Region II Well Construction and Testing Report for Site A-2

Northwest Florida Water Management District

E217002101

Cardno
Shaping the Future

Document Information

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Acronyms

APT	aquifer performance test
bls	below land surface
gpd	gallons per day
gpm	gallons per minute
ITB	invitation to bid
mg/L	milligrams per liter
NTU	Nephelometric Turbidity Unit
PVC	polyvinylchloride
uS/cm	microsiemens per centimeter

1 Introduction

The Northwest Florida Water Management District (District) contracted Cardno to oversee exploratory drilling, construction, and testing activities at well site A-2 in support of development of minimum aquifer levels in the District's Planning Region II. The site is located in the southeast corner of Fred Gannon Rocky Bayou State Park, adjacent to the Bluewater Elementary School in southern Okaloosa County on Range Road (Figure 1-1). The land surface elevation at the site ranges from 50 to 55 feet above sea level.

Two wells were drilled on site A-2 for long-term monitoring of water quality and water levels in the surficial and Floridan aquifers. The District modified the specifications to replace the proposed upper Floridan APT monitor well with a surficial aquifer, long-term monitor well. All other specifications and materials were to follow the Invitation to Bid (ITB) document (ITB No. 16B-007) and any deviations were noted and are described in this report.

Initial site conditions were documented during a pre-construction onsite meeting between District representatives, Cardno staff, Fred Gannon Rocky Bayou State Park managers, and the project manager and lead driller from Applied Drilling and Engineering, Inc. (Driller). The pre-construction site meeting took place on January 17, 2017. Appendix A provides the photo documentation of the initial site visit by Cardno staff. The park managers noted a protected Turkey Oak located approximately 10 feet southeast of the proposed A-2b site. The third photograph in Appendix A shows the location of the Turkey Oak. The leaves of the Turkey Oak are brown due to the time of year the photograph was taken.

Final site conditions were documented on April 26, 2017, during inspection after completion of construction activities and all heavy machinery was demobilized from the site. Appendix B shows the photo documentation of the final site visit by Cardno staff. No unacceptable conditions were noted. The eighth photograph in Appendix B shows the Turkey Oak in the background, in good condition, exhibiting green foliage. No damage to the Turkey Oak occurred during construction activities.

Figure 1-1. Location Map for Site A-2

2 Site Hydrogeology

Data obtained from District-owned monitor wells and Florida Geological Survey wells in the surrounding area and Pratt et al. (1996)[1] were used to anticipate hydrogeologic conditions. Formation descriptions were available for varying depths depending on well construction specifications of the surrounding wells. The most complete well log extended to a depth of 1,460 feet below land surface (bls) and was located approximately seven miles southwest near the city of Destin in Okaloosa County. Site A-2 formation samples were expected to be similar in appearance to the reference well's descriptions. A general description of the regional hydrogeology based on the reference well is provided below.

2.1 Surficial Aquifer

The surficial aquifer is made up of undifferentiated clastics, primarily sands and clays between land surface and 50 feet bls. Highly permeable sand dominates this unit with small amounts of silt, clay, and phosphate.

2.2 Intermediate Aquifer

The Intermediate aquifer is characterized by sediments that slow the movement of water from the surficial aquifer to the Floridan aquifer. Its lithology is generally fine-grained clastic sediments interbedded with carbonate beds, coarser-grained clastics, and shell. The Intermediate aquifer occurs between 50 and 250 feet bls.

2.3 Undifferentiated Floridan Aquifer

The Floridan aquifer consists of consolidated carbonate sequences that occur between 250 and 825 feet bls. These interbedded limestones and dolostones generally have high permeability and are well-indurated. Within the bottom 300 feet of the aquifer, the sand and glauconite content ranges from trace to five percent. The Sub-Floridan aquifer is located below 890 feet bls and is comprised of very fine to coarse sand with some shell.

[1] Pratt, T.R., C.J. Richards, K.A. Milla, J.R. Wagner, J.L. Johnson, and R.J. Curry, 1996. Hydrogeology of the Northwest Florida Water Management District: Northwest Florida Water Management District, Water Resources Special Report 96-4.

3 Well Drilling and Construction

3.1 Site Setup

The Driller mobilized the rig and heavy equipment and made preparations to begin drilling at site A-2 on January 23, 2017. The general construction sequence was as follows: surficial aquifer well (A-2b) was constructed first for the intent to be used as a water supply well for other well construction activities on site, followed by the long-term Floridan aquifer monitor well (A-2). A-2b did not produce enough water to provide water supply for drilling. The drillers were able to connect to a nearby fire hydrant and used water from the hydrant throughout well construction activities. The drilling rig was a Failing top-drive rig and heavy equipment included a Mud Puppy model MP-170-25C, a Versa-Matic air-operated double-diaphragm pump, a Doosan P185WDO-T4F portable air compressor, and a John Deere 310J standard backhoe. The air compressor and backhoe were rented from Sunbelt Rentals. As built drawings for each well are included as Appendix C.

3.2 Surficial Well (A-2b)

Drilling of A-2b by mud-rotary method commenced on January 24, 2017. A pilot hole six-inches in diameter was drilled to 125 feet bls and geophysical logs were run. Geophysical logs are discussed under Section 4.2. The borehole was back-plugged with cement to 69 feet bls.

A four-inch diameter permanent PVC casing with twenty feet of slotted screen and a five-foot blank was set to a depth of 64 feet bls. The annulus was filled with a 20-30 sand pack to 41 feet bls, topped with 30-65 fine sand, and capped off with Type I/II Portland cement. The fine sand was approved as a substitute for the bentonite seal (as outlined in ITB). The wellhead was completed on April 13, 2017. Well A-2b was completed approximately three feet above grade with an 8-inch diameter, square aluminum surface protector and expandable well seal. The surface protector was filled with coarse sand, completed in a 4-ft x 4-ft x 4-in concrete pad and secured with a lock. Concrete-filled metal bollards were installed around the concrete pad for additional protection. The bollards were painted bright yellow (see Appendix B).

3.3 Long-Term Floridan Monitor (A-2)

The drilling rig was set up over the location of A-2 on January 31, 2017 and a pilot hole 29-inches in diameter was advanced to 24 feet bls. The Driller set and grouted 20 feet of 24-inch diameter steel pit casing. An 18-inch steel pipe was set to 100 feet bls and cemented in place as a secondary surface casing to prevent destabilization of the sandy formation during drilling. This addition to the original specifications was proposed by the Driller and approved by the District. A 12-inch diameter steel pipe was installed as a primary surface casing to 300 feet and cemented in place. Once the cement plug was drilled out, the Driller cleared drilling mud from the hole and prepared the rig to begin drilling by reverse-air.

A pilot hole, eight-inches in diameter was drilled by reverse-air to 900 feet bls. Exploratory drilling continued beyond the proposed depth of 700 feet which was the estimated depth to the top of the Bucatunna Clay confining unit (base of upper Floridan aquifer). Lithologic descriptions of sample cuttings did not indicate the presence of the Bucatunna Clay beneath the site. Also, the saltwater interface was not encountered during drilling based on in-field water quality analysis that indicated the aquifer to be fresh to the bottom. The Floridan aquifer was fully penetrated and the sub-Floridan aquifer was encountered at approximately 895 feet bls. On March 8, 2017, additional geophysical logs were run from the base of the 12-inch diameter casing to total depth (see Section 4.2).

On March 9, 2017, the following day, a Step Drawdown Test was conducted on A-2 with the 12-inch diameter steel casing and 600-foot open hole well design. The results of the Step Drawdown Test are discussed in Section 4.3.

Final drilling and construction of A-2 was resumed on March 20, 2017; A-2 was back plugged with sand and capped to a depth of 885 feet bls. The well was reamed to 740 feet bls using a $11^{7/8}$ drill bit. A-2 was cased to 740 feet bls with 6-inch diameter PVC on March 29, 2017 and four grouting events followed. On April 5, 2017 the final reaming to a total depth of 885 feet bls and development were completed. On April 13, 2017, A-2 was completed approximately three feet above grade with a 12-inch diameter steel surface protector and expandable well seal. The surface protector was filled with coarse sand, completed in a 4-ft x 4-ft x 4-in concrete pad and secured with a lock. Concrete filled metal bollards were installed around the concrete pad for additional protection. The surface protector and bollards were painted bright yellow (see Appendix B).

4 Geologic Sampling and Testing

4.1 Lithologic Sampling

Drill cuttings were collected at ten-foot intervals, bagged, and provided to Cardno by the Driller. Cardno staff were on site throughout the exploratory drilling process to observe and note variations in drill speed, rig reactions, and lithologic changes. A hand lens and Munsell Chart were used to determine accurate texture and color of the drill cuttings. Due to the close proximity of wells A-2 and A-2b their lithologic descriptions were combined into one log presented in Appendix D. The sample cuttings collected were submitted to the Florida Geological Survey for description and formation identification. The general lithology is described in Table 4-1 below.

Table 4-1. Generalized Lithology for Site A-2

Depth Range (feet bls)	Lithology
0-80	sand
80-125	clay
125-170	sand
170-290	clay
290-320	limestone/clay
320-360	limestone
360-390	limestone/clay
390-895	limestone/shell
895-900 (TD)	sand

4.2 Geophysical Logging

Geophysical logging was performed on well A-2b during initial exploratory drilling. Advanced Borehole Services ran natural gamma ray, electrical resistivity, spontaneous potential, single-point resistance and caliper logs on January 25, 2017. Cardno staff was on site during additional logging of well A-2 on March 8, 2017 which included logs for natural gamma ray, caliper, electrical resistivity, spontaneous potential, single-point resistance, dual induction, static and pumping water quality, static and dynamic flow, and borehole-compensated sonic/density. The geophysical logs were used in conjunction with lithologic and water quality sampling results to determine final well construction for long term monitoring. Copies of the geophysical logs are provided in Appendix E.

4.3 Step Drawdown Test

The Driller performed the step drawdown test on March 9, 2017. As indicated, A-2 was completed with 300 feet of 12-inch diameter steel casing and 600 feet of open hole at the time the step drawdown test was conducted. A 50-horsepower John Deere Quiet Flow centrifugal pump was connected to a 90-degree elbow joint affixed to the top of the well casing with 125 feet of eight-inch diameter pipe in the casing. The discharge from the pump was monitored with a totalizing flow meter. A pretest was performed to determine the maximum sustainable pumping rate. The maximum sustainable pumping rate was determined to be 950 gallons per minute (gpm). The pump was shutoff and water levels were allowed to recover prior to initiating the step drawdown test.

The step drawdown test consisted of four pumping rates (350 gpm, 550 gpm, 750 gpm, and 950 gpm) at one hour each. Water levels were recorded at an interval of one second on wells A-2 and A-2b using dataloggers with absolute pressure transducers. A barometric logger recorded atmospheric pressure to allow for the compensation of the absolute water level readings for barometric affects. The dataloggers were preprogrammed to continuously record water levels before, during and after the step test. Manual water level measurements were made in each well just prior to the start of the test and at the end of each step.

The specific capacity of well A-2 was calculated for each step using the equation Q/s; where "Q" is the discharge rate in gpm and "s" is the measured drawdown in feet. Both the manual water level measurements and the maximum drawdown recorded by the datalogger at the end of each test step were used to calculate the specific capacity of well A-2. Tables 4-2 and 4-3 summarize the drawdown at the end of each step and specific capacity calculated from the manual readings and transducer readings, respectively. Graphic results of the step drawdown test are provided as Appendix F.

Table 4-2. Summary of A-2 Step Drawdown Test Results Based on Manual Readings

Step Number	Drawdown (feet)	Pumping Rate (gpm)	Specific Capacity (gpm/foot)
1	8.4	350	41.7
2	14.3	550	38.6
3	21.2	750	35.3
4	29.4	950	32.4

Table 4-3. Summary of A-2 Step Drawdown Test Results Based on Transducer Readings

Step Number	Drawdown (feet)	Pumping Rate (gpm)	Specific Capacity (gpm/foot)
1	8.1	350	43.2
2	14.0	550	39.3
3	20.8	750	36.1
4	28.5	950	33.3

4.4 Water Quality Sampling

Samples of produced water from the borehole were collected through the drill stem by reverse-air circulation throughout exploratory drilling. Water samples were collected every 20 feet for testing of field parameters. A total of seven laboratory samples were collected to verify field parameters at some but not all of the same depths (Table 4-4). Field chloride measurements showed that no changes in the chloride profile were found during drilling that would indicate contact with the saltwater-freshwater interface. It is important to note that field chloride measurements starting at 580 feet were significantly higher than laboratory results. This may be due to misinterpreted field titration results. Laboratory results, summarized in Table 4-4 and provided as Appendix G, confirm that the Upper Floridan aquifer is mostly fresh throughout.

Water quality samples were collected at the end of each step of the step drawdown test. Field parameters were run for these samples in addition to collecting laboratory samples to confirm field results (Table 4-5). A total of four samples were collected for laboratory analysis. The field and laboratory results were comparable and did not indicate any water quality changes with an increase in pumping during the test. Although both the field and laboratory results indicate a low concentration of chloride, it should be noted that the field results were consistently at approximately two times the laboratory concentration.

Field parameters were monitored during well development and one water quality sample was collected at the end of final well development for laboratory analysis. The results of these analyses are summarized in

Table 4-6. With the exception of turbidity, only those laboratory results that exceeded the parameter method detection limit (MDL) are shown in the table. Turbidity is included for comparison with the field analysis. None of the parameters detected were above regulatory standards. Based on field observations and these results final well development was determined to be full and complete.

Table 4-4. Drill Stem Water Quality Screening during Exploratory Drilling

Sample ID	Depth (feet)	Field Results			Laboratory Results		
		Temperature (°C)	Specific Conductance (uS/cm)	Chloride (mg/L)*	Specific Conductance (uS/cm)	Total Dissolved Solids (mg/L)	Chloride (mg/L)
	320						
	340	23.1	254.4				
	360	23.1	269.6	10.0			
	380						
	400		301.3	5.0			
A2 - 420 ft	420		385.7	5.0	258	157	2.66
	440		288.7				
A2 - 460 ft	460	24.3	289.9	15.0	262	150	2.74
	480	24.3	287.6				
A2 - 500 ft	500	24.4	279.8	20.0	263	153	2.76
	520	24.3	283.9				
A2 – 540 ft	540	24.4	285.5	15.0	261	151	2.43
	560	24.4	276.9				
	580	24.5	278.8	135.0*			
	600	24.8	278.6				
A-2-620	620	25.0	281.0		246	170	2.70
	640	25.3	280.5				
	660	25.2	281.9				
	680	25.3	283.0	165.0*			
	700	25.4	284.0				
	720	25.4	285.5				
	740	25.3	285.0				
A-2-760	760	25.6	299.5	195.0*	284	171	4.31
	780	26.0	301.8				
	800	26.1	305.2				
	820	26.2	307.4	195.0*			
	840	25.7	308.8				
	860	25.7	317.4				
	880	25.9	326.0				
A-2-900	900	26.0	329.9		287	186	9.41

*Chloride field values are calculated using manual titration and may not be indicative of lab tested results

Table 4-5. Borehole Water Quality during Step-Drawdown Testing

Sample ID	Field Results			Laboratory Results		
	Temperature (°C)	Chlorides (mg/L)	Specific Conductance (uS/cm)	Specific Conductance (uS/cm)	Chlorides (mg/L)	Total Dissolved Solids (mg/L)
Step 1	27.3	17.5	325.9	293	8.83	190
Step 2	26.9	15.0	324.0	288	8.78	164
Step 3	26.7	17.5	324.8	289	8.48	188
Step 4	26.9	15.0	324.9	287	8.52 Q	187

*Q – Hold time exceeded

Table 4-6. Borehole Water Quality at End of Final Well Development

A-2	Parameter	Value
Field Results	Temperature (°C)	27.3
	Turbidity (NTU)	0.61
	Specific Conductance (uS/cm)	331
Laboratory Results	Specific Conductance (uS/cm)	306
	Total Dissolved Solids (mg/L)	180
	Chloride (mg/L)	11.2
	Turbidity (NTU)	0.507 U
	Sulfate (mg/L)	5.96
	Total Alkalinity (mg/L)	126
	Alkalinity Bicarbonate (mg/L)	125
	Calcium (mg/L)	22.2
	pH	7.99
	Iron (µg/L)	16.2 I
	Magnesium (mg/L)	14.9
	Total Hardness (mg/L)	117
	Potassium (mg/L)	2.69
	Sodium (mg/L)	13.4

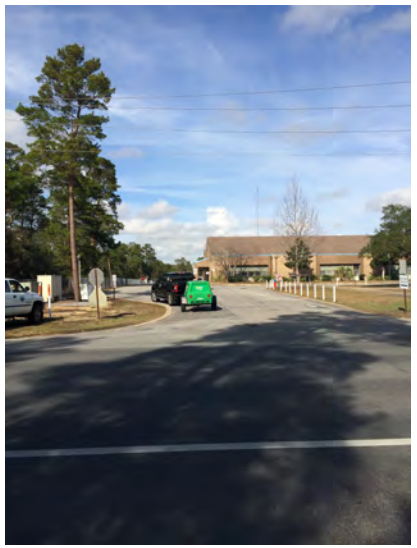
*U – below detection limits, I – value estimated to be between the Laboratory Detection and Reporting Limit

Region II Well Construction and Testing Report for Site A-2

APPENDIX A

PRE-CONSTRUCTION PHOTO DOCUMENTATION

View of existing entrance to Site A-2, facing north.



View of Bluewater Elementary School entrance, facing north.

View of turkey oak near proposed location of A-2b, facing north.

View of access road and proposed location of A-2, facing north.

Date Photos Taken: Jan, 17 2017 Photographer: D. Kelly Complier: D. Kelly

View of proposed surficial well A-2b location, facing west.

View of proposed deep Floridan well A-2 location, facing west.

View of proposed deep Floridan well A-2 location, facing east.

View of proposed surficial well A-2b location, facing east.

Date Photos Taken: Jan 17, 2017 Photographer: D. Kelly Complier: D. Kelly

View of proposed well locations, facing south (A-2 near, A-2b far).

View of existing entrance to Site A-2, facing south.

Region II Well Construction and Testing Report for Site A-2

APPENDIX B

POST-CONSTRUCTION PHOTO DOCUMENTATION

View of existing entrance to Site A-2, facing north..

View of Bluewater Elementary School entrance, facing north.

View of new entrance to Site A-2, facing north..

View of existing entrance (left) and new entrance (right), facing south.


View of finished surficial well A-2b, facing west.


View of finished deep Floridan well A-2, facing west.

