

# WELL SITE SUMMARY

## ROMP 60 – MULBERRY

### Introduction

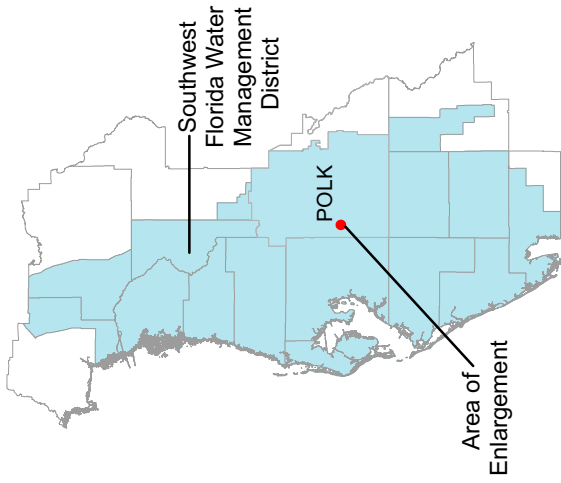
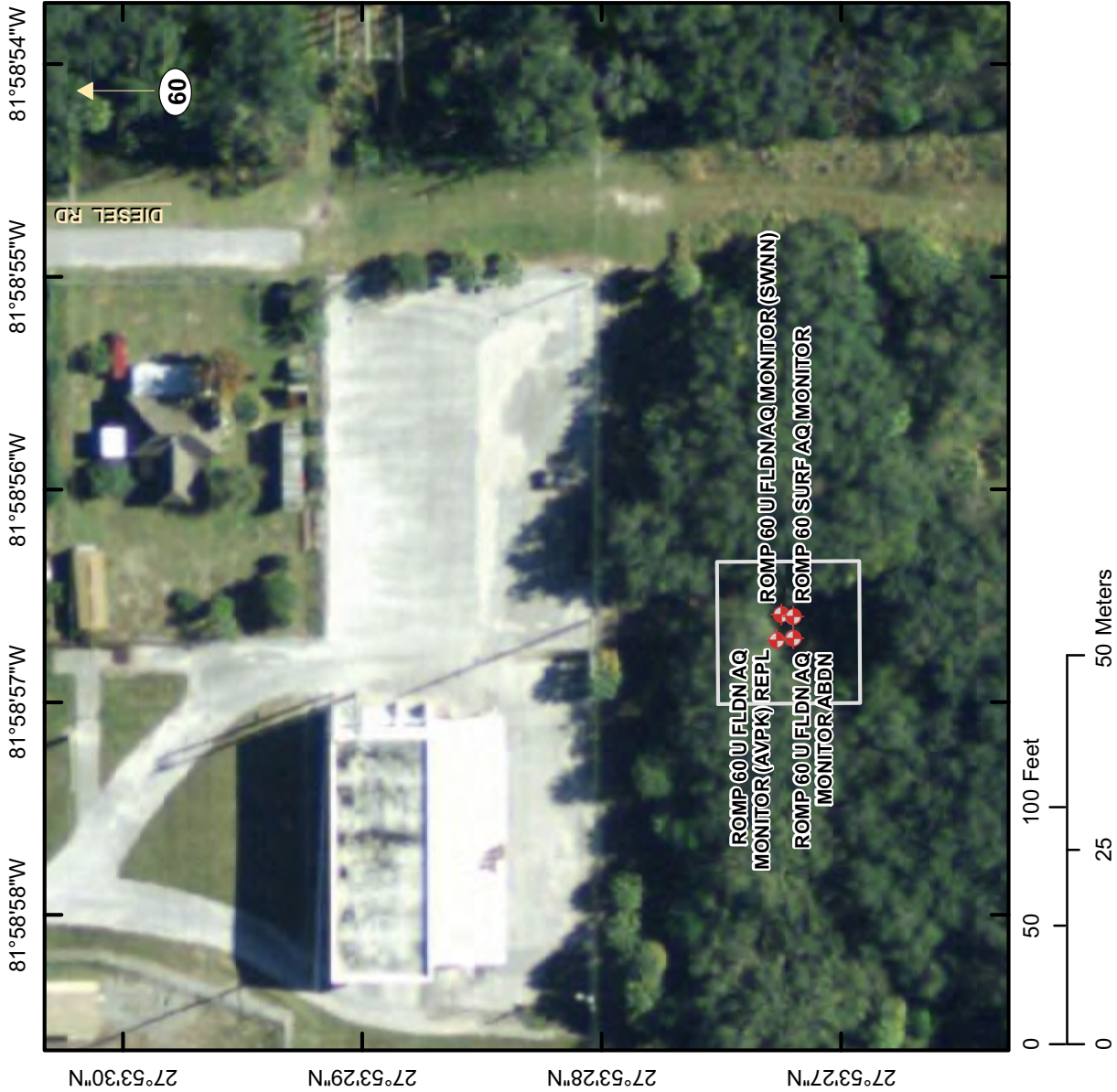
This well site summary is a compilation of information for the ROMP 60 – Mulberry well site (alternately named ROMP 60 – Diesel Road) in Polk County, Florida. The ROMP 60 – Mulberry (herein referred to as ROMP 60) well site was selected to have additional well construction as part of the Dover-Plant City Freeze Management Plan that was developed to mitigate pumping effects during freeze events in response to the unprecedented 11-day freeze the area experienced in January 2010 (appendix A). The purpose of this document is to combine the details of the well construction that occurred from October 18, 2010, to May 25, 2011, and well site information from the existing file of record. Additionally, this summary presents the current (2013) hydrogeologic framework nomenclature used by the Southwest Florida Water Management District (District) and the correlation between current and past stratigraphic unit and hydrogeologic unit nomenclature, which can be used to correlate unit names from past site files to current unit names (appendix B).

### Site Location

The ROMP 60 well site is located in Polk County approximately 0.28 miles south of State Road 60 and 150 feet west of Diesel Road. The well site is located in the southeastern quarter, of the northwestern quarter of Section 11, Township 30 South, Range 23 East. The well site coordinates are latitude 27° 53' 27" North and longitude 81° 58' 56" West (fig. 1). The well site consists of a 60-foot-by-60-foot permanent easement that was purchased for \$6,000 from Troy S. and Eugenia D. Cummings and filed for record on December 12, 1973 and re-recorded on July 31, 1974. The well site is District parcel number 11-020-001 (past records refer to number 11-975-001).

### Well Construction

The ROMP 60 well site originally consisted of an Upper Floridan aquifer well (U FLDN AQ MONITOR ABDN) with an open interval across the Suwannee Limestone, Ocala Limestone and the Avon Park Formation. The well was constructed sometime before February 8, 1955, because that is the start date of the water level data collection record. The well consisted of 10-inch steel casing to 237 feet below land surface and a 10-inch open hole to 710 feet below land surface (table 1 and fig. 2). This well was modified in order to monitor only the Avon Park portion of the Upper Floridan aquifer (table 1 and fig. 3) and another well was constructed to monitor only the Suwannee Limestone portion of the Upper Floridan aquifer. From May 6, 2011, to May 18, 2011, Huss Drilling Inc. (Huss) lined the existing well with 6-inch standard dimension ratio 17 (SDR 17) casing to 470 feet below land surface (table 1 and fig. 4). The modified well is renamed U FLDN AQ MONITOR REPL. During the same time, Huss also constructed the U FLDN AQ MONITOR (SWNN) well. The U FLDN AQ MONITOR (SWNN) well consists of 6-inch SDR 17 casing to 235 feet below land surface and a 6-inch open hole to 310 feet below land surface. On October 18, 2010, Huss installed the SURF AQ MONITOR well (appendix A). The SURF AQ MONITOR well consists of 6-inch, 0.010 slot, schedule 40 polyvinyl chloride (PVC) screen from 9 to 24 feet below land surface and schedule 40 PVC casing from 3 feet above land surface to 9 feet below land surface (table 1 and fig. 5). The wells are equipped with water level recorders for long-term water level monitoring.



