 feet bls, the undifferentiated Arcadia Formation from 168 to 232 feet bls, the Peace River Formation from 83 to 168 feet bls, the Cypresshead Formation from 38 to 83 feet bls, and the undifferentiated sand and clay deposits from land surface to 38 feet

bls. The hydrogeologic units encountered at the site are: the surficial aquifer from land surface to 83 feet bls, a confining unit from 83 to 189 feet bls, and the upper Floridan aquifer from 189 feet bls to beyond the total depth of exploration of 292 feet bls.

## References

- Miller, J.A., 1986, Hydrogeologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina: U.S. Geological Survey Professional Paper 1403-B, 91 p., 33 pls.
- Williams, Christopher P., Scott, Thomas M., and Upchurch, Sam B., 2022, Florida Geomorphology Atlas: Florida Geological Survey Special Publication No. 59, 238 p.
- Yobbi, D.K., 1996, Analysis and Simulation of Ground-Water Flow in Lake Wales Ridge and Adjacent Areas of Central Florida: U.S. Geological Survey Water-Resources Investigations Report 94-4254, 82 p.

**Appendix A. Scanned Daily Drilling Logs Taken  
During Well Construction at the Lake Aurora Well  
site in Polk County, Florida**

---

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
1	TJ FALLON, K Mallam	21 Jan 2020	21 Jan 2020	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony Hudson, Matt Herron, Roy Smith, John	40		

WELL SITE	Lake Aurora	WELL NAME	SA Monitor
-----------	-------------	-----------	------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
09:00			Fallon on-site; Mendez on-site
09:52			Setting Rig up to drill W.S. well; Mix
10:28		1.5-3	Drill
10:42		3-5	SPT (1, 2, 2, 3) 8 blows ← SPT per Ando Hammer
10:44		5-8	Drill
10:45		8-10	SPT (3, 4, 4, 4) 15 blows
10:47		10-13	Drill
10:49		13-15	SPT (2, 3, 5, 6) 16 blows
10:51		15-18	Drill
10:55		18-20	SPT (2, 3, 5, 5) 15 blows
			Add water to Mud pit, Add more Mud, de-sand Mud
11:06		20-23	Drill
11:10		23-25	SPT (3, 4, 5, 8) 20 blows
11:12		25-28	Drill
11:17		28-30	SPT (4, 5, 5, 6) 20 blows
<del>11:20</del>		<del>30-32</del>	<del>Drill</del>
11:23		30-32	SPT (2, 2, 4, 6) 14 blows
11:36		32-34	SPT (1, 2, 3, 5) 11 blows
11:44		34-36	SPT (5, 7, 10, 26) 42 blows
11:50		36-38	SPT (15, 21, 23, 24) 83 blows
12:00		38-40	SPT (8, 13, 17, 21) 59 blows
12:08		40-42	SPT (7, 10, 15, 21) 53 blows 1220- Add mud
12:20		42-44	SPT (10, 14, 15, 21) 60 blows
		44-46	SPT (9, 11, 14, 17) 51 blows
12:42		46-48	SPT (7, 10, 15, 19) 51 blows
12:52		48-50	SPT (8, 8, 9, 15) 40 blows
13:00		50-52	SPT (8, 9, 12, 16) 45 blows
13:11		52-54	SPT (8, 9, 10, 13) 40 blows 1318- Add Water - Filling Rig
13:42		54-56	SPT (7, 7, 8, 12) 34 blows Water tank from mobil tank
13:52		56-58	SPT (6, 8, 11, 14) 39 blows Shovelng sand out of Mud tub
14:01		58-60	SPT (7, 7, 9, 15) 38 blows Added Mud
14:44	14:50	1.5-10	Auger 9 1/4-inch screen outer diameter 6-inch inner diameter
15:20			Drillers off-site

W.L.?  
 or 8' bls

District Representative			
-------------------------	--	--	--



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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
3	TJ FALLON <i>K. Mallams</i>	22 Jan 2020	22 Jan 2020	6.5

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	<i>Tony H, Roy S, Matt H, John</i>	60	—	—

WELL SITE	WELL NAME
Lake Aurora	UFA Monitor

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
14:00			- Moracka/Niederish over hole; Prep for Drill 30r 23 January
14:25			- Mendez OSS site
15:20			- Falbu OSS site

District Representative			
-------------------------	--	--	--



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

1317

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
4	TJ FALLON	23 Jan 2020	21 Jan 2020	4.8

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Matt Herron, John Ray S, Tony H	60	130	130

WELL SITE	WELL NAME
Lake Aurora	UFA Monitor

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
08:15			FALLON on-site; SA-W.L. = 15.09 ft btoe @ 08:30
08:42			Mendez on-site; Rig-on; Quik-Gel dumpster Seams, Circulate Mud
			↳ Add Quik-Gel - total bags - 11
09:47	10:22	L.S. - 63	Drill out SPT borehole to 63' btoe
			↳ 55 ft Rod Score = 111 111 11
10:32	10:34	63-65	SPT (X, 6, 9, 10) 33 blows
10:43		65-68	Drill
10:54		68-70	SPT (6, 7, 8, 10) 31 blows
11:15		70-73	Drill
11:24		73-75	SPT (6, 7, 10, 10) 33 blows
11:33		75-78	Drill
11:41		78-80	SPT (10, 16, 20, 18) 64 blows
12:02		80-83	Drill
12:11		83-85	SPT (4, 5, 6, 7) 22 blows - Clay content
		85-88	Drill
12:34		88-90	SPT (4, 2, 3, 4) 13 blows
12:46		90-93	Drill
12:56		93-95	SPT (2, 2, 4, 5) 13 blows
13:15		95-98	Drill
13:26		98-100	SPT (3, 4, 4, 5) 16 blows
13:37		100-103	Drill
13:49		103-105	SPT (9, 7, 5, 6) 27 blows
14:07		105-108	Drill
14:18		108-110	SPT (7, 4, 13, 13) 33 blows
14:30		110-113	Drill
14:42		113-115	SPT (2, 3, 5, 10) 20 blows - Clay Content
15:00		115-118	Drill
15:18		118-120	SPT (8, 11, 21, 29) 69 blows - Dry clay w/ shell fragments
15:43		120-123	Drill
16:05		123-125	SPT (8, 11, 16, 21) 56 blows
16:24		125-128	Drill
16:47		128-130	SPT (7, 21, 31, 42) 101 blows
16:50			Rig off
17:15			Dr. Heron off-site
17:35			FALLON off-site

District Representative			
-------------------------	--	--	--

Surface casing - 12" → 115 ish.?

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
5	TJ FALLON	24 Jan 2020	21 Jan 2020	130

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Matt & Chance Hermy; Ski, Roy S, Tony H	60	10	140'

WELL SITE	Well Name	UFA Monitor
Lake Aurora	UFA Monitor	UFA Monitor

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
08:05			FALLON on-site; WL's SA = 14.92 blac @ 8:09
08:15			Mendez on-site; Fuel Rig; Rigon; Circulate Mud
08:46	09:15	130-133	Drill (Driller: Natr; Core in n <sup>32</sup> - 50' in SPT Hole - Drill-root)
09:30		133-135	SPT (8, 13, 25, 82) 128 blows
09:48		135-138	Drill
10:07		138-140	SPT (12, 18, 37, 100) 167 blows 4 Trip out; Empty tub; Move Dienerich off of Hole.
11:00			Move Failing 1500 over Hole Mast-up; Tub in place
13:51			All parties off-site

District Representative			
-------------------------	--	--	--



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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
7a	TJ FALLON	27 Jan 2020	21 Jan 2020	L.S.

