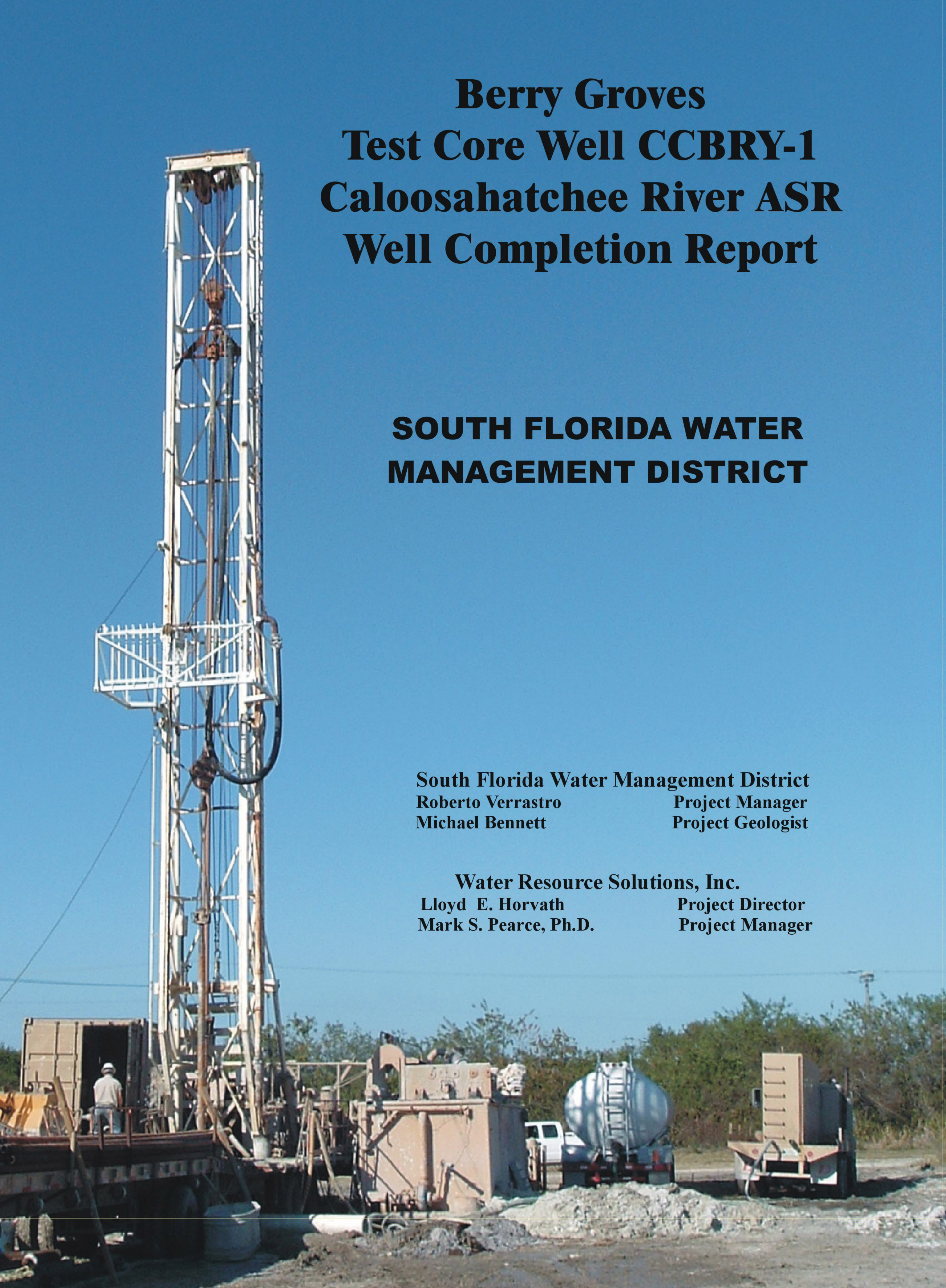

Berry Groves
Test Core Well CCBRY-1
Caloosahatchee River ASR
Well Completion Report

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

South Florida Water Management District

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1.0 INTRODUCTION

1.1 Background

To support the ongoing program to evaluate aquifer storage and recovery within the Caloosahatchee River Basin, the South Florida Water Management District (SFWMD), in association with the U.S. Army Corps of Engineers (USACE), determined that an additional test boring should be taken at the Berry Groves site. The purpose of this test boring was to obtain continuous rock core samples in the interval from 200 to 1,000 feet below land surface (bls) for further evaluation of the subsurface conditions.

The SFWMD awarded the contract to perform this work to Diversified Drilling Corporation (DDC) of Tampa, Florida. DDC mobilized to the site on October 4, 2004.

1.2 Scope

In accordance with the contract for professional services for CERP Caloosahatchee ASR pilot (contract no. C-C13301P dated March 14, 2002), the project required that the following activities be performed:

- Collect core material over the depth range between 200 and 1,000 feet bls.
- Prepare detailed lithologic descriptions of drill cuttings and cores.
- Obtain geophysical logs over the specified depth range.
- Photo-documentation (digital photos) of retrieved cores.
- Send specified core sections to Wolf Technologies, Inc. for further analyses.
- Handling, labeling, packaging, and temporary storage of core samples for delivery to the Florida Geological Survey (FGS).

This report summarizes the drilling/coring, construction, and geophysical logging operations that occurred during the development of this test well.

1.3 Project Location

The core well site, identified as CCBRY-1, is located in the northwestern quadrant of the northeastern corner of Section 6, Township 44 South, Range 28 East, southwest of the City of LaBelle, in Hendry County, Florida. The site is on property owned by the SFWMD that is referred to as “Berry Groves”. The project site is adjacent to State Road 80 and borders the eastern edge of the Townsend Canal, and it is accessible through Berry Groves citrus farm. The well is located east of the Townsend Canal and south of the east-west trending Header Canal approximately 950 feet generally west of the exploratory well EXBRY-1. The wellbore coordinates are latitude 26°41’13” north and longitude 81°33’24” west as measured by Water Resource Solutions (WRS) using a 100-foot measuring tape and the coordinates for EXBRY-1 for reference. The site and test boring location are shown on Figure 1-1.

2.0 DRILLING, CORING, GEOPHYSICAL LOGGING, AND WELLBORE CONSTRUCTION

DDC performed the drilling/coring of test boring CCBRY-1 in two phases. During the first phase, pilot-hole drilling and wire-line coring operations were performed using a truck-mounted table-driven rotary drilling rig (“Faling” 1500). The second phase, which consisted of conventional coring operations, specialty geophysical logging, and final wellbore construction, was accomplished using a larger truck-mounted table-driven rotary drilling rig (“Speedstar” 2500). The second rig was mobilized by DDC to improve core recovery below 600 feet bls.

All drilling, reaming, and coring operations were performed using the mud-rotary method. The drill strings were advanced using a kelly bar. Pit casing was not used. The mud tub provided the sole support structure for the initial borehole. Fresh water was provided by an existing production well located at the drilling site of EXBRY-1. Drill cuttings were continuously collected and described in the field (see Geologist’s Log in Appendix 2-1). Table 2-1 provides a chronology and brief description of drilling, coring, and testing activities at this site.

2.1 Pilot-Hole Drilling to 200 Feet Below Land Surface

On October 4, 2004, DDC mobilized the drilling rig and other equipment to the site. On October 6, 2004, a pilot hole was drilled from land surface to 100.5 feet bls by mud-rotary circulation using a nominal 6-inch-diameter tri-cone roller bit. The following day, the pilot hole was over-drilled from land surface to 100 feet bls using a nominal 12-inch-diameter tri-cone reaming bit. The initial wellbore construction consisted of “Monoflex” nominal 8-inch diameter by 10-foot-long Schedule 40 PVC flush thread casing joints set to 100 feet bls and sealed at depth by hole plug (sodium bentonite chips) placed in the annulus to approximately 38 feet bls. The pilot hole was then advanced using a nominal 8-inch-diameter tri-cone bit from 100 to 140 feet bls. On October 11, 2004, a 6-inch-diameter PVC casing was installed in the 8-inch borehole to 140 feet bls. Pilot-hole drilling continued that same day from 140 to 152 feet bls using a nominal 6-inch drill bit. By the end of this same day, a 4-inch-diameter steel casing was installed inside the 6-inch casing to 152 feet bls. The steel casing string was sealed in place by approximately five vertical feet of sodium bentonite chips used as hole plug in the annulus. On October 12, 2004, preliminary coring began from 152 feet bls using a 10-foot-long inner core barrel designed for cutting 2-inch-diameter cores. The pilot hole was then advanced by drilling from 157 to 185 feet bls using a nominal 4-inch drill bit. On October 13, 2004, the 4-inch steel casing was driven down to a depth of 187 feet bls using the rig's hammer. The preliminary coring continued from 187 to 200 feet bls.

2.2 Wire-Line Coring to 610 Feet Below Land Surface

On October 13, 2004, immediately following the preliminary coring to 200 feet bls, the official test core was advanced from 200 to 230 feet bls, using the same coring assembly. Wire-line coring continued from 230 to 310 feet bls. DDC reported flowing conditions after retrieving the core from 300 to 310 feet bls. From October 15th to October 21st , 2004, the test core boring was advanced from 310 to 600 feet bls. The core recovery efficiency decreased below a depth of 550 feet bls. There was no core recovery in the interval from 570 to 600 feet bls due to the fine-grained nature of the sand encountered in the region. Sand samples were collected from the desander during this phase of the drilling. On October 22, 2004, wire-line coring operations ended at a depth of 610 feet bls. A lithologic description of the recovered core samples collected during wire-line coring is provided in Appendix 2-1.

Each 2-inch-diameter core was measured and photographed using a digital camera. The core samples were then described, double wrapped first in cellophane then in aluminum foil, labeled, and packed in a cardboard core box before being placed in a wooden crate for storage and final shipment. Appendix 2-2 provides a compact disk containing photographs of each retrieved core sample. Throughout wire-line coring operations, core sections collected at pre-selected depth intervals were carefully double wrapped immediately after retrieval to avoid dehydration, and shipped to Wolf

Technologies, Inc. for laboratory analysis. Table 2-2 provides a summary of core sections sent for laboratory analysis showing collection date, collection depth, and sample length. A core recovery log listing core percent recovery is provided in Table 2-3. An overall core recovery percentage of approximately 85% was achieved during wire-line coring operations in the interval from 200 to 610 feet bls.

