Region II Well Construction and Testing Report for Site A-4

Northwest Florida Water Management District

E213001409

Cardno
Shaping the Future

Document Information

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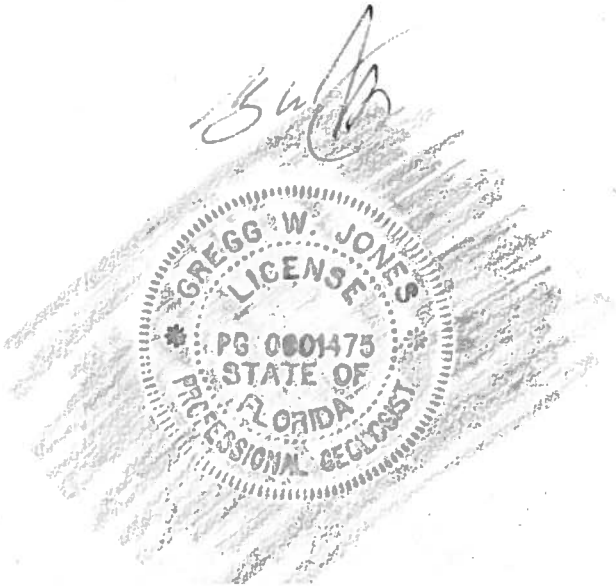

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Acronyms

APT	aquifer performance test
bls	below land surface
ft	foot
gpd	gallons per day
gpm	gallons per minute
ITB	invitation to bid
PVC	polyvinylchloride

1 Introduction

The Northwest Florida Water Management District (District) contracted Cardno to oversee exploratory drilling, construction, and testing activities at well site A-4 in support of development of minimum aquifer levels in the District's Planning Region II. The site is located in the Choctawhatchee River Water Management Area in southern Walton County along Black Creek Road (County Road 3280) and west of Smokehouse Lake Road (Figure 1-1). Site A-4 is on the edge of a tract of planted pine approximately 20 feet above sea level.

Three wells were drilled on site A-4 for long-term monitoring of water quality and water levels in the Floridan aquifer and for monitoring water levels during an onsite aquifer performance test (APT). All 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.

Prior to construction, the half-acre area surrounding the wells was cleared and prepared for heavy machinery with gravel roadway improvements out to County Road 3280. Initial site conditions were documented during a pre-construction onsite meeting between District representatives, Cardno staff, and the project manager and lead driller from Applied Drilling and Engineering, Inc. (Driller). Appendix A provides the photo documentation of the initial site visit by Cardno staff.

Final site conditions were documented during the final 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 observed.

Figure 1-1. Location Map for Site A-4

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 monitor wells. The most complete well log extended to a depth of 720 feet below land surface (bls) and was located 8.2 miles northwest in the city of Freeport in Walton County. Although Site A-4 formation samples were expected to be similar in appearance to the reference well's descriptions, depths of each unit were different because of regional geologic conditions. A general description of the regional hydrogeology based on the reference well is provide 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 190 feet bls.

2.3 Undifferentiated Floridan Aquifer

The Floridan aquifer consists of consolidated carbonate sequences that occur between 190 and 760 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 760 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-4 on August 3, 2016. The general construction sequence was as follows: surficial aquifer well (A-4b) was constructed first so it could be used as a water supply well for other well construction activities on site, followed by the long-term Floridan aquifer monitor well (A-4), which was followed by the APT Floridan aquifer monitor well (A-4a). The temporary design of well A-4 for use as the pumping well during the APT deviated from the original specifications and is described below. 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 is included as Appendix C.

3.2 Surficial Well (A-4b)

Drilling of A-4b by mud-rotary method commenced on August 8, 2016. A six-inch pilot hole was drilled to 145 feet bls and geophysical logs were run. Geophysical logs are discussed under Section 4.2. The borehole was back-plugged with cement to 70 feet bls.

A four-inch poly vinyl chloride (PVC) casing with ten feet of slotted screen and sand pack were installed to a depth of 60 feet bls and the well annulus was capped off with additional cement. The fine sand was approved as a substitute for the bentonite seal (as outlined in ITB) if the sand reached above 50 feet bls and was shown to be fully settled into the borehole. Additional fine sand was poured and tagged at 42 feet bls prior to cementing. The cement cap was tagged at ten feet bls and the rig was moved approximately 34 feet north to begin A-4. Drillers topped off cement to land surface without Cardno staff present.

The final construction was completed on November 16, 2016, with the delay resulting from use of the well as a temporary water supply to drill A-4 and A-4a. A-4b was completed approximately three feet above grade with an 8-inch, 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-4)

The drilling rig was set up over the flagged location of A-4 on August 16, 2016 and the pilot hole was advanced to 64 feet bls. An 18-inch steel pipe was set to 54 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. Another 12-inch steel pipe was installed as a primary surface casing to 146.5 feet and cemented in place. Once the cement plug was drilled out, the Driller cleared the drilling mud from the hole and prepared the rig to begin drilling by reverse-air.

