Engineering/Well Completion Report
Floridan Aquifer System
Test/Monitor Well ORF-60

Reedy Creek Improvement District
Orange County, Florida
Technical Publication WS-20

The Reedy Creek Improvement District

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SOUTH FLORIDA WATER MANAGEMENT DISTRICT
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EXECUTIVE SUMMARY

The Kissimmee Basin Water Supply Plan (KBWSP) completed in 2000 was the first look at the long-term water use conditions for areas in the South Florida Water Management District (SFWMD) located north of Lake Okeechobee. The findings of the KBWSP suggest that the ground water supplies in Orange County area may not be sufficient to meet the 2020 (1-in-10 drought year) water supply needs. The continued use of the upper Floridan aquifer system (FAS) may affect wetlands, reduce spring flow, and possibly be a factor in the formation of sinkholes in this area. These conclusions are however, predicated on a limited amount of geologic and hydrologic information in this region. In particular, information regarding the lower Floridan aquifer (LFA) in this area is very limited. The highest ranked recommendation of the KBWSP was to gather additional hydrogeologic information on the FAS to better resolve the uncertainty of future water use affects. Towards that end, three FAS exploratory sites were completed in the Kissimmee Basin Planning Area (KBPA) between 1999 and 2003. This report summarizes results from one of those sites located at the Reedy Creek Improvement District (RCID). This well will supply information needed to characterize the water supply potential of the LFA and for use in the development of a ground water flow model, which will support future planning and regulatory decisions.

The FAS test site described in this report is located in southwest Orange County on Reedy Creek Improvement District property (**Figure 1**). The test/monitor well is located in the southeast quadrant of Section 23 of Township 24 South, Range 27 East. The geographic coordinates of the RCID test/monitor well are 28° 22’43.7” N latitude and 81° 35’ 15.9” W longitude (North American Datum of 1983 – NAD, 1983). Land surface was surveyed at 131 feet relative to the National Geodetic Vertical Datum of 1929 (NGVD, 1929). The RCID site was selected to augment existing hydrogeologic data and to provide broad, spatial coverage within the KBPA.

The scope of the investigation consisted of constructing and testing a 10-inch diameter test/monitor well in accordance with Florida Department of Environmental Protection (FDEP) Class V, Group 8 well standards. The well identified as ORF-60 was drilled to a total depth of 2,100 feet below land surface (bls). The Contractor constructed a telescoping type well in various stages, completing it into a distinct hydrogeologic zone within the LFA from 1,170 to 1,280 feet bls.

The Contractor, Diversified Drilling Corporation (DDC) based in Tampa, Florida was responsible for all drilling, well construction, and testing services at the RCID site. The cost of this project ($375,000) was mutually shared by RCID, SFWMD, and Orange County Utilities. SFWMD provided oversight during all well drilling, construction, and testing operations.

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

- The top of the FAS as defined by the Southeastern Geological Society AdHoc Committee on Florida Hydrostratigraphic Unit Definition (1986) was identified at a depth of approximately 80 feet bls.

- A 10-inch inner diameter exploratory well was successfully constructed and tested at the RCID site in accordance with FDEP Class V, Group 8, well standards.
- Lithologic and geophysical logs, and specific capacity test results indicate moderate production capacity in Zone A of the UFA (80 to 250 feet bls) and excellent production capacity in Zone B of the UFA (300 to 740 feet bls). The interval from 220 to 715 feet bls yielded a specific capacity value of 235 gallons per minute per foot (gpm/ft) of drawdown at a pumping rate of 2,610 gpm with a calculated transmissivity of 470,000 gallons per day per foot (gpd/ft).
- Water quality data from 220 to 715 feet bls indicate that chloride and total dissolved solids (TDS) in the upper Floridan aquifer waters meet potable drinking water standards with chloride and TDS concentrations of 5 and 134 milligrams per liter (mg/L), respectively.
- Lithologic information and geophysical logs obtained from ORF-60 indicates that low porosity/permeability, poorly indurated grainstones and moderately to well indurated, wackestones and crystalline dolostones occur from 740 to 1,160 feet bls. These low permeable sediments act as a confining unit that effectively isolates the UFA from the LFA.
- Lithologic and geophysical logs and the specific capacity test results indicate very good production capacity of the LFA "Zone A" from 1,170 to 1,280 feet bls. This zone yielded a specific capacity value of 68 gpm/ft of drawdown at a pumping rate of 1,152 gpm with a calculated transmissivity of 232,000 gpd/ft.
- Composite water quality sampling of ORF-60 (1,170 to 1,280 feet bls) indicates that chloride and TDS meet all primary and secondary potable drinking water standards with chloride and TDS concentrations of 8 and 160 mg/L, respectively.
- Lithologic and production-type log data (e.g. flow, temperature logs) indicates very good production from flow zones from 1,170 to 1,195 feet bls and 1,215 to 1,270 feet bls. Below 1,270 feet bls, the productive capacity is limited (as indicated by the fluid-type logs) suggesting lower permeable – semi-confining units near the base of the monitor zone.
- Lithologic data, geophysical logs, and packer test results indicate good production capacity of the LFA in Zone B from 1,860 to 1,970 feet bls. This zone yielded a specific capacity value of 116 gpm/ft of drawdown with chloride and TDS concentrations of 7 and 148 mg/L, respectively.
- The base of the Underground Source of Drinking Water (USDW), those waters having TDS concentrations less than 10,000 mg/L, was not encountered at the total depth of 2,100 feet bls.
- Based on laboratory results produced water from the LFA at this site meet all primary and secondary drinking water standards.

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INTRODUCTION

Background

The Kissimmee Basin Water Supply Plan (KBWSP) completed in 2000 was the first look at the long-term water use conditions for areas in the South Florida Water Management District (SFWMD) located north of Lake Okeechobee. The findings of the KBWSP suggest that the ground water supplies in the Orange County area may not be sufficient to meet the 2020 (1-in-10 drought year) water supply needs. The continued use of the Floridan aquifer system (FAS) may affect wetlands, reduce spring flow, and possibly be a factor in the formation of sinkholes in this area. However, these conclusions are predicated on a limited amount of geologic and hydrologic information in this region. In particular, information regarding the lower Floridan aquifer (LFA) is very limited in this area. The highest ranked recommendation of the KBWSP was to gather additional hydrogeologic information on the lower portion of FAS to better resolve the uncertainty of future water use affects. Towards that end, three FAS exploratory sites were completed in the Kissimmee Basin Planning Area (KBPA) between 1999 and 2003. This report summarizes results from one of those sites located at the Reedy Creek Improvement District (RCID).

The RCID, Orange County Utilities, and SFWMD have a mutual interest concerning the aquifer characteristics and water quality of the LFA in southwest Orange County. The primary objective of this study was to construct and test a single-zone LFA test/monitor well on RCID property that will provide additional hydrogeologic information on the lower portion of FAS in support of the KBWSP. Data collected from testing and long-term monitoring will be instrumental in the development of revising the ground water modeling efforts and other consumptive use analyses. The RCID site is presently part of SFWMD's long-term water level and water quality FAS monitoring network.

The LFA test site described in this report is located in southern Orange County within the RCID (**Figure 1**). The LFA test/monitor well is located in the southeast quadrant of Section 23 of Township 24 South, Range 27 East. The geographic coordinates of the RCID test/monitor well are 28° 22'43.7" N latitude and 81° 35' 15.9" W longitude (North American Datum of 1983 – NAD, 1983). A land surface elevation of 131 feet relative to the National Geodetic Vertical Datum of 1929 (NGVD, 1929) was determined from a U.S. Geological Survey 7.5 minute topographic map.

Project Description

Site preparation and equipment mobilization at the project site began on March 1, 2003. A single zone well was constructed to facilitate long-term monitoring of the LFA (identified as ORF-60). This test/monitor well was drilled to a total depth of 2,100 feet below land surface (bls) and completed between 1,170 and 1,280 feet bls. During construction and testing operations, weekly informational summary reports were submitted to the Underground Injection Control Group at the Florida Department of Environmental Protection (FDEP) in Orlando, Florida. These weekly summary reports are provided in **Appendix A.**

The contractor, Diversified Drilling Corporation (DDC) based in Tampa, Florida was responsible for all drilling, well construction, and testing services at the RCID site. This project

was completed on July 10, 2003 (on schedule) at the budgeted amount of $375,000. SFWMD provided oversight during all well drilling, construction, and testing operations.

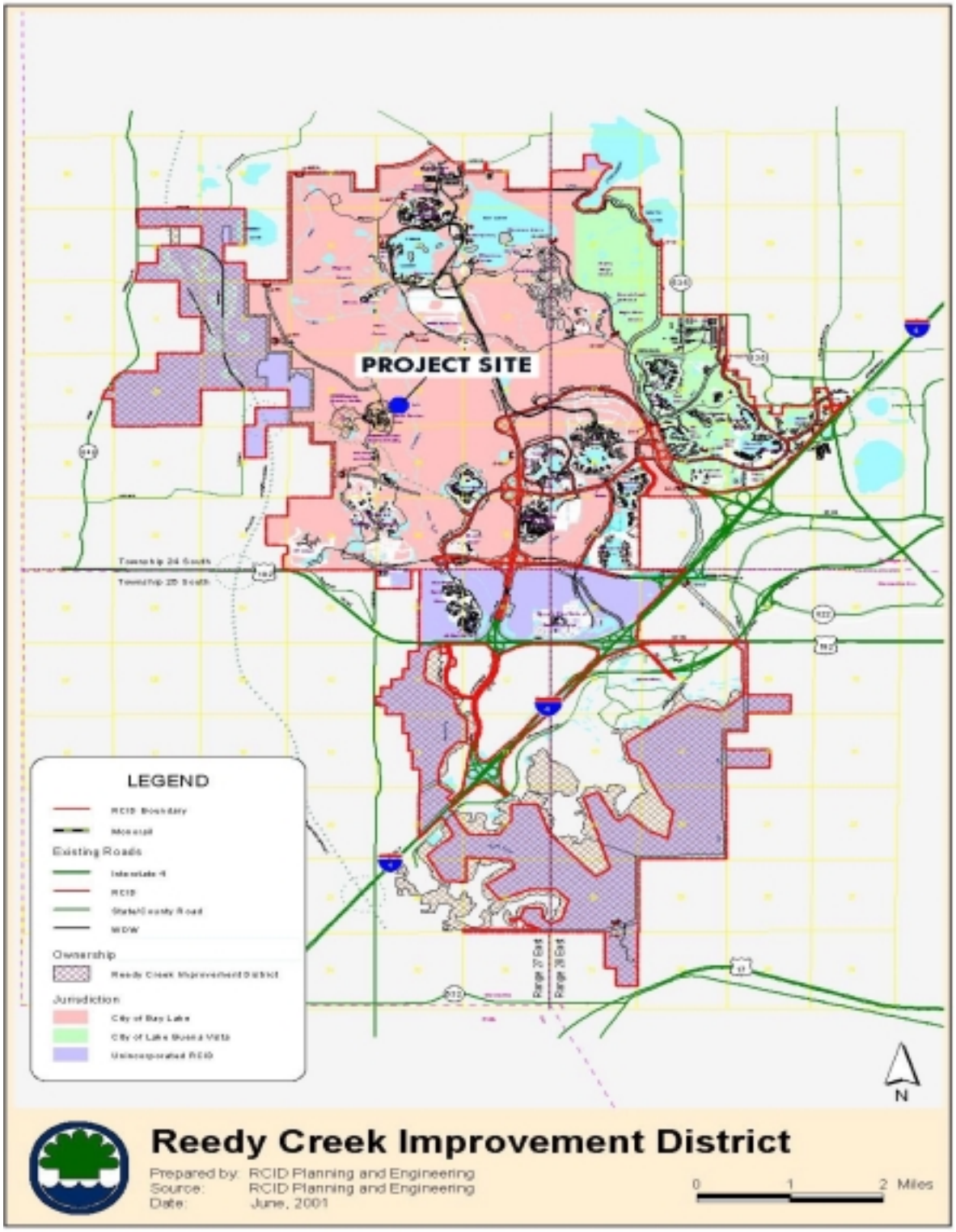

Figure 1. Project Location Map.

EXPLORATORY DRILLING AND WELL CONSTRUCTION

Lower Floridan Aquifer Test/Monitor Well – ORF-60

On March 1, 2003, DDC delivered drilling and support equipment to begin site preparation for drilling and construction of a LFA test/monitor well (referred to as ORF-60). DDC cleared and rough graded the site and then constructed a 2-foot thick drilling pad using crushed limestone. The drilling pad served to reduce impacts to adjacent areas during normal drilling, testing, and construction activities.

Mud rotary and reverse-air techniques were used during drilling operations. Closed-circulation mud rotary drilling was used to advance a nominal 10-inch diameter pilot hole from land surface to 250 feet bls. DDC employed the reverse-air, open circulation method to drill the pilot hole from 250 to 2,100 feet bls due to a highly permeable, fractured/cavernous dolostone/limestone sequence encountered below 250 feet bls, which prohibited continued mud circulation.

SFWMD used formation samples (well cuttings), packer and specific capacity test results, and geophysical logs to determine the actual casing setting depths. Once identified, DDC reamed the pilot hole to a specified diameter and depth for the selected casing setting. Three concentric carbon steel casings (24-, 18-, and 10-inch diameter) were used in the construction of the LFA test/monitor well.

On March 11, 2003, DDC drilled the pilot hole to a depth of 103 feet bls using a 12.25-inch diameter bit via the mud rotary method. They then reamed (over-drilled) the 12.25-inch diameter pilot hole using a nominal 29-inch diameter staged bit reamer to a depth of 103 feet bls. Both the pilot hole and reamed borehole were completed on March 12, 2003. DDC then installed 24-inch diameter pit casing (0.5-inch wall thickness) from land surface to 90 feet bls and pressure grouted it back to land surface using 290 cubic feet (ft^3) of ASTM Type II neat cement. The manufacturer's mill certificates for the 24-inch diameter steel casing are provided in **Appendix B.**

Once installed, DDC continued pilot hole drilling operations (using a 9.875-inch diameter bit) to 250 feet bls via the mud rotary method. The nominal 10-inch diameter pilot hole was re-circulated and conditioned before being geophysically logged from 90 to 250 feet bls. A composite of the geophysical log traces and field prints from Geophysical Log Run No. 1 are provided in **Appendix C-1**.

On March 20, 2003, DDC reamed the nominal 10-inch diameter pilot hole to a depth of 226 feet bls using a nominal 22-inch diameter staged bit reamer. Once completed, the reaming tool was tripped to the bottom of the borehole and conditioned before being geophysically logged using a 4-arm caliper and natural gamma ray sonde. A composite of the geophysical log traces and field prints from Geophysical Log Run No. 2 are provided in **Appendix C-2**. DDC then installed an 18-inch diameter (0.375-inch wall thickness) steel casing from land surface to 220 feet bls. Once installed, the surface casing was grouted to land surface using 536 ft^3 of ASTM Type II neat cement.

Once the surface casing was installed, DDC switched to the reverse-air method to continue the nominal 10-inch diameter pilot hole through carbonate rock of the Eocene-aged, Avon Park Formation to a depth of 715 feet bls. On April 1, 2003, SFWMD conducted a step drawdown test on the open-hole section from 220 to 715 feet bls (see *"Hydrogeologic Testing"* section for results). Upon successful completion of the step drawdown test, DDC continued to drill the nominal 10-inch diameter pilot hole via the reverse-air to a depth of 998 feet bls. MV Geophysical Services then conducted formation evaluation and production borehole logging operations in the open hole section from 220 to 998 feet bls. A composite of the geophysical log traces and field prints from Geophysical Log Run No. 3 are provided in **Appendix C-3.**

On April 9, 2003, DDC completed drilling of the 10-inch diameter pilot hole to the target depth of 1,350 feet bls and began to reverse-air develop the open-hole section for subsequent geophysical logging operations. On April 11, 2003, MV Geophysical Services conducted formation evaluation and production borehole logging operations from 220 to 1,350 feet bls. A composite of the geophysical log traces and field prints from Geophysical Log Run No. 4 are provided in **Appendix C-4.**

Review and analysis of lithologic and geophysical log data from the pilot hole to a depth of 1,350 feet bls indicates that the top of the LFA (Zone A) occurs at a depth of approximately 1,160 feet bls, at the contact between low permeable carbonates and moderately to highly permeable dolostones. The reasons for setting the final 10-inch diameter steel casing at the site to a depth of 1,170 feet bls were to:

- Seal off the permeable section of the upper Floridan and eliminate the downward flow component within the borehole due to lower hydraulic heads present in the LFA below 1,160 feet bls;
- Facilitate reverse-air drilling operations through underlying permeable horizons of the FAS to 2,100 feet bls;
- Locate the casing in a competent rock unit to reduce under-mining (erosion) at its base because of induced (pumped) high velocity upward flow and establish the upper limits of the long-term LFA monitor interval; and
- Evaluate flow characteristics of the lower portion of the FAS within the open-hole interval of 1,170 to 2,100 feet bls.

On April 22, 2003, MV Geophysical logged the nominal 18-inch diameter borehole (Geophysical Log Run No. 5 provided in **Appendix C-5**). Upon completion, DDC began to install the 10-inch diameter steel production casing (ASTM A53, Grade B, 0.365-inch wall thickness) to a depth of 1,170 feet bls. A casing tally of the 10-inch diameter steel casing is provided in **Appendix B, Table 1.** DDC then successfully grouted the annulus to land surface in multiple stages using a combination of ASTM Type II neat cement and bentonite-cement slurry. Pumped volumes, slurry type, and resulting cement levels as measured by a temperature log and physical hard tag after each cement stage are summarized below in **Table 1**.

Stage No.	Pumped Volume (barrels)	Slurry Type	Temperature Taken at ft bls	Hard Tag ft bls
1	76	Neat cement	975	982
2	90	8% bentonite-clement	855	850
3	116	12% bentonite-cement	784	785
4	137	12% bentonite-cement	576	570
5	137	12% bentonite-cement	372	375
6a	81	12% bentonite-cement		
6b	62	Neat-cement	316	320
7	63	Neat-cement	308	310
8	63	Neat-cement	310	306
9	63	Neat-cement	300	301
10	63	Neat-cement	270	275
11	63	Neat-cement	150	150
12	33	Neat-cement		Land surface

Table 1. Cement Volumes Pumped During Well Construction.

The temperature logs were recorded up to eight hours after the multiple cement stages were pumped in the annular space. A composite of temperature log traces and field copies from the multiple temperature logs are provided in Geophysical Log Run No. 6, **Appendix C-6**.

As part of casing integrity verification, a pressure test on the 10-inch diameter production casing was successfully completed on May 12, 2003. The wellhead was sealed at the surface with a temporary header to facilitate the test. Next, the well was filled with water and pressurized to approximately 100-pounds per square inch (psi) with a high-pressure water pump. During the course of the 60-minute pressure test, the total pressure within the 10-inch diameter casing decreased 2 psi, representing a 2% decline - well within the FDEP Underground Injection Control test tolerance limit of ± 5%. **Table 2** summarizes the internal casing pressure readings taken during the course of the 60-minute test.

Elapsed Time (minutes)	Pressure Reading (psi)	Pressure Change (% psi)
0	100.0	-
5	100.0	0.0
10	100.0	0.0
15	100.0	0.0
20	99.5	-0.5
25	99.5	0.0
30	99.0	-0.5
35	99.0	0.0
40	99.0	0.0
45	98.5	-0.5
50	98.5	0.0
55	98.5	0.0
60	98.0	-0.5

Table 2. Internal Casing Pressure Test Results – 10-inch Diameter Steel Production Casing.

In addition, a cement bond log (CBL) was conducted to evaluate the bond quality between the annular cement, the 10-inch diameter production casing string, and the rock formations. The

recorded wave-amplitude curve from the CBL infers that the entire length of the 10-inch diameter steel casing is well supported by the annular cement with good contact with the steel casing and rock formations and no discernable voids within the annular space. The original CBL field print is provided in **Appendix C-6.**

Upon successful completion of the casing pressure test and CBL, DDC continued to drill a nominal 8-inch diameter pilot-hole via reverse-air rotary method from 1,350 feet bls to a total depth of 2,100 feet bls. DDC then developed the open-hole section via reverse-air and prepared it for subsequent geophysical logging operations. On June 13, 2003, MV Geophysical Services conducted formation evaluation and production borehole logging operations in the open-hole section from 1,170 to 2,100 feet bls. A composite of the geophysical log traces and field prints from Geophysical Log Run No. 7 are provided in **Appendix C-7.**

Based on lithologic and geophysical log data, two packer tests were conducted in the open-hole section from 1,510 to 1,540 feet bls and 1,930 to 1,970 feet bls (see *"Hydrogeologic Testing"* section). After testing operations were completed, DDC back-plugged the nominal 8-inch diameter borehole via multiple cement stages to 1,280 feet bls. Cement levels used to back-plug the pilot hole to 1,280 feet bls provided the lower limit of the LFA monitor interval.

In summary, the LFA test/monitor well identified as ORF-60 at the RCID site was constructed using 10-inch diameter steel casing and completed with an open hole monitor interval of 1,170 to 1,280 feet bls. After a specific capacity test on the completed open hole section, DDC installed the permanent wellhead and constructed a 6-foot by 6-foot concrete pad **(Figure 2)** completing well construction activities at this site. Well construction and testing activities related to ORF-60 are summarized in **Appendix B, Table 2**.

Figure 2. Completed Wellhead – Test/Monitor Well (ORF-60 – Yellow Well Head).

HYDROSTRATIGRAPHIC FRAMEWORK

SFWMD collected geologic formation samples (well cuttings) from the pilot hole during drilling operations of the LFA test/monitor well and separated them based on their dominant lithologic or textural characteristics, and to a lesser extent, color. The onsite geologist washed and then described the samples using the Dunham (1962)-classification scheme. SFWMD's on-site lithologic descriptions are summarized in **Appendix D-1.** SFWMD sent these samples to the Florida Geological Survey (FGS) for further analysis and long-term storage identified using the reference number W-18445. An electronic version of the lithologic description can be downloaded directly from the FGS Internet site with the descriptions provided in **Appendix D-2.**

Two major aquifer systems underlie this site, the surficial aquifer system and the Floridan aquifer system with the Floridan aquifer system being the focus of this test well program. These aquifer systems are composed of multiple, discrete aquifers separated by low permeable "confining" units that occur throughout this Tertiary/Quaternary-aged sequence. **Figure 3** shows a generalized lithostratigraphic and hydrogeologic section underlying the RCID site.

The FAS consists of a series Tertiary age limestone and dolostone units. The system includes permeable sediments of the Ocala Limestone, Avon Park Formation, and the Oldsmar Formation. The Paleocene age Cedar Keys Formation with evaporitic gypsum and anhydrite beds forms the lower boundary of the FAS (Miller, 1986). This lithostratigraphic unit was not penetrated at a total depth of 2,100 feet bls at this location.

Lithologic information obtained from drill cuttings indicate that undifferentiated quartz sands occur from land surface to 30 feet bls and forms the surficial aquifer. The undifferentiated sediments present from approximately 30 feet to 75 feet bls consist predominately of soft non-indurated detritial clays, silts, and poorly indurated mudstones (see lithologic log – **Appendix D-1**). These low permeability sediments serve as an intermediate confining unit separating the surficial aquifer from the FAS.

The top of the FAS, as defined 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 (UFA) consists of thin water bearing horizons with high permeability interspersed within thick units of middle-Eocene age sediments with low permeability. At this site, the top of the FAS occurs at a depth of 80 feet bls, which coincides with a change in lithology that occurs below 80 feet bls; identified in the well cuttings and sonic log. These sediments are poorly indurated, high porosity, wackestones-packstones of the Avon Park Formation.

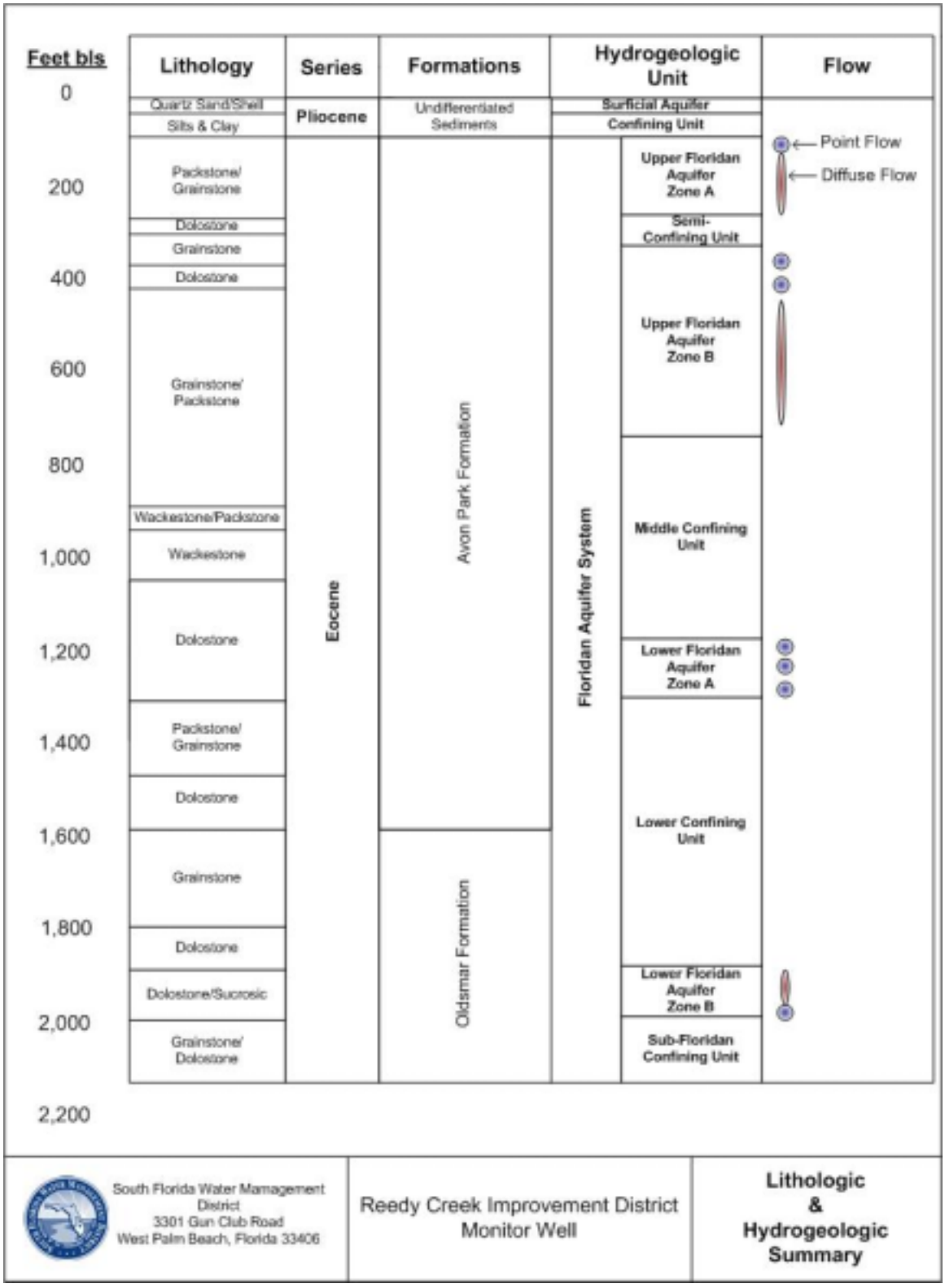

Figure 3. Generalized Lithostratigraphic and Hydrogeologic Section.

Two discrete zones were identified in the UFA separated by a semi-confining unit. These two productive horizons are designated as "Zone A and Zone B" consistent with nomenclature used in O'Reilly et al., 2002. Zone A corresponds to the upper one-third of the aquifer and coincides with the uppermost part of the Avon Park Formation. The top of this interval is marked by a minor lost circulation horizon (permeable zone) at 80 feet bls near the contact between the undifferentiated sediments and Avon Park Formation. The natural gamma log from 80 to 170 feet bls produces thin, intermittent, high-gamma radiation peaks, associated primarily with intervals of high phosphate sand/silt content within low to moderately permeable limestone units. At 170 feet bls, the lithology changes from a tan grainstone containing phosphate grains to a phosphate-free, cream colored, poorly to moderately indurated, packstones and grainstones. This interval is marked by a significant attenuation of the natural gamma ray activity, increased resistivity values, and sonic transit times. These moderately permeable carbonate rocks continue from 170 to 250 feet bls. A well indurated low permeability, grey colored mudstone unit defines the lower limits of Zone A at 250 feet bls.

An intervening semi-confining unit from 250 to 300 feet bls separates Zone A from Zone B in of the UFA. It is composed of competent, well-indurated, low permeability, crystalline dolostones inter-bedded with moderately indurated, tan colored, grainstones and crystalline limestones that occur from 250 to 300 feet bls.

Zone B corresponds to the lower two-thirds of the UFA. The majority of water production from this zone occurs from 310 to 425 feet bls composed of fractured and cavernous dolostone units in the upper portion of the Avon Park Formation. Significant water production occurs at 310 feet bls with minor production at 400 feet bls, as indicated by the flowmeter and temperature logs (see Geophysical Log Run No. 3, **Appendix C-3**). Smaller, less productive intervals continue from 425 to 740 feet bls within poorly to moderately indurated, friable packstone and grainstone units as evident by small deflections on the flowmeter or temperature log traces and seen on the borehole video log.

At this site, the top of the middle semi-confining unit, which separates the upper and lower Floridan aquifers occurs at 740 feet bls. The top of the semi-confining unit is composed of poorly indurated low permeability grainstones that continue to 880 feet bls. Through this upper section, a transition in formation water quality occurs, noted by lower formation and fluid resistivity values (see Geophysical Log Run No. 3, **Appendix C-3**). Moderately to well indurated, low porosity/permeability wackestones occur from 880 to 1,070 feet bls, which become more dolomitic and inter-bedded from 1,025 to 1,060 feet bls. Well-indurated, low permeability, cream to tan colored, dolostones continue from 1,060 to 1,160 feet bls. These low porosity/permeability, well-indurated units caused an indicative decrease in sonic transit times with a corresponding decrease in porosity and a relatively gauge borehole (i.e., similar to the diameter of the drill bit) as measured by a caliper tool. In addition, these low permeable sediments have very little productive capacity, as indicated by a relative straight flowmeter and temperature log trace (see Geophysical Log Run No. 4, **Appendix C-4**). This 420-foot section of low permeability sediments effectively isolates the UFA from the LFA.

The LFA underlies the middle confining unit. The top of the LFA at this site was identified at 1,160 feet bls, where the dolostones becomes more sucrosic and permeable in nature. Through the LFA, the formation resistivity, sonic transit times, and caliper log traces vary significantly in response to fractures and solution features. In addition, the flowmeter log traces indicated significant downward flow below 1,170 feet bls. These sections of the borehole are associated with good to excellent secondary permeability (e.g., fractured and cavernous). Review of the borehole video survey confirmed the presence of highly productive zone of secondary permeability.

The lower Avon Park Formation and upper section of the Oldsmar Formation from 1,280 to 1,860 feet bls consists of low permeable moderately indurated, dolomitic wackestones and packstones and well indurated, dense crystalline dolostones. Formation samples do not show evidence of large-scale secondary porosity development, and the temperature and flowmeter log traces indicate limited water production, which supports the overall confining nature of this 580 foot interval.

A low to moderately permeable dolostone unit occurs from 1,860 to 1,970 feet bls. The change in lithology from a dolomitic limestone to dolostone is noted by individual geophysical log traces. The induction and sonic logs show a slight increase in formation resistivity and lower sonic transit times, which are indicative of well-indurated dolostones. A minor flow zone, present near the bottom of this dolostone sequence was initially identified during reverse-air drilling when flow rates from the well bore increased. Lithologic data and minor deflections in the temperature log and information from the borehole video log confirmed small productive horizons from 1,860 to 1,970 feet bls. This interval was identified as Zone B within the LFA. Low permeable sediments of lower part of the Oldsmar Formation mark the base of the LFA at 1,970 feet bls.

Hard, dense dolostone and well-indurated limestone units with anhydrite units are present from 1,970 feet bls to the total depth of 2,100 feet bls. These low permeable units form the sub-Floridan confining unit – lower limits of the FAS. Review of the borehole video log in concert with the production log data and formation samples confirm the confining nature of this lowermost interval.

HYDROGEOLOGIC TESTING

SFWMD collected specific information during the drilling program to determine the lithologic, hydraulic, and water-quality characteristics of the FAS at this site. These data were to be used in the final design of the LFA test/monitor well for use in site-specific aquifer tests, and a long-term water level and water-quality monitoring program. **Figure 4** summaries the well construction and test results from the RCID site.

Formation Fluid Sampling

During reverse-air drilling of the pilot hole, water samples were taken from circulated return fluids (composite formation water) at 30-foot intervals (average length of drill rod) from 250 feet bls to 1,350 feet bls. Water quality data on the reverse-air returns below 1,350 feet bls were not obtained due to equipment availability. A Hydrolab® multi-parameter probe was used to measure field parameters on each sample, which included temperature, specific conductance, and pH. **Figure 5** shows field determined specific conductance values and calculated total dissolved solids (TDS) concentrations with respect to depth using the following equation from J.D. Hem (1994):

$$TDS = Specific\ Conductance \times 0.65$$

Geophysical Logging

Geophysical logs were conducted in the pilot hole after each stage of drilling and before casing installation. These logs were conducted to provide a continuous record of the physical properties of the subsurface formations and their contained fluids. These logs were later used to assist in the interpretation of lithology, to provide estimates of permeability, porosity, bulk density, resistivity of the aquifer, and to determine the salinity of the ground water using Archie's equation (Archie, 1942). In addition, the extent and degree of confinement of specific intervals can be discerned qualitatively from the individual logs. The geophysical logs also provided data to determine the desired casing setting depths on the test/monitor well.

The geophysical logging contractor(s) downloaded the data directly from the onsite logging processor onto diskettes using log ASCII standard (LAS) version 1.2 or 2.0 format. **Appendix C** contains the geophysical log traces from the various log runs for ORF-60. **Table 3** is a summary of the geophysical logging activity at this site. The original geophysical logs and video surveys from the RCID site are archived (SFWMD Reference No. 095-000014) and available for review at the SFWMD headquarters in West Palm Beach, Florida.

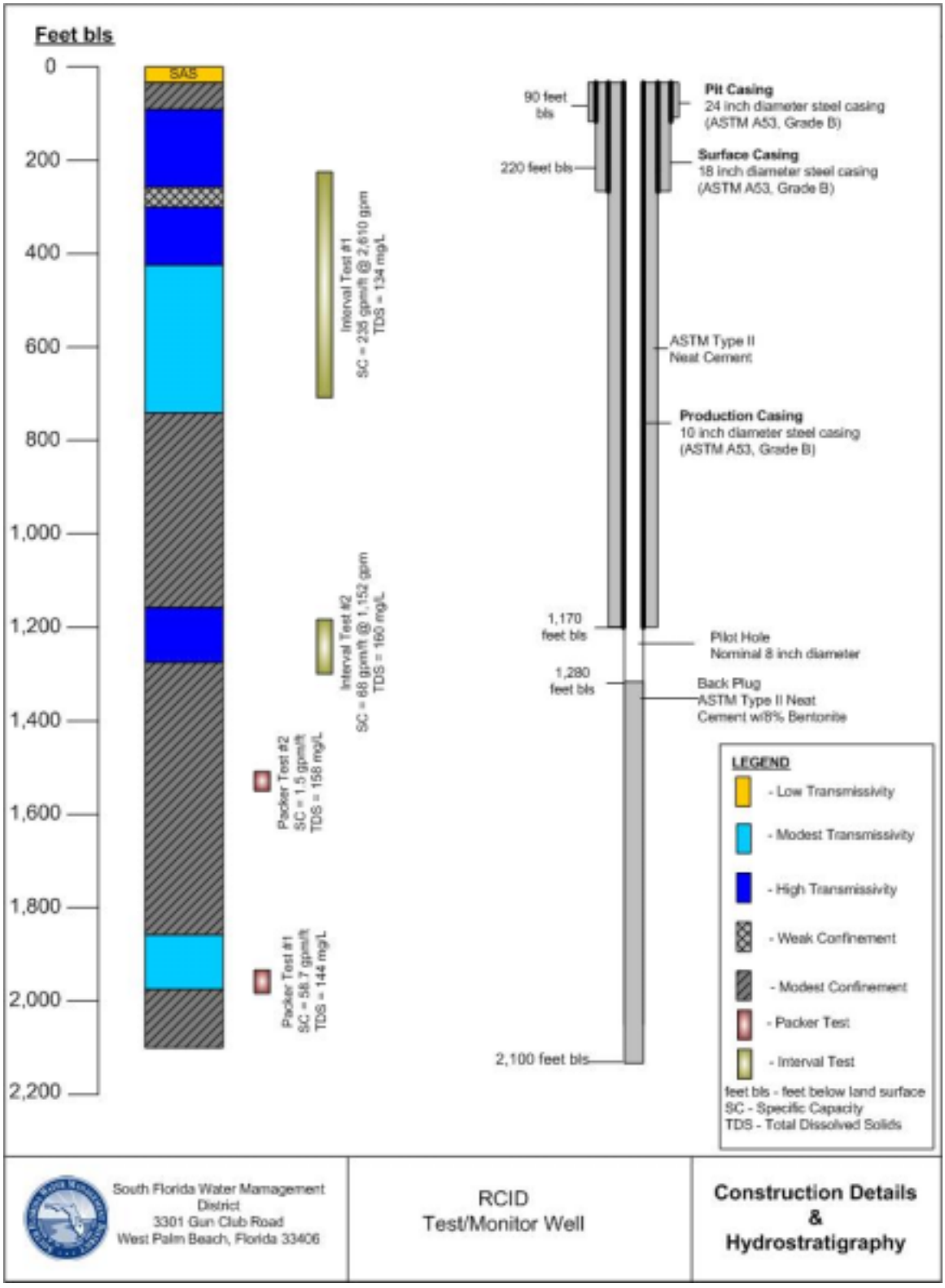

Figure 4. Well Construction and Testing Summary.

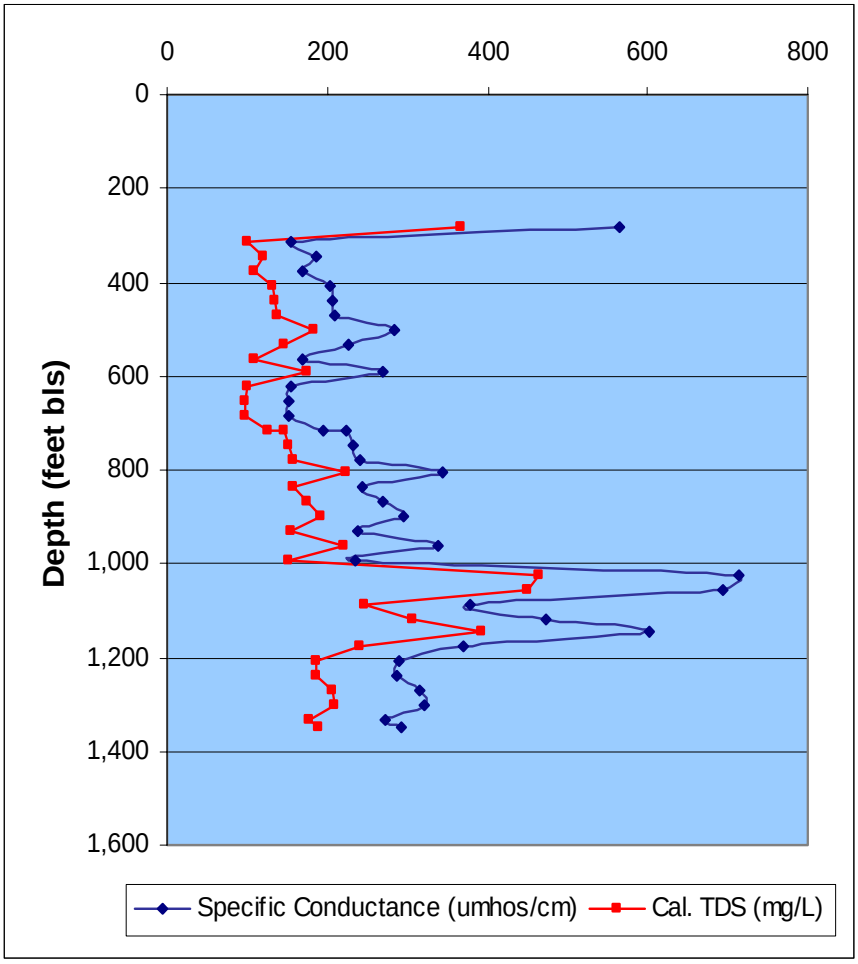

Figure 5. Water Quality with Depth - Reverse Air Returns – ORF-60.