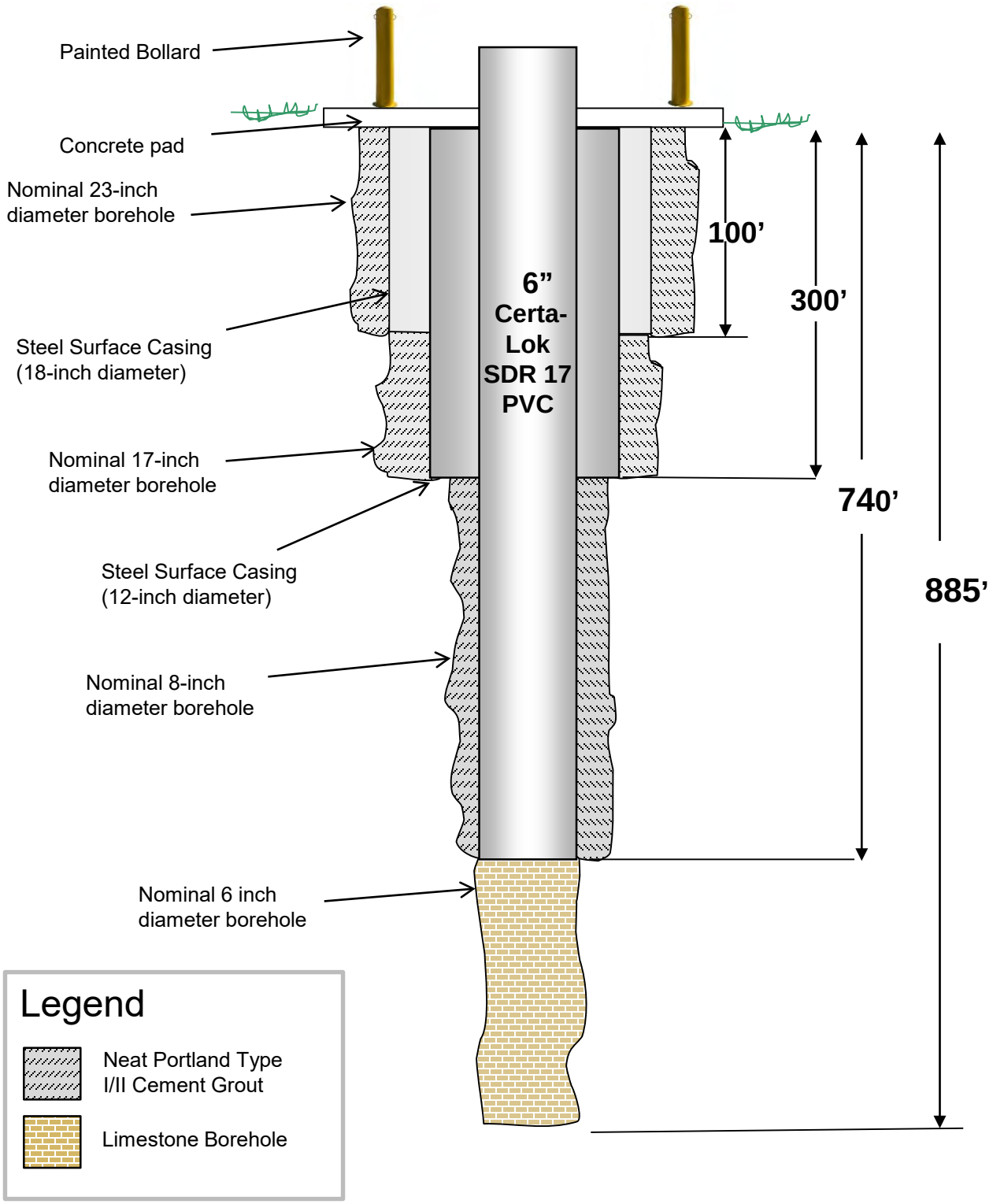

View of finished deep Floridan well A-2, facing east.


View of finished surficial well A-2b, facing east.

Region II Well Construction and Testing Report for Site A-2

APPENDIX C

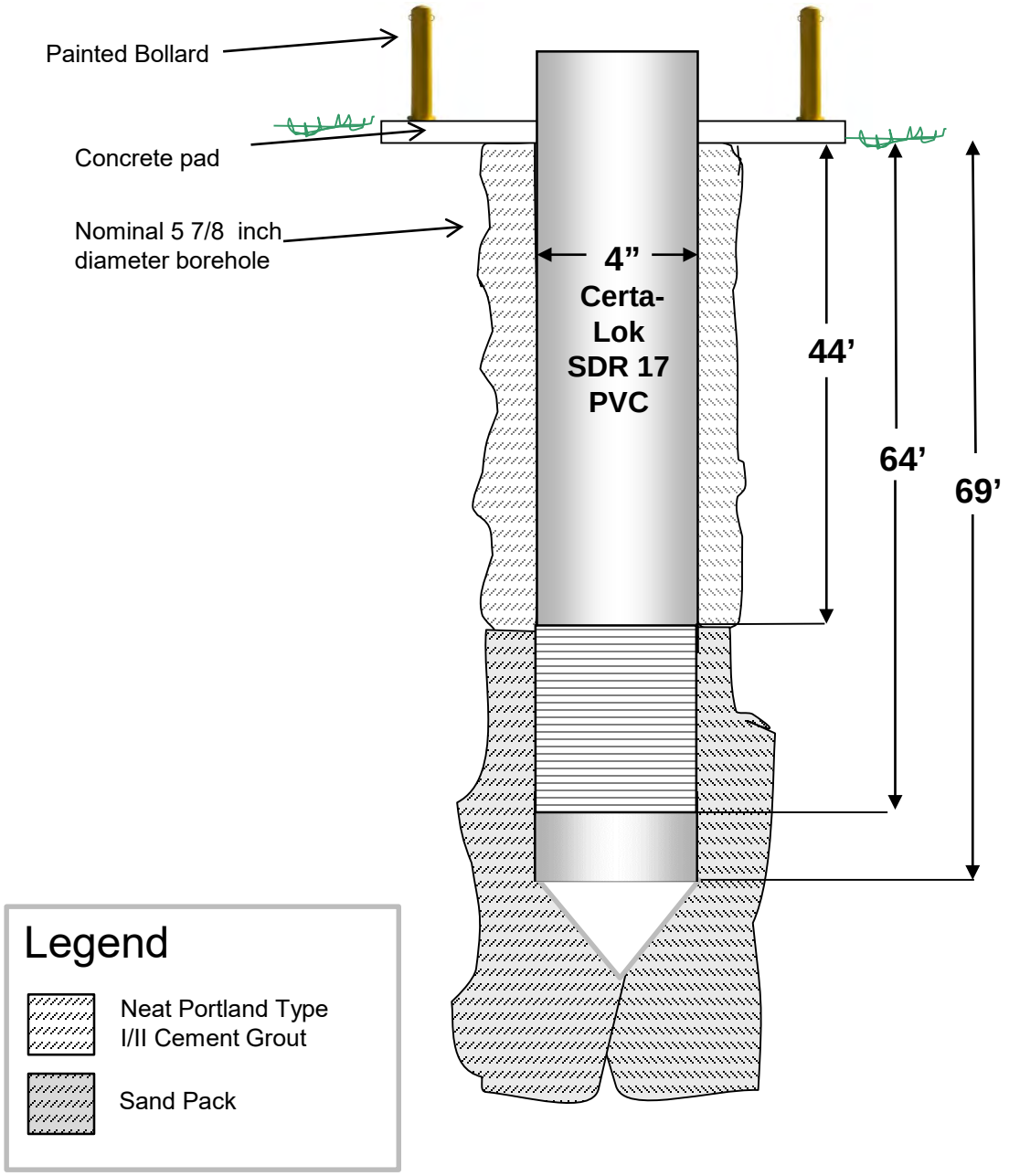
AS-BUILT DRAWING OF WELLS



As-Built Well Schematic

A-2: Fred Gannon Rocky Bayou State Park

Okaloosa County, Florida



As-Built Well Schematic

A-2b: Fred Gannon Rocky Bayou State Park

Okaloosa County, Florida

Region II Well Construction and Testing Report for Site A-2

APPENDIX D

LITHOLOGIC LOG

Project Name: A-2 Oversight

Project No.: E217002101

Well No.: A-2 and A-2b

Sampling Method: Strainer Collection

Described By: Michelle Leonard
Joshua Yates

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
0-10	10	dark yellowish orange (10YR 6/6) sand, fine to medium, angular to sub-angular, rusty coating
10-20	10	pale yellowish orange (10YR 8/6) sand, fine to medium, angular to sub-angular, rusty coating, trace heavy minerals
20-30	10	yellowish gray (5Y 8/1) sand, fine to medium, angular to sub-angular, trace heavy minerals
30-40	10	yellowish gray (5Y 8/1) sand, fine to medium, angular to sub-angular, trace very coarse rounded sand
40-60	20	yellowish gray (5Y 8/1) sand, fine to medium, angular to sub-angular, 40% very coarse rounded sand
60-70	10	yellowish gray (5Y 8/1) sand, fine to medium, angular to sub-angular, trace very coarse rounded sand
70-80	10	yellowish gray (5Y 8/1) sand, fine to medium, angular to sub-angular with olive gray (5Y 4/1) clay
80-90	10	light olive gray (5Y 5/2) clayey sand, very fine to fine, sub-angular to sub-rounded
90-120	30	same as above with increasing clay
120-125	5	dark greenish gray (5GY 4/1) clayey sand, very fine to fine, sub-angular to sub-rounded
125-150	25	light olive gray (5Y 5/2) sand, fine to medium, sub-rounded to sub-angular, micaceous (1%), heavy minerals (%15)
150-160	10	light olive gray (5Y 5/2) sand, fine to medium, sub-rounded to sub-angular, micaceous (trace), heavy minerals (%15)
160-170	10	light olive gray (5Y 5/2) sand, fine to medium, sub-rounded to sub-angular, heavy minerals (%15)
170-190	20	olive gray (5Y 4/1) sandy clay, sand (fine to medium, sub-rounded to sub-angular, heavy minerals), moderately cohesive
190-200	10	olive gray (5Y 4/1) sandy clay, sand (fine to medium, sub-rounded to sub-angular, heavy minerals), more cohesive than above
200-220	20	grayish olive (10Y 4/2) sandy (fine to medium, sub-rounded to sub-angular, micaceous, heavy minerals), clay very cohesive, sand 30%
220-240	20	olive gray (5Y 4/1) sandy clay, sand (fine to medium, sub-rounded to sub-angular, heavy minerals), clay sticky, increasing with depth

Project Name: A-2 Oversight

Project No.: E217002101

Well No.: A-2 and A-2b

Sampling Method: Strainer Collection

Described By: Michelle Leonard
Joshua Yates

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
240-250	10	olive gray (5Y 4/1) sandy clay, sand (fine to medium, sub-rounded to sub-angular, heavy minerals), clay very sticky, increasing with depth
250-260	10	moderate olive brown (5Y 4/4) sandy clay, sand (fine to medium, sub-rounded to sub-angular, heavy minerals), clay sticky, increasing with depth
260-270	10	olive gray (5Y 4/1) sandy clay, sand (fine to medium, sub-rounded to sub-angular, more heavy minerals), clay cohesive
270-290	20	olive gray (5Y 4/1) sandy clay, sand (fine to medium, sub-rounded to sub-angular, more heavy minerals), clay very sticky
290-300	10	olive gray (5Y 4/1) sandy clay, sand (fine to medium, sub-rounded to sub-angular, more heavy minerals), clay cohesive, interbedded with yellowish gray (5Y 8/1) limestone, grainstone, heavy minerals (20%), very well indurated, some bivalve shell (10%)
300-310	10	olive gray (5Y 4/1) sandy clay, sand (fine to medium, sub-rounded to sub-angular, more heavy minerals), clay cohesive, interbedded with yellowish gray (5Y 8/1) limestone, grainstone, heavy minerals (20%), very well indurated, some bivalve shell (10%), mostly clay
310-320	10	no samples
320-330	10	yellowish gray (5Y 7/2) packstone, well-indurated, with olive gray (5Y 4/1) dolostone, 30% bivalve fossils, moderate porosity
330-350	20	yellowish gray (5Y 7/2) grainstone, well-indurated, 15% bivalve fossils, moderate porosity
350-360	10	yellowish gray (5Y 7/2) packstone, well-indurated, 15% bivalve, moderate porosity
360-370	10	greenish gray (5GY 6/1) clay with greenish gray (5GY 6/1) and yellowish gray (5Y 7/2) packstone, 60% bivalve and gastropod fossils, well-indurated
370-380	10	no samples
380-390	10	greenish gray (5GY 6/1) clay with greenish gray (5GY 6/1) and yellowish gray (5Y 7/2) packstone, 60% bivalve and gastropod fossils, well-indurated
390-400	10	greenish gray (5GY 6/1) packstone, 30% bivalve fossils, moderately indurated with dark greenish gray (5GY 4/1) clay

Project Name: A-2 Oversight

Project No.: E217002101

Well No.: A-2 and A-2b

Sampling Method: Strainer Collection

Described By: Michelle Leonard
Joshua Yates

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
400-410	10	light greenish gray (5GY 8/1) packstone with yellowish gray (5Y 7/2) dolostone and dark greenish gray (5GY 4/1) clay
410-420	10	moderate yellowish brown (10YR 4/2) dolostone with yellowish gray (5Y 7/2) clay and packstone, fossiliferous, bivalves
420-430	10	yellowish gray (5Y 7/2) clay transitioning to greenish gray (5GY 6/1) clay, clay is hard and dense
430-440	10	yellowish gray (5Y 7/2) packstone and clay, 20% bivalve fossils
440-450	10	yellowish gray (5Y 7/2) wackestone, well-indurated, low porosity
450-470	20	greenish gray (5GY 6/1) wackestone, fossiliferous, well-indurated, moderate porosity
470-480	10	greenish gray (5GY 6/1) wackestone, fossiliferous, well-indurated, moderate porosity with yellowish gray (5Y 8/1) packstone
480-490	10	greenish gray (5GY 6/1) wackestone, 90% fossil shells with greenish gray (5GY 6/1) clay
490-500	10	greenish gray (5GY 6/1) clay with light bluish gray (5B 7/1) clay and yellowish gray (5Y 8/1) wackestone
500-510	10	very light gray (N8) packstone, moderate porosity, well-indurated, 10% bivalve fossils
510-540	30	very light gray (N8) packstone, high porosity, well-indurated
540-550	10	yellowish gray (5Y 8/1) grainstone, good porosity, well-indurated, abundant bivalve and gastropod fossils interbedded with dark greenish gray (5GY 4/1) clay, cohesive
550-560	10	yellowish gray (5Y 8/1) grainstone, good porosity, very friable, abundant bivalve and gastropod fossils
560-590	30	yellowish gray (5Y 8/1) grainstone, good porosity, well-indurated, abundant bivalve and gastropod fossils
590-620	30	yellowish gray (5Y 8/1) grainstone, good porosity, friable, abundant bivalve and gastropod fossils
620-630	10	yellowish gray (5Y 8/1) grainstone, very good porosity, poorly indurated, fossiliferous
630-690	60	yellowish gray (5Y 8/1) grainstone, very good porosity, friable, fossiliferous

Project Name: A-2 Oversight

Project No.: E217002101

Well No.: A-2 and A-2b

Sampling Method: Strainer Collection

Described By: Michelle Leonard
Joshua Yates

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
690-720	30	yellowish gray (5Y 8/1) grainstone, very good porosity, friable, fossiliferous, abundant shell
720-730	10	yellowish gray (5Y 8/1) grainstone, very good porosity, friable, fossiliferous, abundant shell with pale blue (5PB 7/2) clay, very soft
730-740	10	yellowish gray (5Y 8/1) grainstone, very good porosity, friable, fossiliferous, abundant shell with pale blue (5PB 7/2) and dark greenish gray (5GY 4/1) clay, very soft
740-750	10	yellowish gray (5Y 8/1) grainstone, good porosity, well-indurated, abundant bivalve and gastropod fossils
750-760	10	yellowish gray (5Y 8/1) grainstone, good porosity, well-indurated, abundant bivalve and gastropod fossils with dusky yellow (5Y 6/4) fossils and possible very soft dusky yellow (5Y 6/4) clay
760-770	10	light olive brown (5Y 5/6) to yellowish gray (5Y 7/2) grainstone, moderate porosity, very well indurated, few small vugs, trace heavy minerals
770-780	10	yellowish gray (5Y 8/1) packstone, coral fossils, chalky, very well indurated, good porosity with dark greenish gray (5GY 6/1) clay, very soft, crumbly, trace quartz fine sand
780-790	10	yellowish gray (5Y 8/1) to light bluish gray (5B 7/1) grainstone, moderate porosity, very well indurated, few small vugs, trace heavy minerals
790-800	10	yellowish gray (5Y 8/1) to light bluish gray (5B 7/1) grainstone, moderate porosity, very well indurated, few small vugs, trace shell
800-810	10	yellowish gray (5Y 8/1) to light bluish gray (5B 7/1) grainstone, moderate porosity, very well indurated, few small vugs, trace heavy minerals
810-820	10	yellowish gray (5Y 8/1) to light bluish gray (5B 7/1) grainstone, moderate porosity, very well indurated, few small vugs, trace shell
820-830	10	yellowish gray (5Y 8/1) grainstone, moderately indurated, shelly, trace heavy minerals, few small vugs, very good porosity

Project Name: A-2 Oversight

Project No.: E217002101

Well No.: A-2 and A-2b

Sampling Method: Strainer Collection

Described By: Michelle Leonard
Joshua Yates

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
830-840	10	yellowish gray (5Y 8/1) grainstone, moderate porosity, very well indurated, few small vugs, trace heavy minerals
840-850	10	yellowish gray (5Y 8/1) packstone, fossiliferous, secondary porosity, vuggy, very well indurated, low porosity
850-860	10	yellowish gray (5Y 8/1) packstone, fossiliferous, secondary porosity, vuggy, well indurated, low porosity
860-880	20	yellowish gray (5Y 8/1) to light bluish gray (5B 7/1) packstone, fossiliferous, secondary porosity, vuggy, moderately indurated, low porosity
880-895	15	yellowish gray (5Y 8/1) to light bluish gray (5B 7/1) packstone, fossiliferous, vuggy, very poorly indurated, very low porosity
895-900	5	olive gray (5Y 4/1) fine sand, well sorted, sub-rounded to sub-angular