An eight-inch pilot hole was drilled by reverse-air to approximately 156 feet bls where additional layers of clay were encountered. The drillers switched between mud-rotary and reverse-air through layers of poorly indurated limestone and clay/sandy clay until 220 feet bls. Once the formation cuttings showed the bit was in well indurated limestone, the rig was kept at reverse-air through the duration of drilling the pilot hole. Exploratory drilling continued beyond the proposed depth of 450 feet based on in-field water quality analysis that indicated the aquifer to be much fresher at depth than originally thought. The Floridan aquifer was fully penetrated and the Sub-Floridan aquifer was encountered at approximately 715 feet bls. On September

12, 2016, additional geophysical logs were run from the base of the 12-inch casing to total depth (see Section 4.2).

On September 14th a Step Drawdown Test was conducted on A-4 with the 12-inch steel casing and 573-ft open hole well design. The results of the Step Drawdown Test are discussed in Section 4.3. Subsequent to the step drawdown test, A-4 was back-plugged with sand and capped with a cement plug to 395 feet bls. This deviation from the original specifications allowed for a larger pumping well during the 72-hr APT and for the upper portion of the aquifer to be isolated from the lower portion. The rig was moved approximately 150 feet east to begin drilling APT monitor well A-4a on September 21, 2016.

Final drilling and construction of A-4 was resumed on October 24, 2016 with the drilling-out of the cement plug/sand and reaming of the borehole to 600 feet bls. The well was cased to 600 feet bls with 6-inch PVC on November 1, 2016 and four grouting events followed. After three grouting events, the cement was tagged at 222 feet bls and 30 bags of gravel and two bags of sand were added to fill the known void in that interval. On November 9, 2016 the final reaming to a total depth of 700 feet bls and development were completed. On November 16, 2016, A-4 was completed approximately three feet above grade with a 12-inch 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).

3.4 APT Floridan Monitor (A-4a)

Although Cardno was not present to oversee initial drilling of A-4a, the Driller supplied daily reports from which the following information was taken. Drilling commenced on September 22, 2016. A 12-inch steel surface casing was set and cemented to 63 feet bls. A 6-inch PVC casing was set and cemented to 200 feet bls. The borehole was advanced to a total depth of 385 feet bls. On November 16, 2016, A-4a was completed approximately three feet above grade with a 12-inch 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. The lithology log for well A-4b describes the samples from land surface to 145 feet bls. The lithology log for well A-4 contains sample descriptions through 720 feet bls. Due to the close proximity of wells A-4 and A-4b their lithologic descriptions were combined into one log presented in Appendix E. 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-4

Depth Range (feet bls)	Lithology
0-70	sand
70-150	clay/limestone
150-200	sand/clay
200-360	limestone
360-390	shell
390-490	clay/limestone
490-520	shell/limestone
520-715	limestone
715-720 (TD)	sand

4.2 Geophysical Logging

Geophysical logging was performed on well A-4b during initial exploratory drilling. Advanced Borehole Services ran natural gamma ray, caliper, spontaneous potential, electrical resistivity, and dual induction logs on August 8, 2016. A District representative was on site during additional logging of well A-4 on September 12, 2016 which included logs for natural gamma ray, caliper, spontaneous potential, electrical resistivity, static water quality, pumping water quality, and borehole-compensated sonic/density.

Not all proposed geophysical logs were run. A large cavity between 220 and 250 feet bls created unstable borehole conditions which made logging over this interval difficult. Raveling borehole material posed a threat to the logging tools which were at risk of being stuck. As a result the static and pumping flow logs and the dual induction logs were not run.

The geophysical logs were used in conjunction with lithologic and water quality sampling results to determine temporary well construction for the step drawdown and 72-hr aquifer tests, as well as the final well construction for long term monitoring. Copies of the geophysical logs are provided in Appendix D.

4.3 Step Drawdown Test

The Driller performed the step drawdown test on September 14, 2016 using pressure transducers on wells A-4 and A-4b and a barometric logger. As indicated, A-4 was completed with 147 feet of 12-in steel casing and 573 feet of open hole. 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 84 feet of four-inch pipe in the casing. The discharge from the pump was monitored with a totalizing flow meter.

The step drawdown test consisted of four pumping rates at one hour each. The specific capacity of the well was calculated for each step using the equation Q/s; where "Q" is the discharge rate in gallons per minute (gpm) and "s" is the measured drawdown in feet. Specific capacity values of 263, 244, 229 and 213 gpm/foot were calculated for pumping rates of 500, 600, 700 and 800 gpm, respectively. The step test results are tabulated in Table 4-2. Graphic results of the step drawdown test are provided as Appendix F.

Table 4-2. Summary of Step Test Results

Step Number	Drawdown (feet)	Pumping Rate (gpm)	Specific Capacity (gpm/foot)
1	1.90	500	263
2	2.46	600	244
3	3.06	700	229
4	3.75	800	213

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. Laboratory samples were collected to verify field parameters at some but not all of the same depths. Field chloride measurements showed that no changes in the chloride profile that would indicate contact with the saltwater-freshwater interface were found during drilling. Laboratory results, provided as Appendix G, confirm that the Upper Floridan aquifer is mostly fresh throughout.