Run #	Date	Logger	Logged Interval ft bls	Caliper	Natural Gamma Ray	SP	Dual Induct.	Sonic	Flow-Meter	Temp	Fluid Resist	Video
1	03/17/03	MVG	90 - 250	x	x	x	x	x				
2	03/20/03	MVG	0 - 226	x	x							
3	04/03/03	MVG	220 - 998	x	x	x	x	x	x	x	x	x
4	04/11/03	MVG	220 - 1350	x	x	x	x	x	x	x	x	x
5	04/22/03	MVG	220 - 1172	x	x							
6	Multiple	MVG	0 - 1170		x					x		
7	06/13/03	MVG	1170-2100	x	x	x	x	x	x	x	x	x

MVG = MV Geophysical Inc

Measuring Point Elevation is Land Surface at 131 feet NGVD, 1929

Table 3. Summary of Geophysical Logging Activities.

Packer Tests

SFWMD conducted a series of packer tests within the FAS between 1,510 and 1,970 feet bls. The purpose of these tests was to gain water quality and production capacity data on discrete intervals within the lower portion of the FAS. SFWMD selected intervals based on lithologic, geophysical logs, borehole video surveys, and hydraulic and water quality considerations using all available data.

Packer Test No. 1 was conducted on an interval between 1,930 and 1,970 feet bls. This interval produced formation water with a TDS concentration of 144 mg/L and specific conductance of 264 microumhos per centimeter (µmhos/cm). Packer Test No. 2 conducted between 1,510 and 1,540 feet bls had a TDS concentration of 158 mg/L and specific conductance of 260 µmhos/cm.

DDC purged the packer intervals a minimum of three borehole volumes or until field parameters of samples collected from the discharge pipe had stabilized, then SFWMD obtained individual ground water samples. A limit of ±5% variation in consecutive field parameter readings was used to determine chemical stability. SFWMD staff used a Hydrolab® multi-parameter probe to measure field parameters including temperature, specific conductance, and pH on each sample. SFWMD personnel collected unfiltered and filtered water in accordance with SFWMD sampling protocol. The water samples were placed on ice and transported to the SFWMD water quality laboratory where they were analyzed for inorganic constituents using EPA and/or Standard Method procedures (SFWMD, Comprehensive Quality Assurance Plan, 1999). **Table 4** lists the field parameters and laboratory results for the individual packer tests.

Reedy Creek Improvement District Site, Orange County, Florida.

		Cat ions				Anions				Field Parameters		
Identifier	Depth Interval (ft. bls)	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	TDS mg/L	Specific Conduct. µmhos/cm	Temp ^oC	pH s.u.
ORF-60_ PT2	1510-1540	3.9	0.8	34.0	10.0	4.9	114	22.2	158	260	27.08	7.50
ORF-60_ PT1	1930-1970	3.8	0.6	35.0	8.9	7.2	115	8.6	144	264	25.87	7.71

ft. bls = feet below land surface
mg/L = milligrams per liter
µmhos/cm = microumhos per centimeter
^{o}C = degree Celsius
PT = Packer Test
s.u. = standard unit

Table 4. Inorganic Water Quality Data - Packer Tests.

The Hazen-Williams equation was used to calculate the friction (head) losses for all drawdown data obtained from each packer test because of induced flow up the drill pipe. Packer tests generally involve partial penetration, have significant friction loss due to small pipe diameter, and have short pumping periods, which violate basic assumption of the various analytical methods; therefore, curve-matching techniques were not used to determine transmissivity values from the drawdown or recovery data. **Table 5** lists the pertinent hydraulic information from the individual packer tests.

Identifier	Depth (ft. bls)	Pump Rate (gpm)	Pump Duration (min)	Corrected Drawdown (feet)	Calculated Specific Capacity (gpm/ft)
ORF60-PT2	1510-1540	72	125	15.9	1.5
ORF60-PT1	1930-1970	150	100	2.6	58.7

ft. bls = feet below land surface
gpm = gallons per minute PT = Packer Test
gpm/ft = gallons per minute per foot of drawdown

Table 5. Summary of Hydraulic Data Obtained from Packer Tests.

Specific Capacity and Step Drawdown Tests

Two interval tests were conducted at this site; the first conducted in the UFA from 220 to 715 feet bls and the second in the LFA from 1,170 to 1,280 feet bls. The purpose of these tests was to gain water quality and production capacity data on productive intervals within the FAS.

The first high-volume, specific capacity test was completed on April 1, 2003, within a nominal 10-inch diameter borehole from 220 to 715 feet bls. The objective was to determine the production capacity and water quality characteristics of the UFA at this site.

The procedures listed below were used to conduct individual specific capacity tests in ORF-60 at the RCID site:

1. Select an interval for testing based on geophysical logs and lithologic data.
2. Install a 275-horsepower submersible pump to depth of 80 to 120 feet below the drill floor with a pumping capacity of 500 to 5,000 gpm.
3. Install two 100-psig-pressure transducers inside the production casing connected to a Hermit® 3000 data logger to measure and record water level changes during testing operations.
4. Perform the step drawdown test (3 to 4 one-hour steps).
5. Collect formation water samples for laboratory water quality analyses following SFWMD QA/QC sampling protocol.
6. Record recovery data until water levels return to static conditions.

As part of the first step drawdown test, DDC installed an 8-inch diameter, 275-horsepower submersible pump in the test/monitor well with the pumping bowl set at 90 feet bls. An 8-inch diameter in-line flowmeter was used to measure discharge rates during pumping. An In-situ Inc® data logger connected to down hole pressure transducers installed in ORF-60 continuously measured and recorded water level changes at pre-determined intervals (1 minute) during testing operations.

During this test, ORF-60 was pumped at successively higher pumping rates from 1,350 gallon per minute (gpm) to a maximum of 2,610 gpm. Four pumping steps were used, each lasting 1

hour with drawdown recorded for each rate (or step). The specific capacity calculated for each step from ORF-60 between 220 and 715 feet bls are displayed in **Figure 6.**

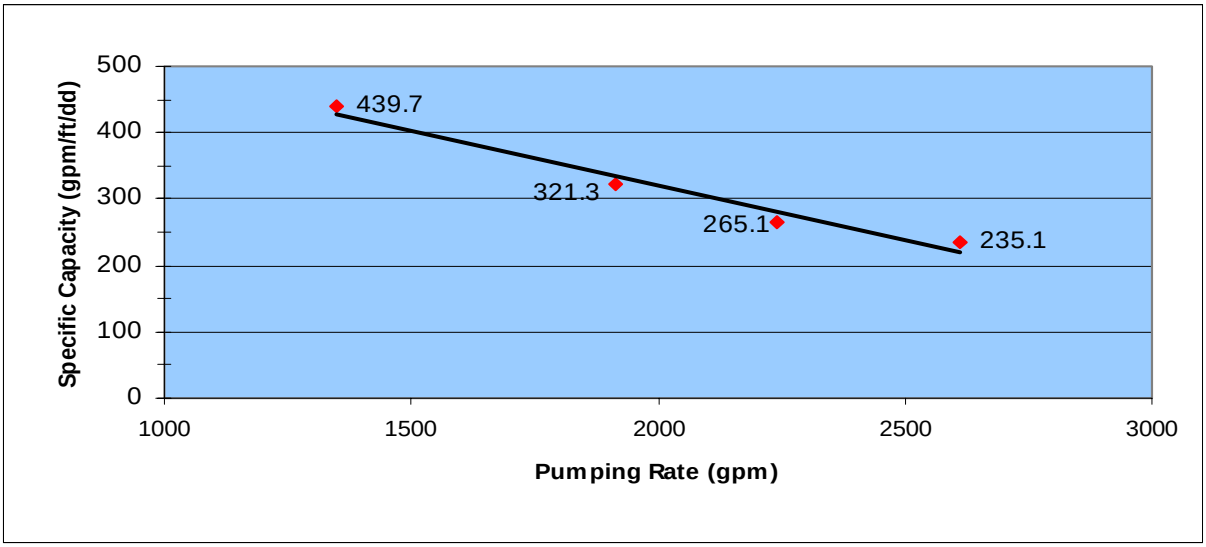

Figure 6. Pump Rates versus Specific Capacity – Step Drawdown Test No. 1.

The second specific capacity test was conducted and completed on November 26, 2003. The objective of this test was to determine well performance and in-situ hydraulic characteristics within the LFA at this site. Specifically, these data were to be used to determine production capacity and to gain water quality information from the completed open-section of ORF-60 between 1,170 and 1,280 feet bls.

DDC installed an 8-inch diameter, 275-horsepower submersible pump in the test/monitor well with the pumping bowl set at 115 feet bls. An 8-inch diameter in-line flowmeter and circular orifice weir with a 6-inch diameter orifice plate were used to measure discharge rates during pumping with automated readings taken from the orifice weir every minute. An In-situ Inc® data logger connected to down hole pressure transducers was installed in ORF-60, which continuously measured and recorded water level changes at pre-determined intervals (1 minute) during testing operations.

During the step drawdown test, ORF-60 was pumped at successively higher pumping rates from 537 gpm to a maximum of 1,152 gpm. Four pumping steps were used, each lasting 1 hour with drawdown recorded for each rate (or step). **Figure 7** is plot of production capacity versus pump rate during the second step drawdown test between 1,170 and 1,280 feet bls. **Table 6** provides a summary of inorganic water quality data for samples collected during the two step drawdown tests.

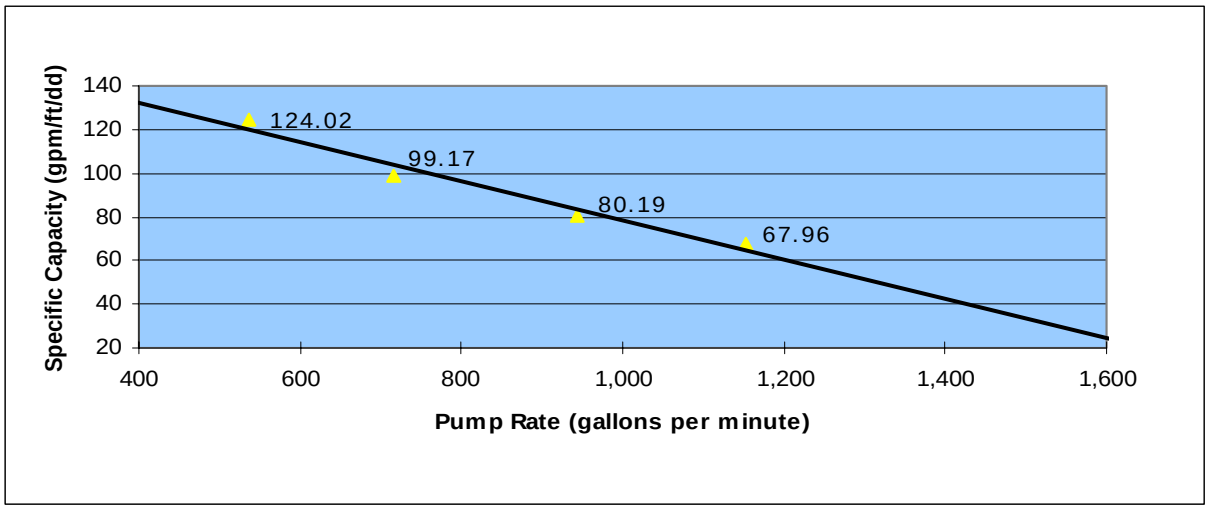

Figure 7. Pump Rate versus Specific Capacity – Step Drawdown Test No. 2.

Reedy Creek Improvement District Site, Orange County, Florida.												
		Cat ions				Anions				Field Parameters		
Identifier	Depth Interval (ft. bls)	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	TDS mg/L	Specific Conduct. µmhos/cm	Temp ^{o} C	pH s.u.
ORF-60_SC1	220-715	3.5	0.7	37.0	7.4	5.1	116	7.5	134	236	23.18	7.45
ORF-60_SC2	1170-1280	3.6	1.1	37.0	11.0	7.6	110	12.0	160	347	24.90	7.86
mg/L = milligrams per liter						ft. bls = feet below land surface				^{o} C = degree Celsius		
µmhos/cm = microumhos per centimeter						SC= Specific Capacity				s.u.= standard unit		

Table 6. Inorganic Water Quality Data from Specific Capacity Tests.

Specific Capacity Data Analysis

The data from the two step drawdown tests were analyzed to determine the overall well capacity and the effects of individual components. Jacob (1946) suggests that the drawdown (s) in a well is the sum of the first order (laminar) component and the second order (turbulent) component and can be expressed as:

$$s = BQ + CQ^2 \qquad \textit{Equation 1}$$

where, the laminar term (BQ) is a function of the aquifer loss and the turbulent term (CQ^2) is related to well loss. This correlation however, has been shown not to be correct and computing well efficiencies using step drawdown data may be in error.

Step tests however, are still useful in evaluating the magnitude of turbulent head loss for the purpose of determining optimum pumping rates. A simple graphical method for determining B and C was developed by Bierschenk (1964) whereby Equation 1 is divided by the pump rate (*Q*) and the terms rearranged to yield:

$$s/Q = CQ + B \qquad \textit{Equation 2}$$

Therefore, if s/*Q* is plotted against *Q*, the result is a straight line with a slope of C and y-intercept of B. The value of B and C from the resultant graph can be used in Equation 2.

Inverting the terms in Equation 2 indicate how specific capacity declines as discharge increases when turbulent flow is present:

$$Q/s = 1 / (CQ + B) \qquad \textit{Equation 3}$$

Observing the change in drawdown and specific capacity as discharge increase can provide information necessary to select optimum pumping rates. Equation 3 was used to estimate (predict) the specific capacity for two additional pumping rates for each test. **Figure 8** shows *s/Q* plotted against *Q* where C is the slope and B is the intercept for Step Drawdown Test No.1. **Table 7** summarizes the discharge and drawdown data plus predicted specific capacities for the UFA between 220 and 715 feet bls.

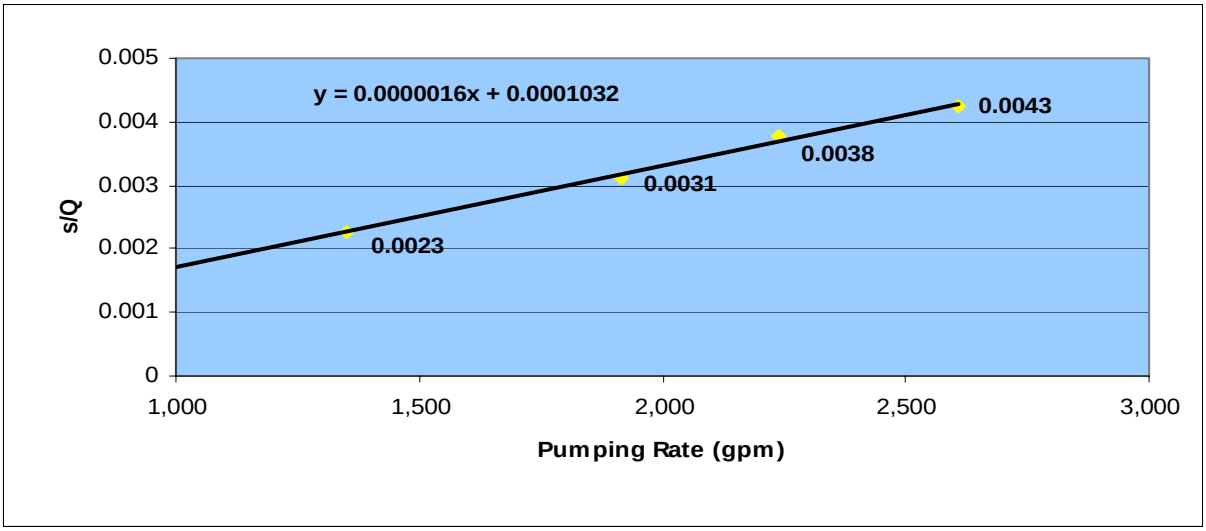

Figure 8. Pump Rate versus s/Q – Step Drawdown Test No. 1.

Measured Pump Rate (Q) gpm	Measured Drawdown (s) feet	Specific Capacity (Q/s) gpm/ft	s/Q feet/gpm	Predicted Specific Capacity (Q/s) (gpm/ft)
1350	3.07	439.74	0.0023	441.85
1915	5.96	321.31	0.0031	315.74
2240	8.45	265.09	0.0038	271.21
2610	11.10	235.14	0.0043	233.69
3000				203.95
3500				175.34

Table 7. Discharge and Drawdown Data – Specific Capacity Test No. 1.

The transmissivity for this 495-foot open-hole section of the UFA was estimated at 468,000 gallons per day per square foot (gpd/ft^2) at this site. The estimated transmissivity was determined by multiplying the specific capacity of 235.14 gpm/ft of drawdown (found in **Table 7**) by a factor of 2,000 (Driscoll 1989).

During the second step drawdown test, ORF-60 was pumped at successively higher pumping rates from 537 gpm to a maximum of 1,152 gpm. **Figure 9** shows s/Q plotted against Q where C is the slope and B is the intercept for Step Drawdown Test No. 2. **Table 8** summarizes the discharge and drawdown data plus predicted specific capacities (using Equation 3) for the LFA between 1,170 and 1,280 feet bls.

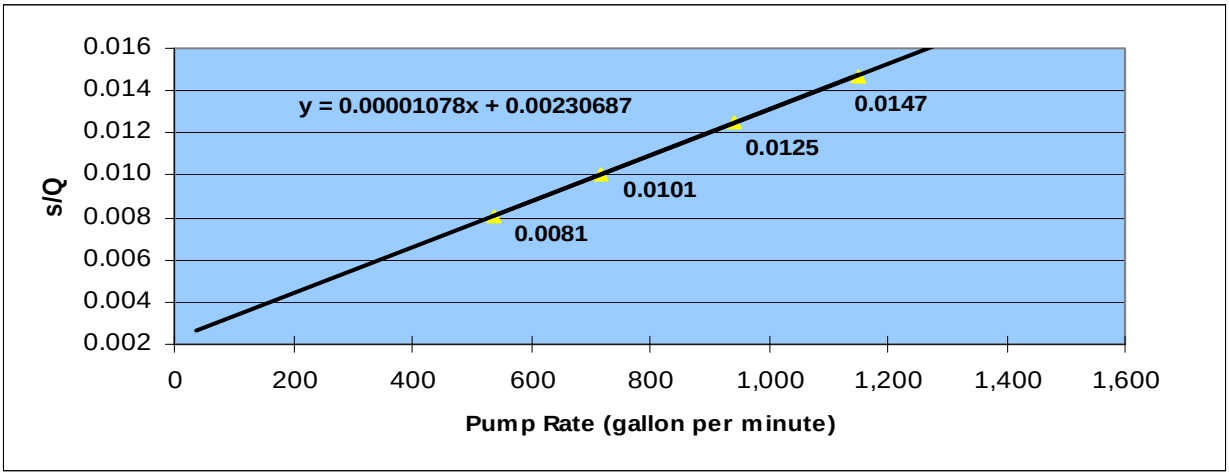

Figure 9. Pump Rate versus s/Q – Step Drawdown Test No. 2.

Measured Pump Rate (Q) gpm	Measured Drawdown (s) feet	Specific Capacity (Q/s) gpm/ft	s/Q feet/gpm	Predicted Specific Capacity (Q/S) (gpm/ft)
537	4.33	124.02	0.0081	123.52
717	7.23	99.17	0.0101	99.64
943	11.76	80.19	0.0125	80.18
1152	16.95	67.96	0.0147	67.91
1350				59.31
1600				51.14

Table 8. Discharge and Drawdown Data – Specific Capacity Test No. 2.

The transmissivity for this 110-foot open-hole section of the LFA was estimated at 136,000 gpd/ft^2 at this site. The estimated transmissivity was determined by multiplying the specific capacity of 67.96 gpm/ft of drawdown (found in **Table 8**) by a factor of 2,000 (Driscoll 1989).

Ground Water Quality Monitoring Program

Upon completion of well construction of ORF-60, background water quality samples were collected and analyzed to determine basic water quality characteristics (temperature, pH, and specific conductance) as well as primary and secondary drinking water standards (Rule 62-550, FAC) and minimum criteria parameters (Rule 62-520, FAC).

Unfiltered and filtered water samples were taken directly from the discharge point into appropriate type of sample containers. Water samples were collected in accordance with FDEP sampling protocol. Once collected, all water samples were preserved and immediately placed on ice in a closed container and transported to a laboratory operated by Advanced Environmental Laboratories (AEL), Inc. in Tampa, Florida. The samples were analyzed for primary and secondary drinking water standards and minimum criteria parameters using EPA and/or Standard Method procedures (SFWMD, 1999). **Table 9** summarizes the analytical results of the inorganic constituents from the completed LFA test/monitor well.

		Cat ions				Anions				Field Parameters		
Identifier	Depth Interval (ft. bls)	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	TDS mg/L	Specific Conduct. µmhos/cm	Temp ^oC	pH s.u.
ORF-60	1170-1280	3.6	1.1	37	11	7.6	110	12.0	160	347	23.29	7.80

mg/L = milligrams per liter ft. bls = feet below land surface ^{o}C = degree Celsius
µmhos/cm = microumhos per centimeter s.u.= standard unit

Table 9. Composite Water Quality Data from Completed Test/Monitor Well – ORF-60.

Laboratory results provided by AEL indicate that produced water from the LFA meet all primary and secondary drinking water standards and are provided in **Appendix E.**

SUMMARY

1. The top of the FAS as defined by the Southeastern Geological Society AdHoc Committee on Florida Hydrostratigraphic Unit Definition (1986) was identified at a depth of approximately 80 feet bls.
2. A 10-inch inner diameter exploratory well at the RCID site was successfully constructed and tested in accordance with FDEP Class V, Group 8, well standards.
3. Lithologic and geophysical logs, and specific capacity test results indicate moderate production capacity in Zone A of the UFA (80 to 250 feet bls) and excellent production capacity in Zone B of the UFA (310 to 740 feet bls). The interval from 220 to 715 feet bls yielded a specific capacity value of 235 gallons per minute per foot (gpm/ft) of drawdown at a pumping rate of 2,610 gpm with a calculated transmissivity of 470,000 gallons per day per foot (gpd/ft).
4. Water quality data from 220 to 715 feet bls indicate that chloride and TDS in the UFA waters meet potable drinking water standards with chloride and TDS concentrations of 5 and 134 mg/L, respectively.
5. Lithologic information and geophysical logs obtained from ORF-60 indicates that low porosity/permeability, poorly indurated grainstones and moderately to well indurated, wackestones and crystalline dolostones occur from 740 to 1,160 feet bls. These low permeable sediments act as a confining unit that effectively isolates the UFA from the LFA.
6. Lithologic and geophysical logs and specific capacity test results indicate very good production capacity of the LFA from 1,170 to 1,280 feet bls. This zone yielded a specific capacity value of 68 gpm/ft of drawdown at pump rate of 1,152 gpm with a calculated transmissivity of 136,000 gpd/ft^2.
7. Composite water quality sampling of ORF-60 (1,170 to 1,280 feet bls) indicates that chloride and TDS meet potable drinking water standards with chloride and TDS concentrations of 8 and 160 mg/L, respectively.
8. The lithologic data and production-type logs (e.g. flow, temperature logs) indicates very good production from flow zones between 1,170 and 1,195 feet bls and 1,215 to 1,270 feet bls. Below 1,270 feet bls, the productive capacity is limited (as indicated by the fluid-type logs) suggesting lower permeable – semi-confining units near the base of the proposed monitor interval.
9. Lithologic and geophysical logs and packer test results indicate good production capacity of the LFA from 1,860 to 1,970 feet bls. Packer test between 1,930 and 1,970 feet bls yielded a specific capacity value of 58.7 gpm/ft of drawdown with chloride and TDS concentrations of 7 and 144 mg/L, respectively.
10. The base of the Underground Source of Drinking Water, those waters having TDS concentrations greater than 10,000 mg/L, was not encounter at a total depth of 2,100 feet bls.
11. Based on laboratory results, produced water from the LFA at this site meet all primary and secondary drinking water standards.

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APPENDIX A
Weekly Summary Reports

CON 24-01

March 18, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.1 – March 10, 2003 through March 14, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the first week of construction on the lower Floridan aquifer test/monitor well and those activities anticipated for the next report period.

The first week of drilling and construction of the test/monitor well began on March 10, 2003. Initially, the Contractor (DDC) drilled the pilot hole to a depth of 103 feet below pad level (bpl) using a 12.75-inch diameter bit via the mud rotary method. The Contractor then reamed (over-drilled) the 12.75-inch pilot hole to a depth of 103 feet bpl using a nominal 29-inch diameter staged bit reamer. Both the pilot hole and reamed borehole were completed on March 11, 2003. DDC then installed 24-inch diameter pit casing to a depth of 90 feet bpl and pressure grouted back to surface using 302 cubic feet of ASTM Type II neat cement. Grouting operations for the 24-inch diameter pit casing were completed on March 12, 2003. The report period ended on March 13, 2003 with the Contractor drilling out the cement plug at the base of the 24-inch diameter pit casing (a result of pressure grouting operations). In addition, the Contractor continued pilot hole drilling operations (using a 9.875-inch diameter bit) to 250 feet bpl via the mud rotary method. During the course of the above-mentioned activities, no unusual drilling or construction events transpired.

During the next report period, the Contractor will re-circulate and condition the 9.875-inch diameter pilot hole from 90 to 250 feet bpl. MV Geophysical Inc will then geophysically log the pilot hole. The pilot hole logging suite will consist of the following: x-y caliper, natural gamma, spontaneous potential (SP), borehole compensated sonic (BHC), and dual induction/laterolog combination. Once logged, the pilot-hole will be reamed using a nominal 23-inch diameter bit and 18-inch diameter steel casing (0.375 inch wall thickness) installed into the top of Floridan aquifer at an approximate depth of 200 feet bpl. Once installed, the 18-inch diameter steel casing will be pressure grouted back to surface using ASTM Type II cement.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando

CON 24-01

March 24, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.2 – March 17, 2003 through March 21, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection of events that transpired during the second week of construction on the lower Floridan aquifer test/monitor well and those activities anticipated for the next report period.

The second week of drilling and construction of the test/monitor well began on March 17, 2003. The Contractor re-circulated and conditioned the 9.875-inch diameter pilot-hole from 90 to 250 feet bpl. MV Geophysical Inc then geophysically logged the pilot-hole. The logging suite (run no.1) consisted of the following: x-y caliper, natural gamma ray, spontaneous potential (SP), borehole compensated sonic (BHC), and dual induction/laterolog combination. A composite of the geophysical log traces is attached for your review.

On March 20, 2003, the Contractor reamed the nominal 10-inch diameter pilot-hole to a depth of 226 feet bpl using a nominal 22-inch diameter staged bit reamer. Once completed, the reaming tool was tripped to the bottom of the borehole and the hole conditioned before being geophysically logged (4-arm caliper and natural gamma ray). The caliper log showed no unusual borehole conditions that would prohibit proper installation of the 18-inch steel surface casing. The Contractor installed the 18-inch diameter (0.375 inch wall thickness) surface casing into the Floridan aquifer system at depth of 220 feet bpl. Once installed, the surface casing was pressure-grouted using 378 cubic feet of ASTM Type II neat cement. On March 21, 2003, the pressure-grouted cement was hard tagged within the annulus at 105 feet bpl, an additional 158 cubic feet of neat cement was tremied into place bringing cement levels to surface. During the above-mentioned activities, no unusual drilling or construction events transpired.

During the next report period, the Contractor will drill-out the cement plug at the base of the surface casing (a result of pressure-grouting operations) using a nominal 17-inch diameter bit. The Contractor will drill a nominal 10-inch pilot-hole via the reverse-air method through the Eocene-aged Ocala Limestone and Avon Park Formation to a depth of 700 feet bpl. If the Contractor reaches this depth, formation evaluation and production type logs will be conducted in the nominal 10-inch diameter pilot-hole.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments: Lithologic Descriptions
Geophysical Logs (Pilot Hole 90 to 225 feet bpl, Run No.1)

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando

CON 24-01

March 31, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.3 – March 24, 2003 through March 28, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection of events that transpired during the third week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The third week of drilling and construction of the test/monitor well began on March 24, 2003. The Contractor drilled-out the cement plug at the base of the surface casing (a result of pressure-grouting operations) using a nominal 17-inch diameter bit. The Contractor continued to drill a nominal 10-inch pilot-hole via the reverse-air method through the Eocene-aged Ocala Limestone and Avon Park Formation to a depth of 715 feet bpl. On March 27, 2003, the Contractor installed a submersible pump into the 18-inch steel casing and developed the open-hole interval from 220 to 715 feet below land surface (bls). During the above-mentioned activities, no unusual drilling or construction events transpired.

During the next report period, MV Geophysical Services, will conduct formation evaluation and production logging operations in the open hole section from 220 to 715 feet bls. The formation evaluation logging suite will consist of the following: x-y caliper, natural gamma ray, spontaneous potential (SP), borehole compensated sonic (BHC), and dual induction/laterolog combination. The production logs include a flowmeter, fluid resistivity, and temperature conducted under both static and dynamic conditions. In addition, a borehole video survey will be run to complement the geophysical log data. Once completed, the Contractor will conduct a step-drawdown test on the same open-hole interval. The Contractor will then continue to drill a nominal 10-inch pilot-hole via the reverse-air method through the Eocene-aged Avon Park Formation to a depth of 1,350 feet bpl. If the Contractor reaches this depth, formation evaluation and production type logs will be conducted in the nominal 10-inch diameter pilot-hole.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments: Lithologic Descriptions

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando

CON 24-01

April 14, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.5 – April 7, 2003 through April 11, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the fifth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The fifth week of drilling and construction of the test/monitor well began on April 7, 2003. During the report period, the Contractor continued to drill a nominal 10-inch pilot-hole from 998 feet below land surface (bls) via reverse-air method. On April 9, 2003, the Contractor completed drilling of the pilot-hole to the target depth of 1,350 feet bls. Once completed, the Contractor reverse-air developed the open-hole section for subsequent geophysical logging operations.

On April 10, 2003, the Contractor installed a submersible pump into the 18-inch steel casing to facilitate well development and geophysical logging. On April 11, 2003, MV Geophysical Services conducted formation evaluation and production logging operations in the open hole section from 220 to 1,350 feet bls. The formation evaluation logging suite consisted of the following: 4-arm caliper, natural gamma ray, spontaneous potential (SP), borehole compensated sonic (BHC), and dual induction/laterolog combination. The production logs included a flowmeter, fluid resistivity, and temperature conducted under both static and dynamic conditions. In addition, a borehole video survey was conducted to complement the geophysical log data. A composite of the geophysical log traces is provided for your review (Attachment No.1).

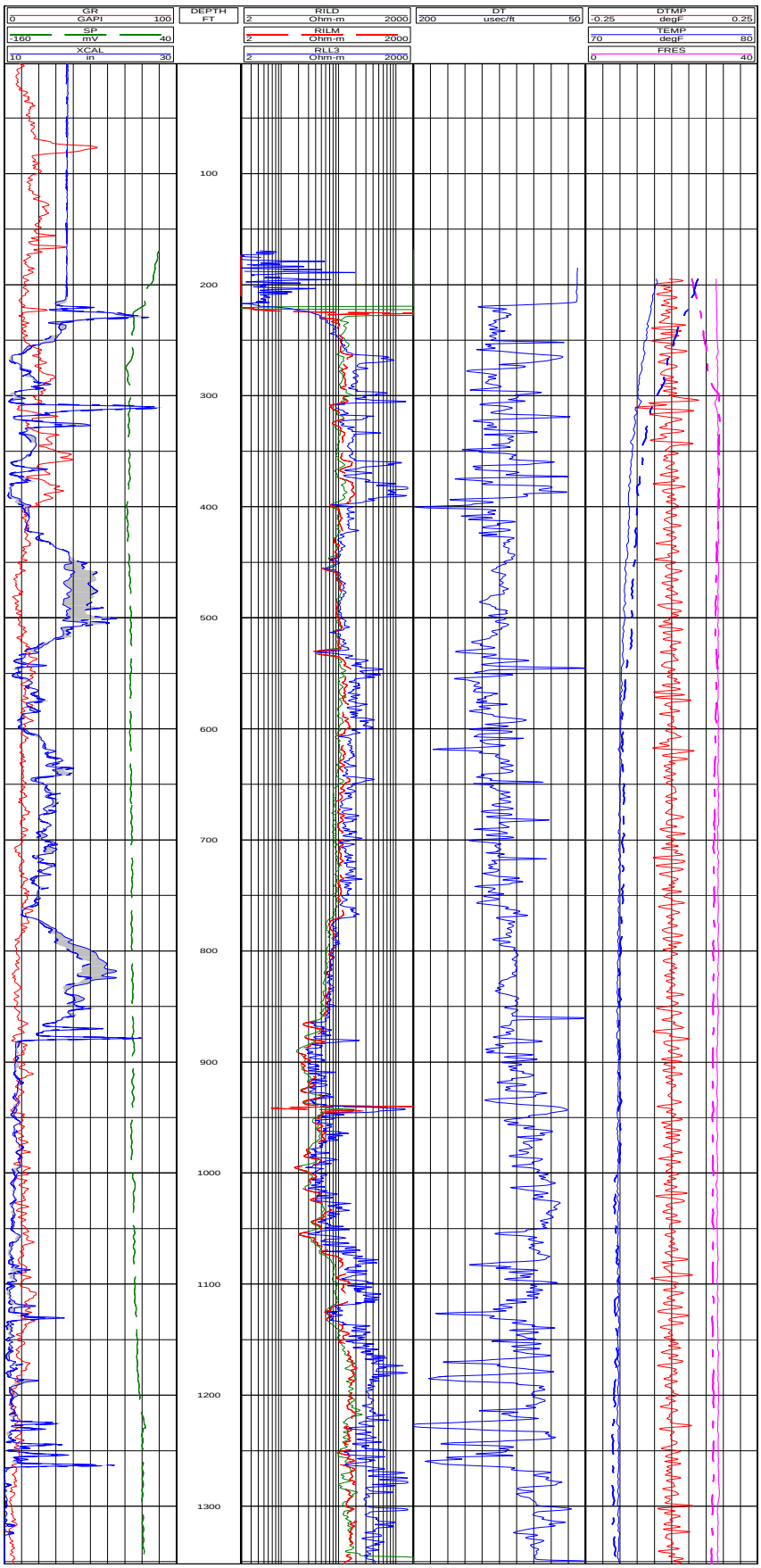
During the next report period, the Contractor will begin to ream a nominal 17-inch borehole to the proposed casing setting depth. Once completion, MV Geophysical will conduct a 4-arm caliper and natural gamma ray log on the reamed borehole. The Contractor will then install the 10-inch-diameter steel production casing (ASTM A53, Grade B, 0.365-inch wall thickness) with the annulus grouted back to surface using ASTM Type II neat cement.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments: Lithologic Log – 0 to 1,350 feet bls
Geophysical Logs – 220 to 1,350 feet bls (Attachment No.1 – provided below)

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando



Attachment No.1 Geophysical Logs (220 to 1,350 feet bls)

CON 24-01

April 21, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.6 – April 14, 2003 through April 18, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the sixth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The sixth week of drilling and construction of the test/monitor well began on April 14, 2003. During the report period, the Contractor began to ream a nominal 17-inch borehole to the proposed casing setting depth of 1,170 feet below land surface (bls) via reverse-air method. At the end of the report period, the Contractor reamed the nominal 10-inch pilot-hole to a depth of 975 feet bls.