Region II Well Construction and
Testing Report for Site A-2

APPENDIX E

GEOLOGIC LOGS

ABS

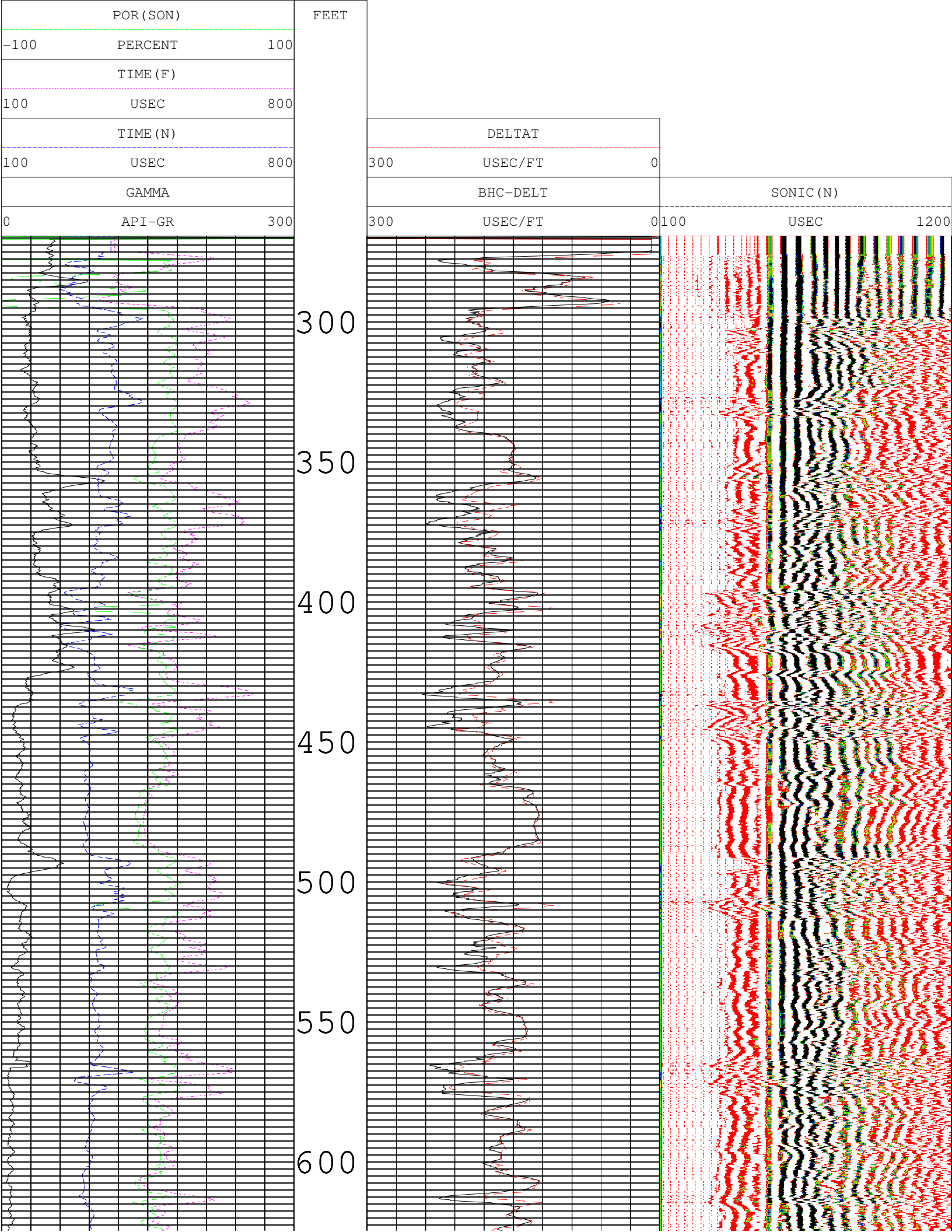
Advanced Borehole Services

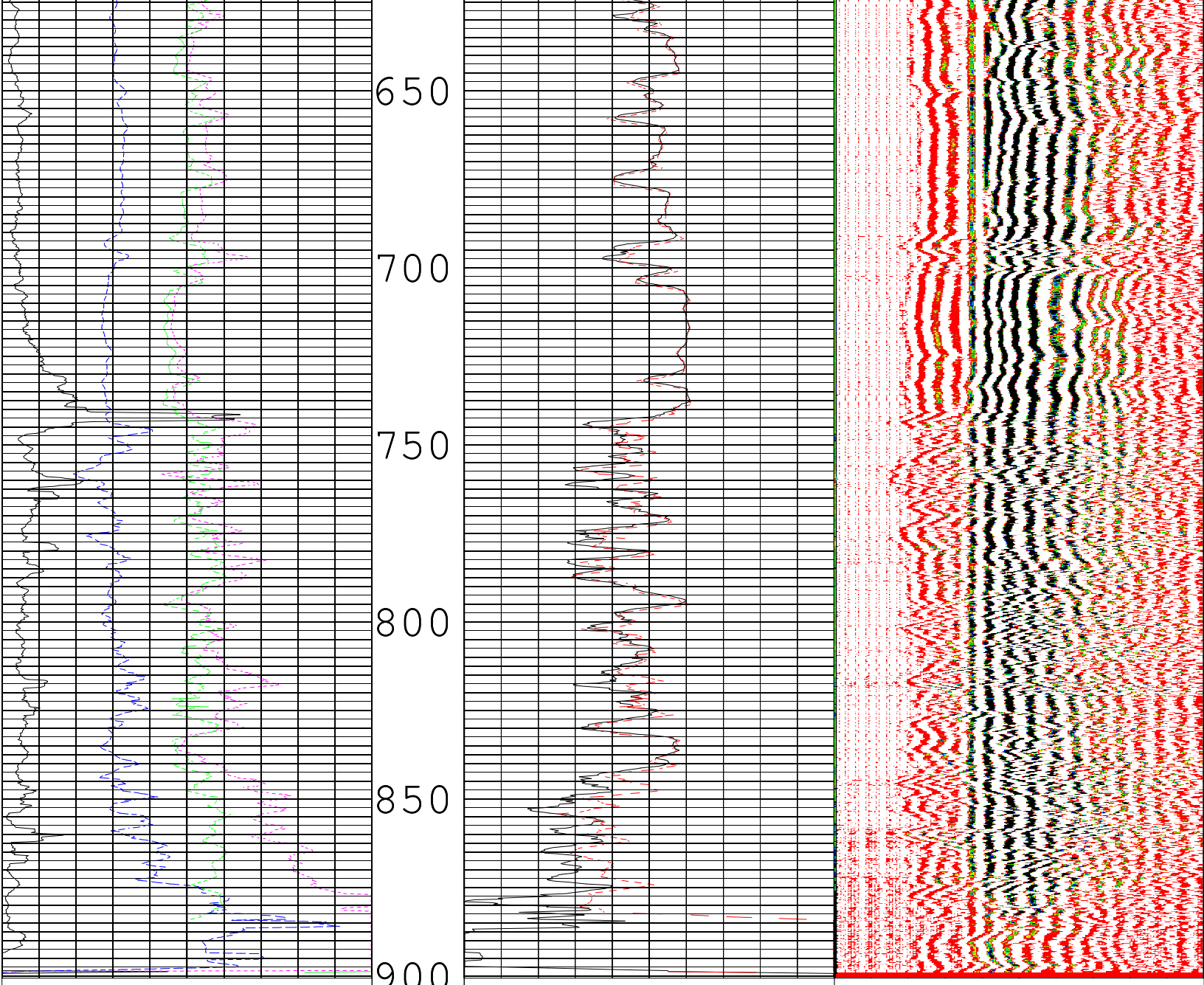
FULL WAVE BHC ACOUSTIC-VDL

WELL A-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL A-2	8044
FIELD	: NICEVILLE	9320
COUNTY	: OKALOOSA	DIL
STATE	: FLORIDA	

LOCATION	:		
SECTION	: None		
TOWNSHIP	: None		
RANGE	: None		
API NO.	:		
UNIQUE WELL ID.	:		
PERMANENT DATUM	: MSL	ELEVATION KB:	None
LOG MEASURED FROM:	GS	ELEVATION DF:	NA
DRL MEASURED FROM:	NA	ELEVATION GL:	NA
DATE	: 03/08/17		
DEPTH DRILLER	: 900		
BIT SIZE	: 6		
LOG TOP	: 269.25		
LOG BOTTOM	: 900.25		
CASING OD	:		
CASING BOTTOM	: 300		
CASING TYPE	: STEEL		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		


POR(SON)
FEET
-100
PERCENT
100
TIME(F)
100
USEC
800
TIME(N)
100
USEC
800
GAMMA
0
API-GR
300
DELTAT
300
USEC/FT
0
BHC-DELT
300
USEC/FT
0
SONIC(N)
100
USEC
1200
300
350
400
450
500
550
600



0	API-GR	300	
GAMMA			
100	USEC	800	
TIME(N)			
100	USEC	800	
TIME(F)			
-100	PERCENT	100	
POR(SON)			FEET

300	USEC/FT	0
BHC-DELT		
300	USEC/FT	0
DELTAT		

100	USEC	1200
SONIC(N)		

TOOL CALIBRATION WELL A-2 03/08/17 10:47
TOOL 9320A2 TM VERSION 0
SERIAL NUMBER 667

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Apr12,99	23:12:30	GAMMA	Default	[CPS]	Default	[CPS]
	Apr12,99	20:12:30	GAMMA	Default	[CPS]	Default	[CPS]

ABS

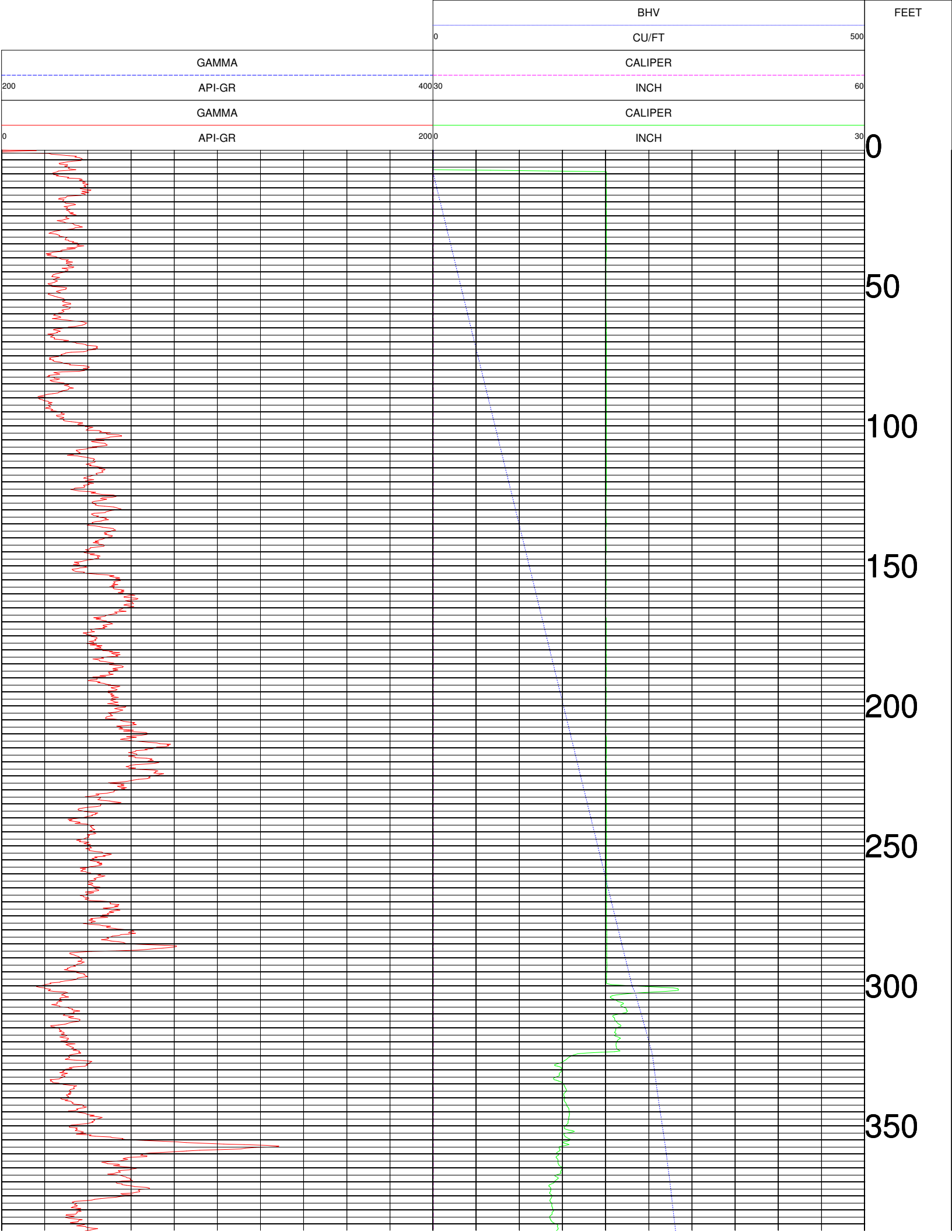
Advanced Borehole Services

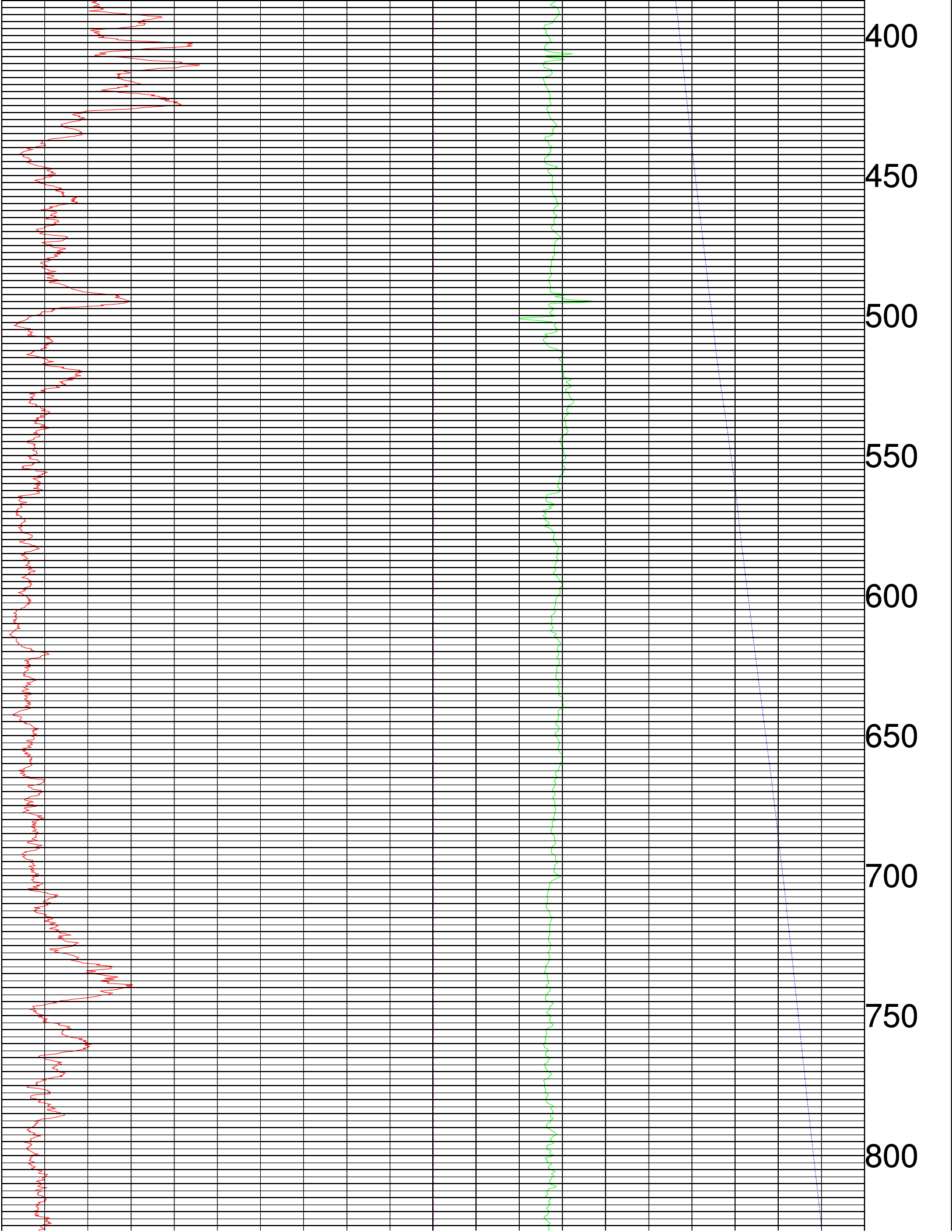
GAMMA RAY (API)-CALIPER

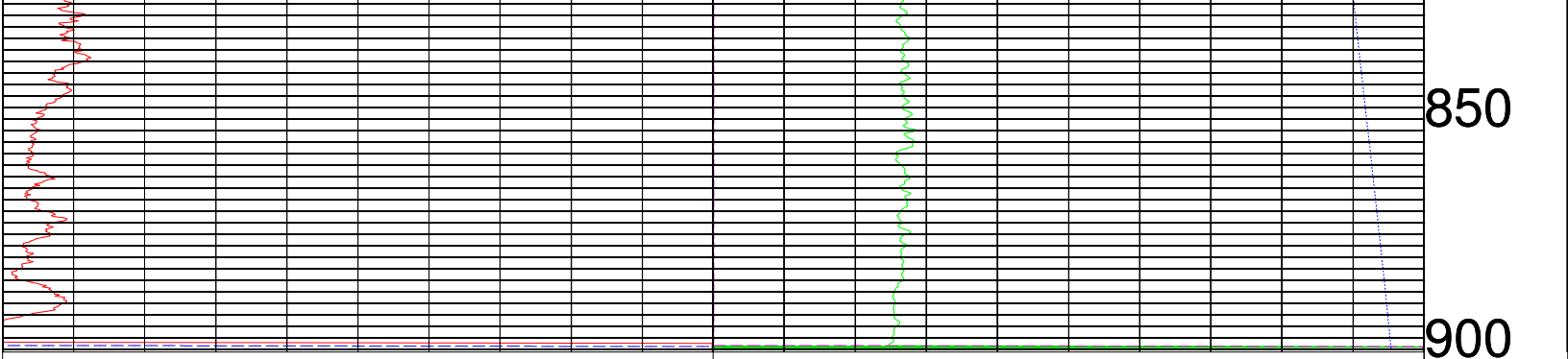
WELL A-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL A-2	8044
FIELD	: NICEVILLE	9320
COUNTY	: OKALOOSA	DIL
STATE	: FLORIDA	

LOCATION	:		
SECTION	: None		
TOWNSHIP	: None		
RANGE	: None		
API NO.	:		
UNIQUE WELL ID.	:		
PERMANENT DATUM	: MSL	ELEVATION KB:	None
LOG MEASURED FROM:	GS	ELEVATION DF:	NA
DRL MEASURED FROM:	NA	ELEVATION GL:	NA
DATE	: 03/08/17		
DEPTH DRILLER	: 900		
BIT SIZE	: 6		
LOG TOP	: 1.50		
LOG BOTTOM	: 902.75		
CASING OD	:		
CASING BOTTOM	: 300		
CASING TYPE	: STEEL		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		


BHV
FEET
0
CU/FT
500
GAMMA
CALIPER
200
API-GR
400
30
INCH
60
GAMMA
CALIPER
0
API-GR
200
0
INCH
30
0
50
100
150
200
250
300
350


400
450
500
550
600
650
700
750
800



0	API-GR	200	0	INCH	30
	GAMMA			CALIPER	
200	API-GR	400	30	INCH	60
	GAMMA			CALIPER	
			0	CU/FT	500
				BHV	FEET

TOOL CALIBRATION WELL A-2 03/08/17 09:15
TOOL 9074A1 TM VERSION 0
SERIAL NUMBER 857

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan12,03	07:10:06	GAMMA	Default	[CPS]	Default	[CPS]
	Jan12,03	04:10:06	GAMMA	180.000	[API-GR]	205.00	[CPS]
2	Dec13,00	22:19:45	CALIPER	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPER	Default	[CPS]	Default	[CPS]
3	Jan18,17	16:15:20	CALIPERL	5.000	[INCH]	152745.00	[CPS]
	Jan18,17	16:15:20	CALIPERL	35.500	[INCH]	86954.00	[CPS]
4	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]