**EXPLANATION**

-  Permanent Easement
-  Name
-  ROMP 60 – Mulberry well location and name

See Table 1 for well details

**Figure 1.** Location and well site layout for the ROMP 60 – Mulberry well site in Polk County, Florida.

Base from Southwest Florida Water Management District digital orthophoto, 2010  
 NAD 1983 HARN StatePlane Florida West FIPS 0902 Feet projection

**Table 1.** Well construction details for the ROMP 60 – Mulberry well site in Polk County, Florida

[ABDN, abandoned; AQ, aquifer; AVPK, Avon Park; bls, below land surface; deg, degree; FLDN, Floridan; ft, feet; min, minute; REPL, replacement; ROMP, Regional Observation and Monitor-well Program; sec, second; SID, site identification; SWNN, Suwannee; SURF, surficial; U, Upper; WCP No., well construction permit number(s)]

Well Name	SID	WCP No.	Well Finish	Well Status	Casing Depth (ft bls)	Total Depth (ft bls)	Latitude (deg min sec)	Longitude (deg min sec)
ROMP 60 SURF AQ MONITOR	768709	807699	6-inch screened	Active	9	24	27° 53' 27.20"	81° 58' 56.60"
ROMP 60 U FLDN AQ MONITOR (SWNN)	777756	811804	6-inch open hole	Active	235	310	27° 53' 27.25"	81° 58' 56.59"
ROMP 60 U FLDN AQ MONITOR (AVPK) REPL	777757	811817	10-inch open hole	Active	470	710	27° 53' 27.27"	81° 58' 56.71"
ROMP 60 U FLDN AQ MONITOR ABDN	17974	811817	10-inch open hole	Abandoned	237	710	27° 53' 27.27"	81° 58' 56.71"

### Lithologic Sampling

Limited lithologic samples were collected and described while constructing the additional wells at the ROMP 60 well site. In the location of the SURF AQ MONITOR well, samples were collected and described from land surface to 28 feet below land surface. The sediments from land surface to 4 feet below land surface were post hole dug to verify no utilities were present. Split-spoon samples were collected in 2-foot intervals from 4 to 28 feet below land surface (appendix C). Drill cuttings were collected and described from land surface to 310 feet below land surface while constructing the U FLDN AQ MONITOR (SWNN) well (table 2).

### Geophysical Logging

Geophysical logs were run in the Upper Floridan aquifer monitor wells using District-owned Century® geophysical logging equipment. Table 3 lists the logs performed at the well site and appendix D presents the geophysical logs. A caliper/gamma-ray log and a multifunction log were run in the U FLDN AQ MONITOR (AVPK) ABDN well before lining the well (appendix D, fig. D1). A caliper/gamma-ray log was run in the U FLDN AQ MONITOR (AVPK) REPL after completion of the lining (appendix D, fig. D2). A caliper/gamma-ray log was run in the U FLDN AQ MONITOR (SWNN) well after construction was completed (appendix D, fig. D3).

### Geology

The ROMP 60 well site is located on the Polk Upland physiographic region (White, 1970) at an elevation of 99.46 feet above the North American Vertical Datum of 1988 (NAVD 88). Originally, the well site consisted of an Upper Floridan aquifer “well of opportunity.” Because the well was not constructed by the District as part of a Geohydrologic Data well network, there was no data collected and available. The original file of record contains a hand drawn lithostratigraphic column from land surface to 464 feet below land surface based on a driller’s completion report from 1974. The permit could not be located. The origin and correctness of the lithostratigraphic column is unknown. The lithologic samples and geophysical logs collected during the additional well construction provide some data to improve the geologic characterization at the well site. The geologic characterization is based on the original lithostratigraphic column and the additional data collected. The geologic units encountered at the well site include, in ascending order: the Avon Park Formation, Ocala Limestone, Suwannee Limestone, Hawthorn Group, and undiffer-

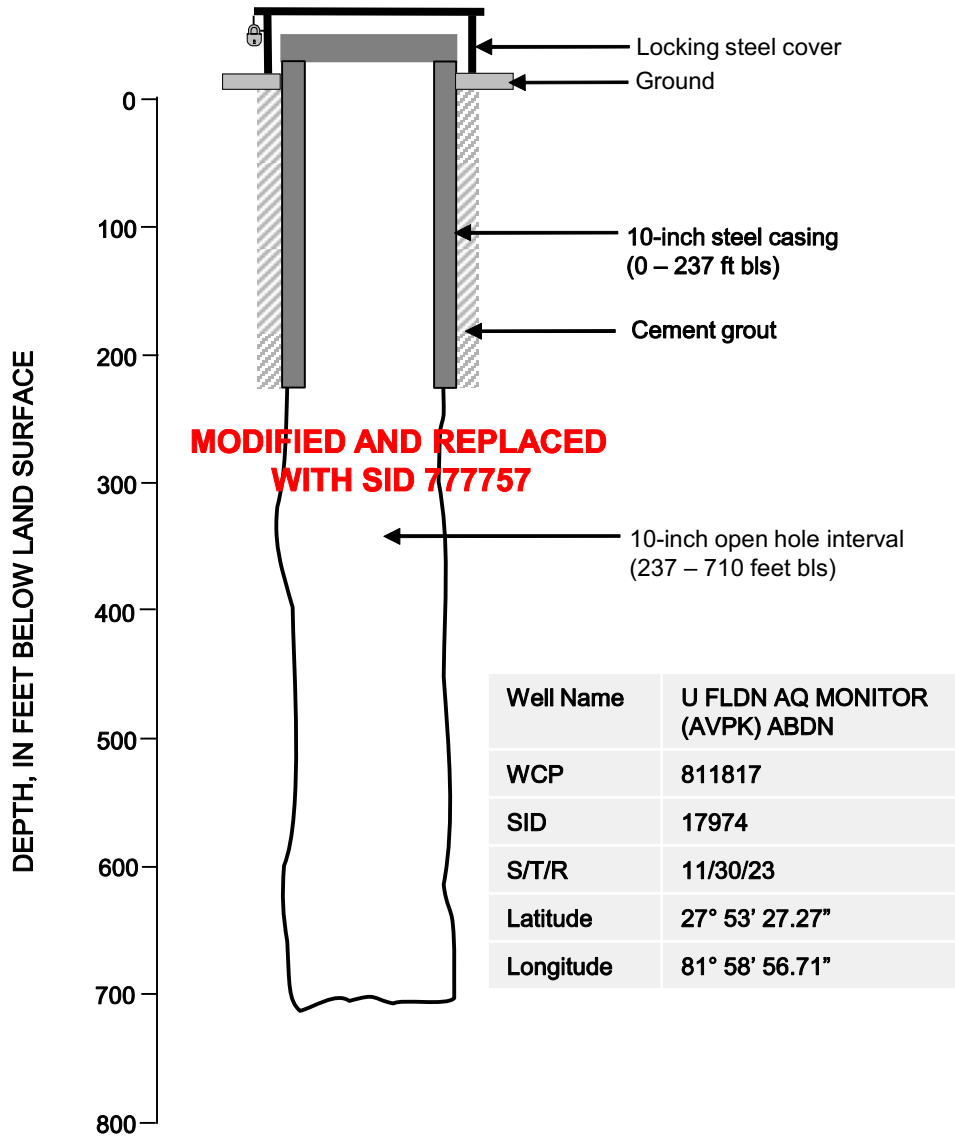
entiated sand and clay sediments. Figure 6 presents the original lithostratigraphic column, the current nomenclature for comparison (also in appendix B), the revised geology based on the additional data, and the hydrostratigraphy.