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Roy Smith, Tony Hudson	140 60-		

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
08:05			Fallon on-site; WL-SA: 14.22 b <sup>+</sup> oc
08:27			Mendez on-site; 08:30 C. Tomlinson; 09:00 K. Mallon + Dave Arnold
09:15			Mud Sample - See Report 7b
09:20	10:20	L.S.-20	Drill w/ 18-inch Drag Bit 205± Rod Count III + Kelly Add Quick Gel - 1 Bag + circulate
10:43	12:25	20-40	Drill; Add Quick Gel 11 bags
10:55			Mud Sample
11:25			Wall Cake thickness test
12:06			Sand Content, mud weight, viscosity (Mud) tests
12:33	14:00	40-60	Drill
14:15		60-80	Drill
14:20	16:40		Sand Content, mud viscosity, mud weight tests
16:40	17:48	80-100	Drill + Circulate Mud
17:58			Mud Sample
18:00			Trip out Rods
18:36			Rig OSC - All parties O.S.S.-size
			Total bags of mud - III III III III

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
76 Fluids	TJ FALLON	27 Jan 2020	21 Jan 2020	6.5

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony Hudson, Ray Smith	60		

WELL SITE	WELL NAME
Lake Aurora	UFA Monitor

TIME LOG		DEPTH	Drilling Fluid Properties				DETAILS OF OPERATIONS	
From	To		pH	% Sand	Wt	Sec	Notes	
					Mud Weight	Marsh Funnel (viscosity)		
1/27	09:15	6.5	5		8.4 lbs/gal		7% Wall Cake (filter loss)	
10	09:40	10		1.5%	8.6 lbs/gal			
	10:27	20		2.0%	8.5 lbs/gal			
	10:55	25		<1%		37c		
	11:25	25					4/32 sec / 30 ml	
	12:06	38		1%	8.7 lbs/gal	39 sec		
	14:15	60		1%	8.7 lbs/gal	40 sec		
	16:40	80		1%	8.7 lbs/gal	46 sec		
	17:58	100		2%	8.8 lbs/gal	46 sec		
1/28	12:36	115		<1%	8.8 lbs/gal	50 sec	4/32 / 25 ml	

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
8	TJ FALLON	28 Jan 2020	21 Jan 2020	100

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony Hudson, Roy Smith	60	13'	114'

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:00			- Driller on-site
07:15			- Fallon, Tomlinson on-site
08:00		L.S. - 30	- Trip in 18-inch bit; Circulate Mud; Add 1 bag Quik-Gel
08:13	08:15	30-40	↳ bit stuck at ~305'; Add 1/2 bag Quik-Gel
08:28	08:31	40-60	- Trip-in Rods; Mud-Hole; Circulate Mud; Add 1/2 Bag Quik-Gel
8:45	9:33		- Dampener Truck on-site; Pump cuttings into dumpster.
09:45	09:55	60-80	- Trip-in Rod; Drill
10:00	10:05	80-100	- Trip-in Rod; Drill; Run Rods up-down hole/Mud the Hole;
10:35	12:50	100-114	- Trip-in Rod; Drill; Add 1 bag Quik-Gel; Fill Make-up Tank
12:30			Mud viscosity = 50 sec (Marsh Funnel), Sand Content, Mud weight, Wall Core
12:50	13:05		- Trip Out; Clay on bit
13:10	14:55	L.S. - 114	- Emlace 12-inch PVC casing 20ft length <del>114'</del> Note: 12-inch casing is screwed not glued/solvent welded on first joint
15:10			- Prepare to Pressure Grout Theoretical 18" x 12.75" x 114' Annular = 731 gallons or 7.8 sacks
16:00			- Mix Cement 17 sacks ↳ Cement (Portland Type I/II) weight = 12.8 lbs/gal/oa
16:31	16:38		- Pump Cement (Pressure Grout); Flush w/ water
16:40	17:08		- Mix Cement 17 sacks ↳ 13.4 lbs per gallon
17:12			- Pump Cement (Pressure Grout); Flush w/ water
17:20			- Casing Floats out of borehole after batch break ↳ Attempt to hammer in w/ cathead - unsuccessful
17:34		114	↳ Ratchet Strap used to pull casing back to 114 ft bl. ↳ Secure in place
17:55			- Remove Tremie; Port land shows at 22' on tremie on 6956 bl. ↳ Pump mud into 12-inch casing to displace Portland. 411 gallons mud San theoretical displacement.
18:00	18:30		- Pump Mud; Clean-up
18:35			- District Stays off site
			Cement - 17 + 17 = 34
			Drill Rig - Failing 1500
			Bags Quik-Gel 1111

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
9	TJ FALLON	29 Jan 2020	21 Jan 2020	106

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony Hudson, Roy Smith, John Helper	60	12	118

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:20			- Fallon on-site; WL-SA = 14.26' b2ac; Test Portland Sample from 2.8 Jun
07:45			- Mendez on-site
07:55	8:20		- Dumpster Track on-site; Transfer Cuttings; Prep San Drilling
09:42		106'	- Rig on; take pressure head OSS as 12-inch ↳ Tag 12-inch Portland @ 106' bts inside casing ↳ Tag 18" x 12" annulus @ ~3'5# bts
			↳ Note: Bit diameter is 17-inches
11:15			- Cut OSS - 12-inch casing
11:35			- Flush Drilling Fluid out as Casing
			- Trip in 1 1/4-inch bit inside 8-inch casing (Drag Bit) ↳ Rds TH
13:40		106-118	- Drill out Portland Formation; Add bag Quik Gel
14:00	14:20		↳ Stop & Circulate Mud
	15:54	-118	- Drill; Circulate Mud
16:25			- Mendez OSS-site
17:05			- Dickert OSS site
			Quik-Gel = 1

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
10	TJ FALLON	30 Jan 2020	21 Jan 2020	120 / 149 SPT

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Roy Smith, Tony Hudson, Matt Herron	60	285ft Wash /	149 wash /

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:59			- Fallon on-site w/ (CA) 14.284Toc
08:05			- Mendez on-site
09:17			- Rig on
09:50		120-	Cleaning dirt hole
10:05	10:50	120-130	Drill
10:50	11:30		Dumpster Truck on-site; Pause Drilling
11:30	12:40	130-140	Drill
11:52			Conduct Mud tests
12:50			Mud Cake too thick - need to make new mud
13:10	14:18	140-148	Drill - Cuttings indicate Green Clays; Shells; Coarse phosphate grains
14:25			Trip Poles out - put Spoon down for SPT
15:15		148-150	SPT (14, 25, 25, 22) 86 blows
16:31	16:58	150-158	Drill; Trip-out & Trip-in Spoon
17:30	17:32	158-160	SPT (20, 50, 4-in) 30 blows - Rode banner on last blow
			↳ Trip out Spoon
18:15			- All parties off-site

District Representative			
-------------------------	--	--	--



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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
106	TJ FALLON			

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling		60		

WELL SITE	WELL NAME
Lake Aurora	<del>XXXXXXXXXX</del>

TIME LOG		DEPTH	DETAILS OF OPERATIONS				
From	To		pH	% Sand	Weight (lbs/gal)	Viscosity (s)	Wall Cake (inches/gal)
<i>Drilling Fluid Properties</i>							
11:55	12:40	132'	11.5	2.5%	8.8	48 sec	20/32 (1/32 + 1/32)
3 February 2020							
09:30			- Add 15 ml by Volume (Graduated Cylinder) of Soda Ash (Suncoast pH Pac) to 1000 gal tank to raise pH → Raises to pH 6 as make-up H <sub>2</sub> O				
10:30			b Add 15 ml more				
10:26						37 sec	
4 February 2020							
09:35	11:04	144	11.5	1%	8.6	33	10/32 x 2 = 20/32 > 100 ml
12:25	12:50	148	10.5	N/A	N/A	28.5	7/32 x 2 = 14/32 > 100 ml
17:15		160	11.0	-	8.6	31.4	3/32 x 2 = 6/32 > 25 ml
Part land							
11:20			pH		Weight (lbs/gal)		
11:20			11		13.3 lbs/gal		→ Add 1 bag
11:30				1st Batch	13.5 lbs/gal		
11:35					13.6 lbs/gal		
11:42					14.0 lbs/gal		
12:20					13.3 lbs/gal		
12:30				2nd Batch	13.7 lbs/gal		
District Representative	12:39				14.0 lbs/gal		

