

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Hydrogeologic Investigation of the
Floridan Aquifer System
L-8 (PBF-15)
Palm Beach County, Florida

Technical Publication WS-25



by
Steven Anderson

September 2008

sfwmd.gov

Executive Summary

Water supply plans for the Lower East Coast Planning Area (LEC) have identified the Floridan aquifer system (FAS) as a possible water supply alternative. The Comprehensive Everglades Restoration Plan (Everglades Plan) is focused on storing available water currently lost to tides. Aquifer storage and recovery has been identified as a major storage option, especially near the planned L-8 Canal Reservoir. Based on these plans, the South Florida Water Management District (SFWMD or District) initiated an exploratory well construction, aquifer testing, and long-term monitoring program in the LEC. This report documents the hydrogeologic investigation of the FAS in the L-8 Basin.

The exploratory wells will supply information needed to characterize the water supply potential of the FAS and to develop groundwater models, which will support future planning and regulatory decisions for the LEC. The LEC includes Palm Beach, Broward, Miami-Dade, and Monroe counties, and the eastern portion of Hendry County. A combination of natural drainage basins and political boundaries define the extent of this planning area. The well site was selected to augment existing hydrogeologic data and provide broad, spatial coverage within the LEC.

The scope of the investigation involved drilling, constructing, and testing an exploratory tri-zone Floridan aquifer monitor well in the L-8 Basin. The tri-zone well, referred to as PBF-15, was constructed as a telescoping style well to monitor water levels and water quality in three distinct FAS intervals. The well was completed in three distinct hydrogeologic units, drilled to a total depth of 2,300 feet below land surface (bls). The well was constructed in two phases using two different contractors. The District provided oversight for both phases of the operations.

The first phase of construction involved drilling a pilot hole to approximately 1,400 feet bls, with a 16-inch-diameter steel casing set to 908 feet bls to complete the first monitor interval. The second phase continued the drilling process to 2,300 feet bls, back plugging the well to a depth of 2,100 feet bls. The second monitor interval was completed with a 12-inch diameter steel casing from 1,400 to 1,583 feet bls, and the third monitor interval was completed with a 4-inch diameter fiberglass casing from 2,010 to 2,100 feet bls.

The main findings of the exploratory drilling and testing program at this site are as follows:

- The top of the FAS as described by the Southeastern Geological Society AdHoc Committee on Florida Hydrostratigraphic Unit Definition (1986) was identified at a depth of approximately 885 feet bls.
- Lithologic descriptions, geophysical logs, specific capacity, packer test results, and water quality data indicate moderate production capacity in the upper and middle portions of the Floridan aquifer.
- Water quality data from straddle packer tests and completed monitor zones indicate that chloride and total dissolved solids in the Floridan aquifer waters exceed potable drinking water standards.
- The base of the underground source of drinking water (USDW), where water contains total dissolved solid concentrations less than 10,000 mg/L, is at an approximate depth of 1,920 feet bls; however, induction resistivity logs estimate the depth of the USDW to be further up the column.
- Productive horizons in the FAS were from 900 to 1,400 feet bls, and from 1,500 to 1,575 feet bls. Fluid resistivity logs indicate that higher water quality is produced from 900 to 940 feet bls, and water quality deteriorates rapidly below 1,890 feet bls.
- Long-term monitoring now records water levels in the FAS, identifying responses to external stresses, such as earth tides and barometric pressure variations.

Table of Contents

EXECUTIVE SUMMARY	I
SECTION 1: INTRODUCTION	1
Background	1
Purpose	2
Project Description	2
SECTION 2: EXPLORATORY DRILLING AND WELL CONSTRUCTION	5
Phase I Drilling	5
Phase II Drilling	8
SECTION 3: STRATIGRAPHIC FRAMEWORK	13
Pliocene Series	13
Miocene Series	13
Hawthorn Group	13
Oligocene Series	14
Suwannee Limestone	14
Eocene Series	15
Ocala Limestone	15
Middle Eocene	15
Avon Park Formation	15
Lower Eocene	16
Oldsmar Formation	16
SECTION 4: HYDROGEOLOGIC FRAMEWORK	17
Surficial Aquifer System	17
Intermediate Confining Unit	17
Floridan Aquifer System	18
Upper Floridan Aquifer	18
Middle Confining Unit	21
Lower Floridan Aquifer	21
SECTION 5: HYDROGEOLOGIC TESTING	23
Formation Sampling	23
Geophysical Logging	23
Packer Tests	25
Inorganic Water Chemistry	28

Core Data and Rock Chemistry	29
Rock Geochemistry	32
Long-Term Groundwater Monitoring Program	33
SECTION 6: SUMMARY	35
SECTION 7: REFERENCES	37

List of Tables

Table 1.	Results of casing pressure test.	8
Table 2.	Summary of monitor intervals for tri-zone FAS monitor well.	10
Table 3.	Formation evaluation logs	24
Table 4.	Summary of inorganic water quality data from PBF-15 packer tests and completed monitor zones.	28
Table 5.	Coring summary for Phase I and II drilling.	31
Table 6.	Water level data collected from monitor zones.	34

List of Figures

Figure 1.	PBF-15 site location map along L-8 Canal.	3
Figure 2.	PBF-15 project location map.	4
Figure 3.	PBF-15 well completion diagram.	11
Figure 4.	Photograph of PBF-15 wellhead.	12
Figure 5.	PBF-15 lithologic and hydrogeologic summary.	20
Figure 6.	PBF-15 piper trilinear diagram of inorganic constituents of the FAS.	29
Figure 9.	Water level data collected from monitor zones.	34

List of Appendices

Appendix A.	Geophysical Logs
Appendix B.	Florida Geological Survey Lithologic Description
Appendix C.	Water Quality Data from Packer Tests
Appendix D.	Long-term Water Level Monitoring

Introduction

BACKGROUND

Water supply plans for the Lower East Coast Planning Area (LEC) of the South Florida Water Management District (SWFMD or District) have identified the Floridan aquifer system (FAS) as a possible alternative water supply source. The Comprehensive Everglades Restoration Plan (Everglades Plan) is focused on storing available water currently lost to tides. The aquifer storage and recovery (ASR) has been identified as a major storage option, especially near the planned L-8 Canal Reservoir. Based on these plans, the District initiated a program of exploratory well construction, aquifer testing, and long-term monitoring of water quality and hydraulic heads to provide data needed to assess the FAS underlying this area. The exploratory wells will supply information needed to characterize the water supply potential and aquifer storage of the FAS, and to develop a groundwater model, which will support future planning and regulatory decisions for the LEC.

The LEC includes Palm Beach, Broward, Miami-Dade, Monroe, and eastern portions of Hendry and Collier counties. A combination of natural drainage basins and political boundaries define the extent of this planning area.

Well Site Location

The L-8 Canal tri-zone monitor well, referred to as PBF-15 by the SFWMD, and W-18728 by the Florida Geological Survey (FGS), is located at latitude 26°44'16.0"N and longitude 80°21'49.0"W (North American Datum of 1927). A survey benchmark is set at an elevation of 24.23 feet relative to the National Geodetic Vertical Datum of 1929 (NGVD 1929), or mean sea level, and 22.75 feet relative to North American Vertical Datum (NAVD 1988). The survey information for the monitor zones is described as follows:

<u>Monitor Zone</u>	<u>NGVD 1929</u>	<u>NAVD 1988</u>
MZ-1	27.21	25.73
MZ-2	27.85	26.37
MZ-3	28.02	26.54

PURPOSE

This report documents the hydrogeologic investigation of the FAS in the L-8 Basin. The report comprises data collected during well drilling, aquifer testing, and monitoring at the L-8 Canal site. The information includes a summary of: 1) well drilling and construction details; 2) lithostratigraphy and hydrogeology; 3) water quality and productive capacity; and 4) short-term hydraulic head data. **Figure 1** illustrates the site location and **Figure 2** shows a more detailed project location.

PROJECT DESCRIPTION

The scope of the investigation involved drilling, constructing, and testing an exploratory tri-zone Floridan aquifer monitor well in the L-8 Basin. The exploratory well was constructed in two phases by two different drilling contractors. The District provided oversight for both phases of the operations. These two phases were separated as follows:

Phase I Drilling: A.C. Schultes, Inc. (ACS), a Tampa-based firm, was responsible for drilling, construction, and testing services under SFWMD contract CN-051190. The well was completed to a depth of 1,400 feet below land surface (bls) with a 16-inch diameter steel casing set to 908 feet bls.

Phase II Drilling: All Webb Enterprises, Inc. (AWE), a Jupiter-based firm, was responsible for completing construction and testing services of the final tri-zone monitor well (PBF-15) under SFWMD contract CN-060367. The well was drilled to a total depth of 2,300 feet bls and then back plugged to a depth of 2,100 feet bls.

PBF-15 was constructed in a telescope manner with three monitor intervals. The first monitor interval was completed with a 16-inch diameter steel casing from 908 to 1,144 feet bls in Phase I. The second interval was completed with a 12-inch diameter steel casing from 1,400 to 1,583 feet bls, and the third monitor interval was completed with a 4-inch diameter fiberglass casing from 2,010 to 2,100 feet bls in Phase II.

Mud-rotary and reverse-air drilling techniques were used. For instance, ACS employed closed-circulation mud-rotary drilling to advance a nominal 12-inch diameter pilot hole from land surface to 1,400 feet bls during Phase I. AWE employed the reverse-air, open-circulation method to drill the pilot-hole from 1,400 to 2,300 feet bls.

The District used formation samples (well cuttings) and geophysical logs to determine casing setting depths. A suitable aquifer horizon was identified for long-term monitoring and the contractors reamed the pilot hole to the specified

diameters and depths for the selected casings. Three concentric casings (36-, 24-, 16-inch diameter) were used in Phase I for the construction of the tri-zone monitor well. Two concentric casings (12- and 4-inch diameter) were used in Phase II to complete of the telescoping style tri-zone monitor well.



Figure 1. PBF-15 site location map along L-8 Canal.



Figure 2. PBF-15 project location map.

Exploratory Drilling and Well Construction

PHASE I DRILLING

On September 13, 2005, ACS mobilized at the L-8 Basin site to begin drilling and construction of the FAS test-monitor well (referred to as PBF-15). ACS installed (via a vibratory hammer) a 30-inch diameter steel pit casing American Society of Testing and Materials (ASTM) A53, Grade B to 36 feet bls. Then ACS cleared and rough-graded the site and built a 2-foot thick by 2-foot high earthen wall with crushed limestone. ACS then lined the earthen wall with a high-density polyethylene (HDPE) membrane to form a temporary drilling pad around the perimeter of the rig and settling tanks. The drilling pad served to contain drilling fluids and formation waters produced during well drilling, testing, and construction activities.

On October 22, 2005, ACS began drilling operations by advancing a 12-inch diameter borehole to a depth of 214 feet bls. ACS then reamed the pilot hole with a 30-inch diameter bit to 214 feet bls. On November 5, 2005, MV Geophysical Survey, Inc., a Fort Myers-based geophysical logging company, logged (natural gamma and 4-arm caliper) the nominal 30-inch borehole (**Appendix A**). On November 8, 2005, ACS installed a 24-inch diameter steel pit casing (ASTM A53, Grade B) to 205 feet bls and pressure grouted the annulus back to 80 feet bls using 15 cubic yards (yd³) of ASTM Type II, Portland cement. On November 9, 2005, ACS pumped an additional stage (7 yd³) of ASTM Type II neat cement, causing cement returns at land surface.

ACS installed a blow-off prevention valve on the 24-inch diameter casing to control potential artesian conditions while penetrating the intermediate aquifer/confining unit and the FAS. On November 15, 2005, ACS resumed mud rotary drilling of the pilot-hole through unconsolidated to semi-consolidated, Miocene-aged sediments and Oligocene/Eocene-aged carbonates. During drilling, a District representative selected five intervals for core collection.

On January 18, 2006, ACS drilled to a depth of 1,415 feet bls, with no noticeable fluid losses. ACS circulated the nominal 10-inch diameter borehole to prepare it

for geophysical logging operations. Schlumberger, an oil field services company, performed geophysical logging of the mud-filled pilot-hole from 205 to 1,415 feet bls on January 20, 2006. Formation evaluation logs consisted of the following: 4-arm Caliper, Gamma Ray, Spectralog®, Electron Capture Spectroscopy, High Resolution Array Induction with Spontaneous Potential, Dipole Sonic, Compensated Density with Photoelectric Effect, Compensated Neutron, and Formation Micro-Imager. These logs provide information on the subsurface permeability distribution within the open-hole section (460 to 1,500 feet bls). **Appendix A** contains the individual log traces from Geophysical Run No. 2.

The District reviewed the geophysical logs (**Appendix A**) and lithologic data (**Appendix B**), and identified the top of the FAS at a depth of approximately 885 feet bls. The 16-inch diameter casing was set to a depth of 908 feet bls to:

1. To avoid future drilling problems, seal off overlying silty clays of the Hawthorn Group and carbonate mud stringers, fine quartz, and phosphatic sands within the lower portion of the Arcadia Formation between 880 and 900 feet bls.
2. Locate the casing in a competent, well-indurated rock unit to reduce undermining (erosion) at its base because of natural and induced high-velocity upward flow.
3. Facilitate reverse-air drilling operations through the underlying permeable horizons of the FAS to the anticipated depth of 2,300 feet bls.
4. Evaluate flow characteristics of the FAS within the anticipated open-hole interval of 905 to 2,300 feet bls.

During logging operations, Schlumberger identified the borehole to be 3-degrees off deviation in the east/northeast direction. The District's Statement of Work stated that the borehole may not exceed 1-degree off deviation. ACS elected to back plug the borehole to 205 feet bls with neat cement and re-drill the borehole, taking deviation surveys every 30 to 1,400 feet bls.

On February 11, 2006, ACS back plugged the borehole from 1,415 feet bls to 176 feet bls with 39 cubic-yards (yd³) of neat cement. Pilot-hole drilling was resumed with a 12-inch diameter bit on February 18, 2006. A problem was encountered at 670 feet bls where the borehole moved off deviation by slightly over 1-degree. Attempts were made to rectify the problem (i.e., side reaming), but the problem could not be corrected. ACS elected to back plug the borehole on March 3, 2006 with 13 yd³ of neat cement to 590 feet bls.

A new pilot hole was drilled to 908 feet bls on March 6, 2006. ACS attempted to ream the pilot-hole with a 23-inch bit, although the bit would move 1-degree off deviation during drilling operations. This may have occurred because not enough bit subs (weight) was behind the drill bit, which helps drill a straight hole.

ACS elected to ream the borehole gradually by using a 17-inch diameter bit before using the 23-inch diameter bit. On April 19, 2005, ACS reamed the borehole with a 17-inch diameter bit to 908 feet bls and on April 24, 2006 they complete the borehole to 908 feet bls with a 23-inch diameter bit. All reaming operations stayed under 0.5-degree off deviation.

On May 2, 2006, MV Geophysical logged (natural gamma and 4-arm caliper) the nominal 23-inch diameter borehole to 903 feet bls without incident (see **Appendix A** for Geophysical Log Run 3). The caliper log identified the bottom of the borehole to be 903 feet bls, which would put the casing too close to the fine quartz and phosphatic sands of the Arcadia Formation. Directed by the District, ACS reamed the borehole to 915 feet bls and MV Geophysical re-logged (natural gamma and 4-arm caliper) the nominal 23-inch diameter borehole without incident on May 8, 2006. The caliper log trace showed no unusual borehole conditions that would prohibit proper installation of the 16-inch diameter steel casing (see **Appendix A** for Geophysical Log Run 4).

On May 8, 2006, ACS installed the 16-inch diameter steel casing (ASTM A53, Grade B) to a depth of 905 feet bls and pressure grouted the annular space using 70 yd³ of ASTM Type II neat cement. A temperature log, run by MV Geophysical on May 9, 2006, identified the top of the cement to be 425 feet bls. Steel tubing was also used to physically locate (hard tag) cement levels within the annulus, indicating cement levels at 388 feet bls. ACS pumped an additional 52 yd³ of ASTM Type II neat cement via the tremie method in two stages. This volume brought cement levels to 6 feet bls.

The wellhead was sealed at the surface with a temporary header for a casing pressure test. Next, the well was filled with water and pressurized to approximately 106-pounds per square inch (psi) with a high-pressure pump. A pressure test (witnessed by a SFWMD representative) on the 16-inch diameter steel casing was completed on May 23, 2006. During the course of the 60-minute pressure test, the total pressure within the 16-inch diameter casing decreased 2.0 psi, representing a 2.0 percent decline within the test tolerance limit of +/- 5 percent (**Table 1**).

Table 1. Results of casing pressure test.

Time Hour	Elapsed Time (min)	Pressure Reading (psi)	Remarks	Recorded by
10:27	0	106.0	Start of test	ER
10:32	5	106.0		ER
10:37	10	105.5		ER
10:42	15	105.5		ER
10:47	20	105.0		ER
10:52	25	105.0		ER
10:57	30	105.0		ER
11:02	35	104.5		ER
11:07	40	104.5		ER
11:12	45	104.5		ER
11:17	50	104.5		ER
11:22	55	104.5		ER
11:27	60	104.0	End of test: Total pressure change 2.0 psi	ER

Witnessed and recorded by Ed Rectenwald, SFWMD.

As a result of pressure grouting, ACS drilled out a cement plug at the base of the 16-inch diameter casing using a nominal 15-inch diameter bit. ACS reconfigured the drill bit assembly using a 12-inch diameter bit and mud rotary drilled from 905 feet to 1,400 feet bls. On May 26, 2006, ACS completed Phase I drilling operations to a depth of 1,400 feet bls. MV Geophysical logged (natural gamma and 4-arm caliper) the borehole on June 2, 2006 to verify total depth and borehole conditions.

ACS constructed a 5-foot by 5-foot reinforced concrete pad at the surface of the monitor wellhead and placed traffic bumpers at its corners. By June 21, 2006, ACS completed Phase I well construction, demobilized drilling equipment, and restored the site.

PHASE II DRILLING

AWE was considered the “Apparent Low Quote” for Phase II, and a “Notice to Proceed” was issued with an effective date of October 9, 2006. AWE mobilized and set up their Challenger 320 HD rig on the existing site. AWE entered the borehole and reverse-air drilled the open-hole interval. After the borehole was conditioned, drilling began on October 20, 2006.

AWE reverse-air drilled from 1,400 to 2,300 feet bls. On January 16, 2007, AWE ran production evaluation logs under artesian flow (dynamic) conditions. These production logs included a flowmeter, high-resolution temperature log, and fluid

resistivity log. On January 10, 2007, Schlumberger logged the water-filled nominal 10-inch diameter pilot-hole from 908 to 2,300 feet bls. The logging suite included Caliper, Gamma Ray, Spectralog®, Dual Induction-Focused Log, Multipole Array AcoustilogSM, Compensated Z-DensilogSM (Z denotes electron density), and a Compensated Neutron. Logs are shown in **Appendix A** and discussed in the Hydrogeologic Testing section.

The District selected packer test intervals based on information provided by analysis of the geophysical logs, video survey, and formation samples (well cuttings). The first of three tests began on February 22, 2007. The tests characterized the water quality and production capacities of specific intervals within the middle portion of the FAS (1,560 to 1,940 feet bls). Packer testing operations were completed on February 27, 2007.

After packer testing, available information was compiled and used to select the open-hole sections for the two lower monitor zones. The District selected 1,400 feet bls as the casing setting depth for the nominal 12-inch diameter steel casing. AWE used a nominal 15-inch diameter bit to ream the pilot-hole from 908 feet bls (base of the 16-inch diameter casing) to 1,400 feet bls. On February 6, 2007, AWE ran a caliper log on the reamed borehole to evaluate its configuration/stability and to calculate cement volumes for grouting operations. AWE attached three steel cement baskets and centralizers to the nominal 12-inch diameter steel casing and installed it at 1,400 feet bls. AWE then grouted the annular space using 620 ft³ of ASTM Type II neat cement placed by the tremie method in seven stages to 1,583 feet bls.

Next, AWE reverse-air drilled and developed the remaining open-hole section from 1,400 to 2,300 feet bls. Once the borehole was cleaned-out, geophysical logs were completed. AWE then installed threaded-and-coupled nominal 4-inch diameter fiberglass reinforced pipe (FRP-Smith Fiberglass, SDT 1510 series) to a depth of 2,010 feet bls. AWE filled the remaining open borehole with gravel and a fine sand cap and cement-grouted the FRP by the tremie method using 225 ft³ of ASTM Type II neat cement pumped in multiple stages. Stage grouting operations caused cement levels to rise up and around the bottom of the casing from 2,010 feet bls to 1,583 feet bls. This volume brought cement levels to 1,583 feet bls, which formed the base of the second monitor interval (referred to as PBF-15 MZ-2). The cement was drilled out and gravel was pumped out to a depth of 2,100 feet bls. This formed the third monitor interval (referred to as PBF-15 MZ-3, 2,010-2,100 feet bls). On March 6, 2007, AWE completed the cement grouting of the nominal 4-inch diameter FRP.

AWE installed three 2-inch diameter stainless steel extensions equipped with 2-inch inner diameter stainless steel ball valves at the surface to complete the wellhead for the tri-zone monitor well. The telescoped-style well allows the SFWMD to monitor water levels and water quality in three distinct FAS intervals. The uppermost monitor zone (PBF-15 MZ-1) was constructed using a

16-inch diameter casing and completed with an annular zone between 908 and 1,144 feet bls. The next zone (PBF-15 MZ-2) was completed within the second productive interval in the FAS, from 1,400 to 1,583 feet bls. The lowermost monitor zone, identified as PBF-15 MZ-3, was completed in the lower section of the middle confining unit below the base of the underground source of drinking water (USDW), from 2,010 to 2,100 feet bls. **Table 2** lists the monitor intervals and completion methods for the tri-zone monitor well.

Table 2. Summary of monitor intervals for tri-zone FAS monitor well.

Identifier	Monitor Interval (feet bls)	Completion Method	Aquifer
PBF-15 MZ-1	908–1,144	Annular Zone	Upper Floridan
PBF-15 MZ-2	1,400–1,583	Annular Zone	Middle Floridan
PBF-15 MZ-3	2,010–2,100	Open Hole	Middle Confining Unit

AWE developed the three monitor intervals via over-pumping and artesian flow techniques until the sediment concentration of produced formation waters was 5 milligrams per liter (mg/L) or less using an Imhoff cone. AWE then built a 5-foot by 5-foot reinforced concrete pad at the surface of the monitor wellhead and placed traffic bumpers at its corners. AWE completed well construction of PBF-15 on March 13, 2007. **Figure 5** is a Well Completion Diagram of the tri-zone monitor well, and **Figure 6** is a photograph of the completed PBF-15 wellhead.

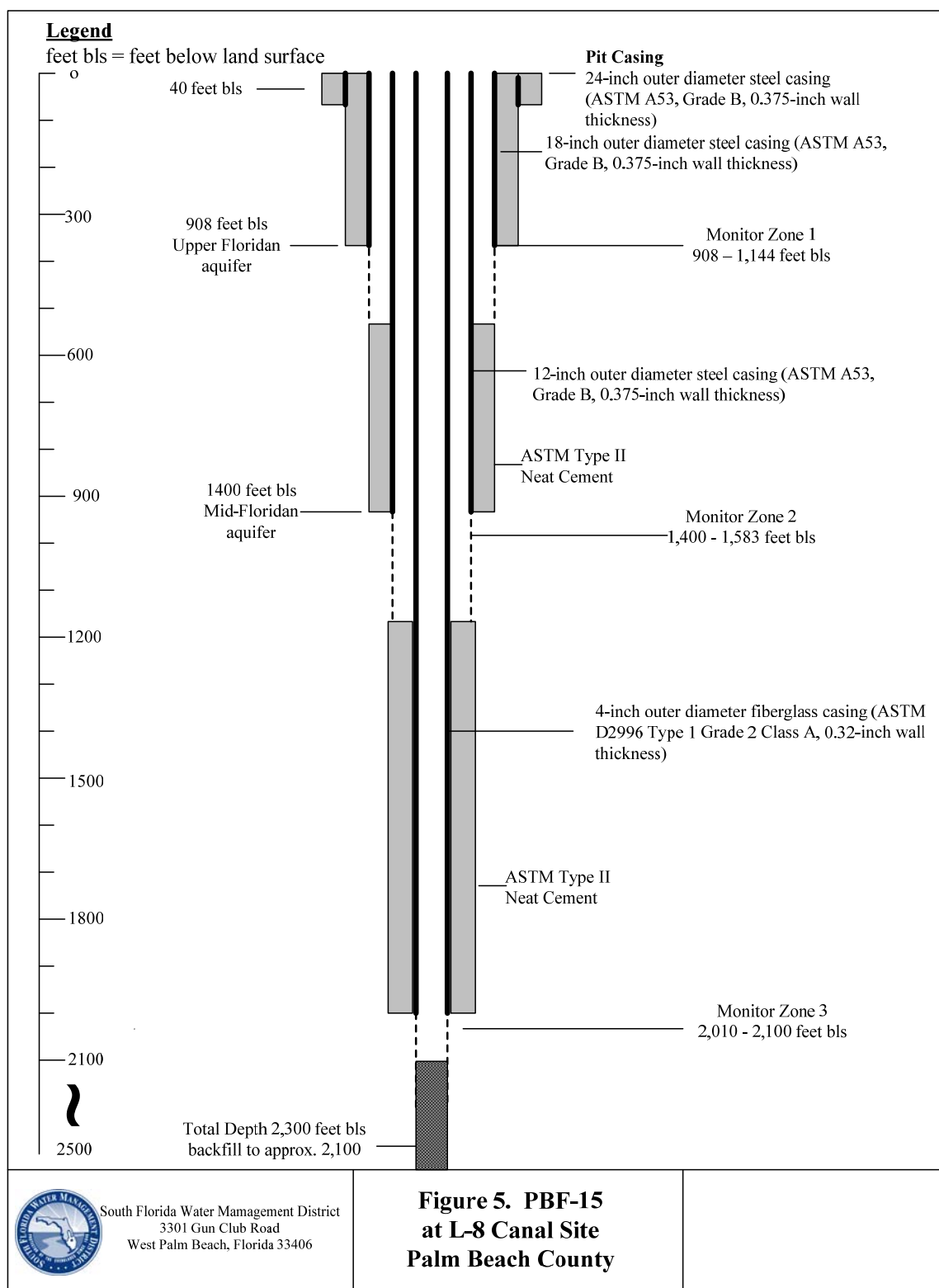


Figure 3. PBF-15 well completion diagram.