2.3 Conventional Coring to 1,012 Feet Below Land Surface

DDC was unable to advance the test core boring past 610 feet bls and elected to suspend coring operations and trip out the coring string, remove both 4-inch and 6-inch temporary casing strings, and move the initial drilling rig off the hole. Due to wellbore conditions, on October 28, 2004, DDC completed demobilization of equipment, capped the wellbore, and removed the “Faling” 1500 rig from the site.

On November 1, 2004, DDC mobilized a larger drilling rig (“Speedstar” 2500) better equipped for conventional coring. From November 11th to November 17th, 2004, DDC reamed out the 8-inch-diameter temporary casing and advanced the borehole to 200 feet bls, using a 7-7/8-inch lead bit with a nominal 13-inch hole opener. On November 18, 2004, an 8-inch-diameter, 0.375-inch wall, steel casing was set in the reamed borehole at 200 feet bls and sealed in place using bentonite hole plug. Drilling operations resumed the following day using a 7-7/8-inch tri-cone drill bit. The mudded hole was advanced to 488 feet bls when the contractor realized that the drilling mud had begun circulating around the outside of the steel casing set at 200 feet bls.

On November 30, 2004, DDC removed the 8-inch steel temporary casing and reamed out the borehole using a 7-7/8-inch lead bit in combination with a nominal 13-inch reaming bit. The following day, the same steel casing was re-installed at a depth of 206 feet bls. The casing string included a 1.5-foot-long rubber packer attached by clamps and positioned on the bottom end of the string. Rock was used to fill the rubber packer followed by “Enviroplug” grout. The grout was placed by tremie pipe, to seal the casing in the lowermost section of the borehole. On December 2, 2004, the borehole was advanced to a depth of 610 feet bls, the last cored interval depth. On December 7, 2004, drilling fluid had leaked around the outside of the re-installed steel casing and the well flowed continuously. On December 9th, 2004, the well flow was controlled by increasing the mud weight with barite. During the following week, DDC removed the steel casing; installed 8-inch-diameter Certa-Lok PVC casing to 200 feet bls; and cemented the casing in the borehole by employing the tremie grouting method using Portland Type 2 cement. The top of the annular cement was tagged at six feet bls. From December 14th to December 20th, 2004, the borehole was advanced to a depth of 610 feet bls, using a 7-1/4-inch tri-cone drill bit.

On December 21, 2004, conventional coring operations began from a depth of 610 feet bls. Coring was accomplished using a 20-foot-long inner core barrel designed for cutting 4-inch-diameter cores. Core recovery was 50% between 610 and 739 feet bls. The core recovery efficiency sharply decreased to 34% in the interval from 739 to 774 feet bls. Good core recovery was accomplished below this depth to a depth of 1,012 feet, the termination depth of the test boring. A Lithology of recovered core samples collected during conventional coring is provided in Appendix 2-1. Table 2-3 summarizes core recovery by depth. An overall core recovery percentage of 71.5% was achieved during conventional coring operations in the interval from 610 to 1,012 feet bls.

Each 4-inch-diameter core was measured and photographed using a digital camera (see photos in Appendix 2-2). The core samples were then described, double wrapped in plastic sheeting, labeled, and placed in a wooden crate for storage. Throughout conventional coring operations, core sections collected at pre-selected depth intervals were carefully double wrapped and shipped to Wolf Technologies, Inc. for laboratory analysis. Representative core sections pre-selected for laboratory analysis are listed in Table 2-2.

From January 4th to January 5th, 2005, the test core boring was over-drilled using a 7-1/4-inch tri-cone drill bit. The following day, Schlumberger Oilfield Services successfully completed specialty geophysical logging of the test hole to the termination depth, recording a bottom tag of 1,012 feet bls. The logging suite included the following: natural gamma spectroscopy, electron capture spectroscopy, high-definition array induction, spontaneous potential, micro-resistivity, compensated neutron, compensated density w/ PE or PEF, dipole sonic imager, formation micro-imager, and 4-arm caliper. Specialty geophysical logging plots are provided in Appendix 2-3.

2.4 Back-Plugging and Final Wellbore Construction

On January 7, 2005, the test hole was back-plugged from the termination depth (1,012 feet bls) to 212 feet bls, using ¼-inch limestone gravel. The contractor pumped 16 cubic feet of cement slurry (Portland mixed with 3% bentonite) atop the gravel. On January 10, 2005, the 8-inch-diameter PVC temporary casing was over-drilled to eight feet bls, using a nominal 13-inch reaming bit in combination with a 7-1/4-inch lead bit. There were no site activities from January 12th through January 25th, 2005, while the SFWMD reviewed all drilling, coring, and geophysical logging data to formulate options for going forward with this project. Based on the decision to temporarily abandon this well, a 4-inch-diameter PVC riser was installed inside the 8-inch-diameter PVC casing, previously over-drilled to eight feet bls. The 4-inch casing extension was fitted with a K-packer used to secure and seal it inside the 8-inch casing. The annulus was then grouted to the surface using neat cement. On February 4, 2005, a 4-foot by 4-foot well pad was constructed using SacCrete. On February 7, 2005, a 7-foot by 7-foot protective bumper cage was installed around the well pad. The capped well riser's finished top edge measures 1.7 feet above finished grade. Final wellbore construction details are presented on Figure 2-1.

3.0 HYDROGEOLOGIC FRAMEWORK

The hydrostratigraphy of the project site is based on interpretations of the geologist's field log describing all drill cuttings and cores recovered at the continuous core site CCBRY-1; interpretations of specialty geophysical logging results for CCBRY-1; interpretations of the geologist's field log and geophysical logs from the exploratory well EXBRY-1; and correlations with nearby sites. The geologist's field log for CCBRY-1, Appendix 2-1, is based on drill cuttings and core samples collected and described in the field using the Dunham Classification scheme (Dunham, 1962). Three principal aquifer systems were penetrated in the test core boring. In descending order of occurrence, they are the surficial aquifer system, intermediate aquifer system, and Floridan aquifer system. Figure 3-1 provides an illustration of a hydrogeologic section for the Caloosahatchee River site.

3.1 Surficial Aquifer System

The site-specific lithologic data indicate that the surficial aquifer is less than 10 feet thick at CCBRY-1. The aquifer is composed of clayey fine-grained quartz sand that contains some silt and organic detritus. Similar surficial quartz sand deposits blanket much of the region and are generally considered to have been deposited on the Pamlico terrace, as described by Healey (1975).

3.2 Intermediate Aquifer System

The intermediate aquifer system comprises all sediments present between the base of the surficial aquifer system and the top of the Floridan aquifer. The stratigraphic units that form the intermediate aquifer system at the project site consist of the Buckingham Marl Member of the Tamiami Formation, Peace River Formation of the Hawthorn Group, and the upper 183 feet of the Arcadia Formation of the Hawthorn Group. The principal hydrostratigraphic units that occur within this interval are the Sandstone and mid-Hawthorn aquifers.

The Buckingham Marl Member of the Tamiami Formation is comprised of gray to green lime mud that typically contains variable amounts of fossil shell, phosphate grains, and quartz sand. The permeability of the unit is generally low. However, lenses of moldic limestone that yield moderate amounts of water are interbedded with the marl in some parts of the region (Weinberg and Cowart, 2001). The Buckingham Marl at the test core site is primarily composed of moldic limestone (wackestone) and extends from 1.5 to 12 feet below land surface (bls). The marly limestone has fair to poor apparent permeability and forms the uppermost confining unit below the surficial aquifer system.

The Peace River Formation of the Hawthorn Group consists of clastic sediments and subordinate amounts of carbonate rocks (Scott, 1988). The formation is approximately 285 feet thick at the project site and is directly underlain by carbonate rocks of the Arcadia Formation.

The upper part of the Peace River Formation at the project site, between the depths of 12 and 65 feet bls, consists of greenish gray to light gray dolomitic clay with variable amounts of fine quartz sand, phosphatic sand, silt, pebble-sized quartz and phosphate, quartz sandy limestone, and shell fragments. These clayey sediments extend throughout much of Lee County and northwestern Hendry County, and are informally referred to as the Cape Coral Clay. The Cape Coral Clay also confines the base of the surficial aquifer system.

The Sandstone aquifer consists of an upper clastic section and an underlying carbonate unit. The clastic sediments include predominantly shell fragments, sand and pebble-sized quartz, and phosphatic sand present between the depths of 65 and 115 feet bls. Most of these strata are reported to have excellent apparent porosity and permeability, particularly in the shell beds, as note in the lithologic log for CCBRY-1.

The carbonate section of the Sandstone aquifer extends from 126 to 187 feet bls, and is separated from the overlying clastic sediments by approximately 11 feet of finely phosphatic and fine quartz sandy clay, which forms a semi-confining unit in the area of the test core. The upper approximate 30 feet (126 to 157 feet bls) of carbonate rock consists of a grain-supported limestones (packstone) with good to fair moldic porosity and fair apparent permeability. A 16-foot interval, from 135 to 151 feet bls, was never recovered. The lower 30 feet (157 to 187 feet bls) of the unit consists of interbedded finely phosphatic and fine quartz sandy clay with shell fragments and medium to coarse quartz sand with fine to medium coarse phosphate. The lowermost few feet of the unit consists of a fossil packstone exhibiting fair moldic and interparticle apparent porosity and fair to poor apparent permeability. A 5-foot interval, from 180 to 185 feet bls, was never recovered.

The basal strata of the Peace River Formation, between 187 and 297 feet bls, consists of low permeability, greenish gray fine quartz sandy clay interbedded with clayey sand, claystone, and fine quartz sandstone. Accessory components include silt, phosphatic sand, and fossil shell. These fine-grained sediments confine the base of the Sandstone aquifer.