During final well construction the upper Floridan aquifer was cased-off and the lower Floridan aquifer was reamed out to total depth. Water quality screening during reaming suggests that some of the produced water during initial exploratory drilling was likely coming from intervals above the bit depth; specifically the upper, more productive portion of the aquifer. Once the final casing was installed to 600 feet bls, the deepest producing zone, which occurred between 600 feet and 700 feet bls, was isolated. This resulted in final water quality of 789 mg/L of chlorides in the borehole of well A-4 at the end of final well development. This was not unexpected but it did show an increase in chlorides not evident during exploratory drilling.

Water quality samples were collected at the end of the step drawdown test and 72-hr APT. Field parameters were run for these samples in addition to collecting laboratory samples to confirm field results. A total of 17 samples were collected for laboratory analysis and all but two were processed.

Table 4-3. Drill Stem Water Quality Screening during Exploratory Drilling

Sample ID	Depth (ft)	Field Results				Laboratory Results		
		Temperature (°C)	pH	Specific Conductance (uS/cm)	Chloride (mg/L)	Specific Conductance (uS/cm)	Total Dissolved Solids (mg/L)	Chloride (mg/L)
A-4-1	240	22.7	7.4	172.3	23	184	94	8.48
	260	22.8	7.2	165.5	19.5			
	280	22.7	7.2	162.2	19.5			
	300	22.6		170.5	24.5			
A-4-2	320	22.8		156.8	20	176	86	8.82
	340	22.7		158.8	40			

Sample ID	Depth (ft)	Field Results				Laboratory Results		
		Temperature (°C)	pH	Specific Conductance (uS/cm)	Chloride (mg/L)	Specific Conductance (uS/cm)	Total Dissolved Solids (mg/L)	Chloride (mg/L)
	360	22.7		160.3	47.5			
A-4-3	360	22.4		163.2	55	178	72	17.6
	380	22.5		166.2	60.5			
A-4-4	400	22.6		165.9	73	181	66	6.89
A-4-5*	420	22.7		160.8	79.5			
A-4-6	440	22.6	6.4	164.6	82.5	183	78	6.74
A-4-7*	460	22.5		165.6	94.5			
	480	22.8		159.1	96			
	500	22.5		159.4	95			
A-4-8	520	22.6		161.2	102.5	179	98	7.43
	540	22.5		164.6	115			
A-4-9	560	22.4		166.5	125	179	98	7.16
	580	22.5		165.8	130			
A-4-10	600	22.6		161.4	140	187	112	7.3
	620	22.8		156.6	145.5			
A-4-11	640	22.5		163.5	157.5	187	110	7.12
	660	22.9		163.6	180			
A-4-12	680	22.7		164.3	210	189	94	7.18
	700	22.8		164.4	212.5			
A-4-13	720	22.6	7.4	165.6	225	189	110	7.11

*sample not processed by lab

Table 4-3. Borehole Water Quality at End of Step Test and APT

Sample ID	Depth Interval (ft)	Field Results				Laboratory Results		
		Temperature (°C)	pH	Spec Cond (uS/cm)	Chloride (mg/L)	Spec Cond (uS/cm)	TDS	Chloride (mg/L)
A-4-14	145-720						62	7.69
A-4-15	145-395	21.5		182.0	165	154	68	8.55
A-4-16	145-395	21.1		168.1		150	70	7.12

Table 4-3. Borehole Water Quality at End of Final Well Development

Sample ID	Depth Interval (ft)	Field Results				Laboratory Results		
		Temperature (°C)	pH	Spec Cond (uS/cm)	Chloride (mg/L)	Spec Cond (uS/cm)	TDS	Chloride (mg/L)
A-4-17	600-700	21.5		6,220	560	6010	3100	789

5 Aquifer Performance Testing

A constant-rate APT was performed at site A-4 to determine hydraulic coefficients of the Floridan aquifer.

5.1 Methodology

The APT was designed to provide a high level of pumping stress on the aquifer. The well network designed for the APT includes three wells, two completed in the Floridan aquifer and one completed in the surficial aquifer. The Floridan monitor well (A-4a) is located 149 feet east of the primary pumping well (A-4) and monitored the interval between 200 feet and 385 feet bls. The surficial well (A-4b) is located 33.5 feet south of well A-4 and monitored the interval between 50 feet and 60 feet bls. Well A-4 was pumped from the interval between 147 feet and 395 feet bls.

A 72-hour constant rate APT was planned and began on October 17, 2016 but was stopped after less than 22 hours because the flow rate dropped below an acceptable range. Water levels recovered and data loggers were reset prior to initiation of the full APT on October 18, 2016. One previous attempt to conduct the APT occurred on October 11, 2016 but it was shut down due to equipment issues. The throttle body on the pump motor was not responding to the toggle button so it was zip-tied open. After only 77 minutes, the pump motor overheated and shut down abruptly.