ABS

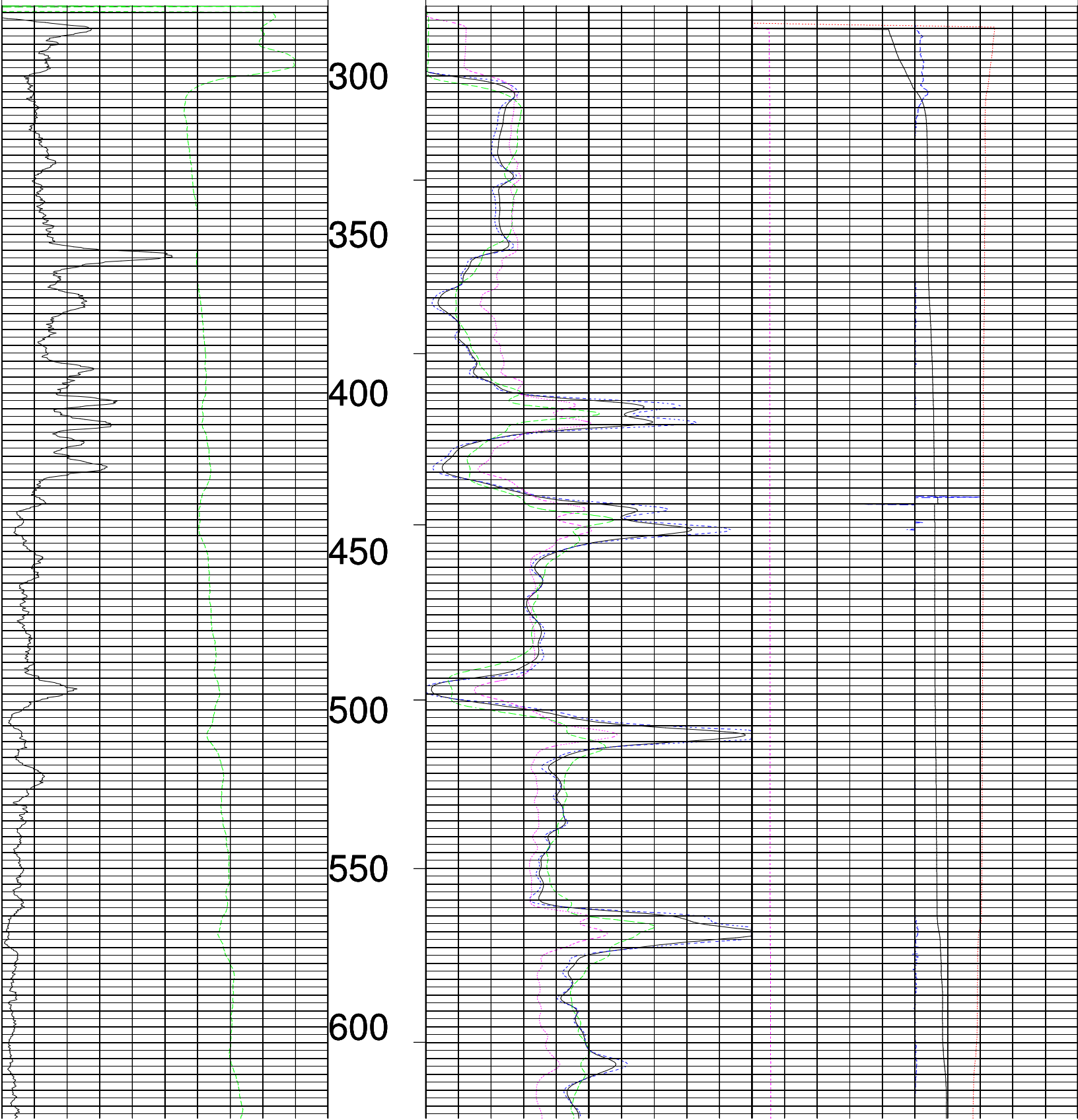
Advanced Borehole Services

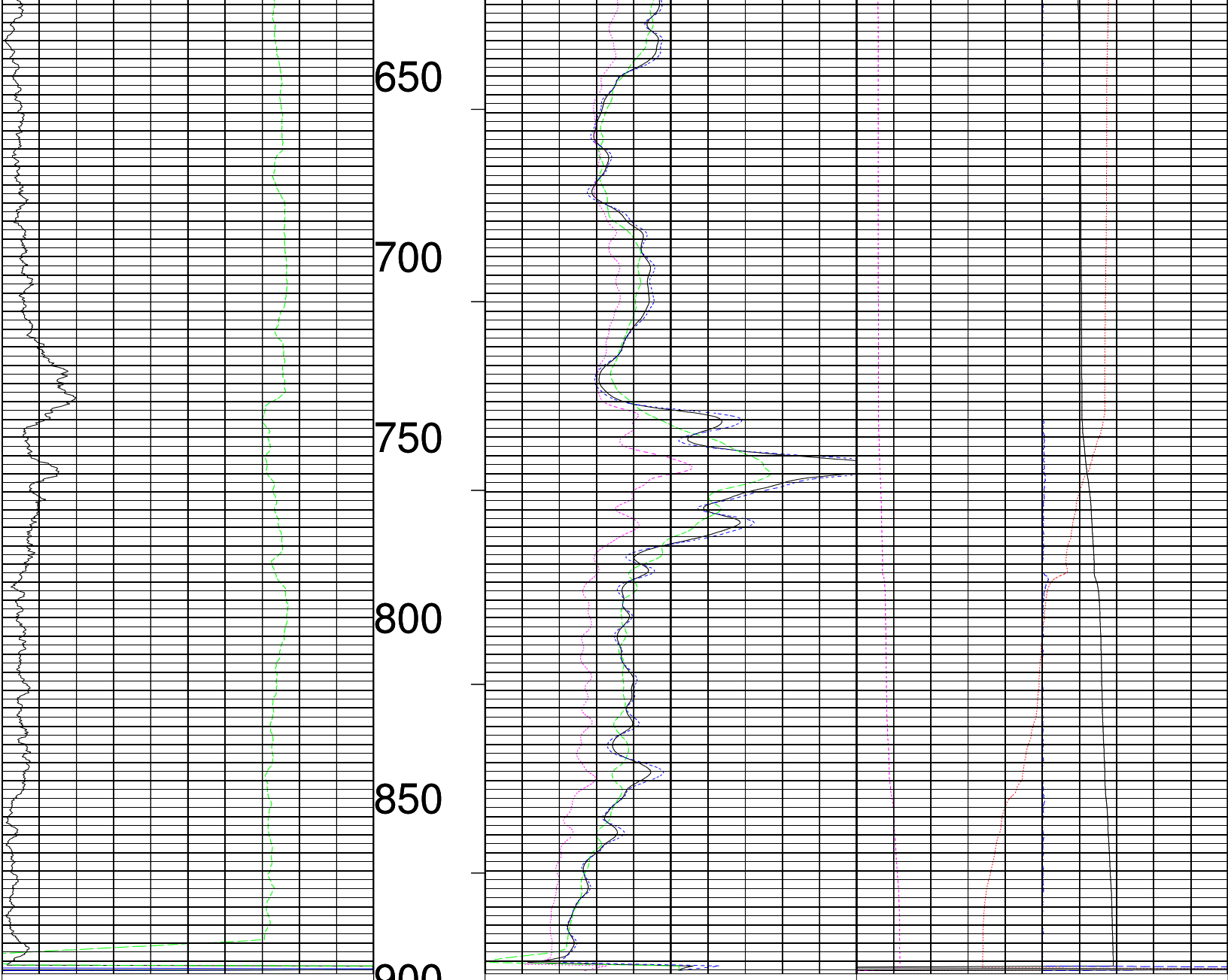
COMBINATION LOG
STATIC WATER QUAL.
WELL A-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL A-2	8044
FIELD	: NICEVILLE	9320
COUNTY	: OKALOOSA	DIL
STATE	: FLORIDA	

LOCATION	:		
SECTION	: None		
TOWNSHIP	: None		
RANGE	: None		
API NO.	:		
UNIQUE WELL ID.	:		
PERMANENT DATUM	: MSL	ELEVATION KB:	None
LOG MEASURED FROM:	GS	ELEVATION DF:	NA
DRL MEASURED FROM:	NA	ELEVATION GL:	NA
DATE	: 03/08/17		
DEPTH DRILLER	: 900		
BIT SIZE	: 6		
LOG TOP	: 278.00		
LOG BOTTOM	: 898.25		
CASING OD	:		
CASING BOTTOM	: 300		
CASING TYPE	: STEEL		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		

		FEET		RES			SP COND	
		<-VOLUME	0	OHM	500	0	US/CM	5000
	SP			LATERAL			RES(FL)	
0	MV	150	SPEED->	0	OHM-M	500	0	OHM-M	50
	GAMMA			RES(64N)			DEL TEMP	
200	API-GR	400		0	OHM-M	500	-0.5	DEG F	0.5
	GAMMA			RES(16N)			TEMP	
0	API-GR	200		0	OHM-M	500	70	DEG F	90





0	API-GR	200		0	OHM-M	500	70	DEG F	90
	GAMMA				RES(16N)			TEMP	
200	API-GR	400		0	OHM-M	500	-0.5	DEG F	0.5
	GAMMA		SPEED->		RES(64N)			DEL TEMP	
0	MV	150		0	OHM-M	500	0	OHM-M	50
	SP		<-VOLUME		LATERAL			RES(FL)	
				0	OHM	500	0	US/CM	5000
			FEET		RES			SP COND	

TOOL CALIBRATION WELL A-2 03/08/17 10:02
TOOL 8044A TM VERSION 0
SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan03,03	10:49:05	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Jan03,03	07:49:05	GAMMA	180.000	[API-GR]	169.00	[CPS]
2	Nov03,16	17:41:12	RES(FL)	41.600	[OHM-M]	54104.00	[CPS]
	Nov03,16	17:41:12	RES(FL)	1.980	[OHM-M]	13283.00	[CPS]
3	Aug17,14	17:00:23	SP	0.000	[MV]	59670.00	[CPS]
	Aug17,14	17:00:23	SP	395.000	[MV]	23612.00	[CPS]
4	Aug17,14	15:38:06	RES(16N)	0.000	[OHM-M]	4284.00	[CPS]
	Aug17,14	15:38:06	RES(16N)	1996.000	[OHM-M]	103525.00	[CPS]
5	Aug17,14	15:38:38	RES(64N)	0.000	[OHM-M]	4160.00	[CPS]
	Aug17,14	15:38:38	RES(64N)	1990.000	[OHM-M]	102789.00	[CPS]
6	Aug17,14	17:19:05	TEMP	71.700	[DEG F]	63355.00	[CPS]
	Aug17,14	17:19:05	TEMP	81.500	[DEG F]	58740.00	[CPS]
7	Aug17,14	15:39:11	RES	0.000	[OHM]	9855.00	[CPS]
	Aug17,14	15:39:11	RES	988.000	[OHM]	58788.00	[CPS]

ABS

Advanced Borehole Services

FLOWING WATER QUALITY

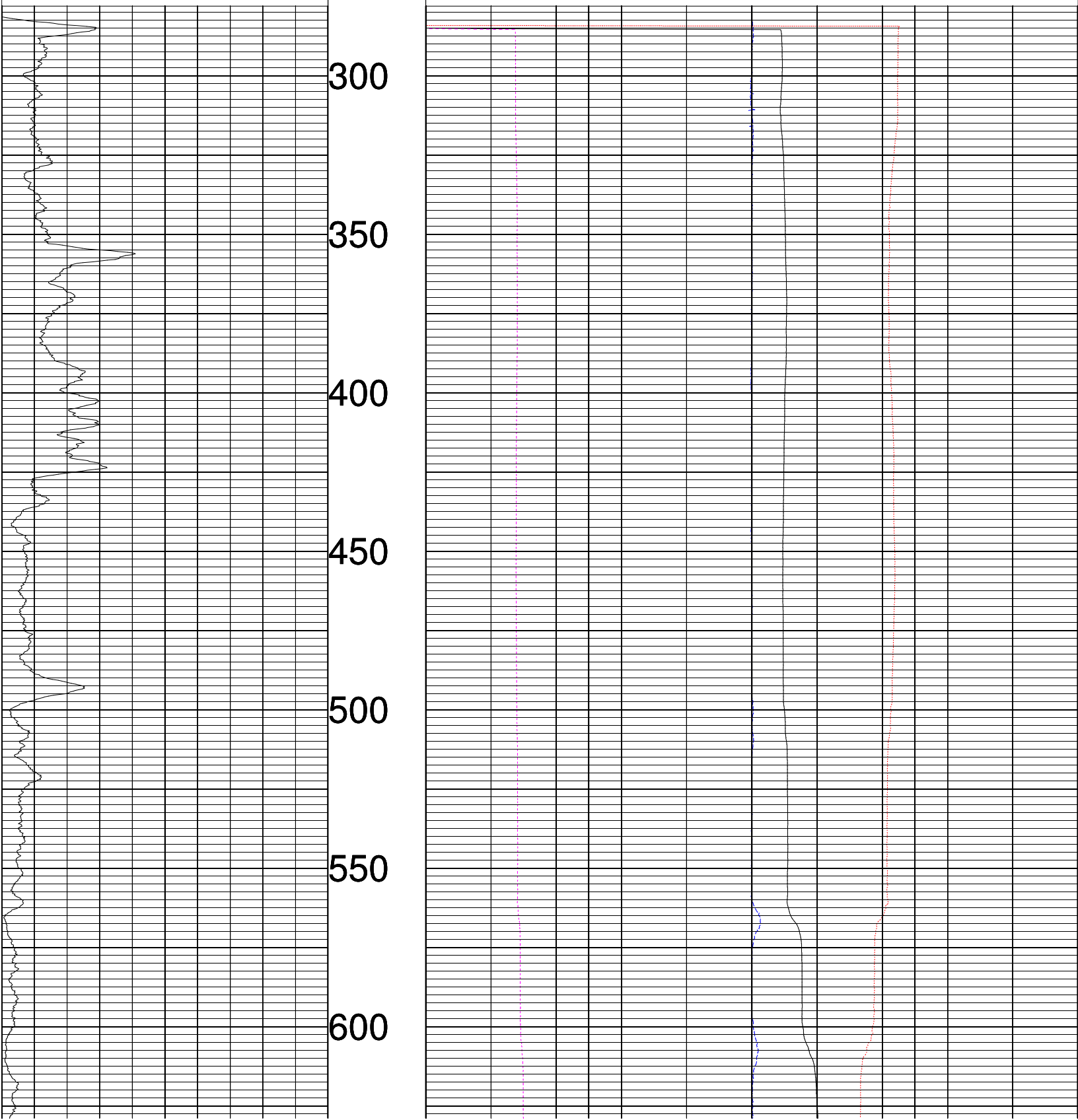
WELL A-2

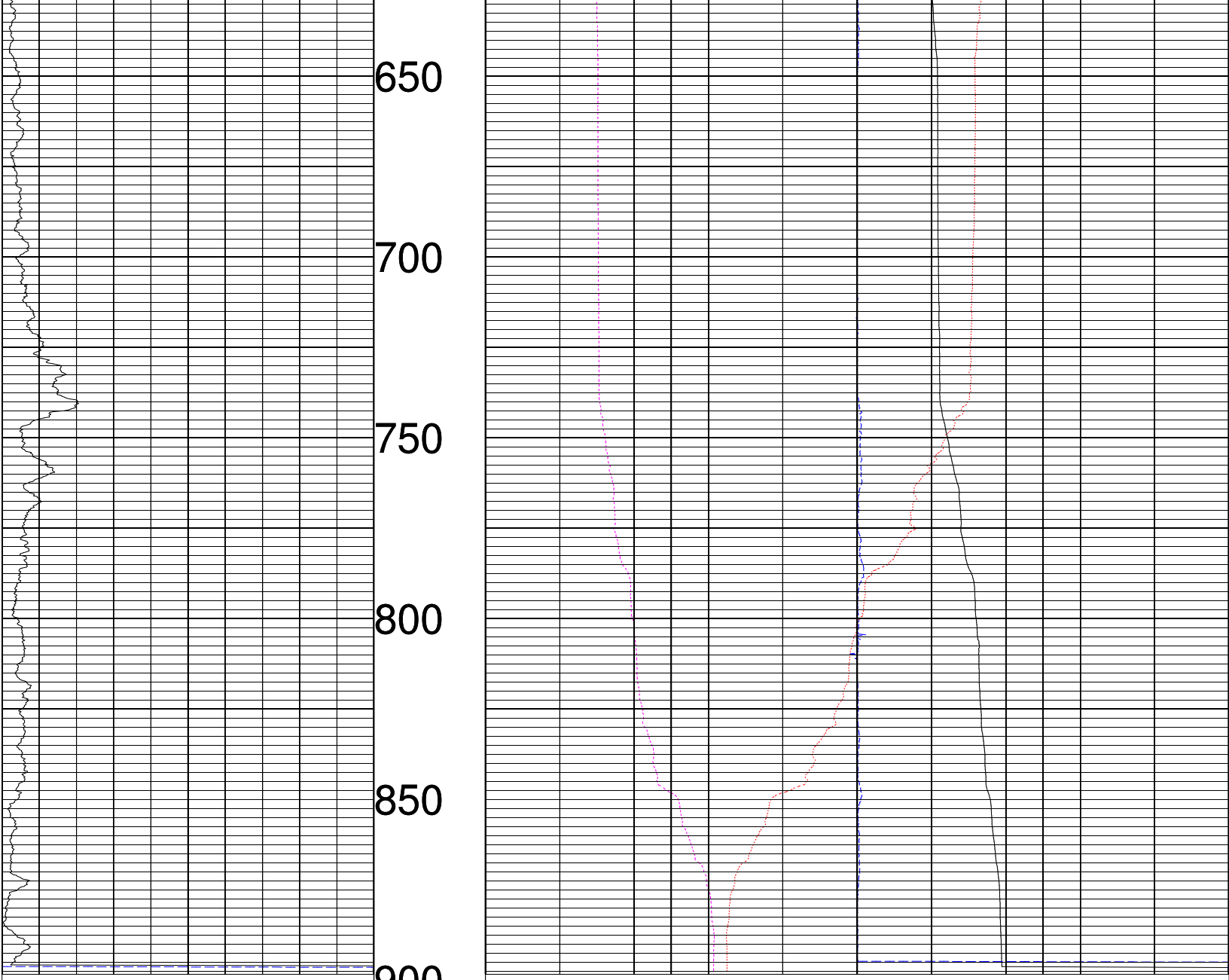
COMPANY	:	APPLIED DRILLING ENGINEERING
WELL	:	WELL A-2
FIELD	:	NICEVILLE
COUNTY	:	OKALOOSA
STATE	:	FLORIDA

OTHER SERVICES:
8044
9320
DIL

LOCATION	:			
SECTION	:	None		
TOWNSHIP	:	None		
RANGE	:	None		
API NO.	:			
UNIQUE WELL ID.	:			
PERMANENT DATUM	:	MSL	ELEVATION KB:	None
LOG MEASURED FROM:		GS	ELEVATION DF:	NA
DRL MEASURED FROM:		NA	ELEVATION GL:	NA
DATE	:	03/08/17		
DEPTH DRILLER	:	900		
BIT SIZE	:	6		
LOG TOP	:	278.00		
LOG BOTTOM	:	898.00		
CASING OD	:			
CASING BOTTOM	:	300		
CASING TYPE	:	STEEL		
BOREHOLE FLUID	:	FOR		
RM TEMPERATURE	:	0		
MUD RES	:	0		
MUD WEIGHT	:			
WITNESSED BY	:			
RECORDED BY	:	AFB		
REMARKS 1	:			
REMARKS 2	:			