The top of the Arcadia Formation occurs at a depth of 297 feet bls at the test core site. The upper 118 feet of the formation consists of interbedded claystone, clay, marl, marly limestone, and siltstone. The limestone strata range from grain-supported to mud-supported rock (packstone to mudstone), with variable amounts of marl, shell, quartz and phosphatic sand. Carbonate rocks of the upper Arcadia Formation present in some portions of Southwest Florida represent an important water yielding interval that is informally referred to as the mid-Hawthorn aquifer. However, these strata at the test core site and in adjacent areas, typically have low to moderate permeability and are not considered to represent a productive aquifer.

Sediments of the Arcadia Formation present between 415 and 480 feet bls consist of interbedded, predominantly mud-supported limestone, clay, marl, and claystone. Accessory components include quartz and phosphatic sand, silt, fossil shell, lime mud, and rarely dolomite. These fine-grained sediments form the basal confining unit of the intermediate aquifer system at the project site.

3.3 Floridan Aquifer System

Miller (1986) broadly divides the Floridan aquifer system into upper and lower carbonate units that have good overall water-yielding properties (upper and lower Floridan aquifers). Intervening sediments of generally lower permeability (middle confining unit) separate them. The test core boring terminated in the upper Floridan aquifer (upper Ocala Limestone) at a depth of 1,012 feet bls. The stratigraphic units penetrated in descending order of occurrence consist of the lower 70 feet of the Arcadia Formation, Suwannee Limestone, and the upper Ocala Limestone.

The basal Arcadia Formation sediments that comprise the upper part of the Floridan aquifer at the test core site extend from 480 to 550 feet bls. The unit consists of predominantly light gray to yellowish gray, phosphatic, grain-supported to mud-supported limestones (packstone to mudstone), variably dolomitic and variably marly. The lithologic log for CCBRY-1 indicates that this limestone sequence exhibits moderate to low apparent permeability. The log suggests that the lower Hawthorn aquifer may not be very productive in this area. Specific capacity data and packer test results for the Lee County Utilities Olga ASR facility, located approximately 1.5 miles northwest of the project site, suggest that transmissivity there is on the order of 30,000 gpd/ft (Water Resource Solutions, 2000).

The top of the Suwannee Limestone was interpreted to be at 550 feet bls at the test core site, based on a sharp decrease in natural gamma activity below that depth. The thickness of this unit appears to be 347 feet, which is 57 feet thicker than estimated in the exploratory well EXBRY-1. The top of the Suwannee Limestone as estimated for CCBRY-1 is 80 feet shallower than that of EXBRY-1. East of the project site, the Suwannee Limestone thins considerably (SFWMD, 2002).

A review of the geologist's field log for the test core boring indicates that the Suwannee Limestone consists mainly of very light gray to yellowish gray, grain-supported to mud-supported limestones (grainstone to wackestone) that contain variable amounts of quartz sand, phosphatic sand, and marl. Light gray quartz sandstones appear interbedded with these limestones at the upper and middle sections of this unit. The apparent porosity and permeability of these rocks is reported to be moderate to low.

Results of the elemental capture spectroscopy log performed in the test core boring CCBRY-1 indicate that quartz sand is a major lithologic component of the Suwannee Limestone in the intervals from 560 to 660 feet bls, and from 730 to 830 feet bls. Logging results for the exploratory well EXBRY-1 show these two quartz sandy zones occurring in the intervals from 650 to 715 feet bls, and from 785 to 865 feet bls. These quartz sandy zones appear shallower and are thicker in the test core boring than those identified in the exploratory well. Interestingly, the thickness of the interval between the upper and lower quartz sandy zones in both the test core boring and the exploratory well is 70 feet. A comparison of the geologic data collected at the Berry Groves site and the geologic data collected from the Olga ASR project located approximately 1.5 miles north west of the Berry Groves site, shows the presence of two similar quartz sandy intervals within the formation. The upper interval, which ranges from 15 to 60 feet thick, consists of sandy limestone present near the top of the Suwannee Limestone. A deeper sequence of sandstone and poorly cemented quartz sand that ranges from 10 to 50 feet thick occurs near the middle of the formation. The apparent correlation of these two intervals at the Olga site with the results for the Caloosahatchee River ASR site suggests that the quartz sand deposits may have some lateral continuity (Water Resource Solutions, 2000).

The top of the Ocala Limestone is interpreted to be at a depth of 897 feet bls at the test core site. This selection is primarily based on a general decrease in natural gamma ray activity below the contact with clay and marl interbeds present in the lower Suwannee Limestone. This compares to a depth of 920 feet bls interpreted at the EXBRY-1 well (Water Resource Solutions, 2004). This interpretation also agrees with the stratigraphic designations applied for the Olga site, which places the Ocala contact below a thin sequence of clay and marl at the base of the Suwannee Limestone. A sequence of marly limestone was reported at the base of the unit at the test core site, instead of clay or marl. Lithologic and geophysical logging data correlate well between the test core site and the exploratory well site in picking the top of this unit. The lithologic characteristics of the Ocala Limestone are similar to those reported for the Suwannee Limestone at the project site. The predominant lithology is very pale orange and yellowish gray, variably chalky, variably marly, grain-supported to mud-supported limestones (packstone to mudstone) with low apparent permeability. Minor amounts of quartz and phosphatic sand is reported present throughout the formation. The test core boring was terminated in the upper Ocala Limestone at 1,012 feet bls.

3.4 Site Data Summary

A review of the core samples collected during the course of this project with regard to suitability for selecting a zone for ASR, does not indicate an interval that would appear to support the desired flow of 5 million gallons per day that is desired for the pilot project. However, it should be noted that the gaps in the recovered core record do not preclude the existence of a flow interval with the appropriate characteristics.

Neither the geophysical logs nor the core data provide sufficient insight into the existence or location of a potential suitable flow zone for this project at this location. Based on recent results, it is suggested that an alternate site be selected at the Berry Groves site for additional exploratory work and evaluation. It is suggested that the proposed site remain outside the footprint of the proposed reservoir.

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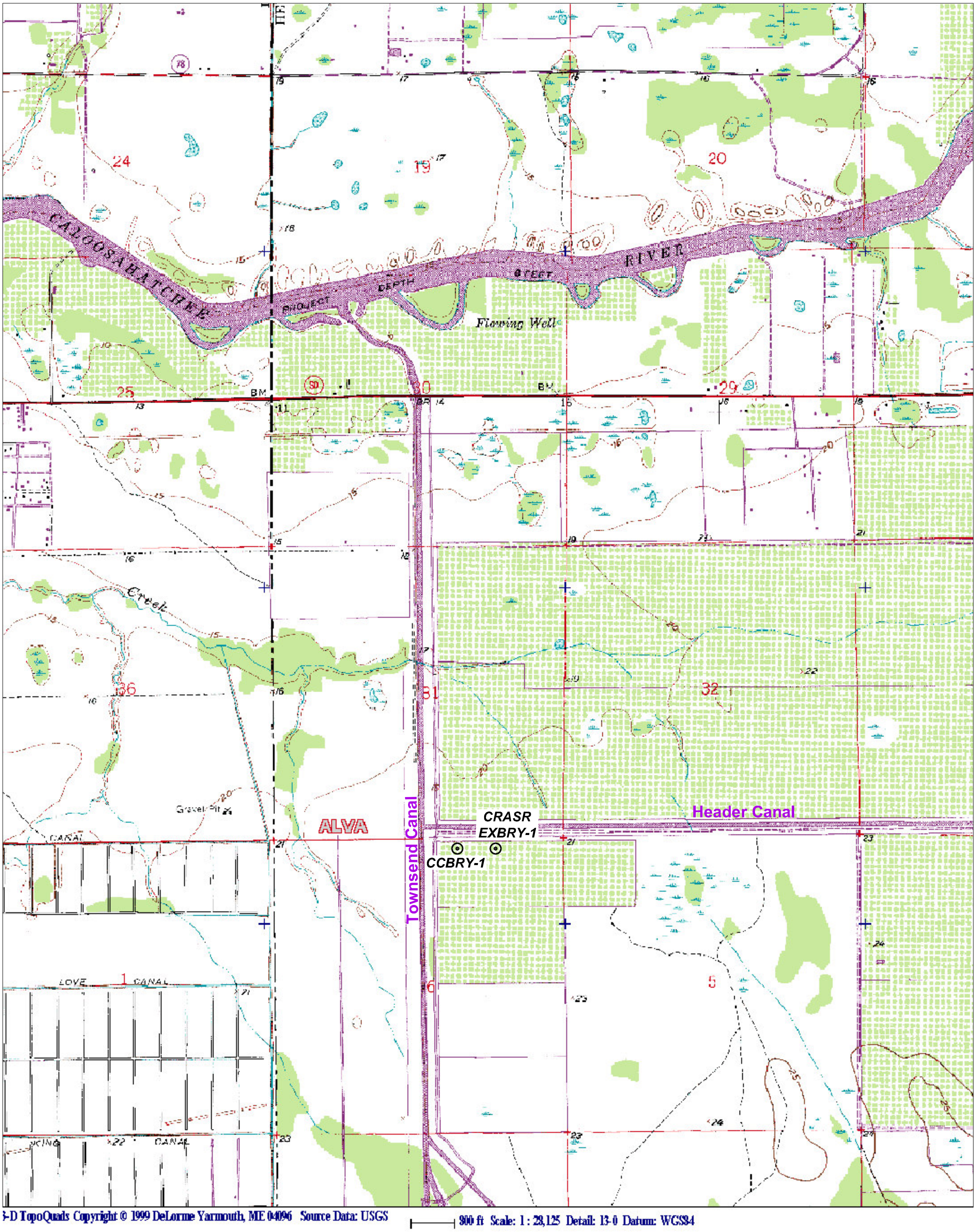
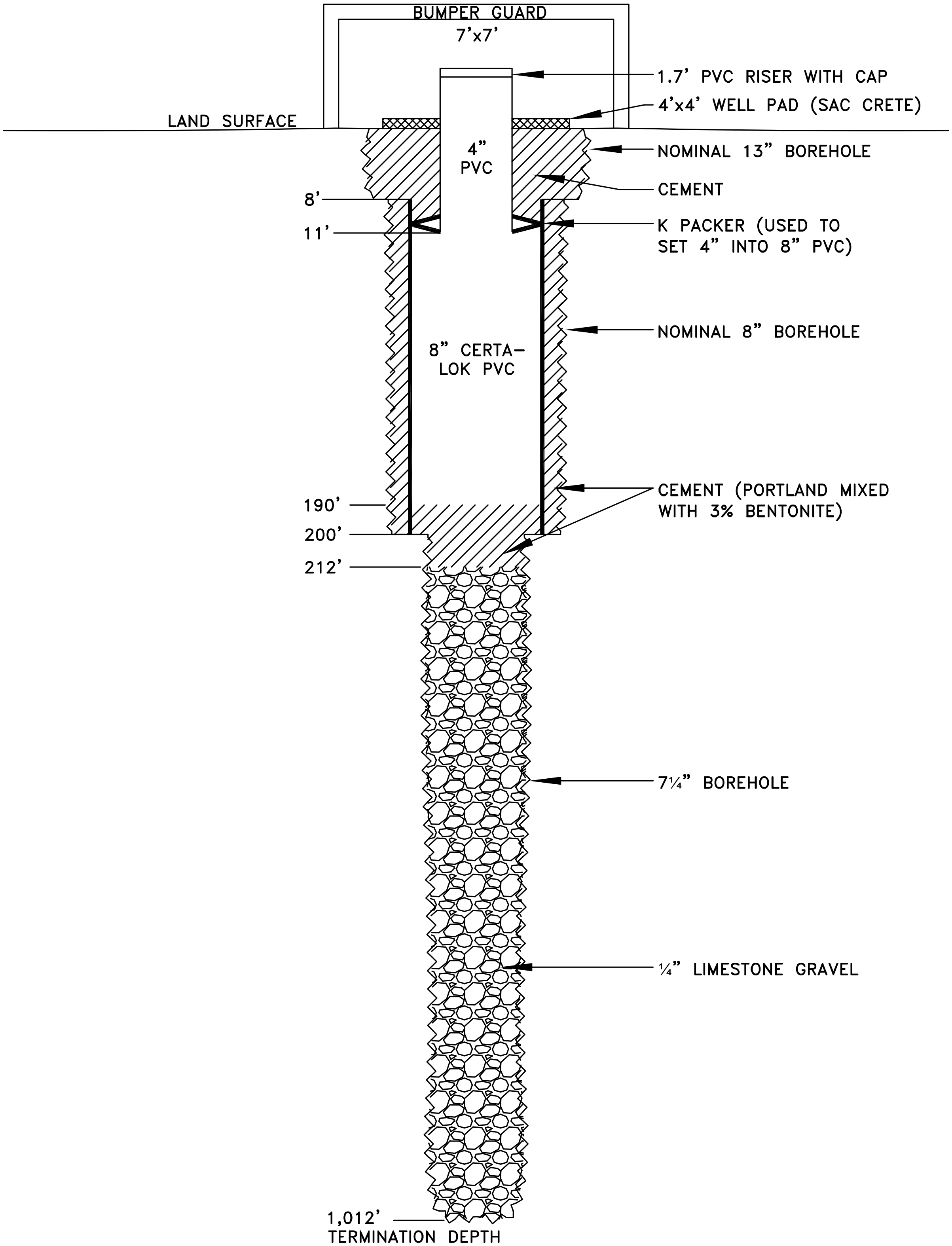