The Avon Park Formation extends from approximately 450 feet below land surface to beyond the total depth of 464 feet below land surface. The top is based on the original lithostratigraphic column but the top is not noticeable on the gamma-ray log. Arthur and others (2008) indicate the top is around 495 feet below land surface. The Ocala Limestone extends from approximately 400 to 450 feet below land surface. The top of the Ocala Limestone is deeper than indicated on the original lithostratigraphic column because the drill cuttings collected during the installation of the U FLDN AQ MONITOR (SWNN) well to 310 feet below land surface are Suwannee Limestone (David N. Arnold P.G., oral commun., 2013). The top also corresponds to a drop in gamma-ray counts per second and subsequent lower counts per second that is characteristic of the Ocala Limestone (appendix D). The Suwannee Limestone is present from approximately 228 to 400 feet below land surface and consists of predominantly very pale orange limestone. The drill cuttings observed at about 228 feet below land surface changed from limestone with clay and sand (which is more indicative of the Arcadia Formation) to only limestone (which is more characteristic of the Suwannee Limestone). The top of the Suwannee Limestone also corresponds to a drop in gamma-ray counts per second and a subsequent variable gamma-ray signature (appendix D). Drill cuttings were not collected below 310 feet below land surface; therefore, the bottom of the Suwannee Limestone was not observed. The gamma-ray log indicates the Suwannee Limestone is present until about 400 feet below land surface where the drop in gamma-ray counts per second observed is considered to be the top of the Ocala Limestone. Arthur and others (2008) indicate the Suwannee Limestone is present from about 191 to 372 feet below land surface. These depths more closely correlate to the revised interval. The Hawthorn Group extends from about 30 to 228 feet below land surface. The Formations and Members of the Hawthorn Group could not be delineated with confidence based on the available data. According to Arthur and others (2008), the Peace River Formation including the Bone Valley Member and the Arcadia Formation including the Tampa and Nocatee Members could be present at the well site. The lithology from about 30 to 90 feet below land surface is predominantly sand, silt, and clay with phosphate. The lithology from about 90 to 180 feet below land surface is predominantly wackestone with chert. The lithology from about 180 to 228 feet below land surface is clay. The undifferentiated sand and clay sediments extend from land surface to about 30 feet below land surface (appendix C and table 2).

## Hydrogeology

Hydrogeologic data is limited for the ROMP 60 well site. The additional well construction provided some data to help delineate the hydrogeologic units at the well site. A lens of perched groundwater was observed during the construction of the SURF AQ MONITOR well from approximately 4 to 7 feet below land surface. A surficial aquifer extends from about 13 to 25 feet below land surface. A confining unit, consisting of dry sandy and silty clay, separates the perched groundwater from the surficial aquifer (appendix A and C). Not enough data were collected to determine if permeable zones separated by confining units coincident with the Hawthorn Group are present at the well site. According to Peterson and Rumbaugh (2012), permeable zones of the Hawthorn aquifer system are not present near the ROMP 60 well site and the unit is a confining unit. Clay is present from about 180 to 228 feet below land surface and could be sufficient to form a confining unit to the Upper Floridan aquifer (table 2).

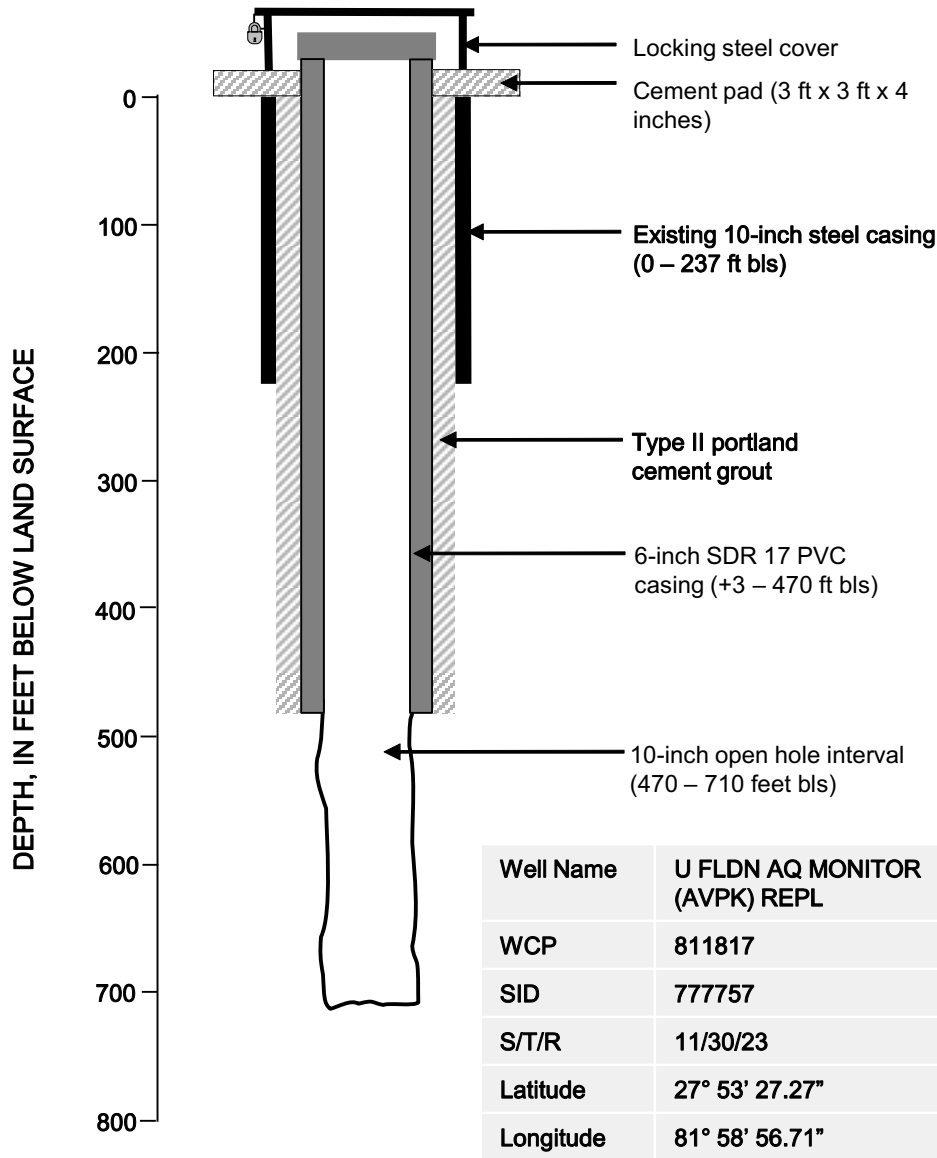
The ROMP 60 wells are equipped with water level recorders. The water level data collection period of record for the U FLDN AQ MONITOR (AVPK) ABDN well is from February 8, 1955, to May 25, 2011. The United States Geological Survey (USGS) collected the water level data until about July 23, 1992, when the District took over the data collection. Water level data collection for the U FLDN AQ MONITOR (AVPK) REPL and U FLDN AQ MONITOR (SWNN) wells began June 21, 2011. Water level data collection for the SURF AQ MONITOR well began December 21, 2010. The water level in the U FLDN AQ MONITOR (AVPK) REPL and U FLDN AQ MONITOR (SWNN) wells is the same and was 78.3 feet NAVD 88 on October 4, 2013. The water level in the SURF AQ MONITOR well was 92.7 feet NAVD 88 on October 4, 2013. The water level difference between the surficial aquifer and the Upper Floridan aquifer is about 14 feet at the well site and suggests the two aquifers are sufficiently separated by a confining unit. The water level data can be accessed from the District's website [www.swfwmd.state.fl.us](http://www.swfwmd.state.fl.us) (accessed October 9, 2013) from the Water Management Information System (WMIS). Data are compiled in the ROMP 60 – Mulberry portfolio ID 373.