During the next report period, the Contractor will continue to ream a nominal 17-inch borehole to the proposed casing setting depth of 1,170 feet bls. Once completion, MV Geophysical will conduct a 4-arm caliper and natural gamma ray log on the reamed borehole. The Contractor will then install the 10-inch-diameter steel production casing (ASTM A53, Grade B, 0.365-inch wall thickness) with the annulus grouted back to surface using ASTM Type II neat cement. Initially, cement levels will be determined using temperature logs then verified by physically hard tagging the cement.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando

CON 24-01

April 28, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.7 – April 21, 2003 through April 25, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the seventh week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The seventh week of drilling and construction of the test/monitor well began on April 21, 2003. During the report period, the Contractor reamed a nominal 17-inch borehole to the proposed casing setting depth of 1,170 feet below land surface (bls) via reverse-air method. Upon completion, MV Geophysical conducted a 4-arm caliper and natural gamma ray log on the reamed borehole (see Attachment No 1). On April 23, the Contractor installed the 10-inch-diameter steel production casing (ASTM A53, Grade B, 0.365-inch wall thickness) to a depth of 1,170 feet bls. The Contractor then pressure grouted the annulus using 420 cubic feet of ASTM Type II neat cement. On April 24, 2003, a cement temperature log was conducted, which indicated the cement level at a depth of 970 feet bls, later hard tagged at 975 feet bls. That same day, the Contractor installed a second cement lift via the tremie method that consisted of 500 cubic feet of bentonite-cement (8% bentonite by volume) slurry. MV Geophysical then conducted a second temperature log, which indicated the cement level at 855 feet bls, which was later hard tagged at the same depth. A composite of the temperature log traces (run 1 and run 2) are provided for your review (Attachment No.1)

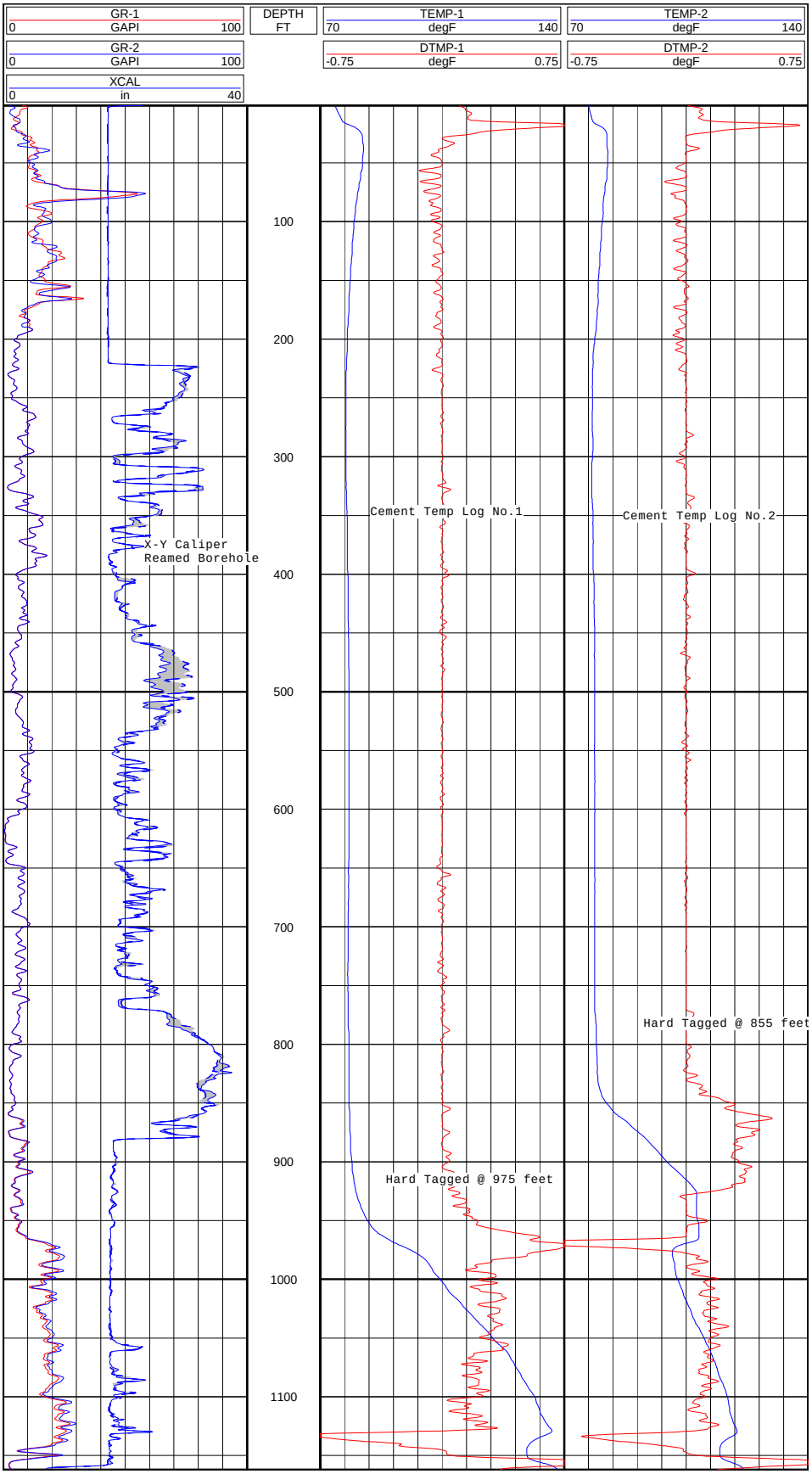
During the next report period, the Contractor will continue to stage grout the 10-inch diameter steel casing to surface via the tremie method. After each cement stage, cement levels will be determined using a temperature log and verified via hard tags. If cement operations are completed, the Contractor will begin to set-up to conduct a 50-psi pressure test on the 10-inch diameter casing.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments Attachment No. 1 (Provided Below)

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando



Attachment No. 1 - X-Y Caliper and Cement Temperature Logs – ORF-60

CON 24-01

May 8, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.8 – April 28, 2003 through May 2, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the eighth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The eighth week of drilling and construction of the test/monitor well began on April 28, 2003. During the report period, the Contractor continued to cement grout the 10-inch-diameter steel production casing (ASTM A53, Grade B, 0.365-inch wall thickness) in multiple stages using a combination of 12% bentonite-cement slurry and neat cement. Cement volumes (ASTM Type II), slurry type, and resulting cement levels as measured by a temperature log and physical hard tag after each cement stage are summarized below:

Stage No.	Volume	Slurry Type	Temp	Hard Tag
3	116 barrels	12% bentonite-cement slurry	784 feet bls	785 feet bls
4	137 barrels	12% bentonite-cement slurry	576 feet bls	570 feet bls
5	137 barrels	12% bentonite-cement slurry	372 feet bls	375 feet bls
6a	81 barrels	12% bentonite-cement slurry		
6b	62 barrels	Neat cement	316 feet bls	320 feet bls
7	63 barrels	Neat-cement	308 feet bls	310 feet bls

Composites of the temperature log traces (run 1 through 4 and 5 through 7) are provided for your review in Attachment No.1 and No.2.

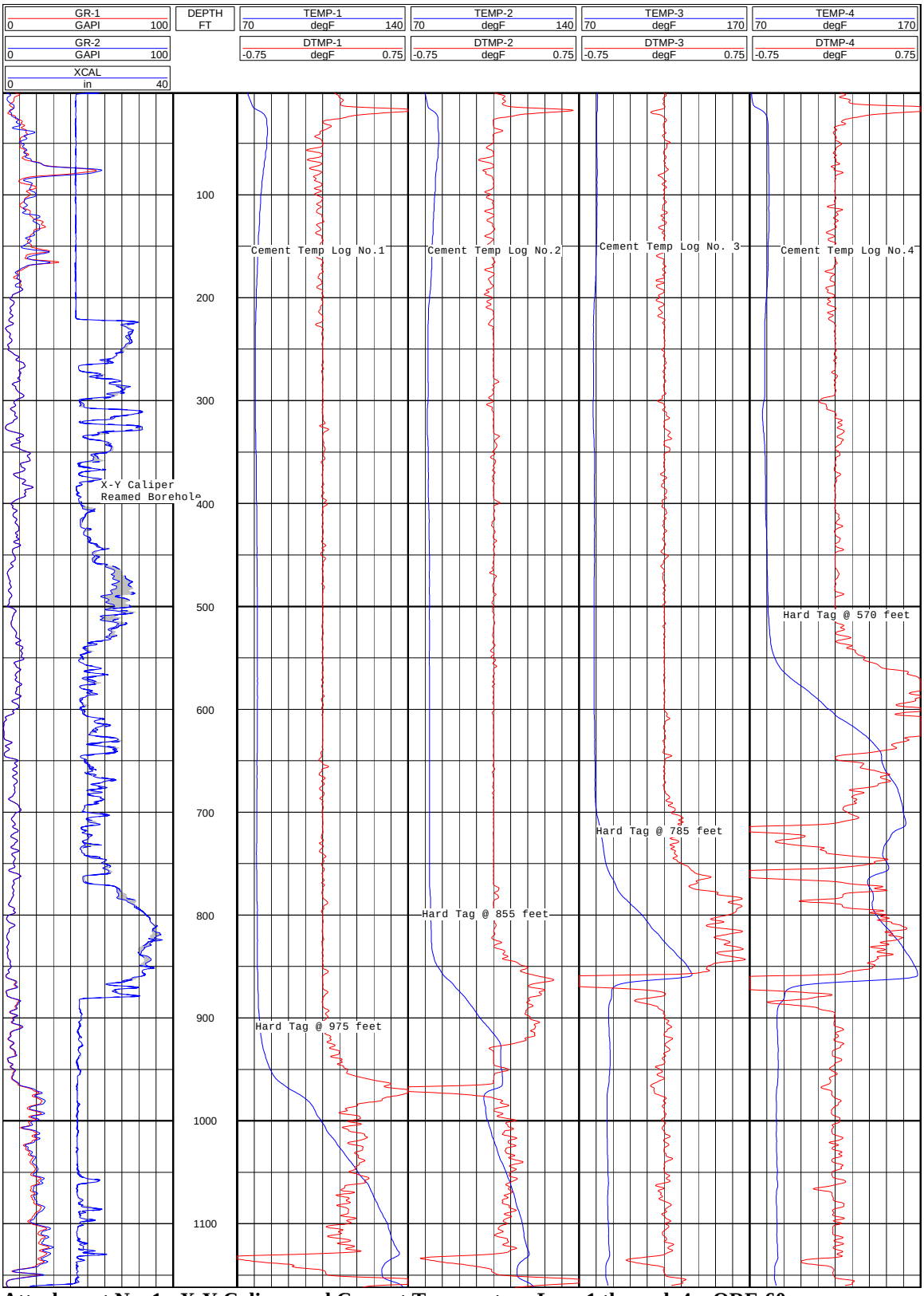
During the next report period, the Contractor will continue to cement grout the 10-inch diameter steel casing to surface via the tremie method. After each cement stage, the cement level will be determined using a temperature log and verified via hard tags. If cement operations are completed, the Contractor will begin to set-up to conduct a 50-psi pressure test on the 10-inch diameter casing.

Sincerely:

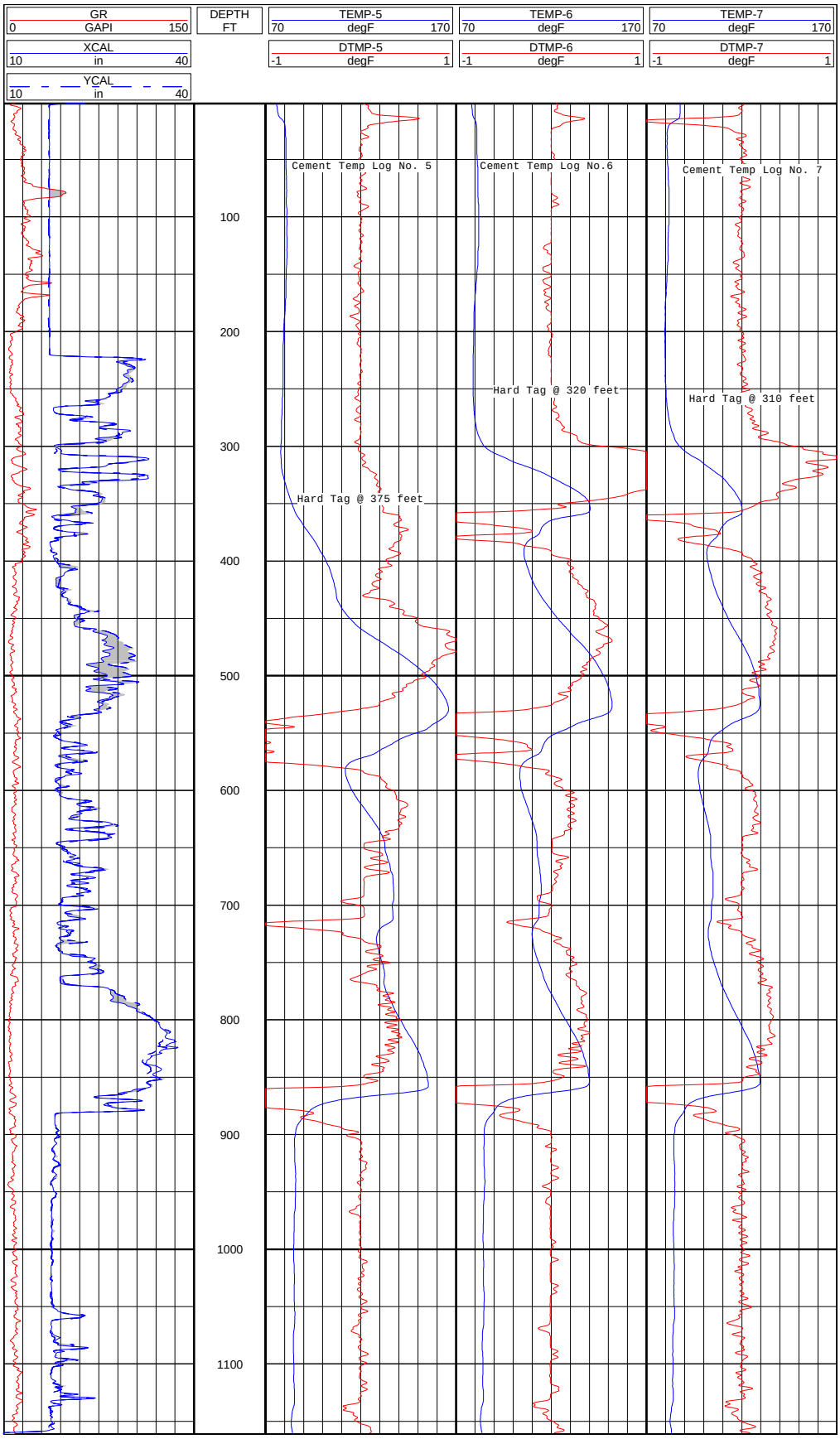
Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments Attachment No. 1 (Provided Below)
Attachment No. 2 (Provided Below)

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando



Attachment No. 1 - X-Y Caliper and Cement Temperature Logs 1 through 4 – ORF-60



Attachment No. 2 - X-Y Caliper and Cement Temperature Logs 5 through 7 – ORF-60

CON 24-01

May 12, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.9 – May 5, 2003 through May 9, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the ninth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The ninth week of drilling and construction of the test/monitor well began on May 5, 2003. During the report period, the Contractor continued to cement grout the 10-inch-diameter steel production casing (ASTM A53, Grade B, 0.365-inch wall thickness) in multiple stages using Type II neat cement. Cement volumes (ASTM Type II), slurry type, and resulting cement levels as measured by a temperature log and physical hard tag after each cement stage are summarized below:

Stage No.	Volume	Slurry Type	Temp	Hard Tag
8	63 barrels	Neat cement	310 feet bls	306 feet bls
9	63 barrels	Neat cement	300 feet bls	301 feet bls
10	63 barrels	Neat cement	270 feet bls	275 feet bls
11	63 barrels	Neat-cement	150 feet bls	150 feet bls
12	33 barrels	Neat-cement		Land Surface

A composite of the temperature log traces (run 8 through 11) are provided for your review in Attachment No.1. After 12 stages, the Contractor successfully cement-grouted the 10-inch diameter steel casing to surface

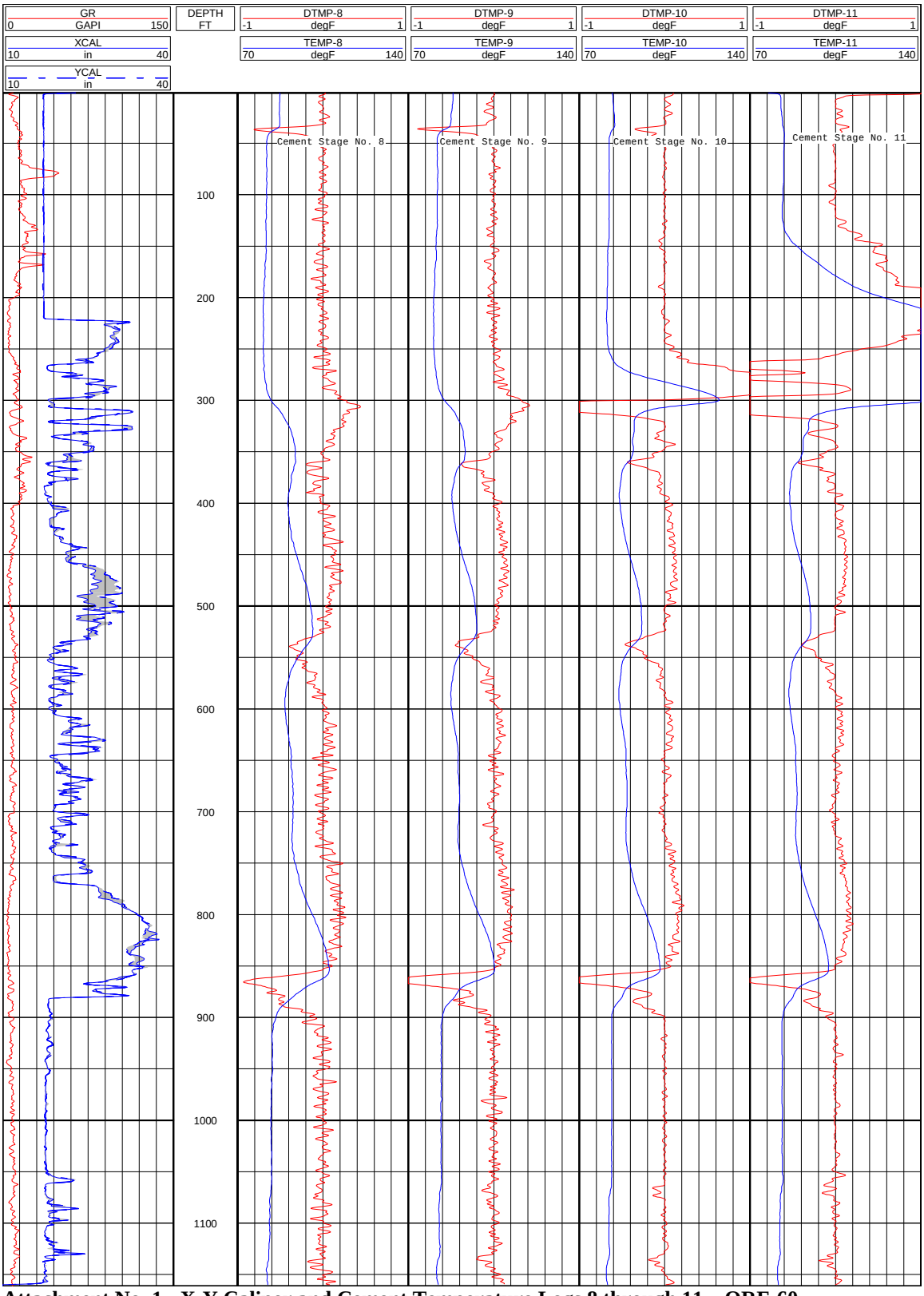
During the next report period, the Contractor will set-up and conduct a 100-psi pressure test on the 10-inch diameter casing. The Contractor will then drill-out the cement plug at the base of the 10-inch diameter casing and remove the temporary back-fill material (3/8-inch diameter crushed limestone) from 1,170 to 1,350 feet below land surface (bls). Upon removal of the back-fill material, the Contractor will resume pilot-hole drilling via reverse-air rotary method.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments Attachment No. 1 (Provided Below)

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando



Attachment No. 1 - X-Y Caliper and Cement Temperature Logs 8 through 11 – ORF-60 CON 24-01

May 19, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.10 – May 12, 2003 through May 16, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the tenth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The tenth week of drilling and construction of the test/monitor well began on May 12, 2003. During the report period, the Contractor conducted and successfully completed a 100-psi pressure test on the 10-inch-diameter steel production casing (ASTM A53, Grade B, 0.365-inch wall thickness). During the 60-minute test, pressure inside the casing dropped 2.0 psi (2%), which are within the test limits of +/- 5%. The results of the pressure test are attached for your review (Attachment No.1). The Contractor then drilled-out the cement plug at the base of the 10-inch diameter casing and removed the temporary back-fill material (3/8-inch diameter crushed limestone) from 1,170 to 1,350 feet below land surface (bls). Upon removal of the back-fill material, the Contractor resumed pilot-hole drilling via reverse-air rotary method to 1,370 feet bls.

During the next report period, the Contractor will continue to drill a nominal 8-inch diameter pilot-hole via reverse-air rotary method from 1,370 feet bls to anticipated depth of 2,200 feet bls.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments Attachment No. 1 (Provided Below)

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando
Paul Petrey, Diversified Drilling Corp.

OSF-60 -- Reedy Creek Casing Pressure Test Field Notes - 13 May 2003

09:40 am Simon Sunderland (SFWMD) arrives on site at Reedy Creek. Diversified Drilling Corporation set up and ready to run 100-psi casing pressure test. Collected pressure gauge calibration sheet and verified model number on pressure gauge matched serial number on calibration sheet.

Weather: Partly cloudy, moderate breeze, temp. ~75 ^{o}F.

Task: Oversee a pressure test of the 10-inch diameter steel casing in Reedy Creek well to determine its structural integrity.

09:54 am Diversified pressures casing to 120 psi. Bleed off excess pressure to 100psi.

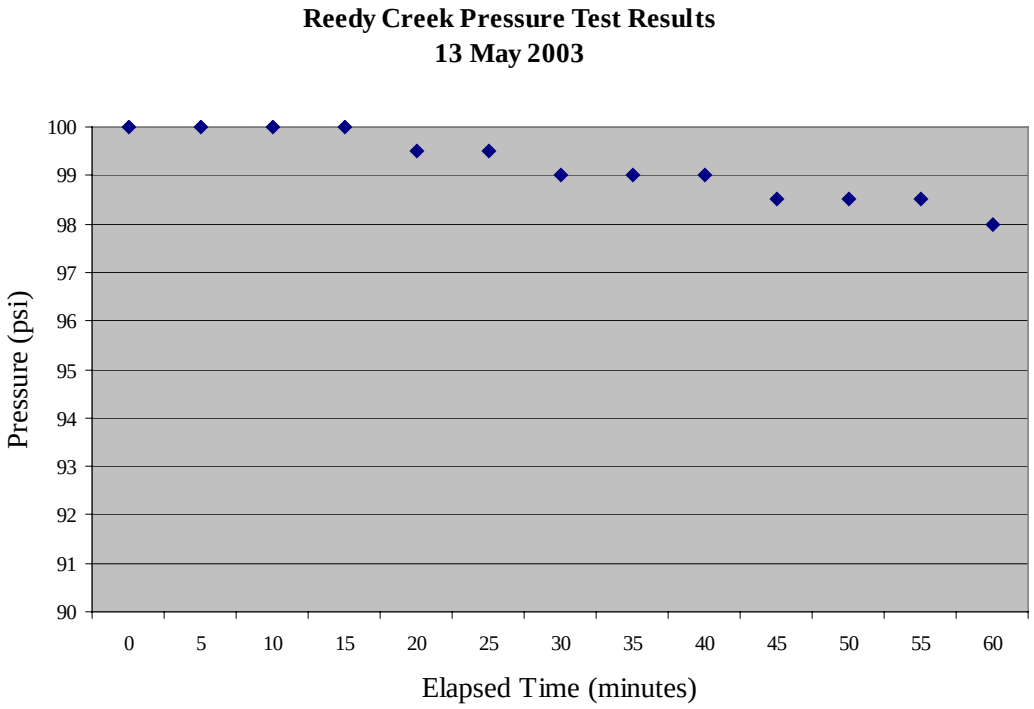
09:56 am Started test.

10:56 am Ended test. Casing lost 2 psi over 60 minutes. Casing passes pressure test.

11:10 am Simon Sunderland (SFWMD) off site.

Reedy Creek Casing Pressure Test Results

Elapsed Time (minutes)	Pressure (psi)	Pressure Change (psi)
0	100.0	-
5	100.0	0
10	100.0	0
15	100.0	0
20	99.5	-0.5
25	99.5	0
30	99.0	-0.5
35	99.0	0
40	99.0	0
45	98.5	-0.5
50	98.5	0
55	98.5	0
60	98.0	-0.5


Reedy Creek Pressure Test Results
13 May 2003
Pressure (psi)
100
99
98
97
96
95
94
93
92
91
90
0
5
10
15
20
25
30
35
40
45
50
55
60
Elapsed Time (minutes)

CON 24-01

May 27, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.11 – May 19, 2003 through May 23, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the eleventh week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The eleventh week of drilling and construction of the test/monitor well began on May 19, 2003. During the report period, the Contractor continued to drill the nominal 8-inch diameter pilot-hole via reverse-air rotary method from 1,370 feet to 1,650 feet below land surface (bls). Lithologic descriptions of the well cuttings are provided for your review (see Attachment No.1).

During the next report period, the Contractor will continue to drill a nominal 8-inch diameter pilot-hole via reverse-air rotary method from 1,650 feet bls to anticipated depth of 2,200 feet bls.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments Attachment No.1 (Lithologic Descriptions)

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando
Paul Petrey, Diversified Drilling Corp.

CON 24-01

June 2, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.12 – May 26, 2003 through May 30, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the twelfth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The twelfth week of drilling and construction of the test/monitor well began on May 26, 2003. During this report period, the Contractor halted drilling operations due to mechanical problems with the rotary table. As result, no additional pilot hole was drilled below the previous depth of 1,650 feet below land surface (bls).

During the latter part of the next report period, the Contractor will resume drilling operations and continue to drill a nominal 8-inch diameter pilot-hole via reverse-air rotary method from 1,650 feet bls to anticipated depth of 2,200 feet bls.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando
Paul Petrey, Diversified Drilling Corp.

CON 24-01

June 9, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.13 – June 2, 2003 through June 6, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the thirteenth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The thirteenth week of drilling and construction of the test/monitor well began on June 2, 2003. During this report period, the Contractor fixed the mechanical problems with the rotary table and restarted drilling operations. On June 6, 2003, the Contractor drilled a nominal 8-inch diameter pilot-hole via reverse-air method from 1,650 feet to 1,766 feet below land surface (bls).

During the next report period, the Contractor will continue to drill a nominal 8-inch diameter pilot-hole via reverse-air rotary method from 1,766 feet bls to an anticipated depth of 2,100 feet bls. If the pilot-hole is completed, the open-hole section will be developed via reverse air and prepared for geophysical logging operations.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando
Paul Petrey, Diversified Drilling Corp.

CON 24-01

June 16, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.14 – June 9, 2003 through June 13, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the fourteenth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The fourteenth week of drilling and construction of the test/monitor well began on June 9, 2003. During this report period, the Contractor drilled a nominal 8-inch diameter pilot-hole via reverse-air method from 1,766 feet to a total depth of 2,100 feet below land surface (bls). Upon completion, the Contractor developed the open-hole section via reverse-air and prepared it for subsequent geophysical logging operations.

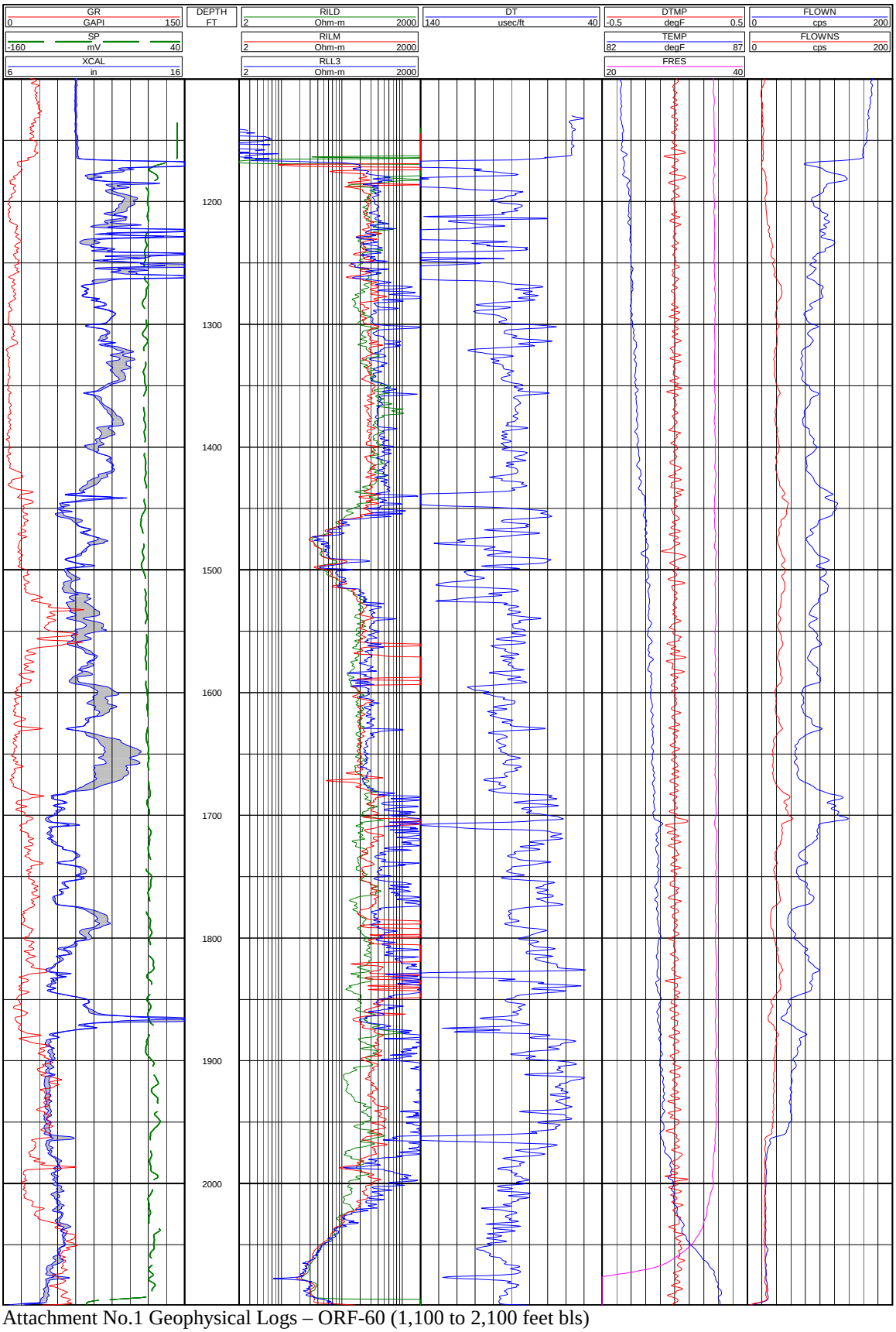
On June 13, 2003, MV Geophysical Services conducted formation evaluation and production logging operations in the open-hole section from 1,170 to 2,100 feet bls. The formation evaluation logging suite consisted of the following: 4-arm caliper, natural gamma ray, spontaneous potential (SP), borehole compensated sonic (BHC), and dual induction/laterolog combination. The production logs included a flowmeter, fluid resistivity, and temperature conducted under both static and dynamic conditions. In addition, a borehole video survey was conducted to complement the geophysical log data. A composite of the geophysical log traces is provided for your review (Attachment No.1).

During the next report period, the Contractor will begin to conduct packer testing operations. Based on lithologic and geophysical log data, the first packer test interval selected is between 1,935 and 1,975 bls. An additional packer test will be conducted later that week within the middle portion of the open-hole section.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando
Paul Petrey, Diversified Drilling Corp.



Attachment No.1 Geophysical Logs – ORF-60 (1,100 to 2,100 feet bls)

CON 24-01

June 30, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.15 – June 16, 2003 through June 20, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the fifteenth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The fifteenth week of drilling and construction of the test/monitor well began on June 16, 2003. During this report period, the Contractor configured and set a dual packer assembly, which isolated an interval (flow zone) from 1,930 feet to 1,970 feet below land surface (bls). The dual packer assembly consisted of two 6.4-inch diameter inflatable packers (Baski) separated by a various lengths of perforated pipe. The packer assembly was connected to non-perforated drill pipe that extended back to land surface. The Contractor then installed a 5-hp submersible pump to begin testing operations. The pressure transducer readings from the isolated section and water quality parameters (temperature, pH, and specific conductance) of the purged formation water were monitored for stability. These parameters were used to determine isolation of the test interval.

The drawdown and recovery phases were completed successfully on June 19, 2003. The calculated specific capacity indicated moderate to good production, yielding 58.7 gallons per minute per foot of drawdown (gpm/ft/Dd). The specific capacity (SC) was calculated using the following method:

SC = Q / Dd = 135 gpm/ (19.32 ft – 17.02 ft) = 58.7 gpm/ft /Dd

Q = pump rate in gallons per minute as measure by an in-line flowmeter,
Dd = aquifer head loss in feet (total head loss – pipe friction loss (0.96 ft/100 feet for 4-inch (ID) pipe which extended to 1,710 feet bls and 0.31 ft/100 feet for 200 feet of 5-inch (ID) pipe). Pumping rate during the drawdown phase was 135 gpm. Friction loss coefficient determined from Appendix 17.A. Ground Water and Wells, 1989.

The productive nature of this interval enabled it to recover to background levels within the first minute after pumping stopped. The quick rise in water levels within the stand-pipe after pumping stopped induced a pressure wave within the water column. The response to this pressure wave is shown in the enclosed time series plot labeled ORF60-PT1R. In addition, a transmissivity value was not determined using curve-matching techniques because these types of tests generally violate the basic assumptions of the various analytical solutions such as partial penetration, friction loss in small pipe, and short pumping period. An estimated transmissivity can be determined by multiplying the specific capacity by 2000 (Driscoll, 1989) (58.7 * 2000) = 117,400 gpd/ft.

Near the end of the drawdown phase of packer test no. 1, composite water samples were taken from the discharge point and submitted to the Orange County's Water Quality Laboratory for major cation/anion/TDS analysis. The water quality results are not yet available but will be submitted to the Department upon completion.

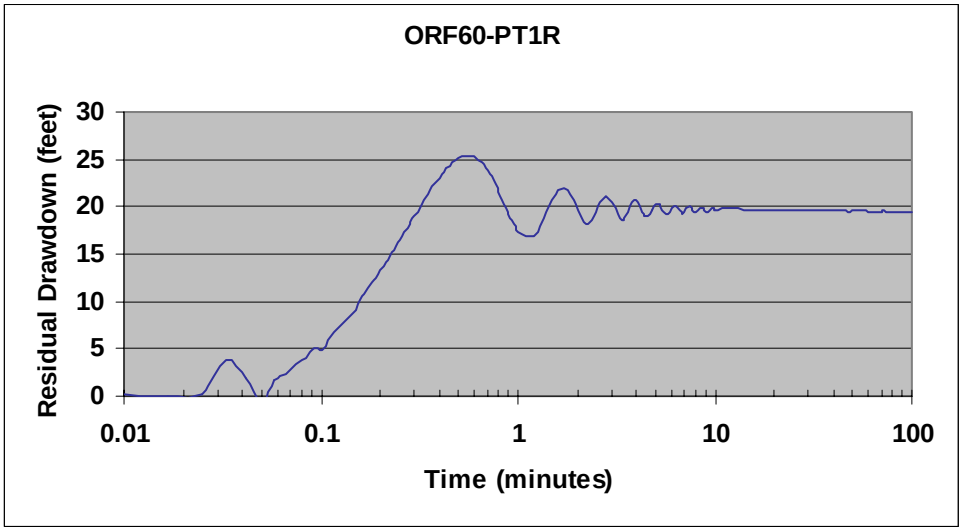
During the next report period, the Contractor will re-configure the dual packer assembly and conduct a second packer test between 1,510 and 1,530 feet bls. Once completed, the Contractor will begin back-plugging operations of the pilot-hole to an anticipated depth of 1,280 feet bls.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments: Packer Test No.1 Recovery Time Series Plot
Lithologic Descriptions (0 to 2,100 feet bls)

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando
Paul Petrey, Diversified Drilling Corp.



Attachment No.1 Time Series Plot o f Residual Drawdown – Packer Test No.1 (1,930 to 1,970 feet bls)

CON 24-01

July 2, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.16 – June 23, 2003 through June 27, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the sixteenth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The sixteenth week of drilling and construction of the test/monitor well began on June 23, 2003. During this report period, the Contractor configured and set a dual packer assembly, which isolated an interval within a low permeable unit from 1,510 feet to 1,540 feet below land surface (bls). The dual packer assembly consisted of two 6.4-inch diameter inflatable packers (Baski) separated by a various lengths of perforated pipe. The packer assembly was connected to non-perforated drill pipe that extended back to land surface. The Contractor then installed a 5-hp submersible pump to begin testing operations. The pressure transducer readings from the isolated section and water quality parameters (temperature, pH, and specific conductance) of the purged formation water were monitored for stability. These parameters were used to determine isolation of the test interval.

The drawdown and recovery phases were completed successfully on June 25, 2003. The calculated specific capacity indicated low production, yielding 1.5 gallons per minute per foot of drawdown (gpm/ft/Dd). The specific capacity (SC) was calculated using the following method:

SC = Q / Dd = 72 gpm/ (51.71 ft – 4.51 ft) = 1.5 gpm/ft /Dd

Q = pump rate in gallons per minute as measure by an in-line flowmeter,
Dd = aquifer head loss in feet (total head loss – pipe friction loss (0.33 ft/100 feet for 4-inch (ID) pipe which extended to 1,300 feet bls and 0.11 ft/100 feet for 200 feet of 5-inch (ID) pipe). Pumping rate during the drawdown phase was 72 gpm. Friction loss coefficient determined from Appendix 17.A. Ground Water and Wells, 1989.

A time series labeled ORF60-PT2R is enclosed for your review. A transmissivity value was not determined using curve-matching techniques because these types of tests generally violate the basic assumptions of the various analytical solutions such as partial penetration, friction loss in small pipe, and short pumping period. An estimated transmissivity, however can be determined by multiplying the specific capacity by 2000 (Driscoll, 1989) (1.5 * 2000) = 3000 gpd/ft). The low specific capacity and estimated transmissivity indicates the confining nature of this unit.

Near the end of the drawdown phase of packer test no. 2, composite water samples were taken from the discharge point and submitted to the Orange County's Water Quality Laboratory for major cation/anion/TDS analysis. The water quality results are not yet available but will be submitted to the Department upon completion.

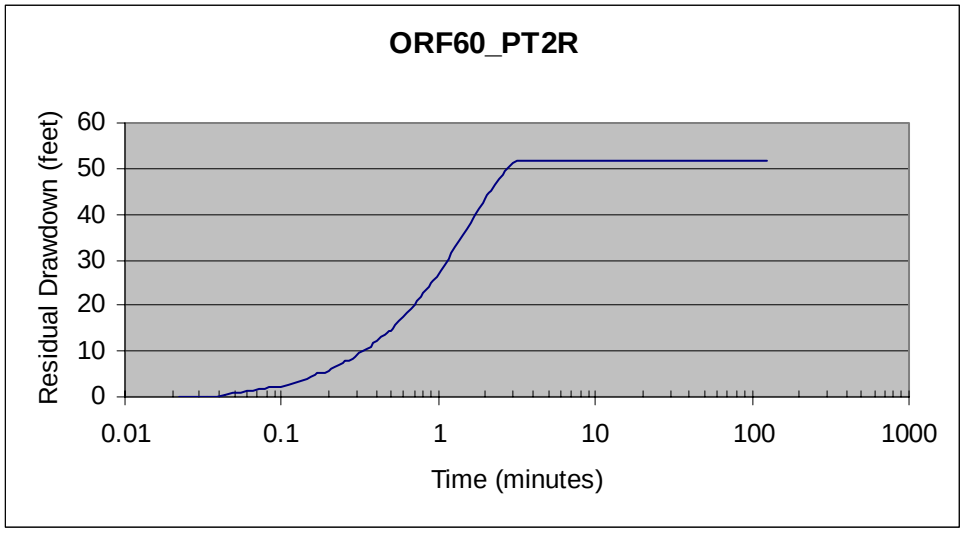
During the next report period, the Contractor will begin back-plugging operations of the pilot-hole to an anticipated depth of 1,280 feet bls.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachments: Packer Test No.2 Recovery Time Series Plot

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando
Paul Petrey, Diversified Drilling Corp.



Attachment No.1 Time Series Plot o f Residual Drawdown – Packer Test No.2 (1,510 to 1,540 feet bls)

CON 24-01

July 7, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.17 – June 30, 2003 through July 4, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the seventeenth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The seventeenth week of drilling and construction of the test/monitor well began on June 30, 2003. During this report period, the Contractor began back-plugging operations. The Contactor configured the drill pipe and began back-plugging operations. At the end of the report period, the Contractor back-plugged the nominal 8-inch diameter borehole to an elevation of 1,380 feet below land surface.

During the next report period, the Contractor will continue back-plugging operations of the pilot-hole to an anticipated depth of 1,280 feet bls. Upon completion, the Contractor will begin demobilization and construction of the wellhead and concrete pad.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando
Paul Petrey, Diversified Drilling Corp.

CON 24-01

July 14, 2003

Dear Interested Parties:

SUBJECT: Weekly Summary Report No.18 – July 7, 2003 through July 11, 2003
Reedy Creek Energy Services, Lower Floridan Aquifer Test/Monitor Well
South Florida Water Management District Well Construction Permit Number
SF022403A

The purpose of this letter is to inform the Florida Department of Environmental Protection (Department) of events that transpired during the eighteenth week of construction on the lower Floridan aquifer test/monitor well identified as ORF-60 and those activities anticipated for the next report period.

The eighteenth week of drilling and construction of the test/monitor well began on July 7, 2003. During this report period, the Contractor completed back-plugging operations of the nominal 8-inch diameter borehole to an elevation of 1,280 feet below land surface (bls).