Figure 4. Photograph of PBF-15 wellhead.

3

Stratigraphic Framework

The District collected geologic formation samples (well cuttings) from the pilot hole during drilling operations for the PBF-15 tri-zone monitor well and analyzed them based on their dominant lithologic or textural characteristics, and, to a lesser extent, color. Formation samples were washed and shipped to the Florida Geological Survey (FGS) for analysis and long-term storage. **Appendix B** contains a copy of the FGS's detailed lithologic description for the pilot-hole/monitor well PBF-15 (FGS reference no. W-18728). An electronic version of the lithologic description is available from the FGS at: <http://www.dep.state.fl.us/geology/gisdatamaps/litholog.htm>.

PLIOCENE SERIES

The sediments occur from land surface to a depth of approximately 200 feet at this site. These sediments consist of quartz sand and shell beds (moderate to well-indurated) typically from the Holocene and Pleistocene age. The well-indurated calcareous sandstone and limestone encountered from 100 to 200 feet bls represent the Pliocene-age of the Tamiami Formation. This formation consists of fine to very coarse-grained quartz sands with varying percentages of silt, clay, and shell material (Reese 2000).

MIOCENE SERIES

Hawthorn Group

The Hawthorn Group is composed of a heterogeneous mixture of silt, clay, calcareous clay, dolosilt, quartz sand, shell, phosphate grains, limestone, and dolomite. The Hawthorn Group can be subdivided into two lithostratigraphic units. The upper unit, the Peace River Formation, is composed predominantly of green to olive-gray siliciclastic material. The lower unit, the Arcadia Formation, is composed principally of carbonates (Scott 1988). A major regional disconformity separates these two units (Scott 1988 and Missimer 1997, 2002). The contact between these two units can often be identified by the occurrence of a rubble bed of coarse- to pebble-size quartz sand and phosphatic sand and gravel. If

present, this unit produces a distinctive response or “peak” on the natural gamma ray log.

Peace River Formation

The top of the Peace River Formation is recognized as the first appearance of an olive-gray to yellowish-gray, poorly indurated clayey silt unit with a minor phosphate component. These poorly indurated silts are at a depth of 200 feet bls. These low permeable sediments are approximately 340 feet thick and extend to a depth of 540 feet bls. The lower portion of the Peace River Formation from 300 to 540 feet bls consists of a low permeability, poorly indurated, light olive-gray to olive-gray clay matrix with minor shell.

Arcadia Formation

Generally, the Arcadia Formation is separated from the Peace River Formation by a lithologic change from predominantly siliciclastic to mixed siliciclastic-carbonate sediments. The matrix shifts from clay to calcilutite. At this site, a distinctive lithologic break occurs at 540 feet bls, where a yellowish-gray to light-gray, moderately indurated, mudstone/wackestone with dolomitic and sparry calcite cement is encountered. There is a distinct change at 720 feet bls from wackestone to packstone, with increased allochemical constituents, and accessory minerals. This lithologic unit is noted on the geophysical logs by a moderate increase in gamma-ray emissions, (see **Appendix A**, PBF-15 Geophysical Log Run No. 2).

The lithology below 570 feet bls shifts to a poorly indurated phosphatic wackestone-packstone. This interval is marked by varying formation resistivity and bulk density readings, and decreased sonic transit times. Between 720 and 885 feet bls, the grain size ranges from microcrystalline to coarse with poor induration. The “marker unit” is located just above this basal Hawthorn Group unit identified by Reese (2000). Reese (2000) found this marker unit to be laterally continuous throughout much of Collier, Lee, Hendry, and Palm Beach counties.

OLIGOCENE SERIES

Suwannee Limestone

The FGS did not identify any contact between the Arcadia Formation and the Suwannee Limestone, based on lithologic considerations. The Suwannee Limestone of the early Oligocene age is interpreted to be present only in western Palm Beach County (Reese 2000).

EOCENE SERIES

Ocala Limestone

The Ocala Limestone is identified at a depth of 885 feet bls. The lithologic character of the upper portion of the Ocala Limestone is similar to the yellowish-gray packstones of the lower Arcadia Formation, as seen in the well cuttings and geophysical log responses. The FGS identified the top of the Ocala Limestone at a depth of 885 feet bls, with the first occurrence of benthic foraminifera, a diagnostic microfossil assumed to be *Lepidocyclina ocalana* (primarily a biostratigraphic designation, Applin and Applin 1944). The lack of lithologic differences between the two lithostratigraphic units may indicate similar depositional environments were present at this location.

At this site, the Ocala Limestone is from 885 to 920 feet bls, consisting primarily of yellowish-gray, moderate to well-indurated wackestone. The allochemical constituent consists primarily of benthic foraminiferal tests, fossil fragments, and cones. Through this lithostratigraphic unit, the natural gamma log records lower emissions than in units above, and varying log-derived neutron/density porosity curves (see **Appendix A**, Geophysical Log Run No. 1).

MIDDLE EOCENE

Avon Park Formation

The FGS identified the Avon Park Formation from 920 to 1,860 feet bls. The formation consists predominantly of moderately to well-indurated, yellowish-gray wackestone and grainstone units that exhibit the effects of low-grade recrystallization. The formation resistivity, photoelectric, density, neutron, sonic, and caliper log responses remain fairly consistent throughout this limestone sequence, noting minor variations in lithology, porosity, and structure, as seen in their individual log traces obtained from Geophysical Log Run No. 1 and 2 (**Appendix A**). A composite of density, sonic, and neutron measurements set at a limestone matrix, coupled with post processing and correlation of conventional 4-inch diameter core, allowed the production of the composite plot of PBF-15 (provided by HuntWallace TM and shown in **Appendix A**, Geophysical Log Run No. 4). This log trace shows a dolomitic limestone that contains varying amounts of interbedding limestone and dolomite.

Dolostones are limited to the interval from 1,310 to 1,330 feet bls, comprising only a small percentage of this large Avon Park Formation, which is considered unusual since a thicker and higher number of dolostone units are generally found. Multi-layers of dolostones were encountered at lower intervals within the borehole under Phase II of the drilling operation. The lithologic logs, based on

cuttings collected every 5 feet, indicate approximately a 10-foot section of dolostone increasing in thickness within the lower portion of the borehole.

LOWER EOCENE

Oldsmar Formation

The top of the Oldsmar Formation was identified by the FGS at a depth of 1,860 feet bls. Its diagnostic microfossils are often obliterated by diagenetic effects, and its lithologic character is similar to the overlying Avon Park Formation. A review of the borehole data by FGS indicates that the Oldsmar Formation was determined based on the first occurrence of light-gray limestone and brown vuggy dolomite, using established lithologic data that is supported by an increase in gamma activity. The foraminifera that resemble Oldsmar index forams (Applin and Applin 1944; Chen 1965; Miller 1986; Duncan *et al.* 1994) were too highly recrystallized to make definitive identifications. The actual top of the Oldsmar Formation may be deeper where limestone is the predominant rock type.

Hydrogeologic Framework

Three major hydrogeologic systems underlie this site: the surficial aquifer system, the intermediate confining unit, and the Floridan aquifer system, with the latter being the focus of this investigation. These aquifer systems are composed of multiple, discrete aquifers separated by low permeability “confining” units that occur throughout this Tertiary/Quaternary-aged sequence. **Figure 7** shows a generalized hydrogeologic section underlying the L-8 Canal Basin (PBF-15) site.

SURFICIAL AQUIFER SYSTEM

At this location, the surficial aquifer system (SAS) consists of the Holocene-aged Pamlico Sand, Pleistocene-aged Anastasia and Ft. Thompson Formations, and the Pliocene-aged Tamiami Formation.

INTERMEDIATE CONFINING UNIT

The intermediate confining unit is below the SAS. This intermediate confining unit extends from the base of the SAS to the top of the FAS, from 200 to 800 feet bls within this study area. The Pliocene-Miocene-aged and the Miocene-aged Hawthorn Group (Scott 1988) separate the FAS from the SAS. The Hawthorn Group sediments consist of unconsolidated shell beds, soft non-indurated clay, silt and quartz-phosphatic sand units, and poorly to moderately indurated mudstones/wackestones (see **Appendix B**, FGS lithologic description).

Underlying the Lower East Coast Planning Area (LEC), the intermediate confining unit contains multiple low permeable confining units. The top of the confining unit is marked by low permeable unconsolidated, clay-rich shell beds and poorly indurated wackestone from 200 to 540 feet bls. Below this interval is a relatively thick, confining unit that extends from 540 to 575 feet bls. This confining unit consists of low permeable, yellowish to light-gray, unconsolidated to poorly-indurated mudstone. A distinctive lithologic break occurs at 575 feet bls where a yellowish-gray, poorly indurated, wackestone/packstone is encountered that continues to 885 feet bls.

FLORIDAN AQUIFER SYSTEM

The Floridan aquifer system (FAS) consists of a series of Tertiary-aged limestone and dolostone units. The system includes permeable sediments of the lower Arcadia Formation, Suwannee (if present) and Ocala Limestones, Avon Park Formation, and Oldsmar Formation. The Paleocene-aged Cedar Keys Formation with evaporitic gypsum and anhydrite forms the lower boundary of the FAS (Miller 1986).

Upper Floridan Aquifer

The top of the FAS, as described by the Southeastern Geological Society AdHoc Committee on Florida Hydrostratigraphic Unit Definition (1986), coincides with the top of a vertically continuous permeable carbonate sequence. The Upper Floridan aquifer consists of thin water-bearing horizons with high permeability interspersed within thick units of late Miocene- to middle-Eocene aged sediments having low permeability. These units include the basal Arcadia Formation, Suwannee and Ocala Limestones, and the Avon Park Formation.

On a regional scale, two zones of high permeability exist within the Upper Floridan aquifer, typically occurring between 850 and 1,600 feet bls. The most transmissive part of this upper zone usually occurs near the top, coincident with zones of dissolution in association with unconformities of the Oligocene- or Eocene-aged formations (Miller 1986). The first transmissive horizon in the FAS at the L-8 Canal site is from 850 to 1,150 feet bls, and includes the basal Arcadia Formation and the Ocala Limestone with no presence of the Suwannee Limestone of the early Oligocene age. This productive unit is composed of yellowish to medium-gray, moderately indurated wackestone to packstone units.

While drilling, minor drilling fluid losses were noted within an interval from 890 to 1,100 feet bls, which is indicative of a porous/permeable horizon. The flowmeter log data indicated that the majority of the water production within this interval is found at 980 feet bls to the casing set at 908 feet bls (**Appendix A**). The temperature and fluid resistivity survey indicate a significant change starting at 960 feet bls. The District selected the depth interval of 908 to 1,144 feet bls for long-term monitoring and hydraulic testing based on moderate to good water production potential and similar water characteristics. Formation water samples obtained from this completed monitor zone (908–1,144 feet bls) yielded chloride and total dissolved solids (TDS) concentrations of 1,700 and 3,400 mg/L, respectively. The production logs indicate production in this packstone unit from 908 to 1,144 feet. Using the current hydrogeologic nomenclature of the hydraulically connected permeable unit, the interval from 908 to 1,144 feet bls can be considered the Upper Floridan aquifer.

A second flow zone was isolated based on drilling logs and geophysical logs run on the drilled interval from 1,400 to 1,600 feet bls. Higher resistivity values were

associated within this horizon and determined to be of interest for a long-term monitor interval. The lithologic log indicates a fairly consistent, very light orange grainstone with intergranular porosity (**Appendix B**). Faster sonic travel times are indicated by the geophysical logs (**Appendix A**). Formation water samples obtained from this completed monitor zone (1,400–1,583 feet bls) were of lower flow and yielded chloride and TDS concentrations of 2,100 and 4,100 mg/L, respectively. This production zone showed similar characteristics to the first production zone, with slightly poorer water quality and flow.

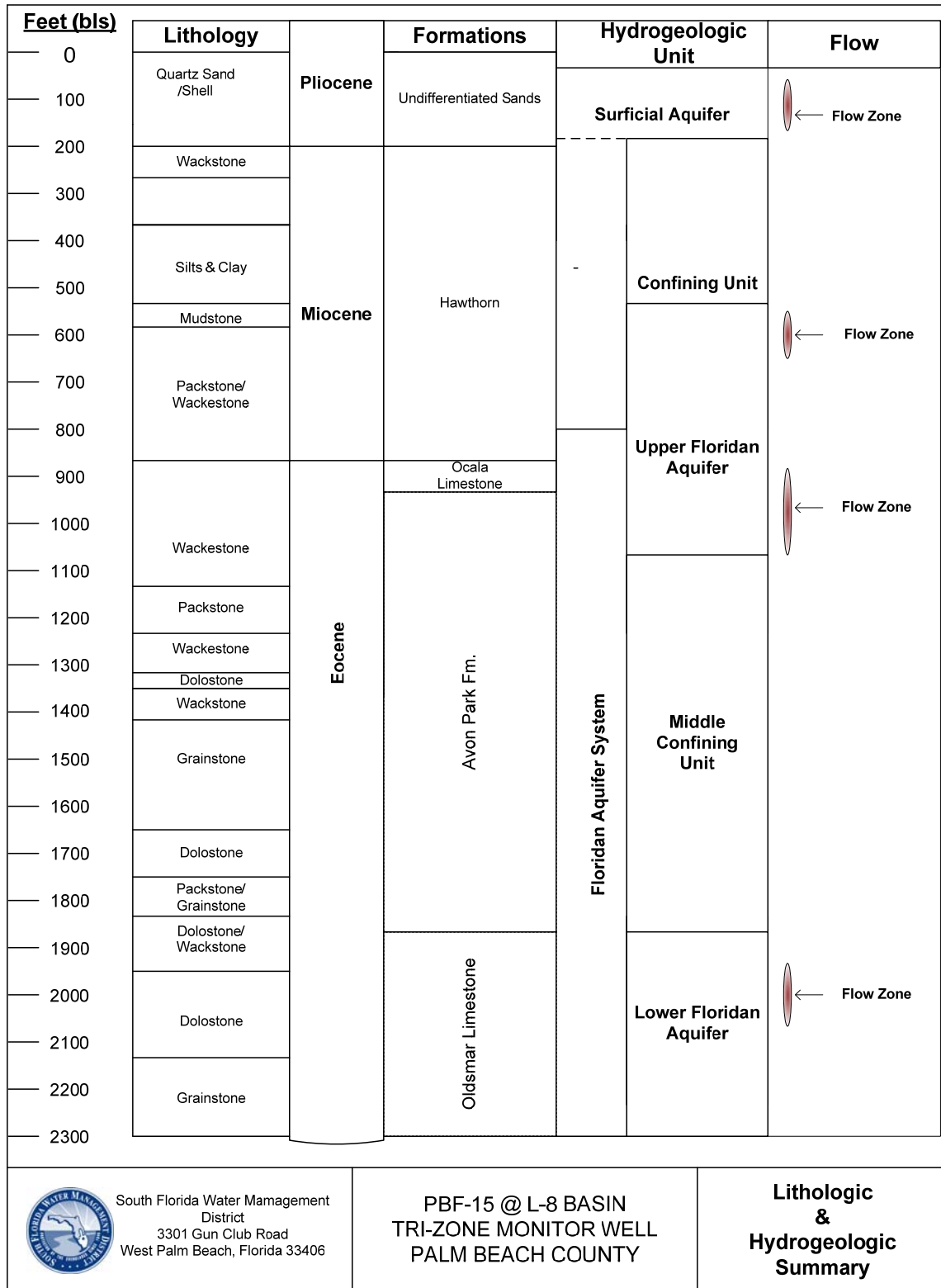


Figure 5. PBF-15 lithologic and hydrogeologic summary.

Middle Confining Unit

Below this productive horizon is a thick, low permeable, inter-aquifer semi-confining carbonate unit that extends from 1,300 to 1,860 feet bls. This Avon Park Formation consists of poorly to moderately indurated “chalky” wackestone and packstone units. Formation samples from this interval do not show evidence of large-scale secondary porosity development (e.g., good pinhole or moldic porosity). The Avon Park Formation from 1,600 to 1,860 feet bls consists of low permeable moderately indurated wackestone and packstone units. Through this interval formation, resistivity values range from 2.0 to 90.0 ohmmeters (ohm-m), bulk density averages of 2.15 gram per centimeter (G/C3) with varying stringers as high as 2.65 G/C3, sonic transit time averages of 90 micro-seconds, and log-derived porosity averages of 28 porosity units. In addition, the production type geophysical log traces indicate no significant productive horizons, as seen by smooth temperature and flowmeter log traces (after correcting for borehole diameter). This supports the confining nature of the interval. The District conducted two separate packer tests from 1,560 to 1,590 feet bls and 1,700 to 1,730 feet bls, which yielded average specific capacity values of 12.0 gallons per minute, per foot, and 7.9 gallons per minute, per foot, respectively.

Lower Floridan Aquifer

The predominant feature in the upper portion was calcilutite matrix with intergranular porosity, grading to a more dolomitic environment. The Oldsmar Formation is reported to be 1,100 to 1,500 thick and is predominantly micritic limestone. The lower portion of the formation is locally called the boulder zone. The boulder zone consists of massive beds of fractured and cavernous dolomite with high permeability. This saline-high permeability zone, which prevents pressure buildup from injection wells, has long been used as an injection horizon. The top of the Lower Floridan aquifer in south Florida is marked by the shallowest zone of highly transmissive dolomite in the Oldsmar or Avon Park Formations (Reese and Memberg 2000). Thick confining units may exist between this permeable zone and the boulder zone (Miller 1986).

The geophysical logs indicate a change in faster travel times and a decrease in sonic porosity at the contact of this dolostone unit. The signature of the deep induction log and fluid resistivity log indicates that a water quality transition is below 1,880 feet bls (identified as the Oldsmar Limestone). Between 1,880 and 1,920 feet bls, fluid resistivity values decrease rapidly with changes in lithology, as noted in the well cuttings. The change in the quality (TDS concentration) of the pore fluids, as well as the occurrence of dolostone, appears to be associated with contact of the Avon Park Formation and the Oldsmar Limestone. This area was also identified by a dynamic flow log as production intervals that range from 1,880 to 1,955 feet bls and 2,040 to 2,070 feet bls.

Formation waters with TDS concentrations less than 10,000 mg/L are considered an underground source of drinking water (USDW). Based on a packer test performed from 1,910 to 1,940 feet bls, the USDW was identified at approximately 1,920 feet bls. The District identified productive intervals that contained waters of similar TDS concentrations from 1,880 to 1,955 feet bls and 2,040 to 2,070 feet bls (Oldsmar Limestone). In addition, the geophysical log data shows a general increase in bulk density and a decrease in sonic transit times, as well as log-derived porosity values (**Appendix A**). However, deflections, in the temperature log (gradient and differential) indicated moderate production. Based on moderate production capacity and similar water characteristics, the District identified this interval (from 2,010 to 2,100 feet bls) to be below the USDW and adequate for long-term monitoring. Formation water samples obtained from this packer test (1,910 to 1,940 feet bls) yielded chloride and TDS concentrations of 7,300 and 15,000 mg/L, respectively. This particular packer test was set to straddle the horizon, which was determined to be the base of the USDW.

5

Hydrogeologic Testing

FORMATION SAMPLING

The District collected information during the drilling program to determine the lithologic, hydraulic, and water-quality characteristics of the Floridan aquifer system. These data were used in the final design of the Floridan aquifer monitor well for use in site-specific aquifer tests, and in a long-term water level and water-quality monitoring program.

GEOPHYSICAL LOGGING

Geophysical logging was conducted in the pilot-holes after each stage of drilling and prior to reaming the boreholes for casing installations. The resulting logs provide a continuous record of the physical properties of the subsurface formations and their respective fluids. These logs were later used to interpret lithology, provide estimates of permeability, porosity, bulk density, and resistivity of the aquifer, and determine the salinity profile of the groundwater (using the Archie Equation, Archie 1942). In addition, the extent of confinement of discrete intervals can be discerned from the individual logs. **Table 3** lists the formation evaluation logs conducted at the L-8 Canal (PBF-15) site, their physical characteristics, and properties measured.

Table 3. Formation evaluation logs

Log Name	Log Type	Principal Application	Maximum Hole Size	Benefit to Ground-water Studies
4-arm Caliper	Mechanical (inches)	Determines borehole diameter and rugosity in two horizontal planes and used to correct other logs	22 inches	Used to correct flowmeter logs and aids in identifying suitable inflatable packer and casing placement
Gamma Ray (GR)	Natural Radioactive Nuclear reported in American Petroleum Institute Units (API)	Correlation, stratigraphic boundaries	24 inches	Correlation, used to estimate shale and clay volume
Spectralog® (SL)	Nuclear -Natural Gamma Emissions of the 256 Mineral spectrum reported in API units.	Correlation, mineral identification - uranium, thorium, and potassium, and clay content	22 inches	Correlation, defines clay type and aids in mineral identification and fracture detection
Dual Induction-Focused Log (DIFL)	Conductivity converted to Resistivity. Bedding resolution to 2 feet in smooth borehole values reported in ohm-meter (ohm-m)	Provides invasion profile and accurate water resistivity (Rw) determination	20 inches	Water Quality - determination of Rw via Archie Equation, and provides estimates of permeability from invasion profile
Compensated Z-Density with Photoelectric absorption	Nuclear - Induced Radioactive - Pad mounted, reports bulk density in grams per cubic centimeters (gm/cc) and porosity in porosity units (p.u)	Porosity analysis, bulk density and lithologic and fluid determination	14 inches affected by rugose borehole	Porosity estimates and lithologic indicator - porosity may be used in Archie Equation.
Compensated Neutron (CN)	Nuclear - Induced Radioactive reports porosity in porosity units (p.u)	Porosity analysis, and lithologic determination	14 inches good in rough or washed out borehole	Porosity estimates, porosity may be used in Archie Equation.
Multipole Array AcoustilogSM (MAC)	Acoustic Sonic - Full wave form records the primary, secondary and tube wave velocities and reports travel times in micro-seconds per foot (usec/ft)	Porosity and permeability analysis, dynamic and mechanical properties	15 inches sensitive to washouts	Evaluates porosity and permeability plus rock mechanical properties - aids in fracture and lithology estimates
Fluid Resistivity Log	Reports the fluid resistivity of borehole fluid at that point within the borehole	Determination of pore water quality	Measures resistivity of fluid independent of borehole size	Function of water quality determination

Table 3. Formation evaluation logs (Continued).

Log Name	Log Type	Principal Application	Maximum Hole Size	Benefit to Ground-water Studies
Temperature Log	Reports temperature variations within the borehole environment	Determination of temperature fluctuations within borehole environment	15 inches sensitive to washouts	Determination of flow zones due to temperature fluctuations
Caliper Flow Logs (Static and Dynamic)	Reports the variation from static flow and dynamic flow	Determines flow zones and is corrected for borehole variations	36 inches	Determinations of flow zone due to flow entering the borehole
Cement Bond Log/Casing Collar Locator	Reports the cement bond and casing collars	Looks at variations of sound to determine cement integrity	Depends on tool type	Determination of the quality of cement bond of casing to matrix
Downhole Camera Survey	Visual display of borehole conditions	Visual confirmation of borehole features from other geophysical logs	36 inches sensitive to water quality clarity	Used to verify bedding planes, rock matrix, and large discontinuities

The geophysical logging contractors downloaded data directly from the onsite logging processor onto CD/DVD disks using the log ASCII standard version 1.2 or 2.0 format. **Appendix A** contains the geophysical log traces from the various log runs for PBF-15. The original geophysical logs and video surveys from the PBF-15 site are archived and available for review at the SFWMD headquarters in West Palm Beach, Florida.

PACKER TESTS

Three packer tests were conducted at the PBF-15 site in the Floridan aquifer system (FAS) between 1,560 and 1,940 feet bls. The tests obtained water quality and production capacity data on discrete intervals within the aquifer. The District selected intervals based on lithologic, hydraulic, and water quality using drill cutting, drill-stem water quality, and geophysical log data collected during well construction.