Note: Not to scale. As-built created from information in the file of record.

[ABDN, abandoned; AVPK, Avon Park; AQ, aquifer; bls, below land surface; FLDN, Floridan; ft, feet; SID, site identification; S/T/R, Section/Township/Range; WCP, well construction permit number(s); U, Upper]

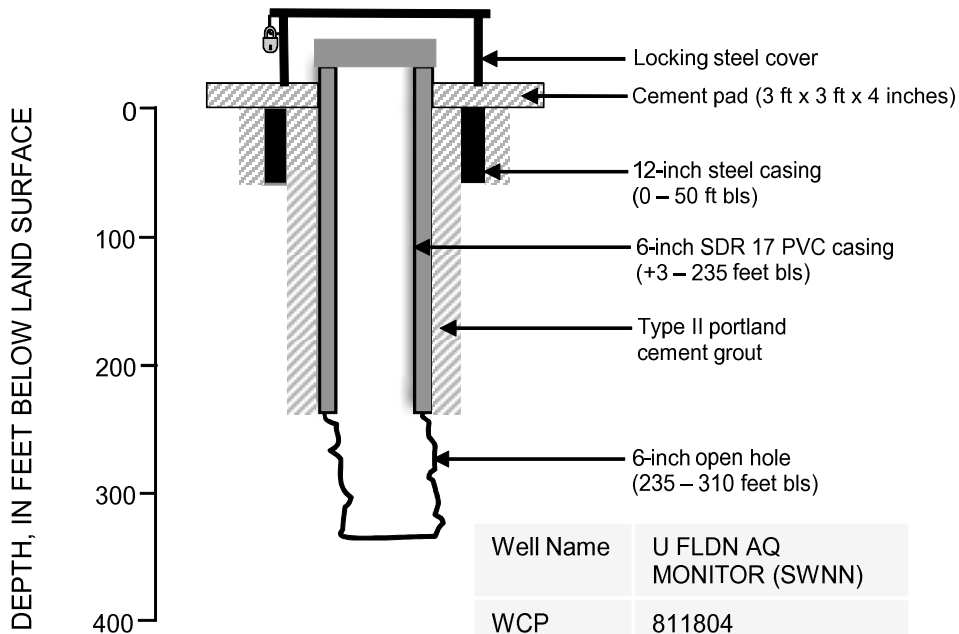
Figure 2. As-built for the U FLDN AQ MONITOR (AVPK) ABDN well constructed at the ROMP 60 – Mulberry well site in Polk County, Florida.



Note: Not to scale.

[AVPK, Avon Park; AQ, aquifer; bls, below land surface; FLDN, Floridan; ft, feet; PVC, polyvinyl chloride; SDR, standard dimension ratio; SID, site identification; S/T/R, Section/Township/Range; WCP, well construction permit number(s); U, Upper]

Figure 3. As-built for the U FLDN AQ MONITOR (AVPK) REPL well constructed at the ROMP 60 – Mulberry well site in Polk County, Florida.

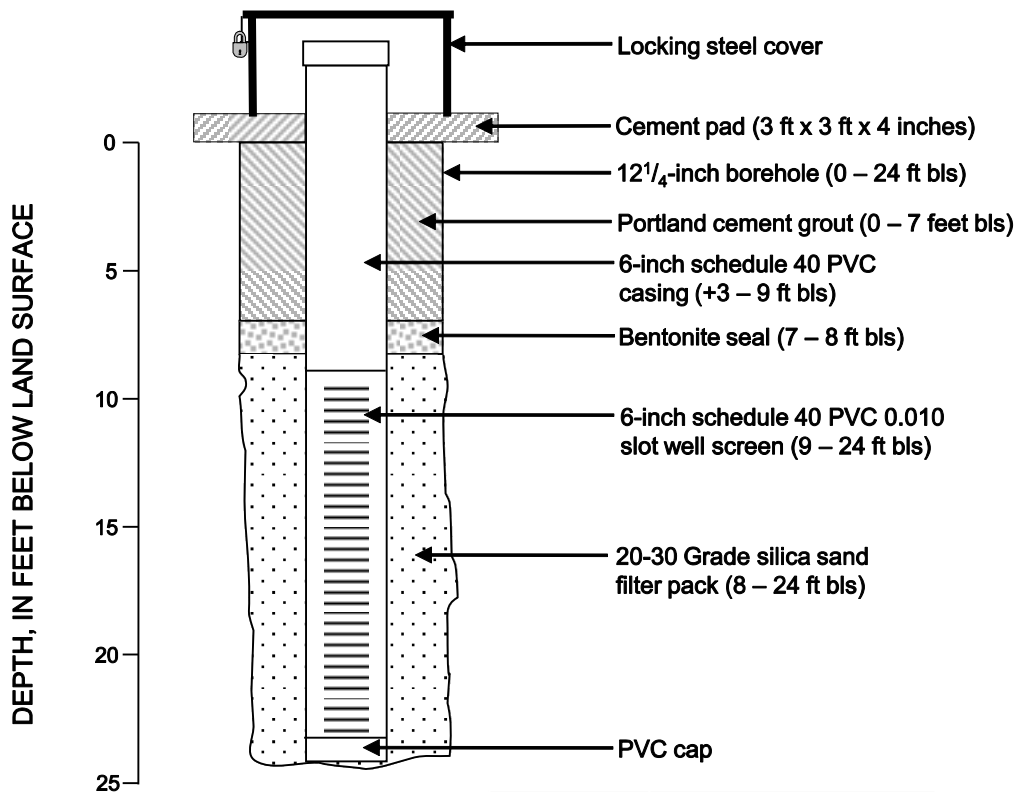


Well Name	U FLDN AQ MONITOR (SWNN)
WCP	811804
SID	777756
S/T/R	11/30/23
Latitude	27° 53' 27.25"
Longitude	81° 58' 56.59"

Note: Not to scale.

[AQ, aquifer; bls, below land surface; FLDN, Floridan; ft, feet; PVC, polyvinyl chloride; SDR, standard dimension ratio; SID, site identification; S/T/R, Section/Township/Range; SWNN, Suwannee; WCP, well construction permit number(s); U, Upper]

**Figure 4.** As-built for the U FLDN AQ MONITOR (SWNN) well constructed at the ROMP 60 – Mulberry well site in Polk County, Florida.



Note: Not to scale.

Well Name	SURF AQ MONITOR
WCP	807699
SID	768709
S/T/R	11/30/23
Latitude	27° 53' 27.20"
Longitude	81° 58' 56.60"

[AQ, aquifer; bls, below land surface; ft, feet; PVC, polyvinyl chloride; SID, site identification; S/T/R, Section/Township/Range; SURF, surficial; WCP, well construction permit number(s)]

Figure 5. As-built for SURF AQ MONITOR well constructed at the ROMP 60 – Mulberry well site in Polk County, Florida.



## Groundwater Quality

Water quality samples were not collected during construction of the wells at the ROMP 60 well site. However, the Water Quality Monitoring Program (WQMP) of the Data Collection Bureau have collected water quality samples for the U FLDN AQ MONITOR (AVPK) ABDN well and various parameter data are available from October 16, 1985, to August 12, 2011. The specific conductance values for the water quality samples from this well are about 330 microsiemens per centimeter ( $\mu\text{S}/\text{cm}$ ). The WQMP currently collects water quality samples for the U FLDN AQ MONITOR (AVPK) REPL and U FLDN AQ MONITOR (SWNN) wells three times per year. Various parameter data are available beginning November 9, 2011, for the U FLDN AQ MONITOR (AVPK) REPL well and March 8, 2012, for the U FLDN AQ MONITOR (SWNN) well. The specific conductance values for the water quality samples collected from the U FLDN AQ MONITOR (AVPK) REPL and U FLDN AQ MONITOR (SWNN) wells are about 330  $\mu\text{S}/\text{cm}$ . The water quality data can be accessed from the WMIS.