	FEET	
		SP COND
		0 US/CM 2000
COMMENTS1		RES(FL)
		0 OHM-M 50
GAMMA		DEL TEMP
200 API-GR 400		-0.5 DEG F 0.5
GAMMA		TEMP
0 API-GR 200		70 DEG F 90





0	API-GR	200
	GAMMA	
200	API-GR	400
	GAMMA	
	COMMENTS1	

70	DEG F	90
	TEMP	
-0.5	DEG F	0.5
	DEL TEMP	
0	OHM-M	50
	RES(FL)	
0	US/CM	2000
	SP COND	

FEET

TOOL CALIBRATION WELL A-2 03/08/17 14:46
TOOL 8044A TM VERSION 0
SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan03,03	10:49:05	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Jan03,03	07:49:05	GAMMA	180.000	[API-GR]	169.00	[CPS]
2	Nov03,16	17:41:12	RES(FL)	41.600	[OHM-M]	54104.00	[CPS]
	Nov03,16	17:41:12	RES(FL)	1.980	[OHM-M]	13283.00	[CPS]
3	Aug17,14	17:00:23	SP	0.000	[MV]	59670.00	[CPS]
	Aug17,14	17:00:23	SP	395.000	[MV]	23612.00	[CPS]
4	Aug17,14	15:38:06	RES(16N)	0.000	[OHM-M]	4284.00	[CPS]
	Aug17,14	15:38:06	RES(16N)	1996.000	[OHM-M]	103525.00	[CPS]
5	Aug17,14	15:38:38	RES(64N)	0.000	[OHM-M]	4160.00	[CPS]
	Aug17,14	15:38:38	RES(64N)	1990.000	[OHM-M]	102789.00	[CPS]
6	Aug17,14	17:19:05	TEMP	71.700	[DEG F]	63355.00	[CPS]
	Aug17,14	17:19:05	TEMP	81.500	[DEG F]	58740.00	[CPS]
7	Aug17,14	15:39:11	RES	0.000	[OHM]	9855.00	[CPS]
	Aug17,14	15:39:11	RES	988.000	[OHM]	58788.00	[CPS]

ABS

Advanced Borehole Services

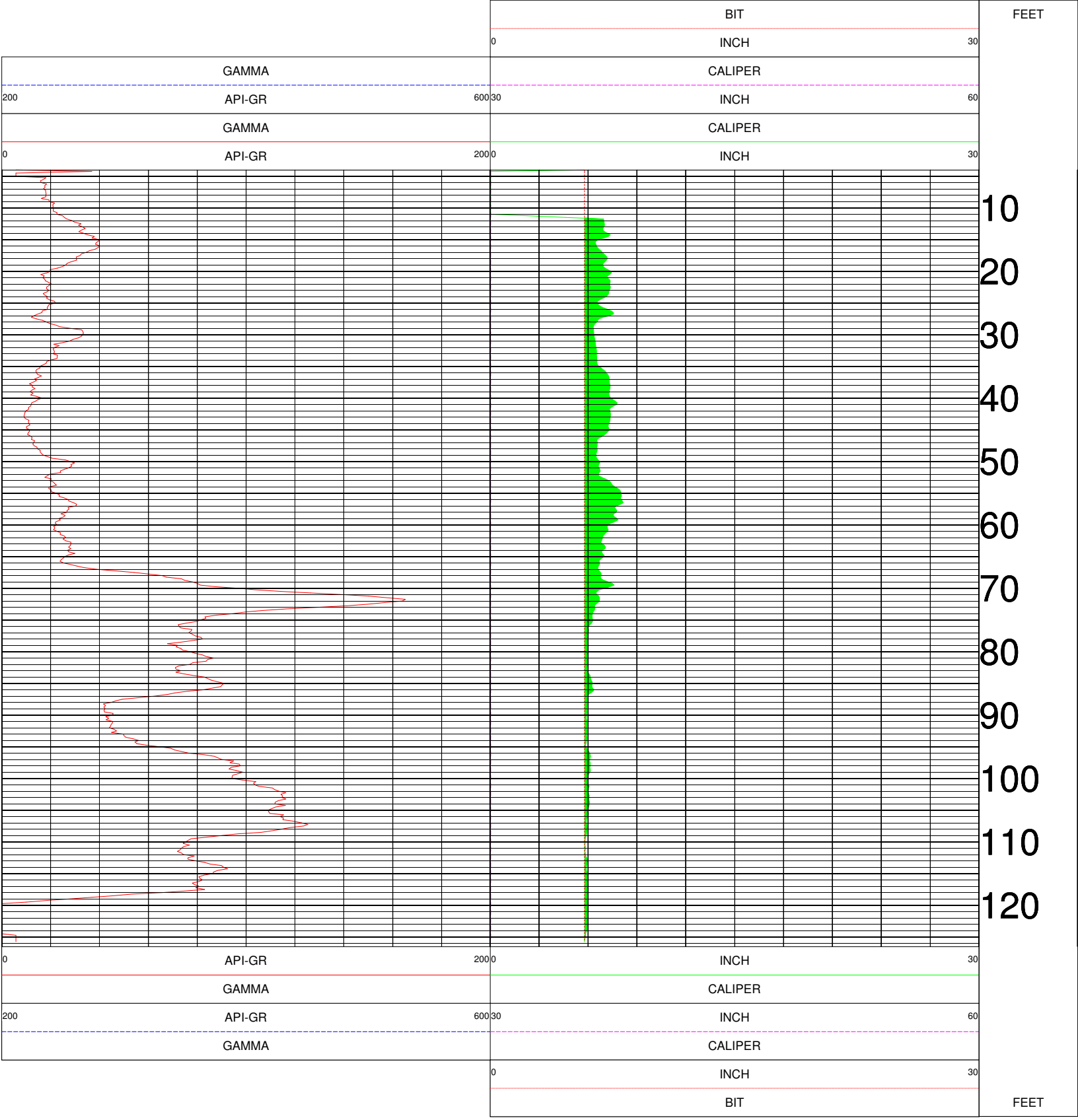
GAMMA RAY (API)-CALIPER

NWFWMD A-2B

COMPANY	:	APPLIED DRILLING ENGINEERING
WELL	:	NWFWMD A-2B
FIELD	:	NUCEVILLE
COUNTY	:	WALTON
STATE	:	FLORIDA

OTHER SERVICES:
9074
8044

LOCATION	:			
SECTION	:	None		
TOWNSHIP	:	None		
RANGE	:	None		
API NO.	:			
UNIQUE WELL ID.	:			
PERMANENT DATUM	:	MSL	ELEVATION KB:	None
LOG MEASURED FROM:		GND SUR	ELEVATION DF:	NA
DRL MEASURED FROM:		NA	ELEVATION GL:	NA
DATE	:	01/25/17		
DEPTH DRILLER	:	125		
BIT SIZE	:	12		
LOG TOP	:	4.00		
LOG BOTTOM	:	126.25		
CASING OD	:			
CASING BOTTOM	:	NA		
CASING TYPE	:	NA		
BOREHOLE FLUID	:	MUD		
RM TEMPERATURE	:	0		
MUD RES	:	0		
MUD WEIGHT	:			
WITNESSED BY	:			
RECORDED BY	:	AFB		
REMARKS 1	:	PILOT		
REMARKS 2	:			


BIT
FEET
0
INCH
30
GAMMA
CALIPER
200
API-GR
600
30
INCH
60
GAMMA
CALIPER
0
API-GR
200
0
INCH
30
10
20
30
40
50
60
70
80
90
100
110
120
0
API-GR
200
0
INCH
30
GAMMA
CALIPER
200
API-GR
600
30
INCH
60
GAMMA
CALIPER
0
INCH
30
BIT
FEET

TOOL CALIBRATION NWFWMD A-2B 01/25/17 09:20
TOOL 9074A1 TM VERSION 0
SERIAL NUMBER 857

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan12,03	07:10:06	GAMMA	Default	[CPS]	Default	[CPS]
	Jan12,03	04:10:06	GAMMA	180.000	[API-GR]	205.00	[CPS]
2	Dec13,00	22:19:45	CALIPER	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPER	Default	[CPS]	Default	[CPS]
3	Jan18,17	16:15:20	CALIPERL	5.000	[INCH]	152745.00	[CPS]
	Jan18,17	16:15:20	CALIPERL	35.500	[INCH]	86954.00	[CPS]
4	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]

ABS

Advanced Borehole Services

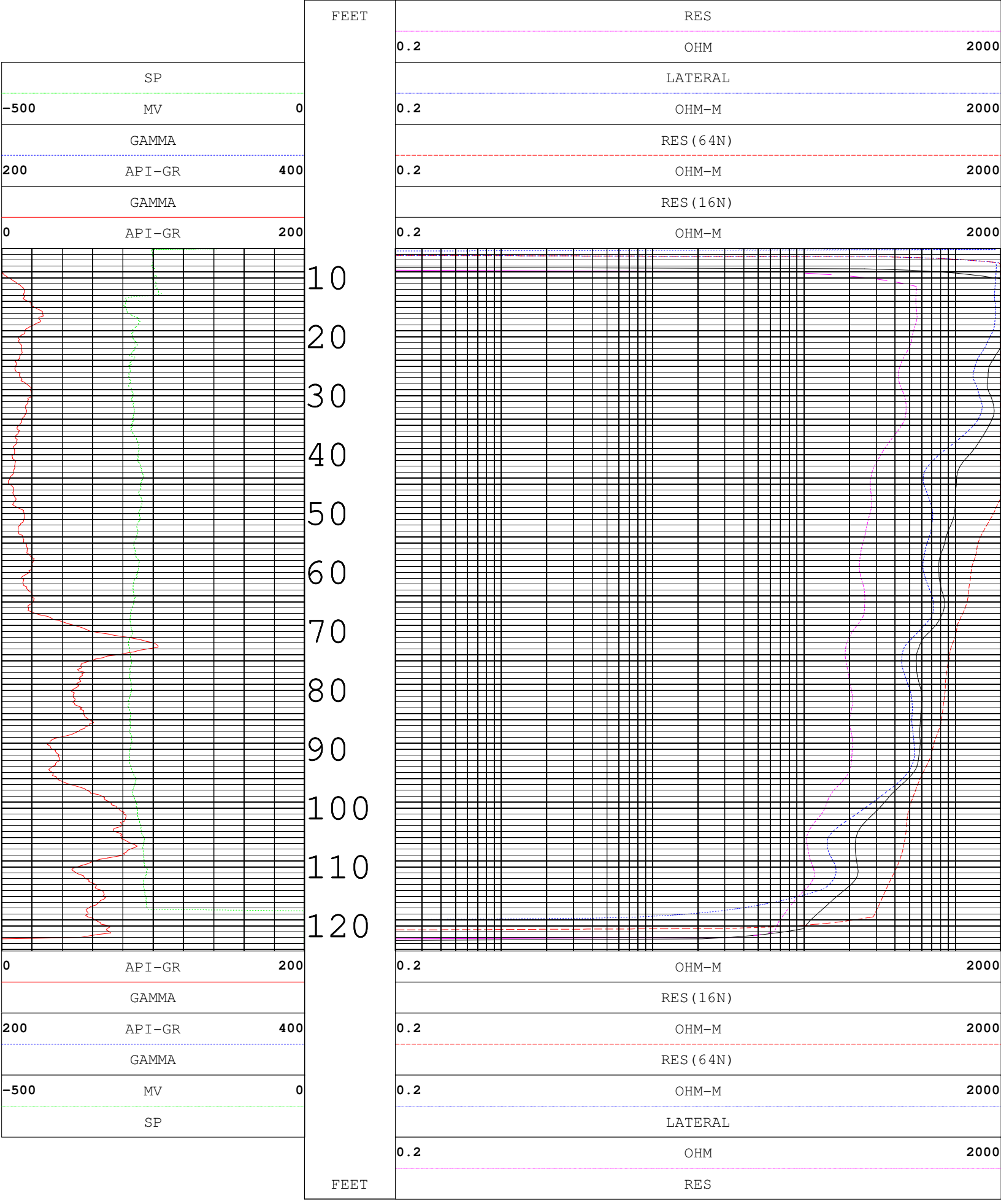
GAMMA RAY-RESISTIVITY (16-64)

NWFWMD A-2B

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: NWFWMD A-2B	9074
FIELD	: NICEVILLE	8044
COUNTY	: WALTON	
STATE	: FLORIDA	

LOCATION	:		
SECTION	: None		
TOWNSHIP	: None		
RANGE	: None		
API NO.	:		
UNIQUE WELL ID.	:		
PERMANENT DATUM	: MSL	ELEVATION KB:	None
LOG MEASURED FROM:	GND SUR	ELEVATION DF:	NA
DRL MEASURED FROM:	NA	ELEVATION GL:	NA

DATE	:	01/25/17
DEPTH DRILLER	:	125
BIT SIZE	:	12
LOG TOP	:	5.00
LOG BOTTOM	:	124.00
CASING OD	:	
CASING BOTTOM	:	NA
CASING TYPE	:	NA
BOREHOLE FLUID	:	MUD
RM TEMPERATURE	:	0
MUD RES	:	0
MUD WEIGHT	:	
WITNESSED BY	:	
RECORDED BY	:	AFB
REMARKS 1	:	PILOT
REMARKS 2	:	


FEET
RES
0.2
OHM
2000
SP
LATERAL
-500
MV
0
0.2
OHM-M
2000
GAMMA
RES(64N)
200
API-GR
400
0.2
OHM-M
2000
GAMMA
RES(16N)
0
API-GR
200
0.2
OHM-M
2000
10
20
30
40
50
60
70
80
90
100
110
120
0
API-GR
200
0.2
OHM-M
2000
GAMMA
RES(16N)
200
API-GR
400
0.2
OHM-M
2000
GAMMA
RES(64N)
-500
MV
0
0.2
OHM-M
2000
SP
LATERAL
0.2
OHM
2000
FEET
RES

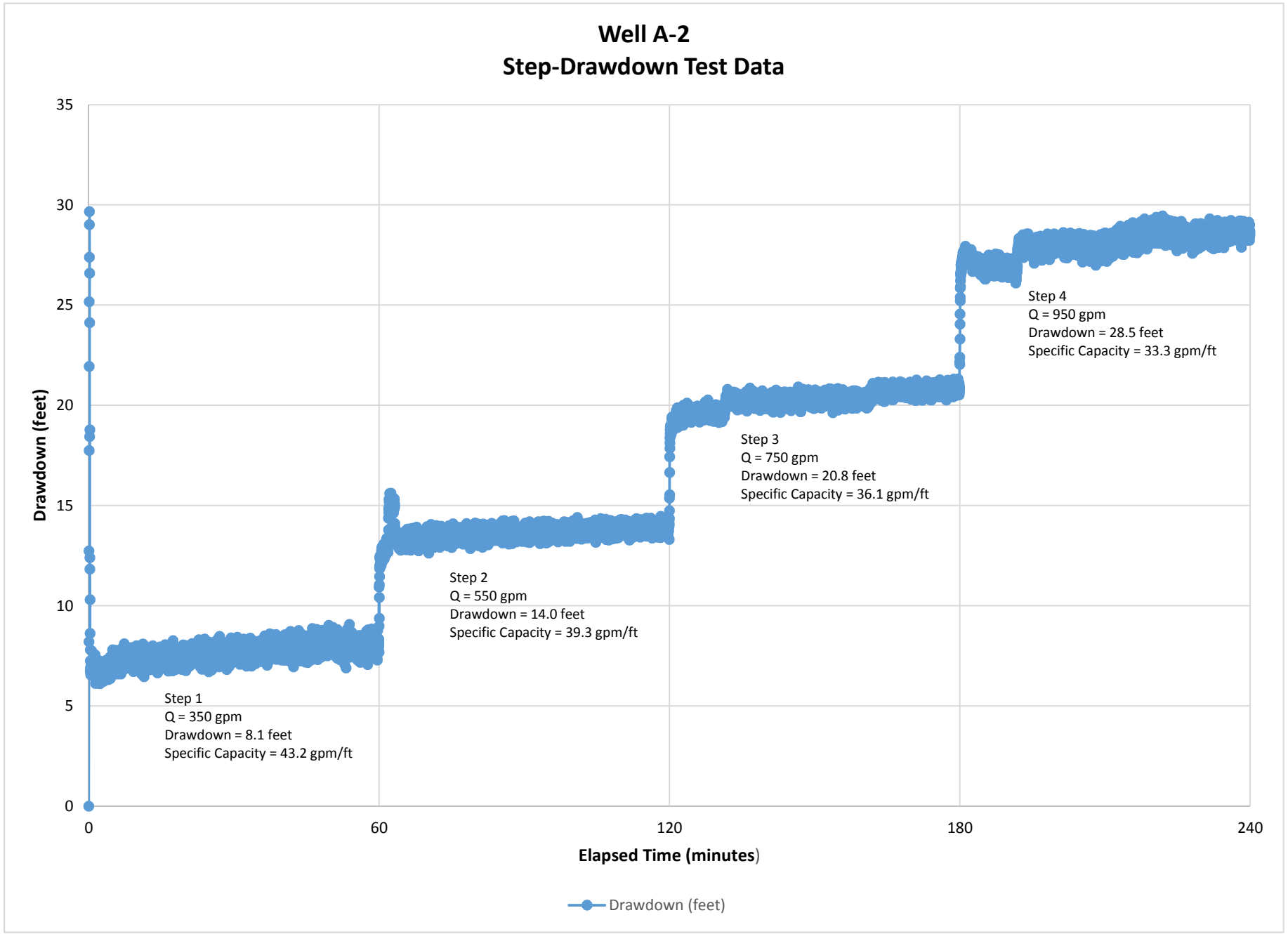
TOOL CALIBRATION NWFWMD A-2B 01/25/17 09:44
TOOL 8044A   TM VERSION 0
SERIAL NUMBER   938