The following procedures were used to conduct straddle packer tests in PBF-15 at the L-8 site:

1. Lower the straddle packer assembly to the test interval based on geophysical and lithologic logs.

2. Set and inflate packers to 190 pounds per square inch (psi) and open the ports between the packers.
3. Install a 4-inch diameter submersible pump to a depth of 60 to 120 feet below the drill floor.
4. Install two 100-psig-pressure transducers inside the drill pipe and one 30-psig transducer in the annulus.
5. Purge a minimum of three drill-stem volumes.
6. Monitor pressure transducer readings and field parameters (e.g., temperature, specific conductance, and pH) from the purged formation water until they are stable. These parameters are used to determine the quality of isolation of the “packed-off” interval.
7. Once the interval is effectively isolated, pump the interval with increasing discharge rates and collect water level data (step-drawdown).
 - Collect formation water samples per SFWMD sampling protocol for laboratory analyses.
 - Record recovery data until the water level returns to static (pre-pumping) conditions.

The Contractor purged the packer intervals at a minimum of three borehole volumes or until field parameters of samples collected from the discharge pipe had stabilized. The District then obtained individual groundwater samples. A limit of +/-5 percent variation in consecutive field parameter readings was used to determine chemical stability. District personnel collected unfiltered and filtered water according to SFWMD sampling protocol. The water samples were placed on ice and transported to the SFWMD water quality laboratory, where they were analyzed for major cations and anions using U.S. Environmental Protection Agency (EPA) and/or Standard Method procedures (SFWMD 1995). **Table 4** lists the field parameters and laboratory results for the individual packer tests.

The Hazen-Williams equation was used to calculate the friction (head) losses for drawdown data because of induced flow up the drill pipe. These head losses were then used to correct the drawdown data for specific capacity determinations. Curve-matching techniques were not used to determine transmissivity values from the drawdown or recovery data. These tests generally involve partial penetration, have significant friction loss due to small pipe diameter, and have short pumping periods, all of which violate the various analytical methods’ basic assumptions. However, the District estimated transmissivity from specific capacity data collected at each interval to provide a reference value for future testing.

Packer Test No. 1 (1,910 to 1,940 feet bls): This packer test obtained water samples for analyses, determined the confining nature of the interval, and collected pertinent hydraulic information before setting the casing through this interval. All Webb Enterprises, Inc. (AWE) conducted this test on February 22, 2007, which consisted of pumping an interval between 1,910 and 1,940 feet bls (part of the Avon Park Formation).

During this test, AWE pumped this interval for two hours. They pumped the zone for 30 minutes at each of the following rates: 50, 75, 100, and 125 gallons per minute (gpm). The specific capacity (SC) at each discharge rate was calculated using the following method:

$$SC = Q / \text{Drawdown (gpm/ft)} \quad \text{Equation 1}$$

Q = Pumping rate in gpm as measured by an in-line flowmeter

s = Measured Drawdown: aquifer head loss in feet

The SFWMD estimated the transmissivity (T) of each tested interval using Equation 2.

$$T = 2000 * SC \text{ gallons per day per foot (gpd/ft)} \quad \text{Equation 2}$$

<u>Q</u> <u>(gpm)</u>	<u>s</u> <u>(feet)</u>	<u>SC</u> <u>(gpm/ft)</u>	<u>Transmissivity</u> <u>(gpd/ft)</u>
50	2.56	19.53	39,060
75	6.63	11.31	22,620
100	12.04	8.31	16,620
125	18.87	6.62	13,240

Packer Test No. 2 (1,700 to 1,730 feet bls): This packer test identified the hydraulic properties and water quality characteristics, and collected pertinent hydraulic information needed before the casing was set in the confining interval of the middle part of the Avon Park Formation. AWE set a dual-packer assembly to isolate an interval between 1,700 and 1,730 feet bls. The District conducted and completed a drawdown/recovery test on February 26, 2007.

During this test, AWE pumped this interval for two hours. They pumped the zone for 30 minutes at each of the following rates: 50, 75, 100, and 125 gpm. The SC and T were calculated at each discharge rate.

<u>Q</u> <u>(gpm)</u>	<u>s</u> <u>(feet)</u>	<u>SC</u> <u>(gpm/ft)</u>	<u>T</u> <u>(gpd/ft)</u>
50	3.49	14.33	28,660
75	11.53	6.50	13,000
100	17.58	5.69	11,380
125	23.71	5.27	10,540

Packer Test No. 3 (1,560 to 1,590 feet bls): This packer test evaluated the hydraulic and water quality characteristics, and collected pertinent hydraulic information before setting the casing through the middle confining unit. AWE set a dual-packer assembly, which isolated an interval between 1,560 and 1,590 feet bls. The District conducted and completed a drawdown/recovery test at this depth on February 27, 2007.

During this test, AWE pumped this interval for two hours. They pumped the zone for 30 minutes at each of the following rates: 50, 75, 100, and 125 gpm. The SC and T were calculated at each discharge rate.

<u>Q</u> <u>(gpm)</u>	<u>s</u> <u>(feet)</u>	<u>SC</u> <u>(gpm/ft)</u>	<u>T</u> <u>(gpd/ft)</u>
50	1.86	26.88	53,760
75	7.26	10.33	20,660
100	17.24	5.80	11,600
125	24.57	5.09	10,180

INORGANIC WATER CHEMISTRY

The water samples for packer tests were analyzed by SFWMD contracted laboratories Tetra Tech and Jupiter Environmental Laboratories, Inc. **Table 5** presents the results from the three packer tests and some of the lab analyses. **Appendix C** presents the complete lab analyses, including the field blank.

Table 4. Summary of inorganic water quality data from PBF-15 packer tests and completed monitor zones.

Identifier	Depth Interval (feet bls)	Cations				Anions			TDS mg/L	Field Parameters		
		Na ⁺ mg/L	K ⁺ mg/L	Ca ²⁺ mg/L	Mg ²⁺ mg/L	Cl ⁻ mg/L	Alka as CaCO ₃ mg/L	SO ₄ ²⁻ mg/L		Specific Conduct. umhos/cm	Temp ° C	pH.
PBF-15 PK1	1910-1940	4,300	18	210	80	7,300	73	960	15,000	23,547	28.65	7.46
PBF-15 PK2	1700-1730	4,100	18	220	86	6,300	75	880	13,000	20,576	28.05	7.72
PBF-15 PK3	1560-1590	3,800	20	170	60	6,000	77	850	12,000	19,839	28.55	7.43
PBF-15 MZ-1	908-1144	916	36	108	123	1,500	128	414	3,526	5,771	27.72	7.77
PBF-15 MZ-2	1400-1583	749	28	92	126	1,351	127	340	2,996	4,995	28.52	8.33
PBF-15 MZ-3	2010-2100	10,080	358	529	1,150	18,010	110	2,249	34,416	48,536	27.93	7.28

mg/L = milligrams per liter

umhos/cm = micromhos per centimeter

pH = standard unit

° C = degree Celsius

feet bls = feet below land surface

PK = Packer Test

MZ = Completed Monitor Zone

After construction, the PBF-15 monitor zones were purged and sampled by Golder Associates, Inc. and Columbia Analytical Services, Inc. for major cations and anions using EPA and/or Standard Method procedures (SFWMD 1995).

The Piper trilinear diagram (**Figure 6**) indicated that sodium and chloride are the dominant ions and as shown in **Table 4**, that the concentrations of dissolved constituents are similar in depth. The inorganic data suggest similar water quality as a dominant source, but stable isotope and noble gas data provided additional information on the recharge sources to the upper and middle segments of the FAS, discussed as follows.

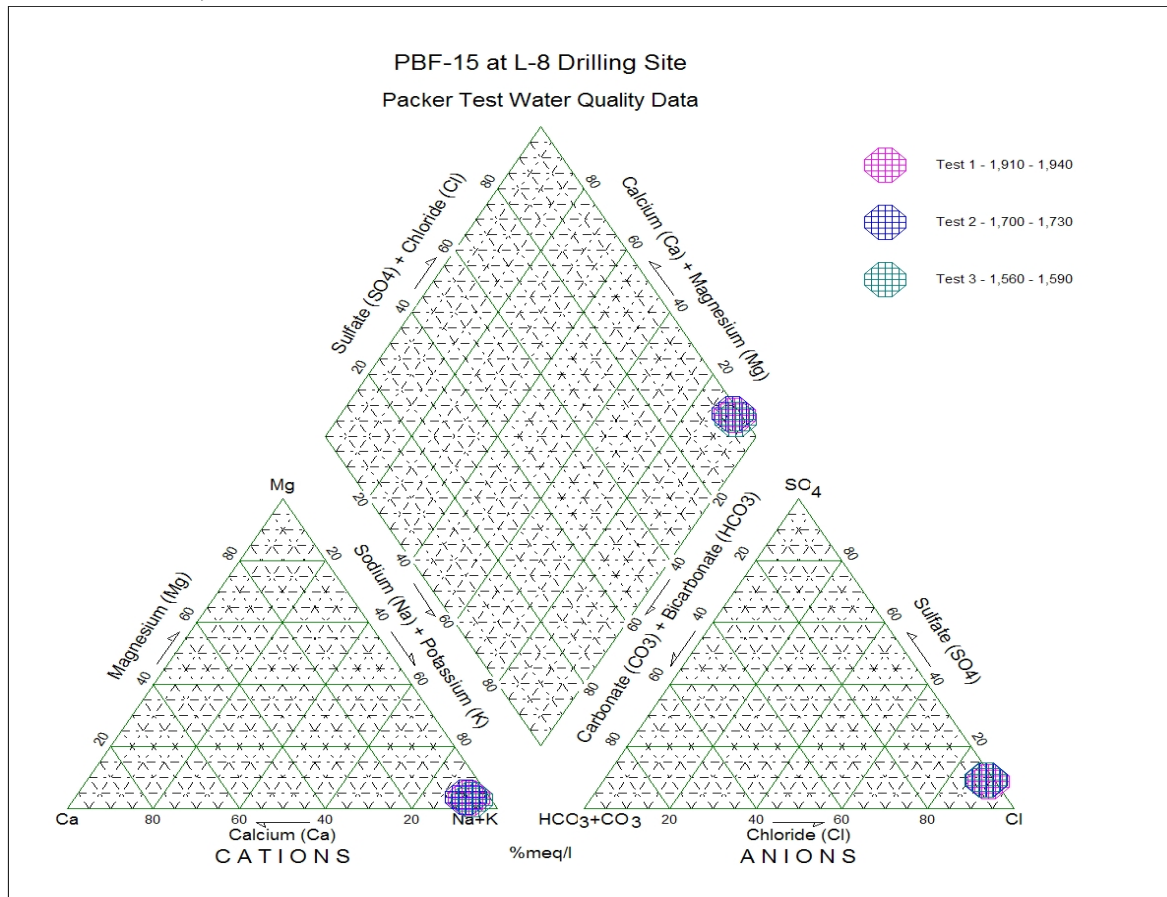


Figure 6. PBF-15 piper trilinear diagram of inorganic constituents of the FAS.

CORE DATA AND ROCK CHEMISTRY

Upon completion of the formation evaluation logs, the District identified seven core intervals from 410 to 2,100 feet bls in the open-hole section of PBF-15 well site. The cores constrained log-derived porosity and permeability values from a carbonate aquifer with laboratory-determined values. The cores were collected by a conventional core barrel tool. A 4-inch diameter, 20-foot long, diamond-tipped core barrel was used. Core recoveries from the seven core runs ranged between 0 and 100 percent, with an average of only 25 percent. **Table 5** is a summary of the full-diameter coring program conducted at this site. Low core recovery may be the result of unfamiliar subsurface conditions or the friable nature of the carbonate section due to its high intergranular porosity and mixed lithology (i.e., carbonate and siliciclastics). The SFWMD sent the full-diameter cores to the

Florida Geological Survey (FGS) in Tallahassee, Florida to determine the rock chemistry parameters. The complete core descriptions were completed for the first phase of the drilling program with six from various rocks of the Upper Floridan aquifer. The FGS selected four intervals from the core samples to perform complete analyses, which are described in the following section. The complete results are covered in the draft interim report titled, *Geochemical and Mineralogical Characterization of Potential Aquifer Storage and Recovery Storage Zones in the Floridan Aquifer System, Comprehensive Everglades Restoration Plan* (Arthur *et al.* 2007).

After the selection process, the FGS cleaned and dried the selected core samples by using a convection oven to remove any residual fluid. The FGS used thin sections and standard petrographic techniques, such as staining, thin sectioning, and impregnation to determine the lithology, rock fabric, grain types, biotic constituents, sedimentary structures, pore type(s), and diagenetic alteration. Rock fabric description followed Dunham's (1962) descriptions with slight modifications. Samples with no dolomite rhombs were classed as limestone. Samples with dolomite rhombs were classified as follows: trace to 50 percent dolomite – dolomitic limestone; 50 percent to 90 percent dolomite – limey dolostones; and greater than 90 percent dolomite – dolostones. The classification of pore types in each sample followed Choquette and Pray (1970). The FGS impregnated each sample with a blue-dyed epoxy before cutting each thin section. This dye filled the voids and spaces in the samples and appeared blue in each thin section. The impregnation process involved immersing each sample in the liquid epoxy, drawing a vacuum for five minutes, applying a pressure of 2,000 psi for eight hours, and then curing in an oven.

The FGS measured the porosity of each sample using a bulk-density technique. The process involved weighing each sample, wrapping it in parafilm wax, and weighing it again. By placing the wrapped sample in a beaker of water, the FGS measured the displacement, which equaled the bulk volume of the sample. The porosity was calculated from the bulk volume and the mass of the sample by using the rock density (2.71 grams per cubic centimeter [gm/cm³] for pure limestone and adjusted based on mineral content) and wax density (0.74 gm/cm³).

The intrinsic (matrix) permeability required each sample to be at least 1-inch thick and 2-inches wide. The matrix permeability was measured by minipermeametry (Goggin 1993; Sutherland *et al.* 1993; Hurst and Goggin 1995). Gas was then injected into the samples at a pressure of 13.8 psi (measured by pressure transducer) and an electronic mass flow meter measured the gas flow rates through the core samples. To calculate the matrix permeability, the FGS unconverted the measured gas flow rates from the minipermeameter to equivalent liquid permeabilities using an empirical correlation between flow rates and Klinkenberg permeabilities of a suite of standards. The standards were cylindrical sandstone core plugs determined by a Core Laboratories, Inc.

PDPK-200 instrument, which is a pressure-decay gas permeameter. The fine scale of this investigation does not reflect the contribution of vugs, molds, fractures, or cavernous porosity greater than the diameter of the minipermeameter's tip (3 millimeters).

The core sample from 797 to 798 feet bls in the Hawthorn Group is classified as a calcareous, dolomitic, phosphatic sandstone. The Schlumberger formation evaluation logs (natural gamma ray) match well with this unit. The porosity and intrinsic permeability are 32.5 percent and 18.5 millidarcies (md), respectively. Sandstone contains very fine quartz, and detrital phosphate is 25 percent of the rock with carbonate mud, which fill much, but not all, of the interparticle pore space.

Table 5. Coring summary for Phase I and II drilling.

Date	Core Interval (feet bls)	Recovery (%)
Phase I		
November 16, 2005	410–420	70
November 22, 2005	797–817	12
December 9, 2005	944–964	12
January 12, 2006	1,040–1,060	25
January 17, 2006	1,275–1,290	100
Phase II		
November 23, 2006	1,600–1,620	25
December 11, 2006	1,900–1,920	55

The dominant pore type throughout the rock is microporosity within the carbonate micrite that occurs between grains, followed by interparticle pore space where mud is absent, and intraparticle pore space within forams and bryozoa. Poor connectivity of these pores results in low permeability. Very small benthic forams and fragments of oyster shells, echinoderms, and ostracods are also present in minor amounts. This host is cut by large burrow structures that are infilled with a coarser grained, phosphatic and sandy quartz-bearing low-mud packstone. Rhombs of authigenic dolomite occur throughout the rock and are the main cementing agent. A low-birefringent clay appears to be present in interparticle pore spaces within the burrow fills, and an analysis indicates the clay is illite. Individual and coalesced framboids of pyrite are also present in the rock and often seem concentrated within the burrow fills.

The core sample from 944 to 945 feet bls in the Avon Park Limestone is classified as a bioturbated, small foraminifera, peloidal high-mud packstone. The porosity and intrinsic permeability are 45.41 percent and 69.3 millidarcies (md), respectively. Dominant pore type is intraparticle with microporosity within the interparticle mud. Matrix permeability is low due to the presence of the interparticle mud. Peloids and a diverse assemblage of shallow-water benthic

forams are the only grain types present. Mud is present in all interparticle pores, but does not completely fill all of them. Some grains are partially to completely micritized. Overall, the sample is suggestive of a moderate-energy, shallow-water platform setting with enough mud to yield a packstone.

The core sample from 1,040 to 1,050 feet bls in the Avon Park Formation is classified as a small foraminifera, peloidal, very low-mud packstone. The porosity and intrinsic permeability are 43.0 percent and 117 millidarcies (md), respectively. Dominant pore types are interparticle and intraparticle. Porosity and matrix permeability are high due to the presence of open and well-connected interparticle pores. Pores have minor amounts of very fine-crystalline cement in them. Dolomite rhombs are small and isolated and make up approximately 3 percent of the matrix. Peloids and a diverse assemblage of shallow-water benthic forams are the dominant grain types present. A depositional setting suggests a shallow, normal marine, moderate-energy shallow subtidal platform.

The core sample from 1,289 to 1,290 feet bls in the Avon Park Formation is classified as a small foraminifera, peloidal grainstone. The Schlumberger formation evaluation logs indicate faster sonic travel times, increased density and resistivity, and an increase in the ratio of density to neutron porosity due to dolomitization, which comprises approximately 35 percent of the rock. The porosity and intrinsic permeability are 33.9 percent and 104 millidarcies (md), respectively. Dominant pore type is interparticle, with some intraparticle. In areas of high dolomite concentration, the original interparticle porosity is reduced and intercrystalline porosity is dominant. Porosity is high and matrix permeability is moderately high due to the presence of open and well-connected pores. Peloids and a diverse assemblage of shallow-water benthic forams are the dominant grain types. Original depositional fabric is hard to assess due to the presence of dolomite.

Rock Geochemistry

Quantitative estimates of mineral content were determined using powder x-ray diffraction. After air-drying, a side-packed powder mount of the finely ground bulk sample was prepared. The x-ray diffraction scan was performed on a Scintag PADV. Peak positions of the mineral abundances were determined on the resultant diffractograms. The mineralogy of the fine silt and clay size components of the insoluble mineral fractions were also assessed after a separate process. The results of the Whole-Rock Bulk Mineralogy indicate that the Hawthorn unit (797–798 ft bls) was considered to be a quartz-bearing, phosphatic, dolomitic limestone with 58.3 percent calcite, 13.5 percent dolomite and quartz, and 9.9 percent apatite. The Ocala unit (944–945 ft bls) was identified as a limestone with 66.8 percent calcite and 31.1 percent quartz. The last of the analyses, the Avon Park unit (1,289–1,290 ft bls), was considered to be a dolomitic limestone with 70.6 percent calcite and 28.9 percent dolomite.

The analyses of the Insoluble Residue (for fine particles) Mineralogy indicated that the most common non-clay phase observed was quartz. Quartz was present in the Hawthorn Group (797–798) in the bulk mineralogy and in the insoluble fractions. However, insoluble fractions indicate that quartz was a minor fraction with abundant clay (illite) and trace amounts of apatite. The apatite analyses indicate that fluorapatite $[\text{Ca}_5(\text{PO}_4)_3\text{F}]$ and carbonate hydroxyl apatite $[\text{Ca}_{10}(\text{PO}_4)_5(\text{CO}_3)(\text{OH})\text{F}]$ are present in the Hawthorn Group. The analyses of the Ocala Limestone (944–945) indicated the presence of moderate amounts of clay (smectite-illite) and kaolinite with trace amounts of quartz. The analyses of the Avon Park Formation (1,289–1,290) showed trace amounts of clay (smectite-illite) and orthoclase with pyrite. Pyrite was not present in the Hawthorn and Ocala samples.

LONG-TERM GROUNDWATER MONITORING PROGRAM

Shortly after tri-zone FAS monitor well (PBF-15) was constructed, District staff collected water samples to establish baseline water quality conditions. Unfiltered and filtered water samples were taken directly from the discharge point or hose of the peristaltic pump where the sample bottles filled slowly, minimizing aeration. As part of the District's water quality sampling protocol, duplicate samples were collected from consecutive bailers with sample splits collected from the same bailer. Once collected, water samples were preserved and immediately placed on ice in a closed container and transported to a SFWMD water quality laboratory. The laboratory analyzed the samples using EPA and/or Standard Method procedures (SFWMD 1995). **Appendix D** and **Table 4** summarize the analytical results.

In addition, the District established a potentiometric-head monitoring program for this well site. A transducer and Campbell CR-10X data logger recorded pressures from the various monitor zones on a 15-minute interval. The data is converted from pounds psi of 2.308 to foot of head. The SFWMD then added the converted pressure readings to the surveyed measuring point elevation (located on the concrete well pad) to obtain a hydraulic head referenced to the National Geodetic Vertical Datum of 1929 (NGVD 1929) and North American Vertical Datum (NAVD 1988). **Table 6** lists the monitor intervals within the FAS, average recorded hydraulic head, and standard deviation.

Table 6. Water level data collected from monitor zones.

Identifier	Monitor Interval (feet bls)	Average Measured Hydraulic Head	Standard Deviation (feet)
PBF-15 MZ-1	908—1,144	52.20 (NAVD 1988)	.44
PBF-15 MZ-2	1,400—1,583	53.04 (NAVD 1988)	.47
PBF-15 MZ-3	2,010—2,100	24.81 (NGVD 1929)	.49

Period of Record –one reading from 01/01/08 to 09/01/08.

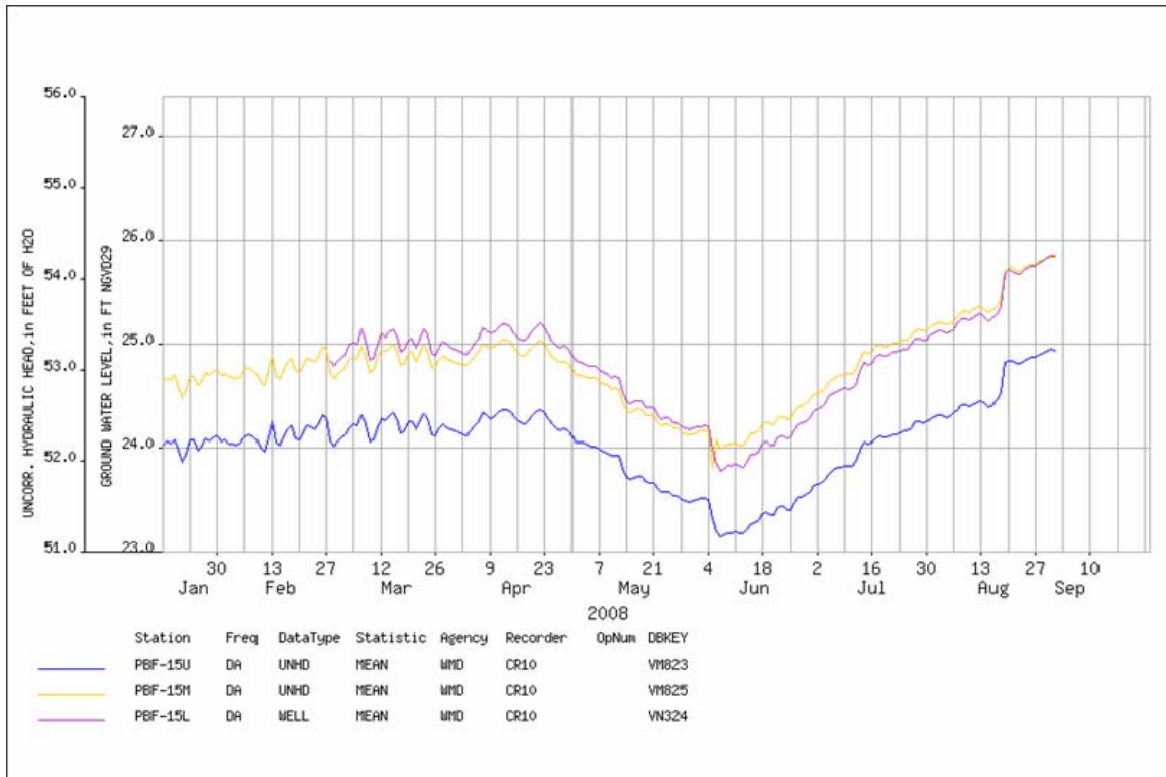


Figure 9. Water level data collected from monitor zones.