After Quick Test bold was Added



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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
12	TJ FALLON / K Mallams	3 Feb 2020	21 Jan 2020	148

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony Hudson, Roy Smith	-60-		

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
8:05			T Fallon Arrive
8:15			T Hudson + R Smith Arrive
9:05			K Mallams Arrive
9:10			Drillers discussed on how to lower pH in mud + Raise pH in Water tank - mud pH = 11.5u H <sub>2</sub> O pH = 5.5u
09:30			Using Suncoast pH Plus to raise pH (Soda Ash) 15 ml (Volume) per 100 gal Using Chlorox pool - spa pH down to lower pH in Mud
09:50			Rig-on; Tee in; Circulate Mud.
11:50			Adding 2 L of Quick Tool Gold to 300 gal vat of H <sub>2</sub> O - Circulate
12:05			Add 1 L of Quick Tool Gold to 300 gal tank of H <sub>2</sub> O - circulate
12:14			Pump Solution down hole
12:25			Mud Test
12:55			Added 35 ml of pH Plus Suncoast pH Plus to H <sub>2</sub> O tank
13:00			Putting 12" drill bit down hole Rods = 1111
13:15	13:40	118-140	Reaming hole - get mud cake off
13:15			Added more Chlorox pool - spa pH down to mud (no measurement - Sprinkle in) Add Mud - 1
13:36	E		Adding more pH + polymer to mud
13:45	14:30	140 ~ 150	Drill/Ream hole
14:30	14:50		Trip out - exchange bit from drag bit to tri-cone bit
14:50			Dump truck Arrive - Clean dumpster out
15:40			Put tri-cone bit on + trip down hole
14:00	14:52	150-160	Drill; Circulate Fluid, Add Quik-Tool-Gold
17:31			• Pull up Rods; Rig off
17:50			• All Activities off-site
			Total bags of Mud - 11

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
13	TJ FALLON	4 Feb 2020	21 Jan 2020	162

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Roy Rowland, Tony Hudson	60	—	162

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:05			Mendez on-site; Prep; Fill Make-up Tank
07:10			FALLON on-site
07:50	9:09		Circulate Drilling Fluid; Wack Hole w/ bit → Hole Open
9:09			Trip out Rod & bit
09:28	10:30		Emplace PVC - 8-inch (20 ft length) 111111 ← Cut 18' off of last PVC Pipe ↳ PVC Solvent Weld with Screws
			Begin grouting - Theoretical - 49 bags - Contractor said he has 162 bags ready (add 10%) - Pressure grout
10:45			MIXING Cement - 20 bags @ 14.8 lbs/gal
11:43	11:51		Pump Cement - Approx ~ 250 gallons
12:04			Mix Portland - 20 bags @ 14.6 lbs/gal
12:40	12:51		Pump Portland - Approx ~ 250 gallons → Witness ReZonn
			Site Clean-up
14:15			All parties off-site
			Total Cement - 20 + 20 = 40
			Theoretical 11.75" x 8.625" Annulus = 42 gal, 2.6 gal/ft, = 44 sacks

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
14	TJ FALLON	5 Feb 2020	21 Jan 2020	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony H. Roy R, Matt H. Askia	60		

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
08:00			District Staff on-site; W.L.'s
08:13	08:30		Mendez Drilling Crew on-site; Site Prep; Rig on
08:30	08:39	160	Remove pressure cap; Remove C. Tenbrun tags - 12" 8" Annulus 4 1/2' b/s
08:39	09:03		Driller move; Failure Rig OSS hole
09:03	09:30		Await Dumpster Truck ↳ Pump OSS clear water from Dumpster
09:30	10:16		Dumpster Truck on-site ↳ Transfer Pump oil med to dumpster
10:16	10:50		Make Dieseltech SO over bore hole; Make-up; Prep to drill out 8-inch
10:50	11:09		Trip-in 8-inch normal bit + Rod 160 St Rod + 3 St bit
11:08	11:25		Cable Breaks on Rig ↳ Delay for Repair
11:25			Circulate Drilling Fluid
11:25	11:55	162-167	Drill; add on 10 St rod; Add Quik-Gel
12:05	12:31	167-	Drill; add 5 St Rod; Add Quik-Gel;
12:34	12:55	167-168	Drill;
12:55	13:17		Prepare 4-inch casing
13:18	13:35		Break out drill string
13:35	16:00	LS-169	Trip in 4-inch casing; w/ Drive Shoe; 170 St Temp Casing w/ T-head ↳ Auto Hammer Temp Casing into formation
16:00	17:15		Set up for casing; Pump out drilling fluid; Adjust + Tweak Barrel Assembly ↳ Barrel is 13 1/4 St long
17:15	17:52		Assemble HQ Rods into 20 St lengths 140 St
17:50		LS-153	Trip-in HQ Rod 140 St Rod + 13 1/4 St Barrel; Police Site
18:25			All Parties OSS-site

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
15	TJ FALLON	6 Feb 2020	21 Jan 2020	170

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony H., Roy R., Matt H., Askia	60		

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:00			Mendez on-site; Site + Core Prep
07:28			- Fallon on-site - W/L
07:40			- Rig on - Prep to Core; Circulate Drilling Fluid
			↳ EZ-Mud in Fluid
			↳ Adjust Inner Barrel Spring length
08:31	08:58	168-170	- Core Run; Add 55t Rod + core again; Retrieve inner barrel; Rig off
09:32			- Drop inner barrel; Rig on; Add 55t HQ Rod
09:47	10:26	170-176.5	- Core Run w/ 55t & 105t ind. alternation; Retrieve inner barrel
10:50	11:20	176.5-180	- Split Run; Core lost 3x 55t; Retrieve barrel
11:29	11:42	180-185	- CORE Run - Switch to 55t Runs
12:00		185-190	- Core Run; Retrieve Barrel
12:27			↳ Driller's Note: Briefly Loses + Regains Circulation Twice 189-190'
12:27	12:50	190-195	- Core Run; Retrieve barrel ↳ Loses Circulation Completely
13:10	13:50	195-200	- Core Run; Retrieve barrel
14:12	14:46	200-205	- Core Run; Retrieve barrel ↳ Regain Partial Circulation @ 202'
			↳ Then lose again
15:03	15:31	205-210	- Core Run; Retrieve barrel
15:45	16:16	210-215	- Core Run; Retrieve barrel - Regain Partial Circulation @ 215
16:31	16:50	215-220	- Core Run - No Recovery - Catcher Block ↳ Lose again
17:05	17:21	215-216.3	- Core Run - Retrieve Core ~ 156
18:00			- All Parties OSS-site

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
116	TJ FALLON	7 Feb 2020	21 Jan 2020	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Roy R., Mott H., Askia	-60-		

WELL SITE	WELL NAME
Lake Aurora	UFA Monitor

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
08:45			- Fallon on site SA W.H. 14.31 bZac
08:55			- Mendez on site 1152/1155 WL 2399 bZac - 8 inch
09:05			↳ Driller turns to 90% Diesel
09:30	09:51	216-226	- Core Run; Partial Circulation Return @ 218-219 ↳ H <sub>2</sub> O Temp @ 168
	↳ 10:05		↳ Retrieve barrel
10:05			- Prepare for airlifting; Air Compressor does not start ↳ Delay 10:05-12:00
12:24	12:36	220	- Air lift (12 min)
12:36	12:53		↳ Airlift out - Prep to Core
12:54	13:10	220-225	- Core Run; Retrieve barrel Partial Circulation @ 222 + 224
13:30	15:00	225-230	- Core Run; Retrieve barrel; Partial Circulation + Soft Drilling @ 1/2 Rev ↳ Pause to clear barrel - 13:36-13:55 ↳ Void/Washout 22.7.7 -
15:17	15:28	230-235	- Core Run - Quick Soft Run - 6.5; 2.5 ft Recovered
15:53	16:15	235-240	- Core Run; Retrieve barrel - partial Recover

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
17	TJ FALLON	10 Feb 2020	21 Feb 2020	JAN