**Table 2.** Lithologic description of the drill cuttings collected during construction of the U FLDN AQ MONITOR (SWNN) well at the ROMP 60 – Mulberry well site in Polk County, Florida. Taken from field notes by the onsite hydrogeologist, David N. Arnold, P.G.

[Codes in parenthesis refer to hue, value, and chroma codes from the Munsell Soil Color Charts (Munsell Color, 2000, Munsell Soil Color Charts: Gretag Macbeth, New Windsor, New York)]

Depth	Description
0 - 10	Sand, light gray (N7) to pale yellowish brown (10YR 6/2), fine-grained, silty, some organics/roots, some grayish orange (10YR 7/4) mottling, few limestone nodules
10 - 20	Sand, dark yellowish orange (10YR 6/6), fine-grained, silty, some clay and phosphate
20 - 30	Clay, dark yellowish orange (10YR 6/6) to moderate yellowish brown (10YR 5/4), silty, some very fine grained sand and phosphate
30 - 40	Sand, pale yellowish orange (10YR 8/6) to grayish orange (10YR 7/4), silty, some greenish gray (5G 8/6) clay
40 - 50	Same as above but with pale olive (10Y 6/2) color
50 - 60	Silt, yellowish gray (5Y 8/1) with very fine grained sand and phosphate
60 - 70	Silt, yellowish gray (5Y 8/1) to light olive gray (5Y 5/2) with very fine grained sand and soft limestone
70 - 80	Clayey silt, pale yellowish brown (10YR 6/2) to grayish orange (10YR 7/4) with phosphate
80 - 90	Same as above with limestone
90 - 100	Limestone, yellowish gray (5Y 8/1) with chert and silt
100 - 120	Limestone - mudstone, yellowish gray (5Y 7/2) to yellowish gray (5Y 8/1) with chert and silt
120 - 150	Limestone - wackestone, grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2)
150 - 170	Same as above with some forams (?)
170 - 180	Limestone - wackestone, yellowish gray (5Y 8/1) to light olive gray (5Y 6/1) with dark greenish gray (5GY 4/1) clay
180 - 190	Same as above plus olive gray (5Y 4/1) clay
190 - 200	Same as above but with dark greenish gray (5GY 4/1) to greenish black (5GY 2/1) clay
200 - 210	Clay, greenish gray (5GY 6/1) to dark greenish gray (5GY 4/1) clay
210 - 228	Same as above with some shell and limestone (wackestone) fragments and very fine grained quartz sand, yellowish gray (5Y 8/1) to light olive gray (5Y 6/1)
228 - 235	Limestone, very pale orange (10YR 8/2)
240 - 260	Same as above with shell fragments
260 - 290	Same as above but the color begins to grade to yellowish gray (5Y 8/1)
290 - 310	Same as above with shell fragments

**Table 3.** Geophysical logs collected from wells installed at the ROMP 60 – Mulberry well site in Polk County, Florida

[ABDN, abandoned; AQ, aquifer; AVPK, Avon Park; bls, below land surface; FLDN, Floridan; PVC, polyvinyl chloride; REPL, replacement; ROMP, Regional Observation and Monitor-well Program; SWNN, Suwannee; U, Upper; Multifunction tool includes natural gamma-ray, short normal (16-inch) resistivity, long normal (64-inch) resistivity, single-point resistance, temperature, specific conductance, and spontaneous potential]

Date (MM/DD/YYYY)	Well Name	Borehole Diameter (inches)	Casing Type	Casing Depth (feet bls)	Log Depth (feet bls)	Tool Type	Tool Number
11/17/2010	ROMP 60 U FLDN AQ MONI- TOR (AVPK) ABDN	10	Steel	237	709.6	Caliper/gamma- ray	9165C
11/17/2010	ROMP 60 U FLDN AQ MONI- TOR (AVPK) ABDN	10	Steel	237	708.8	Multifunction	8144C
05/19/2011	ROMP 60 U FLDN AQ MONI- TOR (AVPK) REPL	6	PVC	470	709.6	Caliper/gamma- ray	9165C
05/19/2011	ROMP 60 U FLDN AQ MONI- TOR (SWNN)	6	PVC	235	304	Caliper/gamma- ray	9165C

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December 1, 2010

MEMORANDUM

TO: ROMP 60 File of Record

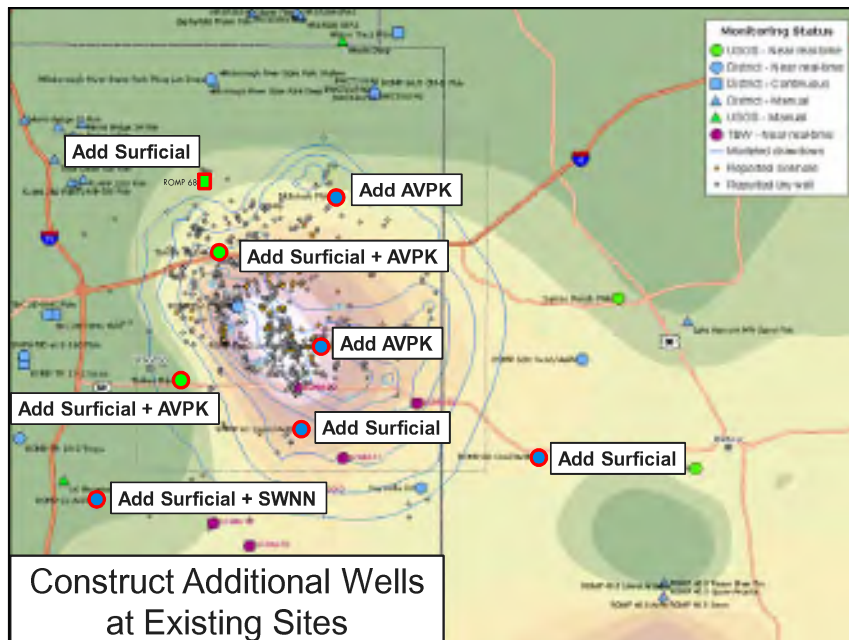
CC: Jerry Mallams, P.G. Geohydrologic Data Manager, Geohydrologic Data Section  
 Tony Gilboy, P.G. Well Construction Regulation Manager, Brooksville Regulation Department

FROM: David N. Arnold, P.G., Hydrogeologist, Well Construction Regulation

SUBJECT: ROMP 60 (Diesel Road) Surficial Monitor Well Installation Summary

The Dover/Plant City area has experienced numerous drawdown events related to withdrawal of groundwater for frost-freeze protection of agricultural commodities, at least as far back as 1977, if not earlier. In the winter of 2010, this area experienced a record number of well failures and sinkholes believed to be caused by groundwater drawdown associated with irrigation used for crop cold-protection water use. The magnitude of the 2010 frost-freeze event brought into focus the need to further enhance data collection in the Dover/Plant City area. Specifically, this event demonstrated the need for additional hydrogeologic data to refine groundwater models and advance understanding of the area's hydrogeology and how it relates to frost-freeze protection withdrawals and drawdown. One of the initiatives approved by the District's Governing Board was to expand the monitoring network by drilling additional wells at existing District and USGS Floridan well sites within the Dover / Plant City Area.

The easternmost of these existing well sites, ROMP 60, had a surficial monitor well constructed on October 18, 2010. The following is a summary of observed hydrogeologic conditions and well construction methodology for the monitor well.