6

Summary

1. The top of the Floridan aquifer system (FAS), as described by the Southeastern Geological Society AdHoc Committee on Florida Hydrostratigraphic Unit Definition (1986), was identified at a depth of approximately 885 feet below land surface (bls).
2. Lithologic and geophysical logs, specific capacity and packer test results, and petrophysical data indicate moderate production capacity in the upper and middle Floridan aquifer.
3. Water quality data from straddle packer tests and completed monitor zones indicate that chloride and total dissolved solids (TDS) in the Floridan aquifer waters exceed potable drinking water standards.
4. The base of the underground source of drinking water (USDW), where water contains TDS concentrations less than 10,000 mg/L, is at an approximate depth of 1,920 feet bls.
5. The inorganic water quality results from samples obtained from 908 to 2,100 feet bls are saline in composition, suggesting that the Floridan aquifer has been intruded by seawater.
6. The Middle Floridan confining unit (1,560–1,590 feet bls) yielded a specific capacity of 5.09 gpm/ft, and a transmissivity of 10,180 gpd/ft.
7. The Middle Floridan confining unit (1,700–1,730 feet bls) yielded a specific capacity of 5.27 gpm/ft, and a transmissivity of 10,540 gpd/ft.
8. The lower portion of the Middle Floridan confining unit (1,910–1,940 feet bls) yielded a specific capacity of 6.62 gpm/ft, and a transmissivity of 13,240 gpd/ft.
9. All packer tests indicate that the Middle Floridan confining unit is consistent, from 1,500 feet bls to 2,000 feet bls, in the L-8 Basin area.
10. The average measured hydraulic heads for the FAS monitor intervals are as follows:
 - 52.20 feet above mean sea level for the 908 to 1,144 feet bls monitor interval.
 - 53.04 feet above mean sea level for the 1,400 to 1,583 feet bls monitor interval.

- Water levels in the FAS respond to external stresses, such as tidal loading and barometric pressure variations.
- Long-term monitoring now records water levels in the FAS, identifying responses to external stresses, such as earth tides and barometric pressure variations.

References

- Applin, P.L. and E.R. Applin. 1944. Regional Subsurface Stratigraphy and Structure of Florida and Southern Georgia. Bulletin 28(12):1673–1753. *American Association of Petroleum Geologists*.
- Archie, G.E. 1942. The Electrical Resistivity Log as an Aid in Determining Some Reservoir Characteristics. *American Institute of Mining, Metallurgical, and Petroleum Engineers Transaction*, 146:54–61.
- Arthur, J.D., et al. 2007 (In Press). Geochemical and Mineralogical Characterization of Potential ASR Storage Zones in the Floridan Aquifer System, Comprehensive Everglades Restoration Plan. *Florida Geological Survey*.
- Chen, C.S. 1965. The Regional Lithostratigraphic Analysis of Paleocene and Eocene Rocks of Florida. Bulletin 45:105. *Florida Geological Survey*.
- Choquette, P.W. and L.C. Pray. 1970. Geologic Nomenclature and Classification of Porosity in Sedimentary Carbonates. *American Association of Petroleum Geologists Bulletin*, 54:207-250.
- Duncan, J.C., W.L. Evan, III, and K.L. Taylor. 1994. The Geologic Framework of the Lower Floridan Aquifer System in Brevard County, Florida. Bulletin 64:90. *Florida Geological Survey*.
- Dunham, R.J. 1962. “Classification of Carbonate Rocks According to Depositional Texture.” In Classification of Carbonate Rocks, ed. W.E. Ham. *American Association of Petroleum Geologists*, 1:108–121.
- Goggin, D.J. 1993. Probe Permeametry: Is it Worth the Effort? *Marine and Petroleum Geology* 10:299–308.
- Hantush, M.S. 1964. “Hydraulics of Wells.” In Advances in Hydrosience, ed. V.T. Chow, Volume 1: 281–432. Academic Press, New York and London.
- Hurst, A. and D.J. Goggin. 1995. Probe Permeametry: an Overview and Bibliography. *AAPG Bulletin*, 79:463–473.
- Miller, J.A. 1986. *Hydrogeologic Framework of the Floridan Aquifer System in Florida and Parts of Georgia, Alabama and South Carolina*. USGS Professional Paper 1403-B. U.S. Geological Survey, Washington, D.C., 91.

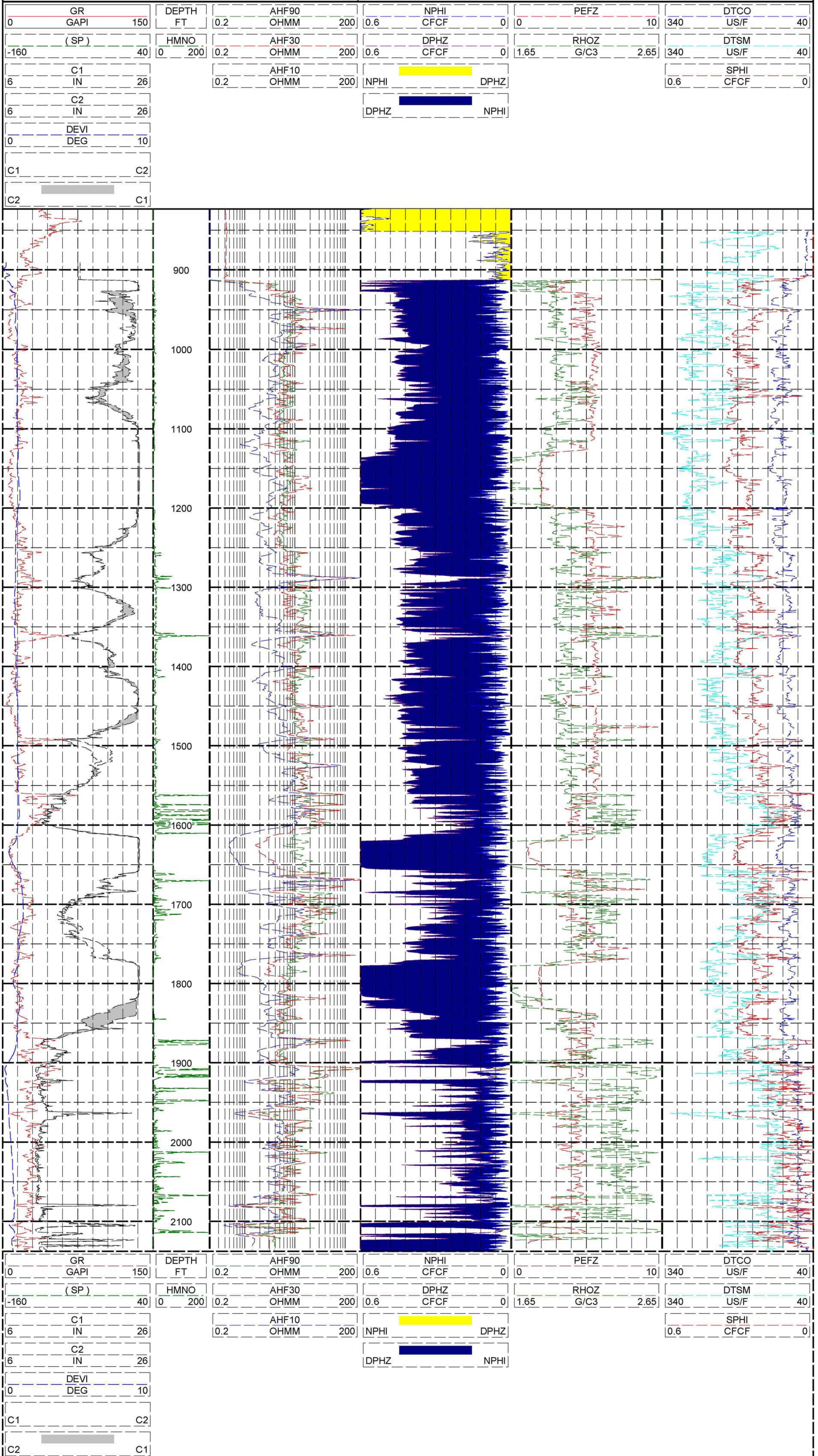
- Missimer, T.M. 1997. *Late Paleogene and Neogene Sea Level History of the Southern Florida Platform Based on Seismic and Sequence Stratigraphy*. PhD diss., University of Miami, 942.
- Missimer, T.M. 2002. Late Oligocene to Pliocene Evolution of the Central Portion of the South Florida Platform: Mixing of Siliciclastic and Carbonate Sediments. *Florida Geological Survey*, Bulletin 65:184.
- Reese, R.S. 2000. *Hydrogeology and the Distribution of Salinity in the Floridan Aquifer System, Southwestern Florida*. USGS Water Resources Investigations Report 98-4253. U.S. Geological Survey, Tallahassee, FL.
- Reese, R.S. and S.J. Memberg. 2000. *Hydrogeology and the Distribution of Salinity in the Floridan Aquifer System, Palm Beach County, Florida*. USGS Water Resources Investigation Report 99-4061. U.S. Geological Survey, Tallahassee, FL.
- Scott, T.M. 1988. The Lithostratigraphy of the Hawthorn Group (Miocene) of Florida. Bulletin No. 59. *Florida Geological Survey*.
- SFWMD. 1995. *Comprehensive Quality Assurance Plan*. South Florida Water Management District, West Palm Beach, FL.
- Southeastern Geologic Ad Hoc Committee on Florida Hydrostratigraphy Unit Definition. 1986. Hydrogeologic Units of Florida: Florida Department of Natural Resources. Special Publication 28:9. *Bureau of Geology*.
- Sutherland, W.J., et al. 1993. Recommended Practice for Probe Permeametry. *Marine and Petroleum Geology*, 10:309–317.
- Winsauer, W.O., et al. 1952. Resistivity of Brinesaturated Sand in Relation to Pore Geometry. *Bulletin of the American Association of Petroleum Geologists*, 36(2):253–277.
- Wyllie, M.R.J., A.R. Gregory, and L.W. Gardner. 1956. Elastic Wave Velocities in Heterogeneous and Porous Media. *Geophysics*, 21(1):41–70.



Geophysical Logs

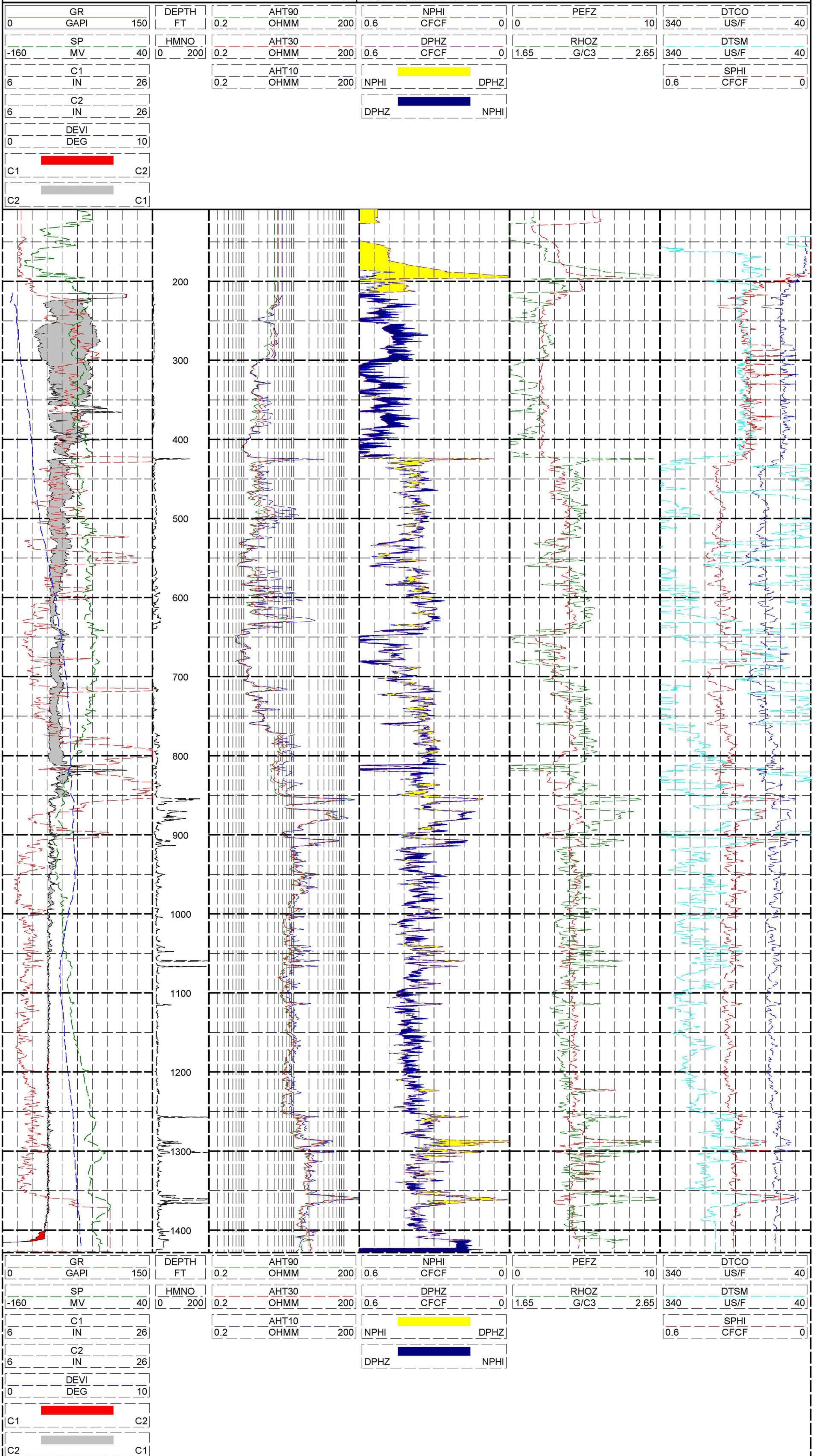
The logo of the South Florida Water Management District is a circular emblem. It features a blue outer ring with the text "SOUTH FLORIDA WATER MANAGEMENT DISTRICT" in white, uppercase letters. Inside the ring, there is a stylized map of Florida in white, set against a background of blue wavy lines representing water. The text "PROTECTION OF THE EVERGLADES SINCE 1948" is written in a smaller, white, uppercase font along the bottom inner edge of the circle.

PBF-15
29 Feb 2008 @ 9:54
DEPTH (FT)
Interval: 823.00 to 2138.00
Depth Scale Ratio: 1/1200



The logo of the South Florida Water Management District is a circular seal. The outer ring contains the text "SOUTH FLORIDA WATER MANAGEMENT DISTRICT" at the top and "PROTECTION OF THE EVERGLADES SINCE 1949" at the bottom. The center of the seal features a stylized map of Florida with a sun rising over the Everglades.

PBF-14
29 Feb 2008 @ 10:28
DEPTH (FT)
Interval: 109.00 to 1428.00
Depth Scale Ratio: 1/1200



Company

Well

Field

County

Location

South Florida Water Management District

PBF-14

S-5A; L-8 Basin Datum in Feet (1929 NGVD)

PALM BEACH

This is All Webb log for the lower portion of PBF-15.

State

Country

FLORIDA

USA



Section

Permanent Datum

Log Measured From

Drilling Meas From

17

Bn Mark

KB/TOC

KB/TOC

Township

43

6.90

Range

40

Above Perm Datum

API Num

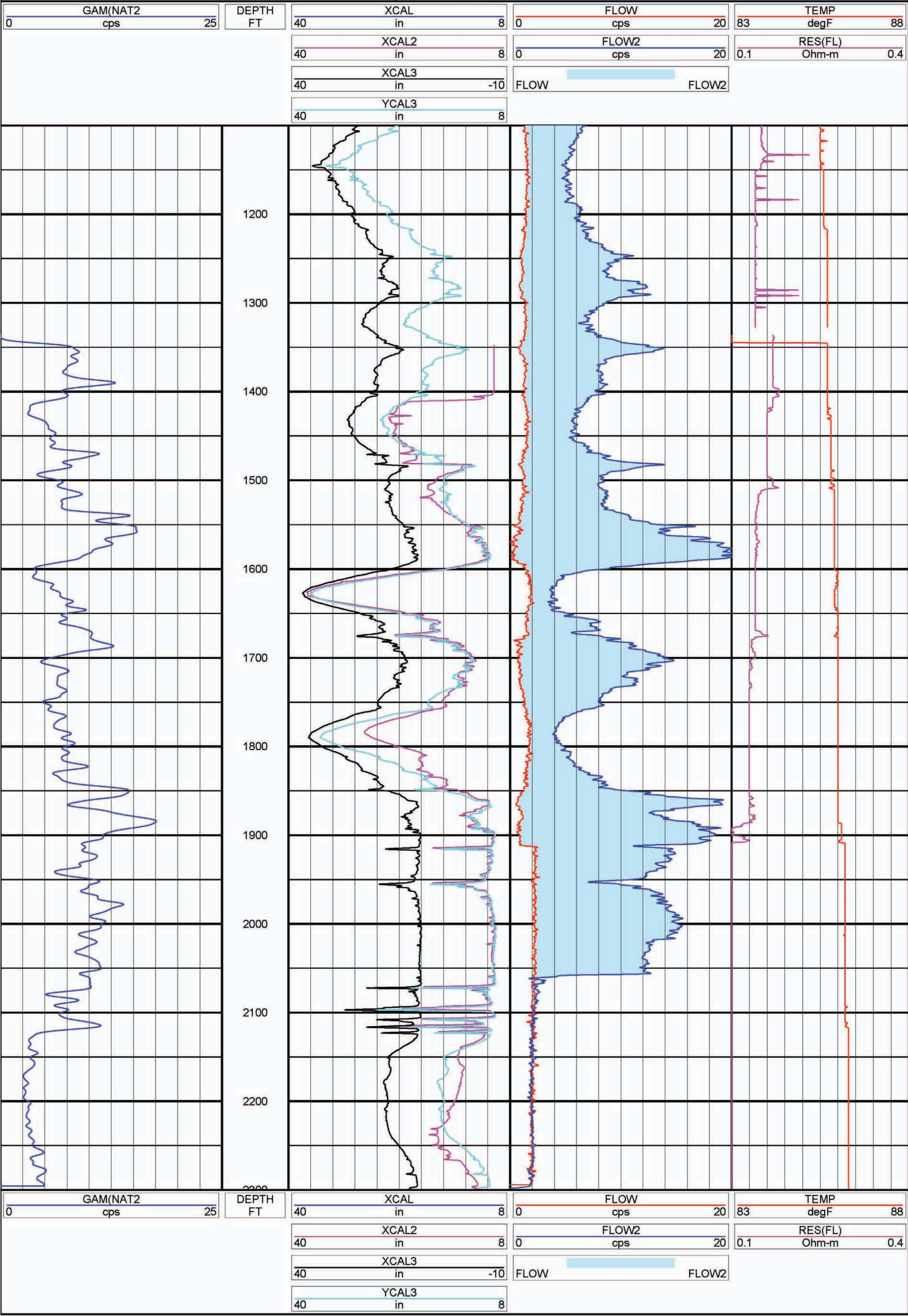
1

K.B.31.13

D.F.31.13

G.L.24.19

PBF-14
29 Feb 2008 @ 15:03
DEPTH (FT)
Interval: 1100.00 to 2300.00
Depth Scale Ratio: 1/1200



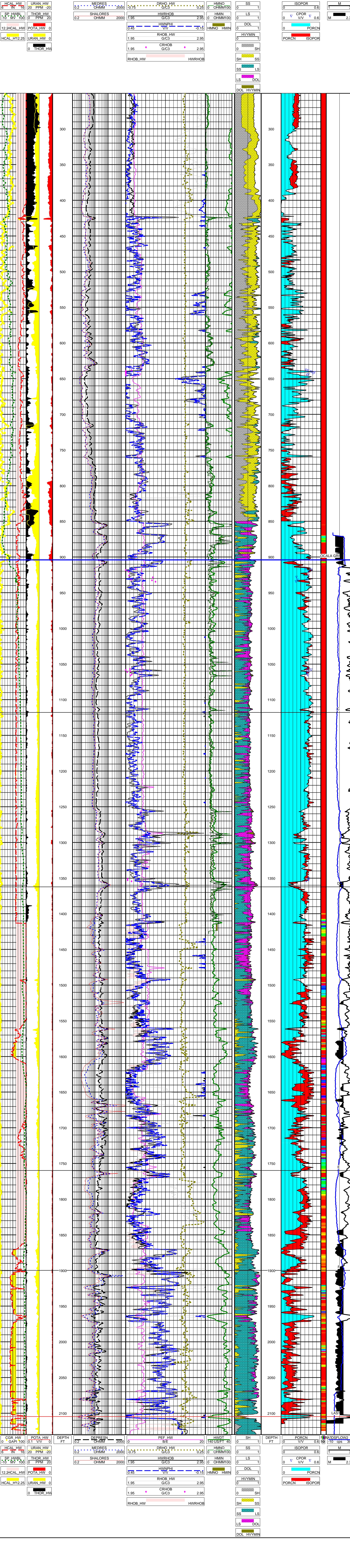


Company ALL WEBB ENTERPRISES
Well L-8 CANAL
Field PBF-14
County PALM BEACH State FLORIDA Country USA
Location

Section 17 Township 43 Range 40 API Num 1
Permanent Datum GROUND L Elevation 15.00000 K.B.
Log Measured From KELLY BU 5.299 Above Perm Datum D.F.
Drilling Meas From G.L.

Date	Run 1	Run 2	Run 3
Depth - Driller	JAN 2006		
Depth - Logger	1400		
Btm Log Interval	1400		
Casing - Driller			
Casing - Logger			
Bitsize	213		
Type Fluid in Hole	200		
Dens. /Visc.	12 IN		
pH / Fluid Loss	WATER		
Source of Sample	9.25ppg /		
Rmf @ Meas. Temp	PIT		
Rmc @ Meas. Temp			
Source: Rmf / Rmc			
Rm @ BHT			
Max. Rec. Temp.			

L-8 CANAL
5 Jul 2007 @ 14:35
DEPTH (FT)
Interval: 250.00 to 2130.00
Depth Scale Ratio: 1/500



B

Florida Geological Survey Lithologic Description

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-18728
 TOTAL DEPTH: 1415 FT.
 SAMPLES - NONE

COUNTY - PALMBEAC
 LOCATION: T. 43S R. 40E S. 17
 LAT = 26D 44M 17S
 LON = 80D 21M 49S
 ELEVATION: 15 FT

COMPLETION DATE: N/A
 OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRI LLER: SFWMD (PBF-14)

WORKED BY: STEVEN PETRUSHAK, 2006
 ELEVATION IS BASED ON LAT/LONG AND TOPOGRAPHIC MAP (NAD-83)

0.0	-	10.0	000NOSM	NO SAMPLES
10.0	-	200.0	090UDSC	UNDIFFERENTIATED SAND AND CLAY
200.0	-	540.0	122PCRV	PEACE RIVER FM.
540.0	-	885.0	122ARCA	ARCADIA FM.
885.0	-	920.0	124OCAL	OCALA GROUP
920.0	-	TD.	124AVPK	AVON PARK FM.
0	-	10	NO SAMPLES	
10	-	15	SAND; YELLOWISH GRAY TO VERY LIGHT ORANGE POROSITY: INTERGRANULAR GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM ROUNDNESS: SUB-ANGULAR TO ANGULAR; MEDIUM SPHERICITY UNCONSOLIDATED ACCESSORY MINERALS: SHELL-05% FOSSILS: MOLLUSKS	
15	-	20	SAND; VERY LIGHT ORANGE TO YELLOWISH GRAY POROSITY: INTERGRANULAR GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM ROUNDNESS: SUB-ANGULAR TO ANGULAR; MEDIUM SPHERICITY UNCONSOLIDATED ACCESSORY MINERALS: SHELL-10% FOSSILS: MOLLUSKS	
20	-	25	AS ABOVE	
25	-	30	AS ABOVE	
30	-	35	SAND; VERY LIGHT ORANGE TO YELLOWISH GRAY POROSITY: INTERGRANULAR GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM ROUNDNESS: SUB-ANGULAR TO ANGULAR; MEDIUM SPHERICITY UNCONSOLIDATED ACCESSORY MINERALS: SHELL-15% FOSSILS: MOLLUSKS	
35	-	40	AS ABOVE	
40	-	45	AS ABOVE	
45	-	50	SHELL BED; VERY LIGHT ORANGE TO GRAYISH BROWN POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-03% FOSSILS: MOLLUSKS	
50	-	55	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED FOSSILS: MOLLUSKS	

- 55 - 60 SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR; UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-20%
FOSSILS: MOLLUSKS
- 60 - 65 SAND; LIGHT OLIVE GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE
ROUNDNESS: SUB-ANGULAR TO ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: SHELL-30%
FOSSILS: MOLLUSKS
- 65 - 70 SAND; LIGHT OLIVE GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM
ROUNDNESS: SUB-ANGULAR TO ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: SHELL-15%, PHOSPHATIC SAND-01%
FOSSILS: MOLLUSKS
- 70 - 75 AS ABOVE
- 75 - 80 SAND; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM
ROUNDNESS: SUB-ANGULAR TO ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: SHELL-30%, PHOSPHATIC SAND-01%
FOSSILS: MOLLUSKS
- 80 - 85 SHELL BED; LIGHT OLIVE GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR; UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-40%, PHOSPHATIC SAND-01%
FOSSILS: MOLLUSKS
- 85 - 90 SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR; UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-30%, PHOSPHATIC SAND-01%
FOSSILS: MOLLUSKS
- 90 - 95 SAND; LIGHT OLIVE GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM
ROUNDNESS: SUB-ANGULAR TO ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: SHELL-20%, PHOSPHATIC SAND-02%
FOSSILS: MOLLUSKS
- 95 - 100 SAND; LIGHT OLIVE GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM
ROUNDNESS: SUB-ANGULAR TO ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: SHELL-25%, PHOSPHATIC SAND-02%
FOSSILS: MOLLUSKS
- 100 - 105 SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR; UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-07%, PHOSPHATIC SAND-01%
FOSSILS: MOLLUSKS

app_b_pbf-14_text.txt

105	-	110	SHELL BED; LIGHT OLIVE GRAY TO VERY LIGHT ORANGE POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-05%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS, CORAL
110	-	115	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-03%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS, CORAL
115	-	120	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-07%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS, CORAL
120	-	125	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-10%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS
125	-	130	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-15%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS
130	-	135	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-25%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS
135	-	140	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-15% FOSSILS: MOLLUSKS
140	-	145	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-20%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS, BARNACLES
145	-	150	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-15%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS
150	-	155	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-20%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS
155	-	160	SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR; UNCONSOLIDATED ACCESSORY MINERALS: QUARTZ SAND-20%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS
160	-	165	AS ABOVE
165	-	170	SHELL BED; LIGHT OLIVE GRAY TO VERY LIGHT ORANGE POROSITY: INTERGRANULAR; POOR INDURATION CEMENT TYPE(S): CALCULITE MATRIX ACCESSORY MINERALS: QUARTZ SAND-15%, PHOSPHATIC SAND-01% FOSSILS: MOLLUSKS