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony H, Roy B, Matt H, Chance	60		

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:40			-Mendez on-site
08:05	09:12	220-L.S.	-Fallon on-site w/L's, Rig-on Breakout HQ; Prop to Ream to 240'
09:13	10:45	168-L.S.	-Break-Out 4-inch Temp Casing w/Hammer
10:45	10:55	L. 168	-Trip in nominal 8-inch (~7%) Tri-cone button bit.
10:55	11:10		-Break
11:10	12:13	L.S-168	-Trip in Bad to 168' Mix Quick-Gel 1 bag - Circulate
12:13	13:15	160-172	-Drill
13:15	14:33		-Fix/Adjust Diederich's Pump/Rogin Pump
14:41	15:53	172-179	-Drill; add EZ-Mud
16:06	17:10	179-189	-Drill; Clear Desanding cone - Lose Circulation @ 185'
17:15	17:30	187-190	-Clean up
			-Police size
	17:55		-All particles 0.55-size

District Representative			
-------------------------	--	--	--



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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
18	TJ FALLON	11 Feb 2020	21 Feb 2020	189

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Ray R, Matt H, Chance	60	JAN	

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:50			Fallon, Mendez on site; W.L.'s; Site Prep Rig on @ 08:10
08:10			Rig on; Preps Drill; Add EZ-Mud + Circulate III Bag Count
08:46	9:35	189-194	- Drill
09:35	10:20		- Driller OSS site to buy cable change to fix drum cable
10:20			- Splice / Fix Cable; Start on Diederich inoperable ↳ Driller OSS-site to get new starter till 12:45 - New Starter
	15:00		End Day's Activity - Diederich cable needs replaced; Driller orders cable from Certified Slings ↳ to be picked up in morning of 12 Feb
	15:10		- Driller OSS-site
	16:19		- FALLON OSS-site

District Representative		
-------------------------	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
19	TJ FALLON	12 Feb 2020	21 Jan 2020	194

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Mat H, Chance H, Roy R	60		

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
09:15			- Follow on-site W/L's
11:05			- Mendez on-site; Rig on; Circulate Mud; Replace Cable; Prep to Drill
11:30	11:55	194-199	- Drill; add Quik-Gel
11:55	12:36	199-204	- Drill "
12:36	13:15	204-209	- Drill "
13:17	16:55	209-214	- Drill "
14:00	17:15	214-	- Drill parting 55'-site

District Representative			
-------------------------	--	--	--

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

? ↓

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
20	TJ FALLON	13 Feb 2020	21 Feb 2020 JAN	214

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Math H, Ray R, Chance H, Tony	60		

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:45			Fellow, Tomlinson on-site; W.L.'s
08:00			Mendez on-site
08:25	1007	214-219	START drilling from 214' to 219' drilling BLIND
1007	1010		MAKE CONNECTION
1010	1105	219-224	START drilling from 219' to 224'
1105	1115		MAKE CONNECTION take 5' OFF Add 10' WAIT ON WATER
1115	1215	224-229	START drilling from 224' to 229' 6 bags Col 1111
1215	1220		MAKE CONNECTION 10 Bags total
1220	1230		START drilling from 229'
1230			MAKE CONNECTION take 5' OFF Add 10' pull rods up 20' to Let water catch up. cutting fall IN NOT able to add 10' rod had to put 5' back on to ream & clean hole back to bottom 229' hole fell in to 227'
	1250		
1250	1320		Start reaming hole back to 229'
1320	1355		Remove 5' add 10' wait on water
1355	1415	229-234	Start drilling from 229' to 234'
1415	1420		MAKE CONNECTION
1420	1435	234-240	Start drilling from 234' to 240'
1435			START tripping rods out 1-5' 10' HT 20' HT 1111 plus 1 10' plus 3" Bit
1515	1530		Trip 4" PVC SCH 40 porta-lok C11C well casing, to 240'
			Theoretical is 394 gal. LAND surface to 240' 7/8 hole by 4.5" o.d. casing.
1530			Setup to mix 20 bags. Pressure Grout 200 14.0 lbs. per gal
	1615		START Pumping down hole. No returns
1615	1630		PUMPED 20 bags
1630			Clean up, C.T., Leaving Site
			Pement - 20 bags

District Representative	Chris Tomlinson		
-------------------------	-----------------	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
21	TJ FALLON	14 Feb 2020	1/21/2020	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Matt H, Chance H, Roy	60		

WELL SITE	Lake Aurora	WELL NAME	SA-Monitor UFA monitor
-----------	-------------	-----------	---------------------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
0800			Setup to tag cement, tagged top of cement @ 235'
	0830		tag cement ON INSIDE @ 240' right at bottom of casing.
0830	0930		Matt going for gravel
0930			Setup to pour gravel from 235' to 230'
	1100		Poured 20 bags 1/4" gravel. TAG top @ 233'
1100	1200		Matt & Tony going back to Lowes for more gravel.
1150	1215		STARTED RAINING
1215			Start back with gravel. dumped another 20 bags NO GAIN
	1315		still @ 233'
1315	1400		Start mixing cement 20 bags 200 gallons @ 14.4ppg
1400	1410		Pump down trim pipe
1410			cleanup and secure site by contractors
1430			C.T. Leaving Site
			Total -
			Gravel = 20 + 20 = 40
			Cement = 20

District Representative	Chris Tomlinson		
-------------------------	-----------------	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
22	TJ FALLON	2/17/2020	1/21/20	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Matt, Chance, Tony			

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
0745			CT onsite, Contractors already onsite
	0900		TAG TOP of Cement @ 233', poured 39 bags of P-Gravel
			TAG TOP of Gravel @ 228'
0900	0950		Setup to MIX Cement - MIXED 15 bags @ 14.2 PPG.
			PUMPED down 150 gals
0950	1215		Clean up & wait for cement to harden.
1215			Run Tag Line in and tagged 218', Mendez will run
			1" PVC trimix and tag cement to confirm @ 218'
			add gravel to confirm its coming up. Top of cement actually
	1400		@ 220' Dumped 37 bags Gravel top @ 220'
1400	1425		START MIXING cement, MIXED 15 bags @ 14.1 PPG
1425	1430		Pump 150 gals. down trimix pipe
1430			Clean up.
1500			C.T. Leaving Site
15:10			Mendez off-site
15:37			Fallon off-site
			Total-
			Gravel - 39 + 37 = 76
			Cement - 15 + 15 = 30

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
	TJ FALLON	2/17/20	1/21/20	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony, Matt, Chance			

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
			160' 8" PVC CASING
			2/18/20 Matt ran PVC OUT and remeasured. 231 to Top of Black Tape, so Actual top of Tag this morning @ 231' PVC measurements were off.
218'	208' 000		2/17/20 37 bags of gravel
220'	208' 000		2/17/20 after pumping 150 gals. top of cement @ 220' add gravel
228'	208' 000		2/17/20 dumped 39 bags of P-Gravel + mixed 150 gals of cement @ 14.2 ppg.
232'	208' 000		2/14/20 dumped 40 50lb. bags of gravel + Pumped 200 gals cement @ 14.4 ppg
235'	208' 000		2/14/20 Tag cement @ 235'
240'			Pumped 200 Gallons Cement Pressure Grout 2/13/20 4" PVC CASING @ 240'

District Representative	Chris Tomlinson	
-------------------------	-----------------	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
23	TJ FALLON	18 Feb 2020	21 Jan 2020	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Matt H, Chance H			