Attached for your review are the water quality results of water samples obtained during the two packer test completed below 1,500 feet bls

During the next report period, the Contractor will complete demobilization and construction of the wellhead and concrete pad. This will be the last weekly summary report submitted to the Department. An engineering report to be completed by the South Florida Water Management District documenting the construction and testing activities at this site will be submitted to the Department upon completion.

Sincerely:

Michael W. Bennett, P.G.
Lead Hydrogeologist
Water Supply Department
South Florida Water Management District

Attachment No.1 Water Quality Data (ORF-60)

Distribution: Anil K. Desai, FL Department of Environmental Protection/Orlando
Duane.Watroba, FL Department of Environmental Protection/Orlando
Ted Mckim, Reedy Creek Energy Services
Carlos Zubiria, Reedy Creek Energy Services
Chris Sweazy, SFWMD/Orlando
Paul Petrey, Diversified Drilling Corp.

Geochemical data from Reedy Creek FAS Test Well (ORF-60, Western Orange County, Florida

Identifer	Depth Interval feet (bls)	Na mg/L	K mg/L	Ca mg/L	Mg mg/L	Cl mg/L	ALKA mg/L	SO4 mg/L	TDS mg/L	Conduct umhos/cm	Temp centi	pH S.U	SiO2 mg/L	Sample Date
ORF-60_SC1	220-715	3.5	0.7	37	7.4	5.1	116	7.5	134	236	23.18	7.45	9.8	04/01/03
ORF-60_PT1	1930-1970	3.8	0.58	35	8.9	7.2	115	8.6	144	264	25.87	7.71	10.8	06/19/03
ORF-60_PT2	1510-1540	3.9	0.75	34	10	4.9	114	22.2	158	260	27.08	7.50	12.4	06/25/03

Attachment No.1 – Water Quality Data from Packer and Specific Capacity Tests

APPENDIX B
Casing Mill Certificates

B I L L O F L A D I N G

No: BLK 26058

Ship From:
Bartow Steel, Inc.
An Edgen Company
3595 Hwy 60 W
Bartow, FL 33830
Tel: 863 869-9716 Fax: 863 869-8520

Ship Date 17Apr03 at 12:14 From LKF
Probill
Via OUR TRUCK
FOB DELIVERED
Frt INCLUDED
Route 0- 0 Manifest
Vhcle Trailer
Slp David Thurner

2

Consigned To: (001)
DIVERSIFIED DRILLING
c/o WELL SITE
REEDY CREEK DEVELOPMENT
(((L@@K 4 MAP)))
ORLANDO, FLORIDA 04/21/2003
Tel: 813 988-1132 Fax: 813 985-6636

Sold To: (5647)
DIVERSIFIED DRILLING
8801 MAISLIN DR
P O BOX 290699
TAMPA, FL 33687-0699

B I L L O F L A D I N G

1) Our Order BLK- 64203- 1 Your PO # 20926
Carbon Steel Pipe ERW ASTM A53B
10.750" OD X .365 WALL X 42'

Heat Number	Tag No	Quantity	PCS	Wt LBS
211261	LKC5431	42 FT	1	1700
Y82522	LK63930	42 FT	1	1700
211261	LKC5429	42 FT	1	1700
211261	LKC5432	42 FT	1	1700
173100B	LKC3589	36 ' 8.0000 "	1	1484
173100B	LKC3581	35 ' 3.0000	1	1427
173100B	LKC3587	38 ' 8.0000	1	1565
173100B	LKC3578	34 ' 9.0000	1	1407
174031C	LKC3594	42 '10.0000	1	1734
173100B	LKC3593	39 '11.0000	1	1616
173070B	LKC3592	39 ' 5.0000	1	1596
173100B	LKC3591	39 ' 5.0000	1	1596
173100B	LKC3590	39 ' 6.0000	1	1599
173070B	LKC3582	35 ' 4.0000	1	1430
173097B	LKC3595	39 ' 3.0000	1	1589
282283A	LK94409	41 ' 6.0000 "	1	1680
11811	LKC4667	40 ' 1.0000 "	1	1623
11811	LKC4666	40 ' 2.0000 "	1	1626
11811	LKC4665	40 ' 2.0000 "	1	1626
11811	LKC4664	40 ' 2.0000 "	1	1626
11811	LKC4683	40 ' 1.0000 "	1	1623
11811	LKC4682	40 ' 2.0000 "	1	1626
11811	LKC4681	40 ' 2.0000 "	1	1626
22236	LKC4680	40 ' 1.0000 "	1	1623
22236	LKC5256	42 ' 4.0000 "	1	1714
22236	LKC5255	42 ' 3.0000 "	1	1710

Page: 1 ....Continued

MTR'S W/~~SHIPMENT~~
faxed 4-21-03 TC → faxed 4-22-03 Karen

The property described above, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession under the contract) agrees to carry to its usual place of deliver at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination, it is mutually agreed, as to each carrier of all or any said property over all or any portion of said route to destination, and as each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western and Illinois Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which govern the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.	CARRIER	FREIGHT Prepaid ☐ Collect ☐
SIGNATURE OF CONSIGNOR X Craig Thurner	AGENT PER (Driver's Signature) X	
If charges are to be prepaid, write or stamp here, "To be Prepaid." RECEIVED $ To apply in payment of the charge on the property described hereon.	AGENT OR CASHIER (The signature here acknowledges only the amount prepaid.)	CHARGES ADVANCED $

B I L L O F L A D I N G

No: BLK 26058

Ship From:
Bartow Steel, Inc.
An Edgen Company
3595 Hwy 60 W
Bartow, FL 33830
Tel: 863 869-9716 Fax: 863 869-8520

Ship Date 17Apr03 at 12:14 From LKF
Probill
Via OUR TRUCK
FOB DELIVERED
Frt INCLUDED
Route 0- 0 Manifest
Vhcle Trailer
Slp David Thurner

Consigned To: (001)
DIVERSIFIED DRILLING

Sold To: (5647)
DIVERSIFIED DRILLING

B I L L	O F L A D I N G			
22423	LKC4679 -	40 ' 2.0000 "	1	1626
22423	LKC4670 -	38 ' 5.0000 "	1	1555
22424	LKC4672 -	38 ' 7.0000 "	1	1562
22426	LKC5254 -	42 ' 3.0000 "	1	1710
	Total:	1,195 ' 7.0000 "	30	48399

	Tags	Pcs	LBS
TOTAL:	30	30	48399

NEED HELP?? CALL PAUL PETRY @ (813) 918-5687

****
****
NOTE: PRODUCT MAY CONTAIN AN ID OR OD BAR CODE
IDENTIFICATION LABEL
****
****

The property described above, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession under the contract) agrees to carry to its usual place of deliver at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination, it is mutually agreed, as to each carrier of all or any said property over all or any portion of said route to destination, and as each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western and Illinois Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.		CARRIER	FREIGHT Prepaid ☐ Collect ☐
SIGNATURE OF CONSIGNOR X Craig Turner		AGENT PER (Driver's Signature) X	
If charges are to be prepaid, write or stamp here, "To be Prepaid."	RECEIVED $ To apply in payment of the charge on the property described hereon.	AGENT OR CASHIER (The signature here acknowledges only the amount prepaid.)	CHARGES ADVANCED $

T-228 P.016/020 F-089

863-869-8520

APR-22-2003 01:31PM FROM-Bartow Steel

Paragon Industries, Inc.
Rt.3 Box 331A
Sapulpa, Oklahoma, 74066
Phone: (918) 291-4459
Fax: (918) 291-0918

'LANT
way 117
es East of
ulpa, OK

MATERIAL TEST REPORT

Certificate Number 10646
Customer PO 1906

Melted and Manufactured in the USA

Manufactured by Electric Resistance Weld (Type E)

tomer
BARTOW STEEL INC.
P.O. BOX 1789
BARTOW, FL 33831-1789

Product
10.75 x .365 40.52# A53B/SA53B

Specifications
ASTM A53-99B
ASME B36.10M-1996

MECHANICAL PROPERTIES

at Number	Steel Order No.		Yield Strength Psi	Tensile Strength Psi	Elongation % in 2 inches	Test Type Orientation/Tensile	Test Condition	Gauge Width
12027	3576		59460	68640	39.7%	Strip/Transverse/Body	As Rolled	1.5
22235	3576		55920	66830	41.0%	Strip/Transverse/Body	As Rolled	1.5
11811	3576		59460	67830	40.3%	Strip/Transverse/Body	As Rolled	1.5

CHEMICAL ANALYSIS %

at Number	Mill Control	C	MN	P	S	Si	Cr	Ni	Mo	Cu	V	Al	Ca
12027	Heat	0.060	0.640	0.012	0.004	0.210	0.030	0.010	0.000	0.020	0.001	0.040	0.003
	Product	0.049	0.631	0.007	0.004	0.217	0.037	0.025	0.014	0.049	0.002	0.031	0.001
22235	Heat	0.070	0.690	0.010	0.005	0.220	0.030	0.010	0.000	0.040	0.001	0.029	0.003
	Product	0.061	0.669	0.007	0.004	0.228	0.027	0.014	0.008	0.037	0.002	0.021	0.001
11811	Heat	0.070	0.660	0.016	0.005	0.210	0.040	0.020	0.010	0.040	0.001	0.034	0.004
	Product	0.054	0.646	0.012	0.004	0.224	0.039	0.020	0.011	0.044	0.002	0.028	0.002

IT / INSPECTION		
drostatic Test PSI	1430	@ 5 secs
ttening Test	YES	
rasonic weldline (NDT)	YES	.125 DH
ll Length Visual	YES	
ll Length Drift	N/A	size
at Treat Min. Temperature	1600	degrees

Comment
PER CUSTOMER REQUEST.

THESE MILL TEST REPORTS APPLY TO
YOUR P.O. # 20926
BARTOW STEEL REF. # 64203

We certify that the product described above has been manufactured, Sampled, Inspected and tested in accordance to the referenced specification and / or order, and is in compliance with all requirements. QA Department

MTR. 01/03

Paragon Industries, Inc.
Rt.3 Box 331A
Sapulpa, Oklahoma, 74066
Phone: (918) 291-4459
Fax: (918) 291-0918

PLANT
Higway 117
5 Miles East of
Sapulpa, OK

MATERIAL TEST REPORT

Certificate Number 10495
Customer PO BLK 1906

Melted and Manufactured in the USA

Manufactured by Electric Resistance Weld (Type E)

Customer	Product	Specifications
BARTOW STEEL, INC. 5015 S. FLORIDA AVE. SUITE 201 LAKELAND, FL 33813-	10.75 x .365 40.52# A53B/SA53B	ASTM A53-99B ASME B36.10M-1996

MECHANICAL PROPERTIES

Heat Number	Steel Order No.	Yield Strength Psi	Tensile Strength Psi	Elongation % in 2 inches	Test Type Orientation/Tensile	Test Condition	Gauge Width
11812	3576	62650	72190	34.1%	Strip/Transverse/Body	As Rolled	1.5
22423*	3576	55920	66830	41.0%	Strip/Transverse/Body	As Rolled	1.5
22236	3576	56160	66520	36.5%	Strip/Transverse/Body	As Rolled	1.5
22424	3576	56240	66730	40.9%	Strip/Transverse/Body	As Rolled	1.5
22425	3576	58690	68950	36.8%	Strip/Transverse/Body	As Rolled	1.5

CHEMICAL ANALYSIS %

Heat Number	Mill Control	C	MN	P	S	Si	Cr	Ni	Mo	Cu	V	Al	Ca
11812	Heat	0.060	0.680	0.012	0.003	0.210	0.040	0.010	0.000	0.020	0.001	0.034	0.004
	Product	0.054	0.640	0.009	0.003	0.227	0.030	0.008	0.007	0.015	0.003	0.033	0.001
22423*	Heat	0.070	0.690	0.010	0.005	0.220	0.030	0.010	0.000	0.040	0.001	0.029	0.003
	Product	0.061	0.669	0.007	0.004	0.228	0.027	0.014	0.008	0.037	0.002	0.021	0.001
22236	Heat	0.060	0.650	0.010	0.005	0.210	0.040	0.020	0.010	0.050	0.001	0.040	0.004
	Product	0.049	0.632	0.007	0.004	0.216	0.036	0.025	0.014	0.049	0.002	0.031	0.001
22424	Heat	0.070	0.650	0.009	0.006	0.210	0.040	0.010	0.010	0.020	0.001	0.030	0.003
	Product	0.066	0.662	0.005	0.006	0.232	0.031	0.013	0.008	0.025	0.002	0.027	0.002
22425	Heat	0.060	0.640	0.013	0.004	0.210	0.040	0.010	0.000	0.020	0.001	0.043	0.003
	Product	0.055	0.642	0.013	0.005	0.221	0.037	0.020	0.011	0.043	0.002	0.027	0.001

TEST / INSPECTION		
Hydrostatic Test PSI	1430	@ 5 secs
Flattening Test	YES	
Ultrasonic weldline (NDT)	YES	.125 DH
Full Length Visual	YES	
Full Length Drift	N/A	size
Heat Treat Min. Temperature	1600	degrees

Comment

THESE MILL TEST REPORTS APPLY TO
YOUR P.O. # 20926
BARTOW STEEL REF. # 64203

We certify that the product described above has been manufuctured, Sampled, Inspected and tested in accordance to the referenced specification and / or order, and is in compliance with all requirements. QA Department

01/03

Paragon Industries, Inc.
Rt.3 Box 331A
Sapulpa, Oklahoma, 74066
Phone: (918) 291-4459
Fax: (918) 291-0918

MATERIAL TEST REPORT

Certificate Number 11029
Customer PO BLK-1916

PLANT
gway 117
les East of
pulpa, OK

Melted and Manufactured in the USA

Results relate only to items tested. Test report not to be reproduced without written approval of Quality Assurance.

Manufactured by Electric Resistance Weld (Type E)

stomer

BARTOW STEEL INC.
P.O. BOX 1789
BARTOW, FL 33831-1789

Product
10.75 x .365 40.52# A53B/SA53B

Specifications
ASTM A53-99B
ASME B36.10M-1996

MECHANICAL PROPERTIES

eat Number	Steel Order No.		Yield Strength Psi	Tensile Strength Psi	Elongation % in 2 inches	Test Type Orientation/Tensile	Test Condition	Gauge Width
11813	3576		59540	68250	38.2%	Strip/Transverse/Body	As Rolled	1.5
22236	3576		56160	66520	36.5%	Strip/Transverse/Body	As Rolled	1.5
22423	3576		56240	66730	40.9%	Strip/Transverse/Body	As Rolled	1.5
11811	3576		59460	67830	40.3%	Strip/Transverse/Body	As Rolled	1.5
22426	3576		59990	69110	39.7%	Strip/Transverse/Body	As Rolled	1.5

CHEMICAL ANALYSIS %

eat Number	Mill Control	C	MN	P	S	Si	Cr	Ni	Mo	Cu	V	Al	Ca
11813	Heat	0.070	0.660	0.010	0.004	0.220	0.030	0.010	0.000	0.020	0.001	0.039	0.003
	Product	0.054	0.630	0.007	0.004	0.226	0.031	0.012	0.009	0.019	0.002	0.031	0.001
22236	Heat	0.060	0.650	0.010	0.005	0.210	0.040	0.020	0.010	0.050	0.001	0.040	0.004
	Product	0.049	0.632	0.007	0.004	0.216	0.036	0.025	0.014	0.049	0.002	0.031	0.001
22423	Heat	0.070	0.650	0.009	0.006	0.210	0.040	0.010	0.010	0.020	0.001	0.030	0.003
	Product	0.066	0.662	0.005	0.006	0.232	0.031	0.013	0.008	0.025	0.002	0.027	0.002
11811	Heat	0.070	0.660	0.016	0.005	0.210	0.040	0.020	0.010	0.040	0.001	0.034	0.004
	Product	0.054	0.646	0.012	0.004	0.224	0.039	0.020	0.011	0.044	0.002	0.028	0.002
22426	Heat	0.060	0.660	0.010	0.005	0.220	0.030	0.010	0.000	0.040	0.001	0.038	0.004
	Product	0.056	0.649	0.005	0.004	0.231	0.026	0.012	0.008	0.039	0.002	0.033	0.001

ST / INSPECTION		
ydrostatic Test PSI	1430	@ 5 secs
attening Test	YES	
ltrasonic weldline (NDT)	YES	.125 DH
ull Length Visual	YES	
ull Length Drift	N/A	size
eat Treat Min. Temperature	1600	degrees

Comment

THESE MILL TEST REPORTS APPLY TO
YOUR P.O. # 20926
BARTOW STEEL REF. # 64203

We certify that the product described above has been manufactured, Sampled, Inspected and tested in accordance to the referenced specification and / or order, and is in compliance with all requirements. QA Department

02/03

.MTR.

검 사 증 명 서 (A)

MILL INSPECTION CERTIFICATE

현 대 강 관 주 식 회 사
HYUNDAI PIPE CO.,LTD.
• 본사·공장 : 울산광역시 북구 염포동 265번지 ☎(052)·230·0000
HEAD OFFICE : # 265, YUMPO-DONG, BUK-KU, ULSAN, KOREA
(ULSAN PLANT) TEL:280-0114 FAX:(052)287-8916
TLX:HDPIPE K 53776
• 서울사무소 : 서울특별시 중구 무교동 77번지 ☎(02)·753·0000
SEOUL OFFICE : # 77, MUGYO-DONG, JOONG-KU, SEOUL, KOREA
TEL:3455-0500 FAX:775-7095

성적서번호 CERTIFICATE NO : B05082 페이지 PAGE : 1
발행일자 DATE OF ISSUE : APR. 27. 2000. E4012900
계약번호 CONTRACT (P/O) NO :
품명 COMMODITY : E.R.W. STEEL PIPE
제품규격 SPECIFICATION : ASTM A53 GR.B
수요가 CUSTOMER :

G:GOOD

종 TYPE OF PIPE END	치수 DIMENSION 외경 x 두께 x 길이 (OUTDIA. x THICK. x LENGTH)	수량 QUANTITY (PCS)	중량 WEIGHT (KG)	수압시험 HYDRO-STATIC TEST MPa / kg f/cm² / PSI	#6 VISUAL & DIMENSION TEST	#7 FLATTENING (B) TEST	#8 WELD DUCTILITY TEST	#9 N.D.	#10 DRIFT TEST	#11 FLARING TEST	#12 CRUSH TEST	#13 R-FLATTENING TEST	#14 HEAT TREATMENT	도막시험 COATING TEST 아연부착량 WEIGHT OF ZINC COAT g/m² / OZ/FT²	굽힘성 BEND TEST TIMES	#5	경도 HARD-NESS RRB / HV	제강번호 HEAT NO.	인장시험 TENSILE TEST 항복강도 YIELD STRENGTH PSI	인장강도 TENSILE STRENGTH B (#15) kg f/mm² / N/mm²	W (#15)	연신율 ELONGATION %	#17	화학성분(%) CHEMICAL COMPOSITION C x 100	Si x 100	Mn x 100	P x 1000	S x 1000	Cu x 100	Ni x 100	Cr x 100	Mo x 100	V x 100	Nb x 1000	Al x 1000	Ceq	충격시험 IMPACT 흡수에너지 Absorbed ENGY. JOULE	전단적면율 SHEAR AREA %
#1	#2 #3 #4																																				
/BE	NB 8" x .322" x21.000'	651	177.313	166	G	G	G	G					G					A82307	32.6	50.8	53.4	32		19	1	80	17	8	1	2	1	Tr	Tr				
	(219.1mm x 8.18mm x 6.401M)			2360															46400	72300	76000																
																		B07576	34.0	50.9	53.2	35		18	1	77	18	7	1	2	1	Tr	Tr				
																			48400	72400	75700																
/BE	NB 8" x .322" x42.000'	77	41.945	166	G	G	G	G					G					B07731	34.6	49.8	52.3	37		17	1	78	17	8	1	2	2	Tr	Tr				
	(219.1mm x 8.18mm x 12.802M)			2360															49200	70800	74400																
																		YS3599	33.2	48.7	51.2	34		18	1	79	15	10	1	2	1	Tr	Tr				
																			47200	69300	72800																
																		YS4147	32.1	47.3	50.0	33		17	1	79	19	10	1	2	1	Tr	Tr				
																			45700	67300	71100																
VBE	NB 8" x .500" x42.000'	80	66.192	211	G	G	G	G					G					YS1679	32.4	50.1	53.0	39		18	1	74	14	7	1	2	1	Tr	Tr				
	(219.1mm x12.70mm x 12.802M)			3000															46100	71300	75400																
																		YS3595	30.9	47.7	50.2	38		16	1	77	12	9	1	1	1	Tr	Tr				
																			44000	67800	71400																
VBE	NB 10" x .365" x21.000'	120	46.318	171	G	G	G	G					G					YS2528	31.0	45.1	47.8	36		15	2	75	16	10	1	2	1	Tr	Tr				

비고 REMARK

THESE MILL TEST REPORTS APPLY TO
YOUR P.O. # 20926
BARTOW STEEL REF. # 64203

참고 NOTES

#1 Type of pipe End 끝종

X
- B : Black
- G : Galvanized
- E : Enameled

X
- V : Varnish
- R : Removal Varnish
- O : Oiling Coating
- P : PE Coating
- C : Coaltar Coating
- A : Asphalt Coating

XX
- PE : Plain End
- BE : Bevel End
- TE : Thread End
- TC : Thread Coupling
- BL : Bell End
- SE : Swaging End
- VJ : Victaulic Joint

#2 NB : Nominal Bore 호칭경, OD: Outside Diameter
#3 Unit 단위 (M : mm, I : Inch)
#4 Unit 단위 (M : Meter, F : Feet, I : Inch)
#5 G : Good
#6 visual & Dimension Test 육안 및 치수검사
#7 Flattening or Bending Test 편평 또는 굽힘시험
#8 Weld Ductility Test 용접부 연신시험
#9 Nondestructive Test 비파괴검사 ( )
#10 Drift Test 관통시험
#11 Flaring Test 확관시험
#12 Crush Test 압궤시험
#13 Reverse Flattening Test 전개시험
#14 Heat Treatment 열처리
#15 B : Base Metal 모재부
#16 W : Weld Part 용접부
#17 H : Heat(Ladle)Analysis 열분석, P:Product Analysis 제품분석

본 제품은 관련규격에 합격되었음을 보증합니다.
WE CERTIFY THAT THE DESCRIBED MATERIAL HAS HEREIN BEEN ACCEPTED IN ACCORDANCE WITH THE PRESCRIBED SPECIFICATION AND ORDER.

SURVEYOR

H. G. Lee
QUALITY ASSURANCE TEAM GENERAL MGR.

14

검 사 증 명 서 (A)

MILL INSPECTION CERTIFICATE

현 대 강 관 주 식 회 사
HYUNDAI PIPE CO.,LTD.

- 본사·공장 : 울산광역시 북구 염포동 265번지 ☎(052)-289-0114
HEAD OFFICE : # 265, YUMPO-DONG, BUK-KU, ULSAN, KOREA
(ULSAN PLANT) TEL:280-0114 FAX:(052)287-8916
TLX:HDPIPE K 53776

- 서울사무소 : 서울특별시 중구 무교동 77번지 ☎(02)-3455-0500~9 FAX:775-7095
SEOUL OFFICE : # 77, MUGYO-DONG, JOONG-KU, SEOUL, KOREA
TEL:3455-0500 FAX:775-7095

인증서번호 CERTIFICATE NO: 805082 페이지 PAGE: 2

발행일자 DATE OF ISSUE: APR. 27. 2000. 84012900

계약번호 CONTRACT (P/O) NO:

품명 COMMODITY: E.R.W. STEEL PIPE

제품규격 SPECIFICATION: ASTM A53 GR.B

수요가 CUSTOMER:

G:GOOD

종 TYPE OF PIPE END ※1	※2	치수 DIMENSION 외경 × 두께 × 길이 (OUTDIA. × THICK. × LENGTH) ※3 ※4	수량 QUANTITY (PCS)	중량 WEIGHT (KG)	수압시험 HYDRO-STATIC TEST kg/cm² PSI	※5	※6 VISUAL & DIMENSION TEST	※7 FLATTENING (B) TEST	※8 WELD DUCTILITY TEST	※9 NON-DESTRUCTIVE TEST	※10 DRIFT TEST	※11 FLARING TEST	※12 CRUSH TEST	※13 R-FLATTENING TEST	※14 HEAT TREATMENT	도막시험 COATING TEST 아연부착량의 WEIGHT OF ZINC COAT g/m² OZ/FT²	굽힘성 DIP TEST TIMES	※5	경도 HARD-NESS RRB HV	제강번호 HEAT NO.	인장시험 TENSILE TEST 항복강도 YIELD STRENGTH PSI	인장강도 TENSILE STRENGTH kg f/mm² PSI	연신율 ELONGATION %	※17	화학성분(%) CHEMICAL COMPOSITION C ×100	Si	Mn ×1000	P	S	Cu	Ni	Cr	Mo	V ×100	Nb	Al ×1000	Ceq	충격시험 IMPACT 흡수에너지 Absorbed EGY. JOULE	전단파면율 SHEAR AREA %
		(273.0㎜ x 9.27㎜ x 6.401M)			2430																																
BE	NB 10"	x .365" x42.000'	236	182.183	171	G	G	G	G					G							182522	32.5	46.5	48.6	37	17	1	78	17	10	1	2	1	Tr	Tr				
		(273.0㎜ x 9.27㎜ x 12.802M)			2430																	46200	66100	69100															
																					182525	31.3	45.6	47.3	30	16	2	76	16	11	1	2	1	Tr	Tr				
																						44500	64900	67900															
																					182528	31.0	45.1	47.8	36	15	2	75	16	10	1	2	1	Tr	Tr				
																						44100	64100	68000															
BE	NB 10"	x .250" x42.000'	87	46.515	117	G	G	G	G					G							178204	32.0	47.2	50.0	37	16	1	67	18	9	1	2	1	Tr	Tr				
		(273.0㎜ x 6.35㎜ x 12.802M)			1660																	45500	67100	71100															
																					182804	31.5	46.7	48.9	32	16	1	74	13	8	1	2	1	Tr	Tr				
																						44800	66400	69600															
		TOTAL ->	1251	560.466																																			

비고 REMARK: FROM-Bartow Steel

비고 NOTES

※1 Type of pipe End 끝종

X
- B : Black
- G : Galvanized
- E : Enameled

X
- V : Varnish
- R : Removal Varnish
- O : Oiling Coating
- P : PE Coating
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- VJ : Victaulic Joint

※2 NB : Nominal Bore 호칭경, OD : Outside Diameter

※3 Unit 단위 (M : mm, I : Inch)

※4 Unit 급위 (M : Meter, F : Feet, I : Inch)

※5 G : Good

※6 visual & Dimension Test 육안 및 치수검사

※7 Flattening or Bending Test 편평 또는 굽힘시험

※8 Weld Ductility Test 용접부 연성시험

※9 Nondestructive Test 비파괴검사 ( )

※10 Drift Test 관통시험

※11 Flaring Test 압확시험

※12 Crush Test 충압시험

※13 Reverse Flattening Test 전개시험

※14 Heat Treatment 열처리

※15 B : Base Metal 모재부

※16 W : Weld Part 용접부

※17 H : Heat(Ladle)Analysis 열분분석, P : Product Analysis 제품분석

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SURVEYOR

H. G. Lee
QUALITY ASSURANCE TEAM GENERAL MGR

THESE MILL TEST REPORTS APPLY TO
YOUR P.O. # 20926
BARTOW STEEL REF. # 64203

Siat

Guatemala 3400 Valentín Alsina - Buenos Aires - Argentina

CERTIFICADO DE CALIDAD
QUALITY CERTIFICATE

Nº 1

Fecha/Date 23/01/2002
Hoja Nº01
PSI Rev. 2-01/00

Cliente/Customer: SIDERCA CORPORATION
Producto: Cañería de Acero con Costura Longitudinal ERW.
Product : Longitudinal Electric Resistance Welded Steel pipe.

Orden de Compra/Purchase Order: TAR-5158
Diámetro: 10,750" x Espesor: 0,365 ". Calidad: API5L2 PSL2
10,750" Outside Diameter x 0.365 " Wall Thickness API5L2 PSL2

O.V. : 6426-2
PF Fab: 6426-2

MUESTRA SAMPLE			ANALISIS QUIMICOS CHEMICAL ANALISES															ENSAYOS MECANICOS MECHANICAL TEST Ksi					PLEGADOS BEND TEST		TENACIDAD TOUGHNESS REAL SIZE							DUR. HARD
LOTE LOT	TUBO PIPE	COLADA HEAT	Cx 100	Mnx 100	Px 1000	Sx 1000	Sx 100	Alx 1000	Crx 100	Nix 100	Mox 1000	Vx 100	Cux 100	Nbx 1000	Tix 1000	Bx 10000	Ceq x100	Yield Test	T.Std T.S.	T.Std Y.S.	Elong %	REL Ratio	Cara Face	Raiz Root	Pos. Loc.	CH. 1	CH. 2	CH. 3	CH. Avg	SH AR %	DWTT Avg %	
	MAX MIN		22	120	25	25			60	40	150	8	40				43		110,0 60,0	65,0 42,0	28	0,93			BODY WELD	10	10	10	13			
	3	1730718	14	101	10	1	17	29	2	1	5	5	2	1	2		33	89,9	82,7	62,6	35	0,75			Body	72	100	73	82	100		
	15	1730718	15	108	9	1	17	32	2	2	5	5	2	1	2		35	89,9	84,3	62,7	38	0,74			Body	101	102	95	99	100		
	19	1731008	13	108	9	2	17	32	1	1	5	5	2	1	3		32	86,6	79,5	62,5	38	0,79			Body	72	82	109	88	100		
	28	1730208	14	103	9	1	20	29	1	1	5	4	2	1	3		32	86,2	81,1	62,5	40	0,77			Body	68	60	73	67	100		
	95	1730978	14	111	10	1	16	27	1	1	5	6	2	1	2		34	86,3	81,9	64,3	40	0,76			Body	55	91	111	86	100		
	196	1730728	14	112	10	1	18	29	1	1	5	6	2	1	3		34	86,7	82,5	64,4	36	0,78			Body	67	103	115	96	100		
	136682	1730708	16	107	10	2	17	30	2	2		5	1	1	2		35															
	136689	1730738	15	105	11	1	16	27	2	2		5	1	1	1		34															
	136700	1730728	16	105	9	2	17	33	2	1		5	2	1	2		33															
	136675	1730748	16	107	10	1	15	26	2	2		5	1	1	1		35															
	136690	1730978	15	106	10	1	18	28	2	1	5	3	3	1	1		34															
	136692	1731008	15	106	9	1	15	28	2	1		5	3	1	2		34															

Control visual y dimensional Visual and dimensional control	100%
Aplastamiento/Ductilidad Flattening test/ductility test	DE API 5L
Marcación Marking	100% API X42 PSL2/API X PSL2**
Prueba hidráulica Hidrostatic test	100% 2560 PSI - 5 SEC
Inspección ultrasónica Ultrasonic inspection	100% STD.REF.HOLE 1/8"
Inspección Radiológica X - Ray inspection	NOT APPLICABLE

CHARPY V - NOTCH TEST: 1/COL.
TEMPERATURE: 32° F
SIZE: 2/3
LOCATION: 90° FROM THE WELD
ORIENTATION: TRANSVERSAL

(Nb+V+Ti): 0.15% Max.

NORMA: API 5L ED. 42
JULY 2000

Prob.Ensayo Tracción
Tensile Test Spec.

Tipo/Type:Strip Spec
Tamaño/Size: 1 1/2"
Orient./Orientación
Transversal

Trat.Térmico en Bold
Weld Head Treatment.
Min.1400°F

Observaciones / Remarks

**API5L A53 D/ASME SA53B/ASTM A53B175

ALL STANDARDS ACCORDING TO LAST EDITION.

*Corresponde a muestra en Mat.Prima
*Samples from raw material.

Jefe Ctl. Cal. / QC Chief

Ing. [illegible] TOMMASI
Jefe Aseguram. de Procesos
SIAT S.A.

①

THESE MILL TEST REPORTS APPLY TO
YOUR P.O. # 20926
BARTOW STEEL REF. # 64203

13

10020801

Siat
Tenaris Group

INSPECTION CERTIFICATE
(DIN 50049.3.1B - EN 10204 3.1B - ISO 10474 3.1B)

Siat S.A.
Guatemala 3400
(B1B22AXZ) Valentín Alsina
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Cliente / Customer	OV	PF. Fab	Número / Number	Fecha / Date	Pág. / Page
SIDERCA CORPORATION	6714/4	6713/2	1	6/08/2002	01 / 03

Producto / Product	Orden de Compra / Purchase Order	Item	Referencia del Cliente / Customer Reference
Cañeria de Acero con Costura Longitudinal ERW. Longitudinal Electric Resistance Welded Steel pipe.	BLK-1669		

Norma / Standard	Grado / Grade	Extremos / Ends
API X42-B PSL2/ASTM A53 B/ASME SA53 B/NACE MR0175	X42 PSL2	BEVELED AT 30° API 5L

Dimensiones / Dimensions	Peso Nominal / Nominal Weight	Largo / Length	Superficie Externa / External Surface	Cantidades / Quantities
10,750"x 9,27 mm 10 3/4 x 0,365 in	60,30 kg/m 40,52 lb/ft	NOMINAL 40 FT	BARNIZ	49 Pz 631,63 m 38656 kg 49 Pcs 2072,28 ft 85221 lb

ENSAYOS MECÁNICOS / MECHANICAL TESTS

Muestra Sample			Ensayo de Tracción Tensile Test						Guided Bend Test Plegado Guiado		Dureza / Hardness Tipo / Type: HV10			Posición Location	Charpy V								DWTT		
				Weld		Body									Absorbed Energy				Shear Area				Shear Area		
Lote Lot	Tubo Pipe	Colada Heat		UTS	EL	UTS	YS	Ratio	EL	Cara Face	Raíz Root	Max	Min	Max Dif		1	2	3	Avg	1	2	3	Avg	1	2	Avg
			Max			110,0	85,0	0,93				248			Body Min	10	10	10	13							
			Min	60,0		60,0	42,0		28						Weld Min											
				ksi	%	ksi	ksi		%						HAZ Min	ft.lb	ft.lb	ft.lb	ft.lb	%	%	%	%	%	%	%
	14	173098C										216	184	32												
	11	173098C		88,6		83,0	64,5	0,78	34						Body	92	111	97	100	100	100	100	100			
	18	282283A										220	196	24												
	19	282283A		90,5		80,6	61,2	0,76	40						Body	81	83	74	79	100	100	100	100			
	40	173097B										219	194	25												
	40	173097B		90,6		83,8	64,0	0,76	40						Body	55	69	64	63	100	100	100	100			
	138	173073B										228	204	24												
	138	173073B		98,5		85,3	64,1	0,75	38						Body	75	77	64	72	100	100	100	100			
	145	173074B										221	192	29												
	145	173074B		89,1		76,7	64,1	0,84	38						Body	72	65	59	69	100	100	100	100			
	191	282282B										230	200	30												
	191	282282B		91,4		85,3	63,1	0,73	35						Body	74	89	111	91	100	100	100	100			
	209	282283A										225	199	26												

Aplastamiento y ductilidad Flattening and ductility tests	API 5L
Charpy V-Notch Test	API 5L
Temperatura / Temperature	0 °C
Probeta / Specimen	2/3 TRANSVERSAL
Ubicación / Location	90 ° FROM WELD
Ensayo de Tracción / Tensile Test	
Probeta / Specimen	
Tipo / Type	STRIP SPECIMEN
Tamaño / Size	1 1/2"
Orientación / Orientation	TRANSVERSAL

UTS: Ultimate tensile strength - Límite de rotura
YS: Yield Strength - Límite de fluencia
EL: Elongation - Alargamiento (Lo = 2")
Ratio: YS/UTS Ratio - Relación fluencia/rotura
Max: Maximum - Máximo
Min: Minimum - Mínimo
Max Dif: Maximum diference - Diferencia máxima
Avg: Average - Promedio
HAZ: Heat affected zone - Zona afectada

Note - Nota:

Siat
Tenaris Group

INSPECTION CERTIFICATE

(DIN 50049.3.1B - EN 10204 3.1B - ISO 10474 3.1B)

Siat S.A.
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Cliente / Customer	OV	PF. Fab	Número / Number	Fecha / Date	Pág. / Page
SIDERCA CORPORATION	**6714/4**	**6713/2**	**1**	**6/08/2002**	**02 / 03**

Producto / Product	Orden de Compra / Purchase Order	Item	Referencia del Cliente / Customer Reference
Cañería de Acero con Costura Longitudinal ERW. **Longitudinal Electric Resistance Welded Steel pipe.**	**BLK-1669**		

Norma / Standard	Grado / Grade	Extremos / Ends
API X42-B PSL2/ASTM A53 B/ASME SA53 B/NACE MR0175	**X42 PSL2**	**BEVELED AT 30° API 5L**

Dimensiones / Dimensions	Peso Nominal / Nominal Weight	Largo / Length	Superficie Externa / External Surface	Cantidades / Quantities
10,750"x 9,27 mm **10 3/4 x 0,365 in**	**60,30 kg/m** **40,52 lb/ft**	**NOMINAL 40 FT**	**BARNIZ**	**49 Pz 631,63 m 38656 kg** **49 Pcs 2072,28 ft 85221 lb**

ANÁLISIS QUÍMICOS DE PRODUCTO / PRODUCT CHEMICAL ANALYSES

Muestra Sample		%																											
		C	Mn	P	S	Si	Al	Cr	Ni	Mo	V	Cu	Sn	Nb	Ti	Co	B	Ca	Elm1	Elm2	Elm3	Ceq1	Ceq2	Pcm	Sum1	Sum2	Sum3	R1	R2	R3
Tubo Pipe	Colada Heat	x 100	x 100	x 1000	x 1000	x 100	x 1000	x 100	x 100	x 1000	x 100	x 100	x 100	x 1000	x 1000	x 100	x 10000	x 10000	x	x	x	x 100	x 100	x 100	x 100	x 100	x 100			
Max		22	120	25	15			40	40	15	8	40										43			15					
Min																														
11	173888C	15	101	10	2	17	34	2	2	5	5	1	5	1	2	1	3	30				34			5					
18	282283A	15	101	18	1	19	33	2	1	5	4	1	2	2	2	1	3	27				33			4					
40	1730978	15	111	12	2	18	29	2	2	5	4	1	1	1	2	1	3	27				35			4					
138	1730738	16	100	15	3	16	24	2	1	5	4	2	2	2	1	1	3	25				34			4					
145	1730748	16	108	9	2	17	35	2	2	5	5	2	8	1	2	1	3	29				36			5					
191	2822828	16	100	14	3	18	24	2	1	5	4	1	2	1	1	1	3	26				34			4					
141747	173073B*	14	101	12	2	16	28	2	1	5	5	2	1	1	1							33			5					
138679	173074B*	16	107	10	1	15	26	2	2		5	1	8	1	1							35			5					
138690	173087B*	15	106	10	1	18	28	2	1	5	3	3	4	1	1							34			3					
138691	173086C*	14	103	10	2	17	29	2	2		5	1	6	1	2							33			5					
141785	2822828*	15	102	13	2	16	23	2	1	5	4	1	2	1	1							33			4					
141288	282283A*	14	103	17	1	21	33	2	1	5	4	2	2	1	2							33			4					

Notas / Notes: Elm: Elemento / Element Ceq: Carbono equivalente - Equivalent Carbon Sum: Suma - Sum R: Ratio
*Corresponde a muestra en Materia Prima. *Samples from raw material.