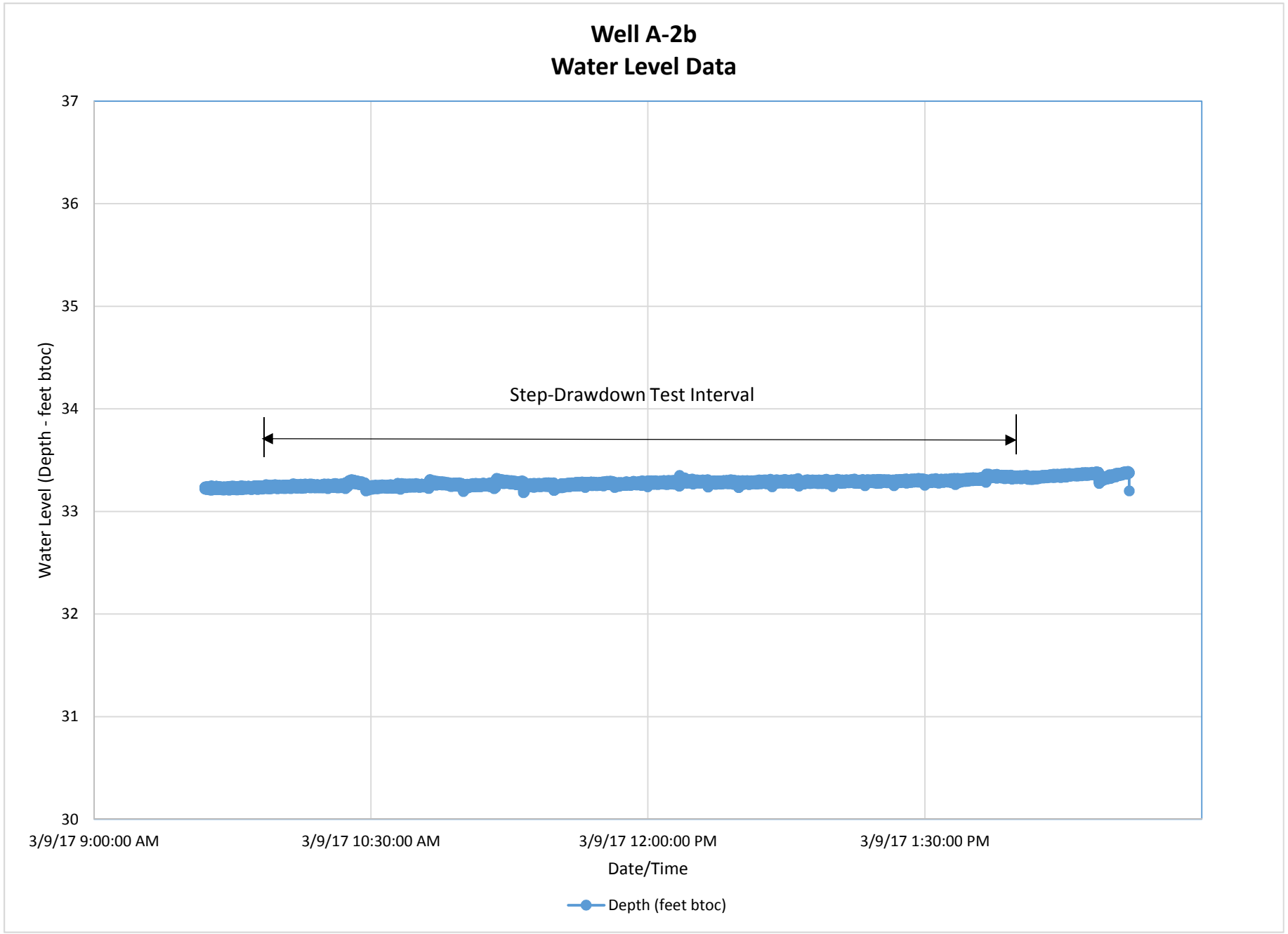
	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Jan03,03	10:49:05	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Jan03,03	07:49:05	GAMMA	180.000	[API-GR]	169.00	[CPS]
2	Nov03,16	17:41:12	RES(FL	41.600	[OHM-M]	54104.00	[CPS]
	Nov03,16	17:41:12	RES(FL	1.980	[OHM-M]	13283.00	[CPS]
3	Aug17,14	17:00:23	SP	0.000	[MV]	59670.00	[CPS]
	Aug17,14	17:00:23	SP	395.000	[MV]	23612.00	[CPS]
4	Aug17,14	15:38:06	RES(16	0.000	[OHM-M]	4284.00	[CPS]
	Aug17,14	15:38:06	RES(16	1996.000	[OHM-M]	103525.00	[CPS]
5	Aug17,14	15:38:38	RES(64	0.000	[OHM-M]	4160.00	[CPS]
	Aug17,14	15:38:38	RES(64	1990.000	[OHM-M]	102789.00	[CPS]
6	Aug17,14	17:19:05	TEMP	71.700	[DEG F]	63355.00	[CPS]
	Aug17,14	17:19:05	TEMP	81.500	[DEG F]	58740.00	[CPS]
7	Aug17,14	15:39:11	RES	0.000	[OHM]	9855.00	[CPS]
	Aug17,14	15:39:11	RES	988.000	[OHM]	58788.00	[CPS]

Region II Well Construction and Testing Report for Site A-2

APPENDIX F

STEP-TEST GRAPHICS


Well A-2
Step-Drawdown Test Data
Drawdown (feet)
35
30
25
20
15
10
5
0
0
60
120
180
240
Elapsed Time (minutes)
Step 1
Q = 350 gpm
Drawdown = 8.1 feet
Specific Capacity = 43.2 gpm/ft
Step 2
Q = 550 gpm
Drawdown = 14.0 feet
Specific Capacity = 39.3 gpm/ft
Step 3
Q = 750 gpm
Drawdown = 20.8 feet
Specific Capacity = 36.1 gpm/ft
Step 4
Q = 950 gpm
Drawdown = 28.5 feet
Specific Capacity = 33.3 gpm/ft
Drawdown (feet)


Well A-2b
Water Level Data
37
36
35
34
33
32
31
30
Water Level (Depth - feet btoc)
Step-Drawdown Test Interval
3/9/17 9:00:00 AM
3/9/17 10:30:00 AM
3/9/17 12:00:00 PM
3/9/17 1:30:00 PM
Date/Time
Depth (feet btoc)

Region II Well Construction and
Testing Report for Site A-2

APPENDIX G

LABORATORY REPORTS

Analytical Report

L7B0343

Project

A-2

Project Number

[none]

March 22, 2017
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

1412 Tech Blvd
Tampa, FL 33619

Phone #: 813-620-2000
Website: www.ftsanalytical.com

March 22, 2017

Michelle Leonard
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

RE: A-2

We are reporting the results of the analyses performed on the samples recieved on 2/27/2017 under the project name referenced above and identified as the lab Work Order L7B0343. All results being reported under this Report apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontracted lab, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reporting using all other available quality control methods.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by FTS Analytical Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise agreed upon. The samples received, and described as recorded in Work Order L7B0343 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

We thank you for selecting FTS Analytical to serve your analytical needs. If you have any questions concerning this report, please do not hesitate to contact us at any time. We will be happy to help.

Sincerely,

Nancy Robertson
Project Manager

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L7B0343-01	A2 - 420 ft	Water	22-Feb-2017 16:00	27-Feb-2017 11:34
L7B0343-02	A2 - 460 ft	Water	23-Feb-2017 10:25	27-Feb-2017 11:34
L7B0343-03	A2 - 500 ft	Water	23-Feb-2017 14:17	27-Feb-2017 11:34
L7B0343-04	A2 - 540 ft	Water	23-Feb-2017 17:00	27-Feb-2017 11:34

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A2 - 420 ft

Lab ID: L7B0343-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**258**		1.00	0.00	mg/L	1	2/28/17 8:47		SM 2510B
TDS, Total Dissolved Solids	**157**		5.00	1.78	mg/L	1	3/1/17 18:00		SM 2540C
Chloride	**2.66**		2.00	0.104	mg/L	1	2/28/17 13:02	16887-00-6	EPA 300.0

Sample: A2 - 460 ft

Lab ID: L7B0343-02

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**262**		1.00	0.00	mg/L	1	2/28/17 8:47		SM 2510B
TDS, Total Dissolved Solids	**150**		5.00	1.78	mg/L	1	3/2/17 14:40		SM 2540C
Chloride	**2.74**		2.00	0.104	mg/L	1	2/28/17 13:27	16887-00-6	EPA 300.0

Sample: A2 - 500 ft

Lab ID: L7B0343-03

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**263**		1.00	0.00	mg/L	1	2/28/17 8:47		SM 2510B
TDS, Total Dissolved Solids	**153**		5.00	1.78	mg/L	1	3/2/17 14:40		SM 2540C
Chloride	**2.76**		2.00	0.104	mg/L	1	2/28/17 13:39	16887-00-6	EPA 300.0

Sample: A2 - 540 ft

Lab ID: L7B0343-04

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**261**		1.00	0.00	mg/L	1	2/28/17 8:47		SM 2510B
TDS, Total Dissolved Solids	**151**		5.00	1.78	mg/L	1	3/2/17 14:40		SM 2540C
Chloride	**2.43**		2.00	0.104	mg/L	1	2/28/17 13:52	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

Sample Results

Client Sample ID: A2 - 420 ft
Lab Sample ID: L7B0343-01 (Water) **Sampled:2/22/17 16:00**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**2.66**		2.00	0.104	mg/L	1	2/28/17 9:16	2/28/17 13:02	16887-00-6
Conductance by Method 2510B									
Specific conductance	**258**		1.00	0.00	mg/L	1	2/24/17 8:20	2/28/17 8:47	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**157**		5.00	1.78	mg/L	1	2/28/17 18:00	3/1/17 18:00	

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

Sample Results
(Continued)

Client Sample ID: A2 - 460 ft
Lab Sample ID: L7B0343-02 (Water) **Sampled:2/23/17 10:25**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**2.74**		2.00	0.104	mg/L	1	2/28/17 9:16	2/28/17 13:27	16887-00-6
Conductance by Method 2510B									
Specific conductance	**262**		1.00	0.00	mg/L	1	2/24/17 8:20	2/28/17 8:47	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**150**		5.00	1.78	mg/L	1	3/2/17 14:40	3/2/17 14:40	

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

Sample Results
(Continued)

Client Sample ID: A2 - 500 ft
Lab Sample ID: L7B0343-03 (Water) **Sampled:2/23/17 14:17**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**2.76**		2.00	0.104	mg/L	1	2/28/17 9:16	2/28/17 13:39	16887-00-6
Conductance by Method 2510B									
Specific conductance	**263**		1.00	0.00	mg/L	1	2/24/17 8:20	2/28/17 8:47	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**153**		5.00	1.78	mg/L	1	3/2/17 14:40	3/2/17 14:40	

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

Sample Results
(Continued)

Client Sample ID: A2 - 540 ft
Lab Sample ID: L7B0343-04 (Water) **Sampled:2/23/17 17:00**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**2.43**		2.00	0.104	mg/L	1	2/28/17 9:16	2/28/17 13:52	16887-00-6
Conductance by Method 2510B									
Specific conductance	**261**		1.00	0.00	mg/L	1	2/24/17 8:20	2/28/17 8:47	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**151**		5.00	1.78	mg/L	1	3/2/17 14:40	3/2/17 14:40	

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7C0027											
Blank (B7C0027-BLK1)					Prepared & Analyzed: 2/28/2017						
Chloride	0.104	U	1.00	0.104	mg/L						
LCS (B7C0027-BS1)					Prepared & Analyzed: 2/28/2017						
Chloride	20.0		1.00	0.104	mg/L	20.0		100	90-110		
LCS Dup (B7C0027-BSD1)					Prepared & Analyzed: 2/28/2017						
Chloride	20.6		1.00	0.104	mg/L	20.0		103	90-110	3	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7C0190											
Blank (B7C0190-BLK1)					Prepared & Analyzed: 2/28/2017						
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
Blank (B7C0190-BLK2)					Prepared & Analyzed: 2/28/2017						
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7C0190-BS1)					Prepared & Analyzed: 2/28/2017						
TDS, Total Dissolved Solids	99.0	J	5.00	1.78	mg/L				80-120		
LCS (B7C0190-BS2)					Prepared & Analyzed: 2/28/2017						
TDS, Total Dissolved Solids	102	J	5.00	1.78	mg/L				80-120		
Duplicate (B7C0190-DUP1)		**Source: L7B0280-07**			Prepared & Analyzed: 2/28/2017						
TDS, Total Dissolved Solids	267		5.00	1.78	mg/L		267			0	20
Batch: B7C0194											
Blank (B7C0194-BLK1)					Prepared & Analyzed: 3/2/2017						
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7C0194-BS1)					Prepared & Analyzed: 3/2/2017						
TDS, Total Dissolved Solids	112		5.00	1.78	mg/L	100		112	80-120		
LCS (B7C0194-BS2)					Prepared & Analyzed: 3/2/2017						
TDS, Total Dissolved Solids	107		5.00	1.78	mg/L	100		107	80-120		
Duplicate (B7C0194-DUP1)		**Source: L7B0327-01**			Prepared & Analyzed: 3/2/2017						
TDS, Total Dissolved Solids	782		5.00	1.78	mg/L		784			0.3	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7B0420											
Blank (B7B0420-BLK1)					Prepared: 2/24/2017 Analyzed: 2/28/2017						
Specific conductance	1.00	U	1.00	1.00	mg/L						
Duplicate (B7B0420-DUP1)		**Source: L7B0299-01**			Prepared & Analyzed: 2/24/2017						
Specific conductance	2.65		1.00	1.00	mg/L		2.63			0.8	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	3/22/17 10:23

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	12/31/2017
483	NC CERTIFICATE	ANC	FTSL	12/31/2017
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE Renewal in Process	DOD	FTSL	11/30/2016
P330-07-00105	USDA CERTIFICATE	USDA	FTSA	

Notes and Definitions

Item	Definition
U	Compound was not detected.
Dry	Sample results reported on a dry weight basis.
I	Value estimated to be between the Laboratory Detection and Reporting Limit
J	QC Failure see Case Narrative
L	Concentration exceeds calibration range
N	Tentatively Identified Compound
Q	Hold time exceeded
V	Analyte equal to or above detection limit in the method blank
TNTC	Bacteria is present but Too Numerous To Count

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

Page _____ of _____

2505 N. Falkenburg Rd., Tampa, FL 33619 (813-620-2000) / 5675 New Tampa Hwy, Lakeland, FL 33815 (863-646-8526)
6017 Financial Drive, Norcross, GA 30071 (770-449-8800)

Company Name: Cardno
Address: 3905 Crescent Park Drive
Results Sent to: Michelle Leonard
Email address: michelle.leonard@cardno.com
Contact Phone #: 813-552-1616 Cell#: Same
Project Name (Site): A-2
Project Number (ID):
Regulatory Program: n/a

Receiver's Initials/Temp: _____ / 4.4°
Custody Seal(s): ___ Y N Lab Work Order # L7B0343
P.O.# (if required):
Field Comments / Lab Precautions:

Sampler(s): (signature)
Sampler(s): (printed)

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix (See below)	Composite	Grab	No. of Containers	Container Type:	Preservation Code:	SC	TDS	Chloride	Analysis Requested
1	A2-42ft	42ft	2/22/17 16:00	GW		✓	1			X	X	X	
2	A2-46ft	46ft	2/23/17 10:25	GW		✓	3			X	X	✓	
3	A2-50ft	50ft	2/23/17 14:17	GW		✓	3			X	X	X	
4	A2-54ft	54ft	2/23/17 17:00	GW		✓	3			X	X	✓	
5													
6													
7													
8													
9													
10													

1) Relinquished By: Date / Time 2/27/17 1134
2) Received By: Date / Time 2/27/17 1134
Delivered by: (Circle One)
Fed Ex / UPS / Courier / Lab Pickup / Hand / Other

3) Relinquished By: Date / Time
4) Received By: Date / Time

5) Relinquished By: Date / Time
6) Received By: Date / Time

Turnaround Time (business days)

___10 Days ; ___5-7 Days; ___3 Days
___2 Days ; ___1 Day; ___Same Day

Matrix Guide: (W=Water) (DW = Drinking Water) (GW = Groundwater) (SW = Surface Water) (L = Liquid) (O = Oil) (S = Soil) (SD = Solid) (SL = Sludge) (A = Air) (C = Air Cartridge)
Preservation: 1 = HCL 2 = HNO_3 3 = H_2SO_4 4 = NaOH + $NaAsO_2$ 5 = NaOH + ZnAc 6 = $Na_2S_2O_3$ 7 = DI Water & MeOH 8 = NaHSO4 & MeOH 9 = None 10 = NaHS04
Container Type: VC=Vial (Clear); VA =Vial (Amber); GC=Glass (Clear); GA=Glass (Amber); P=Plastic (HDPE); TB=Tedlar Bag; ES=EnCore Sampler; ZB=Ziploc Bag; O=Other

Analytical Report

L7C0082

Project

A-2

Project Number

[none]

April 12, 2017
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

1412 Tech Blvd
Tampa, FL 33619

Phone #: 813-620-2000
Website: www.ftsanalytical.com

April 12, 2017

Michelle Leonard
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

RE: A-2

We are reporting the results of the analyses performed on the samples recieved on 3/6/2017 under the project name referenced above and identified as the lab Work Order L7C0082. All results being reported under this Report apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontracted lab, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reporting using all other available quality control methods.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by FTS Analytical Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise agreed upon. The samples received, and described as recorded in Work Order L7C0082 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

We thank you for selecting FTS Analytical to serve your analytical needs. If you have any questions concerning this report, please do not hesitate to contact us at any time. We will be happy to help.