- 170 - 175 SHELL BED; VERY LIGHT ORANGE TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR; UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-15%, PHOSPHATIC SAND-01%
FOSSILS: MOLLUSKS, BARNACLES
- 175 - 180 SHELL BED; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR; UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-20%
FOSSILS: MOLLUSKS, BARNACLES, BENTHIC FORAMINIFERA
- 180 - 185 SHELL BED; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR; UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-30%
FOSSILS: MOLLUSKS
- 185 - 190 SAND; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE
ROUNDNESS: SUB-ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: SHELL-40%
FOSSILS: MOLLUSKS
- 190 - 195 SAND; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE
ROUNDNESS: SUB-ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: SHELL-30%, PHOSPHATIC SAND-01%
FOSSILS: MOLLUSKS
- 195 - 200 SHELL BED; LIGHT OLIVE GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR; UNCONSOLIDATED
ACCESSORY MINERALS: QUARTZ SAND-35%
FOSSILS: MOLLUSKS
- 200 - 225 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: SHELL-10%, CLAY-10%, SILT-10%
QUARTZ SAND-01%
FOSSILS: MOLLUSKS
- 225 - 230 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: SHELL-07%, CLAY-10%, SILT-10%
QUARTZ SAND-01%
FOSSILS: MOLLUSKS
- 230 - 235 AS ABOVE
- 235 - 240 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE

app_b_pbf-14_text.txt

70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: SHELL-10%, CLAY-10%, SILT-10%
QUARTZ SAND-01%
FOSSILS: MOLLUSKS

240 - 245 AS ABOVE

245 - 250 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: SHELL-10%, CLAY-10%, SILT-10%
QUARTZ SAND-01%
FOSSILS: SHARKS TEETH, MOLLUSKS

250 - 255 NO SAMPLES

255 - 260 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: SHELL-07%, CLAY-10%, SILT-15%
QUARTZ SAND-01%
FOSSILS: MOLLUSKS

260 - 265 CLAY; LIGHT OLIVE GRAY TO OLIVE GRAY
POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, SILT-25%
HEAVY MINERALS-01%

265 - 270 CLAY; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-25%, CALCILUTITE-03%
FOSSILS: SHARKS TEETH

270 - 275 NO SAMPLES

275 - 280 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-20%, SHELL-02%

280 - 285 CLAY; LIGHT OLIVE GRAY TO OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-25%, SHELL-03%

285 - 290 CLAY; LIGHT OLIVE GRAY TO OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-30%, SHELL-05%
FOSSILS: MOLLUSKS

- 290 - 295 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, SKELETAL, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: CLAY-15%, SILT-10%
PHOSPHATIC SAND-01%
- 295 - 300 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX
ACCESSORY MINERALS: CLAY-05%, SILT-05%
PHOSPHATIC SAND-01%
- 300 - 305 CLAY; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-07%, CALCILUTITE-05%, SILT-15%
FOSSILS: MOLLUSKS
- 305 - 310 CLAY; DARK GRAYISH YELLOW TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: SHELL-07%, CALCILUTITE-02%, SILT-15%
FOSSILS: MOLLUSKS
- 310 - 315 AS ABOVE
- 315 - 320 CLAY; LIGHT OLIVE GRAY TO DARK GRAYISH YELLOW
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-03%, SILT-20%, CALCILUTITE-05%
FOSSILS: MOLLUSKS
- 320 - 325 AS ABOVE
- 325 - 330 AS ABOVE
- 330 - 335 CLAY; YELLOWISH GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-02%, SILT-20%, CALCILUTITE-03%
FOSSILS: MOLLUSKS
- 335 - 340 CLAY; YELLOWISH GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-03%, SILT-15%, CALCILUTITE-03%
FOSSILS: MOLLUSKS
- 340 - 345 CLAY; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-25%, CALCILUTITE-03%
- 345 - 350 CLAY; LIGHT OLIVE GRAY TO YELLOWISH GRAY

POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-03%
 IRON STAIN-03%

- 350 - 355 AS ABOVE
- 355 - 360 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-15%, CALCILUTITE-03%
- 360 - 365 AS ABOVE
- 365 - 370 AS ABOVE
- 370 - 375 AS ABOVE
- 375 - 380 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-15%, CALCILUTITE-07%
- 380 - 385 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-15%, CALCILUTITE-03%
- 385 - 390 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-15%, CALCILUTITE-02%
 LIMESTONE-02%
- 390 - 395 AS ABOVE
- 395 - 400 CLAY; OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX
 ACCESSORY MINERALS: SILT-15%, CALCILUTITE-01%
- 400 - 405 CLAY; OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-02%
- 405 - 410 CLAY; OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-02%
 QUARTZ SAND-01%
- 410 - 415 CLAY; OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-07%
- 415 - 420 AS ABOVE
- 420 - 425 AS ABOVE
- 425 - 430 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION

CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-02%, SHELL-01%

- 430 - 435 AS ABOVE
- 435 - 440 NO SAMPLES
- 440 - 445 CLAY; OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-02%, SHELL-01%
- 445 - 450 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-02%, SHELL-02%
- 450 - 455 CLAY; OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-05%
 PHOSPHATIC SAND-01%, SHELL-01%
- 455 - 460 AS ABOVE
- 460 - 465 CLAY; LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-15%, CALCILUTITE-07%, SHELL-01%
- 465 - 470 CLAY; LIGHT OLIVE GRAY TO OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-15%, CALCILUTITE-07%, SHELL-01%
- 470 - 475 CLAY; LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-15%, CALCILUTITE-10%, SHELL-01%
 FOSSILS: SHARKS TEETH
- 475 - 480 NO SAMPLES
- 480 - 485 CLAY; OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-05%, SHELL-03%
- 485 - 490 CLAY; OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-20%, CALCILUTITE-03%, SHELL-01%
- 490 - 495 AS ABOVE
- 495 - 500 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
 CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
 ACCESSORY MINERALS: SILT-15%, CALCILUTITE-05%
 PHOSPHATIC SAND-03%, SHELL-01%
- 500 - 505 CLAY; OLIVE GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION

CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-20%, CALCILUTITE-03%
PHOSPHATIC SAND-02%, SHELL-02%

- 505 - 510 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-20%, CALCILUTITE-03%
PHOSPHATIC SAND-01%, SHELL-05%
- 510 - 515 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-20%, CALCILUTITE-03%, SHELL-05%
- 515 - 520 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-20%, CALCILUTITE-03%, SHELL-07%
PHOSPHATIC SAND-01%
- 520 - 525 CLAY; OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-20%, CALCILUTITE-02%, SHELL-01%
- 525 - 530 CLAY; OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-20%, CALCILUTITE-03%, SHELL-02%
PHOSPHATIC SAND-02%
- 530 - 535 CLAY; OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX
ACCESSORY MINERALS: SILT-20%, CALCILUTITE-03%, SHELL-05%
PHOSPHATIC SAND-01%
INTERVAL INCLUDES LESS THAN 01% GLAUCONITE
- 535 - 540 AS ABOVE
- 540 - 545 MUDSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-05%, PHOSPHATIC SAND-01%
FOSSILS: SHARKS TEETH
- 545 - 550 MUDSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-07%, PHOSPHATIC SAND-03%
- 550 - 555 MUDSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS

10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-02%, PHOSPHATIC SAND-03%

- 555 - 560 MUDSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, PHOSPHATIC SAND-05%
- 560 - 565 MUDSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, PHOSPHATIC SAND-07%
- 565 - 570 MUDSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-07%
- 570 - 575 MUDSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-07%, SHELL-01%
- 575 - 580 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-15%, SHELL-02%
- 580 - 585 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-05%, PHOSPHATIC SAND-15%
- 585 - 590 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE

60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-02%, PHOSPHATIC SAND-15%

- 590 - 595 AS ABOVE
- 595 - 600 AS ABOVE
- 600 - 605 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, PHOSPHATIC SAND-15%
- 605 - 610 AS ABOVE
- 610 - 615 MUDSTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-10%, SHELL-01%
- 615 - 620 WACKESTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-07%
- 620 - 625 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-20%, SHELL-05%
- 625 - 630 PACKSTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE, SKELETAL
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-15%, SHELL-05%
FOSSILS: FOSSIL FRAGMENTS
- 630 - 635 AS ABOVE
- 635 - 640 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE

75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-10%, SHELL-03%

- 640 - 645 AS ABOVE
- 645 - 650 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-05%, SHELL-03%
- 650 - 655 GRAINSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, INTRACLASTS
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE
UNCONSOLIDATED
ACCESSORY MINERALS: PHOSPHATIC SAND-03%
FOSSILS: MOLLUSKS, BRYOZOA, FOSSIL FRAGMENTS
- 655 - 660 AS ABOVE
- 660 - 665 AS ABOVE
- 665 - 670 WACKESTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, INTRACLASTS, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO VERY COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-07%
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS
- 670 - 675 PACKSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE
UNCONSOLIDATED
ACCESSORY MINERALS: PHOSPHATIC SAND-07%
FOSSILS: FOSSIL FRAGMENTS
- 675 - 680 AS ABOVE
- 680 - 685 PACKSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE
UNCONSOLIDATED
ACCESSORY MINERALS: PHOSPHATIC SAND-02%, QUARTZ SAND-03%
FOSSILS: FOSSIL FRAGMENTS
- 685 - 690 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE, INTRACLASTS

80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-02%, QUARTZ SAND-02%
FOSSILS: FOSSIL FRAGMENTS

- 690 - 695 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, INTRACLASTS, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-01%
FOSSILS: FOSSIL FRAGMENTS
- 695 - 700 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN TYPE: CALCILUTITE, SKELETAL, INTRACLASTS
50% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO COARSE; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-02%
FOSSILS: FOSSIL FRAGMENTS
- 700 - 705 WACKESTONE; LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN TYPE: CALCILUTITE, SKELETAL, INTRACLASTS
50% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO COARSE; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-03%
FOSSILS: FOSSIL FRAGMENTS
- 705 - 710 AS ABOVE
- 710 - 715 AS ABOVE
- 715 - 720 AS ABOVE
- 720 - 725 PACKSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, INTRACLASTS, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
UNCONSOLIDATED
ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-15%
SHELL-02%
FOSSILS: FOSSIL FRAGMENTS
- 725 - 730 PACKSTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, SKELETAL, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
UNCONSOLIDATED
ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-03%
SHELL-02%
FOSSILS: SHARKS TEETH, FOSSIL FRAGMENTS

- 730 - 735 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, INTRACLASTS, CALCILUTITE
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-02%
 SHELL-05%
 FOSSILS: FOSSIL FRAGMENTS
- 735 - 740 MUDSTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY
 GRAIN TYPE: CALCILUTITE, INTRACLASTS
 10% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-01%, SHELL-01%
- 740 - 745 MUDSTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY
 GRAIN TYPE: CALCILUTITE, INTRACLASTS
 10% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-02%, SHELL-02%
- 745 - 750 MUDSTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY
 GRAIN TYPE: CALCILUTITE, INTRACLASTS
 07% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-01%, QUARTZ SAND-01%
- 750 - 755 AS ABOVE
- 755 - 760 PACKSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, SKELETAL
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-10%, QUARTZ SAND-05%
 SHELL-05%
 FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS
- 760 - 765 WACKESTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR, LOW PERMEABILITY
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 70% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-02%, QUARTZ SAND-02%
 SHELL-01%
 FOSSILS: FOSSIL FRAGMENTS
- 765 - 770 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY

POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-02%, QUARTZ SAND-05%
SHELL-02%

770 - 775 MUDSTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN TYPE: CALCILUTITE, INTRACLASTS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, QUARTZ SAND-01%

775 - 780 AS ABOVE

780 - 785 WACKESTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN TYPE: INTRACLASTS, CALCILUTITE
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO COARSE; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX

785 - 790 MUDSTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY
GRAIN TYPE: CALCILUTITE, INTRACLASTS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-01%, PHOSPHATIC SAND-01%

790 - 795 AS ABOVE

795 - 800 AS ABOVE

800 - 805 AS ABOVE

805 - 810 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, SKELETAL, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%
FOSSILS: FOSSIL FRAGMENTS

810 - 815 PACKSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, INTRACLASTS, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%
FOSSILS: FOSSIL FRAGMENTS

- 815 - 825 NO SAMPLES
- 825 - 830 WACKESTONE; LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, INTRACLASTS, CALCILUTITE
 75% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-15%, QUARTZ SAND-03%
 FOSSILS: FOSSIL FRAGMENTS, BRYOZOA, BENTHIC FORAMINIFERA
- 830 - 835 WACKESTONE; LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, SKELETAL, CALCILUTITE
 75% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-15%, QUARTZ SAND-03%
 FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA
 SHARKS TEETH, BRYOZOA
- 835 - 840 WACKESTONE; OLIVE GRAY TO LIGHT OLIVE GRAY
 GRAIN TYPE: INTRACLASTS, CALCILUTITE, SKELETAL
 60% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-20%, QUARTZ SAND-03%
 FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA
- 840 - 845 AS ABOVE
- 845 - 850 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE, SKELETAL
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: COARSE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-02%
 FOSSILS: FOSSIL FRAGMENTS, WORM TRACES
- 850 - 855 PACKSTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE, SKELETAL
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-05%
 SHELL-01%
 FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA
- 855 - 860 AS ABOVE
- 860 - 865 AS ABOVE
- 865 - 870 PACKSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE, SKELETAL
 80% ALLOCHEMICAL CONSTITUENTS

GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-05%
 FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA

870 - 875 AS ABOVE

875 - 880 PACKSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE, SKELETAL
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-07%, QUARTZ SAND-03%
 FOSSILS: FOSSIL FRAGMENTS

880 - 885 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE, SKELETAL
 70% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-10%, QUARTZ SAND-02%
 FOSSILS: FOSSIL FRAGMENTS

885 - 890 WACKESTONE; YELLOWISH GRAY TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 60% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-03%, QUARTZ SAND-01%
 OTHER FEATURES: LOW RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA

890 - 895 AS ABOVE

895 - 900 WACKESTONE; YELLOWISH GRAY TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 60% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO COARSE
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-03%, QUARTZ SAND-01%
 OTHER FEATURES: LOW RECRYSTALLIZATION
 FOSSILS: FOSSIL FRAGMENTS, WORM TRACES

900 - 910 WACKESTONE; YELLOWISH GRAY TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 60% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-03%
 OTHER FEATURES: LOW RECRYSTALLIZATION
 FOSSILS: FOSSIL FRAGMENTS

app_b_pbf-14_text.txt

910 - 915 WACKESTONE; YELLOWISH GRAY TO WHITE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-02%
FOSSILS: FOSSIL FRAGMENTS

915 - 920 WACKESTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-02%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, CONES

920 - 925 WACKESTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%
FOSSILS: BENTHIC FORAMINIFERA, CONES

925 - 930 WACKESTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-02%, PHOSPHATIC SAND-02%
FOSSILS: BENTHIC FORAMINIFERA, CONES
INTERVAL INCLUDES FORAMINIFERA CRIBROBULMINA (VALVULINA)
CUSHMANI

930 - 935 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, DOLOMITE-01%
FOSSILS: BENTHIC FORAMINIFERA, CONES

935 - 940 WACKESTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%, PHOSPHATIC SAND-02%
FOSSILS: BENTHIC FORAMINIFERA, CONES

- 940 - 945 WACKESTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 70% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-01%
 FOSSILS: BENTHIC FORAMINIFERA, CONES
- 945 - 950 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 60% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-01%, PHOSPHATIC SAND-02%
 FOSSILS: BENTHIC FORAMINIFERA, CONES, SHARKS TEETH
- 950 - 955 WACKESTONE; YELLOWISH GRAY TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 30% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-02%
- 955 - 960 WACKESTONE; YELLOWISH GRAY TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 60% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-02%, PHOSPHATIC SAND-02%
 FOSSILS: CONES
- 960 - 965 AS ABOVE
- 965 - 970 WACKESTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 60% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-02%, QUARTZ SAND-01%
 DOLOMITE-01%
- 970 - 975 WACKESTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 70% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-03%, DOLOMITE-01%
 FOSSILS: CONES
- 975 - 980 WACKESTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR

GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, DOLOMITE-02%
FOSSILS: CONES, MOLLUSKS

980 - 985 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, QUARTZ SAND-01%
DOLOMITE-02%
FOSSILS: CONES

985 - 990 WACKESTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, QUARTZ SAND-01%
DOLOMITE-01%
FOSSILS: CONES

990 - 995 WACKESTONE; YELLOWISH GRAY TO VERY LIGHT GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%

995 - 1000 WACKESTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, DOLOMITE-01%
FOSSILS: CONES

1000 - 1005 WACKESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, DOLOMITE-01%
FOSSILS: BENTHIC FORAMINIFERA

1005 - 1010 WACKESTONE; YELLOWISH GRAY TO WHITE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS

GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-01%
 FOSSILS: CONES

- 1010 - 1015 WACKESTONE; YELLOWISH GRAY TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 60% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: SHELL-01%
 FOSSILS: CONES
- 1015 - 1020 AS ABOVE
- 1020 - 1025 AS ABOVE
- 1025 - 1030 WACKESTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-01%, DOLOMITE-01%
 FOSSILS: CONES
- 1030 - 1035 WACKESTONE; YELLOWISH GRAY TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-01%, SHELL-01%
 FOSSILS: CONES
- 1035 - 1040 WACKESTONE; YELLOWISH GRAY TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: PHOSPHATIC SAND-01%, SHELL-02%
 FOSSILS: CONES
- 1040 - 1050 NO SAMPLES
- 1050 - 1055 WACKESTONE; YELLOWISH GRAY
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, CALCILUTITE
 70% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: SHELL-01%
 FOSSILS: CONES
- 1055 - 1060 WACKESTONE; YELLOWISH GRAY

POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, PYRITE-01%
FOSSILS: CONES

1060 - 1065 WACKESTONE; YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, PYRITE-01%
OTHER FEATURES: MUDDY
FOSSILS: CONES

1065 - 1070 AS ABOVE

1070 - 1075 WACKESTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-30%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES

1075 - 1080 WACKESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, DOLOMITE-20%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: CONES

1080 - 1085 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-40%, SHELL-01%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES

1085 - 1090 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, DOLOMITE-30%

OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES
INTERVAL INCLUDES LESS THAN 01% DISSIMINATED PYRITE

- 1090 - 1095 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, DOLOMITE-20%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES
- 1095 - 1100 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, DOLOMITE-03%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES
- 1100 - 1105 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-02%, DOLOMITE-03%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES
- 1105 - 1110 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%, SHELL-01%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES
- 1110 - 1115 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-07%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES
- 1115 - 1120 AS ABOVE
- 1120 - 1125 PACKSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR

GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES

1125 - 1130 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%, SHELL-01%
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES

1130 - 1135 PACKSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION

1135 - 1140 PACKSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-03%, SHELL-01%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: CONES

1140 - 1145 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%, SHELL-01%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: CONES

1145 - 1150 AS ABOVE

1150 - 1155 PACKSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%, DOLOMITE-02%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, CONES

- 1155 - 1160 PACKSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: SHELL-01%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: CONES
- 1160 - 1165 PACKSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: CONES, BENTHIC FORAMINIFERA
- 1165 - 1170 PACKSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-03%
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES, BENTHIC FORAMINIFERA
- 1170 - 1175 AS ABOVE
- 1175 - 1180 AS ABOVE
- 1180 - 1185 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-03%
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES, BENTHIC FORAMINIFERA
- 1185 - 1190 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO COARSE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-03%
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES, BENTHIC FORAMINIFERA
INTERVAL INCLUDES FORAMINIFERA SPIROLINA CORYENSIS
- 1190 - 1195 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET, SKELETAL

85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES, BENTHIC FORAMINIFERA
INTERVAL INCLUDES FORAMINIFERA CRIBROBULIMINA (VALVULINA)
CUSHMANI

- 1195 - 1200 AS ABOVE
- 1200 - 1205 AS ABOVE
- 1205 - 1210 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET, SKELETAL
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES, BENTHIC FORAMINIFERA
- 1210 - 1215 AS ABOVE
- 1215 - 1220 PACKSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET, SKELETAL
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%, SHELL-01%
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES, BENTHIC FORAMINIFERA
- 1220 - 1225 AS ABOVE
- 1225 - 1230 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, INTRACLASTS
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS-01%
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES, BENTHIC FORAMINIFERA
- 1230 - 1235 AS ABOVE
- 1235 - 1240 AS ABOVE
- 1240 - 1245 WACKSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, INTRACLASTS
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC

FOSSILS: CONES, BENTHIC FORAMINIFERA

- 1245 - 1250 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: PELLET, INTRACLASTS
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-01%
 OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
 FOSSILS: CONES, BENTHIC FORAMINIFERA
- 1250 - 1255 AS ABOVE
- 1255 - 1260 AS ABOVE
- 1260 - 1265 AS ABOVE
- 1265 - 1270 AS ABOVE
- 1270 - 1275 AS ABOVE
- 1275 - 1280 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: PELLET, INTRACLASTS
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-03%
 OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
 FOSSILS: CONES, BENTHIC FORAMINIFERA
- 1280 - 1285 AS ABOVE
- 1285 - 1290 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: PELLET, INTRACLASTS
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-05%
 OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
 FOSSILS: CONES
- 1290 - 1295 AS ABOVE
- 1295 - 1300 AS ABOVE
- 1300 - 1305 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, PELLET
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-07%
 OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
 FOSSILS: CONES
- 1305 - 1310 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN

POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-10%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC

- 1310 - 1315 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-30%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: CONES
- 1315 - 1320 AS ABOVE
- 1320 - 1325 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-25%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: CONES
- 1325 - 1330 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-30%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: CONES
- 1330 - 1335 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-30%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: CONES
- 1335 - 1340 AS ABOVE
- 1340 - 1345 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-10%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES

app_b_pbf-14_text.txt

1345 - 1350 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, PELLET
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-15%
 OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
 FOSSILS: CONES

1350 - 1355 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, PELLET
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-10%
 OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
 FOSSILS: CONES, BENTHIC FORAMINIFERA

1355 - 1360 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, PELLET
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-05%
 OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
 FOSSILS: CONES

1360 - 1365 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, PELLET
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-10%, ORGANICS-01%
 OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
 FOSSILS: CONES

1365 - 1370 AS ABOVE

1370 - 1375 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, PELLET
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-02%, ORGANICS-01%
 OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, CONES

1375 - 1380 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: INTRACLASTS, PELLET
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION

app_b_pbf-14_text.txt

CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-15%, ORGANICS-01%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION

1380 - 1385 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-10%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES

1385 - 1390 AS ABOVE

1390 - 1395 AS ABOVE

1395 - 1400 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES

1400 - 1405 AS ABOVE

1405 - 1410 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-07%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, CONES

1410 - 1415 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: INTRACLASTS, PELLET
25% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-10%
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION
FOSSILS: CONES

1415 - 1420 AS ABOVE

1420 TOTAL DEPTH

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-18728
 TOTAL DEPTH: 2300 FT.
 SAMPLES - NONE

COUNTY - PB18728
 LOCATION: T.43S R.40E S.17 BB
 LAT = 26D 44M 17S
 LON = 80D 21M 49S
 ELEVATION: 15 FT

COMPLETION DATE: N/A
 OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER: SFWMD / SFWMD WELL NAME: PBF-15 AND ALSO L-8

WORKED BY: DAVID WAGNER DECEMBER 2007
 ENTERED BY DAVID WAGNER JANUARY 2008
 ELEVATION AND STR TAKEN FROM GIS MAP, DATUM WGS84
 THIS DESCRIPTION IS FOR THE BOTTOM 900' OF CUTTINGS FOR THIS WELL.
 THE DEPTH INTERVAL OF THIS 900' IS 1400'-2300'.
 THE NUMBER OF 5' INTERVAL SAMPLES COMPRISING THIS 900' IS 175
 FOLLOWING THE DESCRIPTION OF MILLER(1986) FOR THE OLDSMAR LIMESTONE
 1860' WAS CHOSEN FOR THE TOP OF OLDSMAR DUE TO THE FIRST OCCURRENCE
 OF LIGHT GREY LIMESTONE AND BROWN VUGGY DOLOMITE. ACTUAL TOP OF
 OLDSMAR MAY BE DEEPER WHERE LIMESTONE BECOMES THE MAIN ROCK TYPE IN
 A COUPLE INTERVALS, 1865'-1880' AND 1955'-1965'. THESE LIMESTONES
 CONTAIN FORAMINIFERA THAT RESEMBLE OLDSMAR INDEX FORAMS BUT ARE TOO
 HIGHLY RECRYSTALLIZED TO MAKE DEFINITIVE IDENTIFICATIONS.