### **ROMP 60 Surficial Monitor Well**

Well construction activities were performed on October 18, 2010. A locally perched lense of groundwater was observed at a depth of approximately 4 feet below land surface (BLS) to a depth of approximately 7 feet BLS. The depth to water within the surficial aquifer was observed at approximately 13 feet BLS while well construction activities were being performed. After the ROMP 60 Surficial Monitor Well was constructed and fully developed, the depth to water within the surficial aquifer was observed at approximately 11.86 feet BLS (approximately 14.86 feet below top of casing). The basal confining unit for the surficial aquifer at this location was observed at approximately 25 feet BLS due to an increase in the clay content observed in geologic split spoon samples and a sharp increase in penetration blow counts. Due to a slow recharge rate, the monitor was pumped dry and allowed to recharge five times until development water was clear and free of sediment a period of 3 hours and 17 minutes. This monitor well is screened from approximately 9 feet BLS to approximately 24 feet BLS. A 20/30 silica sand filter surrounds the well's screened interval and extends approximately 1-foot above the well screen. A 1-foot bentonite seal is located above the 20/30 silica sand to separate the surficial aquifer from the locally perched lense of groundwater.

**A**

	WYRICK 1960	LICHTLER 1960	CLARKE 1964	LEVE 1966	WOLANSKY 1978	MILLER 1980	BOGESS 1986 & AUTHUR AND OTHERS 2008	DISTRICT NOMENCLATURE
	nonartesian aquifer	Shallow aquifer	water-table aquifer	shallow aquifer system	unconfined aquifer	surficial aquifer	surficial aquifer system	surficial aquifer
	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit

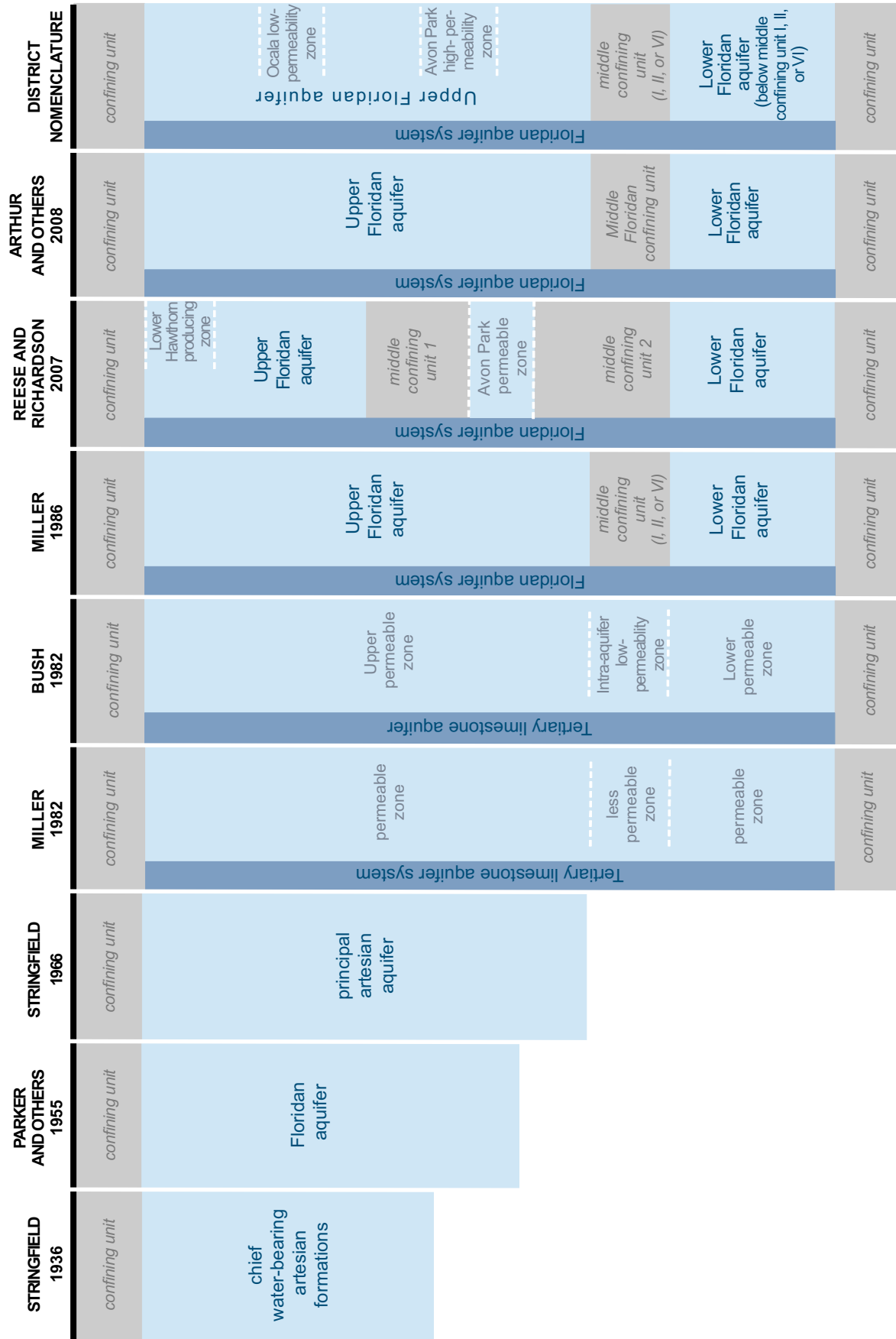
**B**

	SPROUL 1972	JOYNER, HSUTCLIFFE 1976	WEDDERBURN 1982	WOLANSKY 1983	BARR 1986	TORRES 2001	KNOCHENMUS 2006	ARTHUR AND OTHERS 2008	DISTRICT NOMENCLATURE
	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit
	sandstone aquifer	zone 1	Sandstone aquifer	Tamiami - upper Hawthorn aquifer	Permeable zone 1	Tamiami/ Peace River zone (PZ1)	Zone 1	Peace River aquifer	Peace River aquifer
	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit
	upper Hawthorn aquifer	zone 2	mid-Hawthorn aquifer	Intermediate aquifers	Permeable zone 2	Upper Arcadia zone (PZ2)	Zone 2	Intermediate aquifer system / intermediate confining unit	upper Arcadia aquifer
	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit
	lower Hawthorn aquifer	zone 3	lower Hawthorn / Tampa producing zone	lower Hawthorn - upper Tampa aquifer	Permeable zone 3	Lower Arcadia zone (PZ3)	Zone 3	Intermediate aquifer system	lower Arcadia aquifer
	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit	confining unit

[FAS, Floridan aquifer system]

**Appendix B.** Nomenclature of (A) the surficial aquifer, (B) the Hawthorn aquifer system, and (C) the Floridan aquifer system used by the Southwest Florida Water Management District compared to previously used names; and (D) current (2012) hydrogeologic framework nomenclature of the Southwest Florida Water Management District.

C



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

**Appendix B.** (Continued) Nomenclature of (A) the surficial aquifer, (B) the Hawthorn aquifer system, and (C) the Floridan aquifer system used by the Southwest Florida Water Management District compared to previously used names; and (D) current (2012) hydrogeologic framework nomenclature of the Southwest Florida Water Management District.

D

SERIES		STRATIGRAPHIC UNIT	HYDROGEOLOGIC UNIT
Holocene Pleistocene	undifferentiated sand and clay		surficial aquifer
	Cypresshead Fm		
	Caloosahatchee Fm		
Pliocene		Tamiami Fm	
Miocene	late	Hawthorn Group Coosawhatchie Formation Peace River Formation Bone Valley Member	confining unit
	middle		Peace River aquifer
	early	Arcadia Formation	confining unit
Oligocene	late	Arcadia Formation Tampa Member Nocatee Member	upper Arcadia aquifer
	early	Suwannee Limestone	confining unit
Eocene	late	Ocala Limestone	lower Arcadia aquifer
	middle	Avon Park Formation	
	early	Oldsmar Formation	
Paleocene		Cedar Keys Formation	confining unit

**Appendix B.** (Continued) Nomenclature of (A) the surficial aquifer, (B) the Hawthorn aquifer system, and (C) the Floridan aquifer system used by the Southwest Florida Water Management District compared to previously used names; and (D) current (2012) hydrogeologic framework nomenclature of the Southwest Florida Water Management District.