Sincerely,

Nancy Robertson
Project Manager

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L7C0082-01	A-2-620	Water	28-Feb-2017 10:11	06-Mar-2017 09:45
L7C0082-02	A-2-760	Water	28-Feb-2017 17:36	06-Mar-2017 09:45
L7C0082-03	A-2-900	Water	02-Mar-2017 16:15	06-Mar-2017 09:45
L7C0082-04	A-2-dev	Water	03-Mar-2017 08:33	06-Mar-2017 09:45

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-2-620

Lab ID: L7C0082-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**246**		1.00	0.00	mg/L	1	3/7/17 11:43		SM 2510B
TDS, Total Dissolved Solids	**170**		5.00	1.78	mg/L	1	3/7/17 16:50		SM 2540C
Chloride	**2.70**		2.00	0.104	mg/L	1	3/8/17 17:51	16887-00-6	EPA 300.0

Sample: A-2-760

Lab ID: L7C0082-02

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**284**		1.00	0.00	mg/L	1	3/7/17 11:43		SM 2510B
TDS, Total Dissolved Solids	**171**		5.00	1.78	mg/L	1	3/7/17 16:50		SM 2540C
Chloride	**4.31**		2.00	0.104	mg/L	1	3/8/17 18:04	16887-00-6	EPA 300.0

Sample: A-2-900

Lab ID: L7C0082-03

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**287**		1.00	0.00	mg/L	1	3/7/17 11:43		SM 2510B
TDS, Total Dissolved Solids	**186**		5.00	1.78	mg/L	1	3/9/17 16:00		SM 2540C
Chloride	**9.41**		2.00	0.104	mg/L	1	3/8/17 18:16	16887-00-6	EPA 300.0

Sample: A-2-dev

Lab ID: L7C0082-04

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**269**		1.00	0.00	mg/L	1	3/7/17 11:43		SM 2510B
TDS, Total Dissolved Solids	**217**		5.00	1.78	mg/L	1	3/9/17 16:00		SM 2540C
Chloride	**10.5**		2.00	0.104	mg/L	1	3/8/17 18:29	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

Sample Results

Client Sample ID: A-2-620
Lab Sample ID: L7C0082-01 (Water) **Sampled:2/28/17 10:11**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**2.70**		2.00	0.104	mg/L	1	3/8/17 7:51	3/8/17 17:51	16887-00-6
Conductance by Method 2510B									
Specific conductance	**246**		1.00	0.00	mg/L	1	3/7/17 11:41	3/7/17 11:43	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**170**		5.00	1.78	mg/L	1	3/7/17 16:50	3/7/17 16:50	

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

Sample Results
(Continued)

Client Sample ID: A-2-760
Lab Sample ID: L7C0082-02 (Water) **Sampled:2/28/17 17:36**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**4.31**		2.00	0.104	mg/L	1	3/8/17 7:51	3/8/17 18:04	16887-00-6
Conductance by Method 2510B									
Specific conductance	**284**		1.00	0.00	mg/L	1	3/7/17 11:41	3/7/17 11:43	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**171**		5.00	1.78	mg/L	1	3/7/17 16:50	3/7/17 16:50	

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

Sample Results
(Continued)

Client Sample ID: A-2-900
Lab Sample ID: L7C0082-03 (Water) **Sampled:3/2/17 16:15**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**9.41**		2.00	0.104	mg/L	1	3/8/17 7:51	3/8/17 18:16	16887-00-6
Conductance by Method 2510B									
Specific conductance	**287**		1.00	0.00	mg/L	1	3/7/17 11:41	3/7/17 11:43	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**186**		5.00	1.78	mg/L	1	3/9/17 16:00	3/9/17 16:00	

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

Sample Results
(Continued)

Client Sample ID: A-2-dev
Lab Sample ID: L7C0082-04 (Water) **Sampled:3/3/17 8:33**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**10.5**		2.00	0.104	mg/L	1	3/8/17 7:51	3/8/17 18:29	16887-00-6
Conductance by Method 2510B									
Specific conductance	**269**		1.00	0.00	mg/L	1	3/7/17 11:41	3/7/17 11:43	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**217**		5.00	1.78	mg/L	1	3/9/17 16:00	3/9/17 16:00	

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7C0201											
Blank (B7C0201-BLK1)						Prepared & Analyzed: 3/8/2017					
Chloride	0.104	U	2.00	0.104	mg/L						
LCS (B7C0201-BS1)						Prepared & Analyzed: 3/8/2017					
Chloride	21.8		2.00	0.104	mg/L	20.0		109	90-110		
LCS Dup (B7C0201-BSD1)						Prepared & Analyzed: 3/8/2017					
Chloride	20.7		2.00	0.104	mg/L	20.0		104	90-110	5	20
Duplicate (B7C0201-DUP1)		**Source: L7C0090-09**				Prepared & Analyzed: 3/8/2017					
Chloride	1.89	I	2.00	0.104	mg/L		1.88			0.7	20
Matrix Spike (B7C0201-MS1)		**Source: L7C0090-09**				Prepared & Analyzed: 3/8/2017					
Chloride	23.9		2.00	0.104	mg/L	20.0	1.88	110	80-120		
Matrix Spike Dup (B7C0201-MSD1)		**Source: L7C0090-09**				Prepared & Analyzed: 3/8/2017					
Chloride	23.8		2.00	0.104	mg/L	20.0	1.88	109	80-120	0.5	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7C0292											
Blank (B7C0292-BLK1)						Prepared & Analyzed: 3/7/2017					
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7C0292-BS1)						Prepared & Analyzed: 3/7/2017					
TDS, Total Dissolved Solids	102		5.00	1.78	mg/L	100		102	80-120		
LCS Dup (B7C0292-BSD1)						Prepared & Analyzed: 3/7/2017					
TDS, Total Dissolved Solids	101		5.00	1.78	mg/L	100		101	80-120	1	20
Duplicate (B7C0292-DUP1)		**Source: L7C0082-02**				Prepared & Analyzed: 3/7/2017					
TDS, Total Dissolved Solids	182		5.00	1.78	mg/L		171			6	20
Batch: B7C0387											
Blank (B7C0387-BLK1)						Prepared & Analyzed: 3/9/2017					
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7C0387-BS1)						Prepared & Analyzed: 3/9/2017					
TDS, Total Dissolved Solids	105		5.00	1.78	mg/L	100		105	80-120		
LCS Dup (B7C0387-BSD1)						Prepared & Analyzed: 3/9/2017					
TDS, Total Dissolved Solids	115		5.00	1.78	mg/L	100		115	80-120	9	20
Duplicate (B7C0387-DUP1)		**Source: L7C0047-01**				Prepared & Analyzed: 3/9/2017					
TDS, Total Dissolved Solids	404		5.00	1.78	mg/L		391			3	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7C0175											
Duplicate (B7C0175-DUP1)		**Source: L7C0082-01**			Prepared & Analyzed: 3/7/2017						
Specific conductance	248		1.00	0.00	mg/L		246			0.8	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	4/12/17 10:03

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	12/31/2017
483	NC CERTIFICATE	ANC	FTSL	12/31/2017
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE Renewal in Process	DOD	FTSL	11/30/2016
P330-07-00105	USDA CERTIFICATE	USDA	FTSA	

Notes and Definitions

Item	Definition
U	Compound was not detected.
Dry	Sample results reported on a dry weight basis.
I	Value estimated to be between the Laboratory Detection and Reporting Limit
J	QC Failure see Case Narrative
L	Concentration exceeds calibration range
N	Tentatively Identified Compound
Q	Hold time exceeded
V	Analyte equal to or above detection limit in the method blank
TNTC	Bacteria is present but Too Numerous To Count

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

1412 Tech Blvd, Tampa, FL 33619 (813-620-2000) / 5675 New Tampa Hwy, Lakeland, FL 33815 (863-646-8526)
6017 Financial Drive, Norcross, GA 30071 (770-449-8800)

Company Name: Cardno
Address: 3905 Crescent Park Drive Riverview 33578
Results Sent to: Michelle Leonard
Email address: Michelle.leonard@cardno.com
Contact Phone #: 813-257-0075 Cell#: 813-352-1626
Project Name (Site): A-2
Project Number (ID):
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: 3.6 / [illegible]
Custody Seal(s): Y N Lab Work Order # L7C0082
P.O.# (if required):
Field Comments / Lab Precautions:

Sampler(s): (signature)
Sampler(s): (printed) Michelle Leonard

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix	Composite	Grab	No. of Containers	TDS	SPC	Chlorides										Container Type
							Analysis Requested	P	P	P										
								9	9	9										Preservation Code
1	A-2-620	620	2/28/17 10:11	GW		√	3	1	1	1										
2	A-2-760	760	2/28/17 17:36	GW		√	3	1	1	1										
3	A-2-900	900	3/2/17 16:15	GW		√	3	1	1	1										
4	A-2-dev	n/a	3/3/17 8:33	GW		√	3	1	1	1										
5																				
6																				
7																				
8																				
9																				
10																				

1) Relinquished By:	Date / Time 3/6/17 9:45	2) Received By:	Date / Time 3/6/17 9:45
3) Relinquished By:	Date / Time	4) Received By:	Date / Time
5) Relinquished By:	Date / Time	6) Received By:	Date / Time

Delivered by: (Circle One)
Fed Ex / UPS / Courier / Lab Pickup / Hand / Other

MSA or FTS terms and conditions apply

Circle a Turnaround Time (business days)
STD TAT; 10 Days ; 5-7 Days; 3 Days
2 Days ; 1 Day; Same Day

Matrix Guide: (W=Water) (DW = Drinking Water) (GW = Groundwater) (SW = Surface Water) (L = Liquid) (O = Oil) (S = Soil) (SD = Solid) (SL = Sludge) (A = Air) (C = Air Cartridge)
Preservation: 1 = HCL 2 = HNO_3 3 = H_2SO_4 4 = NaOH + $NaAsO_2$ 5 = NaOH + ZnAc 6 = $Na_2S_2O_3$ 7 = DI Water & MeOH 8 = NaHSO4 & MeOH 9 = None 10 = NaHS04
Container Type: VC=Vial (Clear); VA =Vial (Amber); GC=Glass (Clear); GA=Glass (Amber); P=Plastic (HDPE); TB=Tedlar Bag; ES=EnCore Sampler; ZB=Ziploc Bag; O=Other

Analytical Report

L7C0184

Project

A-2 Oversight

Project Number

[none]

May 11, 2017
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

1412 Tech Blvd
Tampa, FL 33619

Phone #: 813-620-2000
Website: www.ftsanalytical.com

May 11, 2017

Michelle Leonard
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

RE: A-2 Oversight

We are reporting the results of the analyses performed on the samples recieved on 3/10/2017 under the project name referenced above and identified as the lab Work Order L7C0184. All results being reported under this Report apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontracted lab, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reporting using all other available quality control methods.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by FTS Analytical Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise agreed upon. The samples received, and described as recorded in Work Order L7C0184 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

We thank you for selecting FTS Analytical to serve your analytical needs. If you have any questions concerning this report, please do not hesitate to contact us at any time. We will be happy to help.

Sincerely,

Nancy Robertson
Project Manager

MWBE SDBE
NELAC DoD Accredited

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L7C0184-01	A2 350 gpm	Water	09-Mar-2017 10:50	10-Mar-2017 14:06
L7C0184-02	A2 550 gpm	Water	09-Mar-2017 11:50	10-Mar-2017 14:06
L7C0184-03	A2 750 gpm	Water	09-Mar-2017 12:50	10-Mar-2017 14:06
L7C0184-04	A2 950 gpm	Water	09-Mar-2017 13:50	10-Mar-2017 14:06

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Analysis Case Narrative

Method 300.0 Chloride

Sample A2 950 gpm was analyzed outside of hold time due to client request. The original data was incorrect due to autosampler not analyzing full sample volume. The sample is qualified with Q.

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A2 350 gpm

Lab ID: L7C0184-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**293**		1.00	0.00	mg/L	1	3/10/17 17:00		SM 2510B
TDS, Total Dissolved Solids	**190**		5.00	1.78	mg/L	1	3/16/17 16:00		SM 2540C
Chloride	**8.83**		2.00	0.104	mg/L	1	3/10/17 19:45	16887-00-6	EPA 300.0

Sample: A2 550 gpm

Lab ID: L7C0184-02

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**288**		1.00	0.00	mg/L	1	3/10/17 17:00		SM 2510B
TDS, Total Dissolved Solids	**164**		5.00	1.78	mg/L	1	3/16/17 16:00		SM 2540C
Chloride	**8.78**		2.00	0.104	mg/L	1	3/10/17 19:57	16887-00-6	EPA 300.0

Sample: A2 750 gpm

Lab ID: L7C0184-03

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**289**		1.00	0.00	mg/L	1	3/10/17 17:00		SM 2510B
TDS, Total Dissolved Solids	**188**		5.00	1.78	mg/L	1	3/16/17 16:00		SM 2540C
Chloride	**8.48**		2.00	0.104	mg/L	1	3/10/17 20:10	16887-00-6	EPA 300.0

Sample: A2 950 gpm

Lab ID: L7C0184-04

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**287**		1.00	0.00	mg/L	1	3/10/17 17:00		SM 2510B
TDS, Total Dissolved Solids	**177**		5.00	1.78	mg/L	1	3/16/17 16:00		SM 2540C
Chloride	**8.52**	Q	2.00	0.104	mg/L	1	5/10/17 10:45	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Sample Results

Client Sample ID: A2 350 gpm
Lab Sample ID: L7C0184-01 (Water) **Sampled:3/9/17 10:50**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**8.83**		2.00	0.104	mg/L	1	3/10/17 15:05	3/10/17 19:45	16887-00-6
Conductance by Method 2510B									
Specific conductance	**293**		1.00	0.00	mg/L	1	3/10/17 16:15	3/10/17 17:00	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**190**		5.00	1.78	mg/L	1	3/16/17 16:00	3/16/17 16:00	

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Sample Results
(Continued)

Client Sample ID: A2 550 gpm
Lab Sample ID: L7C0184-02 (Water) **Sampled:3/9/17 11:50**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**8.78**		2.00	0.104	mg/L	1	3/10/17 15:05	3/10/17 19:57	16887-00-6
Conductance by Method 2510B									
Specific conductance	**288**		1.00	0.00	mg/L	1	3/10/17 16:15	3/10/17 17:00	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**164**		5.00	1.78	mg/L	1	3/16/17 16:00	3/16/17 16:00	

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Sample Results
(Continued)

Client Sample ID: A2 750 gpm
Lab Sample ID: L7C0184-03 (Water) **Sampled:3/9/17 12:50**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**8.48**		2.00	0.104	mg/L	1	3/10/17 15:05	3/10/17 20:10	16887-00-6
Conductance by Method 2510B									
Specific conductance	**289**		1.00	0.00	mg/L	1	3/10/17 16:15	3/10/17 17:00	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**188**		5.00	1.78	mg/L	1	3/16/17 16:00	3/16/17 16:00	

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Sample Results
(Continued)

Client Sample ID: A2 950 gpm
Lab Sample ID: L7C0184-04 (Water) **Sampled:3/9/17 13:50**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**8.52**	Q	2.00	0.104	mg/L	1	5/10/17 7:30	5/10/17 10:45	16887-00-6
Conductance by Method 2510B									
Specific conductance	**287**		1.00	0.00	mg/L	1	3/10/17 16:15	3/10/17 17:00	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**177**		5.00	1.78	mg/L	1	3/16/17 16:00	3/16/17 16:00	

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7C0244											
Blank (B7C0244-BLK1)					Prepared & Analyzed: 3/10/2017						
Chloride	0.104	U	2.00	0.104	mg/L						
LCS (B7C0244-BS1)					Prepared & Analyzed: 3/10/2017						
Chloride	21.7		2.00	0.104	mg/L	20.0		109	90-110		
LCS Dup (B7C0244-BSD1)					Prepared & Analyzed: 3/10/2017						
Chloride	21.3		2.00	0.104	mg/L	20.0		107	90-110	2	20
Matrix Spike (B7C0244-MS1)		**Source: L7C0175-21**			Prepared & Analyzed: 3/10/2017						
Chloride	32.0		2.00	0.104	mg/L	20.0	14.5	87	80-120		
Matrix Spike Dup (B7C0244-MSD1)		**Source: L7C0175-21**			Prepared & Analyzed: 3/10/2017						
Chloride	31.9		2.00	0.104	mg/L	20.0	14.5	87	80-120	0.1	20
Batch: B7E0174											
Blank (B7E0174-BLK1)					Prepared: 5/10/2017 Analyzed: 10/5/2017						
Chloride	0.104	U	2.00	0.104	mg/L						
LCS (B7E0174-BS1)					Prepared: 5/10/2017 Analyzed: 10/5/2017						
Chloride	20.4		2.00	0.104	mg/L	20.0		102	90-110		
LCS Dup (B7E0174-BSD1)					Prepared: 5/10/2017 Analyzed: 10/5/2017						
Chloride	19.4		2.00	0.104	mg/L	20.0		97	90-110	5	20
Duplicate (B7E0174-DUP1)		**Source: L7E0119-01**			Prepared: 5/10/2017 Analyzed: 10/5/2017						
Chloride	11.6		2.00	0.104	mg/L		10.6			9	20

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Quality Control
(Continued)

Anions by Method 300.0 (Continued)

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7E0174 (Continued)											
Matrix Spike (B7E0174-MS1)		**Source: L7E0119-01**			Prepared: 5/10/2017		Analyzed: 10/5/2017				
Chloride	31.5		2.00	0.104	mg/L	20.0	10.6	104	80-120		
Matrix Spike Dup (B7E0174-MSD1)		**Source: L7E0119-01**			Prepared: 5/10/2017		Analyzed: 10/5/2017				
Chloride	32.1		2.00	0.104	mg/L	20.0	10.6	107	80-120	2	20

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7C0436											
Blank (B7C0436-BLK1)					Prepared & Analyzed: 3/16/2017						
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7C0436-BS1)					Prepared & Analyzed: 3/16/2017						
TDS, Total Dissolved Solids	100		5.00	1.78	mg/L	100		100	80-120		
LCS Dup (B7C0436-BSD1)					Prepared & Analyzed: 3/16/2017						
TDS, Total Dissolved Solids	109		5.00	1.78	mg/L	100		109	80-120	9	20
Duplicate (B7C0436-DUP1)		**Source: L7C0175-19**			Prepared & Analyzed: 3/16/2017						
TDS, Total Dissolved Solids	2890		5.00	1.78	mg/L		2840			2	20
Duplicate (B7C0436-DUP2)		**Source: L7C0184-01**			Prepared & Analyzed: 3/16/2017						
TDS, Total Dissolved Solids	190		5.00	1.78	mg/L		190			0	20

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7C0260											
Duplicate (B7C0260-DUP1)			**Source: L7C0184-01**			Prepared & Analyzed: 3/10/2017					
Specific conductance	295		1.00	0.00	mg/L		293			0.7	20

Cardno - Riverview	Project: A-2 Oversight	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	5/11/17 9:21

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	12/31/2017
483	NC CERTIFICATE	ANC	FTSL	12/31/2017
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE Renewal in Process	DOD	FTSL	11/30/2016
P330-07-00105	USDA CERTIFICATE	USDA	FTSA	

Notes and Definitions

Item	Definition
U	Compound was not detected.
Dry	Sample results reported on a dry weight basis.
I	Value estimated to be between the Laboratory Detection and Reporting Limit
J	QC Failure see Case Narrative
L	Concentration exceeds calibration range
N	Tentatively Identified Compound
Q	Hold time exceeded
V	Analyte equal to or above detection limit in the method blank
TNTC	Bacteria is present but Too Numerous To Count

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

1412 Tech Blvd, Tampa, FL 33619 (813-620-2000) / 5675 New Tampa Hwy, Lakeland, FL 33815 (863-646-8526)
6017 Financial Drive, Norcross, GA 30071 (770-449-8800)

Page _____ of _____

LTC0184

Company Name: Cardno
Address: 3905 Crescent Park Drive
Results Sent to: David P. Kelly
Email address: david.p.kelly@cardno.com
Contact Phone #: 813-664-4500 Cell#:
Project Name (Site): A2 Oversight
Project Number (ID):
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: 182 / EB
Custody Seal(s): Y N Lab Work Order #
P.O.# (if required):
Field Comments / Lab Precautions:

Sampler(s): (signature)
Sampler(s): (printed)

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix	Composite	Grab	No. of Containers	Analysis Requested: TDS	Chloride	SPC	Container Type	Preservation Code
1	A2 350gpm		3/1/17 at 10:50	GW		X	3	X	X	X		
2	A2 550gpm		3/9/17 11:50	GW		X	3	X	X	X		
3	A2 750gpm		3/9/17 12:50	GW		X	3	X	X	X		
4	A2 950gpm		3/9/17 13:50	GW		X	3	X	X	X		
5												
6												
7												
8												
9												
10												

1) Relinquished By: _____ Date / Time 3/9/17 14:06
2) Received By: _____ Date / Time 3/9/17 14:06
3) Relinquished By: _____ Date / Time
4) Received By: _____ Date / Time
5) Relinquished By: _____ Date / Time
6) Received By: _____ Date / Time

Delivered by: (Circle One)
Fed Ex / UPS / Courier / Lab Pickup / Hand / Other

MSA or FTS terms and conditions apply

Circle a Turnaround Time (business days)
STD TAT; 10 Days ; 5-7 Days; 3 Days
2 Days ; 1 Day; Same Day

Matrix Guide: (W=Water) (DW = Drinking Water) (GW = Groundwater) (SW = Surface Water) (L = Liquid) (O = Oil) (S = Soil) (SD = Solid) (SL = Sludge) (A = Air) (C = Air Cartridge)
Preservation: 1 = HCL 2 = HNO_3 3 = H_2SO_4 4 = NaOH + $NaAsO_2$ 5 = NaOH + ZnAc 6 = $Na_2S_2O_3$ 7 = DI Water & MeOH 8 = NaHSO4 & MeOH 9 = None 10 = NaHS04
Container Type: VC=Vial (Clear); VA =Vial (Amber); GC=Glass (Clear); GA=Glass (Amber); P=Plastic (HDPE); TB=Tedlar Bag; ES=EnCore Sampler; ZB=Ziploc Bag; O=Other

Analytical Report

L7D0248

Project

A-2

Project Number

[none]

April 27, 2017
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

1412 Tech Blvd
Tampa, FL 33619

Phone #: 813-620-2000
Website: www.ftsanalytical.com

April 27, 2017

David Kelly
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

RE: A-2

We are reporting the results of the analyses performed on the samples recieved on 4/13/2017 under the project name referenced above and identified as the lab Work Order L7D0248. All results being reported under this Report apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontracted lab, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reporting using all other available quality control methods.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by FTS Analytical Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise agreed upon. The samples received, and described as recorded in Work Order L7D0248 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

We thank you for selecting FTS Analytical to serve your analytical needs. If you have any questions concerning this report, please do not hesitate to contact us at any time. We will be happy to help.