1400.	-	1860.	124AVPK	AVON PARK FM.
1860.	-	2175.	124OLDM	OLDSMAR LIMESTONE
2175.	-	2200.	000NOSM	NO SAMPLES
2200.	-		124OLDM	OLDSMAR LIMESTONE

0 - 1400 NO SAMPLES
 SAMPLES FOR 0'-1400' WERE RECEIVED AT AN EARLIER DATE AND
 DESCRIBED BY STEVEN PETRUSHAK.

1400 - 1405 GRAINSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
 GRAIN TYPE: SKELETAL, PELLET, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: GYPSUM-01%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA
 TWO TO THREE PERCENT OF THE SAMPLE IS MADE UP OF MUDSTONE
 FRAGMENTS WITH LOW POROSITY AND MAY BE DOLOMITIC.

1405 - 1410 GRAINSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
 GRAIN TYPE: SKELETAL, PELLET, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: GYPSUM-01%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA
 FIVE PERCENT OF SAMPLE IS MADE UP OF MUDSTONE FRAGMENTS
 WITH LOW POROSITY AND MAY BE DOLOMITIC.

1410 - 1415 GRAINSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
 GRAIN TYPE: SKELETAL, PELLET, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT

OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
TWO TO THREE PERCENT OF SAMPLE IS MADE UP OF MUDSTONE
FRAGMENTS WITH LOW POROSITY AND MAY BE DOLOMITIC. TRACE
AMOUNTS OF ORGANICS ALSO PRESENT IN SAMPLE.

- 1415 - 1420 GRAINSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
GRAIN TYPE: SKELETAL, PELLET, CRYSTALS
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
TWO PERCENT OF SAMPLE IS MADE UP OF MUDSTONE FRAGMENTS WITH
LOW POROSITY AND MAY BE DOLOMITIC. FIVE PERCENT OF SAMPLE
IS PACKSTONE FRAGMENTS.
- 1420 - 1425 GRAINSTONE; VERY LIGHT ORANGE
IP% POROSITY: MOLDIC
GRAIN TYPE: SKELETAL, PELLET, CRYSTALS
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
TRACE AMOUNTS OF DOLOMITE AND ORGANICS PRESENT IN SAMPLE.
COUPLE PERCENT OF BOTH MUDSTONE AND PACKSTONE FRAGMENTS
ALSO PRESENT IN SAMPLE.
- 1425 - 1430 GRAINSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
GRAIN TYPE: SKELETAL, PELLET, CRYSTALS
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
TRACE AMOUNTS OF DOLOMITE AND ORGANICS PRESENT IN SAMPLE.
FIVE PERCENT OF SAMPLE IS MUDSTONE FRAGMENTS WITH LOW
POROSITY WHICH MAY BE DOLOMITIC. TWO PERCENT OF SAMPLE IS
PACKSTONE FRAGMENTS.
- 1430 - 1435 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
GRAIN TYPE: SKELETAL, PELLET, CRYSTALS
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-03%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
GRAINSTONE IS THE MAIN ROCK TYPE BUT ~15% OF SAMPLE IS
FRAGMENTS OF A WHITE LIMESTONE THAT RANGES FROM WACKESTONE
TO PACKSTONE. FIVE PERCENT OF SAMPLE IS A LIGHT GREY
DOLOMITIC MUDSTONE.
- 1435 - 1440 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
GRAIN TYPE: SKELETAL, PELLET, CRYSTALS
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: FINE TO GRAVEL
MODERATE INDURATION

CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-03%, CALCITE-01%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 MOST OF SAMPLE CONSISTS OF VERY SMALL FRAGMENTS OF
 GRAINSTONE. TWENTY PERCENT OF SAMPLE IS A WHITE LIMESTONE
 RANGING FROM WACKESTONE TO PACKSTONE. ABOUT 7% OF SAMPLE
 IS A GREY MUDSTONE WITH HIGHER INDURATION AND LOW POROSITY.

1440 - 1445 AS ABOVE

1445 - 1450 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR, PIN POINT VUGS, MOLDIC
 GRAIN TYPE: SKELETAL, PELLET, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-03%, CALCITE-01%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 ABOUT 30% OF SAMPLE IS A WHITE LIMESTONE RANGING FROM
 WACKESTONE TO PACKSTONE. ABOUT 5% OF SAMPLE IS A GREY
 MUDSTONE WITH HIGHER INDURATION AND LOW POROSITY. THE
 WHITE LIMESTONE IS ALSO MORE HIGHLY INDURATED.

1450 - 1455 AS ABOVE

1455 - 1460 AS ABOVE

1460 - 1465 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: CALCITE-02%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 SAMPLE ALMOST COMPLETELY MADE UP OF VERY SMALL ROCK
 FRAGMENTS MOSTLY IN THE VERY FINE TO FINE GRAIN SIZE RANGE
 AND MOST OF REST BEING MEDIUM TO COARSE GRAIN SIZE.
 INDURATION IS HARD TO DISCERN BECAUSE THE ROCK PIECES ARE
 SO SMALL, MAY BE VERY POOR.

1465 - 1470 AS ABOVE

1470 - 1475 AS ABOVE

1475 - 1480 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 POOR INDURATION
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: CALCITE-02%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 SAMPLE IS BASICALLY THE SAME AS ABOVE BUT THE ROCK PIECES
 HAVE INCREASED IN SIZE A BIT HAVING MORE COARSE GRAIN SIZE
 PIECES. ABOUT 5% OF SAMPLE IS A GREY DOLOMITIC WELL
 INDURATED MUDSTONE.

1480 - 1485 AS ABOVE

1485 - 1490 GRAINSTONE; VERY LIGHT ORANGE TO WHITE

POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: CALCITE-01%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 ROCK FRAGMENTS ARE TOO SMALL TO DISCERN INDURATION, BUT IT
 MAY BE VERY POOR. ABOUT 3% OF SAMPLE IS WELL INDURATED GREY
 MUDSTONE. ABOUT 15% OF SAMPLE IS A WHITE WACKESTONE TO
 PACKSTONE.

1490 - 1495 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: CALCITE-02%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 ROCK FRAGMENTS ARE VERY SMALL MOSTLY RANGING FROM VERY FINE
 TO FINE GRAIN SIZE. THERE IS 2% OF EACH A GREY MUDSTONE
 AND A WHITE WACKESTONE TO PACKSTONE INCORPORATED IN SAMPLE.

1495 - 1500 AS ABOVE

1500 - 1505 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: CALCITE-01%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 TRACE AMOUNTS OF DOLOMITE ALSO PRESENT. ROCK PIECES TOO
 SMALL TO DISCERN INDURATION, MAY BE VERY POOR. ABOUT 2% OF
 SAMPLE IS A GREY WELL INDURATED MUDSTONE AND 15% OF SAMPLE
 IS A WHITE WACKESTONE TO PACKSTONE.

1505 - 1510 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-02%
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 INDURATION CANNOT BE DISCERNED FROM THE SMALL PIECES WHICH
 ARE BASICALLY INDIVIDUAL GRAINS, BUT INDURATION IS PROBABLY
 UNCONSOLIDATED TO VERY POOR. APPROXIMATELY 15%-20% OF
 SAMPLE IS MADE UP OF A WHITE PACKSTONE WHICH IS MODERATELY
 TO WELL INDURATED. THREE PERCENT OF SAMPLE IS A GREY
 MUDSTONE.

1510 - 1515 AS ABOVE

1515 - 1520 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-02%
 OTHER FEATURES: HIGH RECRYSTALLIZATION

FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 SAMPLE BASICALLY THE SAME AS ABOVE BUT PERCENTAGE OF WHITE
 PACKSTONE FRAGMENTS HAS REDUCED TO 7%-10%.

1520 - 1525 AS ABOVE

1525 - 1530 AS ABOVE

1530 - 1535 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-02%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 PERCENTAGE OF WHITE PACKSTONE FRAGMENTS HAS INCREASED TO
 15%-20%. INDURATION IS UNDISCERNABLE, BUT PROBABLY VERY
 POOR.

1535 - 1540 AS ABOVE

1540 - 1545 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-02%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 INDURATION CANNOT BE DISCERNED FROM THE SMALL FRAGMENTS
 BUT IT IS PROBABLY VERY POORLY INDURATED.

1545 - 1550 AS ABOVE

1550 - 1555 GRAINSTONE; VERY LIGHT ORANGE TO WHITE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-02%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 INDURATION CANNOT BE DISCERNED FROM THE SMALL FRAGMENTS.
 SAMPLE IS BASICALLY MADE UP OF A LOOSE FORAM BED. ROCK IS
 MOST LIKELY VERY POORLY INDURATED.

1555 - 1560 AS ABOVE

1560 - 1565 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-15%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 LIMESTONE INDURATION CANNOT BE DISCERNED FROM THE SMALL
 FRAGMENTS MOST WHICH ARE JUST INDIVIDUAL FORAMS.
 INDURATION IS PROBABLY VERY POOR. APPROXIMATELY 3%-5% OF
 SAMPLE IS A WHITE PACKSTONE. DOLOMITE PRESENT HIGHLY
 ALTERED, SUBHEDRAL AND HAS A GRAIN SIZE RANGE OF
 MICROCRYSTALLINE TO VERY FINE WITH A MODAL SIZE OF

MICROCRYSTALLINE. DOLOMITE INDURATION IS GOOD.

- 1565 - 1570 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CRYSTALS, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRAVEL
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-20%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
LIMESTONE INDURATION CANNOT BE DISCERNED FROM THE SMALL
FRAGMENTS. DOLOMITE PRESENT IS HIGHLY ALTERED, SUBHEDRAL
AND HAS A GRAIN SIZE RANGE OF MICROCRYSTALLINE TO VERY FINE
WITH A MODAL SIZE OF MICROCRYSTALLINE. INDURATION OF THE
DOLOMITE IS GOOD. ABOUT 7% OF SAMPLE IS A WHITE PACKSTONE.
- 1570 - 1575 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CRYSTALS
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-25%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
LIMESTONE INDURATION CANNOT BE DISCERNED FROM THE SMALL
FRAGMENTS. DOLOMITE PRESENT IS HIGHLY ALTERED, SUBHEDRAL
AND HAS A GRAIN SIZE RANGE OF MICROCRYSTALLINE TO VERY FINE
WITH A MODAL SIZE OF MICROCRYSTALLINE. INDURATION OF THE
DOLOMITE IS GOOD. ABOUT 20% OF THE SAMPLE IS A WHITE
PACKSTONE.
- 1575 - 1580 PACKSTONE; WHITE TO DARK YELLOWISH BROWN
GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRANULE
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-30%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
DOLOMITE PRESENT IS HIGHLY ALTERED, SUBHEDRAL AND HAS A
GRAIN SIZE RANGE OF MICROCRYSTALLINE TO VERY FINE WITH A
MODAL SIZE OF MICROCRYSTALLINE. DOLOMITE INDURATION IS
GOOD.
- 1580 - 1585 PACKSTONE; WHITE TO DARK YELLOWISH BROWN
GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-25%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA
DOLOMITE PRESENT IS HIGHLY ALTERED, SUBHEDRAL AND HAS A
GRAIN SIZE RANGE OF MICROCRYSTALLINE TO VERY FINE WITH A
MODAL SIZE OF MICROCRYSTALLINE. INDURATION OF THE DOLOMITE
IS GOOD. LIMESTONE RANGES FROM A WACKESTONE TO A PACKSTONE.
- 1585 - 1590 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CRYSTALS
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRAVEL
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX

- ACCESSORY MINERALS: DOLOMITE-30%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 DOLOMITE PRESENT IS HIGHLY ALTERED, SUBHEDRAL-EUHEDRAL AND
 HAS A GRAIN SIZE RANGE OF MICROCRYSTALLINE TO VERY FINE
 WITH A MODAL SIZE OF MICROCRYSTALLINE. INDURATION OF THE
 DOLOMITE IS GOOD. INDURATION IS NOT DISCERNABLE, BECAUSE OF
 HOW SMALL THE SAMPLE FRAGMENTS ARE. MOST OF SAMPLE ARE
 INDIVIDUAL LOOSE GRAINS. INDURATION OF LIMESTONE IS
 PROBABLY VERY POOR.
- 1590 - 1595 DOLOSTONE; GRAYISH ORANGE TO DARK YELLOWISH BROWN
 POROSITY: INTERCRYSTALLINE, MOLDIC, INTERGRANULAR
 50-90% ALTERED; SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-20%
 FOSSILS: BENTHIC FORAMINIFERA
 LIMESTONE PRESENT IS COMPOSED 93% OF ALLOCHEMS LARGER THAN
 SILT SIZED. GRAIN SIZE RANGE IS VERY FINE TO GRAVEL WITH A
 MODAL SIZE OF FINE. LIMESTONE GRAIN TYPES PRESENT ARE
 SKELETAL AND CRYSTALLINE. INDURATION OF LIMESTONE IS
 PROBABLY VERY POOR.
- 1595 - 1600 DOLOSTONE; GRAYISH ORANGE TO DARK YELLOWISH BROWN
 POROSITY: INTERCRYSTALLINE, MOLDIC, INTERGRANULAR
 50-90% ALTERED; SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-10%
 FOSSILS: BENTHIC FORAMINIFERA
 LIMESTONE PRESENT IS THE SAME LOOSE GRAINSTONE SEEN ABOVE.
- 1600 - 1605 PACKSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 75% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRANULE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 OTHER FEATURES: DOLOMITIC
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 INDURATION RANGES FROM POOR TO MODERATE. TRACE AMOUNTS OF
 ORGANIC LAMINATIONS PRESENT.
- 1605 - 1610 PACKSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRANULE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-01%
 OTHER FEATURES: DOLOMITIC
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION RANGES FROM POOR TO MODERATE. TRACE AMOUNTS OF
 ORGANIC LAMINATIONS PRESENT.
- 1610 - 1615 AS ABOVE
- 1615 - 1620 AS ABOVE
- 1620 - 1625 PACKSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE, MOLDIC
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS

85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRANULE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-02%
 OTHER FEATURES: DOLOMITIC
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION RANGES FROM POOR TO MODERATE. TRACE AMOUNTS OF
 ORGANIC LAMINATIONS PRESENT IN SAMPLE. ABOUT 3% OF SAMPLE
 IS A LIGHT-MEDIUM GREY MUDSTONE.

1625 - 1630 AS ABOVE

1630 - 1635 GRAINSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 90% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRAVEL
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-02%
 FOSSILS: BENTHIC FORAMINIFERA
 ABOUT 3% OF SAMPLE IS WHITE PACKSTONE FRAGMENTS WHICH HAVE
 AN ALLOCHEM PERCENTAGE GREATER THAN SILT SIZE OF ABOUT 80%.
 MOST OF SAMPLE CONSISTS OF LOOSE ALLOCHEMS.

1635 - 1640 AS ABOVE

1640 - 1645 AS ABOVE

1645 - 1650 AS ABOVE

1650 - 1655 DOLOSTONE; GRAYISH BROWN
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: VERY FINE
 RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-15%
 OTHER FEATURES: SUCROSIC
 FOSSILS: BENTHIC FORAMINIFERA
 CRYSTALLINITY RANGES FROM SUBHEDRAL TO EUHEDRAL. LIMESTONE
 PRESENT HAS AN ALLOCHEM PERCENTAGE THAT IS GREATER THAN
 SILT SIZE OF 90% AND GRAIN SIZE RANGE OF VERY FINE TO
 GRAVEL WITH A MODAL SIZE OF FINE. LIMESTONE GRAIN TYPES
 PRESENT ARE SKELETAL AND CRYSTALLINE.

1655 - 1660 GRAINSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO VERY COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-15%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA
 DOLOMITE PRESENT IS HIGHLY ALTERED, EUHEDRAL AND HAS A
 GRAIN SIZE RANGE OF MICROCRYSTALLINE TO VERY FINE WITH A
 MODAL SIZE OF VERY FINE. DOLOMITE IS MODERATELY INDURATED.
 INDURATION OF LIMESTONE IS VERY POOR.

1660 - 1665 GRAINSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE

- POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-07%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA
TRACE AMOUNTS OF GYPSUM PRESENT IN SAMPLE. INDURATION IS VERY POOR.
- 1665 - 1670 PACKSTONE; VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CRYSTALS
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-10%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA
TRACE AMOUNTS OF ORGANIC LAMINATIONS PRESENT IN SAMPLE.
- 1670 - 1675 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, PIN POINT VUGS, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-15%
OTHER FEATURES: SUCROSIC
FOSSILS: BENTHIC FORAMINIFERA
LIMESTONE PRESENT HAS AN ALLOCHAME PRECENTAGE THAT IS GREATER THAN SILT SIZED OF 80% AND A GRAIN SIZE RANGE OF VERY FINE TO GRANULE WITH MODAL SIZE OF MEDIUM. LIMESTONE GRAIN TYPES PRESENT ARE SKELETAL AND CRYSTALLINE. TRACE AMOUNTS OF ORGANICS ARE PRESENT IN SAMPLE.
- 1675 - 1680 DOLOSTONE; MODERATE YELLOWISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, MOLDIC, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
MODERATE INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-25%
FOSSILS: BENTHIC FORAMINIFERA
INDURATION VARIES FROM POOR TO MODERATE. LIMESTONE PRESENT HAS AN ALLOCHEM PERCENTAGE THAT IS GREATER THAN SILT SIZED OF 75% AND A GRAIN SIZE RANGE OF FINE TO GRAVEL WITH A MODAL SIZE OF VERY COARSE. LIMESTONE GRAIN TYPES PRESENT ARE SKELETAL, MICRITE AND CRYSTALLINE.
- 1680 - 1685 DOLOSTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, MOLDIC
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-40%
FOSSILS: BENTHIC FORAMINIFERA
LIMSTONE PRESENT HAS AN ALLOCHEM PERCENTAGE THAT IS GREATER THAN SILT SIZED OF 75% AND A GRAIN SIZE RANGE OF FINE TO GRAVEL WITH A MODAL SIZE OF VERY COARSE. LIMESTONE GRAIN TYPES PRESENT ARE SKELETAL, MICRITE AND CRSYTALLINE. LIMESTONE IS HIGHLY RECRYSTALLIZED.
- 1685 - 1690 DOLOSTONE; MODERATE YELLOWISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, MOLDIC, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE

- RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-25%
 FOSSILS: BENTHIC FORAMINIFERA
 LIMESTONE PRESENT HAS AN ALLOCHEM PERCENTAGE THAT IS
 GREATER THAN SILT SIZED OF 75% AND A GRAN SIZE RANGE OF
 FINE TO GRAVEL WITH A MODAL SIZE OF VERY COARSE. LIMESTONE
 GRAIN TYPES PRESENT ARE SKELETAL, MICRITE AND CRYSTALLINE.
 LIMESTONE IS HIGHLY RECRYSTALLIZED.
- 1690 - 1695 DOLOSTONE; MODERATE YELLOWISH BROWN TO MODERATE DARK GRAY
 POROSITY: INTERCRYSTALLINE, PIN POINT VUGS; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-03%
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION IS HIGHER IN THE GREY DOLOSTONES VERSUS THE
 BROWN DOLOSTONES.
- 1695 - 1700 DOLOSTONE; MODERATE YELLOWISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-03%
 FOSSILS: BENTHIC FORAMINIFERA
 PERMEABILITY POSSIBLY LOW.
- 1700 - 1705 DOLOSTONE; GRAYISH BROWN TO MODERATE GRAY
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: LIMESTONE-30%
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 LIMESTONE PRESENT HAS AN ALLOCHEM PERCENTAGE THAT IS
 GREATER THAN SILT SIZED OF 75% AND A GRAIN SIZE RANGE OF
 FINE TO GRAVEL WITH A MODAL SIZE OF MEDIUM. LIMESTONE
 GRAIN TYPES PRESENT ARE SKELETAL, MICRITE AND CRYSTALLINE.
 COLOR OF LIMESTONE IS VERY PALE ORANGE (10YR 8/2).
- 1705 - 1710 DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 EUHEDRAL
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: LIMESTONE-15%
 FOSSILS: BENTHIC FORAMINIFERA
 MOST OF SAMPLE IS VERY SMALL PIECES OF DOLOSTONE OR
 INDIVIDUAL DOLOMITE GRAINS. ONE OF THE LARGER PIECES SHOWS
 GOOD INDURATION AND ANOTHER SHOWS POOR INDURATION.
- 1710 - 1715 WACKESTONE; WHITE TO DARK YELLOWISH BROWN
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE
 GRAIN TYPE: CALCILUTITE, SKELETAL, CRYSTALS
 40% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-40%
 FOSSILS: BENTHIC FORAMINIFERA
 DOLOMITE PRESENT IS HIGHLY ALTERED, SUBHEDRAL AND HAS A
 GRAIN SIZE RANGE OF MICROCRYSTALLINE TO FINE WITH A MODAL

SIZE OF VERY FINE. INDURATION FOR DOLOMITE IS MODERATE.

- 1715 - 1720 WACKESTONE; WHITE TO DARK YELLOWISH BROWN
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE
 GRAIN TYPE: CALCILUTITE, CRYSTALS, SKELETAL
 30% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-25%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA
 DOLOMITE PRESENT IS HIGHLY ALTERED, SUBHEDRAL AND HAS A
 GRAN SIZE RANGE OF MICROCRYSTALLINE TO FINE WITH A MODAL
 GRAIN SIZE OF VERY FINE. INDURATION OF DOLOMITE IS GOOD.
- 1720 - 1725 PACKSTONE; WHITE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRAVEL
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-07%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, FOSSIL MOLDS
- 1725 - 1730 DOLOSTONE; MODERATE YELLOWISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 ACCESSORY MINERALS: LIMESTONE-20%
 FOSSILS: BENTHIC FORAMINIFERA
 LIMESTONE PRESENT IS A POORLY INDURATED GRAINSTONE WITH
 DOLOMITE CRYSTALS INCORPORATED IN THEM.
- 1730 - 1735 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-25%
 FOSSILS: BENTHIC FORAMINIFERA
 LIMESTONE PRESENT HAS AN ALLOCHEM PERCENTAGE THAT IS
 GREATER THAN SILT SIZED OF 85% AND A GRAIN SIZE RANGE OF
 FINE TO GRANULE WITH A MODAL SIZE OF COARSE. LIMESTONE
 GRAIN TYPES PRESENT ARE SKELETAL AND MICRITE.
- 1735 - 1740 PACKSTONE; WHITE TO MODERATE YELLOWISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO VERY COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-05%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION RANGES FROM POOR TO MODERATE.
- 1740 - 1745 AS ABOVE
- 1745 - 1750 AS ABOVE
- 1750 - 1755 GRAINSTONE; WHITE TO MODERATE YELLOWISH BROWN
 POROSITY: INTERGRANULAR

GRAIN TYPE: SKELETAL, CALCILUTITE
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: COARSE TO GRAVEL; POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-07%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA

1755 - 1760 PACKSTONE; WHITE TO MODERATE YELLOWISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE
 90% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: COARSE TO GRAVEL; POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-07%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA

1760 - 1765 GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE
 95% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: FINE; RANGE: FINE TO VERY COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-02%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 SAMPLE IS PREDOMINANTLY COMPOSED OF LOOSE FINE TO MEDIUM
 GRAIN SIZE ALLOCHEMS.

1765 - 1770 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO VERY COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-02%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID

1770 - 1775 AS ABOVE

1775 - 1780 AS ABOVE

1780 - 1785 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO VERY COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-05%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID

1785 - 1790 AS ABOVE

1790 - 1795 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: COARSE; RANGE: FINE TO GRANULE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-05%

OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA

1795 - 1800 AS ABOVE

1800 - 1805 GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: VERY FINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA

1805 - 1810 GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: FINE TO GRANULE; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA
MAJORITY OF SAMPLE CONSISTS OF LOOSE FINE TO MEDIUM GRAIN
SIZE ALLOCHEMS AND ROCK FRAGMENTS. INDURATION IS VERY
POOR.

1810 - 1815 AS ABOVE

1815 - 1820 GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: COARSE; RANGE: FINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-03%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA
MAJORITY OF SAMPLE CONSISTS OF LOOSE MEDIUM TO COARSE GRAIN
SIZE ALLOCHEMS AND ROCK FRAGMENTS.

1820 - 1825 AS ABOVE

1825 - 1830 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-20%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA
DOLOMITE PRESENT IS HIGHLY ALTERED, SUBHEDRAL AND HAS A
GRAIN SIZE RANGE OF MICROCRYSTALLINE TO MEDIUM WITH A MODAL
SIZE OF VERY FINE.