Water Resource Solutions	PROJECT NAME: CERP ASR	DWG. NUMBER: A-014792A11
	PROJECT NUMBER: 01-04792.01	DATE: 03/21/05

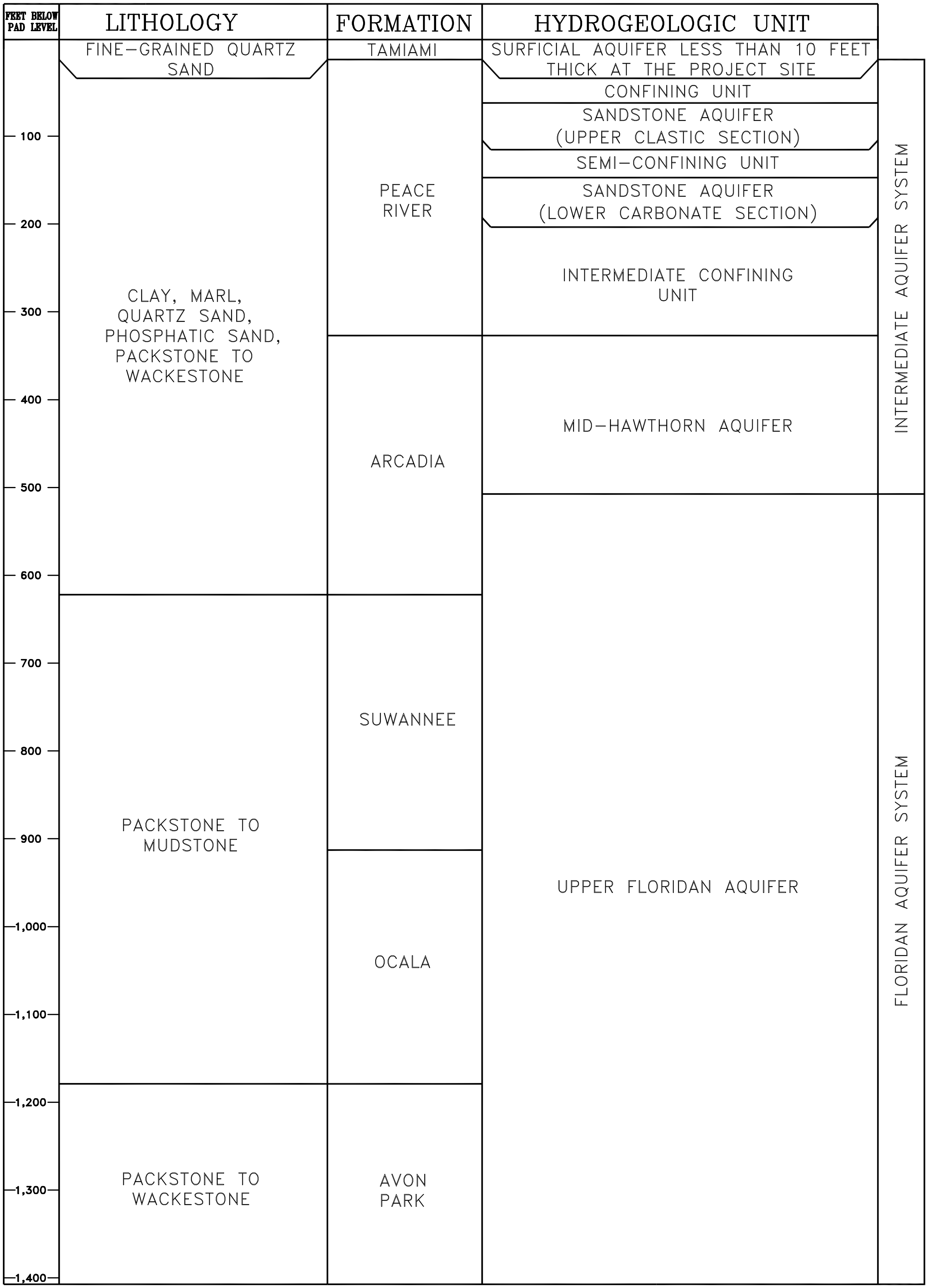
FIGURE 1-1. PROJECT LOCATION MAP.

TEST CORE BORING CCBRY-1



Water Resource Solutions	PROJECT NAME: CERP ASR	DWG. NUMBER: A-014792A11
	PROJECT NUMBER: 01-04792.01	DATE: 03/16/05

FIGURE 2-1. CCBRY-1 WELL CONSTRUCTION DETAILS.



Water Resource Solutions	PROJECT NAME: CERP ASR	DWG. NUMBER: A-014792A11_1
	PROJECT NUMBER: 01-04792.01	DATE: 03/21/05

FIGURE 3-1. HYDROGEOLOGIC SECTION FOR THE CALOOSAHATCHEE RIVER SITE.

Table 2-1. A CHRONOLOGY OF FIELD EVENTS IN COMPLETING TEST CORE CCBRY-1

Date	Field Activity Description
10/4/2004	Contractor mobilizes drilling rig and equipment to the drill site.
10/6/2004	A nominal 6-inch pilot hole drilled by mud-rotary circ. to 100.5 ft bls.
10/7/2004	Pilot hole over-drilled using nominal 12-inch bit to 100 ft bls. An 8-inch Sch. 40 PVC temporary casing installed at 100 ft bls and set in-place using hole plug (sodium bentonite chips). Top of hole plug tagged at 38 ft bls in the annulus, within the clay interval of the formation. Advance the 8-inch pilot hole from 100 to 140 ft bls.
10/11/2004	A 6-inch PVC temporary casing installed inside the 8-inch borehole to 140 ft bls. Continue pilot-hole drilling from 140 to 152 ft bls using a nominal 6-inch bit. Install a 4-inch steel temporary casing inside the 6-inch casing to 152 ft bls. Seal the steel casing inside the PVC casing using approx. 5 vertical feet of hole plug in the annulus.
10/12/2004	Begin unofficial wire-line coring cutting 2-inch-diameter cores using a 10-foot-long core barrel.
10/13/2004	The 4-inch steel casing is driven down to a depth of 187 ft bls by using the rig's hammer. Unofficial coring continues to a depth of 200 ft bls. Official wire-line coring begins from 200 ft bls.
10/22/2004	Core boring advanced from 600 to 610 ft bls under flowing conditions. Note: No core recovery from 564 to 600 ft bls.
10/27/2004	The 4-inch and 6-inch temporary casing strings are removed as the contractor is unable to advance the test core boring past 610 ft bls.
10/28/2004	Demobilization of the equipment and drilling rig is completed. The wellbore is capped.
11/1/2004	The contractor mobilizes a larger truck-mounted table-driven rotary rig (Speedstar 2500) on-site.
11/11/2004	Begin reaming out the 8-inch temporary casing using a 7-7/8-inch lead bit in combination with a nominal 13-inch hole opener.
11/17/2004	Complete reaming operations to 200 ft bls.
11/18/2004	Set an 8-inch-diameter, 0.375-inch-wall steel casing in the reamed hole to 200 ft bls and seal in-place using bentonite hole plug.
11/19/2004	Begin mud-rotary drilling using a 7-7/8-inch drill bit.
11/23/2004	End drilling operations at 488 ft bls as the drilling mud begins to leak up along the outside of the steel casing.
11/30/2004	The 8-inch steel casing is removed and the borehole is reamed out by mud-rotary circulation using a 7-7/8-inch lead bit in combination with a nominal 13-inch hole opener.
12/1/2004	The 8-inch steel casing recently removed is re-installed to a depth of 206 ft bls. A 1.5-foot-long funnel-shaped rubber packer is attached to the bottom end of the casing string using clamps. Rock was used to fill the packer followed by Enviroplug grout placed by tremie pipe, and used to seal the casing in the lowermost section of the borehole.
12/2/2004	Resume drilling operations by mud-rotary using a nominal 8-inch tri-cone drill bit. Clean out the hole to 610 ft bls, the last cored depth.
12/7/2004	Drilling is suspended as drilling mud is leaking up around the outside of the steel casing.
12/9/2004	The well is killed using a mixture of barite and gel, weighing on average 9.4 pounds per gallon.
12/10/2004	The steel casing is removed and borehole cleaned out. An 8-inch-diameter Certa-Lok PVC casing is installed to 200 ft bls and cemented in-place by tremie grouting using Portland cement. The annular cement is tagged at 6 ft bls.