Elm1 =

Elm2 =

Elm3 =

Ceq1 = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Ceq2 =

Pcm =

Sum1 = Nb+V+Ti

Sum2 =

Sum3 =

R1 =

R2 =

R3 =

(3)

Siat
Tenaris Group

INSPECTION CERTIFICATE

(DIN 50049.3.1B - EN 10204 3.1B - ISO 10474 3.1B)

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Cliente / Customer	OV	PF. Fab	Número / Number	Fecha / Date	Pág. / Page
SIDERCA CORPORATION	6714/4	6713/2	1	6/06/2002	03 / 03

Producto / Product	Orden de Compra / Purchase Order	Item	Referencia del Cliente / Customer Reference
Cañería de Acero con Costura Longitudinal ERW. **Longitudinal Electric Resistance Welded Steel pipe.**	BLK-1669		

Norma / Standard	Grado / Grade	Extremos / Ends
API X42-B PSL2/ASTM A53 B/ASME SA53 B/NACE MR0175	X42 PSL2	BEVELED AT 30° API 5L

Dimensiones / Dimensions	Peso Nominal / Nominal Weight	Largo / Length	Superficie Externa / External Surface	Cantidades / Quantities
10,750"x 9,27 mm 10 3/4 x 0,365 in	60,30 kg/m 40,52 lb/ft	NOMINAL 40 FT	BARNIZ	49 Pz 631,63 m 38656 kg 49 Pcs 2072,28 ft 85221 lb

Marcación / Marking

@ = Monograma / Monogram API NN = Número de tubo / pipe number LL = Largo / Length PP = Peso / Weight MM/YY = Mes / Año - Month / Year HH = Colada / Heat

Estarcido (tubo) / Stenciling (pipe)

5L-210 SIAT @ MM/YY 10.750 0.365" 40.52 Lb/Ft API X42 PSL2/API B PSL2/ASTM A53 B/ASME SA53 B/NACE MR0175. E. TESTED 2560 PSI.
IND. ARGENTINA N°: NN LENGTH: (Ft): LL. PF/IT: 6714-4. PO BLK-1669. N° HEAT: .-

Observaciones / Remarks

VISUAL AND DIMENSIONAL CONTROL 100%
HYDROSTATIC TEST : 2560 PSI - 5 SEC.
WELD ULTRASONIC INSPECTION: REFERENCE STD. 1/8" DRILLED HOLE.

Length: max. 42.97 Ft.
min. 41.01 Ft.

STD: API 5L ED. 42. JULY 2000
ASTM A53.ED. 1999
ASME SA53. ED. 2001
NACE MR 0175. ED1999

Por la presente certificamos que el material aquí descripto ha sido fabricado de acuerdo con las normas y especificaciones solicitadas en vuestra orden y satisfacen los correspondientes requerimientos	We hereby certified that the material herein described has been manufactured in accordance with the standards and specifications required in your order and satisfies the corresponding requirements
Este certificado se emite mediante un sistema computarizado y es válido con firma electrónica. En el certificado original el logo SIAT-TENARIS (verde) está impreso en la parte superior y como fondo de la hoja. En caso que el poseedor entregue una copia del mismo, deberá garantizar la conformidad con el original, haciéndose responsable por cualquier uso ilegal o indebido.	This certificate is issued by a computarized system and it is valid with the electronic signature. On the original the SIAT-TENARIS green coloured trade mark is stamped on the upper part and as background of the page. In case the owner of the certificate released a copy, he must attest its conformity to the original, taking upon himself the responsibility for any unlawful or not allowed use.
Cualquier alteración y / o falsificación estará sujeta a la ley. Si necesita asegurar la autenticidad de este certificado, contactarse con Siat S.A., e-mail: ctommasi@siat.com.ar	Any alteration and / or falsification will be subject to the law If you need to assure the authenticity of this certificate, please do not hesitate to contact Siat S.A., e-mail ctommasi@siat.com.ar

Process Engineering Department
Sector Ingeniería de Procesos
CLAUDIO G. TOMMASI

552 Rev. 0.12/01

(1)

Siat
Tenaris Group

THESE MILL TEST REPORTS APPLY TO
YOUR P.O. # 20926
BARTOW STEEL REF. # 64203

INSPECTION CERTIFICATE

(DIN 50049.3.1B - EN 10204 3.1B - ISO 10474 3.1B)

10020801

Siat S.A.
Guatemala 3400
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Cliente / Customer	OV	PF. Fab	Número / Number	Fecha / Date	Pág. / Page
SIDERCA CORPORATION	5714/2	5713/1	1	6/08/2002	01 / 03

Producto / Product	Orden de Compra / Purchase Order	Item	Referencia del Cliente / Customer Reference
Cañería de Acero con Costura Longitudinal ERW. Longitudinal Electric Resistance Welded Steel pipe.	BLK-1669		

Norma / Standard	Grado / Grade	Extremos / Ends
API X42-B PSL2/ASTM A53 B/ASME SA53 B/NACE MR0175	X42 PSL2	BEVELED AT 30° API 5L

Dimensiones / Dimensions	Peso Nominal / Nominal Weight	Largo / Length	Superficie Externa / External Surface	Cantidades / Quantities
8,625 "x 8,18 mm 8 5/8 x 0,322 in	42,54 kg/m 28,59 lb/ft	NOMINAL 40 FT	BARNIZ	46 Pz 598,85 m 26070 kg 46 Pcs 1964,73 ft 57474 lb

ENSAYOS MECÁNICOS / MECHANICAL TESTS

Muestra Sample			Ensayo de Tracción Tensile Test						Guided Bend Test Plegado Guiado		Dureza / Hardness Tipo / Type: HV10			Posición Location	Charpy V								DWTT		
				Weld		Body				Cara Face	Raíz Root	Max	Min	Max Dif		Absorbed Energy				Shear Area				Shear Area		
Lote Lot	Tubo Pipe	Colada Heat		UTS	EL	UTS	YS	Ratio	EL							1	2	3	Avg	1	2	3	Avg	1	2	Avg
			Max			110,0	65,0	0,93				248			Body Min	10	10	10	13							
			Min	60,0		60,0	42,0		27						Weld Min HAZ Min											
				ksi	%	ksi	ksi		%							ft.lb	ft.lb	ft.lb	ft.lb	%	%	%	%	%	%	%
	4	282283B										222	201	21												
	4	282283B		88,6		82,7	59,5	0,72	36						Body	79	83	100	87	100	100	100	100			
	12	282282A										221	197	24												
	12	282282A		88,6		81,5	60,9	0,75	38						Body	85	77	74	79	100	100	100	100			
	23	271761B										228	207	21												
	23	271761B		90,2		85,7	61,9	0,72	36						Body	114	119	108	114	100	100	100	100			
	50	174078C										219	199	20												
	50	174078C		88,9		82,8	62,1	0,76	38						Body	79	114	121	105	100	100	100	100			
	254	174031C										217	196	21												
	254	174031C		87,9		81,5	63,8	0,78	36						Body	119	105	114	112	100	100	100	100			
	282	173094B										222	203	19												
	282	173094B		90,8		66,4	64,4	0,74	38						Body	79	68	68	71	100	100	100	100			
	368	271761B										220	199	21												

Aplastamiento y ductilidad Flattening and ductility tests	API 5L
Charpy V-Notch Test Temperatura / Temperature	API 5L 0 °C
Probeta / Specimen	2/3 TRANSVERSAL
Ubicación / Location	90 ° FROM WELD
Ensayo de Tracción / Tensile Test Probeta / Specimen	
Tipo / Type	STRIP SPECIMEN
Tamaño / Size	1-1/2
Orientación / Orientation	TRANSVERSAL

UTS: Ultimate tensile strength - Límite de rotura
YS: Yield Strength - Límite de fluencia
EL: Elongation - Alargamiento (Lo = 2")
Ratio: YS/UTS Ratio - Relación fluencia/rotura
Max: Maximum - Máximo
Min: Minimum - Mínimo
Max Dif: Maximum diference - Diferencia máxima
Avg: Average - Promedio
HAZ: Heat affected zone - Zona afectada

Note - Nota:

Siat
Tenaris Group

INSPECTION CERTIFICATE

(DIN 50049.3.1B - EN 10204 3.1B - ISO 10474 3.1B)

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Cliente / Customer	OV	PF. Fab	Número / Number	Fecha / Date	Pág. / Page
SIDERCA CORPORATION	6714/2	6713/1	1	6/08/2002	02 / 03

Producto / Product	Orden de Compra / Purchase Order	Item	Referencia del Cliente / Customer Reference
Cañería de Acero con Costura Longitudinal ERW. Longitudinal Electric Resistance Welded Steel pipe.	BLK-1669		

Norma / Standard	Grado / Grade	Extremos / Ends
API X42-B PSL2/ASTM A53 B/ASME SA53 B/NACE MR0175	X42 PSL2	BEVELED AT 30° API 5L

Dimensiones / Dimensions	Peso Nominal / Nominal Weight	Largo / Length	Superficie Externa / External Surface	Cantidades / Quantities
8,625 "x 8,18 mm 8 5/8 x 0,322 in	42,54 kg/m 28,59 lb/ft	NOMINAL 40 FT	BARNIZ	46 Pz 598,85 m 26070 kg 46 Pcs 1964,73 ft 57474 lb

ANÁLISIS QUÍMICOS DE PRODUCTO / PRODUCT CHEMICAL ANALYSES

Muestra / Sample		%																											
		C	Mn	P	S	Si	Al	Cr	Ni	Mo	V	Cu	Sn	Nb	Ti	Co	B	Ca	Elm1	Elm2	Elm3	Ceq1	Ceq2	Pcm	Sum1	Sum2	Sum3	R1	R2	R3
Tubo / Pipe	Colada / Heat	x 100	x 100	x 1000	x 1000	x 100	x 1000	x 100	x 100	x 1000	x 100	x 100	x 100	x 1000	x 1000	x 100	x 10000	x 10000	x	x	x	x 100	x 100	x 100	x 100	x 100	x 100			
Max		22	120	25	15			40	40	15	8	40										43			15					
Min																														
4	282283B	14	109	16	1	21	38	2	1	5	4	2	1	1	2	1	3	30				33			4					
12	282282A	14	103	16	1	21	36	2	1	5	4	2	1	1	2	1	3	32				33			4					
23	271761B	14	106	10	1	18	24	2	1	5	4	2	2	1	2	1	3	25				33			4					
50	174078C	14	105	12	3	17	30	2	1	5	5	2	2	1	2	1	3	33				33			5					
254	174031C	14	107	12	2	20	34	2	1	5	4	1	1	1	2	1	3	34				33			4					
282	173094B	15	114	8	1	14	25	2	1	5	5	2	2	1	2	1	3	34				36			5					
41512	173094B	15	111	8	1	15	26	2	1	5	5	2	2	1	1							35			5					
41532	174031C	14	104	12	2	20	35	2	1	6	4	2	1	1	1							33			4					
41552	174078C	14	103	12	3	17	32	2	1	6	5	2	1	1	1							33			5					
41572	271761B	14	102	9	1	18	25	2	1	6	4	2	1	2	1							33			4					
41592	282282A	15	104	10	1	19	26	2	1	5	4	2	1	2	1							34			4					
41612	282283B	14	102	11	3	17	42	2	1	5	4	2	1	1	1							33			4					

Notas / Notes: Elm: Elemento / Element Ceq: Carbono equivalente - Equivalent Carbon Sum: Suma - Sum R: Ratio
*Corresponde a muestra en Materia Prima. *Samples from raw material.

Elm1 =

Elm2 =

Elm3 =

Ceq1 = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Ceq2 =

Pcm =

Sum1 = Nb+V+Ti

Sum2 =

Sum3 =

R1 =

R2 =

R3 =

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Tenaris Group

(3)

INSPECTION CERTIFICATE

(DIN 50049.3.1B - EN 10204 3.1B - ISO 10474 3.1B)

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Cliente / Customer	OV	PF. Fab	Número / Number	Fecha / Date	Pág. / Page
SIDERCA CORPORATION	6714/2	6713/1	1	6/08/2002	03 / 03

Producto / Product	Orden de Compra / Purchase Order	Item	Referencia del Cliente / Customer Reference
Cañeria de Acero con Costura Longitudinal ERW. **Longitudinal Electric Resistance Welded Steel pipe.**	BLK-1669		

Norma / Standard	Grado / Grade	Extremos / Ends
API X42-B PSL2/ASTM A53 B/ASME SA53 B/NACE MR0175	X42 PSL2	BEVELED AT 30° API 5L

Dimensiones / Dimensions	Peso Nominal / Nominal Weight	Largo / Length	Superficie Externa / External Surface	Cantidades / Quantities
8,625 "x 8,18 mm 8 5/8 x 0,322 in	42,54 kg/m 28,59 lb/ft	NOMINAL 40 FT	BARNIZ	46 Pz 598,85 m 26070 kg 46 Pcs 1964,73 ft 57474 lb

Marcación / Marking
@ = Monograma / Monogram API NN = Número de tubo / pipe number LL = Largo / Length PP = Peso / Weight MM/YY = Mes / Año - Month / Year HH = Colada / Heat

Estarcido (tubo) / Stenciling (pipe)
5L-210 SIAT @ MM/YY 8.625" 0.322" 28.59 Lb/Ft API X42 PSL2/API B PSL2/ASTM A53 B/ASME SA53 B/NACE MR0175. E. TESTED 2659 PSI.
IND. ARGENTINA N°: NN LENGTH: (Ft): LL. PF/IT: 6714-2. PO BLK-1669. N° HEAT: -

Observaciones / Remarks

VISUAL AND DIMENSIONAL CONTROL 100%
HYDROSTATIC TEST : 2659 PSI - 5 SEC.
WELD ULTRASONIC INSPECTION: REFERENCE STD. 1/8" DRILLED HOLE

Length: max. 42.97 Ft.
min. 41.01 Ft.

STD: API 5L ED 42. JULY 2000
ASTM A53 ED 1999
ASME SA53 ED. 2001
NACE MR 0175 ED1999

Por la presente certificamos que el material aquí descripto ha sido fabricado de acuerdo con las normas y especificaciones solicitadas en vuestra orden y satisfacen los correspondientes requerimientos	We hereby certified that the material herein described has been manufactured in accordance with the standards and specifications required in your order and satisfies the corresponding requirements
Este certificado se emite mediante un sistema computarizado y es válido con firma electrónica. En el certificado original el logo SIAT-TENARIS (verde) está impreso en la parte superior y como fondo de la hoja. En caso que el poseedor entregue una copia del mismo, deberá garantizar la conformidad con el original, haciéndose responsable por cualquier uso ilegal o indebido.	This certificate is issued by a computarized system and it is valid with the electronic signature. On the original the SIAT-TENARIS green coloured trade mark is stamped on the upper part and as background of the page. In case the owner of the certificate released a copy, he must attest its conformity to the original, taking upon himself the responsibility for any unlawful or not allowed use.
Cualquier alteración y / o falsificación estará sujeta a la ley. Si necesita asegurar la autenticidad de este certificado, contactarse con Siat S.A., e-mail: ctommasi@siat.com.ar	Any alteration and / or falsification will be subject to the law. If you need to assure the authenticity of this certificate, please do not hesitate to contact Siat S.A., e-mail ctommasi@siat.com.ar

Process Engineering Department
Sector Ingeniería de Procesos
CLAUDIO G. TOMMASI

BORUSAN BORU
Borusan Birleşik Boru Fabrikaları A.Ş.

MILL TEST CERTIFICATE

Certificate No 9242 — Page 1/ 5

Date 8/05/2002

Type of Document	EN 10204 /3.1 B
Contract No/Lot No	2088 / 01
Standard	API 5L PSL1/ASTM A53/ASME SA53
Material	ASTM A53 GR B/ASME SA53 GR B/API 5L GR B
Product	E.R.W STEEL PIPE
Customer	ABD-NORSTEEL CORP
Order No./LC No.	16633 / BLK-17703
Shipment No	401
Remarks	API 5L-00/ASTM A53-01/ASME SA53-97

Inspector's Stamp: K 2

Item	Dimension OD X WT X L (INCH)	M.Type	Pieces	Total Length (Ft)	Total Weight (Tons)	Type
1	3 1/2 "X .216X21.0	NWB	874	18354.0	63.113	VPE
2	3 1/2 "X .216X42.0	NWB	210	8820.0	30.330	VPE
3	4 1/2 "X .237X21.0	GWB	437	9177.0	44.923	VPE
4	4 1/2 "X .237X42.0	GWB	224	9408.0	46.048	VPE
5	5 9/16"X .258X21.0	GWB	278	5838.0	38.721	VPE
6	5 9/16"X .258X42.0	GWB	76	3192.0	21.161	VPE
7	6 5/8 "X .280X21.0	GWB	306	6426.0	55.298	VPE
8	6 5/8 "X .280X42.0	GWB	278	11676.0	100.469	VPE
9	8 5/8 "X .322X21.0	GWB	402	8442.0	109.287	VPE
10	8 5/8 "X .322X42.0	GWB	191	8022.0	103.841	VPE
11	10 3/4"X .365X21.0	GWB	315	6615.0	121.401	VPE
12	10 3/4"X .365X42.0	GWB	180	7560.0	138.780	VPE
13	12 3/4"X .375X21.0	GWB	181	3801.0	85.432	VPE
14	12 3/4"X .375X42.0	GWB	104	4368.0	98.176	VPE

Item	Heat No.	Chemical Composition(%) C x100	Si	Mn	P	S	Al	Mo x1000	Cr	Ni	Cu	V	Nb	Ti	Ceq
1	221429	17	1	89	10	12	65	0	10	6	24	1	2	1	.323
1	221430	14	1	85	10	14	69	0	10	8	28	1	2	1	.288
1	221432	17	1	89	10	12	66	0	9	5	24	1	2	1	.322
2	117195	14	1	83	9	12	67	0	10	7	27	1	2	1	.285
2	221430	14	1	85	10	14	69	0	10	8	28	1	2	.1	.288

MANAGER OF QUALITY CONTROL DEPARTMENT
Koray YASAR
BORUSAN
Quality Control Department

e-mail : tcpfcof@borusan.com

THESE MILL TEST REPORTS APPLY TO
YOUR P.O. # 20926
BARTOW STEEL REF. # 64203

BORUSAN BORU
Borusan Birleşik Boru Fabrikaları A.Ş.

MILL TEST CERTIFICATE

Certificate No 9242

Item	Heat No.	Chemical Composition(%) C x100	Si	Mn	P	S	Al x1000	Mo	Cr	Ni	Cu	V	Nb	Ti	Ceq
3	114250	16	1	89	15	9	56	0	22	11	26	1	1	1	.312
3	211203	17	1	94	13	12	61	0	10	5	18	1	1	1	.328
4	117149	17	1	93	13	11	61	0	10	5	17	1	1	1	.330
4	210740	15	1	89	10	12	61	0	12	30	34	2	1	1	.300
5	221327	13	0	82	3	7	69	0	14	8	29	2	4	2	.275
6	221327	13	0	82	3	7	69	0	14	8	23	2	4	2	.275
7	211209	15	1	86	11	9	75	0	13	7	26	1	1	1	.295
8	221103	15	1	86	9	8	48	0	11	7	23	1	1	1	.297
8	221105	16	1	90	12	9	73	0	13	6	24	1	1	1	.315
8	221108	14	1	91	13	8	62	0	12	5	20	1	1	1	.298
8	231280	15	1	90	13	8	61	0	12	5	20	0	1	1	.304
8	231283	16	1	89	11	9	72	0	12	6	22	1	0	1	.308
9	117368	13	0	88	9	13	56	0	4	2	17	0	0	0	.277
9	137600	14	1	89	10	15	54	0	5	3	18	0	0	1	.291
9	211332	15	1	86	6	10	66	0	6	15	24	0	0	1	.293
9	211333	14	1	87	8	10	59	1	24	12	26	1	1	1	.291
9	211385	14	1	91	12	17	58	0	5	3	18	0	0	1	.297
9	220099	15	1	86	7	10	69	0	9	20	29	1	1	1	.301
10	117368	13	0	88	9	13	56	0	4	2	17	0	0	0	.277
10	137167	14	1	90	10	17	56	0	4	3	17	0	0	1	.293
10	211333	14	1	87	9	10	58	1	24	12	26	1	1	1	.291
10	211335	15	1	90	7	10	67	0	4	6	27	1	1	1	.301
10	211385	14	1	91	12	17	56	0	5	3	18	0	0	1	.297
11	136737	15	1	99	10	10	77	0	11	9	24	1	2	1	.320
11	211154	16	20	100	13	10	80	5	5	5	5	5	5	5	.324
11	211260	15	1	99	10	9	76	0	11	9	24	1	2	1	.323
11	211261	14	2	105	12	9	66	0	13	10	32	1	2	2	.318
11	221154	13	1	101	11	8	57	0	13	9	27	1	2	1	.302
12	211154	16	20	100	13	10	80	5	5	5	5	5	5	5	.324
12	211260	15	1	99	10	9	76	0	11	9	24	1	2	1	.323
→ 12	211261	14	2	105	12	9	66	0	13	10	32	1	2	2	.318
12	221154	13	1	101	11	8	57	0	13	9	27	1	2	1	.302

MANAGER OF QUALITY CONTROL DEPARTMENT
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BORUSAN BORU
Borusan Birleşik Boru Fabrikaları A.Ş.

MILL TEST CERTIFICATE

Certificate No 9242 Page 3/ 5

Item	Heat No.	Chemical Composition(%) C x100	Si	Mn	P	S	Al x1000	Mo	Cr	Ni	Cu	V	Nb	Ti	Ceq
12	221261	16	20	100	13	10	80	5	5	5	6	5	5	5	.324
12	231354	15	1	100	8	12	63	0	10	12	33	1	1	1	.321
13	127612	18	2	90	9	9	68	0	11	15	62	1	2	1	.331
13	136360	15	1	110	11	10	57	0	16	7	25	1	1	1	.342
13	211250	15	1	103	10	11	59	0	13	9	29	1	1	1	.329
13	211251	14	1	98	7	8	67	0	11	9	26	1	2	1	.310
14	211250	15	1	103	10	11	53	0	13	9	29	1	1	1	.329
14	211251	14	1	98	7	8	67	0	11	9	26	1	2	1	.310
14	211252	14	19	98	7	8	42	1	8	10	29	1	2	1	.307

Item	Heat No.	Tensile Test ***	YS psi	TS psi	E %	Impact Test ***	Ave	Tem	HT psi/Sec	Threads EL	NP	B D	V D	F B	D E	D T	N C
1	221429	KLB	52486	68421	31				2494/ 5			30	G	G	G	G	G
1	221430	KLB	48300	61980	32				2494/ 5			30	G	G	G	G	G
1	221432	KLB	52880	66343	31				2494/ 5			30	G	G	G	G	G
2	117195	KLB	50104	63290	31				2494/ 5			30	G	G	G	G	G
2	221430	KLB	48300	61980	32				2494/ 5			30	G	G	G	G	G
3	114250	KLB	61507	71726	33				2204/ 5			30	G	G	G	G	G
3	211203	KLB	62007	72160	34				2204/ 5			30	G	G	G	G	G
4	117149	KLB	64469	74283	35				2204/ 5			30	G	G	G	G	G
4	210240	KLB	65730	75574	34				2204/ 5			30	G	G	G	G	G
5	221327	KLB	56098	67608	31				1943/ 5			30	G	G	G	G	G
6	221327	KLB	56098	67608	31				1943/ 5			30	G	G	G	G	G
7	211209	KLB	61409	69871	31				1783/ 5			30	G	G	G	G	G
8	221103	KLB	65315	74116	31				1783/ 5			30	G	G	G	G	G
8	221105	KLB	66073	74319	31				1783/ 5			30	G	G	G	G	G
8	221108	KLB	64847	74392	32				1783/ 5			30	G	G	G	G	G
8	231280	KLB	64723	73459	32				1783/ 5			30	G	G	G	G	G

MANAGER OF QUALITY CONTROL DEPARTMENT
Kemal YASAN
Quality Control Department

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BORUSAN BORU
Borusan Birleşik Boru Fabrikaları A.Ş.

M I L L T E S T C E R T I F I C A T E

Certificate No 9242

Item	Heat No.	Tensile Test ***	YS psi	TS psi	E %	Impact Test ***	Ave 345	Tem	HT psi/Se	Threads EL	NP	B ID	V D	F B	D E	N D T	C
8	231283	KLB	67194	76897	32				1763/ 5			30	G	G	G	G	G
9	117368	KQW		72002					1566/ 5				G	G	G	G	G
9	117368	KLB	54621	66811	31				1566/ 5			30	G	G	G	G	G
9	137600	KQW		73927					1566/ 5				G	G	G	G	G
9	137600	KLB	55980	69423	30				1566/ 5			30	G	G	G	C	G
9	211332	KQW		71062					1566/ 5				G	G	G	G	G
9	211332	KLB	54883	65141	34				1566/ 5			30	G	G	G	G	G
9	211333	KQW		76553					1566/ 5				G	G	G	G	G
9	211333	KLB	57372	70747	31				1566/ 5			30	G	G	G	G	G
9	211385	KQW		75381					1566/ 5				G	G	G	G	G
9	211385	KLB	57012	70376	32				1566/ 5			30	G	G	G	G	G
9	220099	KQW		75843					1566/ 5				G	G	G	G	G
9	220099	KLB	63848	70867	32				1566/ 5			30	G	G	G	G	G
10	117368	KQW		72002					1566/ 5				G	G	G	G	G
10	117368	KLB	54621	66811	31				1566/ 5			30	G	G	G	G	G
10	137167	KQW		70880					1566/ 5				G	G	G	G	G
10	137167	KLB	58838	69654	32				1566/ 5			30	G	G	G	G	G
10	211333	KQW		76553					1566/ 5				G	G	G	G	G
10	211333	KLB	57372	70747	31				1566/ 5			30	G	G	G	G	G
10	211335	KQW		81018					1566/ 5				G	G	G	G	G
10	211335	KLB	61506	71868	33				1566/ 5			30	G	G	G	G	G
10	211385	KQW		75381					1566/ 5				G	G	G	G	G
10	211385	KLB	57012	70376	32				1566/ 5			30	G	G	G	G	G
11	136737	KQW		78916					1711/ 5				G	G	G	C	G
11	136737	KLB	62990	76149	32				1711/ 5			30	G	G	G	G	G
11	211154	KLB	51126	69691	28				1711/ 5			30	G	G	G	G	G
11	211260	KQW		76044					1711/ 5				G	G	G	C	G
11	211260	KLB	59442	71664	32				1711/ 5			30	G	G	G	G	G
11	211261	KQW		80411					1711/ 5				G	G	G	G	G
11	211261	KLB	62158	74902	33				1711/ 5			30	G	G	G	G	G
11	221154	KQW		81289					1711/ 5				G	G	G	C	G
11	221154	KLB	62992	76005	31				1711/ 5			30	G	G	G	G	G

MANAGER OF QUALITY CONTROL DEPARTMENT
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BORUSAN BORU
Borusan Birleşik Boru Fabrikaları A.Ş.

MILL TEST CERTIFICATE

Certificate No 9242 Page 5/ 5

Item	Heat No.	Tensile Test ***	YS psi	TS psi	E %	Impact Test ***	Ave	Tem	HT psi/Se	Threads EL	NP	B D	V D	F B	D E	D T	N C
12	211154	KLB	51126	69691	28				1711/ 5			30	G	G	G	G	G
12	211260	KQW		76044					1711/ 5				G	G	G	G	G
12	211260	KLB	59442	71664	32				1711/ 5			30	G	G	G	G	G
12	211261	KQW		80411					1711/ 5				G	G	G	G	G
12	211261	KLB	62158	74902	33				1711/ 5			30	G	G	G	G	G
12	221154	KQW		81289					1711/ 5				G	G	G	G	G
12	221154	KLB	62992	76005	31				1711/ 5			30	G	G	G	G	G
12	221261	KLB	51126	69691	28				1711/ 5			30	G	G	G	G	G
12	231354	KQW		78933					1711/ 5				G	G	G	C	C
12	231354	KLB	62421	75206	34				1711/ 5			30	G	G	G	G	G
13	127612	KQW		71017					1247/ 5				G	G	G	G	G
13	127612	KLB	52499	68600	30				1247/ 5			30	G	G	G	G	G
13	136360	KQW		76666					1247/ 5				G	G	G	G	G
13	136360	KLB	57945	70627	30				1247/ 5			30	G	G	G	G	G
13	211250	KQW		75824					1247/ 5				G	G	G	G	G
13	211250	KLB	57807	73563	32				1247/ 5			30	G	G	G	G	G
13	211251	KQW		77604					1247/ 5				G	G	G	G	G
13	211251	KLB	56763	69995	32				1247/ 5			30	G	G	G	G	G
14	211250	KQW		75824					1247/ 5				G	G	G	G	G
14	211250	KLB	57807	73563	32				1247/ 5			30	G	G	G	G	G
14	211251	KQW		77604					1247/ 5				G	G	G	G	G
14	211251	KLB	56763	69995	32				1247/ 5			30	G	G	G	G	G
14	211252	KQW		75931					1247/ 5				G	G	G	G	G
14	211252	KLB	57575	71979	31				1247/ 5			30	G	G	G	G	G

MANAGER OF QUALITY CONTROL DEPARTMENT
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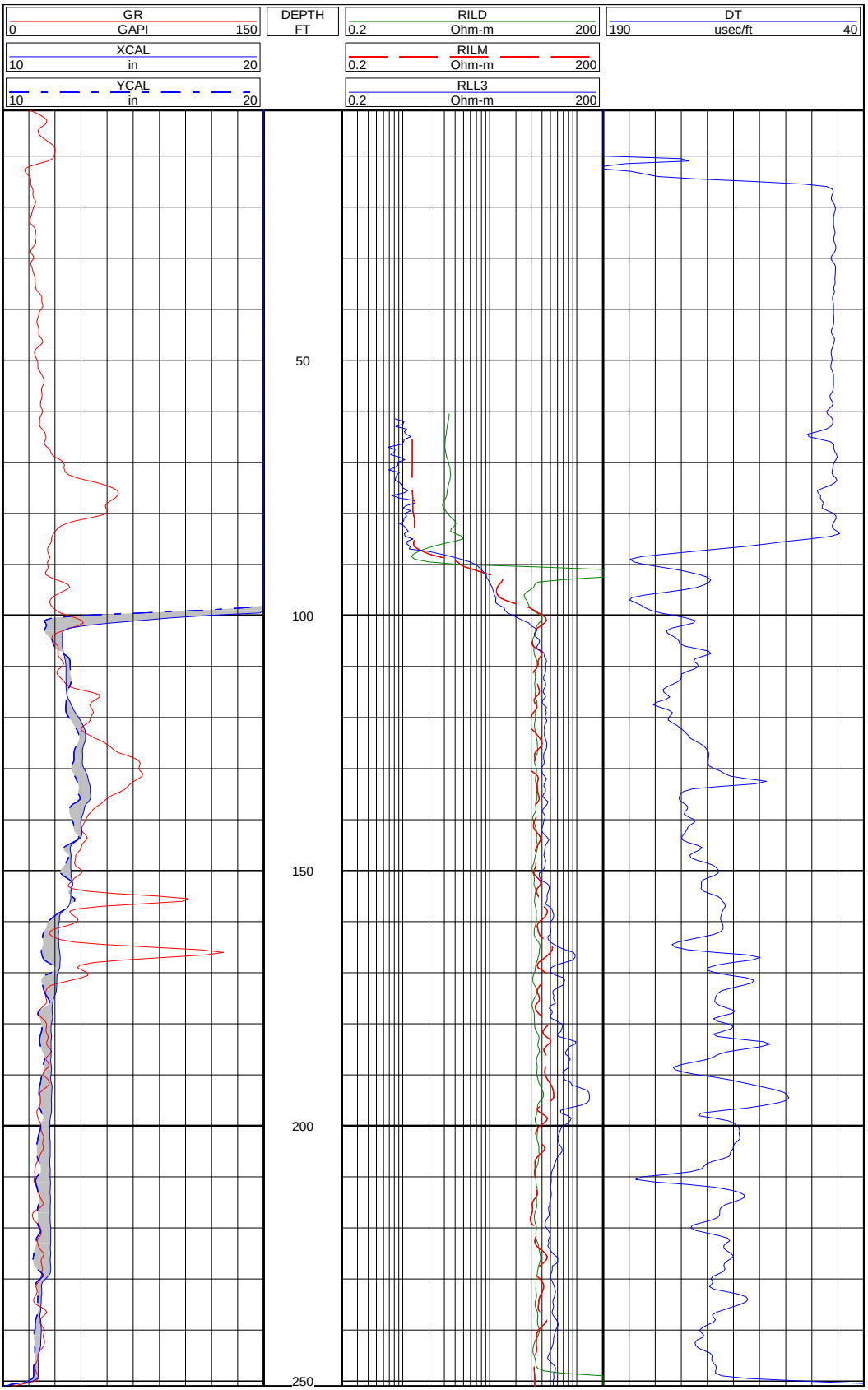
BD.: Beval Degree
VD.: Visual&Dimensions
FB.: Flattenning-Bending
DE.: Drift Expanding
C..: Coating
EL.: Effective Length
G..: Good
YS:Yield Stress
TS:Tensile Strength
E..: Elongation
Ave: Average
HT.: Hydrostatic Test
NP.: Number per inch
M.Type: Manuf.type

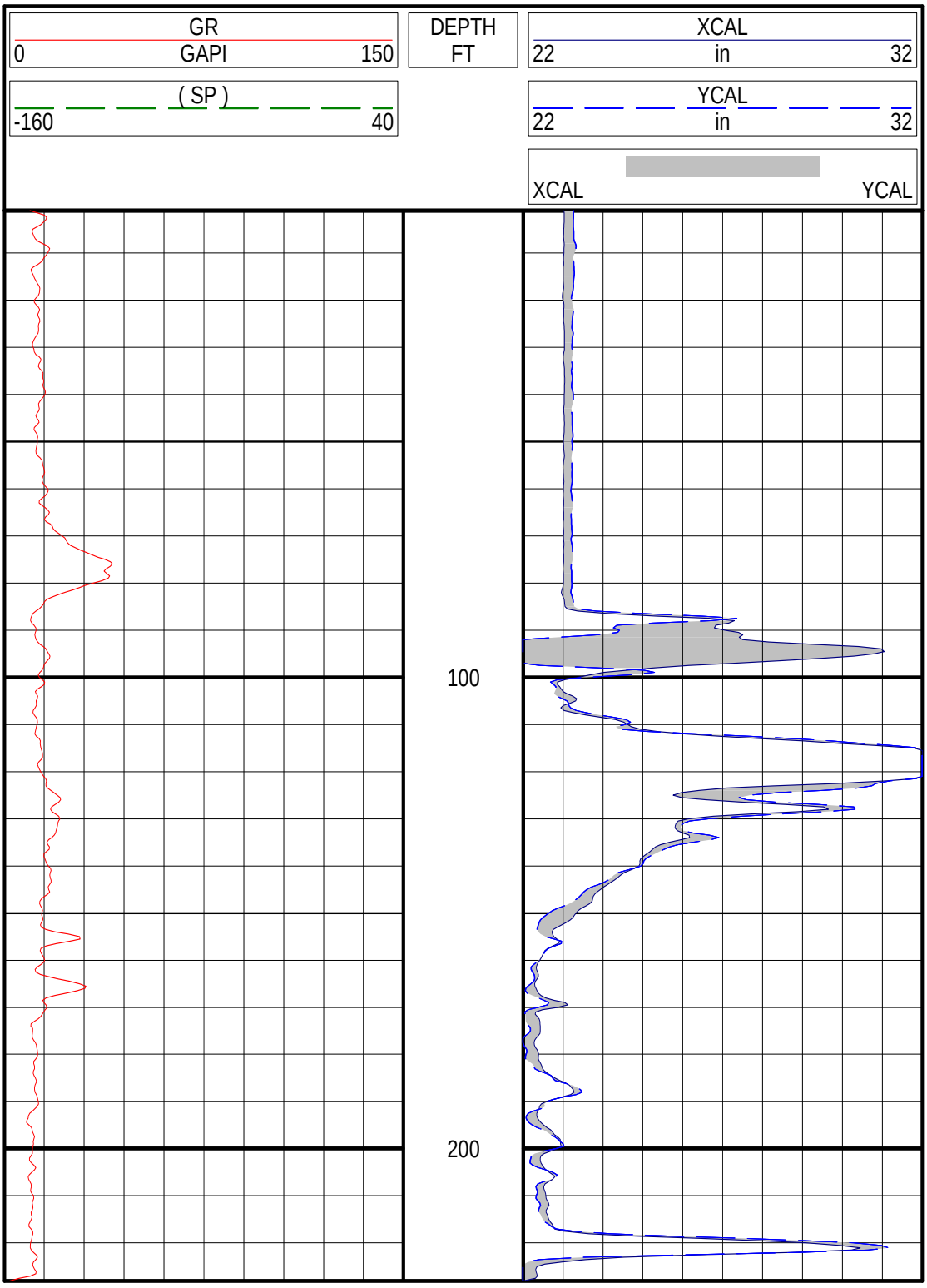
*1.L=Ladle,P=Product Analysis
*2.Kind of Steel:K=Killed
*3.Direction:L=Longitudinal
Q=Transverse
*4.Sampling Position:B=Base
W=Weld
*5.Impact Type :U Type,V Type

* We hereby certify that the material described above complies with the terms of order contract