The full APT duration was 66 hours and started on October 18, 2016 at 4:14 p.m. with a pumping rate of 1,200 gpm using a 50-horsepower John Deere Quiet Flow centrifugal pump. The potentiometric changes in the pumping well and the two observation wells were measured using “non-vented” pressure transducers before, during and after the tests. The non-vented transducers require barometric compensation, therefore two barometric transducers were also deployed. The frequency of measurements for the APT ranged between one second and five minutes during the test. Table 5-1 below shows the programmed schedule for the loggers. Two loggers (one primary and one backup) were deployed at each well.

Table 5-1. Programmed Schedule of Data Loggers

Frequency		Duration
1 second	for	3 hours
10 seconds	for	2 hours
60 seconds	for	20 hours
5 minutes	for	80 hours

A representative for the Driller was present on site during the overnight hours to collect manual field readings to verify data logger readings. A Cardno representative collected manual field readings during daylight hours. Prior to cutting power to the pump, the data loggers were retrieved, reset, and deployed to collect five days of recovery data. The APT was terminated at 10:14 a.m. on October 21, 2016.

No rainfall events occurred during the APT or during the pre- and post-test background data collection seven days before and after the APT. Only trace amounts (less than a tenth of an inch) of rainfall were recorded at the Ponce de Leon Emerald Coast Middle School Weather STEM (KFLSANTA7) on October 15th, 19th, 21st, and 28th. The discharge water was diverted using 400 feet of flat hose to the nearby wooded area. The drainage in the wooded area flows downgradient towards the Choctawhatchee River floodplain. No issues with leaks or overflows that would affect surficial aquifer water levels were recorded during the APT.

5.2 Results

A straight line analysis was performed on the APT data to help identify where on the Theis curve the data lie and where the curve breaks due to leakance. The data show a slight "wobble" which makes the curve matching imprecise. The leaky analytical methods (Hantush, and Hantush Jacobs) yield very similar transmissivity to the Theis analysis because there is very little leakance. Background data collected before and after the APT did not suggest that any corrections for environmental or meteorological events were necessary.

Results from the analyses indicate that the transmissivity of the Floridan aquifer is about 680,000 gallons per day per foot (gpd/ft) (or 90,909 ft^2/day) and the calculated storage of the aquifer is about 1.01×10^{-3}. A rough estimate of transmissivity from specific capacity yields about 500,000 gpd/ft (or 66,845 ft^2/day) so these results are well within an order of magnitude. The pumping rate was not high enough to see a response in well A-4b during the course of the 66-hour test, so the leakance could not be estimated. A graphic representing the APT results is provided in Appendix H.

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APPENDIX A

PRE-CONSTRUCTION PHOTO DOCUMENTATION


Deep APT monitor well location (A-4a), facing north.


Deep APT monitor well location (A-4a), facing west.


Shallow APT monitor well location (A-4b), facing west.


Shallow APT monitor well location (A-4B), facing north.

Generator number 758993 already mobed on site.


Empty water tanks already mobed on site.

Backhoe number 435534 already mobed on site.


South side of improved lime rock access road.

Date Photos Taken: Aug 2, 2016 Photographer: M. Leonard Compiler: M. Leonard

Mud machine and pump on trailer being mobed on site.

Length of improved lime rock road, facing north toward CR 3280.

Deep MFL monitor well location (A-4), facing west.

Deep MFL monitor well location (A-4), facing north.

Small depressional feature between A-4 and A-4a, flagging indicates edge.

Private property adjacent to site, flagged with pink tape, facing northeast.

Private property adjacent to site, flagged with pink tape, continued to the right from previous photo.

Private property adjacent to site, flagged with pink tape, continued to the right from previous photo.

Access gate and lime rock road to site from CR 3280, facing north.

Western gate post along access road to site.

Eastern gate post along access road to site.

Overall condition of access gate and adjacent area, facing south from CR 3280.

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APPENDIX B

POST-CONSTRUCTION PHOTO DOCUMENTATION

Site A-4 gate, facing south.

Portion of improved gravel road with A-4 and A-4b in background, facing south.

Close view of completed A-4 well, facing south.

Close view of completed A-4b well, facing south.