Table 2-1. A CHRONOLOGY OF FIELD EVENTS IN COMPLETING TEST CORE CCBRY-1

Date	Field Activity Description
12/14/2004	Resume drilling operations by mud-rotary using a 7-1/4-inch tri-cone drill bit.
12/20/2004	Advance the 7-1/4-inch borehole to 610 ft bls.
12/21/2004	Begin conventional coring operations using a 20-foot-long core barrel designed for cutting 4-inch-diameter core samples.
1/4/2005	The termination depth of the test core is reached.
1-4-05 through 1-5-05	The test core boring is over-drilled by mud-rotary circulation using a 7-1/4-inch tri-cone bit.
1/6/2005	Schlumberger successfully completed specialty geophysical logging of the test hole to the termination depth, recording a bottom-hole tag of 1,012 ft bls. The logging suite included the following: natural gamma spectroscopy, electron capture spectroscopy, high definition array induction, spontaneous potential, micro-resistivity, compensated neutron, compensated density w/ PE or PEF, dipole sonic imager, formation micro-imager, and 4-arm caliper.
1/7/2005	The test core boring is back-plugged using 1/4-inch limestone gravel from the termination depth (1,012 ft bls) to 212 ft bls. Pump 16 cubic feet of cement slurry (Portland mixed with 3% bentonite) atop the gravel emplaced in the test hole the night before.
1/10/2005	Over-drill the 8-inch PVC temporary casing, by mud-rotary circulation, using a nominal 13-inch bit in combination with a 7-1/4-inch lead bit, to 8 ft bls.
1/11/2005	Representatives from the SFWMD visited the site to examine core samples recovered during conventional coring operations.
1/26/2005	The contractor installed a 4-inch-diameter PVC riser inside the 8-inch-diameter PVC temporary casing previously over-drilled to 8 ft bls. The 4-inch casing extension was fitted with a K-packer designed to secure and seal the 4-inch extension inside the 8-inch casing. The annulus was then grouted to the surface using neat cement.
2/4/2005	A 4-foot by 4-foot well pad constructed using SacCrete was installed. The well riser's finished cut places the top edge at four inches above finished grade. Drilling rig and equipment are demobilized from the project site.
3/7/2005	Representative of WRS visits the site to inspect and photograph well pad, well riser, and protective bumpers. Also, confirm that R & L Carriers have hauled away all rock core samples (25 boxes) destined for the Florida Geological Survey in Tallahassee, Florida.

Table 2-2. CORE SAMPLES SELECTED FOR LABORATORY ANALYSES

Collection Date	Core Number	Cored Interval Depth (ft, bls)	Representative Core Sample Interval Depth (ft, bls)	Representative Core Sample Length (ft)
10/13/2004	2	210 - 220	218.0 - 220.0	2.0
10/14/2004	10	290 - 300	291.0 - 292.7	1.7
10/18/2004	19	380 - 390	380.0 - 382.0	2.0
10/19/2004	25	440 - 450	443.6 - 444.6	1.0
10/19/2004	25	440 - 450	447.4 - 448.6	1.2
10/19/2004	29	480 - 490	485.3 - 487.3	2.0
10/20/2004	35	540 - 550	543.2 - 545.2	2.0
12/23/2004	40	652 - 672	654.0 - 654.5	0.5
12/23/2004	40	652 - 672	660.7 - 661.6	0.9
12/27/2004	43	724 - 739	724.5 - 725.3	0.8
12/27/2004	43	724 - 739	731.2 - 731.7	0.5
12/29/2004	48	807 - 827	807.5 - 808.2	0.7
12/30/2004	54	917 - 937	917.0 - 917.5	0.5

NOTE: Selected core samples collected from clay(ey) intervals that have a high water content were carefully double wrapped and shipped to Wolf Technologies, Inc., for laboratory analysis, immediately after sampling to avoid dehydration. The selected rock core samples were wrapped, packed, and shipped out in a timely manner.

Table 2-3. **CORE RECOVERY LOG**

Coring Date	Core Number	Cored Interval (ft, bls)	Core Length (ft)	Core Recovery (%)
10/13/2004	1	200 - 210	10.0	100
10/13/2004	2	210 - 220	10.0	100
10/13/2004	3	220 - 230	10.0	100
10/14/2004	4	230 - 240	10.0	100
10/14/2004	5	240 - 250	5.0	50
10/14/2004	6	250 - 260	9.7	97
10/14/2004	7	260 - 270	9.7	97
10/14/2004	8	270 - 280	10.0	100
10/14/2004	9	280 - 290	10.0	100
10/14/2004	10	290 - 300	10.0	100
10/15/2004	11	300 - 310	9.6	96
10/15/2004	12	310 - 320	10.0	100
10/15/2004	13	320 - 330	10.0	100
10/15/2004	14	330 - 340	10.0	100
10/18/2004	15	340 - 350	10.0	100
10/18/2004	16	350 - 360	10.0	100
10/18/2004	17	360 - 370	10.0	100
10/18/2004	18	370 - 380	10.0	100
10/18/2004	19	380 - 390	10.0	100
10/18/2004	20	390 - 400	10.0	100
10/18/2004	21	400 - 410	9.8	98
10/18/2004	22	410 - 420	10.0	100
10/19/2004	23	420 - 430	10.0	100
10/19/2004	24	430 - 440	10.0	100
10/19/2004	25	440 - 450	9.1	91
10/19/2004	26	450 - 460	10.0	100
10/19/2004	27	460 - 470	10.0	100
10/19/2004	28	470 - 480	10.0	100
10/19/2004	29	480 - 490	9.8	98
10/19/2004	30	490 - 500	10.0	100
10/19/2004	31	500 - 510	10.0	100
10/19/2004	32	510 - 520	10.0	100
10/20/2004	33	520 - 530	10.0	100
10/20/2004	34	530 - 540	10.0	100
10/20/2004	35	540 - 550	9.5	95
10/20/2004	36	550 - 560	7.6	76
10/20/2004	37	560 - 570	4.4	44
12/21/2004	38	610 - 628	4.0	22
12/23/2004	39	632 - 652	14.0	70
12/23/2004	40	652 - 672	16.8	84
12/23/2004	41	672 - 683	6.0	55
12/27/2004	42	704 - 724	11.5	58
12/27/2004	43	724 - 739	12.4	83
12/28/2004	44	739 - 754	3.6	24
12/28/2004	45	754 - 774	8.3	42
12/28/2004	46	774 - 787	11.5	89
12/28/2004	47	787 - 807	14.6	73
12/29/2004	48	807 - 827	3.0	15
12/29/2004	49	827 - 847	20.0	100

Table 2-3. **CORE RECOVERY LOG**

Coring Date	Core Number	Cored Interval (ft, bls)	Core Length (ft)	Core Recovery (%)
12/29/2004	50	847 - 867	16.1	81
12/29/2004	51	867 - 877	10.0	100
12/29/2004	52	877 - 897	18.0	90
12/30/2004	53	897 - 917	20.0	100
12/30/2004	54	917 - 937	20.0	100
1/3/2005	55	937 - 957	20.0	100
1/3/2005	56	957 - 971	13.2	94
1/3/2005	57	971 - 991	6.7	34
1/4/2005	58	991 - 1011	19.0	95

APPENDIX 2-1

GEOLOGIST'S LOGS

GEOLOGIST'S LOG
CALOOSAHATCHEE ASR TEST CORE

Depth	**Lithology**
0-1.5	Sand, dark yellowish orange (10YR 6/6), clayey fine quartz, silty, fair porosity, fair to poor apparent permeability
1.5-12	Limestone, very pale orange (10YR 8/2), wackestone, moderately well indurated, silty, good to fair moldic porosity, fair apparent permeability
12-22	Clay, greenish gray (5GY 6/1), fine quartz sand, soft to firm, silty, phosphatic (very fine to coarse), poor apparent permeability
22-38	Clay, greenish gray (5GY 6/1), fine quartz sand, firm to stiff, silty, sticky, variably finely phosphatic, poor apparent permeability
38-40	Limestone, yellowish gray (5Y 7/2), wackestone, fine to coarse quartz sand, moderately well indurated, good to fair moldic porosity, fair to poor apparent permeability
40-48	Clay, light gray (N7), fine quartz sand, soft to firm, finely phosphatic, common medium-coarse to pebble-sized quartz and phosphate, poor apparent permeability
48-65	Shell bed (whole and fragments, incl. Mollusks and Gastropods), yellowish gray (5Y 8/1), with thin interbeds of clay as above, common fine quartz sand, excellent porosity and excellent apparent permeability in the shell beds
65-90.5	Shell bed (whole and fragments, incl. Mollusks and Gastropods), yellowish gray (5Y 8/1), abundant fine to very coarse quartz and phosphate sand, rare pebble-sized quartz, excellent porosity, excellent apparent permeability
90.5-100.5	Sand, light gray (N7), medium to very coarse quartz, poorly sorted, sub-rounded, abundant medium to very coarse phosphate, excellent porosity, excellent apparent permeability
100.5-112	Sand, light gray (N7), quartz, medium to very coarse, poorly sorted, sub-rounded, common coarse to very coarse phosphate, occasional shell fragments, excellent porosity, excellent permeability
112-113	Limestone, yellowish gray (5Y 8/1), packstone, well indurated, sparry, fine quartz sandy, finely phosphatic, poor porosity, poor apparent permeability
113-115	Sand, light gray (N7), quartz, medium coarse to pebble-sized, poorly sorted, sub-rounded, common coarse to very coarse phosphate, excellent porosity, excellent permeability
115-126	Clay, greenish gray (5GY 6/1), soft, fine quartz sand, silty, finely phosphatic, poor porosity, poor apparent permeability
126-135	Limestone, yellowish gray (5Y 8/1), packstone, sparry, well indurated, very hard, fine quartz sand, finely phosphatic, fair moldic porosity, fair to poor apparent permeability, loss of circulation at approximately 134 feet bls
135-151	No recovery
151-157	Limestone, yellowish gray (5Y 7/2), fossil packstone, moderately indurated, common shell inclusions in rock (mollusks and gastropods),