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:55			231'
08:20	10:00		- Fallen on-site; Mendez on-site; W.L.'s; Tag 4"x8" annulus @ <del>228</del> 231' btec 8-inch - Pea Gravel in 4"x8" annulus; 26 - Five gallon buckets + Minimal Return - Try to bridge annular space @ 228' with 3 5gal buckets before grouting
10:00	11:00		- Mix Grout; 1/2 bag bentonite w/ 11 bags Portland; Pump into annulus - Clean-up + Wait for grout to cure -> 12.3 lbs/gal w/ Quick Gel additive - Mendez off-site for lunch + supplies
13:40			- Dump 1 bucket Pea gravel in annulus to tag @ 231 waiting on Decision from DAVE Arnold to approve 1/2" PVC bridge.
15:00	15:00		DAVE Arnold called No response from DEP he made call to move forward. They will start rounding up material needed for Bridge 1" PVC will be sent to bottom of hole and 1/2" PVC will be placed through 1" PVC and sent to bottom in random lengths not to exceed 6' in length. ONCE several pieces are placed at bottom we will add gravel to create bridge.
16:00	15:30		Time leaving site A.T. Leaving Site, Matt + Chance
			Total = Gravel = 26 + 3 + 1 = 30 Grout = 11

District Representative	Chris Tomlinson	
-------------------------	-----------------	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
24	TJ FALLON	2/18/20	1/21/20	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling				

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
			1500 DAVE gave verbal to proceed with PVC Bridge.
			LAKE Aurora
		4"	
			8" PVC @ 160'
			8" Normal Bore hole
			227 - 232' VOID
			LAST Fri 2/14/20
		231'	27 5gals Buckets
		235'	Coarse Cement 40 - 80 120 lbs
		240'	

District Representative	Chris Tomlinson		
-------------------------	-----------------	--	--



30  
14  
#

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
24	TJ FALLON	2/19/20	1/21/20	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	MATT, Chance, Tony, Roy			

WELL SITE	WELL NAME
Lake Aurora	UFA Monitor

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
0730			C.T. onsite
0745			Contractors onsite start gluing 1" PVC Trimie pipe together. Had THEM remove all screws from Trimie
			Tag top of Gravel/Cement @ 231', cut 1/2 inch PVC into random lengths 1, 2, 3, 4, and 5" sent down well inside 1" PVC trimie to create bridge. Added 20 5gal buckets of gravel and tagged at 227' trying to get gravel to 225' above voids.
	1045		Gravel would come up to 227' but would not hold found more 1/2 inch pvc onsite and cut into ONE + TWO foot sections and sent down inside 1-inch PVC, added 1 5gal bucket of gravel and tagged at 225'
	1115		WAIT on Cement, Kristina M. onsite
1115	1245		Drillers leave for lunch
1340			Tony + Roy onsite with cement. drillers setup to mix Cement. @ 225' Trimie hole is 370 gals. Total bag - #15 weight of cement 14 lbs/gal
1422	1426		Pumping grout down Annulus trimie pipe start off 15' off bottom Contractors cleaning up around site
			Breaking rig down to take to another site for one day. Tony + Chance will continue grouting well tomorrow.
1700			Leaving Site.
			Two 1/2" PVC Bridges sent down well
			Total - Gravel - 20 + 1 = 21 Cement - #15

Gravel  
20

21  
Buckets

District Representative	Chris Tomlinson		
-------------------------	-----------------	--	--

*Recap for Invoice*

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
	TJ FALLON	2/20/20		

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling				

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS	
From	To			
			Cored from 170' - 240'	
Gravel	Gravel			
	Thurs 2/13/20		4" PVC set to 240' Pumped 20 bags cement	Cement 20
40	Fri 2/14/20		Tagged @ 235' started gravel 20 gravel + 20 more bags Pumped another 20 bags cement	20
76	MON 2/17/20		Tagged @ 223' Poured 39 bags gravel tag @ 228' mixed 15 bags cement. Tag @ 220' dumped another 37 bags of gravel. Tag @ 220', Pumped 15 more bags cement 76 bags Gravel 30 bags cement	30
30		2/18/20	Tag 231' so we lost 10' from last cement pump. Added 26 buckets of gravel, added 3 more buckets mixed 11 bags cement add 1 bucket gravel. 30 bags Gravel 11 bags cement	11
21		2/19/20	20 buckets of Gravel tag @ 227' started CT packer added 1 bucket of Gravel, mixed 15 bags cement. 21 bags Gravel 15 bags cement	15
19.5		2/20/20	Tagged 218' 10 buckets gravel added PVC Add 7 buckets tag @ 216.5' add more PVC 1/2" Add 7 buckets tag @ 215' add more PVC 1/2" Add 5.5 buckets tag @ 213' mix 16 bags cement	15
			Total Gravel 196.5	Total Cement 112
			4" PVC casing	Theoretical 394 gals. 40 Actual Pumped - 1,110 gals 111
			8" PVC casing	Theoretical 392 gal 44 bags Actual Pumped. 40 bags
			.12" PVC casing	Theoretical 588 gal 140 bags Actual Pumped 600 34 bags
				34

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
25	TJ FALLON / K Mallams	2/20/20	1/21/20	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Tony, Chance Hudson			

WELL SITE	WELL NAME
Lake Aurora	UFA Monitor

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
0700			C.T. onsite
0730			Tony & Chance onsite, setup to tag top of cement
			Tag top of cement @ 218'; added 10 buckets of gravel
			Cut more PVC 1/2" to put down hole through 1" PVC
			Still at 218'
	0920		Added 7 buckets of gravel tagged at 216.5'
0920			Cut more 1/2 inch PVC to send down 1" PVC. added
	1000		7 buckets of gravel tagged @ 215'
1000	1010		Cut more 1/2 inch PVC to send down 1" Tremmie
1010	1020		start with gravel 5.5 buckets tagged @ 213'
1030			setup to mix (15) bags cement - weight 13.8 lbs/gal
	1130		Add one more bag of cement - weight 14.0 lbs/gal
1130	1140		start pumping cement
1140			start clean up
1400			tagged grout - still @ 213' - grout did not remain in Annulus
1405			Adding gravel - 5 gallon buckets - 1/2, 1, 1, 1, 1 = 4.5
1419			tag 207 ft btoe
1425			Preparing to mix grout - only has (13) bags left in truck. I mentioned that he needs to be careful on how much water he adds to the cement mix - we don't want light cement.
1445			weigh cement - 14.0 lbs/gal
1450			Pump cement down Annulus - got return from Annulus - pumped ~ 135 gallons
1515			Tremmie pipe locked in hole
1515	1625		Tony going to get more cement - Chance clean up site
1630			H2O level is ~ 25' btoe
			Filled 4-inch PVC casing up w/ H2O so grout doesn't wet PVC
			1/2 inch PVC bridges sent down well
1635			Tremmie pipe down - 70 ft of tremmie pipe - feels grout ~ 68' btoe
1640			Preparing grout - portland type 1 cement - 20 bags weight - 13.8 lbs/gal
1717			Add 1 more bag of cement - weight - 14.0 lbs/gallon
1725			Pump cement in Annulus - H2O level is 4" receded a bit ~ 5' btoe total
			Gravel - 10 + 7 + 7 + 5.5 + 4.5 = 34 - 5 gallon buckets
			Cement - 15 + 1 + 20 + 1
			3 1/2 inch PVC Bridges sent down well
1735			no return to surface - had return of H2O thru ann time
1800			Clean up - Drillers + Geologist leave

District Representative			
-------------------------	--	--	--

20

Gravel 10  
7  
7  
5.5  
4.5



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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
27	TJ FALLON	24 Feb 2020	21 Jan 2020	~240

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Matt Herron, Roy Rowland	290		

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS
From	To		
07:45	08:30		Mendez on-site; Un-Trailer Rig; Move Monarka over UFA Borehole; Prep
07:55			Fallon on-site; W/L's 230 L
08:30	09:55	13 - 240	Trip in Rod w/ Coring bit 220-5t HQ + 13 5t barrel + bit
			↳ Prep for Coring; Fill Water Tank; Fuel Rig
09:55	10:05	240-245	Core Run; Recover Barrel
10:45	10:59	245-250	Core Run; Retrieve Barrel
11:19	11:30	250-255	Core Run; Retrieve Barrel
11:47	12:05	255-260	Core Run; Retrieve Barrel → No Recovery
		265-270	Core Run; Retrieve Barrel
12:05	12:30		Prep to Airlift; Airlift in
12:30	13:30		Mendez off-site to buy battery + lunch
13:30	13:50		Air lift - 80 ft of Airlift; Set up for Core Run
14:35	14:44	260-265	Core Run; Retrieve Barrel
			↳ Previous Run in inner barrel
15:05	15:15		Dumpster pick-up
15:35	15:40	265-270	Core Run; Retrieve Barrel
		270-	Core Run; Retrieve Barrel
15:55	16:45		Airlift - Open interval 260-270 → Sweep Hole
			↳ Airlift out; Prep for core
16:45	17:16	270-275	Core Run; Retrieve Barrel
17:16		275-280	Core Run; Retrieve Barrel
18:00			All parties off site