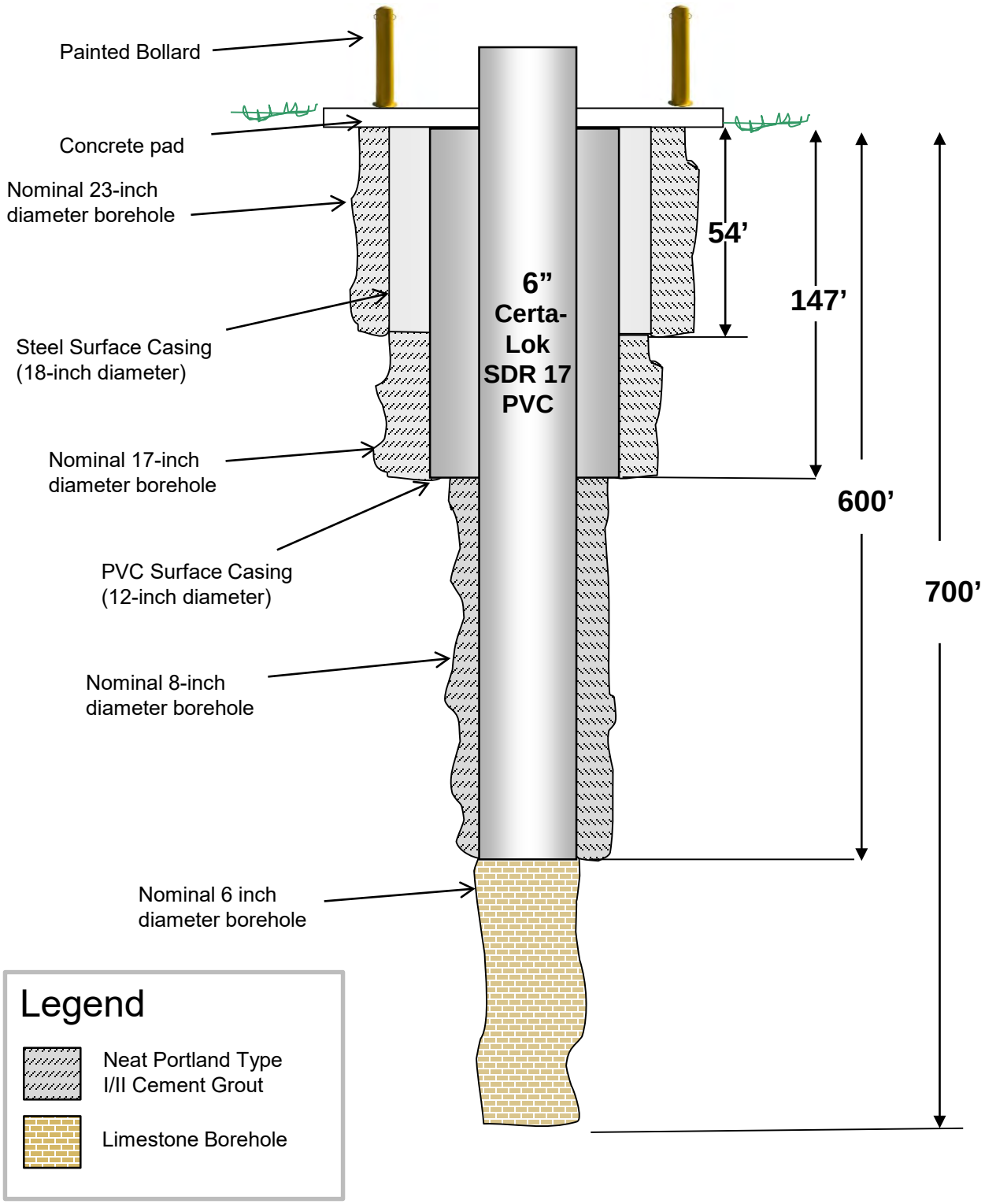
Date Photos Taken: Nov 30, 2016 Photographer: D. Kelly Compiler: M. Leonard

 View across site, facing east.	 Close view of completed A-4a well, facing east.