1830 - 1835 PACKSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT

- ACCESSORY MINERALS: DOLOMITE-40%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA
 DOLOMITE PRESENT IS COMPLETELY ALTERED, SUBHEDRAL AND HAS A
 GRAIN SIZE RANGE OF MICROCRYSTALLINE TO MEDIUM WITH A MODAL
 SIZE OF VERY FINE.
- 1835 - 1840 DOLOSTONE; DARK YELLOWISH ORANGE TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 90-100% ALTERED
 SUBHEDRAL
 GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-15%
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION OF DOLOMITE IS PROBABLY VERY POOR BUT IS NOT
 DISCERNABLE BECAUSE DOLOMITES PRESENT ARE LOOSE CRYSTALS OF
 GIVEN GRAIN SIZE. LIMESTONE PRESENT HAS AN ALLOCHEM
 PERCENTAGE GREATER THAN SILT SIZED OF 85% AND A GRAIN SIZE
 RANGE OF FINE TO GRANULE WITH A MODAL SIZE OF MEDIUM.
 LIMESTONE GRAIN TYPES PRESENT ARE SKELETAL, MICRITE AND
 CRYSTALLINE.
- 1840 - 1845 DOLOSTONE; DARK YELLOWISH ORANGE TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 90-100% ALTERED
 SUBHEDRAL
 GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM
 POOR INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-40%
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION IS PROBABLY VERY POOR, BECAUSE DOLOMITES PRESENT
 ARE LOOSE CRYSTALS OF GIVEN GRAIN SIZE. LIMESTONE PRESENT
 HAS AN ALLOCHEM PERCENTAGE GREATER THAN SILT SIZED OF 85%
 AND A GRAIN SIZE RANGE OF FINE TO GRANULE WITH A MODAL SIZE
 OF MEDIUM. LIMESTONE GRAIN TYPES PRESENT ARE SKELETAL
 MICRITE AND CRYSTALLINE.
- 1845 - 1850 PACKSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH ORANGE
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: COARSE; RANGE: FINE TO VERY COARSE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-40%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 DOLOMITE PRESENT IS COMPLETELY ALTERED, SUBHEDRAL AND HAS A
 GRAIN SIZE RANGE OF VERY FINE TO MEDIUM WITH A MODAL SIZE
 OF VERY FINE.
- 1850 - 1855 PACKSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: COARSE; RANGE: FINE TO GRANULE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-15%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 DOLOMITE PRESENT IS COMPLETELY ALTERED, SUBHEDRAL AND HAS A
 GRAIN SIZE RANGE OF MICROCRYSTALLINE TO FINE WITH A MODAL
 SIZE OF VERY FINE.
- 1855 - 1860 PACKSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH ORANGE
 POROSITY: INTERGRANULAR

- GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 80% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: COARSE; RANGE: FINE TO GRANULE
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-20%
 FOSSILS: BENTHIC FORAMINIFERA
 DOLOMITE PRESENT IS COMPLETELY ALTERED, SUBHEDRAL AND HAS A
 GRAIN SIZE RANGE OF MICROCRYSTALLINE TO FINE WITH A MODAL
 SIZE OF VERY FINE.
- 1860 - 1865 DOLOSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 90-100% ALTERED
 EUHEDRAL
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-25%
 FOSSILS: BENTHIC FORAMINIFERA
 TWO DOLOSTONES PRESENT ONE THAT IS MORE HIGHLY INDURATED
 AND COLORED PALE YELLOWISH BROWN WITH A GRAIN SIZE ALMOST
 COMPLETELY MICROCRYSTALLINE. THE OTHER DOLOSTONE IS
 IDENTICAL TO THE DOLOSTONES SEEN ABOVE AND IT IS DESCRIBED
 IN THE MAIN DESCRIPTION FOR THIS INTERVAL. THERE IS ABOUT
 A 50/50 SPLIT BETWEEN THE TWO DOLOSTONES. LIMESTONE PRESENT
 HAS AN ALLOCHEM PERCENTAGE OF 90% AND HAS A GRAIN SIZE
 RANGE OF FINE TO GRAVEL WITH A MODAL SIZE OF COARSE.
 LIMESTONE GRAIN TYPES PRESENT ARE SKELETAL, MICRITE AND
 CRYSTALLINE.
- 1865 - 1870 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-15%
 FOSSILS: BENTHIC FORAMINIFERA
 LIMESTONE PRESENT HAS AN ALLOCHEM PERCENTAGE GREATER THAN
 SILT SIZED OF 80% AND A GRAIN SIZE RANGE OF FINE TO GRANULE
 WITH A MODAL SIZE OF FINE. LIMESTONE GRAIN TYPES PRESENT
 ARE SKELETAL, MICRITE AND CRYSTALLINE.
- 1870 - 1875 PACKSTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE
 GRAIN TYPE: SKELETAL, CALCILUTITE
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRAVEL
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-30%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 DOLOMITE PRESENT IS COMPLETELY ALTERED, SUBHEDRAL AND HAS A
 GRAIN SIZE RANGE OF MICROCRYSTALLINE TO FINE WITH A MODAL
 SIZE OF VERY FINE. INDURATION OF DOLOSTONE IS VARIABLE
 BEING MOSTLY GOOD TO MODERATE IN SOME OF THE FRAGMENTS WITH
 MORE EUHEDRAL CRYSTALLINITY.
- 1875 - 1880 PACKSTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE
 GRAIN TYPE: SKELETAL, CALCILUTITE
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: VERY COARSE; RANGE: FINE TO GRAVEL
 POOR INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-40%

OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 DOLOMITE PRESENT IS COMPLETELY ALTERED, SUBHEDRAL AND HAS A
 GRAIN SIZE RANGE OF MICROCRYSTALLINE TO FINE WITH A MODAL
 SIZE OF VERY FINE. INDURATION OF DOLOSTONE IS VARIABLE
 BEING HIGH IN MOST OF THE DOLOSTONES AND MODERATE IN THE
 MORE EUHEDRAL DOLOSTONES. DOLOSTONES ARE VARIABLY
 SUCROSIC. A FEW SMALL VUGS PRESENT IN LARGE DOLOSTONE
 FRAGMENTS.

- 1880 - 1885 DOLOSTONE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 90-100% ALTERED
 SUBHEDRAL
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
 GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-20%
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 FEW SMALL VUGS IN DOLOSTONE BUT THE ROCK IS PRIMARILY
 MASSIVE WITH LOW PERMEABILITY UNLESS THERE IS FRACTURING
 PRESENT THAT CANNOT BE SEEN IN CUTTINGS. LIMESTONE PRESENT
 HAS AN ALLOCHEM PERCENTAGE THAT IS GREATER THAN SILT SIZED
 OF 85% AND A GRAIN SIZE RANGE OF FINE TO GRAVEL WITH A
 MODAL SIZE OF VERY COARSE. LIMESTONE GRAIN TYPES PRESENT
 ARE SKELETAL AND MICRITE.
- 1885 - 1890 DOLOSTONE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-30%
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, FOSSIL MOLDS
 INDURATION RANGES FROM MODERATE TO GOOD. DOLOSTONES ARE
 VARIABLY SUCROSIC WITH FEW SMALL VUGS. LIMESTONE PRESENT
 HAS AN ALLOCHEM PERCENTAGE THAT IS GREATER THAN SILT SIZED
 OF 90% AND A GRAIN SIZE RANGE OF FINE TO GRAVEL WITH A
 MODAL SIZE OF COARSE. LIMESTONE GRAIN TYPES PRESENT ARE
 SKELETAL AND MICRITE.
- 1890 - 1895 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
 POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
 90-100% ALTERED; SUBHEDRAL
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 SAMPLE IS VARIABLY SUCROSIC. ROCK FRAGMENTS ARE UNUSUALLY
 LARGE FOR CUTTINGS, LARGE ENOUGH TO MAKE A MASSIVE
 SEDIMENTARY STRUCTURE SEEM POSSIBLE.
- 1895 - 1900 DOLOSTONE; GRAYISH BROWN
 POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
 LOW PERMEABILITY; 50-90% ALTERED; SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
- 1900 - 1905 AS ABOVE
- 1905 - 1910 AS ABOVE
- 1910 - 1915 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
 POROSITY: INTERCRYSTALLINE, PIN POINT VUGS
 90-100% ALTERED; SUBHEDRAL
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT

MOST OF THE SAMPLE LOOKS MASSIVE WITH LOW PERMEABILITY.
ABOUT 3% OF SAMPLE IS POORLY INDURATED AND IS MORE OF A
YELLOWISH ORANGE COLOR AND ALSO CONTAINS DARK LAMINATIONS.

- 1915 - 1920 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH ORANGE
POROSITY: INTERCRYSTALLINE, PIN POINT VUGS; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
TWO DOLOSTONES ARE PRESENT. THE ONE DESCRIBED IN THE MAIN
FOR THE INTERVAL MAKES UP ~70% OF THE SAMPLE THE SECOND
DOLOSTONE IS YELLOWISH ORANGE, EUHEDRAL, HIGHLY PERMEABLE
AND POORLY TO MODERATELY INDURATED.
- 1920 - 1925 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
- 1925 - 1930 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, MOLDIC
POSSIBLY HIGH PERMEABILITY; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: SUCROSIC
TRACE AMOUNTS OF ORGANICS PRESENT IN THE SAMPLE. TWO
DOLOSTONES ARE PRESENT, THE ONE DESCRIBED IN THE MAIN
DESCRIPTION MEAKES UP ~70% OF SAMPLE. THE OTHER DOLOSTONE
MAY BE MASSIVE AND RESEMBLES THE DOLOSTONE DESCRIBED FOR
THE INTERVAL 1920'-1925'.
- 1930 - 1935 DOLOSTONE; DARK YELLOWISH ORANGE
POROSITY: INTERCRYSTALLINE, MOLDIC
POSSIBLY HIGH PERMEABILITY; 50-90% ALTERED; EUHEDRAL
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: SUCROSIC
INDURATION RANGES FROM MODERATE TO GOOD. APPROXIMATELY 20%
OF SAMPLE IS A DARK YELLOWISH BROWN DOLOMITE DESCRIBED FOR
THE INTERVAL 1920'-1925'.
- 1935 - 1940 DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE
POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: SUCROSIC
DESPITE THE SMALL MOLD/VUG PORES PRESENT PERMEABILITY
APPEARS TO BE LOW. WATER POURED/DRIPPED ON SAMPLE DOESN'T
INFILTRATE.
- 1940 - 1945 AS ABOVE
- 1945 - 1950 AS ABOVE
- 1950 - 1955 AS ABOVE
- 1955 - 1960 WACKESTONE; WHITE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR, MOLDIC
GRAIN TYPE: CALCILUTITE, SKELETAL
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE

- ACCESSORY MINERALS: DOLOMITE-40%
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 DOLOMITE PRESENT RANGES FROM A COMPLETELY ALTERED
 SUBHEDRAL DARK YELLOWISH BROWN DOLOMITE TO A VERY PALE
 ORANGE DOLOMITE OF MEDIUM ALTERATION, SUBHEDRAL
 CRYSTALLINITY. BOTH HAVE A GRAIN SIZE RANGE OF
 MICROCRYSTALLINE TO FINE. FORAMS PRESENT ARE DICTYOCONUS
 AND ROTALIDS POSSIBLY MISCELLANEA NASSAUENSIS.
- 1960 - 1965 WACKESTONE; WHITE TO DARK YELLOWISH BROWN
 POROSITY: INTERGRANULAR, MOLDIC
 GRAIN TYPE: CALCILUTITE, SKELETAL, CRYSTALS
 20% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE
 ACCESSORY MINERALS: DOLOMITE-15%
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 THE DOLOSTONE PRESENT IS HIGHLY ALTERED, SUBHEDRAL AND HAS
 A GRAIN SIZE RANGE OF MICROCRYSTALLINE TO VERY FINE WITH A
 MODAL SIZE OF VERY FINE. DOLOSTONE IS WELL INDURATED.
- 1965 - 1970 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 POOR INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-05%
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION IN MOST OF THE SAMPLE IS VERY POOR ALMOST
 UNCONSOLIDATED LOOSE GRAINS OF DOLOMITE. APPROXIMATELY 10%
 OF SAMPLE IS A WELL INDURATED DOLOSTONE RANGING IN COLOR
 FROM PALE YELLOWISH BROWN TO DARK YELLOWISH BROWN.
- 1970 - 1975 WACKESTONE; DARK YELLOWISH BROWN TO LIGHT GREENISH GRAY
 X% POROSITY: INTERGRANULAR, MOLDIC
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-05%
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION VARIES FROM MEDIUM TO GOOD.
- 1975 - 1980 AS ABOVE
- 1980 - 1985 DOLOSTONE; GRAYISH ORANGE TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR, MOLDIC
 10-50% ALTERED; SUBHEDRAL
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-03%
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION RANGES FROM MODERATE TO GOOD.
- 1985 - 1990 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-02%
 FOSSILS: BENTHIC FORAMINIFERA
 INDURATION VARIES FROM POOR TO GOOD. ABOUT 15% OF THE
 DOLOMITE LOOKS LIKE A COLOR MIXTURE BETWEEN PALE YELLOWISH
 BROWN TO DARK YELLOWISH BROWN.
- 1990 - 1995 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE

RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-02%
 FOSSILS: BENTHIC FORAMINIFERA

1995 - 2000 AS ABOVE

2000 - 2005 DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ACCESSORY MINERALS: LIMESTONE-01%
 FOSSILS: BENTHIC FORAMINIFERA

2005 - 2010 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 FOSSILS: BENTHIC FORAMINIFERA

2010 - 2015 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
 SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT
 ALSO PRESENT IS A VARIABLE FINE MOLDIC/VUGGY POROSITY.
 SAMPLE APPEARS TO HAVE LOW PERMEABILITY FROM WATER BEING
 POURED/DRIPPED ON IT.

2015 - 2020 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
 POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY
 50-90% ALTERED; SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
 CEMENT TYPE(S): DOLOMITE CEMENT

2020 - 2025 DOLOSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
 POROSITY: INTERCRYSTALLINE; SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO VERY FINE
 CEMENT TYPE(S): DOLOMITE CEMENT
 SAMPLE COLOR IS VARIABLE. COLORS ALSO PRESENT ARE GRAYISH
 ORANGE, MODERATE YELLOWISH BROWN AND PALE YELLOWISH BROWN.
 INDURATION VARIES FROM POOR TO GOOD. MAJORITY OF THE
 SAMPLE HAS GOOD INDURATION BUT THE FRAGMENTS WITH GRAYISH
 TO YELLOWISH ORANGE HAVE AN ABUNDANCE OF MOLDIC PORES AND
 HAS POOR INDURATION. THE ALTERATION VARIES FROM MEDIUM TO
 HIGH BEING HIGHER IN THE DARKER DOLOMITES.

2025 - 2030 AS ABOVE

2030 - 2035 AS ABOVE

2035 - 2040 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERCRYSTALLINE; 10-50% ALTERED; SUBHEDRAL
 GRAIN SIZE: MICROCRYSTALLINE
 RANGE: MICROCRYSTALLINE TO VERY FINE
 CEMENT TYPE(S): DOLOMITE CEMENT
 INDURATION RANGES FROM MODERATE TO POOR. DOLOSTONE HAS AN
 INTRACLASTIC GRAINTYPE IN SOME OF THE FRAGMENTS OF WHICH
 HAVE POOR INDURATION.

2040 - 2045 AS ABOVE

2045 - 2050 AS ABOVE

2050 - 2055 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
THERE ARE FEW SMALL VUG PORES BUT OTHER THAN THAT THE
SAMPLE APPEARS MASSIVE AND IMPERMEABLE.

2055 - 2060 AS ABOVE

2060 - 2065 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO MEDIUM; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
THERE ARE FEW SMALL VUG PORES BUT OTHER THAN THAT THE
SAMPLE APPEARS MASSIVE AND IMPERMEABLE. THERE ARE TWO
DARKER (DARK YELLOWISH BROWN) DOLOSTONE FRAGMENTS PRESENT
WHICH ARE ANHEDRAL TO SUBHEDRAL AND HIGHLY TO COMPLETELY
ALTERED AND VERY WELL INDURATED. THESE TWO FRAGMENTS MAKE
UP 3-5 PERCENT OF THE SAMPLE.

2065 - 2070 DOLOSTONE; GRAYISH ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
CEMENT TYPE(S): DOLOMITE CEMENT
INDURATION RANGES FROM POOR IN THE MORE POROUS EUHEDRAL
DOLOSTONES TO VERY GOOD IN THE MORE FINE GRAIN SUBHEDRAL
SOLOSTONES. CRYSTALLINITY RANGES FROM SUBHEDRAL TO
EUHEDRAL.

2070 - 2075 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
APPROXIMATELY 2% OF SAMPLE HAS BETTER CRYSTALLINITY AND
POOR INDURATION.

2075 - 2080 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
CRYSTALLINITY RANGES FROM SUBHEDRAL TO EUHEDRAL. COLOR
ASLO HAS A HINT OF ORANGE MIXED IN.

2080 - 2085 DOLOSTONE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT

2085 - 2090 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH ORANGE
POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
APPROXIMATELY 5% OF SAMPLE HAS BETTER CRYSTALLINITY AND
LOWER INDURATION AND IS MORE POROUS.

2090 - 2095 AS ABOVE

2095 - 2100 DOLOSTONE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
THREE PERCENT OF SAMPLE HAS MUCH HIGHER POROSITY THAN THE
REST AND IS USUALLY COLORED MODERATE YELLOWISH BROWN (10YR
5/4) .

2100 - 2105 DOLOSTONE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, MOLDIC, LOW PERMEABILITY
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
THREE PERCENT OF SAMPLE HAS MUCH HIGHER POROSITY THAN THE
REST OF THE SAMPLE AND IS USUALLY COLORED VERY PALE ORANGE .

2105 - 2110 AS ABOVE

2110 - 2115 AS ABOVE

2115 - 2120 DOLOSTONE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, MOLDIC
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-02%
FOSSILS: BENTHIC FORAMINIFERA
POSSIBLE CAVINGS DUE TO LIMESTONE AND INTRACLASTIC POORLY
INDURATED DOLOSTONES PRESENT.

2120 - 2125 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH ORANGE
POROSITY: INTERCRYSTALLINE, MOLDIC; 50-90% ALTERED
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
CRYSTALLINITY VARIES FROM SUBHEDRAL TO EUHEDRAL.
INDURATION IS LOWER IN THE MORE EUHEDRAL FRAGMENTS.

2125 - 2130 AS ABOVE

2130 - 2135 DOLOSTONE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, MOLDIC
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-02%
FOSSILS: BENTHIC FORAMINIFERA

2135 - 2140 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-07%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA

2140 - 2145 AS ABOVE

2145 - 2150 AS ABOVE

2150 - 2155 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO VERY COARSE
MODERATE INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-07%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA

2155 - 2160 AS ABOVE

2160 - 2165 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
MODERATE INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID

2165 - 2170 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE
93% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
MODERATE INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-10%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA

2170 - 2175 AS ABOVE

2175 - 2200 NO SAMPLES

2200 - 2205 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
RANGE: MEDIUM TO FINE; MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-07%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID

2205 - 2210 AS ABOVE

2210 - 2215 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
MODERATE INDURATION
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: BENTHIC FORAMINIFERA

2215 - 2220 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN

POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE
 90% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
 MODERATE INDURATION
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-05%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID

2220 - 2225 AS ABOVE

2225 - 2230 AS ABOVE

2230 - 2235 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-03%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 INDURATION RANGES FROM POOR TO MODERATE BUT MOST OF SAMPLE IS MODERATE.

2235 - 2240 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL; POOR INDURATION
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-03%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID

2240 - 2245 GRAINSTONE; VERY LIGHT ORANGE TO DARK YELLOWISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 93% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: GRAVEL TO FINE
 CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX
 ACCESSORY MINERALS: DOLOMITE-03%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 INDURATION VARIES FROM POOR TO MODERATE.

2245 - 2250 AS ABOVE

2250 - 2255 AS ABOVE

2255 - 2260 AS ABOVE

2260 - 2265 PACKSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-01%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 INDURATION VARIES FROM POOR TO MODERATE.

2265 - 2270 PACKSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS

85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-01%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 ANOTHER FOSSIL TYPE FOUND LOOKS LIKE ALGAE OR CORAL.

2270 - 2275 PACKSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-03%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID
 DOLOMITE PERCENTAGE MAY BE HIGHER OR LOWER BUT IS HARD TO
 DISCERN DUE TO THE SMALL AND LOOSE CRYSTALS PRESENT. SOME
 APPEAR TO BE CALCITE AND SOME DOLOMITE.

2275 - 2280 AS ABOVE

2280 - 2285 PACKSTONE; VERY LIGHT ORANGE
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 85% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-05%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID

2285 - 2290 GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 90% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRANULE
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-05%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA

2290 - 2295 GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 90% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-07%
 OTHER FEATURES: HIGH RECRYSTALLIZATION
 FOSSILS: BENTHIC FORAMINIFERA, ECHINOID

2295 - 2300 GRAINSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
 POROSITY: INTERGRANULAR
 GRAIN TYPE: SKELETAL, CALCILUTITE, CRYSTALS
 90% ALLOCHEMICAL CONSTITUENTS
 GRAIN SIZE: MEDIUM; RANGE: FINE TO GRAVEL
 MODERATE INDURATION
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
 ACCESSORY MINERALS: DOLOMITE-07%
 OTHER FEATURES: HIGH RECRYSTALLIZATION

FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, FOSSIL MOLDS

2300 TOTAL DEPTH

C

Water Quality Data from Packer Tests



Jupiter Environmental Laboratories, Inc.
150 S. Old Dixie Highway
Jupiter, FL 33458
Phone: (561)575-0030
Fax: (561)575-4118
www.jupiterlabs.com
clientservices@jupiterlabs.com

March 14, 2007

Randy Keyser
Tetra-Tech EC, Inc.
759 S. Federal Hwy
Ste. 100
Stuart, FL 34994

RE: LOG# 717987
Project ID: 3300 PBF-15 Parker Test
COC# 29391

Dear Randy Keyser:

Enclosed are the analytical results for sample(s) received by the laboratory on Friday, February 23, 2007. Results reported herein conform to the most current NELAC standards, where applicable, unless indicated by * in the body of the report.

The enclosed Chain of Custody is a component of this package and should be retained with the package and incorporated therein.

Results for all solid matrices are reported in dry weight unless otherwise noted. Results for all liquid matrices are reported as received in the laboratory unless otherwise noted.

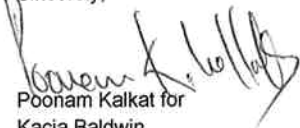
Samples are disposed of after 30 days of their receipt by the laboratory unless archiving is requested in writing. The laboratory maintains the right to charge storage fees for archived samples.

Certain analyses are subcontracted to outside NELAC certified laboratories, please see the Footnotes section of this report for NELAC certification numbers of laboratories used.

A Statement of Qualifiers is available upon request.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,


Poonam Kalkat for
Kacia Baldwin
kbaldwin@jupiterlabs.com

Enclosures

Report ID: 717987 - 276939
3/14/2007

Page 1 of 6

FDOH# E86546
CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



SAMPLE ANALYTE COUNT

LOG# 717987

Project ID: 3300 PBF-15 Parker Test

Lab ID	Sample ID	Method	Analytes Reported
717987001	PBF-15 GWB	EPA 160.1	1
717987001	PBF-15 GWB	EPA 200.8 (Total)	4
717987001	PBF-15 GWB	EPA 310.2	1
717987001	PBF-15 GWB	EPA 325.2	1
717987001	PBF-15 GWB	EPA 340.1	1
717987001	PBF-15 GWB	EPA 375.4	1
717987001	PBF-15 GWB	EPA 9060	1
717987001	PBF-15 GWB	EPA 6010B	2
717987001	PBF-15 GWB	SW-846 9056	1
717987002	PBF-15 GW001	EPA 160.1	1
717987002	PBF-15 GW001	EPA 200.8 (Total)	4
717987002	PBF-15 GW001	EPA 310.2	1
717987002	PBF-15 GW001	EPA 325.2	1
717987002	PBF-15 GW001	EPA 340.1	1
717987002	PBF-15 GW001	EPA 375.4	1
717987002	PBF-15 GW001	EPA 9060	1
717987002	PBF-15 GW001	EPA 6010B	2
717987002	PBF-15 GW001	SW-846 9056	1

FDOH# E86546
CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



SAMPLE SUMMARY

LOG# 717987

Project ID: 3300 PBF-15 Parker Test

Lab ID	Sample ID	Matrix	Date Collected	Date Received
717987001	PBF-15 GWB	Aqueous Liquid	2/23/2007 12:45	2/23/2007 16:00
717987002	PBF-15 GW001	Aqueous Liquid	2/23/2007 14:25	2/23/2007 16:00

FDOH# E86546
CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..





Jupiter

Environmental Laboratories, Inc.

Jupiter Environmental Laboratories, Inc.