District Representative			
-------------------------	--	--	--

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

REPORT #	SITE GEOLOGIST	DATE	DATE ON SITE	START DEPTH
28	TJ FALLON	25 Feb 2020	21 Jan 2020	

CONTRACTOR	CREW	PROPOSED TD	PROGRESS	DEPTH
Mendez Drilling	Matt Herron, Roy Rowland			

WELL SITE	Lake Aurora	WELL NAME	UFA Monitor
-----------	-------------	-----------	-------------

TIME LOG		DEPTH	DETAILS OF OPERATIONS	
From	To			
07:15			Mendez on site; Rig on Prep for AirLift	
07:40			Fallen on-site V6	
07:50	07:57	270-280	AirLift 80ft hose line in hole @ 135 psi	
07:57	08:20		Lower Rods; Drop inner-burrel	
08:20	08:47	280-285	Core Run; Retrieve barrel	
08:47	09:05	285-292	Core Run (5ft); pause + add 33ft HQ Rod; Core to 292; Retrieve barrel	
09:05	10:17	280-290	Change Air Compressor fan belt; Prep fan AirLift ↳ Line-in HQ Rods; bit 10ft off bottom	
10:10	11:15		SA Specific Capacity Test	
10:30	11:00	260-290	Trip out 20ft HQ + airLift 30ft off bottom	
11:13	11:46	230-290	Trip out 30ft HQ + airLift 60ft off bottom 20-25 Pump SA + Gauge	
11:46	12:30	230-L.S.	Break-out HQ	
12:30	14:12	293-L.S.	Break Down site; Caliper/Gamma Log Well	
14:12	15:03		Cut off casings; Prep for Well Test	
15:03	16:00		Pump Test UFA; Submersible Pump	
16:00			Construct pad	
16:25			Fallon off-site	
			Specific Capacity Tests	
			SA (btm)	
			UFA	
		Initial W.L.	14.43' @ 10:14	25.88' @ 15:03
		Pumping W.L.	19.12 @ 10:46	35.95 @ 15:59
		Recovered W.L.		
		GPM Rate	42.85 gpm	8.82 gpm
		Spec Cap	9.14 gpm/ft	0.875 gpm/ft

District Representative			
-------------------------	--	--	--

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

---



**Florida Department of Environmental Protection  
Florida Geological Survey GEODES**



**Well Number: W-19796 (Lake Aurora)**

**Total Depth**

**Elevation:**

**County:** Polk

**Location:** Sec 18 T.30S.,R.29E.

**Drill Completion Date:**

**Other Logs:**

**USGS Quad:** Bartow

**Lat/Long:** 27° 52' 46.83" N; 81° 27' 53.63" W

**Owner/Driller:** SWFWMD

**Described by:** WILLIAM C. GLADWIN

**Verified By PG:** BAKER\_A

**Comments:** SWFWMD contracted borehole description. This borehole was delivered 9/30/2020 but due to Covid-19 restrictions the description was delayed. This borehole is of good quality, consists of split spoon samples from 0'-170', and HQ core from 170'-292.6'. Detailed lithologic picks and descriptions are provided.

**Verification:** Is Verified

<b>Geological Formation Picks</b>		
0 - 38 ft	UDSC	Undifferentiated Sand and Clay
38 - 83 ft	CYPR	Cypresshead Formation
83 - 168 ft	PCRV	Peace River Formation
168 - 232 ft	ARCA	Arcadia Formation
232 - 240 ft	SWNN	Suwannee Limestone
240 - ft	OCAL	Ocala Limestone

0 - 3 ft No Sample; Comments: Interval labelled. "No recovery"

3 - 5 ft Sand; Color: Very Light Orange (10YR 8/2) to Grayish Orange (10YR 7/4); Porosity: Intergranular; Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Organics - <1%; General Fossils: No Fossils

5 - 8 ft No Sample; Comments: Interval labelled. "No recovery"

8 - 10 ft Sand; Color: Very Light Orange (10YR 8/2) to Light Yellowish Orange (10YR 8/6); Porosity: Intergranular; Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Organics - <1%; General Fossils: No Fossils

10 - 13 ft No Sample; Comments: Interval labelled. "No recovery"

13 - 15 ft Sand; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular; Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Organics - <1%; General Fossils: No Fossils



- 15 - 18 ft No Sample; Comments: Interval labelled. "No recovery"
- 18 - 20 ft Sand; Color: Very Light Orange (10YR 8/2) to Dark Yellowish Brown (10YR 4/2); Porosity: Intergranular; Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils; Comments: First appearance of mica minerals. (<1%)
- 20 - 23 ft No Sample; Comments: Interval labelled. "No recovery"
- 23 - 25 ft Sand; Color: Very Light Orange (10YR 8/2) to Moderate Yellowish Brown (10YR 5/4); Porosity: Intergranular; Grain Size: Fine; Range: Fine to Medium; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Organics - <1%; General Fossils: No Fossils
- 25 - 28 ft No Sample; Comments: Interval labelled. "No recovery"
- 28 - 30 ft Sand; Color: Very Light Orange (10YR 8/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 30 - 32 ft Sand; Color: Dark Yellowish Brown (10YR 4/2) to Dark Yellowish Brown (10YR 2/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 32 - 34 ft Sand; Color: Dark Yellowish Brown (10YR 2/2) to Moderate Yellowish Brown (10YR 5/4); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 34 - 36 ft Sand; Color: Moderate Brown (5YR 4/4) to Moderate Yellowish Brown (10YR 5/4); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 36 - 38 ft Sand; Color: Moderate Brown (5YR 4/4) to Moderate Yellowish Brown (10YR 5/4); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 38 - 40 ft Sand; Color: Grayish Orange (10YR 7/4) to Dark Yellowish Orange (10YR 6/6); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 40 - 42 ft Sand; Color: Very Light Orange (10YR 8/2) to Light Yellowish Orange (10YR 8/6); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - 1%, Organics - <1%; General Fossils: No Fossils
- 42 - 44 ft Sand; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - 1%, Organics - <1%; General Fossils: No Fossils
- 44 - 46 ft Sand; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - 1%, Organics - <1%; General Fossils: No Fossils
- 46 - 48.5 ft Sand; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 48.5 - 50 ft Sand; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils

## 50 Well Construction at the Lake Aurora Well Site in Polk County, Florida

- 50 - 52 ft Sand; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 52 - 54 ft Sand; Color: White (N9) to Very Light Orange (10YR 8/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 54 - 56 ft Sand; Color: White (N9); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 56 - 58 ft Sand; Color: White (N9); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 58 - 60 ft Sand; Color: White (N9); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 60 - 63 ft No Sample; Comments: Interval labelled. "No recovery"
- 63 - 65 ft Sand; Color: White (N9); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 65 - 68 ft No Sample; Comments: Interval labelled. "No recovery"
- 68 - 70 ft Sand; Color: White (N9); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 70 - 73 ft No Sample; Comments: Interval labelled. "No recovery"
- 73 - 75 ft Sand; Color: White (N9); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 75 - 78 ft No Sample; Comments: Interval labelled. "No recovery"
- 78 - 80 ft Sand; Color: Very Light Orange (10YR 8/2) to Light Yellowish Orange (10YR 8/6); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Very Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 80 - 83 ft No Sample; Comments: Interval labelled. "No recovery"
- 83 - 85 ft Sand; Color: Yellowish Gray (5Y 7/2) to Light Olive (10Y 6/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Poor Induration; Sedimentary Structures: Mottled; Accessory Minerals: Clay - 15%, Heavy Minerals - <1%, Mica - 5%, Organics - <1%; General Fossils: No Fossils; Comments: Interval transitions to a sand and clay sample with mica grains (<5%) throughout.
- 85 - 88 ft No Sample; Comments: Interval labelled. "No recovery"
- 88 - 90 ft Sand; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Very Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Clay - 2%, Heavy Minerals - <1%, Mica - 5%, Organics - <1%; General Fossils: No Fossils
- 90 - 93 ft No Sample; Comments: Interval labelled. "No recovery"