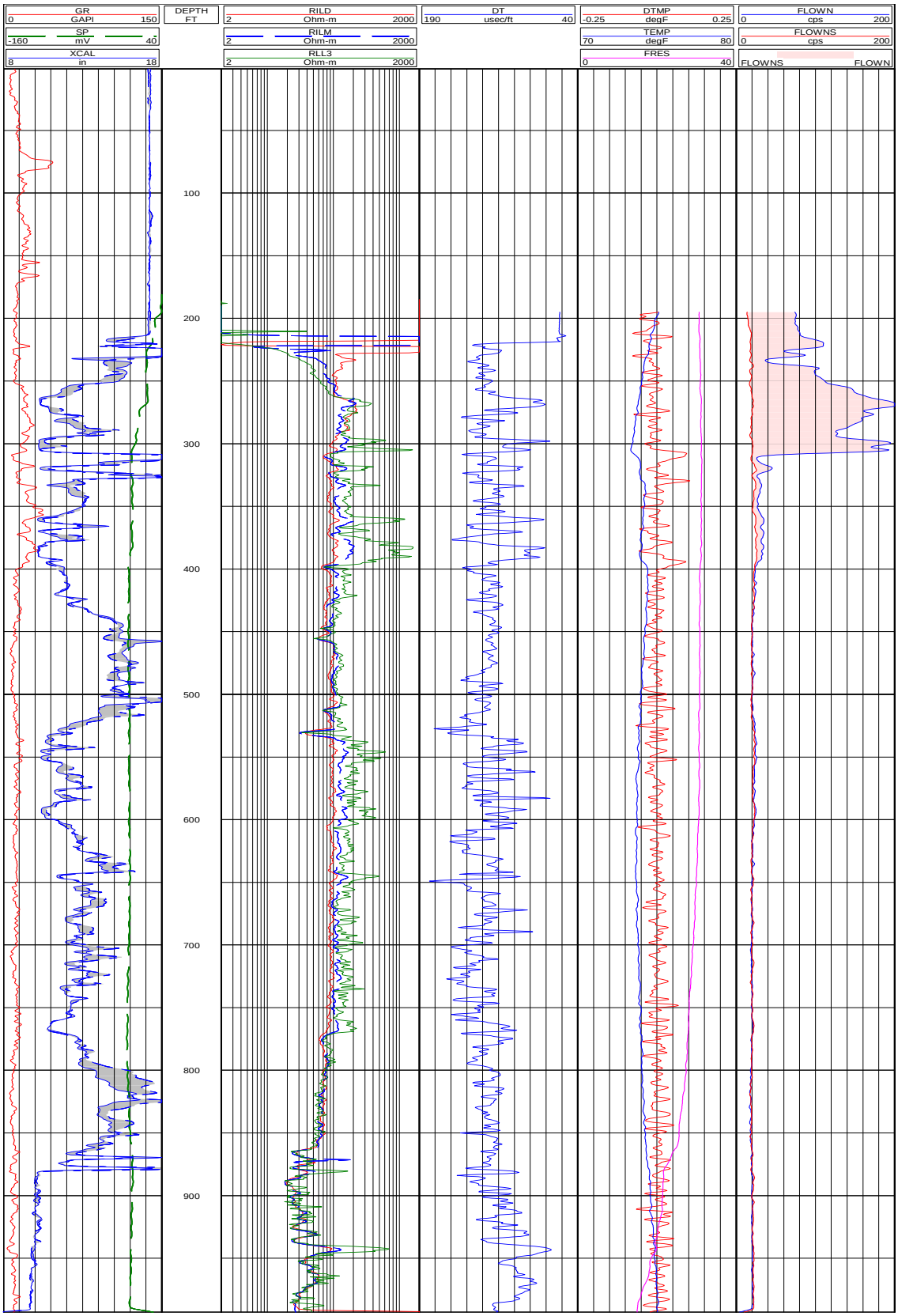
APPENDIX C
Geophysical Logs



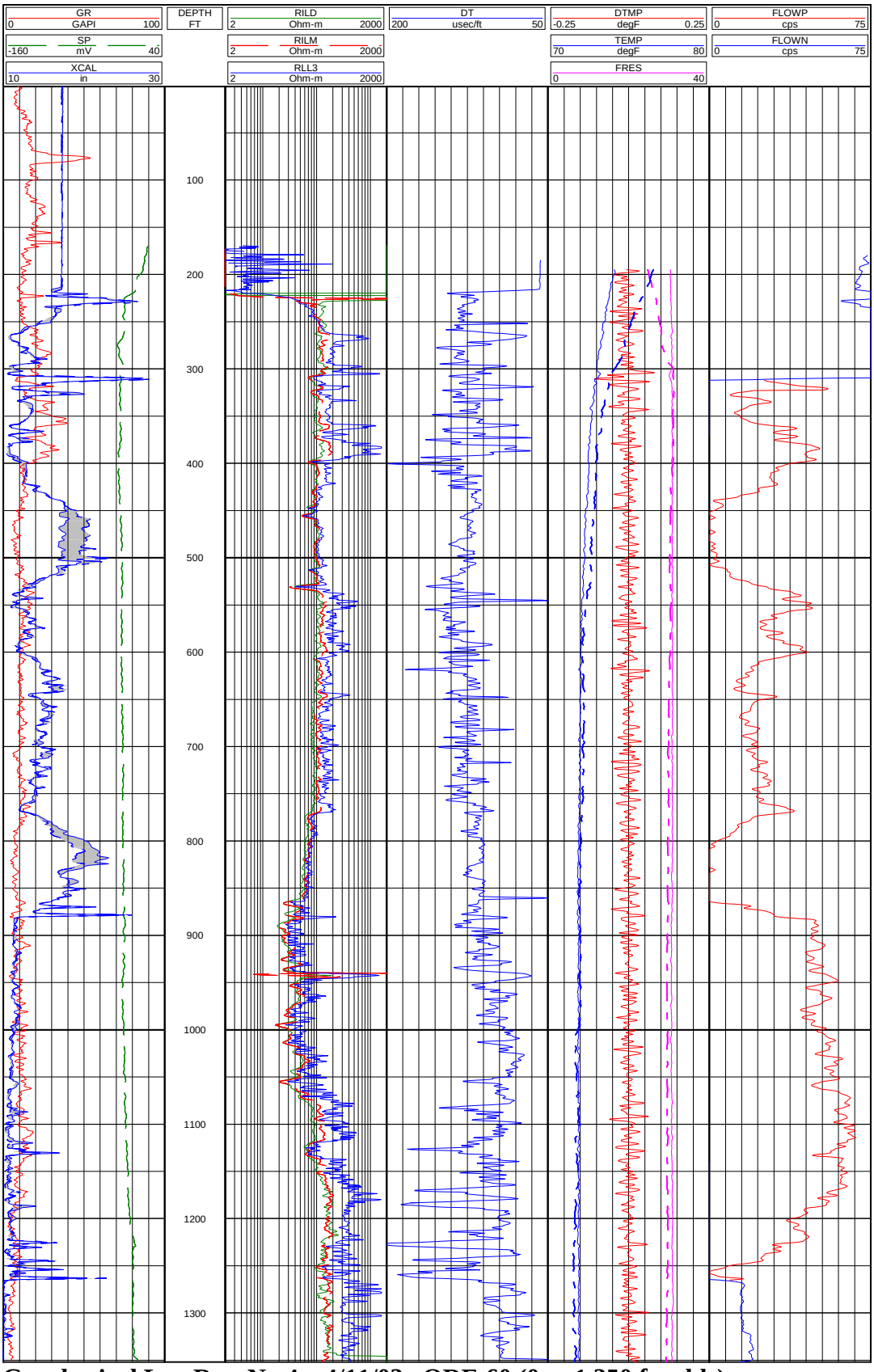
Geophysical Log Run No.1 – 3/17/03 – ORF-60 (0 to 250 feet bls)



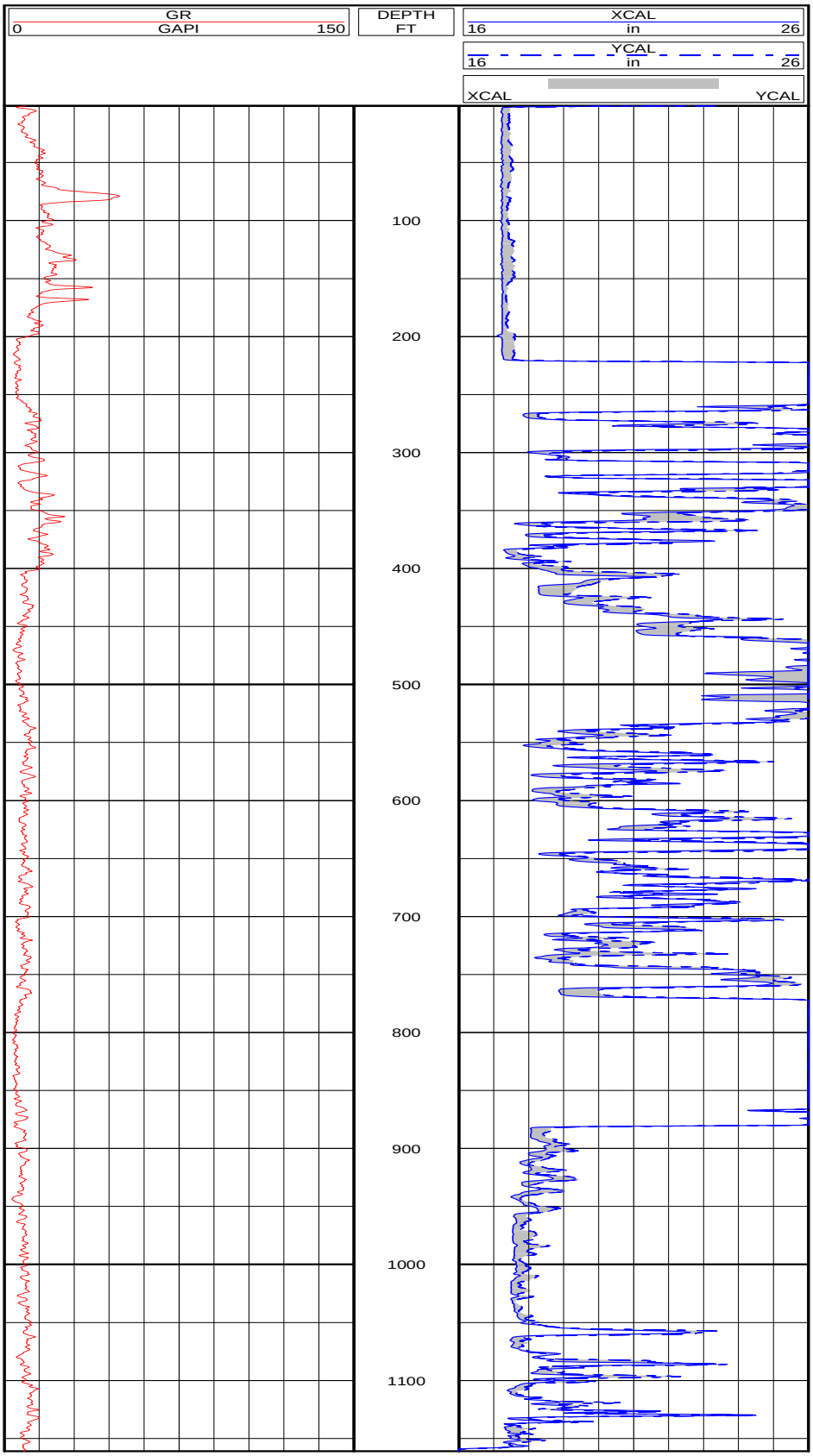
Geophysical Log Run No.2 – 3/20/03 – ORF-60 (0 to 230 feet bls



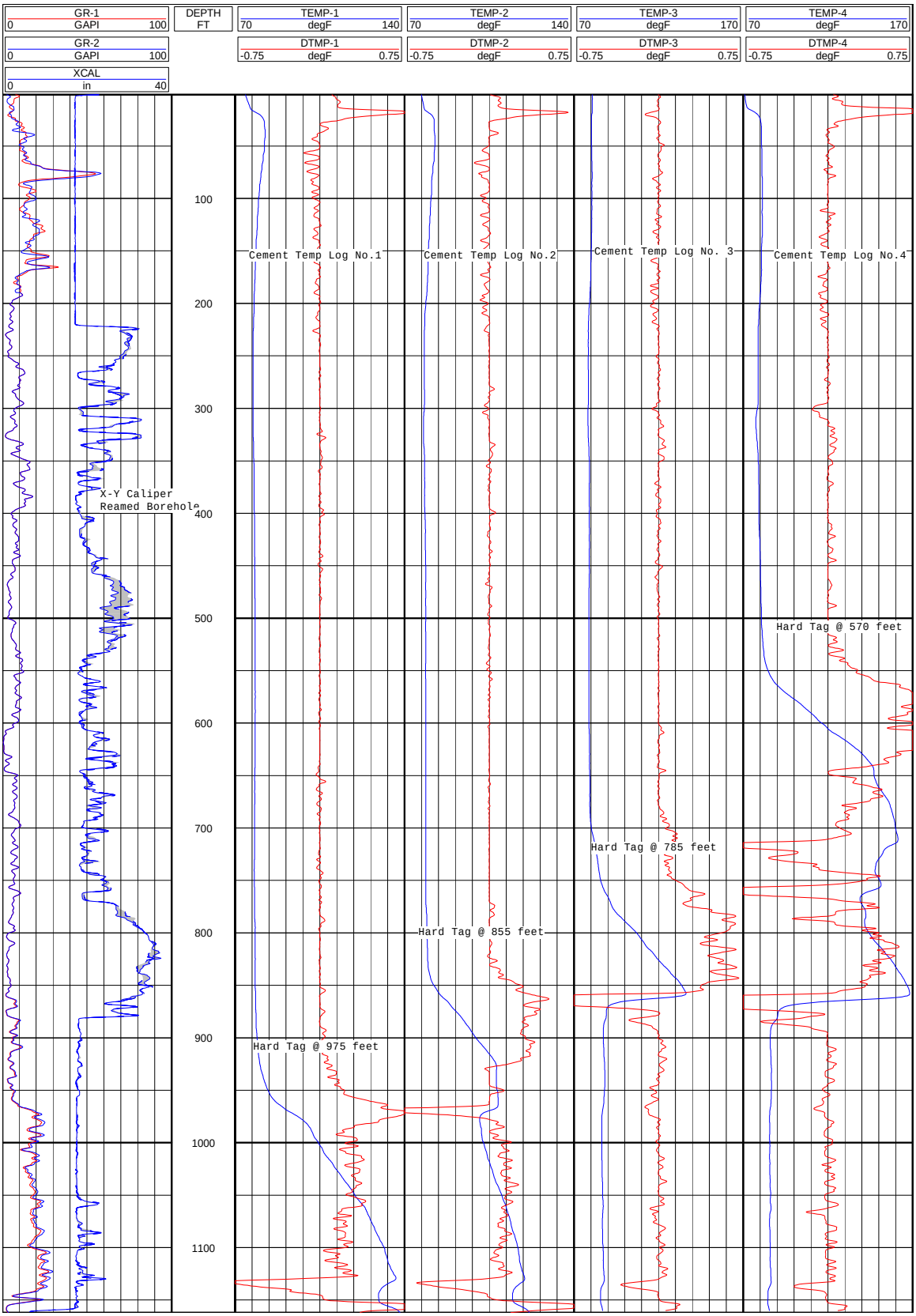
Geophysical Log Run No. 3 - 4/3/03 – ORF-60 (0 to 993 feet bls)



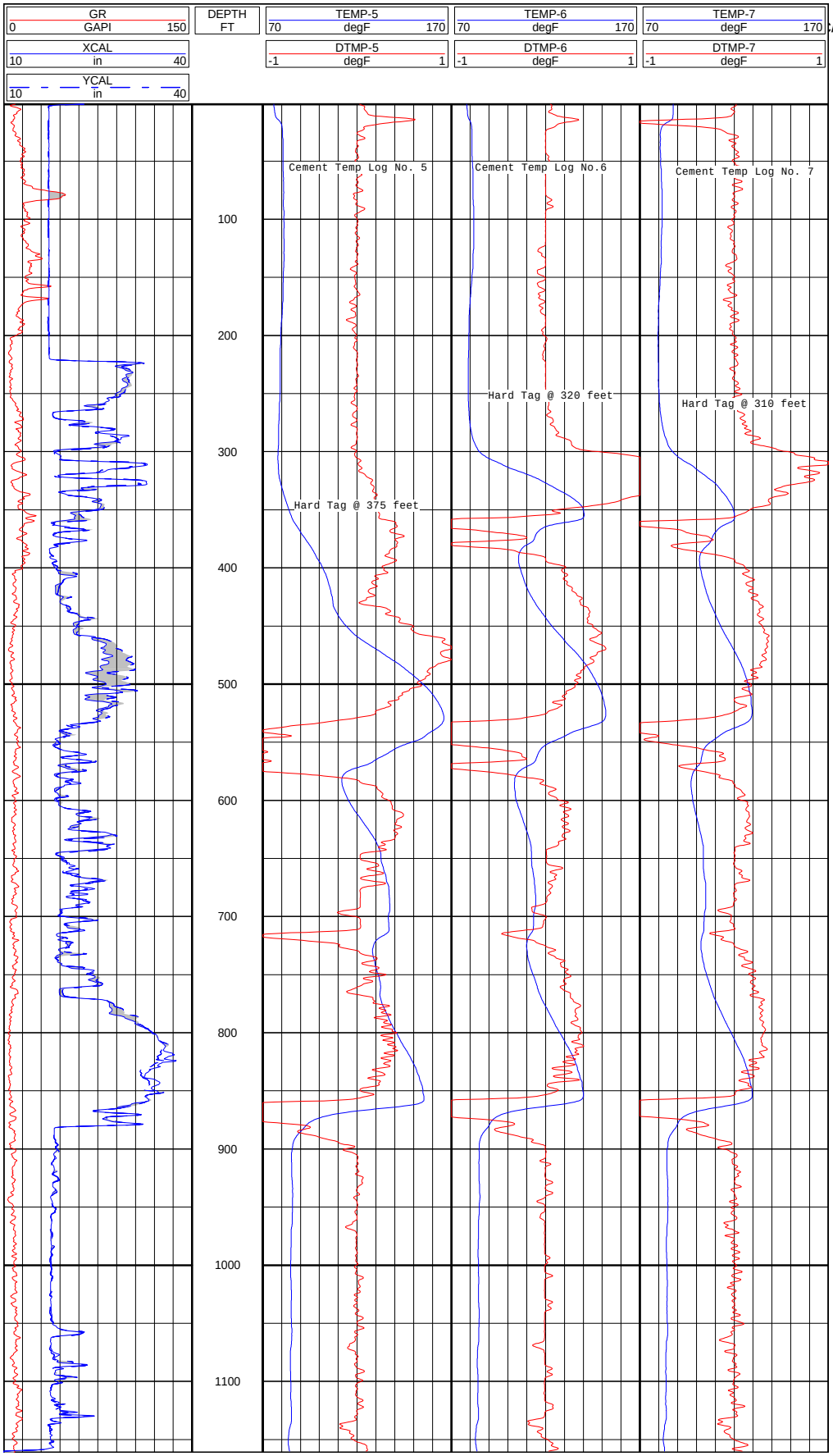
Geophysical Log Run No.4 – 4/11/03– ORF-60 (0 to 1,350 feet bls)



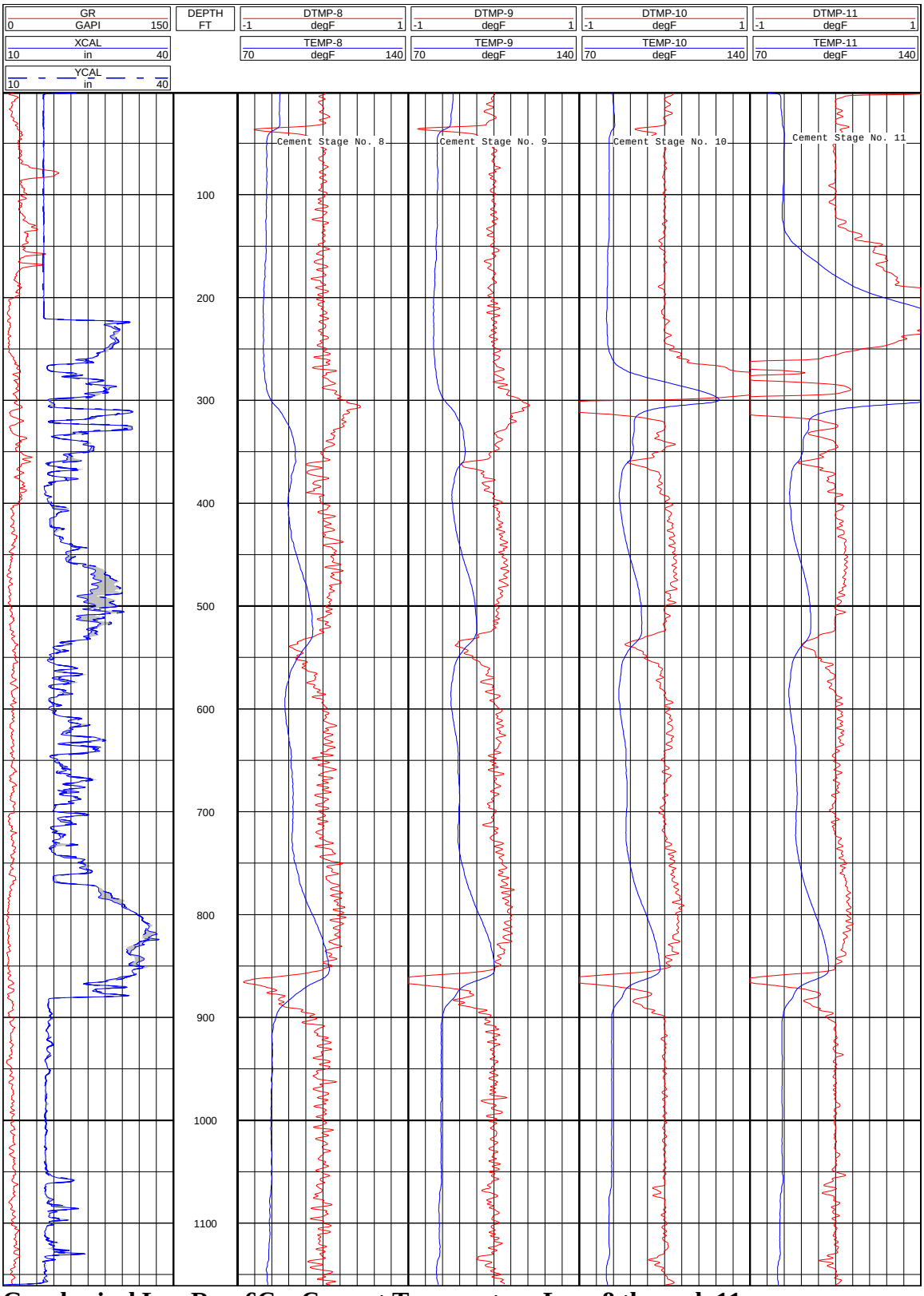
Geophysical Log Run No. 5 – 4/22/03 (0 to 1,160 feet bls)



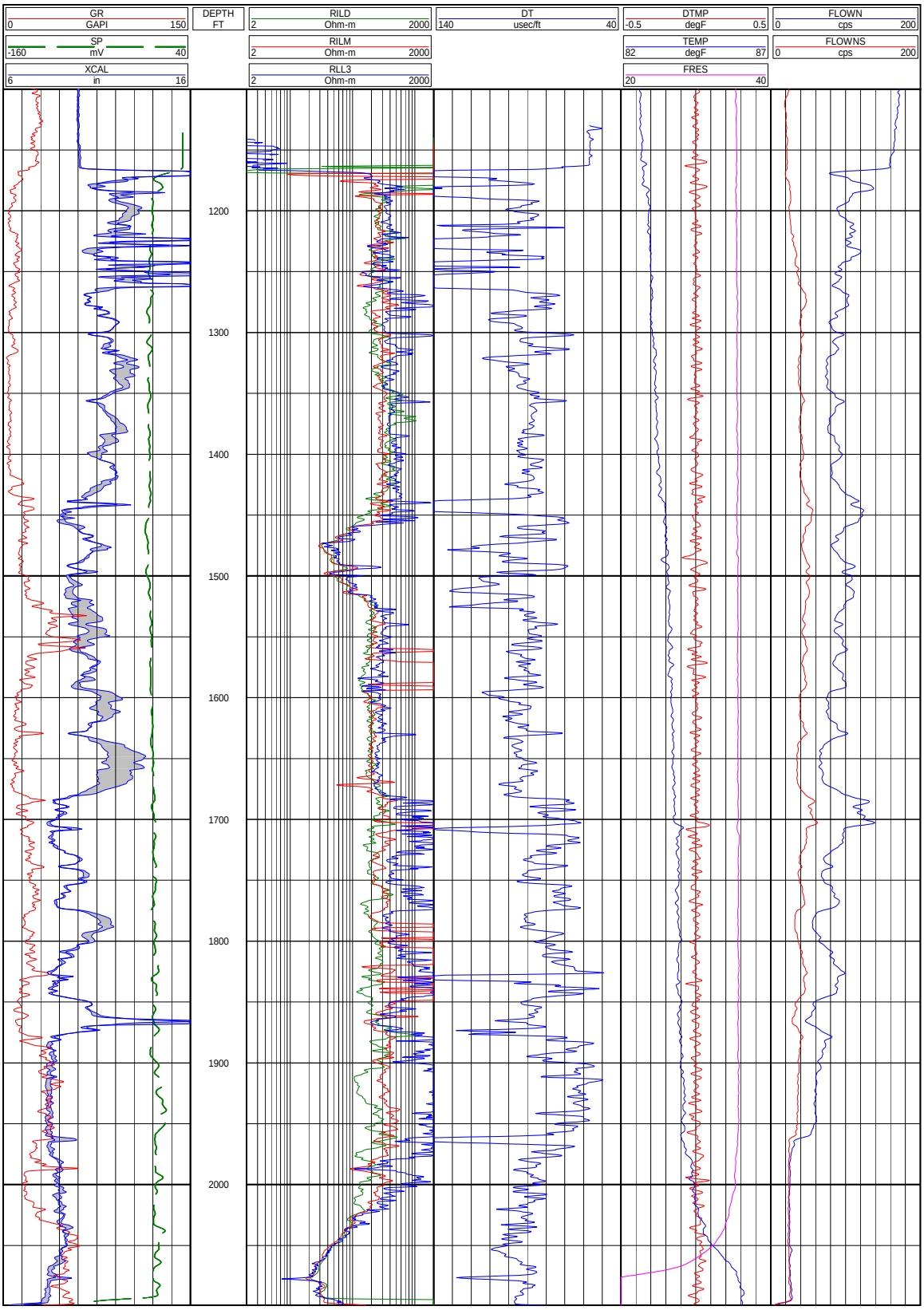
Geophysical Log Run 6A -Cement Temperature Logs 1 through 4 – ORF-60



Geophysical Log Run No 6B – Cement Temperature Logs 5 through7



Geophysical Log Run 6C – Cement Temperature Logs 8 through 11



Geophysical Log Run No.7- 6/13/03– ORF-60 (1,100 to 2,200 feet bls)

APPENDIX D
Lithologic Field Reports

Field Lithologic Log
Reedy Creek Test Well: ORF-60
Orange County, Florida

Depth in Feet (bls)

From	To	Lithologic Description
0	10	White, well sorted medium quartz sand, good permeability
10	30	Brown, well sorted, medium quartz sand, good permeability
30	35	Brown, well sorted, medium quartz sand, abundant grey clay
35	55	Grey silty lime mudstone
55	80	Greenish grey phosphatic lime mudstone
80	90	Light brown wackestone, medium hard, interparticle porosity
90	105	Light brown packstone, medium hard, interparticle porosity
105	170	Tan grainstone, friable, occasional phosphate, interparticle porosity
170	200	Cream-colored grainstone, friable, common echinoid fossils, moldic porosity
200	215	Cream-colored packstone, friable, common echinoid fossils, moldic porosity
215	250	Cream-colored grainstone, friable, common echinoid fossils, moldic porosity
255	260	Cream-colored grainstone, friable, common echinoid and dictyoconus fossils, moldic porosity, 15% grey mudstone, hard low permeability
260	265	Brown dolomite, friable, crystalline, low permebility, 15% grey mudstone, low permeability
265	275	Brown dolomite, friable, crystalline, low permebility, 30% grey mudstone, low permeability
275	295	Cream-colored grainstone, friable, common echinoid and dictyoconus fossils, moldic porosity
295	300	Cream-colored mudstone, very friable, intergranular porosity, 5% tan crystalline dolomite
300	310	Cream-colored grainstone, friable, common echinoid and dictyoconus fossils, moldic porosity

310	315	Tan mudstone, friable, intergranular and vuggy porosity, 5% light grey crystalline dolomite
315	320	Cream-colored dolomite/crystalline limestone, hard, low permeability
320	325	Tan mudstone, friable, intergranular and vuggy porosity, 5% light grey crystalline dolomite
325	335	Cream-colored mudstone, friable, dictyoconus fossils, intergranular and vuggy porosity, 5% light grey crystalline dolomite
335	340	Cream-colored/tan grainstone, friable, moldic porosity, 15% brown crystalline dolomite
340	345	Cream-colored/tan grainstone, friable, dictyoconus fossils, moldic porosity, 15% brown crystalline dolomite
345	350	Cream-colored grainstone/crystalline limestone, friable, moldic porosity
350	355	Cream-colored/tan grainstone, friable, dictyoconus fossils, moldic porosity, 15% brown crystalline dolomite
355	360	Cream-colored/tan grainstone, friable, echinoid and dictyoconus fossils, moldic porosity, 15% brown crystalline dolomite and tan lime mud
360	365	Dark brown dolomite, crystalline, low permeability
365	370	Cream-colored/tan grainstone, friable, dictyoconus fossils, moldic porosity, 15% brown crystalline dolomite
370	375	Tan dolomite, crystalline, low permeability
375	380	Tan dolomite, crystalline, low permeability, some soft offwhite lime mud
380	390	Dark brown dolomite, crystalline, low permeability
390	400	Dark brown dolomite, crystalline, some vugs on larger cutting fragments
400	405	Grey lime mud, very soft, some tan crystalline dolomite, hard, some vugs of larger fragments
405	425	Tan grainstone, friable, moldic and intergranular porosity
425	440	Cream-colored grainstone, friable, moldic and intergranular porosity
440	445	Cream-colored grainstone, friable, echinoid fossils, moldic and intergranular porosity

445	455	Cream-colored grainstone, friable, mainly moldic and intergranular porosity, some vuggy porosity
455	465	Cream-colored grainstone, friable, echinoid fossils, moldic and intergranular porosity
465	485	Tan grainstone, friable, mollusk fossils, moldic and intergranular porosity, some vuggy porosity
485	490	Tan grainstone, friable, moldic, vuggy, and intergranular porosity
490	500	Tan grainstone, friable, mollusk fossils, moldic and intergranular porosity, some vuggy porosity
500	520	Light grey grainstone, friable, mollusk fossils, moldic and intergranular porosity, some vuggy porosity
520	540	Tan grainstone, friable, mollusk fossils, moldic and intergranular porosity, some vuggy porosity
540	550	Tan mudstone, friable, vuggy and moldic porosity
550	595	Tan packstone-grainstone, hard, mollusk fossils, vuggy and moldic porosity
595	605	Brown packstone-grainstone, hard, vuggy and moldic porosity
605	610	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity
610	615	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, some hard crystalline dolomite
615	620	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity
620	625	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, some hard crystalline dolomite
625	645	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity
645	650	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, some hard crystalline dolomite
650	655	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity

655	660	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, <5% white calcite and grey dolomite
660	665	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, some hard crystalline dolomite
665	675	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity
675	680	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, some hard crystalline dolomite and tan/brown calcite
680	700	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity
700	705	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, some hard crystalline dolomite
705	735	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity
735	750	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, 5% grey crystalline dolomite
750	755	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, 5% grey crystalline dolomite, 2% crystalline calcite
755	765	Cream-colored packstone-grainstone, friable, mollusk fossils, vuggy and moldic porosity, 5% grey crystalline dolomite
765	770	Cream-colored packstone, friable, mollusk fossils, vuggy and moldic porosity, 5% grey crystalline dolomite
770	780	Cream-colored mudstone, friable, mollusk fossils, vuggy and moldic porosity, 5% grey crystalline dolomite
780	815	Tan grainstone, friable, mollusk fossils, vuggy and moldic porosity, 5% grey crystalline dolomite
815	820	Tan packstone, friable, mollusk fossils, vuggy and moldic porosity, 10% grey crystalline dolomite
820	825	Tan grainstone, friable, mollusk fossils, vuggy and moldic porosity, 20% white/grey crystalline dolomite
825	835	Tan grainstone, friable, mollusk fossils, vuggy and moldic porosity, 10% white/grey crystalline dolomite

835	840	Tan grainstone, friable, mollusk fossils, vuggy and moldic porosity, 20% grey/black crystalline dolomite
840	845	Tan grainstone, friable, mollusk fossils, vuggy and moldic porosity, 1% crystalline calcite
845	855	Tan grainstone, friable, mollusk fossils, vuggy and moldic porosity
855	865	Cream-colored grainstone, friable, mollusk fossils, vuggy and moldic porosity, 20% grey crystalline dolomite
865	870	Cream-colored grainstone, friable, mollusk fossils, vuggy and moldic porosity, 20% soft grey clay/lime mud, 10% grey crystalline dolomite
870	875	Tan wackestone -packstone, friable, mollusk fossils, vuggy and moldic porosity, 10% soft brown clay/lime mud, 10% grey crystalline calcite
875	880	Tan wackestone-packstone, friable, mollusk fossils, vuggy and moldic porosity, 10% grey crystalline dolomite, 5% soft brown clay/lime mud
880	890	Cream-colored wackestone-packstone, friable, mollusk fossils, vuggy and moldic porosity, 20% soft white clay/lime mud "chalky", 10% grey crystalline dolomite
890	895	Cream-colored wackestone-packstone, friable, mollusk fossils, vuggy and moldic porosity, 10% grey crystalline dolomite, 5% soft white clay/lime mud "chalky"
895	900	Cream-colored wackestone-packstone, friable, mollusk fossils, vuggy and moldic porosity, 25% Cream-colored/tan crystalline dolomite
900	905	Cream-colored wackestone-packstone, friable, mollusk fossils, vuggy and moldic porosity, 10% grey crystalline dolomite, 5% soft white clay/lime mud "chalky"
905	915	Tan wackestone-packstone, friable, mollusk fossils, vuggy and moldic porosity, 25% tan crystalline dolomite
915	920	Tan wackestone-packstone, friable, mollusk fossils, vuggy and moldic porosity, 30% dark brown crystalline dolomite
920	925	Tan wackestone-packstone, friable, mollusk fossils, vuggy and moldic porosity, 10% dark brown crystalline dolomite
925	930	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 5% white crystalline dolomite
930	940	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 1% white crystalline dolomite

940	950	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 40% soft, white clay/lime mud "chalky", 5% white crystalline limestone
950	955	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 1% white crystalline dolomite
955	960	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 40% soft, white clay/lime mud "chalky", 5% white crystalline limestone
960	980	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 1% white crystalline dolomite
980	985	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 1% white crystalline dolomite, 1% crystalline limestone
985	995	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 10% white crystalline dolomite, 10% crystalline limestone
995	1,000	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 20% white crystalline dolomite
1,000	1,005	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 20% white crystalline dolomite, 1% crystalline limestone
1,005	1,010	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 20% white crystalline dolomite, 5% dark brown clay/lime mud, 1% crystalline limestone
1,010	1,015	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 20% white crystalline dolomite, 1% crystalline limestone
1,015	1,020	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 20% white crystalline dolomite, 15% dark brown clay/lime mud, 1% crystalline limestone
1,020	1,025	Tan wackestone, friable, mollusk fossils, vuggy and moldic porosity, 30% white crystalline dolomite
1,025	1,030	Tan/Cream-colored crystalline dolomite, hard, 20% soft, grey clay/lime mud, low permeability
1,030	1,035	Tan/Cream-colored crystalline dolomite, hard, 10% tan packstone, friable, mollusk fossils, vuggy and moldic porosity
1,035	1,040	Tan/Cream-colored crystalline dolomite, hard, 10% soft, white clay/lime mud, low permeability
1,040	1,045	Tan packstone, friable, mollusk fossils, vuggy and moldic porosity, 30% white crystalline dolomite

1,045	1,050	Tan/Cream-colored crystalline dolomite, hard, 40% tan packstone, friable, mollusk fossils, vuggy and moldic porosity
1,050	1,060	Tan/Cream-colored crystalline dolomite, hard, 10% tan packstone, friable, mollusk fossils, vuggy and moldic porosity
1,060	1,070	Tan/Cream-colored crystalline dolomite, hard, vuggy, 5% white crystalline limestone
1,070	1,080	Tan/Cream-colored crystalline dolomite, hard, vuggy
1,080	1,090	Dark brown crystalline dolomite, hard, vuggy
1,090	1,100	Cream-colored/tan crystalline dolomite, hard, vuggy
1,100	1,105	Cream-colored/tan crystalline dolomite, hard, vuggy, 5% tan packstone, friable, mollusk fossils, vuggy and moldic porosity
1,105	1,110	Cream-colored/tan crystalline dolomite, hard, vuggy
1,110	1,115	Cream-colored/tan crystalline dolomite, hard, vuggy, fewer vugs than previous interval
1,115	1,120	Cream-colored/tan crystalline dolomite, hard, vuggy
1,120	1,130	Cream-colored/tan crystalline dolomite, hard, vuggy, 5% dark brown clay/lime mud
1,130	1,135	Cream-colored/tan crystalline dolomite, hard, vuggy, fewer vugs than previous interval
1,135	1,140	Cream-colored/tan crystalline dolomite, hard, vuggy, 15% white crystalline limestone
1,140	1,150	Cream-colored/tan crystalline dolomite, hard, vuggy, 5% white crystalline limestone
1,150	1,160	Cream-colored/tan crystalline dolomite, hard, vuggy, fewer vugs than the previous interval, 5% white crystalline limestone
1,160	1,165	Brown crystalline dolomite, hard, vuggy, fewer vugs than the previous interval, 5% white crystalline limestone
1,165	1,170	Brown crystalline dolomite, hard, vuggy, fewer vugs than the previous interval, 1% white crystalline limestone
1,170	1,180	Dark brown dolomite, hard, "sucrosic", some vugs, otherwise low permeability

1,180	1,185	Tan packstone, friable, mollusk fossils, vuggy and moldic porosity, 40% dark brown dolomite, hard, "sucrosic"
1,185	1,205	Tan dolomite, hard, "sucrosic", some vugs, otherwise low permeability, 5% tan crystalline dolomite
1,205	1,210	Dark brown dolomite, hard, "sucrosic", some vugs, otherwise low permeability, 5% dark brown crystalline dolomite
1,210	1,215	Tan dolomite, hard, "sucrosic", some vugs, otherwise low permeability, 5% tan crystalline dolomite
1,215	1,230	Dark brown dolomite, hard, "sucrosic", 30 % tan grainstone, friable, intergranular porosity
1,230	1,235	Dark brown dolomite, hard, "sucrosic", dense, low permeability
1,235	1,240	Dark brown dolomite, hard, "sucrosic", dense, low permeability, 10% dark brown crystalline dolomite
1,240	1,245	Grey crystalline dolomite, hard, dense, low permeability, 40% dark brown dolomite, hard, "sucrosic", vuggy
1,245	1,250	Dark brown dolomite, hard, "sucrosic", vuggy, 40% grey crystalline dolomite, hard, dense, low permeability
1,250	1,255	Grey crystalline dolomite, hard, dense, low permeability, 40% dark brown dolomite, hard, "sucrosic", vuggy
1,255	1,265	Tan dolomite, hard, "sucrosic", some vugs, 30% tan packstone, friable, mollusk fossils, vuggy and modlic porosity
1,265	1,270	Grey crystalline dolomite, hard, dense, low permeability, 40% dark brown dolomite, hard, "sucrosic", vuggy
1,270	1,275	Tan dolomite, hard, "sucrosic", some vugs, 15% offwhite packstone, friable, mollusk fossils, vuggy and modlic porosity, 5% grey crystalline dolomite
1,275	1,285	Tan dolomite, hard, "sucrosic", some vugs, 5% grey crystalline dolomite
1,285	1,320	Tan dolomite, hard, "sucrosic", some vugs, 30% offwhite packstone, friable, mollusk fossils, vuggy and modlic porosity, 5% grey crystalline dolomite
1,320	1,340	Tan packstone, friable, mollusk fossils, vuggy and modlic porosity, 20% grey crystalline dolomite, hard, low permeability
1,340	1,345	Tan/grey packstone, friable, mollusk fossils, vuggy and modlic porosity, 20% grey crystalline dolomite, hard, low permeability

1,345	1,350	Grey packstone, friable, mollusk fossils, vuggy and modlic porosity, 5% brown crystalline dolomite, hard, low permeability
1,350	1,370	Grey grainstone, friable, mollusk fossils, vuggy and modlic porosity, hard, low permeability
1,370	1,385	Grey grainstone, friable, mollusk fossils, vuggy and modlic porosity, 5% anyhydrite, hard, low permeability
1,385	1,430	Grey grainstone, friable, mollusk fossils, vuggy and modlic porosity, 5% anyhydrite, 20% brown dolomite, hard, low permeability
1,430	1,445	Grey grainstone, friable, mollusk fossils, vuggy and modlic porosity, 5% anyhydrite, hard, low permeability
1,445	1,460	Dark brown to brown dolomite, hard, "sucrosic", some vugs, 10% light grey grainstone, friable, mollusk fossils, vuggy and modlic porosity
1,460	1,480	Dark brown to brown dolomite, hard, "sucrosic", some vugs, 10% anhydrite
1,480	1,490	Dark brown to brown dolomite, hard, "sucrosic", some vugs, 45% anhydrite
1,490	1,500	Dark brown to brown dolomite, hard, "sucrosic", some vugs, 45% anhydrite, interbedded with white sticky clay
1,500	1,515	Brown dolomite, hard, "sucrosic", some vugs, 45% anhydrite
1,515	1,520	Brown dolomite, hard, "sucrosic", some vugs, 45% anhydrite, interbedded with white sticky clay
1,520	1,535	Brown dolomite, hard, "sucrosic", some vugs, 30% anhydrite
1,534	1,545	Brown dolomite, hard, "sucrosic", some vugs, 30% anhydrite, interbedded with grey sticky clay
1,545	1,550	Brown dolomite, hard, "sucrosic", some vugs, 30% anhydrite
1,550	1,560	Brown dolomite, hard, "sucrosic", some vugs, 20% anhydrite, interbedded with grey sticky clay
1,560	1,580	Light grey grainstone, moderately hard, vuggy porosity, 5% anyhydrite, 15% brown dolomite, hard, low permeability
1,580	1,585	Light brown packstone, moderately hard, vuggy porosity, 5% anyhydrite, low permeability

1,585	1,600	Light brown and light grey grainstone, moderately hard, vuggy porosity, 5% anyhydrite, good permeability
1,600	1,615	Light brown and grey grainstone, moderately hard, vuggy porosity, 5% anyhydrite, good permeability
1,615	1,635	Light brown and grey grainstone, moderately hard, micritic, good permeability
1,635	1,640	Light brown and grey grainstone, friable, micritic, good permeability
1,640	1,655	Light brown grainstone, friable, micritic, good permeability
1,655	1,665	Light grey grainstone, friable, micritic, good permeability
1,665	1,680	Light brown grainstone, friable, micritic, good permeability
1,680	1,690	Light brown grainstone, friable, micritic, 10% phosphate, good permeability
1,690	1,725	Light brown dolomite, hard, crystalline, low permeability
1,725	1,740	Brown dolomite, hard, crystalline, < 10% tan grainstone, low permeability
1,740	1,750	Light tan grainstone, friable, micritic, 20% brown dolomite, moderate permeability
1,750	1,755	Very light tan grainstone, hard, micritic, 15% brown dolomite, moderate permeability
1,755	1,765	Very light tan grainstone, hard, micritic, 25% brown dolomite, moderate permeability
1,765	1,775	Tan grainstone, moderately hard, micritic, good permeability
1,775	1,780	Dark brown dolomite, hard, crystalline, 40% tan grainstone, low permeability
1,780	1,785	Light tan/light grey grainstone, hard, sucrosic, good permeability
1,790	1,805	Brown dolomite, hard, crystalline, low permeability
1,805	1,820	Grey dolostone, moderately hard, low permeability
1,820	1,835	Brown dolomite, very hard, crystalline, low permeability
1,835	1,855	Dark brown dolomite, very hard, crystalline, low permeability
1,855	1,865	Very light brown dolomite, very hard, crystalline, low permeability
1,865	1,870	Off white grainstone, moderately hard, sucrosic, good permeability

1,870	1,880	Off white grainstone, moderately hard, sucrosic, 15% brown dolomite, good permeability
1,880	1,885	Grey and tan grainstone, moderately hard, sucrosic, 20% brown dolomite
1,885	1,915	Brown dolomite, very hard, crystalline, low permeability
1,915	1,925	Grey grainstone, hard, sucrosic, good permeability
1,925	1,955	Brown dolomite, very hard, crystalline, low permeability
1,955	1,960	Light grey grainstone, hard, sucrosic, 10% shell fragments, good permeability
1,960	1,965	Brown dolomite, very hard, crystalline, low permeability
1,965	1,970	Light grey grainstone, hard, sucrosic, 10% shell fragments, good permeability
1,970	1,990	Brown dolomite, very hard, crystalline, low permeability
1,990	2,015	Tan and light grey grainstone, friable, sucrosic, good permeability
2,015	2,095	Grey grainstone, hard, sucrosic, good permeability
2,095	2,100	Dark grey packstone, hard, sucrosic, 20% white lime mud, low permeability

Lithologic Descriptions
Florida Geological Survey

LITHOLOGIC WELL LOG PRINTOUT SOURCE - FGS

WELL NUMBER: W-18445
TOTAL DEPTH: 2100 FT.
420 SAMPLES FROM 0 TO 2100 FT.