Sincerely,

Nancy Robertson
Project Manager

MWBE SDBE
NELAC DoD Accredited

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L7D0248-01	A-2	Water	13-Apr-2017 00:00	13-Apr-2017 15:28

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Analysis Case Narrative

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-2

Lab ID: L7D0248-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**306**		1.00	0.00	mg/L	1	4/17/17 14:38		SM 2510B
TDS, Total Dissolved Solids	**180**		5.00	1.78	mg/L	1	4/19/17 14:05		SM 2540C
Chloride	**11.2**		2.00	0.104	mg/L	1	4/17/17 16:13	16887-00-6	EPA 300.0
Sulfate	**5.96**		2.00	0.168	mg/L	1	4/17/17 16:13	14808-79-8	EPA 300.0
Alkalinity, Total (as CaCO3)	**126**		2.00	0.500	mg/L	1	4/21/17 17:00		SM 2320B
pH	**7.99**		1.00	1.00	SU	1	4/14/17 14:10		SM 4500-H
Alkalinity, Bicarbonate (as CaCO3)	**125**		2.00	0.500	mg/L	1	4/21/17 17:00		SM 2320B
Calcium	**22200**		500	7.30	ug/L	1	4/18/17 16:56	7440-70-2	EPA 6010C
Iron	**16.2**	I	100	3.10	ug/L	1	4/18/17 16:56	7439-89-6	EPA 6010C
Magnesium	**14900**		500	5.40	ug/L	1	4/18/17 16:56	7439-95-4	EPA 6010C
Hardness, Total as (Ca + Mg)	**117000**		500	7.30	ug/L	1	4/18/17 16:56		EPA 6010C
Potassium	**2690**		500	2.20	ug/L	1	4/18/17 16:56	9/7/7440	EPA 6010C
Sodium	**13400**	JV	500	2.30	ug/L	1	4/18/17 16:56	7440-23-5	EPA 6010C

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Sample Results

Client Sample ID: A-2
Lab Sample ID: L7D0248-01 (Water) **Sampled:4/13/17 0:00**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Alkalinity, Total by Method 2320B									
Alkalinity, Total (as CaCO3)	**126**		2.00	0.500	mg/L	1	4/21/17 11:00	4/21/17 17:00	
Alkalinity, Bicarbonate (as CaCO3)	**125**		2.00	0.500	mg/L	1	4/21/17 11:00	4/21/17 17:00	
Anions by Method 300.0									
Chloride	**11.2**		2.00	0.104	mg/L	1	4/17/17 15:15	4/17/17 16:13	16887-00-6
Sulfate	**5.96**		2.00	0.168	mg/L	1	4/17/17 15:15	4/17/17 16:13	14808-79-8
Conductance by Method 2510B									
Specific conductance	**306**		1.00	0.00	mg/L	1	4/17/17 14:30	4/17/17 14:38	
pH by Method 4500-H+-B									
pH	**7.99**		1.00	1.00	SU	1	4/14/17 14:10	4/14/17 14:10	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**180**		5.00	1.78	mg/L	1	4/19/17 14:05	4/19/17 14:05	
Total Metal Analysis by Method 6010C									
Calcium	**22200**		500	7.30	ug/L	1	4/17/17 13:30	4/18/17 16:56	7440-70-2
Iron	**16.2**	I	100	3.10	ug/L	1	4/17/17 13:30	4/18/17 16:56	7439-89-6
Magnesium	**14900**		500	5.40	ug/L	1	4/17/17 12:30	4/18/17 16:56	7439-95-4
Hardness, Total as (Ca + Mg)	**117000**		500	7.30	ug/L	1	4/17/17 13:30	4/18/17 16:56	
Potassium	**2690**		500	2.20	ug/L	1	4/17/17 13:30	4/18/17 16:56	9/7/7440
Sodium	**13400**	JV	500	2.30	ug/L	1	4/17/17 13:30	4/18/17 16:56	7440-23-5
Turbidity by Method 180.1									
Turbidity	0.507	U	1.00	0.507	NTU	1	4/14/17 15:00	4/14/17 15:04	

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control

Total Metal Analysis by Method 6010C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0249											
Blank (B7D0249-BLK1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	7.30	U	500	7.30	ug/L						
LCS (B7D0249-BS1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	11100		500	7.30	ug/L	10000		111	80-120		
LCS Dup (B7D0249-BSD1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	11200		500	7.30	ug/L	10000		112	80-120	1	20
Duplicate (B7D0249-DUP1)		**Source: L7D0245-13**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	7510		500	7.30	ug/L		7580			1	20
Matrix Spike (B7D0249-MS1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	33300		500	7.30	ug/L	10000	22200	111	80-120		
Matrix Spike Dup (B7D0249-MSD1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	33500		500	7.30	ug/L	10000	22200	113	80-120	0.7	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Total Metal Analysis by Method 6010C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0249											
Blank (B7D0249-BLK1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	7.30	U	500	7.30	ug/L						
Magnesium	5.40	U	500	5.40	ug/L						
Hardness, Total as (Ca + Mg)	7.30	U	500	7.30	ug/L						
LCS (B7D0249-BS1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	11100		500	7.30	ug/L	10000		111	80-120		
Magnesium	10300		500	5.40	ug/L	10000		103	85-115		
LCS Dup (B7D0249-BSD1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	11200		500	7.30	ug/L	10000		112	80-120	1	20
Magnesium	10300		500	5.40	ug/L	10000		103	85-115	0.6	20
Duplicate (B7D0249-DUP1)		**Source: L7D0245-13**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	7510		500	7.30	ug/L		7580			1	20
Magnesium	1490		500	5.40	ug/L		1500			0.8	20
Hardness, Total as (Ca + Mg)	24900		500	7.30	ug/L		25200			1	200
Matrix Spike (B7D0249-MS1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	33300		500	7.30	ug/L	10000	22200	111	80-120		
Magnesium	24600		500	5.40	ug/L	10000	14900	97	85-115		
Matrix Spike Dup (B7D0249-MSD1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Calcium	33500		500	7.30	ug/L	10000	22200	113	80-120	0.7	20
Magnesium	24700		500	5.40	ug/L	10000	14900	98	85-115	0.7	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Total Metal Analysis by Method 6010C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0249											
Blank (B7D0249-BLK1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Potassium	2.20	U	500	2.20	ug/L						
LCS (B7D0249-BS1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Potassium	8100		500	2.20	ug/L	10000		81	80-120		
LCS Dup (B7D0249-BSD1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Potassium	8180		500	2.20	ug/L	10000		82	80-120	0.9	20
Duplicate (B7D0249-DUP1)		**Source: L7D0245-13**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Potassium	672		500	2.20	ug/L		684			2	20
Matrix Spike (B7D0249-MS1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Potassium	10900		500	2.20	ug/L	10000	2690	82	80-120		
Matrix Spike Dup (B7D0249-MSD1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Potassium	10900		500	2.20	ug/L	10000	2690	82	80-120	0.5	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Total Metal Analysis by Method 6010C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0249											
Blank (B7D0249-BLK1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Iron	3.10	U	100	3.10	ug/L						
LCS (B7D0249-BS1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Iron	10300		100	3.10	ug/L	10000		103	80-120		
LCS Dup (B7D0249-BSD1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Iron	10300		100	3.10	ug/L	10000		103	80-120	0.1	20
Duplicate (B7D0249-DUP1)		**Source: L7D0245-13**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Iron	855		100	3.10	ug/L		871			2	20
Matrix Spike (B7D0249-MS1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Iron	10300		100	3.10	ug/L	10000	16.2	103	80-120		
Matrix Spike Dup (B7D0249-MSD1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Iron	10300		100	3.10	ug/L	10000	16.2	103	80-120	0.3	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Total Metal Analysis by Method 6010C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0249											
Blank (B7D0249-BLK1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Magnesium	5.40	U	500	5.40	ug/L						
LCS (B7D0249-BS1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Magnesium	10300		500	5.40	ug/L	10000		103	80-120		
LCS Dup (B7D0249-BSD1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Magnesium	10300		500	5.40	ug/L	10000		103	80-120	0.6	20
Duplicate (B7D0249-DUP1)		**Source: L7D0245-13**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Magnesium	1490		500	5.40	ug/L		1500			0.8	20
Matrix Spike (B7D0249-MS1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Magnesium	24600		500	5.40	ug/L	10000	14900	97	80-120		
Matrix Spike Dup (B7D0249-MSD1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Magnesium	24700		500	5.40	ug/L	10000	14900	98	80-120	0.7	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Total Metal Analysis by Method 6010C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0249											
Blank (B7D0249-BLK1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Sodium	13.0	I	500	2.30	ug/L						
LCS (B7D0249-BS1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Sodium	8830		500	2.30	ug/L	10000		88	80-120		
LCS Dup (B7D0249-BSD1)					Prepared: 4/17/2017 Analyzed: 4/18/2017						
Sodium	8910		500	2.30	ug/L	10000		89	80-120	0.8	20
Duplicate (B7D0249-DUP1)		**Source: L7D0245-13**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Sodium	1580		500	2.30	ug/L		1560			1	20
Matrix Spike (B7D0249-MS1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Sodium	20800	J	500	2.30	ug/L	10000	13400	74	80-120		
Matrix Spike Dup (B7D0249-MSD1)		**Source: L7D0248-01**			Prepared: 4/17/2017 Analyzed: 4/18/2017						
Sodium	21100	J	500	2.30	ug/L	10000	13400	76	80-120	1	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Alkalinity, Total by Method 2320B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0424											
Blank (B7D0424-BLK1)					Prepared & Analyzed: 4/21/2017						
Alkalinity, Total (as CaCO3)	0.500	U	2.00	0.500	mg/L						
Alkalinity, Bicarbonate (as CaCO3)	0.500	U	2.00	0.500	mg/L						
LCS (B7D0424-BS1)					Prepared & Analyzed: 4/21/2017						
Alkalinity, Total (as CaCO3)	66.0		2.00	0.500	mg/L	69.0		96	90-110		
Alkalinity, Bicarbonate (as CaCO3)	0.500	UJ	2.00	0.500	mg/L	69.0			90-110		
LCS Dup (B7D0424-BSD1)					Prepared & Analyzed: 4/21/2017						
Alkalinity, Total (as CaCO3)	67.0		2.00	0.500	mg/L	69.0		97	90-110	2	20
Alkalinity, Bicarbonate (as CaCO3)	0.500	UJ	2.00	0.500	mg/L	69.0			90-110		20
Duplicate (B7D0424-DUP1)		**Source: L7D0248-01**			Prepared & Analyzed: 4/21/2017						
Alkalinity, Total (as CaCO3)	126		2.00	0.500	mg/L		126			0.3	20
Alkalinity, Bicarbonate (as CaCO3)	0.500	U	2.00	0.500	mg/L		125				20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0252											
Blank (B7D0252-BLK1)					Prepared & Analyzed: 4/17/2017						
Chloride	0.104	U	1.00	0.104	mg/L						
LCS (B7D0252-BS1)					Prepared & Analyzed: 4/17/2017						
Chloride	21.0		1.00	0.104	mg/L	20.0		105	90-110		
LCS Dup (B7D0252-BSD1)					Prepared & Analyzed: 4/17/2017						
Chloride	20.4		1.00	0.104	mg/L	20.0		102	90-110	3	20
Duplicate (B7D0252-DUP1)		**Source: L7D0248-01**			Prepared & Analyzed: 4/17/2017						
Chloride	11.2		1.00	0.104	mg/L		11.2			0.1	20
Matrix Spike (B7D0252-MS1)		**Source: L7D0245-13**			Prepared & Analyzed: 4/17/2017						
Chloride	34.5	J	1.00	0.104	mg/L	20.0	3.11	157	80-120		
Matrix Spike Dup (B7D0252-MSD1)		**Source: L7D0245-13**			Prepared & Analyzed: 4/17/2017						
Chloride	34.2	J	1.00	0.104	mg/L	20.0	3.11	156	80-120	0.7	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0252											
Blank (B7D0252-BLK1)					Prepared & Analyzed: 4/17/2017						
Sulfate	0.168	U	2.00	0.168	mg/L						
LCS (B7D0252-BS1)					Prepared & Analyzed: 4/17/2017						
Sulfate	20.5		2.00	0.168	mg/L	20.0		103	90-110		
LCS Dup (B7D0252-BSD1)					Prepared & Analyzed: 4/17/2017						
Sulfate	19.8		2.00	0.168	mg/L	20.0		99	90-110	3	20
Duplicate (B7D0252-DUP1)		**Source: L7D0248-01**			Prepared & Analyzed: 4/17/2017						
Sulfate	5.99		2.00	0.168	mg/L		5.96			0.6	20
Matrix Spike (B7D0252-MS1)		**Source: L7D0245-13**			Prepared & Analyzed: 4/17/2017						
Sulfate	27.0	J	2.00	0.168	mg/L	20.0	ND	135	80-120		
Matrix Spike Dup (B7D0252-MSD1)		**Source: L7D0245-13**			Prepared & Analyzed: 4/17/2017						
Sulfate	26.3	J	2.00	0.168	mg/L	20.0	ND	132	80-120	3	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Turbidity by Method 180.1

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0236											
Blank (B7D0236-BLK1)						Prepared & Analyzed: 4/14/2017					
Turbidity	0.507	U	1.00	0.507	NTU						
LCS (B7D0236-BS1)						Prepared & Analyzed: 4/14/2017					
Turbidity	195		1.00	0.507	NTU	200		98	80-120		
Duplicate (B7D0236-DUP1)		**Source: L7D0248-01**				Prepared & Analyzed: 4/14/2017					
Turbidity	0.507	U	1.00	0.507	NTU		ND				20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0368											
Blank (B7D0368-BLK1)						Prepared & Analyzed: 4/19/2017					
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7D0368-BS1)						Prepared & Analyzed: 4/19/2017					
TDS, Total Dissolved Solids	99.0		5.00	1.78	mg/L	100		99	80-120		
LCS Dup (B7D0368-BSD1)						Prepared & Analyzed: 4/19/2017					
TDS, Total Dissolved Solids	113		5.00	1.78	mg/L	100		113	80-120	13	20
Duplicate (B7D0368-DUP1)		**Source: L7D0247-01**				Prepared & Analyzed: 4/19/2017					
TDS, Total Dissolved Solids	271		5.00	1.78	mg/L		270			0.4	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

pH by Method 4500-H+-B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0237											
Duplicate (B7D0237-DUP1)		**Source: L7D0247-01**			Prepared & Analyzed: 4/14/2017						
pH	6.52		0.100	0.100	SU		6.53			0.2	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7D0264											
Duplicate (B7D0264-DUP1)		**Source: L7D0175-01**			Prepared & Analyzed: 4/17/2017						
Specific conductance	871		1.00	0.00	mg/L		868			0.3	20

Cardno - Riverview	Project: A-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	4/27/17 9:18

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	12/31/2017
483	NC CERTIFICATE	ANC	FTSL	12/31/2017
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE Renewal in Process	DOD	FTSL	11/30/2016
P330-07-00105	USDA CERTIFICATE	USDA	FTSA	

Notes and Definitions

Item	Definition
U	Compound was not detected.
Dry	Sample results reported on a dry weight basis.
I	Value estimated to be between the Laboratory Detection and Reporting Limit
J	QC Failure see Case Narrative
L	Concentration exceeds calibration range
N	Tentatively Identified Compound
Q	Hold time exceeded
V	Analyte equal to or above detection limit in the method blank
TNTC	Bacteria is present but Too Numerous To Count

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

1412 Tech Blvd., Tampa, FL 33619 (813-620-2000) / 5675 New Tampa Hwy, Lakeland, FL 33815 (863-646-8526)
6017 Financial Drive, Norcross, GA 30071 (770-449-8800)

Company Name: CARDNO
Address: 3905 CRESCENT PARK DRIVE
Results Sent to: DAVID KELLY
Email address: DAVID.P.KELLY@CARDNO.COM
Contact Phone #: 813-295-9507 Cell#: SAME
Project Name (Site): A-2
Project Number (ID): NWFWMD
Regulatory Program:
Sampler(s): (signature) [signature]
Sampler(s): (printed) DAVID KELLY

Receiver's Initials/Temp: [initials] / 3.0
Custody Seal(s): ___ Y N Lab Work Order # L7D0248
P.O.# (if required):
Field Comments / Lab Precautions:

Analysis Requested

Container Type:	SPC	pH	Turbidity									
Preservation Code:	No	—	—	HNO3					No	No	No	No
Analysis	SPCOND	PH	TURBIDITY	Ca	Mg	K	Fe	Tot Hard	HCO3	TDS	Cl	SO4

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix (See below)	Composite	Grab	No. of Containers
1	A-2	885 bls		GW		X	5
2							
3							
4							
5							
6							
7							
8							
9							
10							

1) Relinquished By: [signature] Date / Time 4/13/17 3:28pm
2) Received By: [signature] Date / Time 4/13/17 3:28
3) Relinquished By: Date / Time
4) Received By: Date / Time
5) Relinquished By: Date / Time
6) Received By: Date / Time

Delivered by: (Circle One)
Fed Ex / UPS / Courier / Lab Pickup / Hand / Other

Turnaround Time (business days)
___10 Days ; X 5-7 Days; ___3 Days
___2 Days ; ___1 Day; ___Same Day

Matrix Guide: (W=Water) (DW = Drinking Water) (GW = Groundwater) (SW = Surface Water) (L = Liquid) (O = Oil) (S = Soil) (SD = Solid) (SL = Sludge) (A = Air) (C = Air Cartridge)
Preservation: 1 = HCL 2 = HNO_3 3 = H_2SO_4 4 = NaOH + $NaAsO_2$ 5 = NaOH + ZnAc 6 = $Na_2S_2O_3$ 7 = DI Water & MeOH 8 = NaHSO4 & MeOH 9 = None 10 = NaHS04
Container Type: VC=Vial (Clear); VA =Vial (Amber); GC=Glass (Clear); GA=Glass (Amber); P=Plastic (HDPE); TB=Tedlar Bag; ES=EnCore Sampler; ZB=Ziploc Bag; O=Other