- 93 - 95 ft Sand; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: Medium; Unconsolidated; Accessory Minerals: Clay - 1%, Heavy Minerals - <1%, Mica - 2%, Organics - <1%; General Fossils: No Fossils
- 95 - 98 ft No Sample; Comments: Interval labelled. "No recovery"
- 98 - 100 ft Sand; Color: Very Light Orange (10YR 8/2) to White (N9); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Clay - 2%, Heavy Minerals - <1%, Mica - <1%, Organics - <1%; General Fossils: No Fossils; Comments: This interval contains white sands with abundant lenses of grey clay near the top of sample.
- 100 - 103 ft No Sample; Comments: Interval labelled. "No recovery"
- 103 - 105 ft Sand; Color: Very Light Orange (10YR 8/2) to White (N9); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Clay - <1%, Heavy Minerals - <1%, Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 105 - 108 ft No Sample; Comments: Interval labelled. "No recovery"
- 108 - 110 ft Sand; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 7/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Clay - <1%, Heavy Minerals - <1%, Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 110 - 113 ft No Sample; Comments: Interval labelled. "No recovery"
- 113 - 115 ft Sand; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Clay - <1%, Heavy Minerals - <1%, Mica - <1%, Organics - <1%; General Fossils: No Fossils
- 115 - 118 ft No Sample; Comments: Interval labelled. "No recovery"
- 118 - 120 ft Sand; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Calcilitite - 20%, Clay - <1%, Heavy Minerals - <1%, Mica - <1%, Organics - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments
- 120 - 123 ft No Sample; Comments: Interval labelled. "No recovery"
- 123 - 125 ft Sand; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Calcilitite - 20%, Clay - <1%, Heavy Minerals - <1%, Mica - <1%, Organics - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments
- 125 - 128 ft No Sample; Comments: Interval labelled. "No recovery"
- 128 - 130 ft Sand; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Clay - <1%, Heavy Minerals - <1%, Mica - <1%, Organics - <1%, Silt-Size Dolomite - 15%; Other Features: Calcareous; General Fossils: No Fossils
- 130 - 133 ft No Sample; Comments: Interval labelled. "No recovery"
- 133 - 135 ft Silt; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Clay - <1%, Heavy Minerals - <1%, Mica - <1%, Organics - <1%, Silt-Size Dolomite - 15%; Other Features: Calcareous; General Fossils: Fossil Fragments; Comments: Contains highly fragmented mollusk shells that have been bleached white.
- 135 - 138 ft No Sample; Comments: Interval labelled. "No recovery"

## 52 Well Construction at the Lake Aurora Well Site in Polk County, Florida

138 - 140 ft Silt; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-rounded to Rounded; Sphericity: High; Unconsolidated; Accessory Minerals: Clay - <1%, Heavy Minerals - <1%, Mica - <1%, Organics - <1%, Silt-Size Dolomite - 20%; Other Features: Calcareous; General Fossils: Fossil Fragments

140 - 148 ft No Sample; Comments: Interval labelled. "No recovery"

148 - 150 ft Sand; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Poor Induration; Accessory Minerals: Clay - 2%, Heavy Minerals - <1%, Mica - <1%, Phosphatic Gravel - 1%, Silt-Size Dolomite - 6%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds; Comments: This interval marks the change in lithology from unconsolidated sand and silt into limestone with phosphate present.

150 - 158 ft No Sample; Comments: Interval labelled. "No recovery"

158 - 160 ft Sand; Color: Yellowish Gray (5Y 7/2) to Light Olive Gray (5Y 5/2); Porosity: Intergranular; Grain Size: Very Fine; Range: Very Fine to Fine; Roundness: Sub-angular to Sub-rounded; Sphericity: Medium; Poor Induration; Accessory Minerals: Clay - 15%, Mica - <1%, Organics - <1%, Phosphatic Gravel - 1%, Phosphatic Sand - 1%, Silt-Size Dolomite - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds; Comments: This interval is sand intermixed with clays. Top of interval is predominantly silt sized dolomite.

160 - 168 ft No Sample; Comments: Interval labelled. "No recovery"

168 - 170 ft Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - <1%, Clay - <1%, Mica - <1%, Organics - <1%, Phosphatic Gravel - 2%, Phosphatic Sand - 1%, Quartz Sand - 6%; Other Features: Calcareous, Fossiliferous, Dolomitic, Low Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Mollusks; Comments: Change to a well indurated, moldic limestone with numerous fossils. Sample is dolomitic with low recrystallization. Phosphate abundant.

170 - 172 ft Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - <1%, Clay - <1%, Mica - <1%, Organics - <1%, Phosphatic Gravel - 3%, Phosphatic Sand - 4%, Quartz Sand - 1%; Other Features: Calcareous, Fossiliferous, Dolomitic, Low Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Mollusks; Comments: Sample is dolomitic and moderately recrystallized. Increase in phosphate.

172 - 174 ft Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled, Bioturbated, Burrowed; Accessory Minerals: Calcite - <1%, Clay - <1%, Mica - <1%, Organics - <1%, Phosphatic Gravel - 8%, Phosphatic Sand - 13%, Quartz Sand - 3%; Other Features: Calcareous, Fossiliferous, Dolomitic, Low Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Sharks Teeth; Comments: Sample is dolomitic and moderately recrystallized.

174 - 176 ft Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - <1%, Clay - <1%, Mica - <1%, Organics - <1%, Phosphatic Gravel - 5%, Phosphatic Sand - 15%, Quartz Sand - 3%; Other Features: Calcareous, Fossiliferous, Dolomitic, Medium Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Sharks Teeth; Comments: Sample is dolomitic and moderately recrystallized.

176 - 178 ft Dolostone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Alteration: Medium (10-50%); Crystallinity: Anhydral; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix, Dolomite; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - <1%, Clay - <1%, Organics - <1%, Phosphatic Sand - 4%; Other Features: Calcareous, Dolomitic, Medium Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Bryozoa; Comments: Interval is predominantly dolostone but contains intermixed limestone.

178 - 180 ft Dolostone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Alteration: Medium (10-50%); Crystallinity: Anhedral; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix, Dolomite; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - <1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - 1%; Other Features: Calcareous, Dolomitic, Medium Recrystallization, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks; Comments: Interval is predominantly dolostone intermixed with limestone.

180 - 182 ft Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - <1%, Organics - <1%, Phosphatic Gravel - 3%, Phosphatic Sand - 20%, Quartz Sand - 2%; Other Features: Calcareous, Fossiliferous, Dolomitic, Low Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Bryozoa; Comments: Moving away from dolomitized rock back to limestone with high phosphate and fossil content.

182 - 184 ft Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - <1%, Organics - <1%, Phosphatic Gravel - 3%, Phosphatic Sand - 15%, Quartz Sand - 1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks

184 - 186 ft Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 3%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Comments: Decrease in phosphate.

184 - 186 ft Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 3%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Comments: Decrease in phosphate.

186 - 186.9 ft Wackestone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Comments: Clear boundary separates this sample from the coarser grained phosphatic limestone above.