COMPLETION DATE: 07/03/03
OTHER TYPES OF LOGS AVAILABLE - NONE

COUNTY - ORANGE
LOCATION: T.24S R.27E S.23
LAT = 28D 28M 18S
LON = 81D 32M 05S
ELEVATION: 115 FT

OWNER/DRILLER:SFWMD/DIVERSIFIED DRILLING CORP.

WORKED BY:E. DORN 7/29/2003
SECTION BCC

0.	-	75.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
75.	-	1565.	124AVPK	AVON PARK FM.
1565.	-	2100.	124OLDM	OLDSMAR LIMESTONE

0 - 5 SAND; TRANSPARENT TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: FINE; RANGE: VERY FINE TO COARSE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; HIGH SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: PHOSPHATIC SAND-01%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: NO FOSSILS

5 - 10 AS ABOVE

10 - 15 SAND; TRANSPARENT TO GRAYISH BROWN
POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: FINE; RANGE: FINE TO COARSE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; HIGH SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: PHOSPHATIC SAND-01%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: NO FOSSILS

15 - 20 SAND; TRANSPARENT TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: FINE; RANGE: FINE TO COARSE
ROUNDNESS: ANGULAR TO SUB-ROUNDED; HIGH SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: PHOSPHATIC SAND- T%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: NO FOSSILS

20 - 25 SAND; TRANSPARENT TO GRAYISH BROWN
POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE
ROUNDNESS: SUB-ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: IRON STAIN- T%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: NO FOSSILS

25 - 30 AS ABOVE

30 - 35 SAND; TRANSPARENT TO GRAYISH BROWN
POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM
ROUNDNESS: SUB-ANGULAR TO ANGULAR; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: PLANT REMAINS-01%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: PLANT REMAINS

35 - 40 SAND; TRANSPARENT TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
GRAIN SIZE: FINE; RANGE: VERY FINE TO VERY COARSE
ROUNDNESS: ANGULAR TO ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
ACCESSORY MINERALS: PLANT REMAINS- T%, PHOSPHATIC SAND-01%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: PLANT REMAINS

40 - 45 CLAY; MODERATE LIGHT GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, LOW PERMEABILITY; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: QUARTZ SAND-15%, ORGANICS- T%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: PLANT REMAINS

45 - 50 SAND; YELLOWISH GRAY TO MODERATE LIGHT GRAY
POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM
ROUNDNESS: ANGULAR TO SUB-ANGULAR; MEDIUM SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-20%, ORGANICS-01%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: PLANT REMAINS

50 - 55 AS ABOVE

55 - 60 SAND; LIGHT OLIVE GRAY TO OLIVE GRAY
POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM
ROUNDNESS: ANGULAR TO SUB-ANGULAR; HIGH SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-10%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: NO FOSSILS

60 - 65 SAND; LIGHT OLIVE GRAY TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM
ROUNDNESS: ANGULAR TO SUB-ANGULAR; HIGH SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-07%, PLANT REMAINS- T%
OTHER FEATURES: UNWASHED SAMPLE

FOSSILS: PLANT REMAINS

65 - 70 SAND; LIGHT OLIVE GRAY TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN SIZE: FINE; RANGE: VERY FINE TO VERY COARSE
ROUNDNESS: ANGULAR TO ROUNDED; HIGH SPHERICITY
POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: CLAY-05%, PLANT REMAINS-01%
ORGANICS-02%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: PLANT REMAINS

70 - 75 AS ABOVE

75 - 80 WACKESTONE; YELLOWISH GRAY TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: COARSE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: CLAY-10%, QUARTZ SAND-03%
ORGANICS-03%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: FOSSIL FRAGMENTS

80 - 85 WACKESTONE; YELLOWISH GRAY TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: COARSE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-02%, PHOSPHATIC GRAVEL-07%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS
Dictyoconus Americanus

85 - 90 AS ABOVE

90 - 95 AS ABOVE

95 - 100 WACKESTONE; YELLOWISH GRAY TO LIGHT GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND-01%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: FOSSIL FRAGMENTS

100 - 105 WACKESTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE

20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: ECHINOID
Driller's mud or cement present

105 - 110 WACKESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: BENTHIC FORAMINIFERA
Dictyoconus

110 - 115 PACKSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: FOSSIL FRAGMENTS
DRILLER'S MUD/CEMENT PRESENT

115 - 120 AS ABOVE

120 - 125 AS ABOVE

125 - 130 AS ABOVE

130 - 135 AS ABOVE

135 - 140 WACKESTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND- T%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: BENTHIC FORAMINIFERA
DICTYOCONUS

140 - 145 WACKESTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX

OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: BENTHIC FORAMINIFERA
DICTYOCONUS

145 - 150 AS ABOVE

150 - 155 PACKSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
60% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: LOW RECRYSTALLIZATION, UNWASHED SAMPLE
FOSSILS: FOSSIL MOLDS, BENTHIC FORAMINIFERA
POSSIBLE DRILLER'S CEMENT PRESENT; DICTYOCONUS

155 - 160 WACKESTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND- T%, ORGANICS- T%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: BENTHIC FORAMINIFERA
DICTYOCONUS

160 - 165 AS ABOVE

165 - 170 WACKESTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
45% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND- T%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: BENTHIC FORAMINIFERA
DICTYOCONUS; SAND IS VERY COARSE AND ANGULAR; POSSIBLE
DRILLER'S CEMENT PRESENT.

170 - 175 MUDSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND- T%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: BENTHIC FORAMINIFERA
POSSIBLE DRILLER'S CEMENT PRESENT

175 - 180 WACKESTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE
25% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND- T%
OTHER FEATURES: UNWASHED SAMPLE

180 - 185 WACKESTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: ECHINOID

185 - 190 WACKESTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE
25% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND- T%
OTHER FEATURES: UNWASHED SAMPLE

190 - 195 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE, SKELETAL
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: QUARTZ SAND- T%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: BENTHIC FORAMINIFERA
DICTYOCONUS

195 - 200 MUDSTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: FINE TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS- T%
OTHER FEATURES: UNWASHED SAMPLE

200 - 205 AS ABOVE

205 - 210 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE, SKELETAL

15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: FOSSIL FRAGMENTS

210 - 215 AS ABOVE

215 - 220 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE, SKELETAL
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE, LOW RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS

220 - 225 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE
25% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE

225 - 230 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, MOLDIC
GRAIN TYPE: PELLET, CALCILUTITE
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS- T%
OTHER FEATURES: UNWASHED SAMPLE, LOW RECRYSTALLIZATION
DOLOMITIC

230 - 235 AS ABOVE

235 - 240 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE, SKELETAL
35% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: FOSSIL FRAGMENTS

240 - 245 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, CALCILUTITE, SKELETAL
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION

CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: FOSSIL FRAGMENTS

245 - 250 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, MOLDIC
GRAIN TYPE: PELLET, CALCILUTITE, SKELETAL
25% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: MEDIUM TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: UNWASHED SAMPLE, LOW RECRYSTALLIZATION
DOLOMITIC
FOSSILS: FOSSIL FRAGMENTS

250 - 255 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, MOLDIC
GRAIN TYPE: CALCILUTITE, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE; RANGE: FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS
DICTYOCONUS; GREY CARBONATE PRESENT - POSSIBLE CASING
CEMENT. SUBSTANCE IS A LIGHT GRAY WITH VERY FINE-GRAINED
SAND, APPEARS TO BE 'SWEATING' EVAPORITES. WILL BE REFERRED
TO AS DRILLING CEMENT IN LATER SAMPLES. 20%

255 - 260 DOLOSTONE; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL MOLDS
DRILLING CEMENT 20%

260 - 265 DOLOSTONE; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%
OTHER FEATURES: SUCROSIC, HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS
DRILLING CEMENT 25%

265 - 270 DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH ORANGE
POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION

CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-01%, CALCITE- T%
OTHER FEATURES: SUCROSIC, HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS
DRILLING CEMENT 15%

270 - 275 PACKSTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
70% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MEDIUM TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-10%
FOSSILS: FOSSIL FRAGMENTS
DOLOMITE IS CRYPTOCRYSTALLINE, ANHEDRAL, AND POSSESSES NO VUGS.

275 - 280 DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH ORANGE
POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS
DRILLER'S CEMENT 5%

280 - 285 DOLOSTONE; GRAYISH ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%
OTHER FEATURES: UNWASHED SAMPLE
FOSSILS: NO FOSSILS
DC 3% (DC= DRILLER'S CEMENT)

285 - 290 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, VUGULAR, MOLDIC
GRAIN TYPE: CALCILUTITE; 10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: ECHINOID, FOSSIL MOLDS
DC 2%

290 - 295 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE; RANGE: FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX

ACCESSORY MINERALS: DOLOMITE-30%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS
DC 1%

295 - 300 DOLOSTONE; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR, VUGULAR, LOW PERMEABILITY
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS
DC 3%

300 - 305 SAND; GRAYISH ORANGE TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR, VUGULAR, LOW PERMEABILITY
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS
DC 5%

305 - 310 WACKESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: CALCILUTITE, PELLET, SKELETAL
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE; RANGE: FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-07%
FOSSILS: FOSSIL FRAGMENTS

310 - 315 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-01%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS
DC 1%

315 - 320 DOLOSTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERGRANULAR, VUGULAR; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS
DC 1%

320 - 325 MUDSTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: CALCILUTITE; 05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-30%
FOSSILS: NO FOSSILS

325 - 330 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, PELLET, SKELETAL
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MEDIUM TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-20%, CALCILUTITE-15%
FOSSILS: FOSSIL FRAGMENTS
ACCESSORY MICRITE IS IN THE FORM OF A POORLY INDURATED
VERY PALE ORANGE TO WHITE CARBONATE MUDSTONE

330 - 335 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, PELLET
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: FINE; RANGE: MEDIUM TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
FOSSILS: FOSSIL FRAGMENTS
DC 2%

335 - 340 LIMESTONE; VERY LIGHT ORANGE TO GRAYISH ORANGE
POROSITY: INTERGRANULAR, VUGULAR, MOLDIC
GRAIN TYPE: CALCILUTITE, PELLET, CRYSTALS
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
FOSSILS: FOSSIL FRAGMENTS
TWO KINDS OF LIMESTONE: A CHALKY WACKESTONE (40%) AND A
RECRYSTALLIZED LIMESTONE WHOSE ORIGINAL FABRIC IS NOT
APPARENT (60%)

340 - 345 LIMESTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, CRYSTALS, PELLET
02% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-10%, DOLOMITE-05%
FOSSILS: NO FOSSILS
ACCESSORY LIMESTONE IS CHALKY, VERY PALE ORANGE MUDSTONE

345 - 350 PACKSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, VUGULAR, MOLDIC

GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MEDIUM; RANGE: COARSE TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-02%
FOSSILS: FOSSIL FRAGMENTS
DC 7%

350 - 360 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS

360 - 365 WACKESTONE; VERY LIGHT ORANGE TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: PELLET, CALCILUTITE, SKELETAL
30% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-35%
FOSSILS: FOSSIL FRAGMENTS
DC 1%

365 - 370 DOLOSTONE; MODERATE YELLOWISH BROWN TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS

370 - 375 DOLOSTONE; DARK YELLOWISH BROWN TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-20%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS

375 - 380 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE

RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-03%
OTHER FEATURES: SUCROSIC, HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS
DC 1%

380 - 385 AS ABOVE

385 - 390 AS ABOVE

390 - 395 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS

395 - 400 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, INTRACLASTS, PELLET
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: LITHOGRAPHIC; RANGE: COARSE TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%, ORGANICS-01%
FOSSILS: NO FOSSILS

400 - 405 DOLOSTONE; GRAYISH ORANGE TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR
POSSIBLY HIGH PERMEABILITY; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

405 - 410 AS ABOVE

410 - 415 AS ABOVE

415 - 420 DOLOSTONE; GRAYISH ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR; 10-50% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; POOR INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: LIMESTONE-02%
FOSSILS: NO FOSSILS

420 - 425 DOLOSTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; MODERATE INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

425 - 430 AS ABOVE

430 - 435 DOLOSTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; MODERATE INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: LIMESTONE-25%
FOSSILS: NO FOSSILS

435 - 440 AS ABOVE

440 - 445 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: CALCILUTITE, PELLET
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: LITHOGRAPHIC; RANGE: COARSE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-01%
OTHER FEATURES: DOLOMITIC, HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS

445 - 450 AS ABOVE

450 - 455 AS ABOVE

455 - 460 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, VUGULAR, MOLDIC
GRAIN TYPE: CALCILUTITE, CRYSTALS
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: LITHOGRAPHIC
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%
OTHER FEATURES: DOLOMITIC, HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS

460 - 465 AS ABOVE

465 - 470 AS ABOVE

470 - 475 AS ABOVE

475 - 480 AS ABOVE

480 - 485 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY

POROSITY: INTERGRANULAR
GRAIN TYPE: CALCILUTITE, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO LITHOGRAPHIC
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

485 - 490 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 10-50% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-03%
OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

490 - 495 AS ABOVE

495 - 500 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: CALCILUTITE, PELLET
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: LITHOGRAPHIC; RANGE: VERY FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: LOW RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

500 - 505 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, VUGULAR, MOLDIC
GRAIN TYPE: CALCILUTITE, CRYSTALS
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: LITHOGRAPHIC; RANGE: VERY FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

505 - 510 AS ABOVE

510 - 515 AS ABOVE

515 - 520 AS ABOVE

520 - 525 AS ABOVE

525 - 530 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT

ACCESSORY MINERALS: LIMESTONE-05%
FOSSILS: NO FOSSILS
DC 1%

530 - 535 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%
FOSSILS: NO FOSSILS

535 - 540 AS ABOVE

540 - 545 AS ABOVE

545 - 550 AS ABOVE

550 - 555 AS ABOVE

555 - 560 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC
GRAIN TYPE: CALCILUTITE, CRYSTALS
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: LITHOGRAPHIC; RANGE: VERY FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

560 - 565 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
FOSSILS: NO FOSSILS

565 - 570 AS ABOVE

570 - 575 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-02%
FOSSILS: NO FOSSILS

575 - 580 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC; 50-90% ALTERED
SUBHEDRAL

GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS- T%
OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

580 - 585 AS ABOVE

585 - 590 AS ABOVE
DC 1%

590 - 595 AS ABOVE

595 - 600 AS ABOVE

600 - 605 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS
DC 2%

605 - 610 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-02%
OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

610 - 615 AS ABOVE

615 - 620 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-15%
OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

620 - 625 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE

GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: ANHYDRITE-01%
OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

625 - 630 AS ABOVE

630 - 635 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-05%, ORGANICS-01%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CALCAREOUS
FOSSILS: NO FOSSILS

635 - 640 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-01%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

640 - 645 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-03%, DOLOMITE-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

645 - 650 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-05%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CALCAREOUS
FOSSILS: NO FOSSILS

650 - 655 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE

GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-07%, ORGANICS-01%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CALCAREOUS
FOSSILS: NO FOSSILS
DC 2%

655 - 660 AS ABOVE

660 - 665 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS
DC 2%

665 - 670 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS
DC 1%

670 - 675 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, VUGULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS
DC 1%

675 - 680 AS ABOVE

680 - 685 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, VUGULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-02%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

685 - 690 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, VUGULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-02%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS
DC 1%

690 - 695 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, VUGULAR, MOLDIC
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS
DC 1%

695 - 700 DOLOSTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, MOLDIC, VUGULAR; 10-50% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS- T%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CALCAREOUS
FOSSILS: NO FOSSILS
DC 4%

700 - 705 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, MOLDIC, VUGULAR
GRAIN TYPE: CRYSTALS, CALCILUTITE
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS- T%, DOLOMITE-01%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
DC 2%

705 - 710 AS ABOVE

710 - 715 AS ABOVE

715 - 720 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION

CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS- T%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

720 - 725 AS ABOVE

725 - 730 AS ABOVE

730 - 735 AS ABOVE

735 - 740 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-10%, ORGANICS- T%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

740 - 745 AS ABOVE

745 - 750 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

750 - 755 AS ABOVE

755 - 760 AS ABOVE

760 - 765 AS ABOVE

765 - 770 AS ABOVE

770 - 775 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

775 - 780 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE

GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-01%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

780 - 785 AS ABOVE

785 - 790 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

790 - 795 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

795 - 800 AS ABOVE

800 - 805 AS ABOVE

805 - 810 AS ABOVE

810 - 815 AS ABOVE

815 - 820 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS- T%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

820 - 825 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-01%
OTHER FEATURES: CALCAREOUS

FOSSILS: NO FOSSILS

825 - 830 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-02%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS
DC 1%

830 - 835 AS ABOVE

835 - 840 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

840 - 845 AS ABOVE

845 - 850 AS ABOVE

850 - 855 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR
GRAIN TYPE: CALCILUTITE, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO LITHOGRAPHIC; MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS- T%
OTHER FEATURES: DOLOMITIC
FOSSILS: NO FOSSILS

855 - 860 AS ABOVE

860 - 865 SILT-SIZE DOLOMITE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-03%, ORGANICS-02%
LIMESTONE-03%
FOSSILS: NO FOSSILS

865 - 870 DOLOSTONE; YELLOWISH GRAY TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT

ACCESSORY MINERALS: LIMESTONE-15%, CLAY-10%, ORGANICS- T%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

870 - 875 DOLOSTONE; YELLOWISH GRAY TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CLAY-30%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

875 - 880 CLAY; GRAYISH BROWN TO DARK YELLOWISH ORANGE
POROSITY: INTERGRANULAR; POOR INDURATION
CEMENT TYPE(S): CLAY MATRIX
ACCESSORY MINERALS: GYPSUM-07%, CLAY-01%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

880 - 885 DOLOSTONE; YELLOWISH GRAY TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-07%, CLAY-01%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

885 - 890 AS ABOVE

890 - 895 DOLOSTONE; YELLOWISH GRAY TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-01%, LIMESTONE-15%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

895 - 900 DOLOSTONE; YELLOWISH GRAY TO WHITE
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-05%
FOSSILS: NO FOSSILS

900 - 905 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE

POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-05%, ORGANICS-01%
FOSSILS: NO FOSSILS

905 - 910 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-03%, ORGANICS-02%
FOSSILS: NO FOSSILS

910 - 915 DOLOSTONE; YELLOWISH GRAY TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-10%, CHERT-15%
FOSSILS: NO FOSSILS

915 - 920 AS ABOVE

920 - 925 DOLOSTONE; YELLOWISH GRAY TO WHITE
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-05%, ORGANICS-01%
FOSSILS: NO FOSSILS

925 - 930 DOLOSTONE; YELLOWISH GRAY TO WHITE
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-05%
FOSSILS: NO FOSSILS

930 - 935 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION

CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-02%, ORGANICS-02%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: NO FOSSILS

935 - 940 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-40%, ORGANICS-01%
FOSSILS: NO FOSSILS
GYPSUM IS IN TWO FORMS: PLATY, FIBROUS GYPSUM AND A CHALKY WHITE POWDER. LATTER FORMS A LOOSE CEMENT BETWEEN DOLOMITE CLASTS; PROBABLY NOT IN ORIGINAL FORM - COULD BE RE-PRECIPITATED.

940 - 945 AS ABOVE

945 - 950 DOLOSTONE; YELLOWISH GRAY TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-02%
FOSSILS: NO FOSSILS
GYPSUM CONTAINED WITHIN SOME PORE SPACES OF ROCK

950 - 955 DOLOSTONE; YELLOWISH GRAY TO WHITE
POROSITY: VUGULAR, INTERGRANULAR, MOLDIC; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-20%, CHERT-01%
FOSSILS: NO FOSSILS

955 - 960 DOLOSTONE; YELLOWISH GRAY TO GRAYISH ORANGE
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-03%
FOSSILS: NO FOSSILS

960 - 965 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-05%
FOSSILS: NO FOSSILS

965 - 970 AS ABOVE

970 - 975 AS ABOVE

975 - 980 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-03%, LIMESTONE-10%
FOSSILS: NO FOSSILS

980 - 985 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-05%, LIMESTONE-05%
FOSSILS: NO FOSSILS

985 - 990 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-15%, LIMESTONE-05%
FOSSILS: NO FOSSILS

990 - 995 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-02%, ORGANICS- T%
FOSSILS: NO FOSSILS
DC 1%

995 - 1000 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-01%, ORGANICS-01%
FOSSILS: NO FOSSILS

1000 - 1005 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-01%, ORGANICS-01%
FOSSILS: NO FOSSILS

1005 - 1010 AS ABOVE

1010 - 1015 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: GYPSUM-02%, ORGANICS-07%
FOSSILS: NO FOSSILS

1015 - 1020 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR
GRAIN TYPE: CALCILUTITE, CRYSTALS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-03%, ORGANICS- T%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

1020 - 1025 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-30%
FOSSILS: NO FOSSILS
DC 2%

1025 - 1030 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-03%, CHERT-01%
FOSSILS: NO FOSSILS

1030 - 1035 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-07%, ORGANICS- T%
FOSSILS: NO FOSSILS

1035 - 1040 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: VUGULAR, MOLDIC, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-15%
FOSSILS: NO FOSSILS

1040 - 1045 AS ABOVE

1045 - 1050 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-05%
FOSSILS: NO FOSSILS

1050 - 1055 LIMESTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, CALCILUTITE
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

1055 - 1060 DOLOSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: VUGULAR, INTERGRANULAR; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: GYPSUM-01%, ORGANICS- T%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

1060 - 1065 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: CRYSTALS, CALCILUTITE
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: GYPSUM-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

1065 - 1070 AS ABOVE

1070 - 1075 AS ABOVE

1075 - 1080 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
FOSSILS: NO FOSSILS
SAMPLE CONTAINS A SMALL (T%) AMOUNT OF LARGE (1-2 MM)
PERFECTLY SHAPED DOLOMITE RHOMBS.

1080 - 1085 AS ABOVE

1085 - 1090 AS ABOVE

1090 - 1095 AS ABOVE

1095 - 1100 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: ORGANICS-01%, QUARTZ- T%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

1100 - 1105 AS ABOVE

1105 - 1110 AS ABOVE

1110 - 1115 LIMESTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: CRYSTALS, PELLET
02% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS- T%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

1115 - 1120 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-15%
FOSSILS: NO FOSSILS

1120 - 1125 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-10%, QUARTZ-01%
FOSSILS: NO FOSSILS

1125 - 1130 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ORGANICS-01%, QUARTZ-01%
FOSSILS: NO FOSSILS

1130 - 1135 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: QUARTZ-05%, ORGANICS-01%
FOSSILS: NO FOSSILS

1135 - 1140 AS ABOVE

1140 - 1145 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: QUARTZ-05%, ORGANICS-05%
FOSSILS: NO FOSSILS

1145 - 1150 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERGRANULAR, INTERCRYSTALLINE
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: QUARTZ-07%, ORGANICS-05%
FOSSILS: NO FOSSILS

1150 - 1155 AS ABOVE

1155 - 1160 AS ABOVE

1160 - 1165 AS ABOVE

1165 - 1170 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: VUGULAR, INTERCRYSTALLINE, INTERGRANULAR
50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1170 - 1175 AS ABOVE

1175 - 1180 DOLOSTONE; GRAYISH BROWN TO GRAYISH ORANGE
POROSITY: VUGULAR, INTERCRYSTALLINE, INTERGRANULAR
50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: QUARTZ-03%, LIMESTONE-01%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS
SAMPLE APPEARS TO HAVE CAVITY-FILLING LIMESTONE- POSSIBLE
RESULT OF SEVERAL DIAGENETIC EVENTS

1180 - 1185 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1185 - 1190 AS ABOVE

1190 - 1195 AS ABOVE

1195 - 1200 AS ABOVE

1200 - 1205 AS ABOVE

1205 - 1210 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1210 - 1215 LIMESTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR
GRAIN TYPE: PELLET, CALCILUTITE
35% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: CHERT-03%, ORGANICS-01%, DOLOMITE-15%
OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

1215 - 1220 AS ABOVE

1220 - 1225 AS ABOVE

1225 - 1230 AS ABOVE

1230 - 1235 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CHERT-40%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1235 - 1240 AS ABOVE

1240 - 1245 AS ABOVE

1245 - 1250 AS ABOVE

1250 - 1255 AS ABOVE

1255 - 1260 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: QUARTZ- T%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1260 - 1265 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CHERT-45%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1265 - 1270 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CHERT-20%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1270 - 1275 AS ABOVE

1275 - 1280 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CHERT-05%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS
DC 3%

1280 - 1285 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CHERT-05%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1285 - 1290 AS ABOVE

1290 - 1295 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CHERT-03%, LIMESTONE-10%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1295 - 1300 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CHERT-05%, LIMESTONE-03%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1300 - 1305 DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH ORANGE
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%, CHERT-07%, QUARTZ-02%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1305 - 1310 AS ABOVE

1310 - 1315 AS ABOVE

1315 - 1320 AS ABOVE

1320 - 1325 DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH ORANGE
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
SEDIMENTARY STRUCTURES: LAMINATED
ACCESSORY MINERALS: LIMESTONE-15%, CHERT-05%, QUARTZ-01%
ORGANICS- T%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS
DC T%

1325 - 1330 AS ABOVE

1330 - 1335 AS ABOVE

1335 - 1340 LIMESTONE; YELLOWISH GRAY TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-20%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS
POSSIBLE DOLOMITE OF CALCITE CRYSTALS WITHIN LIMESTONE
FABRIC IS REMINISCENT OF DRUSY CALCITE - EUHEDRAL TO
SUBHEDRAL CRYSTALS BETWEEN LIMESTONE CLASTS; SAMPLE HAS
BEEN HEAVILY RECRYSTALLIZED.

1340 - 1345 AS ABOVE

1345 - 1350 AS ABOVE

1350 - 1355 LIMESTONE; YELLOWISH GRAY TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-15%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS

1355 - 1360 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%, ORGANICS-01%
FOSSILS: NO FOSSILS

1360 - 1365 NO SAMPLES

1365 - 1370 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SILICIC CEMENT
ACCESSORY MINERALS: DOLOMITE-02%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

1370 - 1375 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SILICIC CEMENT
ACCESSORY MINERALS: DOLOMITE-05%, CHERT- T%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

1375 - 1380 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SILICIC CEMENT
ACCESSORY MINERALS: CHERT-25%, DOLOMITE-03%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

1380 - 1385 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SILICIC CEMENT
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: FOSSIL MOLDS

1385 - 1390 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CHERT-01%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1390 - 1395 AS ABOVE

1395 - 1400 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SILICIC CEMENT
ACCESSORY MINERALS: CHERT-01%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
SUCROSIC
FOSSILS: NO FOSSILS

1400 - 1405 AS ABOVE

1405 - 1410 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SILICIC CEMENT
ACCESSORY MINERALS: CHERT-01%, DOLOMITE-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
SUCROSIC
FOSSILS: NO FOSSILS

1410 - 1415 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SILICIC CEMENT
ACCESSORY MINERALS: CHERT-01%, DOLOMITE-07%
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

1415 - 1420 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-05%, CHERT-01%, ORGANICS-01%
OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

1420 - 1425 AS ABOVE

1425 - 1430 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT
ACCESSORY MINERALS: DOLOMITE-02%
OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION
FOSSILS: NO FOSSILS

1430 - 1435 AS ABOVE

1435 - 1440 AS ABOVE

1440 - 1445 AS ABOVE

1445 - 1450 DOLOSTONE; YELLOWISH GRAY TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-15%, CHERT-20%, QUARTZ-01%
FOSSILS: NO FOSSILS

1450 - 1455 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%, CHERT-30%, QUARTZ-02%
FOSSILS: NO FOSSILS

1455 - 1460 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH ORANGE
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: QUARTZ-01%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1460 - 1465 AS ABOVE

1465 - 1470 DOLOSTONE; GRAYISH ORANGE TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-01%
FOSSILS: NO FOSSILS

1470 - 1475 DOLOSTONE; GRAYISH ORANGE TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ANHYDRITE-03%, LIMESTONE-01%
FOSSILS: FOSSIL MOLDS

1475 - 1480 AS ABOVE

1480 - 1485 DOLOSTONE; GRAYISH ORANGE TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ANHYDRITE-30%, CHERT-10%
FOSSILS: NO FOSSILS

1485 - 1490 AS ABOVE

1490 - 1495 DOLOSTONE; YELLOWISH GRAY TO WHITE
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, ANHYDRITE CEMENT
ACCESSORY MINERALS: ANHYDRITE-35%, CHERT-05%
FOSSILS: NO FOSSILS
ANHYDRITE FORMS A THICK LAYER AND MATRIX BETWEEN CLASTS OF DOLOMITE AND CHERT; CHUNKS DIS-AGGREGATE WHEN WET; PROBABLE RE-FORMATION IN THIS FORM AFTER SAMPLE WAS TAKEN.

1495 - 1500 AS ABOVE

1500 - 1505 DOLOSTONE; GRAYISH ORANGE TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ANHYDRITE-25%
FOSSILS: NO FOSSILS

1505 - 1510 AS ABOVE

1510 - 1515 AS ABOVE

1515 - 1520 DOLOSTONE; YELLOWISH GRAY TO WHITE
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, ANHYDRITE CEMENT
ACCESSORY MINERALS: ANHYDRITE-45%
FOSSILS: NO FOSSILS
COMMENT AS IN 1495'

1520 - 1525 AS ABOVE

1525 - 1530 DOLOSTONE; GRAYISH ORANGE TO WHITE
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ANHYDRITE-05%
FOSSILS: NO FOSSILS

1530 - 1535 AS ABOVE

1535 - 1540 DOLOSTONE; WHITE TO GRAYISH ORANGE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, VUGULAR
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ANHYDRITE-03%
FOSSILS: NO FOSSILS
SAMPLE COVERED WITH A LAYER OF WHITE MICRITE, ACCURATE
PERCENTAGES DIFFICULT TO GAUGE

1540 - 1545 AS ABOVE

1545 - 1550 DOLOSTONE; GRAYISH BROWN TO WHITE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, VUGULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: ANHYDRITE-03%
FOSSILS: NO FOSSILS

1550 - 1555 DOLOSTONE; WHITE TO GRAYISH ORANGE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, VUGULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: CALCILUTITE-30%, ANHYDRITE-05%
LIMESTONE-10%
FOSSILS: NO FOSSILS
COMMENT AS IN 1540'

1555 - 1560 AS ABOVE

1560 - 1565 AS ABOVE

1565 - 1570 PACKSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-03%
FOSSILS: FOSSIL FRAGMENTS

1570 - 1575 LIMESTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERCRYSTALLINE, INTERGRANULAR
GRAIN TYPE: CRYSTALS, PELLET
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: LITHOGRAPHIC; RANGE: VERY FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-02%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS

1575 - 1580 AS ABOVE

1580 - 1585 AS ABOVE

1585 - 1590 LIMESTONE; MODERATE BLUISH GRAY TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, VUGULAR
GRAIN TYPE: CRYSTALS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-45%, ANHYDRITE- T%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS
SAMPLE IS COMPOSED OF TWO TYPES OF LIMESTONE - THE DARK CRYSTALLINE VARIETY THAT COMPOSES 55% OF THE SAMPLE, AND A YELLOWISH GRAY PACKSTONE COMPOSED OF MICRITE, PELLETS, AND SOME SKELETAL FRAGMENTS. tHIS PORTION FO THE SAMPLE IS ALSO WELL INDURATED WITH A CALCILUTITE CEMENT. iT CONTAINS BOTH VUGULAR AND INTERPARTICLE POROSITY; 45% OF SAMPLE.

1590 - 1595 AS ABOVE

1595 - 1600 LIMESTONE; DARK GRAY TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, INTERGRANULAR
GRAIN TYPE: CRYSTALS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-05%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS
COMMENT AS ABOVE.

1600 - 1605 PACKSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, VUGULAR, INTERCRYSTALLINE
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-10%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS
MAJORITY OF SAMPLE IS NOW COMPOSED OF PACKSTONE
W/CRYSTALLINE LIMESTONE BEING IN THE MINORITY.

1605 - 1610 PACKSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, VUGULAR, INTERCRYSTALLINE
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS

1610 - 1615 AS ABOVE

1615 - 1620 AS ABOVE

1620 - 1625 AS ABOVE

1625 - 1630 AS ABOVE

1630 - 1635 AS ABOVE

1635 - 1640 AS ABOVE

1640 - 1645 PACKSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS-01%, DOLOMITE-01%
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS

1645 - 1650 AS ABOVE

1650 - 1655 AS ABOVE

1655 - 1660 AS ABOVE

1660 - 1665 AS ABOVE

1665 - 1670 PACKSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
80% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: CHERT-01%, ORGANICS- T%, DOLOMITE-01%
FOSSILS: FOSSIL FRAGMENTS

1670 - 1675 LIMESTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: CALCILUTITE, PELLET
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-01%, CHERT- T%, ORGANICS- T%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: NO FOSSILS

1675 - 1680 PACKSTONE; YELLOWISH GRAY TO VERY LIGHT ORANGE
POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: CHERT-02%, DOLOMITE-01%, ORGANICS-02%
FOSSILS: FOSSIL FRAGMENTS

1680 - 1685 WACKESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: ORGANICS-01%, DOLOMITE- T%, CHERT- T%
FOSSILS: NO FOSSILS

1685 - 1690 AS ABOVE

1690 - 1695 DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-05%, CHERT- T%
FOSSILS: NO FOSSILS

1695 - 1700 AS ABOVE

1700 - 1705 AS ABOVE

1705 - 1710 AS ABOVE

1710 - 1715 AS ABOVE

1715 - 1720 DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-20%, CHERT- T%
FOSSILS: NO FOSSILS

1720 - 1725 AS ABOVE

1725 - 1730 DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-20%, CHERT- T%
FOSSILS: NO FOSSILS

1730 - 1735 DOLOSTONE; MODERATE YELLOWISH BROWN TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-15%, CHERT- T%
FOSSILS: NO FOSSILS
SOME SUCROSIC DOLOMITE PRESENT (15% OF SAMPLE)

1735 - 1740 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: VERY FINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-30%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1740 - 1745 PACKSTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERGRANULAR, VUGULAR, INTERCRYSTALLINE
GRAIN TYPE: PELLET, SKELETAL, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-10%
FOSSILS: NO FOSSILS

1745 - 1750 AS ABOVE

1750 - 1755 AS ABOVE

1755 - 1760 WACKESTONE; YELLOWISH GRAY TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR, VUGULAR, INTERCRYSTALLINE
GRAIN TYPE: CALCILUTITE, PELLET
40% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-20%
FOSSILS: NO FOSSILS

1760 - 1765 DOLOSTONE; MODERATE YELLOWISH BROWN TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, VUGULAR
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: VERY FINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-35%
FOSSILS: NO FOSSILS

1765 - 1770 LIMESTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: CALCILUTITE, OOLITE CLAST
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-30%
FOSSILS: NO FOSSILS
MAJORITY OF SAMPLE IS COMPOSED OF A MICRITE MATRIX WITH
EUHEDRAL DOLOMITE CRYSTALS GROWING IN IT.