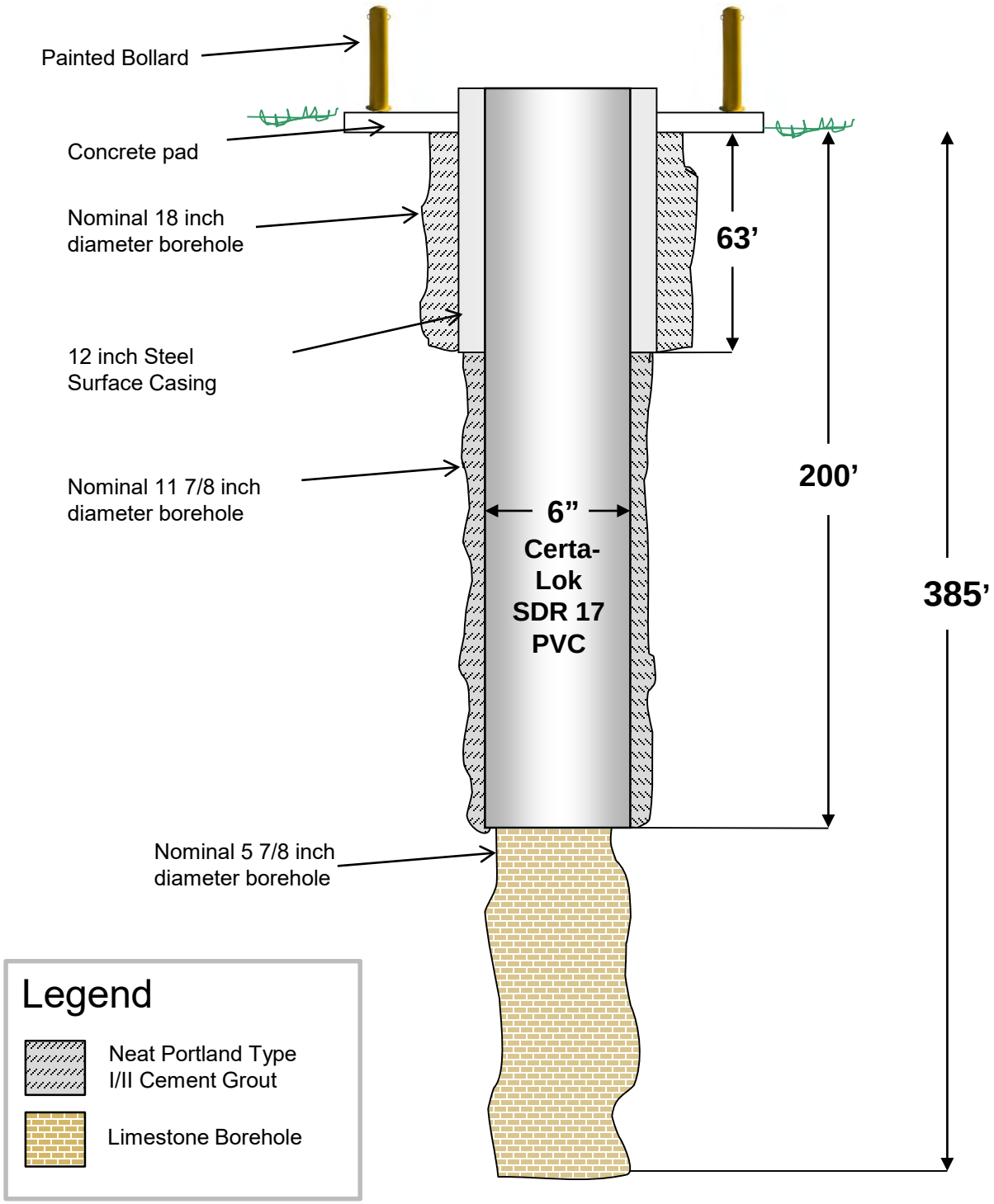
Region II Well Construction and Testing Report for Site A-4