Depth	Lithology
	rare very fine phosphate, good moldic and interparticle porosity, fair apparent permeability
157-160	Clay, light greenish gray (5GY 8/1), fine quartz sand, soft, marly, finely phosphatic, common shell fragments, poor apparent permeability
160-170	Sand, yellowish gray (5Y 8/1), medium to coarse quartz, sub-rounded, abundant fine to medium coarse phosphate, excellent interparticle porosity, excellent apparent permeability
170-180	Clay, greenish gray (5GY 6/1), very fine quartz sand, soft, silty, finely phosphatic, abundant shell fragments, poor apparent permeability
180-185	No recovery
185-187	Limestone, yellowish gray (5Y 8/1), fossil packstone, moderately indurated, finely phosphatic, minor very fine quartz sand, fair moldic and interparticle porosity, fair to poor apparent permeability
187-200	Clayey sand, light greenish gray (5GY 8/1), fine quartz, semi-consolidated, sub-rounded, abundant shell fragments, abundant fine phosphate, good interparticle porosity, fair to poor apparent permeability
	Pilot-hole drilling ends, start of official coring interval
200-225	Clay, light greenish gray (5GY 8/1), fine quartz sand, firm to stiff, silty, finely phosphatic, minor shell fragments, poor apparent permeability
225-230	Claystone, light greenish gray (5GY 8/1) to greenish gray (5GY 6/1), fine quartz sand, friable to moderately indurated, finely phosphatic, minor shell fragments, poor porosity, poor apparent permeability, interbedded with sandy clay as above.
230-232	Clay, yellowish gray (5Y 7/2) to pale greenish yellow (10Y 8/2), fine quartz sandy, firm to stiff, silty, finely phosphatic, common shell fragments, poor apparent permeability
232-236	Clay, light olive gray (5Y 5/2) to grayish olive (10Y 4/2), fine quartz sand, stiff, silty, finely phosphatic, poor apparent permeability
236-240	Clay, light olive gray (5Y 6/1), fine quartz sand, stiff to very stiff, silty, finely phosphatic, minor to abundant shell fragments, poor apparent permeability
240-245	Clay, greenish gray (5GY 6/1), fine quartz sand, soft to firm, phosphatic (fine to medium-coarse), silty, minor to common shell fragments, poor apparent permeability
245-250	No recovery
250-279	Clay, greenish gray (5GY 6/1), fine quartz sand, soft to firm, phosphatic (fine to medium-coarse), silty, minor to common shell fragments, poor apparent permeability
279-289	Sandstone, medium light gray (N6), fine quartz, poorly indurated, clayey, silty, finely phosphatic, minor to common shell fragments, good interparticle porosity, fair to poor apparent permeability
289-297	Claystone, pale olive (10Y 6/2), very fine quartz sand, moderately indurated, silty, finely phosphatic, minor to common shell fragments, fair

Depth	Lithology
	to poor porosity, poor apparent permeability
297-304	Claystone, light gray (N7) to light greenish gray (5GY 8/1), silty, moderately to moderately well indurated, shelly, finely phosphatic, very fine quartz sand, minor shell fragments, poor porosity, poor apparent permeability
304-304.5	Clay, greenish gray (5GY 6/1), silty, soft, finely phosphatic, common shell fragments, minor very fine quartz sand, poor apparent permeability
304.5-309	Limestone, light gray (N7) to light greenish gray (5GY 8/1), wackestone, moderately indurated, fossiliferous (incl. bivalves), clayey, finely phosphatic, fair moldic porosity, poor apparent permeability
309-320	Claystone, light gray (N7) to light greenish gray (5GY 8/1), silty, moderately indurated, very fine quartz sand, finely phosphatic, minor shell fragments, poor porosity, poor apparent permeability
320-325.5	Claystone, light gray (N7) to light greenish gray (5GY 8/1), poorly indurated, moderately silty, common very fine to fine quartz sand, common very fine to fine phosphate, minor shell fragments, poor porosity, poor apparent permeability
325.5-333	Marly limestone, very light gray (N8) to yellowish gray (5Y 8/1), mudstone to wackestone, poorly to moderately indurated, common very fine to fine quartz sand, common very fine to fine phosphate, minor shell fragments, trace moldic porosity, poor to moderate apparent permeability
333-340	Clay, light olive gray (5Y 6/1) to olive gray (5Y 4/1), stiff, slightly silty, trace very fine to fine phosphate, poor porosity, poor apparent permeability
340-343.5	Clay, light olive gray (5Y 6/1) to olive gray (5Y 4/1), stiff, slightly silty, minor very fine to fine phosphate, minor shell fragments, poor porosity, poor apparent permeability
343.5-353	Marl, very light gray (N8) to light greenish gray (5GY 8/1), moderately stiff, sandy, common very fine to fine phosphate, minor very fine to fine quartz, minor shell fragments decreasing with depth, poor porosity, poor apparent permeability
353-356	Marl, very light gray (N8) to yellowish gray (5Y 8/1), stiff, sandy, minor very fine to fine phosphate, trace very fine to fine quartz, minor shell fragments, poor porosity, poor apparent permeability
356-361	Marly limestone, very light gray (N8) to yellowish gray (5Y 8/1), wackestone, poorly to moderately indurated, common shell fragments, minor very fine to fine quartz sand, minor very fine to fine phosphate, minor moldic porosity, poor to moderate apparent permeability
361-378.5	Siltstone, light olive gray (5Y 6/1), poorly indurated, abundant very fine phosphate, minor shell fragments, trace clay, poor porosity, poor apparent permeability
378.5-380	Limestone, yellowish gray (5Y 8/1), wackestone to packstone,

Depth	Lithology
	moderately indurated, common shell, minor interbedded siltstone as above, minor very fine to fine quartz, minor very fine to fine phosphate, good moldic porosity, fair to good apparent permeability
380-387.3	Marl, light gray (N7) to yellowish gray (5Y 8/1), moderately stiff, common very fine to fine phosphate, minor limestone as above, minor shell fragments, poor porosity, poor apparent permeability
387.3-391.3	Siltstone, greenish gray (5GY 6/1), poorly indurated, abundant very fine phosphate, minor very fine quartz, occasional shell fragments, poor porosity, poor apparent permeability
391.3-399.6	Marly limestone, very light gray (N8) to yellowish gray (5Y 8/1), wackestone to packstone, poorly to moderately indurated, common very fine to fine quartz, minor shell fragments, trace very fine to fine phosphate, poor to moderate porosity, poor apparent permeability
399.6-412.4	Siltstone, light gray (N7) to light olive gray (5Y 6/1), poorly indurated, calcareous, abundant very fine to fine phosphate, minor shell fragments, trace very fine to fine quartz, poor porosity, poor apparent permeability
412.4-420	Sandy clay, olive gray (5Y 4/1) to dark greenish gray (5GY 4/1), very stiff, abundant ver fine to fine quartz, abundant very fine to fine phosphate, trace shell, poor porosity, poor apparent permeability
420-422.3	Marl, light gray (N7) to yellowish gray (5Y 8/1), stiff, abundant very fine to fine phosphate, minor very fine to fine quartz, minor shell fragments, poor porosity, poor apparent permeability
422.3-428.6	Marl, yellowish gray (5Y 8/1), stiff, sticky, minor very fine to fine phosphate, minor shell fragments, trace very fine to fine quartz, poor porosity, poor apparent permeability
428.6-434.7	Clay, greenish gray (5GY 6/1), very stiff, common silt, trace very fine to fine quartz, trace shell, poor porosity, poor apparent permeability
434.7-436.6	Clay, greenish black (5G 2/1), very stiff, minor silt, common shell at base, poor porosity, poor apparent permeability
436.6-439.6	Limestone, light gray (N8) to yellowish gray (5Y 8/1), mudstone to wackestone, moderately indurated, abundant shell, minor fine phosphate, trace medium light gray (N5) silty clay, poor porosity, poor apparent permeability
439.6-441.7	Silty clay, medium gray (N5) to light olive gray (5Y 6/1), friable, abundant shell fragments, common fine to coarse phosphate, minor lime mud, trace fine quartz, poor porosity, poor apparent permeability
441.7-447.4	Limestone, light gray (N7) to yellowish gray (5Y 8/1), mudstone to wackestone, moderately indurated, minor fine phosphate, minor shell fragments, poor porosity, poor apparent permeability
447.4-449	Clay, light gray (N7) to yellowish gray (5Y 8/1), soft, sticky, minor shell, minor very fine to fine quartz, minor very fine to fine phosphate, poor porosity, poor apparent permeability
449-451	Limestone, light gray (N7) to yellowish gray (5Y 8/1), mudstone to