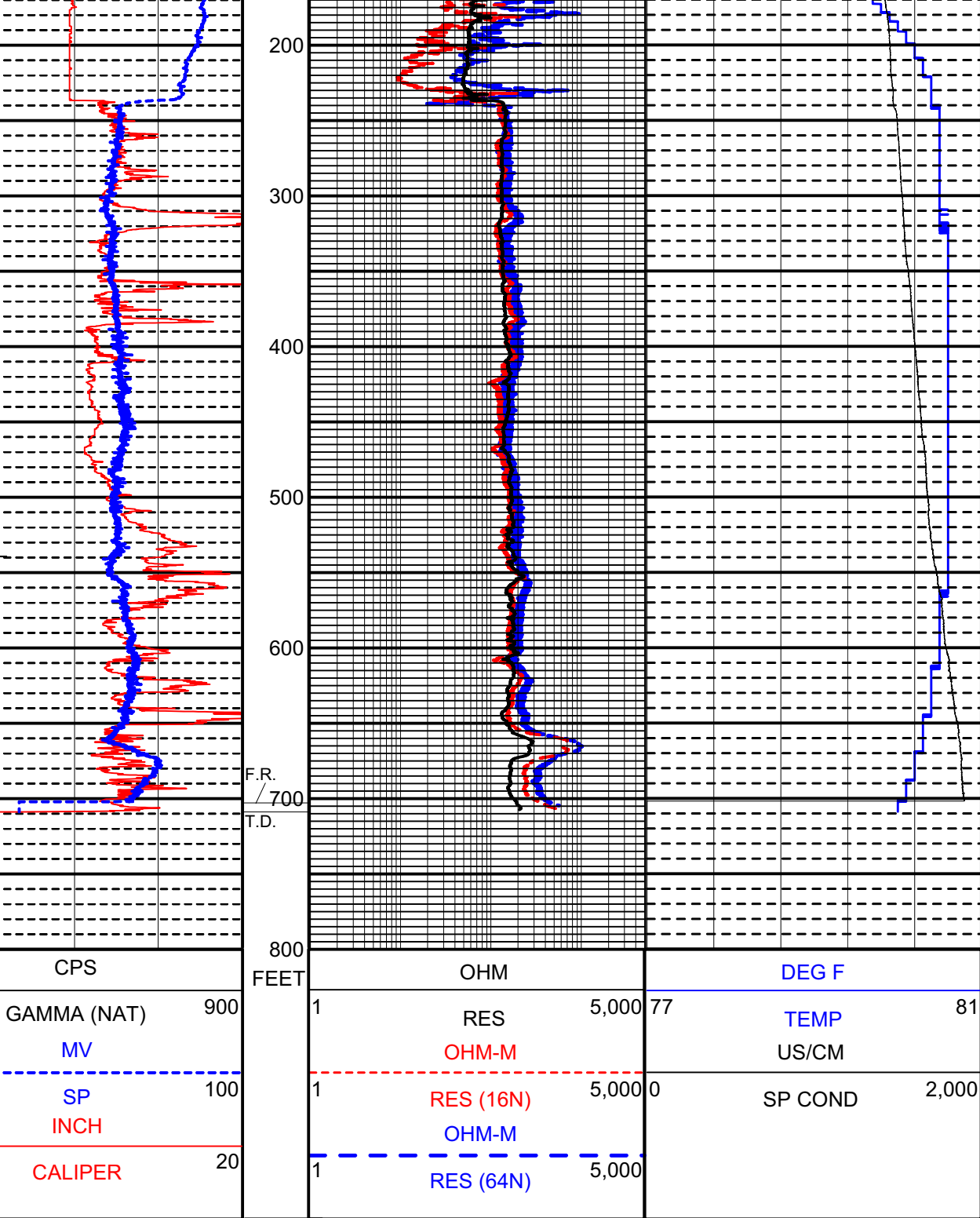
Site Name: ROMP 60 – Mulberry SURF AQ MONITOR

Hydrogeologist: David N. Arnold, P.G.

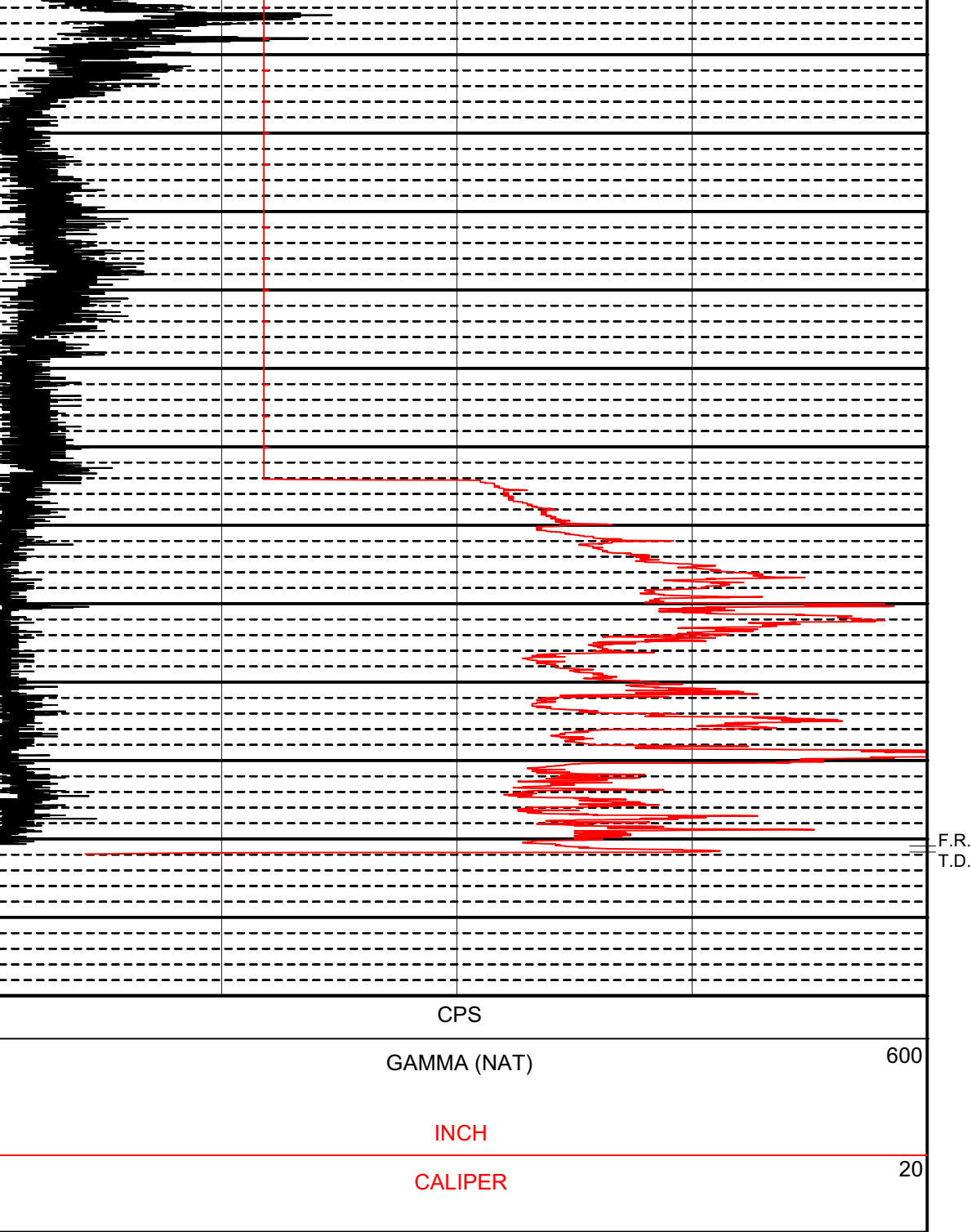
Date	Box No.	Geology	Hydrology	Hydrostrat.	Depth (ft bis)	Recovery (%)	Lithology	Description	Notes
10/18/2010	1	undifferentiated sand and clay	permeable	locally perched aquifer	0 - 1	100		Sand, quartz; Grayish black; Fine grained; Some roots and silt-sized organics.	Post hole dig 0-4 feet bis. Water at ~ 3 feet bis.
10/18/2010	1		permeable	locally perched aquifer	1 - 3	100		Sand, quartz; Pale yellowish brown; Fine grained; Some silt-sized organics. Roots and moderate brown nodules between 2 and 3 feet bis.	
10/18/2010	1			locally perched aquifer	3 - 5.5	100		Sand, quartz; Pale yellowish brown; Fine grained, becomes fine to very fine grained from 4 to 6 feet bis; Some silt sized organics.	
10/18/2010	1		not permeable	locally perched aquifer	5.5 - 8	80		Clay, sandy/silty with shell fragments; Very light gray with dark orangish brown mottling / staining.	Becomes dry at ~ 7 feet bis.
10/18/2010	1-2			confining unit	8 - 16	80		Clay, sandy/silty with less shell fragments than above; Light gray with pale yellowish orange mottling. Also has a few light greenish gray clay stringers. Mottling is more dark yellowish orange to light brown toward 14-16 feet bis.	Becomes wet ~ 13 feet bis.
10/18/2010	2		semi-permeable	surficial aquifer	16 - 18	50		Sand, clayey/silty; Dark yellowish orange to moderate yellowish brown; Very fine grained.	
10/18/2010	2		semi-permeable	surficial aquifer	18 - 20	90		Clay, sandy/silty; Light gray with dark yellowish orange to moderate yellowish brown mottling. Has increasing sand and phosphate content toward 20 feet bis.	
10/18/2010	3		not permeable	confining unit	20 - 25	95		Sand, silty; Dark yellowish orange to moderate yellowish brown with shell fragments and phosphate.	Becomes dry at ~ 25 feet bis.
10/18/2010	3		not permeable	confining unit	25 - 28	50		Clay, silty; very pale orange; hard, contains phosphate.	