APPENDIX C

AS-BUILT DRAWING OF WELLS

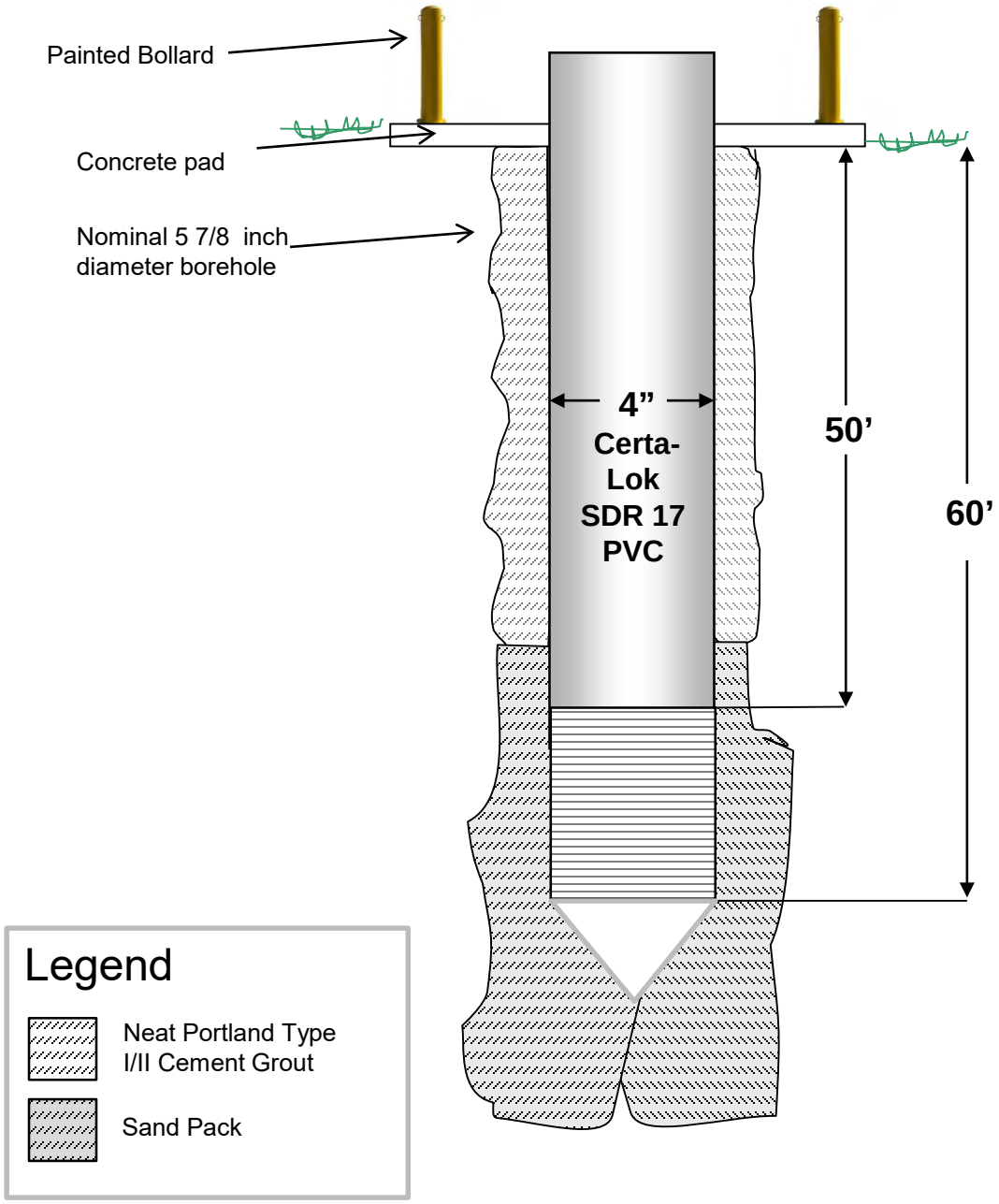


As-Built Well Schematic
A-4: Choctawhatchee WMA
Walton County, Florida



As-Built Well Schematic
A-4a: Choctawhatchee WMA

Walton County, Florida



As-Built Well Schematic
A-4b: Choctawhatchee WMA

Walton County, Florida

Region II Well Construction and Testing Report for Site A-4

APPENDIX D

GEOPHYSICAL LOGS

ABS

Advanced Borehole Services

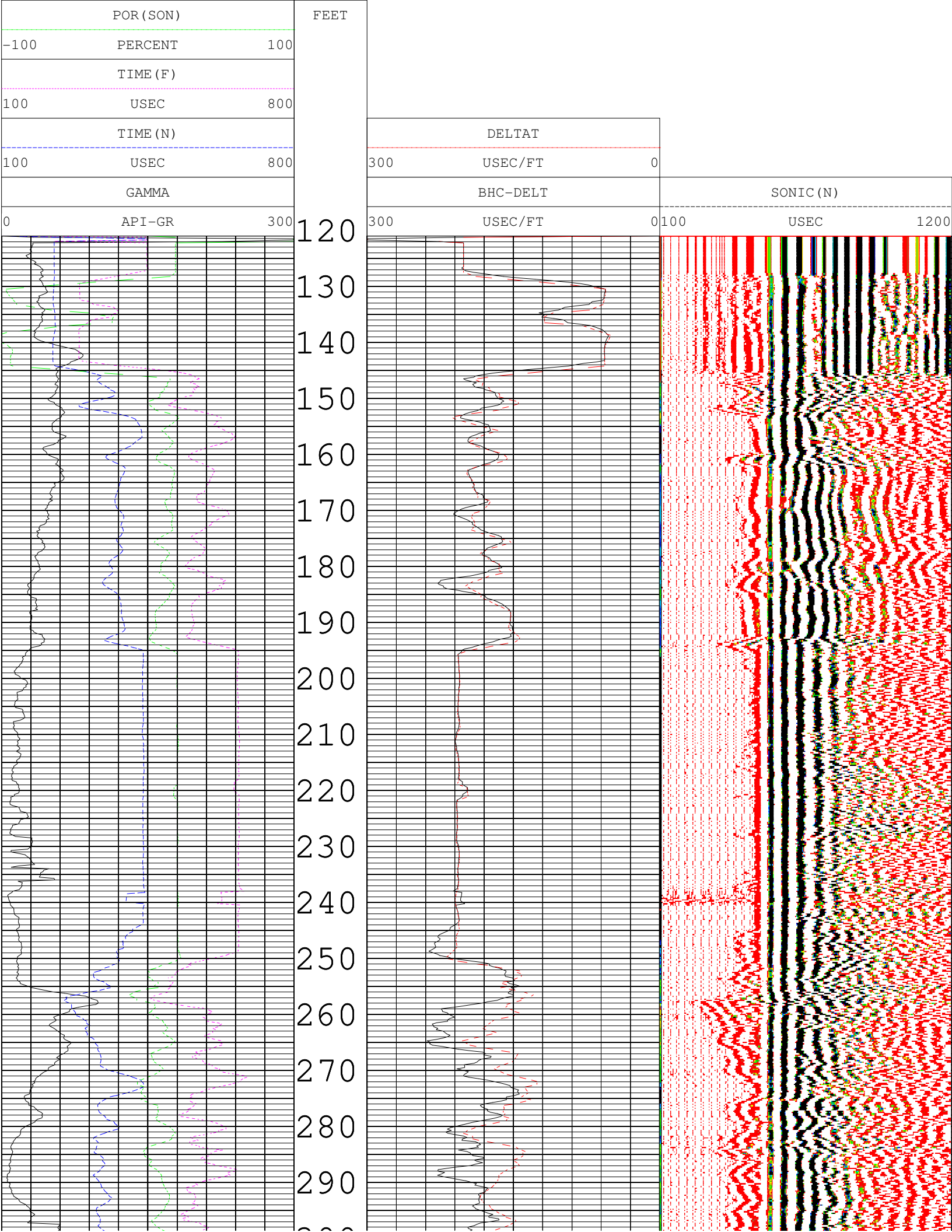
FULL WAVE BHC ACOUSTIC-VDL

WELL A-4

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL A-4	EICHLER
FIELD	: BRUCE	DIL