Depth	Lithology
	wackestone, moderately well indurated, minor shell fragments, trace fine phosphate, poor porosity, poor apparent permeability
451-451.8	Marl, very light gray (N8) to yellowish gray (5Y 8/1), stiff, common shell fragments, trace very fine to fine phosphate, poor porosity, poor apparent permeability
451.8-457.1	Limestone, yellowish gray (5Y 8/1) to light olive gray (5Y 6/1), mudstone, dolomitic, moderately well indurated, minor shell fragments, trace fine phosphate, minor interbedded light olive gray clay, common moldic porosity in the upper one foot, poor to moderate porosity and apparent permeability
457.1-459.3	Claystone, medium light gray (N6) to olive gray (5Y 4/1), silty, moderately to moderately well indurated, trace shell fragments, trace very fine to fine phosphate, poor porosity, poor apparent permeability
459.3-463.8	Limestone, light gray (N7) to yellowish gray (5Y 8/1), mudstone, well indurated, minor shell fragments, trace fine phosphate, minor moldic porosity at base, poor porosity, poor to moderate apparent permeability
463.8-470.6	Marl, very light gray (N8) to yellowish gray (5Y 8/1), soft, minor shell fragments, silty, trace very fine to fine phosphate, poor porosity, poor apparent permeability
470.6-472.9	Limestone, very light gray (N8), wackestone to packstone, moderately well indurated, common shell fragments, moderate to good moldic porosity, moderate to good apparent permeability
472.9-477.2	Marly limestone, yellowish gray (5Y 8/1), packstone, moderately indurated, minor shell fragments, trace very fine to fine phosphate, minor moldic porosity, moderate apparent permeability
477.2-481.5	Limestone, very light gray (N8) to yellowish gray (5Y 8/1), mudstone, well indurated, slightly dolomitic, trace fine phosphate, minor moldic porosity at base, moderate porosity, moderate apparent permeability
481.5-498.7	Limestone, light gray (N7) to yellowish gray (5Y 8/1), mudstone to packstone, well indurated, slightly dolomitic, common shell fragments, trace very fine to fine phosphate, excellent moldic porosity, good to excellent apparent permeability
498.7-501	Limestone, medium light gray (N6) to yellowish gray (5Y 8/1), mudstone to wackestone, poor to moderately indurated, dolomitic, minor shell fragments, minor very fine to fine phosphate, poor porosity, poor apparent permeability
501-503.4	Limestone, light gray (N7) to yellowish gray (5Y 8/1), mudstone to wackestone, moderately well indurated, slightly dolomitic, trace shell fragments, trace very fine to fine phosphate, poor to moderate porosity, poor to moderate apparent permeability
503.4-513	Marly limestone, very light gray (N8) to yellowish gray (5Y 8/1), wackestone, poor to moderately indurated, common shell fragments, trace very fine to fine phosphate, minor moldic porosity, poor to

Depth	Lithology
	moderate apparent permeability
513-519	Marl, light gray (N7) to yellowish gray (5Y 8/1), soft, silty, common very fine to fine quart, minor shell fragments, trace very fine to fine phosphate, poor porosity, poor apparent permeability
519-522.5	Marly limestone, light gray (N7) to yellowish gray (5Y 8/1), mudstone to wackestone, moderately indurated, minor shell fragments, minor very fine to fine phosphate, minor moldic porosity, poor to moderate apparent permeability
522.5-524.7	Limestone, light gray (N7) to yellowish gray (5Y 8/1), wackestone to packstone, moderately indurated, common shell fragments, trace very fine to fine phosphate, minor moldic porosity, poor to moderate apparent permeability
524.7-527.8	Marly limestone, light gray (N7) to yellowish gray (5Y 8/1), mudstone to wackestone, moderately indurated, minor shell fragments, minor very fine to fine phosphate, minor moldic porosity, poor to moderate apparent permeability
527.8-530	Limestone, light gray (N7) to yellowish gray (5Y 8/1), wackestone to packstone, moderately indurated, common shell fragments, trace very fine to fine phosphate, minor moldic porosity, poor to moderate apparent permeability
530-545.5	Marly limestone, white (N9) to light gray (N7) to yellowish gray (5Y 8/1), mudstone to packstone, poor to moderately indurated, friable, minor shell fragments, trace very fine to fine phosphate, occasional moldic porosity, poor to moderate apparent permeability
545.5-548.1	Dolomitic limestone, medium light gray (N6) to light gray (N8), wackestone to packstone, moderately indurated, minor shell fragments, minor very fine to fine phosphate, poor to moderate porosity, poor to moderate apparent permeability
548.1-550	Marly limestone, white (N9) to light gray (N7) to yellowish gray (5Y 8/1), mudstone to packstone, poor to moderately indurated, friable, minor shell fragments, trace very fine to fine phosphate, occasional moldic porosity, poor to moderate apparent permeability
550-554.7	Sandy limestone, light gray (N7) to yellowish gray (5Y 8/1), packstone, moderately well indurated, abundant shell fragments, common very fine to fine quartz, trace very fine to fine phosphate, excellent moldic porosity, excellent apparent permeability
554.7-557.6	Sandstone, light gray (N7) to yellowish gray (5Y 8/1), moderately indurated, common very fine to fine quartz, trace very fine to fine phosphate, trace shell fragments, minor moldic porosity, poor to good apparent permeability
557.6-560	No recovery
560-564.4	Sandy clay, light gray (N7) to light olive gray (5Y 6/1), soft, sticky, abundant very fine to fine quartz, trace very fine to fine phosphate, trace

Depth	Lithology
	shell, poor porosity, poor apparent permeability
564.4-600	No core recovery – predominately very fine to fine quartz with minor phosphate and trace shell present in drilling fluid returns
600-610	No recovery
610 - 614	Limestone, yellowish gray (5Y 7/2), fossil packstone, moderately to poorly indurated, fine quartz sandy, shelly, silty, variably finely phosphatic, common molds, fair moldic porosity, fair to poor apparent permeability
614 – 628	No recovery
628 - 632	No core recovery – Note: Sediments collected from the core barrel consisted of the following: Sand, fine-grained quartz, sub-rounded, common silt and fragments of limestone as above
632 – 638.5	Limestone, yellowish gray (5Y 7/2), fossil packstone, variably indurated (well to poorly indurated), fine-grained, fine quartz sandy, silty, finely phosphatic, variably pin-point vuggy, fair to poor porosity, poor apparent permeability
638.5 - 646	Limestone, yellowish gray (5Y 7/2), wackestone, moderately to poorly indurated, fine-grained, variably very finely phosphatic, minor very fine quartz sand, minor pin-point vugs, poor porosity, poor apparent permeability
646 - 652	No recovery
652 - 657	Limestone, yellowish gray (5Y 8/1) to very light gray (N8), fossil packstone, well indurated, fine-grained, marly, finely phosphatic, minor very fine quartz sand, minor spar, variably moldic, fair to poor moldic porosity, poor apparent permeability
657 - 668.8	Limestone, white (N9) to yellowish gray (5Y 8/1), wackestone, moderately to poorly indurated, fine-grained, chalky, variably very finely phosphatic, minor very fine quartz sand, variably pin-point vuggy, poor porosity, poor apparent permeability
668.8 - 672	No recovery
672 - 683	Limestone, yellowish gray (5Y 8/1), wackestone, moderately to poorly indurated, fine-grained, chalky, variably very fine quartz sandy, minor molds, trace of very fine phosphate, poor porosity, poor apparent permeability
683 - 704	No recovery
704 - 705.5	Limestone, yellowish gray (5Y 7/2), grainstone, poorly indurated, fine-grained, very fine quartz sandy, finely phosphatic, good interparticle porosity, good to fair apparent permeability
705.5 - 706.5	Limestone, yellowish gray (5Y 8/1), wackestone, well to moderately indurated, fine-grained, variably fine quartz sandy, chalky, trace of very fine phosphate, minor molds, poor porosity, poor apparent permeability
706.5 - 715.5	Grainstone as above
715.5 - 724	No recovery

GEOLOGIST'S LOG
CALOOSAHATCHEE ASR TEST CORE

Depth	Lithology
724 - 725.5	Limestone, yellowish gray (5Y 8/1), fossil packstone, moderately well indurated, medium to coarse grained, marly, very finely phosphatic, moldic, good to fair moldic porosity, fair to poor apparent permeability
725.5 - 728	Limestone, yellowish gray (5Y 8/1), wackestone, moderately to poorly indurated, fine-grained, fine quartz sandy, very finely phosphatic, variably marly, poor porosity, poor apparent permeability
728 - 731	Fossil packstone as above
731 - 735	Wackestone as above
735 - 736.4	Limestone, yellowish gray (5Y 7/2), grainstone, poorly indurated, fine-grained, very fine quartz sandy, finely phosphatic, good interparticle porosity, fair apparent permeability
736.4 - 739	No recovery
739 - 742.6	Limestone, yellowish gray (5Y 8/1), wackestone, moderately to poorly indurated, medium to coarse-grained, fine quartz sandy, very finely phosphatic, marly, moldic, fair moldic porosity, poor apparent permeability
742.6 - 754	No recovery
754 - 759	Limestone, very light gray (N8), grainstone, moderately to poorly indurated, fine quartz sandy, finely phosphatic, good interparticle porosity, good to fair apparent permeability
759 - 761	Limestone, very light gray (N8) to yellowish gray (5Y 8/1), wackestone, well indurated, medium to coarse-grained, fine quartz sandy, very finely phosphatic, moldic, good to fair moldic porosity, poor apparent permeability
761 - 762.3	Grainstone as above
762.3 - 774	No recovery
774 - 785.5	Sandstone, light gray (N7), quartz, moderately to poorly indurated, fine-grained, sub-rounded, finely phosphatic, with abundant shell fragments, good interparticle porosity, good apparent permeability
785.5 - 787	No recovery
787 - 789	Limestone, very light gray (N8) to yellowish gray (5Y 8/1), grainstone, moderately to well indurated, medium to coarse-grained, fine quartz sandy, phosphatic (fine to medium-coarse), variably moldic, good interparticle and moldic porosity, good to fair apparent permeability
789 - 796	Sandstone, light gray (N7), quartz, moderately to poorly indurated, fine-grained, sub-rounded, finely phosphatic, with common shell fragments, good interparticle porosity, good apparent permeability
796 - 801.6	Sandstone, light gray (N7), quartz, moderately to poorly indurated, poorly sorted (fine to medium-coarse), sub-rounded, phosphatic (fine to medium-coarse), shelly, good interparticle porosity, good apparent permeability
801.6 - 807	No recovery
807 - 810	Sandstone, light gray (N7), quartz, moderately to poorly indurated, fine-