186.9 - 190 ft Mudstone; Color: Light Gray (N7) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 4%, Quartz Sand - 2%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

190 - 192 ft Mudstone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 2%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

192 - 194 ft Mudstone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 4%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

194 - 196.3 ft Mudstone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%, Phosphatic Gravel - 1%, Phosphatic Sand - 4%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

## 54 Well Construction at the Lake Aurora Well Site in Polk County, Florida

196.3 - 198 ft Mudstone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%, Phosphatic Gravel - 1%, Phosphatic Sand - 5%, Quartz Sand - 1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

198 - 200 ft Mudstone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%, Phosphatic Gravel - 1%, Phosphatic Sand - 5%, Quartz Sand - 1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

200 - 202 ft Mudstone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 4%, Quartz Sand - 1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

202 - 204 ft Wackestone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - 1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Comments: Increase in density of fossil fragments/molds.

204 - 205.8 ft Wackestone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - 1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

205.8 - 207.8 ft Wackestone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - 1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Comments: Increase in density of fossil fragments/molds.

207.8 - 210 ft Wackestone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - 2%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 5%, Quartz Sand - 1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Comments: Gradates to packstone at 209.4'. Intraclasts are large shell fossil fragments and molds. (<1.0cm-4.5cm)

210 - 212 ft Wackestone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Medium; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled, Burrowed; Accessory Minerals: Calcite - 3%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 2%, Quartz Sand - <1%; Other Features: Calcareous, Fossiliferous, High Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Comments: Intraclasts are large shell fossil fragments and molds (<1.0cm-4.5cm), inlaid within mudstone. Specimen is heavy and highly recrystallized.

212 - 214 ft Wackestone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 1%, Heavy Minerals - <1%, Organics - <1%, Phosphatic Gravel - 2%, Phosphatic Sand - 12%, Quartz Sand - 2%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Comments: Increase in phosphate sand content and quartz. Trace heavy minerals resembling chalcopyrite.

214 - 215.8 ft Wackestone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - 3%, Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - 6%, Quartz Sand - 2%; Other Features: Calcareous, Fossiliferous, Low Recrystallization; General Fossils: Fossil Fragments, Fossil Molds,

Mollusks, Gastropods; Comments: Top of interval is mostly phosphate and decreases with depth. Bottom 6.0 inch of sample is a mudstone with numerous calcite crystals.

215.8 - 218 ft Dolostone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Alteration: Highly (50-90%); Crystallinity: Anhedral; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix, Dolomite; Sedimentary Structures: Mottled; Accessory Minerals: Clay - <1%, Organics - <1%, Phosphatic Gravel - 3%, Phosphatic Sand - 2%, Quartz Sand - 2%; Other Features: Calcareous, Dolomitic, High Recrystallization; General Fossils: Fossil Fragments, Fossil Molds; Comments: Change in lithology to a well indurated, calcareous dolostone with numerous phosphate gravel. Small lenses of clay present.

218 - 220 ft Dolostone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Alteration: Highly (50-90%); Crystallinity: Anhedral; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix, Dolomite; Sedimentary Structures: Mottled, Burrowed; Accessory Minerals: Organics - <1%, Phosphatic Gravel - 3%, Phosphatic Sand - 2%, Quartz Sand - <1%; Other Features: Calcareous, Dolomitic, High Recrystallization; General Fossils: Fossil Fragments, Fossil Molds; Comments: This interval consists of a highly recrystallized phosphatic dolostone.

220 - 223 ft Dolostone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Alteration: Highly (50-90%); Crystallinity: Anhedral; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix, Dolomite; Sedimentary Structures: Mottled, Burrowed; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Gravel - 1%, Phosphatic Sand - 2%, Quartz Sand - 1%; Other Features: Calcareous, Dolomitic, High Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods

223 - 225.6 ft Limestone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Crystals; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Gravel - 1%, Phosphatic Sand - 2%, Quartz Sand - 2%; Other Features: Calcareous, Dolomitic, Low Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Comments: Change in lithology from a dolostone back to a mudstone with low dolomite recrystallization. Decrease in phosphate.

225.6 - 227.7 ft Dolostone; Color: Very Light Gray (N8) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Alteration: Highly (50-90%); Crystallinity: Anhedral; Grain Size: Microcrystalline; Range: Microcrystalline to Very Fine; Good Induration; Cement Type: Dolomite, Calcilutite Matrix; Sedimentary Structures: Mottled; Accessory Minerals: Organics - <1%, Phosphatic Gravel - <1%, Phosphatic Sand - <1%, Quartz Sand - <1%; Other Features: Calcareous, Dolomitic, High Recrystallization; General Fossils: Fossil Fragments, Fossil Molds

227.7 - 232.5 ft No Sample; Comments: Labelled "VOID"

232.5 - 235 ft Limestone; Color: Very Light Orange (10YR 8/2) to Grayish Orange (10YR 7/4); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled, Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods, Coral; Comments: Orange-gray, moldic, fossiliferous limestone. Phosphate all but disappeared.

235 - 240 ft Limestone; Color: Very Light Orange (10YR 8/2) to Grayish Orange (10YR 7/4); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Mottled, Burrowed; Accessory Minerals: Calcite - 1%, Organics - <1%, Phosphatic Sand - <1%; Other Features: Calcareous, Fossiliferous, Low Recrystallization; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods, Coral; Comments: Poor recovery. Only 2.0 feet of sample recovered.

240 - 245.7 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods; Index Fossils: *Lepidocyclus ocalana*; Comments: Poor recovery. Only 2.0 feet of sample recovered. *Ocala* index fossil *Lepidocyclus ocalana* present.

## 56 Well Construction at the Lake Aurora Well Site in Polk County, Florida

245.7 - 248 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Mollusks, Gastropods, Brachiopod, Benthic Foraminifera; Index Fossils: *Lepidocyclina ocalana*; Comments: Ocala index fossils present.

248 - 250 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera; Index Fossils: *Lepidocyclina ocalana*; Comments: Ocala index fossils present.

250 - 252 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Moldic, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera; Index Fossils: *Lepidocyclina ocalana*; Comments: Ocala index fossils present.

252 - 254 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera; Index Fossils: *Lepidocyclina ocalana*; Comments: Ocala index fossils present.

254 - 256.3 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera; Index Fossils: *Lepidocyclina ocalana*; Comments: Ocala index fossils present.

256.3 - 258 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera; Index Fossils: *Lepidocyclina ocalana*; Comments: Ocala index fossils present.

258 - 260 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera; Index Fossils: *Lepidocyclina ocalana*; Comments: Ocala index fossils present.

260 - 262 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclina ocalana*; Comments: Ocala index fossils present.

262 - 264 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclina ocalana*; Comments: Ocala index fossils present.

264 - 266.1 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other



Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

266.1 - 268 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

268 - 270 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

270 - 272 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

272 - 274 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

274 - 275.5 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

275.5 - 278 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint, Vugular; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

278 - 280 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Sedimentary Structures: Burrowed; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Benthic Foraminifera, Mollusks; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

280 - 282 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Benthic Foraminifera, Mollusks, Brachiopod; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

282 - 284 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Benthic Foraminifera, Mollusks, Brachiopod; Index Fossils: *Lepidocyclus ocalana*; Comments: Ocala index fossils present.

## 58 Well Construction at the Lake Aurora Well Site in Polk County, Florida

284 - 286 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous, Fossiliferous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Benthic Foraminifera, Mollusks, Brachiopod; Index Fossils: Lepidocyclina ocalana; Comments: Ocala index fossils present.

286 - 288 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds; Comments: Decrease in fossil content.

288 - 290 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods

290 - 292 ft Limestone; Color: Very Light Orange (10YR 8/2) to Yellowish Gray (5Y 8/1); Porosity: Intergranular, Pinpoint; Grain Type: Biogenic, Calcilutite, Pellet; Grain Size: Very Fine; Range: Very Fine to Fine; Good Induration; Cement Type: Calcilutite Matrix; Accessory Minerals: Calcite - <1%, Organics - <1%; Other Features: Calcareous; General Fossils: Fossil Fragments, Fossil Molds, Gastropods, Brachiopod

292 - 292.6 ft No Sample; Comments: Labelled "Sample removed. 292-292.6".

**Appendix C. Digital Photographs of Samples  
Retrieved at the Lake Aurora Well Site in Polk  
County, Florida**

---













This page intentionally left blank

This page intentionally left blank

This page intentionally left blank