[AQ, aquifer; bis, below land surface; ft, feet; Hydrostrat., Hydrostratigraphy; No., number; ROMP, Regional Observation and Monitor-well Program; SURF, surficial]

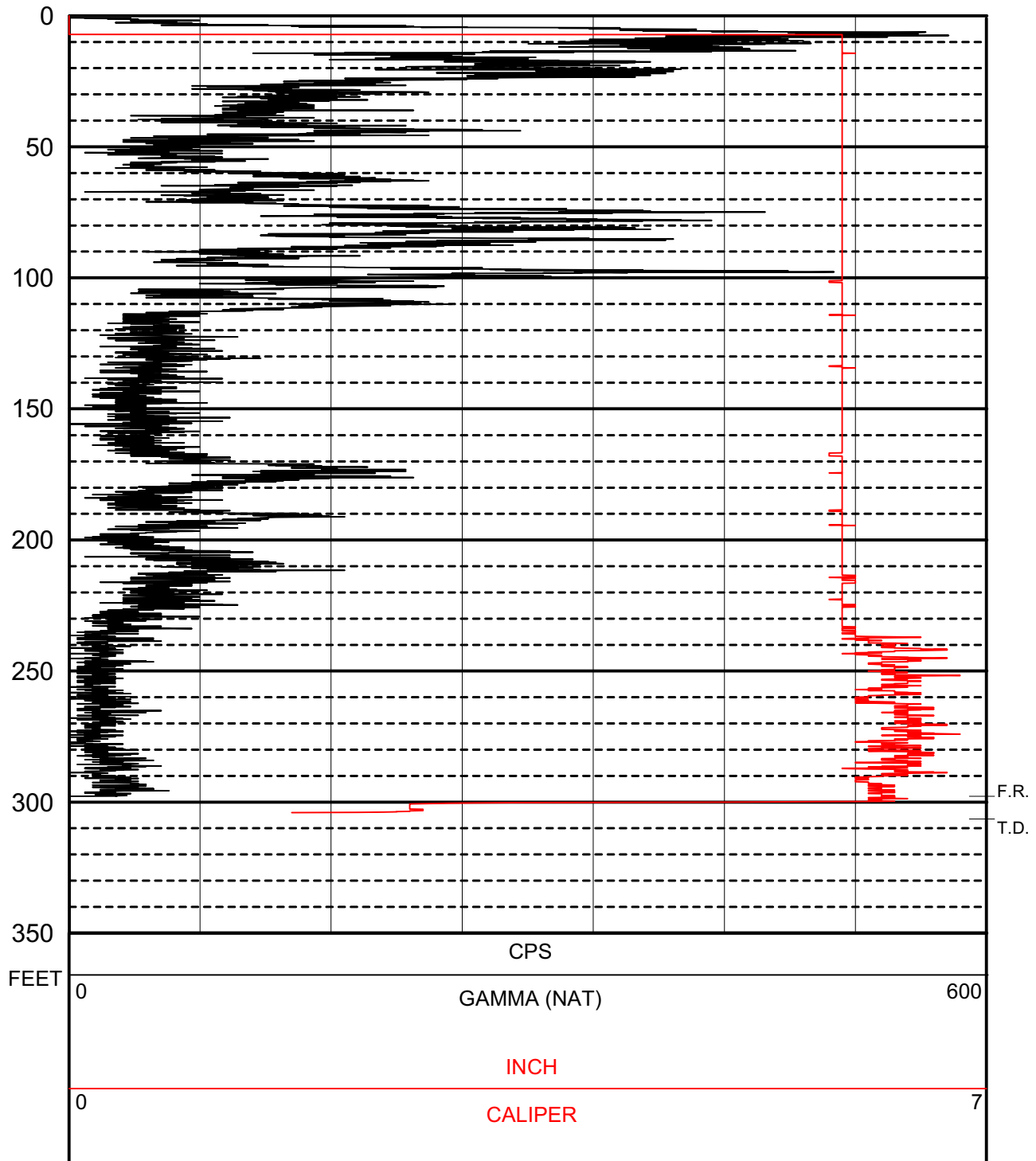
**Appendix C.** Lithologic log for the split-spoon samples collected during the installation of the surficial aquifer monitor well (SURF AQ MONITOR) for the ROMP 60 – Mulberry well site in Polk County, Florida.



per second; F.R., first reading above total depth; RES, resistivity; SP COND, specific conductance; SP, spontaneous potential; US/CM, microsiemens per centimeter]



nts per second; F.R., first reading above total depth; T.D., total depth]



[CPS, counts per second; F.R., first reading above total depth; T.D., total depth]

**Appendix D, Figure D3.** Gamma-ray and caliper log for the U FLDN AQ MONITOR (SWNN) well conducted at the ROMP 60 – Mulberry well site in Polk County, Florida. The log was performed on May 19, 2011, using the 9165C (caliper/ gamma-ray) tool. Six-inch polyvinyl chloride casing was installed from land surface to 235 feet below land surface at the time of logging. The log scale is 2 inches per 100 feet and it is linearly scaled. The FR is 297.7 feet below land surface and the TD is 304 feet below land surface.