1770 - 1775 AS ABOVE

1775 - 1780 LIMESTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: CALCILUTITE, OOLITE CLAST
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-45%
FOSSILS: NO FOSSILS
COMMENT AS ABOVE

1780 - 1785 AS ABOVE

1785 - 1790 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-05%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1790 - 1795 AS ABOVE

1795 - 1800 AS ABOVE

1800 - 1805 NO SAMPLES

1805 - 1810 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 10-50% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: CALCILUTITE-35%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS
EUHEDRAL DOLOMITE IN A MICRITE MATRIX

1810 - 1815 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERGRANULAR, INTERCRYSTALLINE; 10-50% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX
ACCESSORY MINERALS: CALCILUTITE-30%, LIMESTONE-05%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS
COMMENT AS ABOVE

1815 - 1820 AS ABOVE

1820 - 1825 DOLOSTONE; MODERATE YELLOWISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%, CALCILUTITE-02%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1825 - 1830 DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-01%, CALCILUTITE-02%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1830 - 1835 DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; EUHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%, CALCILUTITE-03%
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1835 - 1840 AS ABOVE

1840 - 1845 AS ABOVE

1845 - 1850 DOLOSTONE; MODERATE YELLOWISH BROWN TO OLIVE GRAY
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; EUHEDRAL
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1850 - 1855 AS ABOVE

1855 - 1860 DOLOSTONE; GRAYISH BROWN TO OLIVE GRAY
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; EUHEDRAL
GRAIN SIZE: VERY FINE; RANGE: FINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
FOSSILS: NO FOSSILS

1860 - 1865 AS ABOVE

1865 - 1870 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: CALCILUTITE, CRYSTALS, PELLET
15% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO LITHOGRAPHIC; MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: NO FOSSILS

1870 - 1875 AS ABOVE

1875 - 1880 AS ABOVE

1880 - 1885 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH ORANGE
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: VERY FINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
FOSSILS: NO FOSSILS

1885 - 1890 AS ABOVE

1890 - 1895 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: VERY FINE
RANGE: VERY FINE TO CRYPTOCRYSTALLINE; GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-02%
FOSSILS: NO FOSSILS

1895 - 1900 AS ABOVE

1900 - 1905 LIMESTONE; YELLOWISH GRAY TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, INTERGRANULAR
GRAIN TYPE: CALCILUTITE
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: DOLOMITE-30%
FOSSILS: NO FOSSILS
EUHEDRAL DOLOMITE CRYSTALS IN A MICRITE MATRIX

1905 - 1910 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE- T%
FOSSILS: NO FOSSILS

1910 - 1915 DOLOSTONE; GRAYISH BROWN TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, INTERGRANULAR; 50-90% ALTERED
ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-01%
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

1915 - 1920 AS ABOVE

1920 - 1925 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE- T%
FOSSILS: NO FOSSILS

1925 - 1930 AS ABOVE

1930 - 1935 AS ABOVE

1935 - 1940 AS ABOVE

1940 - 1945 AS ABOVE

1945 - 1950 DOLOSTONE; GRAYISH BROWN TO MODERATE YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: SUCROSIC
FOSSILS: NO FOSSILS

1950 - 1955 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
FOSSILS: NO FOSSILS

1955 - 1960 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR; 50-90% ALTERED
SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-01%
FOSSILS: NO FOSSILS

1960 - 1965 AS ABOVE

1965 - 1970 AS ABOVE

1970 - 1975 AS ABOVE

1975 - 1980 DOLOSTONE; GRAYISH BROWN TO OLIVE GRAY
POROSITY: INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
FOSSILS: NO FOSSILS

1980 - 1985 NO SAMPLES

1985 - 1990 LIMESTONE; VERY LIGHT ORANGE TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
GRAIN TYPE: CALCILUTITE, CRYSTALS, PELLET
05% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
MODERATE INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-05%
OTHER FEATURES: LOW RECRYSTALLIZATION
FOSSILS: NO FOSSILS

1990 - 1995 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, VUGULAR
GRAIN TYPE: CALCILUTITE, CRYSTALS, PELLET
10% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: MICROCRYSTALLINE; RANGE: FINE TO LITHOGRAPHIC
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-35%
OTHER FEATURES: HIGH RECRYSTALLIZATION
FOSSILS: NO FOSSILS

1995 - 2000 AS ABOVE

2000 - 2005 AS ABOVE

2005 - 2010 AS ABOVE

2010 - 2015 LIMESTONE; YELLOWISH GRAY TO MODERATE GRAY
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, VUGULAR
GRAIN TYPE: PELLET, CALCILUTITE, SKELETAL
20% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY FINE; RANGE: FINE TO LITHOGRAPHIC
GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE-20%
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, DOLOMITIC
FOSSILS: NO FOSSILS

2015 - 2020 AS ABOVE

2020 - 2025 AS ABOVE

2025 - 2030 AS ABOVE

2030 - 2035 AS ABOVE

2035 - 2040 AS ABOVE

2040 - 2045 DOLOSTONE; GRAYISH ORANGE TO GRAYISH BROWN
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; SUBHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-15%
FOSSILS: NO FOSSILS

2045 - 2050 AS ABOVE

2050 - 2055 LIMESTONE; YELLOWISH GRAY TO MODERATE GRAY
POROSITY: INTERCRYSTALLINE, INTERGRANULAR, VUGULAR
GRAIN TYPE: CRYSTALS, CALCILUTITE
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: CHERT- T%
OTHER FEATURES: DOLOMITIC
FOSSILS: NO FOSSILS

2055 - 2060 AS ABOVE

2060 - 2065 DOLOSTONE; YELLOWISH GRAY TO MODERATE GRAY
POROSITY: INTERCRYSTALLINE, VUGULAR, INTERGRANULAR
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
ACCESSORY MINERALS: LIMESTONE-10%
FOSSILS: NO FOSSILS

2065 - 2070 AS ABOVE

2070 - 2075 DOLOSTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR
50-90% ALTERED; ANHEDRAL
GRAIN SIZE: MICROCRYSTALLINE
RANGE: MICROCRYSTALLINE TO CRYPTOCRYSTALLINE
GOOD INDURATION
CEMENT TYPE(S): DOLOMITE CEMENT
OTHER FEATURES: CALCAREOUS
FOSSILS: NO FOSSILS

2075 - 2080 AS ABOVE

2080 - 2085 AS ABOVE

2085 - 2090 LIMESTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY
POROSITY: INTERGRANULAR, INTERCRYSTALLINE, VUGULAR
GRAIN TYPE: CRYSTALS, CALCILUTITE
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
OTHER FEATURES: DOLOMITIC
FOSSILS: NO FOSSILS

2090 - 2095 AS ABOVE

2095 - 2100 LIMESTONE; LIGHT OLIVE GRAY TO MODERATE LIGHT GRAY
POROSITY: INTERGRANULAR, INTERCRYSTALLINE
GRAIN TYPE: CRYSTALS, CALCILUTITE
GRAIN SIZE: MICROCRYSTALLINE
RANGE: VERY FINE TO LITHOGRAPHIC; GOOD INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: ANHYDRITE-01%
OTHER FEATURES: DOLOMITIC
FOSSILS: NO FOSSILS

2100 TOTAL DEPTH

APPENDIX E
Primary and Secondary Drinking Water Laboratory Results

Advanced
Environmental Laboratories, Inc.

5810-D Breckenridge Parkway
Tampa, FL 33610
813-630-9616
FAX 813-630-4327

Client:	Diversified Drilling	**Report No.:**	T0310976
Project Name:	Disney Injection Well	**Date Sampled:**	11/26/03
Project Number:	24310	**Date Received:**	11/26/03 10:00
PWS ID#:		**Date Reported:**	12/23/03
Attention:	Paul Petrey		
Phone Number:			
Address:	8801 Maislin Drive		
	Tampa, FL 33637		

Project Description

The analytical results for the samples contained in this report were submitted for analysis as outlined by the Chain of Custody.

Project Name: Disney Injection Well

Approved By: _____

Nissa Mulnick, QA Deputy

If you have any questions, the above named should be contacted.

Advanced Environmental Laboratories certifies that the test results in this report meet all requirements of the NELAC standards, unless notated otherwise in the body of the report.

Total Number of Pages = 19

Advanced Environmental Laboratories, Inc.

Analytical Report

Client: Diversified Drilling
Project Name: Disney Injection Well
Matrix: Water
PWS ID#:

Report No.: T0310976
Date/Time Sampled: 11/26/03 8:45
Date/Time Received: 11/26/03 10:00

Client Sample ID: Well Tap
Site: Reddy Creek

Sampled By: Jason Hopp
Shipping Method: AEL Pick-up

Inorganic Analysis

Parameter ID		Analytes:	MCL	Sample Number	Results	Units	Qualifier	Analysis Method	Analysis Date/Time	MDL	Lab	Analyst
1005		**Arsenic**	0.050	T0310976-01	**0.0016**	mg/L	U	SW6010B	12/2/03 19:36	**0.0016**	J	KC
1010		**Barium**	2.0	T0310976-01	**0.018**	mg/L		SW6010B	12/2/03 19:36	**0.00076**	J	KC
1015		**Cadmium**	0.0050	T0310976-01	**0.00054**	mg/L	i	SW6010B	12/2/03 19:36	**0.00036**	J	KC
1020		**Chromium**	0.10	T0310976-01	**0.0012**	mg/L	i	SW6010B	12/2/03 19:36	**0.0010**	J	KC
1030	*	**Lead**	0.015	T0310976-01	**0.00091**	mg/L	U	SW6010B	12/2/03 19:36	**0.00091**	J	KC
1036	*	**Nickel**	0.10	T0310976-01	**0.00085**	mg/L	U	SW6010B	12/2/03 19:36	**0.00085**	J	KC
1045		**Selenium**	0.050	T0310976-01	**0.0022**	mg/L	U	SW6010B	12/2/03 19:36	**0.0022**	J	KC
1052		**Sodium**	160	T0310976-01	**3.6**	mg/L		SW6010B	12/2/03 19:36	**0.049**	J	KC
1075		**Beryllium**	0.0040	T0310976-01	**0.000059**	mg/L	U	SW6010B	12/2/03 19:36	**0.000059**	J	KC

i The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U The compound was analyzed for but not detected.
J DOH certification #E82574 (AEL-JAX) (FL NELAC certification)
* Comment for Lead – Analyzed 12-04-03 11:34 due to reanalysis.
* Comment for Nickel – Analyzed 12-04-03 11:34 due to reanalysis.
MDL Method Reporting Limit
For all Results qualified with an I, the PQL is defined to be 4 times the MDL

Advanced Environmental Laboratories, Inc.

Analytical Report

Client: Diversified Drilling
Project Name: Disney Injection Well
Matrix: Water
PWS ID#:

Report No.: T0310976
Date/Time Sampled: 11/26/03 8:45
Date/Time Received: 11/26/03 10:00

Client Sample ID: Well Tap
Site: Reddy Creek

Sampled By: Jason Hopp
Shipping Method: AEL Pick-up

Miscellaneous Analytes

Parameter ID	Analytes:	MCL	Sample Number	Results	Units	Qualifier	Analysis Method	Analysis Date/Time	MDL	Lab	Analyst
	Total Coliform (MF)		T0310976-01	**1**	cfu/100ml	U	SM9222B	11/26/03 10:30	**1.0**	*T*	DMF
	Total Alkalinity (as CaCO3)		T0310976-01	**110**	mg/L		E310.1	12/24/03 12:30	**5.0**	*T*	DLS
1017	**Total Chlorides**	250	T0310976-01	**7.6**	mg/L	i	E325.1	12/6/03 17:18	**2.5**	*T*	NBM
1024	**Cyanide**	0.20	T0310976-01	**0.0041**	mg/L	U	SM4500CN-E	12/2/03 8:15	**0.0041**	*T*	JH
1025	**Fluoride**	4.0	T0310976-01	**0.14**	mg/L		SM4500F-C	12/1/03 10:20	**0.031**	*T*	DLS
1040	**Nitrate (as N)**	10	T0310976-01	**0.050**	mg/L	U	SM4500NO3-F	11/26/03 12:00	**0.050**	*T*	CLB
1041	**Nitrite (as N)**	1.0	T0310976-01	**0.050**	mg/L	U	SM4500NO3-F	11/26/03 12:00	**0.050**	*T*	CLB
1055	**Sulfate (as SO4)**	250	T0310976-01	**12**	mg/L		E375.4	12/9/03 16:30	**1.9**	*T*	SB
1905	* **Color**	15	T0310976-01	**8.0**	Color Units		SM2120B	11/26/03 10:35	**5.0**	*T*	AJ
1920	**Odor**	3.0	T0310976-01	**8.0**	TON		SM2150B	11/26/03 15:40	**1.0**	*T*	AJ
1925	**pH**	6.5-8.5	T0310976-01	**8.0**	pH Units	, Q	E150.1	11/26/03 10:25		*T*	NS
1930	**Total Dissolved Solids**	500	T0310976-01	**160**	mg/L		E160.1	12/1/03 13:30	**10**	*T*	JH
2905	**MBAS**	0.50	T0310976-01	**0.064**	mg/L	i	E425.1	11/26/03 12:20	**0.026**	*T*	AJ

i The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
Q Sample held beyond the acceptable hold time.
U The compound was analyzed for but not detected.
T DOH certification #E84589, Compqap #980174 (AEL-Tampa)
* Comment for Color -- pH was 8.00 at time of color analysis.
MDL Method Reporting Limit
For all Results qualified with an I, the PQL is defined to be 4 times the MDL

Advanced Environmental Laboratories, Inc.

Analytical Report

Client: Diversified Drilling
Project Name: Disney Injection Well
Matrix: Water
PWS ID#:

Report No.: T0310976
Date/Time Sampled: 11/26/03 8:45
Date/Time Received: 11/26/03 10:00

Client Sample ID: Well Tap
Site: Reddy Creek

Sampled By: Jason Hopp
Shipping Method: AEL Pick-up

Secondary Chemical Analysis

Parameter ID	Analytes:	MCL	Sample Number	Results	Units	Qualifier	Analysis Method	Analysis Date/Time	MDL	Lab	Analyst
1002	**Aluminum**	0.20	T0310976-01	**0.021**	mg/L	i	SW6010B	12/2/03 19:36	**0.021**	J	KC
1022	**Copper**	1.0	T0310976-01	**0.0049**	mg/L		SW6010B	12/2/03 19:36	**0.0011**	J	KC
1028	**Iron**	0.30	T0310976-01	**0.090**	mg/L		SW6010B	12/2/03 19:36	**0.019**	J	KC
1032	**Manganese**	0.050	T0310976-01	**0.0019**	mg/L	i	SW6010B	12/2/03 19:36	**0.0014**	J	KC
1050	* **Silver**	0.10	T0310976-01	**0.00017**	mg/L	U	SW6010B	12/2/03 19:36	**0.00017**	J	KC
1095	* **Zinc**	5.0	T0310976-01	**0.0025**	mg/L	U	SW6010B	12/2/03 19:36	**0.0025**	J	KC

i The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U The compound was analyzed for but not detected.
J DOH certification #E82574 (AEL-JAX) (FL NELAC certification)
* Comment for Silver -- Analyzed 12-04-03 11:34 due to reanalysis.
* Comment for Zinc -- Analyzed 12-04-03 11:34 due to reanalysis.
MDL Method Reporting Limit
For all Results qualified with an I, the PQL is defined to be 4 times the MDL

Advanced Environmental Laboratories, Inc.

Analytical Report

Client: Diversified Drilling
Project Name: Disney Injection Well
Matrix: Water
PWS ID#:

Report No.: T0310976
Date/Time Sampled: 11/26/03 8:45
Date/Time Received: 11/26/03 10:00

Client Sample ID: Well Tap
Site: Reddy Creek

Sampled By: Jason Hopp
Shipping Method: AEL Pick-up

Total Metals

Parameter ID	Analytes:	MCL	Sample Number	Results	Units	Qualifier	Analysis Method	Analysis Date/Time	MDL	Lab	Analyst
	Calcium		T0310976-01	**37**	mg/L		SW6010B	12/2/03 19:36	**0.018**	J	KC
*	**Potassium**		T0310976-01	**1.1**	mg/L		SW6010B	12/2/03 19:36	**0.11**	J	KC
	Magnesium		T0310976-01	**11**	mg/L		SW6010B	12/2/03 19:36	**0.016**	J	KC

J DOH certification #E82574 (AEL-JAX) (FL NELAC certification)
* Comment for Potassium – Analyzed 12-4-03 due to reanalysis.
MDL Method Reporting Limit
For all Results qualified with an I, the PQL is defined to be 4 times the MDL

Advanced Environmental Laboratories, Inc.

Analytical Report

Client: Diversified Drilling
Project Name: Disney Injection Well
Matrix: Water
PWS ID#:

Report No.: T0310976
Date/Time Sampled: 11/26/03 8:45
Date/Time Received: 11/26/03 10:00

Client Sample ID: Well Tap
Site: Reddy Creek

Sampled By: Jason Hopp
Shipping Method: AEL Pick-up

Total Metals (Hg)

Parameter ID	Analytes:	MCL	Sample Number	Results	Units	Qualifier	Analysis Method	Analysis Date/Time	MDL	Lab Analyst
1035	**Mercury**	0.0020	T0310976-01	**0.000018**	mg/L	U	SW7470A	12/5/03 8:42	**0.000018**	*J* TP

U The compound was analyzed for but not detected.
J DOH certification #E82574 (AEL-JAX) (FL NELAC certification)

MDL Method Reporting Limit
For all Results qualified with an I, the PQL is defined to be 4 times the MDL

Advanced Environmental Laboratories, Inc.

Analytical Report

Client: Diversified Drilling
Project Name: Disney Injection Well
Matrix: Water
PWS ID#:

Report No.: T0310976
Date/Time Sampled: 11/26/03 8:45
Date/Time Received: 11/26/03 10:00

Client Sample ID: Well Tap
Site: Reddy Creek

Sampled By: Jason Hopp
Shipping Method: AEL Pick-up

Total Metals (Sb)

Parameter ID	Analytes:	MCL	Sample Number	Results	Units	Qualifier	Analysis Method	Analysis Date/Time	MDL	Lab Analyst
	Antimony		T0310976-01	**0.0034**	mg/L	U	SW7041A	12/11/03 15:27	**0.0034**	KC

U The compound was analyzed for but not detected.

MDL Method Reporting Limit
For all Results qualified with an I, the PQL is defined to be 4 times the MDL

Advanced Environmental Laboratories, Inc.

Analytical Report

Client: Diversified Drilling
Project Name: Disney Injection Well
Matrix: Water
PWS ID#:

Report No.: T0310976
Date/Time Sampled: 11/26/03 8:45
Date/Time Received: 11/26/03 10:00

Client Sample ID: Well Tap
Site: Reddy Creek

Sampled By: Jason Hopp
Shipping Method: AEL Pick-up

Total Metals (Tl)

Parameter ID	Analytes:	MCL	Sample Number	Results	Units	Qualifier	Analysis Method	Analysis Date/Time	MDL	Lab	Analyst
1085	**Thallium**	0.0020	T0310976-01	**0.00098**	mg/L	U	SW7841	12/15/039:17	**0.00098**	*J*	KC

U The compound was analyzed for but not detected.
J DOH certification #E82574 (AEL-JAX) (FL NELAC certification)

MDL Method Reporting Limit
For all Results qualified with an I, the PQL is defined to be 4 times the MDL

Advanced Environmental Laboratories, Inc.

Analytical Report

Client: Diversified Drilling
Project Name: Disney Injection Well
Matrix: Water
PWS ID#:

Report No.: T0310976
Date/Time Sampled: 11/26/03 8:45
Date/Time Received: 11/26/03 10:00

Client Sample ID: Well Tap
Site: Reddy Creek

Sampled By: Jason Hopp
Shipping Method: AEL Pick-up

Volatile Organic Analysis

Parameter ID	Analytes:	MCL	Sample Number	Results	Units	Qualifier	Analysis Method	Analysis Date/Time	MDL	Lab Analyst
2378	**1,2,4-Trichlorobenzene**	70	T0310976-01	**0.30**	ug/L	U	SW8260B	12/9/03 18:04	**0.30**	J BB
2380	**Cis-1,2-dichloroethene**	70	T0310976-01	**0.33**	ug/L	U	SW8260B	12/9/03 18:04	**0.33**	J BB
2955	**Xylenes (Total)**	10000	T0310976-01	**0.86**	ug/L	U	SW8260B	12/9/03 18:04	**0.86**	J BB
2964	**Methylene Chloride**	5.0	T0310976-01	**0.21**	ug/L	U	SW8260B	12/9/03 18:04	**0.21**	J BB
2968	**1,2-Dichlorobenzene**	600	T0310976-01	**0.28**	ug/L	U	SW8260B	12/9/03 18:04	**0.28**	J BB
2969	**1,4-Dichlorobenzene**	75	T0310976-01	**0.30**	ug/L	U	SW8260B	12/9/03 18:04	**0.30**	J BB
2976	**Vinyl Chloride**	1.0	T0310976-01	**0.49**	ug/L	U	SW8260B	12/9/03 18:04	**0.49**	J BB
2977	**1,1-Dichloroethene**	7.0	T0310976-01	**0.50**	ug/L	U	SW8260B	12/9/03 18:04	**0.50**	J BB
2979	**Trans-1,2-dichloroethene**	100000	T0310976-01	**0.50**	ug/L	U	SW8260B	12/9/03 18:04	**0.50**	J BB
2980	**1,2-Dichloroethane**	3.0	T0310976-01	**0.36**	ug/L	U	SW8260B	12/9/03 18:04	**0.36**	J BB
2981	**1,1,1-Trichloroethane**	200	T0310976-01	**0.39**	ug/L	U	SW8260B	12/9/03 18:04	**0.39**	J BB
2982	**Carbon Tetrachloride**	3.0	T0310976-01	**0.39**	ug/L	U	SW8260B	12/9/03 18:04	**0.39**	J BB
2983	**1,2-Dichloropropane**	5.0	T0310976-01	**0.30**	ug/L	U	SW8260B	12/9/03 18:04	**0.30**	J BB
2984	**Trichloroethene**	3.0	T0310976-01	**0.43**	ug/L	U	SW8260B	12/9/03 18:04	**0.43**	J BB
2985	**1,1,2-Trichloroethane**	5.0	T0310976-01	**0.34**	ug/L	U	SW8260B	12/9/03 18:04	**0.34**	J BB
2987	**Tetrachloroethene**	3.0	T0310976-01	**0.43**	ug/L	U	SW8260B	12/9/03 18:04	**0.43**	J BB
2989	**Chlorobenzene**	100	T0310976-01	**0.31**	ug/L	U	SW8260B	12/9/03 18:04	**0.31**	J BB
2990	**Benzene**	1000	T0310976-01	**0.30**	ug/L	U	SW8260B	12/9/03 18:04	**0.30**	J BB
2991	**Toluene**	1000	T0310976-01	**0.29**	ug/L	U	SW8260B	12/9/03 18:04	**0.29**	J BB
2992	**Ethylbenzene**	700	T0310976-01	**0.27**	ug/L	U , AIC	SW8260B	12/9/03 18:04	**0.27**	J BB
2996	**Styrene**	100	T0310976-01	**0.25**	ug/L	U , AIC	SW8260B	12/9/03 18:04	**0.25**	J BB

AIC Alternate initial calibration criteria used (mean RSD <15%)
U The compound was analyzed for but not detected.
J DOH certification #E82574 (AEL-JAX) (FL NELAC certification)

MDL Method Reporting Limit
For all Results qualified with an I, the PQL is defined to be 4 times the MDL

Advanced
Environmental Laboratories, Inc.

5810-D Breckenridge Parkway
Tampa, Florida 33610
(813) 630-9616
FAX (813) 630-4327

Client: Diversified Drilling
P.O. Box 290699
Tampa, FL 33687
Contact: Paul Petrey
Phone Number: (813)988-1132
Project Location: Disney Injection Well/Reddy Creek

Report Number: T0310976
Date Reported: 12/23/03
Date/TimeSampled: 11/26/03 0845
Date/Time Received: 11/26/03 1000
Compqap: 980174
DOH Cert. No.: E84589
Total Pages: 19

Matrix: Ground Water

RADIOCHEMICAL ANALYSIS
62-550.310(5)
(PWS033)

Parameter ID	Name(MCL)	Sample Number	Analysis Result(pci/l)	Data Qualifier	Error (+/-)	Analytical Method	MDL	Analysis Date	Analyst Initials	DOH Lab ID:
4000	Gross Alpha(5.0**)	T0310976-01	1.6	U	1.2	EPA 900.0	1.6	12/10/03	MJN	E83033
4030	Radium 228(3.0*)	T0310976-01	1	U	0.6	EPA Ra-05	1	12/8/03	KLN	E83033

Approved by: _____
Nissa Mulnick, Quality Assurance Deputy

Advanced Environmental Lab certifies that the test results in this report meet all requirements of Nelac standards.

*** Above 5 pci/l requires analysis on Radium 226, above 15 pci/l requires analysis on Uranium.*
**Radium 226 and 228 cannot exceed 3*
MCL-Maximum Contaminant Level
U-Sample was analyzed for but not detected

Florida Radiochemistry Services, Inc.

Contact: Michael J. Naumann
5456 Hoffner Ave., Suite 201 Orlando, FL 32812
Phone: (407) 382-7733 Fax: (407)382-7744
Certification I. D. # E83033

Work Order #: 0312008
Report Date: 12/11/03

Report to:

Advanced Environmental Laboratories, Inc.
5810-D Breckenridge Parkway
Tampa, FL 33610
Attention: Michael Cammarata

I do hereby affirm that this record contains no willful misrepresentations and that this information given by me is true to the best of my knowledge and belief. I further certify that the methods and quality control measures used to produce these laboratory results were implemented in accordance with the requirements of this laboratory's certification and NELAC Standards.

Signed Michael J. Naumann Date 12-11-03
Michael J. Naumann - President

Florida Radiochemistry Services, Inc.

Sample Login

Client:	**Advanced Environmental Laboratories, Inc.**	**Date / Time Received**	**Work order #**
		12/02/03 09:51	**0312008**
Client Contact:	**Michael Cammarata**		
Client P.O.			
Project I.D.	**T0310976**		

Lab Sample I.D.	Client Sample I.D.	Sample Date/Time	Analysis Requested
0312008-01	T0310976-01	11/26/03 08:45	Ga, Ra228

Analysis Results

Gross Alpha	**<1.6**	**Radium 228**	**<1.0**
Error +/-	**1.2**	**Error +/-**	**0.6**
MDL	**1.6**	**MDL**	**1.0**
EPA Method	**900.0**	**EPA Method**	**Ra-05**
Prep Date	**12/09/03**	**Prep Date**	**12/05/03**
Analysis Date	**12/10/03**	**Analysis Date**	**12/08/03**
Analyst	**MJN**	**Analyst**	**PJ**
Units	**pCi/l**	**Units**	**pCi/l**

Florida Radiochemistry Services, Inc.

QA Page

Analyte	Sample #	Date Analyzed	Sample Result	Amount Spiked	Spike Result	Spike /Dup Result	Spike % Rec.	Spike Dup % Rpd
Gross Alpha	0311257-02	12/10/03	<0.8	10.2	10.0	10.0	98	0.0
Radium 228	0312008-01	12/08/03	<1.0	6.8	6.0	6.2	88	3.3

	Quality Control Limits	
	% RPD	% Rec.
Gross Alpha	15.8	65-125
Radium 228	19.1	77-115

SOUTHERN ANALYTICAL LABORATORIES, INC.
110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2218

Advanced Environmental Laboratories Inc.
5810-D Breckenridge Parkway
Tampa, FL 33610-

December 9, 2003
Project No: 39139

Laboratory Report

FDEP Report Form attached for the following sample(s):

Client Project Description: **T0310976**

Sample Number	Sample Description	Date & Time Collected	Date & Time Received
39139.01	T0310976-01	11/26/03 08:45	11/26/03 13:50

FDOH Laboratory No. E84129
NELAP Accredited

Approved By: **Francis I. Daniels, Laboratory Director**
Leslie C. Boardman, Q. A. Manager

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2218

Advanced Environmental Laboratories Inc.
T0310976

December 9, 2003
Project No: 39139

Sample ID: T0310976-01

Pesticide/PCB Analysis
62-550.310(4)b
(PWS029)

Parameter ID	Name	MCL	Sample Number	Analysis Result	Units	Analytical Method	Analysis Date	Detection Limit	Lab ID
2005	Endrin	2	39139.01	0.1 U	ug/l	EPA 525.2	12/05/03	0.1	E84129
2010	gamma-BHC (Lindane)	0.2	39139.01	0.06 U	ug/l	EPA 525.2	12/05/03	0.06	E84129
2015	Methoxychlor	40	39139.01	0.05 U	ug/l	EPA 525.2	12/05/03	0.05	E84129
2020	Toxaphene	3	39139.01	0.5 U	ug/l	EPA 508.1	12/06/03	0.5	E84129
2031	Dalapon	200	39139.01	1 U	ug/l	EPA 515.3	12/06/03	1	E84129
2032	Diquat	20	39139.01	1 U	ug/l	EPA 549.2	12/03/03	1	E84129
2033	Endothall	100	39139.01	20 U	ug/l	EPA 548.1	12/04/03	20	E84129
2034	Glyphosate	700	39139.01	10 U	ug/l	EPA 547	12/05/03	10	E84129
2035	Di(2-ethylhexyl)adipate	400	39139.01	0.3 U	ug/l	EPA 525.2	12/05/03	0.3	E84129
2036	Oxamyl (Vydate)	200	39139.01	0.5 U	ug/l	EPA 531.1	12/09/03	0.5	E84129
2037	Simazine	4	39139.01	0.07 U	ug/l	EPA 525.2	12/05/03	0.07	E84129
2039	Di(2-ethylhexyl)phthalate	6	39139.01	1.0 U	ug/l	EPA 525.2	12/05/03	1.0	E84129
2040	Picloram	500	39139.01	0.75 U	ug/l	EPA 515.3	12/06/03	0.75	E84129
2041	Dinoseb	7	39139.01	0.5 U	ug/l	EPA 515.3	12/06/03	0.5	E84129
2042	Hexachlorocyclopentadiene	50	39139.01	0.2 U	ug/l	EPA 525.2	12/05/03	0.2	E84129
2046	Carbofuran	40	39139.01	0.5 U	ug/l	EPA 531.1	12/09/03	0.5	E84129
2050	Atrazine	3	39139.01	0.06 U	ug/l	EPA 525.2	12/05/03	0.06	E84129
2051	Alachlor	2	39139.01	0.2 U	ug/l	EPA 525.2	12/05/03	0.2	E84129
2065	Heptachlor	0.4	39139.01	0.08 U	ug/l	EPA 525.2	12/05/03	0.08	E84129
2067	Heptachlor Epoxide	0.2	39139.01	0.1 U	ug/l	EPA 525.2	12/05/03	0.1	E84129
2105	2,4-D	70	39139.01	1 U	ug/l	EPA 515.3	12/06/03	1	E84129
2110	2,4,5-TP (Silvex)	50	39139.01	0.25 U	ug/l	EPA 515.3	12/06/03	0.25	E84129
2274	Hexachlorobenzene	1	39139.01	0.05 U	ug/l	EPA 525.2	12/05/03	0.05	E84129
2306	Benzo(a)pyrene	0.2	39139.01	0.1 U	ug/l	EPA 525.2	12/05/03	0.1	E84129
2326	Pentachlorophenol	1	39139.01	0.1 U	ug/l	EPA 515.3	12/06/03	0.1	E84129
2383	PCBs	0.5	39139.01	0.2 U	ug/l	EPA 508.1	12/06/03	0.2	E84129
2931	Dibromochloropropane	0.2	39139.01	0.005 U	ug/l	EPA 504.1	12/05/03	0.005	E84129
2946	Ethylene dibromide	0.02	39139.01	0.005 U	ug/l	EPA 504.1	12/05/03	0.005	E84129
2959	Chlordane	2	39139.01	0.05 U	ug/l	EPA 508.1	12/06/03	0.05	E84129
504.1	Date Extracted		39139.01	12/04/03		EPA 504.1			E84129
508.1	Date Extracted		39139.01	12/04/03		EPA 508.1			E84129
515.3	Date Extracted		39139.01	12/04/03		EPA 515.3			E84129
525.2	Date Extracted		39139.01	12/04/03		EPA 525.2			E84129
548.1	Date Extracted		39139.01	11/28/03		EPA 548.1			E84129
549.2	Date Extracted		39139.01	12/02/03		EPA 549.2			E84129

Footnotes:

U Analyte was not detected; indicated concentration is method detection limit.

39139

Chain-of-Custody for AEL Tampa to Southern Analyti

AEL Tampa
5810-D Breckenridge Parkway
Tampa, FL 33610
813-630-9616 Fax 813-630-4327
Contact Person: Michael Cammarata

Southern Analytical
110 Bayview Blvd.
Oldsmar, FL 34677
813-855-1844
Contact Person: Sample Receiving

Project #: T0310976

Department: SA

☐ **Check if Rush**

Lab Code	Client Sample ID	Test	Matrix	Collect Date	/ Time	Receive Date	Due Date	# Bottles	Bottle Type (Pres.)
T0310976-01	Well Tap	62-550 549.2	Water	11/26/2003	8:45	11/26/03 10:00	12/3/2003		1x1LAP $Na_2S_2O_3$
T0310976-01	Well Tap	62-550 548	Water	11/26/2003	8:45	11/26/03 10:00	12/3/2003		
T0310976-01	Well Tap	62-550 547	Water	11/26/2003	8:45	11/26/03 10:00	12/3/2003		3x1LG Na_2SO_3
T0310976-01	Well Tap	62-550 531.1	Water	11/26/2003	8:45	11/26/03 10:00	12/3/2003		5x40mLV $Na_2S_2O_3$
T0310976-01	Well Tap	62-550 525.2	Water	11/26/2003	8:45	11/26/03 10:00	12/3/2003		
T0310976-01	Well Tap	62-550 515.1	Water	11/26/2003	8:45	11/26/03 10:00	12/3/2003		3x40mLAV $Na_2S_2O_3$
T0310976-01	Well Tap	62-550 508.1	Water	11/26/2003	8:45	11/26/03 10:00	12/3/2003		1x40mLV HCl
T0310976-01	Well Tap	62-550 508	Water	11/26/2003	8:45	11/26/03 10:00	12/3/2003		
T0310976-01	Well Tap	62-550 504.1	Water	11/26/2003	8:45	11/26/03 10:00	12/10/2003		

Tampa Relinquisher: [signature]

Shipping Relinquisher: [signature]

Shipping Receiver: FE

Southern Analytical Receiver: [signature]

Date/Time: 11/26/2003 10:21:28 AM

Date/Time: 11/26/03, 1350

Chain-of-Custody for AEL Tampa to Florida Radioch

AEL Tampa
5810-D Breckenridge Parkway
Tampa, FL 33610
813-630-9616 Fax 813-630-4327
Contact Person: Michael Cammarata

Florida Radiochemistry
5456 Hoffner Ave., Suite 201
Orlando, FL 32812-2517
407-382-7733
Contact Person: Sample Receiving

Project #: T0310976

Department: **FloridaRad**

☐ **Check if Rush**

Lab Code	Client Sample ID	Test	Matrix	Collect Date	/ Time	Receive Date	Due Date	# Bottles	Bottle Type (Pres.)
T0310976-01	Well Tap	Radium 228	Water	11/26/2003	8:45	11/26/03 10:00	12/10/2003		1L Amber Glass
T0310976-01	Well Tap	Gross Alpha	Water	11/26/2003	8:45	11/26/03 10:00	12/10/2003		1L Poly

Tampa Relinquisher: [signature] **Shipping Receiver:** [signature] **Date/Time:** 12/1/03 1600 ~~11/26/2003 10:21:05 AM~~

Shipping Relinquisher: _____ **Florida Radiochemistry Receiver:** [signature] **Date/Time:** 12/2/03 9:51

Chain-of-Custody for AEL Tampa to AEL Jax

AEL Tampa
5810-D Breckinridge Parkway
Tampa, FL 33610
813-630-9616 Fax 813-630-4327
Contact Person: Michael Cammarata

AEL Jax
6601 Southpoint Parkway
Jacksonville, FL 32216
904-363-9350 Fax 904-363-9354
Contact Person: Sean Hyde

Project #: T0310976
CustomerName: Diversified Drilling
Collector: Jason Hopp

☐ **Check if Rush**

Lab Code	Client Sample ID	Test	Matrix	Collect Date	/ Time	Receive Date	Due Date	# Bottles	Bottle Type (Pres.)
T0310976-01	Well Tap	-550 Metals ICP (Primary) C	Water	11/26/2003	8:45	11/26/03 10:00	**12/10/2003**	____	1L Poly
T0310976-01	Well Tap	50 Metals ICP (Secondary)	Water	11/26/2003	8:45	11/26/03 10:00	**12/10/2003**	____	1L Poly
T0310976-01	Well Tap	62-550 VOCs GW	Water	11/26/2003	8:45	11/26/03 10:00	**12/10/2003**	____	40mL VOC Vial
T0310976-01	Well Tap	Hg	Water	11/26/2003	8:45	11/26/03 10:00	**12/10/2003**	____	500mL Poly
T0310976-01	Well Tap	Sb (GFAA)	Water	11/26/2003	8:45	11/26/03 10:00	**12/10/2003**	____	500mL Poly
T0310976-01	Well Tap	Tl (GFAA)	Water	11/26/2003	8:45	11/26/03 10:00	**12/10/2003**	____	500mL Poly

Tampa Relinquisher: _____ **Shipping Receiver:** _____ **Date/Time:** 11/26/03 16:00

Shipping Relinquisher: _____ **Jacksonville Receiver:** _____ **Date/Time:** 12-2-03 0840

Advanced
Environmental Laboratories, Inc.
❑ Jacksonville: 6601 Southpoint Parkway, Jacksonville, FL 32216 • (904) 363-9350 Fax (904) 363-9354
❑ Tampa: 5810-D Breckenridge Parkway, Tampa, FL 33610 • (813) 630-9616 Fax (813) 630-4327
❑ Gainesville: 2106 NW 67th Place, Suite 7, Gainesville, FL 32606 • (352) 367-1500 Fax (352) 367-0050

CHAIN OF CUSTODY RECORD

LAB NUMBER: T031976

CLIENT NAME:	PROJECT NAME:
Diversified Drilling	Disney Injection Well
ADDRESS: P.O. Box 290649	P.O. NUMBER / PROJECT NUMBER: 24310
Tampa, FL 33687	PROJECT LOCATION:
PHONE: 968-1132 FAX: 955-6636	Reddy Creek
CONTACT: Paul Petry	SAMPLED BY: Jason Hopp

TURN AROUND TIME:
☒ STANDARD
❑ RUSH _____

REMARKS / SPECIAL INSTRUCTIONS:
pH: 7.86
Temp: 24.9°C
Turb: 0.55

WW= waste water **SW**=surface water **GW**=ground water **DW**=drinking water **OIL** **A**=air **SO**=soil **SL**=sludge

SAMPLE ID	SAMPLE DESCRIPTION	Grab Composite	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. CONT.	Preserv	BOTTLE SIZE & TYPE	ANALYSIS REQUIRED	LAB NUMBER
	Well Tap	G	11/26/03	8:45	GW	18		2 1/2°	Gross Alpha / Rad 22 SOC VOC Total Coliform	T031976-01

I = Ice H = (HCl) S = (H_2SO_4) N = (HNO_3) T = (Sodium Thiosulfate)

Shipment	Method	Sample Kit	Cooler #		Relinquished by:	Date	Time	Received by:	Date	Time
Out: / /	Via: _____	RB _____	D/T _____	1		11/26/03	1000		11/26/03	10:00
		AB _____	D/T _____	2						
Ret: / /	Via: _____	Trip Bl.		3						
	11/26/03	QC ❑ sent	☒ received	4						

Received on ice: ☒ yes ❑ no