150 S. Old Dixie Highway

Jupiter, FL 33458

Phone: (561)575-0030

Fax: (561)575-4118

ANALYTICAL RESULTS

LOG# 717987

Project ID: 3300 PBF-15 Parker Test

Lab ID: **717987001**

Date Received: 2/23/2007

Matrix: Aqueous Liquid

Sample ID: **PBF-15 GWB**

Date Collected: 2/23/2007

Parameters	Results	Units	Report Limit	MDL	DF Prepared	By	Analyzed	By	Qual	CAS
Analysis Desc: TDS by EPA 160.1 [REF] (W)		Analytical Method: EPA 160.1								
Total Dissolved Solids		U mg/L	1.0	0.33	1		03/01/07	ESC		
Analysis Desc: Bromide by EPA 9056 [REF] (W)		Analytical Method: SW-846 9056								
Bromide		U mg/L	1.0	0.098	1		02/27/07	ESC		24959-67-9
Analysis Desc: Silica 6010B Calc. [REF] (W)		Analytical Method: EPA 6010B								
Silica		U mg/L	0.43	0.20	1		03/01/07	ESC		7631-86-9
Analysis Desc: TOC by EPA 9060 [REF] (W)		Analytical Method: EPA 9060								
TOC	0.27	mg/L	1.0	0.18	1		02/28/07	ESC	I	
Analysis Desc: Chloride by EPA 325.2 (W)		Analytical Method: EPA 325.2								
Chloride		U mg/L	0.50		1		02/28/07	SS		16887-00-6
Analysis Desc: Sulfate by 375.4 (W)		Analytical Method: EPA 375.4								
Sulfate		U mg/L	1.0		1		02/28/07	SS	J4	14808-79-8
Analysis Desc: Fluoride by EPA 340.1 (W)		Analytical Method: EPA 340.1								
Fluoride		U mg/L	0.10		1		02/28/07	SS	J4	16984-48-8
Analysis Desc: Alkalinity, EPA 310.2 (W)		Analytical Method: EPA 310.2								
Alkalinity	5.2	mg/L	5.0		1		02/28/07	SS	J4	
Analysis Desc: EPA 200.8 Metals (W)		Analytical Method: EPA 200.8 (Total)								
Strontium		U mg/L	0.0040	0.0020	1	02/27/07	ZS	02/27/07	ZS	7440-24-6
Sodium (EPA 6010B)	0.32i	mg/L	0.50	0.16	1	02/28/07	ESC	03/09/07	ESC	7440-23-5
Magnesium	0.0031	mg/L	0.00082	0.00041	1	02/27/07	ZS	02/27/07	ZS	7439-95-4
Potassium		U mg/L	0.0068	0.0034	1	02/27/07	ZS	02/27/07	ZS	7440-09-7
Calcium		U mg/L	0.048	0.024	1	02/27/07	ZS	02/27/07	ZS	7440-70-2

Report ID: 717987 - 276939
3/14/2007

Page 4 of 6

FDOH# E86546

CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc.





ANALYTICAL RESULTS

LOG# 717987
Project ID: 3300 PBF-15 Parker Test

Lab ID: **717987002**
Sample ID: **PBF-15 GW001**

Date Received: 2/23/2007 Matrix: Aqueous Liquid
Date Collected: 2/23/2007

Parameters	Results	Units	Report Limit	MDL	DF Prepared	By	Analyzed	By	Qual	CAS
Analysis Desc: TDS by EPA 160.1 [REF] (W)		Analytical Method: EPA 160.1								
Total Dissolved Solids	15000	mg/L	1.0	0.33	1		03/01/07	ESC		
Analysis Desc: Bromide by EPA 9056 [REF] (W)		Analytical Method: SW-846 9056								
Bromide	30	mg/L	10	0.98	10		03/01/07	ESC		24959-67-9
Analysis Desc: Silica 6010B Calc. [REF] (W)		Analytical Method: EPA 6010B								
Silica	11	mg/L	0.43	0.20	1		03/01/07	ESC		7631-86-9
Analysis Desc: TOC by EPA 9060 [REF] (W)		Analytical Method: EPA 9060								
TOC	2.0	mg/L	1.0	0.18	1		02/28/07	ESC		
Analysis Desc: Chloride by EPA 325.2 (W)		Analytical Method: EPA 325.2								
Chloride	7300	mg/L	500		1000		02/28/07	SS		16887-00-6
Analysis Desc: Sulfate by 375.4 (W)		Analytical Method: EPA 375.4								
Sulfate	960	mg/L	100		100		02/28/07	SS	J4	14808-79-8
Analysis Desc: Fluoride by EPA 340.1 (W)		Analytical Method: EPA 340.1								
Fluoride	3.0	mg/L	0.50		5		02/28/07	SS	J4	16984-48-8
Analysis Desc: Alkalinity, EPA 310.2 (W)		Analytical Method: EPA 310.2								
Alkalinity	73	mg/L	5.0		1		02/28/07	SS	J4	
Analysis Desc: EPA 200.8 Metals (W)		Analytical Method: EPA 200.8 (Total)								
Strontium	7.0	mg/L	0.0040	0.0020	1	02/27/07	ZS	02/27/07	ZS	7440-24-6
Sodium (EPA 6010B)	4300	mg/L	5.0	1.6	10	02/28/07	ESC	03/09/07	ESC	7440-23-5
Magnesium	80	mg/L	0.00082	0.00041	1	02/27/07	ZS	02/27/07	ZS	7439-95-4
Potassium	18	mg/L	0.0068	0.0034	1	02/27/07	ZS	02/27/07	ZS	7440-09-7
Calcium	210	mg/L	0.048	0.024	1	02/27/07	ZS	02/27/07	ZS	7440-70-2

FDOH# E86546 CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



ANALYTICAL RESULTS QUALIFIERS

LOG# 717987
Project ID: 3300 PBF-15 Parker Test

PARAMETER QUALIFIERS

- I Estimated value below the lowest calibration point. Confidence correlates with concentration.
- J4 MS/MSD recovery exceeded control limits due to matrix interference. LCS/LCSD recovery was within acceptable range.
-

PROJECT COMMENTS

717987 Report Limit = PQL
"i" Flag indicates that the reported value is between the laboratory method detection limit and the practical quantitation limit.

SUBCONTRACTOR NELAC CERTIFICATION ID

717987 ESC = E87487

FDOH# E86546 CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



Chain of Custody Record

LAB USE ONLY

J.E.L. Log # 717987

BAR CODE

P.O. #

Jupiter Environmental Laboratories

Quote#

Company Name <u>Tetra Tech ECL</u>		LAB ANALYSIS										Date		Time	
Address <u>759 S. Federal Hwy - Suite 100</u>												2/23/07		1600	
City <u>Stuart</u> State <u>FL</u> Zip <u>34994</u>															
Sampling Site Address <u>PBF-15 Packer Test</u>															
Attn: <u>Randy Keyser</u> Fax/Email <u>772-781-3411</u>															
Project Name <u>PBF-15 Packer Test</u> Project # <u>3300</u>															
Sampler Name/Signature <u>Lacy Salomone</u>															
#	Sample Label (Client ID)	Collected Date	Collected Time	Matrix Code*	# of Cont	Parameters	Alkalinity, Chloride Sulfate, Fluoride	TDS	TOC	Bromide	Calcium, Potassium, Magnesium Sodium, Strontium	SiO ₂ - Silica	Field Filtered (Y/N)	Integrity OK (Y/N)	Comments
1	PBF-15-GWB	2-23-07	1245	GW	6		X	X	X	X	X	X			Questions - Call
2	PBF-15-GW001	2-23-07	1425	GW	6		X	X	X	X	X	X			Randy Keyser
3															772-781-3401
4															
5															
6															
7															
8															
9															
0															
Matrix Codes*		Pres Codes**		Relinquished by		Date		Time		Received by		Date		Time	
S Soil/Solid Sediment SW Surface Water GW Ground Water SL Sludge WW Waste Water O Other (Please Specify) DW Drinking Water		A- none B- HNO ₃ C- H ₂ SO ₄ D- NaOH E- HCl		Ice O- Other M- MeOH		2/23/07		1600		Randy Keyser		2/23/07		1600	
QA/QC level with report															
None 1 2 3 See price guide for applicable fees															
T.A.T. Request FDEP Temp Control: 3 °C															
Standard SFWMD X Date Required															
Rush Date Required															

March 14, 2007

Randy Keyser
Tetra-Tech EC, Inc.
759 S. Federal Hwy
Ste. 100
Stuart, FL 34994

RE: LOG# 717995
Project ID: 3300 PBF-15 Packer Test
COC# 29392

Dear Randy Keyser:

Enclosed are the analytical results for sample(s) received by the laboratory on Tuesday, February 27, 2007. Results reported herein conform to the most current NELAC standards, where applicable, unless indicated by * in the body of the report.

The enclosed Chain of Custody is a component of this package and should be retained with the package and incorporated therein.

Results for all solid matrices are reported in dry weight unless otherwise noted. Results for all liquid matrices are reported as received in the laboratory unless otherwise noted.

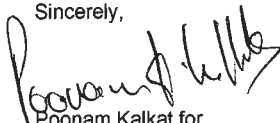
Samples are disposed of after 30 days of their receipt by the laboratory unless archiving is requested in writing. The laboratory maintains the right to charge storage fees for archived samples.

Certain analyses are subcontracted to outside NELAC certified laboratories, please see the Footnotes section of this report for NELAC certification numbers of laboratories used.

A Statement of Qualifiers is available upon request.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Poonam Kalkat for
Kacia Baldwin
kbaldwin@jupiterlabs.com

Enclosures

Report ID: 717995 - 276933
3/14/2007

Page 1 of 5

FDOH# E86546
CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



SAMPLE ANALYTE COUNT

LOG# 717995

Project ID: 3300 PBF-15 Packer Test

Lab ID	Sample ID	Method	Analytes Reported
717995002	PBF-15-GW002	EPA 160.1	1
717995002	PBF-15-GW002	EPA 200.8 (Total)	4
717995002	PBF-15-GW002	EPA 310.2	1
717995002	PBF-15-GW002	EPA 325.2	1
717995002	PBF-15-GW002	EPA 340.1	1
717995002	PBF-15-GW002	EPA 375.4	1
717995002	PBF-15-GW002	EPA 9060	1
717995002	PBF-15-GW002	EPA 6010B	2
717995002	PBF-15-GW002	SW-846 9056	1

FDOH# E86546
CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



SAMPLE SUMMARY

LOG# 717995

Project ID: 3300 PBF-15 Packer Test

Lab ID	Sample ID	Matrix	Date Collected	Date Received
717995001	No Sample	Aqueous Liquid		2/27/2007 09:10
717995002	PBF-15-GW002	Aqueous Liquid	2/26/2007 18:10	2/27/2007 09:10

FDOH# E86546
CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



ANALYTICAL RESULTS

LOG# 717995

Project ID: 3300 PBF-15 Packer Test

Lab ID: **717995002**
Sample ID: **PBF-15-GW002**

Date Received: 2/27/2007 Matrix: Aqueous Liquid
Date Collected: 2/26/2007

Parameters	Results	Units	Report Limit	MDL	DF Prepared	By	Analyzed	By	Qual	CAS
Analysis Desc: TDS by EPA 160.1 [REF] (W)		Analytical Method: EPA 160.1								
Total Dissolved Solids	13000	mg/L	1.0	0.33	1		03/02/07	ESC		
Analysis Desc: Bromide by EPA 9056 [REF] (W)		Analytical Method: SW-846 9056								
Bromide	24	mg/L	1.0	0.098	1		02/28/07	ESC		24959-67-9
Analysis Desc: Silica 6010B Calc. [REF] (W)		Analytical Method: EPA 6010B								
Silica	9.80	mg/L	0.430	0.20	1		03/02/07	ESC		7631-86-9
Analysis Desc: TOC by EPA 9060 [REF] (W)		Analytical Method: EPA 9060								
TOC	3.5	mg/L	1.0	0.18	1		03/05/07	ESC		
Analysis Desc: Chloride by EPA 325.2 (W)		Analytical Method: EPA 325.2								
Chloride	6300	mg/L	500		1000		03/01/07	SS	J4	16887-00-6
Analysis Desc: Sulfate by 375.4 (W)		Analytical Method: EPA 375.4								
Sulfate	880	mg/L	100		100		02/28/07	SS	J4	14808-79-8
Analysis Desc: Fluoride by EPA 340.1 (W)		Analytical Method: EPA 340.1								
Fluoride	3.0	mg/L	0.50		5		02/28/07	SS	J4	16984-48-8
Analysis Desc: Alkalinity, EPA 310.2 (W)		Analytical Method: EPA 310.2								
Alkalinity	75	mg/L	5.0		1		02/28/07	SS	J4	
Analysis Desc: EPA 200.8 Metals (W)		Analytical Method: EPA 200.8 (Total)								
Strontium	7.6	mg/L	0.0040	0.0020	1	02/27/07	ZS	02/27/07	ZS	7440-24-6
Sodium (EPA 6010B)	4100	mg/L	2.5	0.81	5	03/01/07	ESC	03/08/07	ESC	7440-23-5
Magnesium	86	mg/L	0.00082	0.00041	1	02/27/07	ZS	02/27/07	ZS	7439-95-4
Potassium	18	mg/L	0.0068	0.0034	1	02/27/07	ZS	02/27/07	ZS	7440-09-7
Calcium	220	mg/L	0.048	0.024	1	02/27/07	ZS	02/27/07	ZS	7440-70-2

Report ID: 717995 - 276933
3/14/2007

Page 4 of 5

FDOH# E86546 CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



ANALYTICAL RESULTS QUALIFIERS

LOG# 717995

Project ID: 3300 PBF-15 Packer Test

PARAMETER QUALIFIERS

- J4 MS/MSD recovery exceeded control limits due to matrix interference. LCS/LCSD recovery was within acceptable range.
- V Indicates that the analyte was detected in both the sample and the associated method blank.

PROJECT COMMENTS

717995 Report Limit = PQL

SUBCONTRACTOR NELAC CERTIFICATION ID

717995 ESC = E87487

FDOH# E86546 CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..





Jupiter

Environmental Laboratories, Inc.

Jupiter Environmental Laboratories, Inc.

150 S. Old Dixie Highway

Jupiter, FL 33458

Phone: (561)575-0030

Fax: (561)575-4118

www.jupiterlabs.com

clientservices@jupiterlabs.com

March 14, 2007

Randy Keyser
Tetra-Tech EC, Inc.
759 S. Federal Hwy
Ste. 100
Stuart, FL 34994

RE: LOG# 718014
Project ID: 3300 PBF-15 Parker Test
COC# 29785

Dear Randy Keyser:

Enclosed are the analytical results for sample(s) received by the laboratory on Wednesday, February 28, 2007. Results reported herein conform to the most current NELAC standards, where applicable, unless indicated by * in the body of the report.

The enclosed Chain of Custody is a component of this package and should be retained with the package and incorporated therein.

Results for all solid matrices are reported in dry weight unless otherwise noted. Results for all liquid matrices are reported as received in the laboratory unless otherwise noted.

Samples are disposed of after 30 days of their receipt by the laboratory unless archiving is requested in writing. The laboratory maintains the right to charge storage fees for archived samples.

Certain analyses are subcontracted to outside NELAC certified laboratories, please see the Footnotes section of this report for NELAC certification numbers of laboratories used.

A Statement of Qualifiers is available upon request.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Poonam Kalkat for

Kacia Baldwin

kbaldwin@jupiterlabs.com

Enclosures

Report ID: 718014 - 276916
3/14/2007

Page 1 of 5

FDOH# E86546
CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



SAMPLE ANALYTE COUNT

LOG# 718014

Project ID: 3300 PBF-15 Parker Test

Lab ID	Sample ID	Method	Analytes Reported
718014001	PBF-15-GW003	EPA 160.1	1
718014001	PBF-15-GW003	EPA 200.8 (Total)	4
718014001	PBF-15-GW003	EPA 310.2	1
718014001	PBF-15-GW003	EPA 325.2	1
718014001	PBF-15-GW003	EPA 340.1	1
718014001	PBF-15-GW003	EPA 375.4	1
718014001	PBF-15-GW003	EPA 9060	1
718014001	PBF-15-GW003	EPA 6010B	2
718014001	PBF-15-GW003	SW-846 9056	1

FDOH# E86546
CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



SAMPLE SUMMARY

LOG# 718014

Project ID: 3300 PBF-15 Parker Test

Lab ID	Sample ID	Matrix	Date Collected	Date Received
718014001	PBF-15-GW003	Aqueous Liquid	2/27/2007 17:45	2/28/2007 09:40

FDOH# E86546
CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



ANALYTICAL RESULTS

LOG# 718014

Project ID: 3300 PBF-15 Parker Test

Lab ID: **718014001**
Sample ID: **PBF-15-GW003**

Date Received: 2/28/2007 Matrix: Aqueous Liquid
Date Collected: 2/27/2007

Parameters	Results	Units	Report Limit	MDL	DF Prepared	By	Analyzed	By	Qual	CAS
Analysis Desc: TDS by EPA 160.1 [REF] (W) Analytical Method: EPA 160.1										
Total Dissolved Solids	12000	mg/L	1.0	0.33	1		03/05/07	ESC		
Analysis Desc: Bromide by EPA 9056 [REF] (W) Analytical Method: SW-846 9056										
Bromide	23	mg/L	10	0.98	10		03/02/07	ESC		24959-67-9
Analysis Desc: Silica 6010B Calc. [REF] (W) Analytical Method: EPA 6010B										
Silica	9.60	mg/L	0.43	0.20	1		03/02/07	ESC		7631-86-9
Analysis Desc: TOC by EPA 9060 [REF] (W) Analytical Method: EPA 9060										
TOC	2.2	mg/L	1.0	0.18	1		03/07/07	ESC		
Analysis Desc: Chloride by EPA 325.2 (W) Analytical Method: EPA 325.2										
Chloride	6000	mg/L	500		1000		03/06/07	SS	J4	16887-00-6
Analysis Desc: Sulfate by 375.4 (W) Analytical Method: EPA 375.4										
Sulfate	850	mg/L	100		100		03/06/07	SS		14808-79-8
Analysis Desc: Fluoride by EPA 340.1 (W) Analytical Method: EPA 340.1										
Fluoride	2.8	mg/L	0.50		5		03/06/07	SS	J4	16984-48-8
Analysis Desc: Alkalinity, EPA 310.2 (W) Analytical Method: EPA 310.2										
Alkalinity	77	mg/L	5.0		1		03/07/07	SS		
Analysis Desc: EPA 200.8 Metals (W) Analytical Method: EPA 200.8 (Total)										
Strontium	6.7	mg/L	0.0040	0.0020	1	03/01/07	ZS	03/01/07	ZS	7440-24-6
Sodium (EPA 6010B)	3800	mg/L	2.5	0.81	5	03/01/07	ESC	03/08/07	ESC	7440-23-5
Magnesium	60	mg/L	0.00082	0.00041	1	03/01/07	ZS	03/01/07	ZS	7439-95-4
Potassium	20	mg/L	0.0068	0.0034	1	03/01/07	ZS	03/01/07	ZS	7440-09-7
Calcium	170	mg/L	0.048	0.024	1	03/01/07	ZS	03/01/07	ZS	7440-70-2

FDOH# E86546 CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



ANALYTICAL RESULTS QUALIFIERS

LOG# 718014

Project ID: 3300 PBF-15 Parker Test

PARAMETER QUALIFIERS

J4 MS/MSD recovery exceeded control limits due to matrix interference. LCS/LCSD recovery was within acceptable range.

V Indicates that the analyte was detected in both the sample and the associated method blank.

PROJECT COMMENTS

718014 Report Limit = PQL

SUBCONTRACTOR NELAC CERTIFICATION

ID

718014 ESC = E87487

FDOH# E86546

CERTIFICATE OF ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Jupiter Environmental Laboratories, Inc..



Chain of Custody Record

Jupiter Environmental Laboratories

LAB ANALYSIS										Parameters		Relinquished by		Pres Codes **		Matrix Codes *		QA/QC level with report							
Company Name	Address	City	State	Zip	Sampling Site Address	Attn:	Project Name	Project #	Sampler Name/Signature	#	Sample Label (Client ID)	Collected Date	Collected Time	Matrix Code*	# of Cont	I	I	H	I	N	N	Field Filtered (Y/N)	Integrity OK (Y/N)	Comments	
Tetra Tech FC1	799 S. Federal Hwy. Suite 100	Stuart	FL	34994	PBF-15, Packer Test, Palm Beach FL	Randy Keyser	PBF-15 Packer Test	3305	Lacy Salomon	1	PBF-15-GW003	2-27-07	1745	GW	6		X	X	X	X					
										2															
										3															
										4															
										5															
										6															
										7															
										8															
										9															
										0															

Company Name: Tetra Tech FC1

Address: 799 S. Federal Hwy. Suite 100

City: Stuart State: FL Zip: 34994

Sampling Site Address: PBF-15, Packer Test, Palm Beach FL

Attn: Randy Keyser FaxEmail: 772-781-3411

Project Name: PBF-15 Packer Test Project #: 3305

Sampler Name/Signature: Lacy Salomon

Matrix Codes: A- none, B- HNO3, C- H2SO4, D- NaOH, E- HCl, I- Ice, O- Other, M- MeOH

QA/QC level with report: None 1 2 3 See price guide for applicable fees

T.A.T. Request: FDEP Standard SFWD X Date Required: Rush

Temp Control: 4 °C

Jupiter Environmental Laboratories, Inc.

450 Old Dixie Highway, Suite 204, Jupiter, FL 33458

00705

D

Long-term Water Level Monitoring

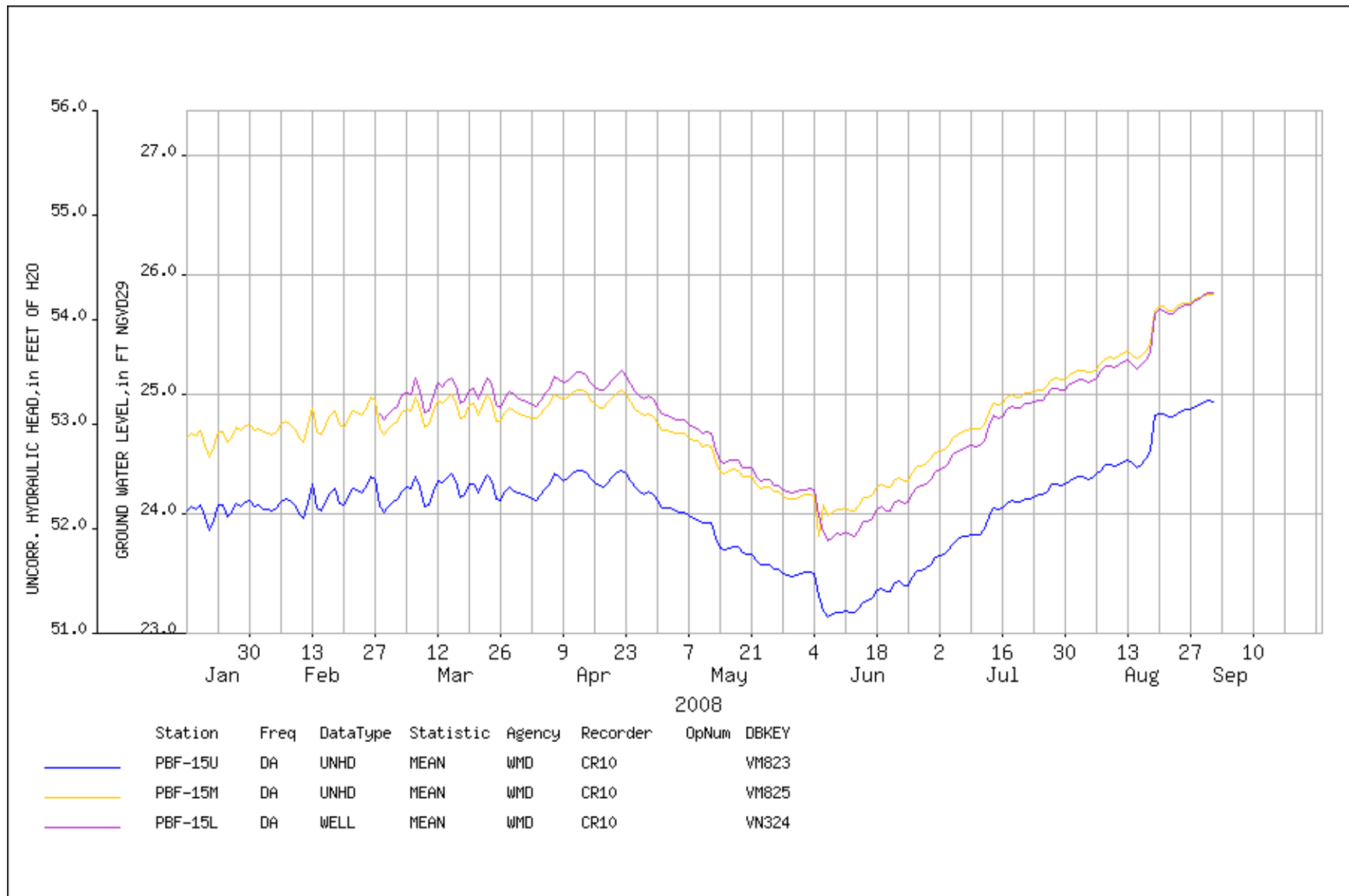


Figure D-1. Long-term water level monitoring.



sfwmd.gov

South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406
561-686-8800 • FL WATS 1-800-432-2045
www.sfwmd.gov

MAILING ADDRESS: P.O. Box 24680
West Palm Beach, FL 33416-4680