Depth	Lithology
	grained, sub-rounded, finely phosphatic, with common to minor shell fragments, good interparticle porosity, good apparent permeability
810 - 827	No recovery
827 - 835.5	Limestone, yellowish gray (5Y 8/1), fossil packstone, moderately well indurated, fine to very coarse-grained, variably marly, finely phosphatic, minor fine quartz sand, variably moldic, good to fair moldic porosity, fair to poor apparent permeability
835.5 - 847	Limestone, light gray (N7) to yellowish gray (5Y 8/1), grainstone, moderately indurated, fine-grained, fine quartz sandy, variably silty, finely phosphatic, good to fair interparticle porosity, fair to poor apparent permeability
847 - 852	Limestone, yellowish gray (5Y 8/1), fossil packstone, moderately well indurated, fine to very coarse-grained, variably marly, finely phosphatic, minor fine quartz sand, moldic, excellent moldic porosity, good apparent permeability
852 - 862	Limestone, light gray (N7) to yellowish gray (5Y 8/1), wackestone, well indurated, finely phosphatic, variably fine quartz sandy, poor porosity, poor apparent permeability
862 - 863.1	Limestone, yellowish gray (5Y 7/2), wackestone, well indurated, fine to very coarse-grained, marly, finely phosphatic, fossiliferous, minor fine quartz sand, variably moldic, fair to poor moldic porosity, poor apparent permeability
863.1 - 867	No recovery
867 - 873.5	Limestone, yellowish gray (5Y 7/2) and light gray (N7), fossil packstone, well indurated, fine to very coarse-grained, variably marly, finely phosphatic, minor fine quartz sand, moldic, good moldic porosity, good apparent permeability
873.5 - 877	Limestone, yellowish gray (5Y 7/2), fossil packstone, well indurated, fine to very coarse-grained, marly, variably finely phosphatic, minor fine quartz sand, variably moldic, fair to poor moldic porosity, poor apparent permeability
877 – 879.5	Limestone, yellowish gray (5Y 7/2), fossil packstone, moderately well to well indurated, fine to very coarse-grained, variably marly, very finely phosphatic, minor very fine quartz sand, variably moldic, fair moldic porosity, fair to poor apparent permeability
879.5 - 884	Limestone, yellowish gray (5Y 7/2), wackestone, fine to very coarse-grained, moderately to well indurated, marly, very finely phosphatic, trace of fine quartz sand, variably moldic, fair to poor moldic porosity, poor apparent permeability
884 - 888.5	Fossil packstone as above
888.5 - 895	Wackestone as above
895 - 897	No recovery
897 - 908.1	Limestone, very pale orange (10YR 8/2), wackestone, moderately well

Depth	Lithology
	to well indurated, fine to medium-coarse, chalky, very finely phosphatic, poor porosity, poor apparent permeability
908.1 - 908.7	Limestone, very pale orange (10YR 8/2), wackestone, well indurated, fine to very coarse-grained, chalky, very finely phosphatic, moldic, good to fair moldic porosity, fair to poor apparent permeability
908.7 - 917	Limestone, very pale orange (10YR 8/2), wackestone, moderately well to well indurated, fine to medium-coarse, chalky, very finely phosphatic, poor porosity, poor apparent permeability
917 - 937	Limestone, very pale orange (10YR 8/2), wackestone, moderately to well indurated, fine to very coarse-grained, chalky, very finely phosphatic, variably marly, trace of very fine quartz sand, variably moldic, fair to poor moldic porosity, poor apparent permeability
937 - 940	Limestone, yellowish gray (5Y 8/1), fossil packstone, well indurated, fine to coarse-grained, marly, finely phosphatic, variably moldic, poor moldic porosity, poor apparent permeability
940 - 949	Limestone, yellowish gray (5Y 8/1), wackestone, well indurated, fine to coarse-grained, chalky, finely phosphatic, trace of very fine quartz sand, poor porosity, poor apparent permeability
949 - 957	Limestone, yellowish gray (5Y 7/2), wackestone, well indurated, fine to very coarse-grained, marly, finely phosphatic, trace of very fine quartz sand, moldic, good to fair moldic porosity, fair to poor apparent permeability
957 - 960	Limestone, yellowish gray (5Y 7/2), fossil packstone, moderately well to well indurated, fine to very coarse-grained, marly, finely phosphatic, trace of very fine quartz sand, variably moldic, fair moldic porosity, poor apparent permeability
960 - 970.2	Limestone, yellowish gray (5Y 7/2), mudstone, well indurated, chalky, very finely phosphatic, trace of very fine quartz sand, poor porosity, poor apparent permeability
970.2 - 971	No recovery
971 - 977.7	Limestone, yellowish gray (5Y 8/1), wackestone, moderately well to well indurated, fine to coarse-grained, finely phosphatic, trace of very fine quartz sand, variably marly, poor porosity, poor apparent permeability
977.7 - 991	No recovery
991 - 996	Limestone, yellowish gray (5Y 8/1), wackestone, well indurated, fine to coarse-grained, marly, variably very finely phosphatic, trace of very fine quartz sand, poor porosity, poor apparent permeability
996 - 1006	Limestone, dark yellowish brown (10YR 4/2) and yellowish gray (5Y 8/1), mudstone, well indurated, variably chalky, very finely phosphatic, trace of very fine quartz sand, minor mold traces, poor porosity, poor apparent permeability
1006 - 1010	Limestone, yellowish gray (5Y 7/2) and light greenish gray (5GY 8/1), wackestone, well indurated, fine to very coarse-grained, fine quartz

Depth	Lithology
	sandy, finely phosphatic, variably chalky, variably moldic, poor moldic porosity, poor apparent permeability

APPENDIX 2-2

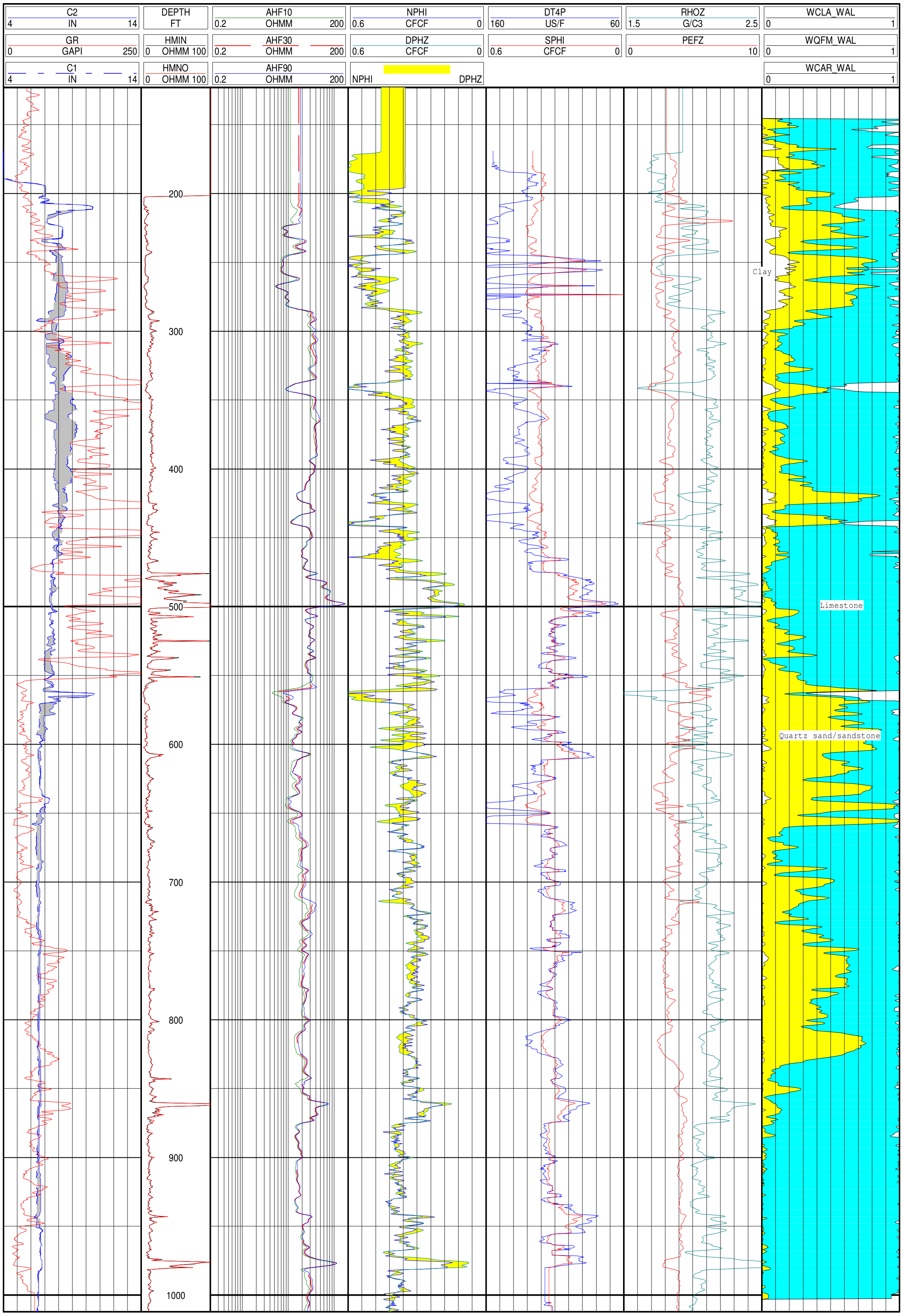
DIGITAL PHOTOGRAPHS OF RETRIEVED CORES

CORE PHOTOGRAPH FILE NOMENCLATURE

The file name for each core photograph is composed of the core number (number sequences of recovered cores), followed by representative depth of the top of the core photographed, followed by letters A, B, C….which represent sequential photo shots down the length of the core.

APPENDIX 2-3

SPECIALTY GEOPHYSICAL LOGGING PLOTS



Geophysical Logs – CCBRY-1