COUNTY	: WALTON	BHCAVL
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	: 09/12/16
DEPTH DRILLER	: 720
BIT SIZE	: 7.8
LOG TOP	: 121.00
LOG BOTTOM	: 718.25
CASING OD	:
CASING BOTTOM	: 147
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
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PERCENT
100
TIME(F)
100
USEC
800
TIME(N)
100
USEC
800
DELTAT
300
USEC/FT
0
GAMMA
BHC-DELT
SONIC(N)
0
API-GR
300
300
USEC/FT
0
100
USEC
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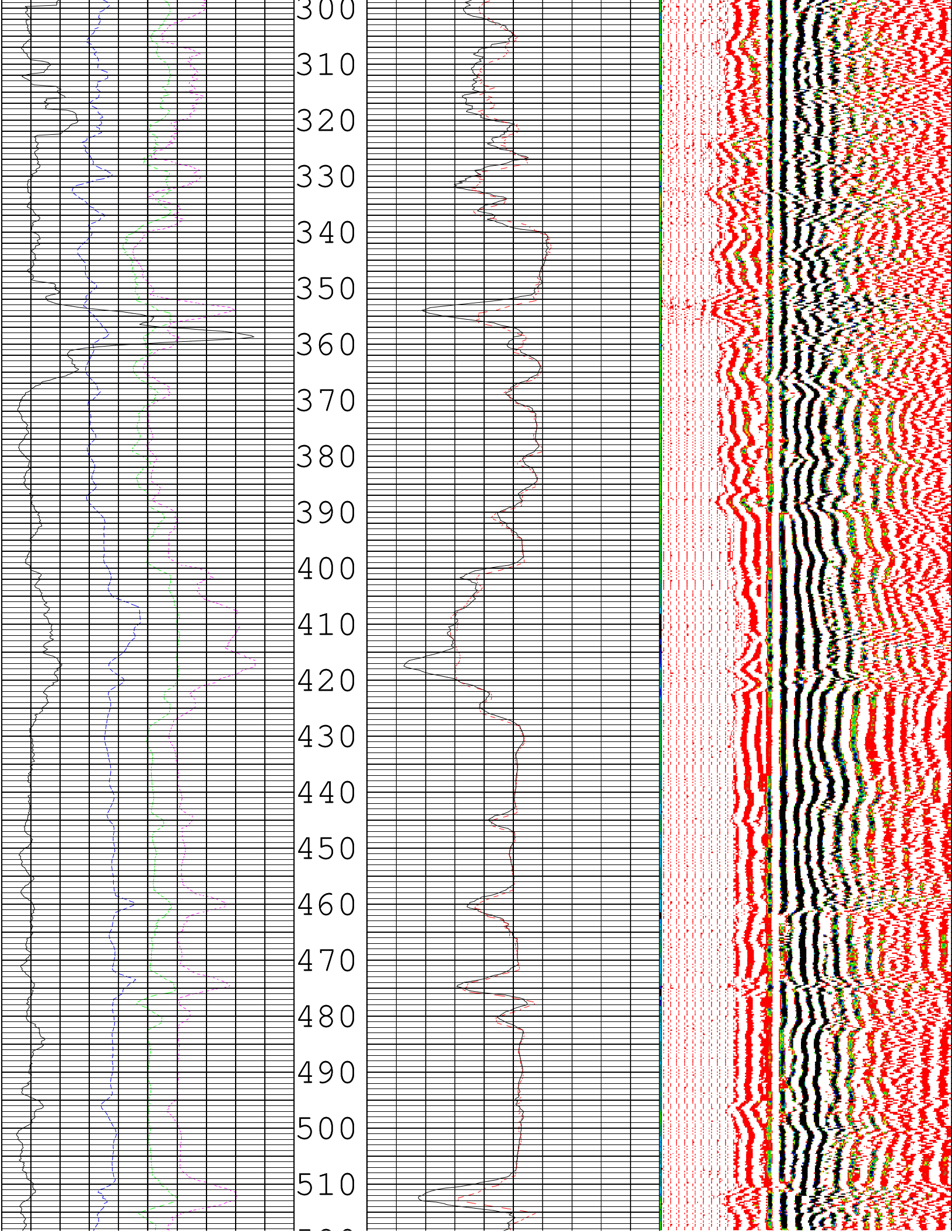
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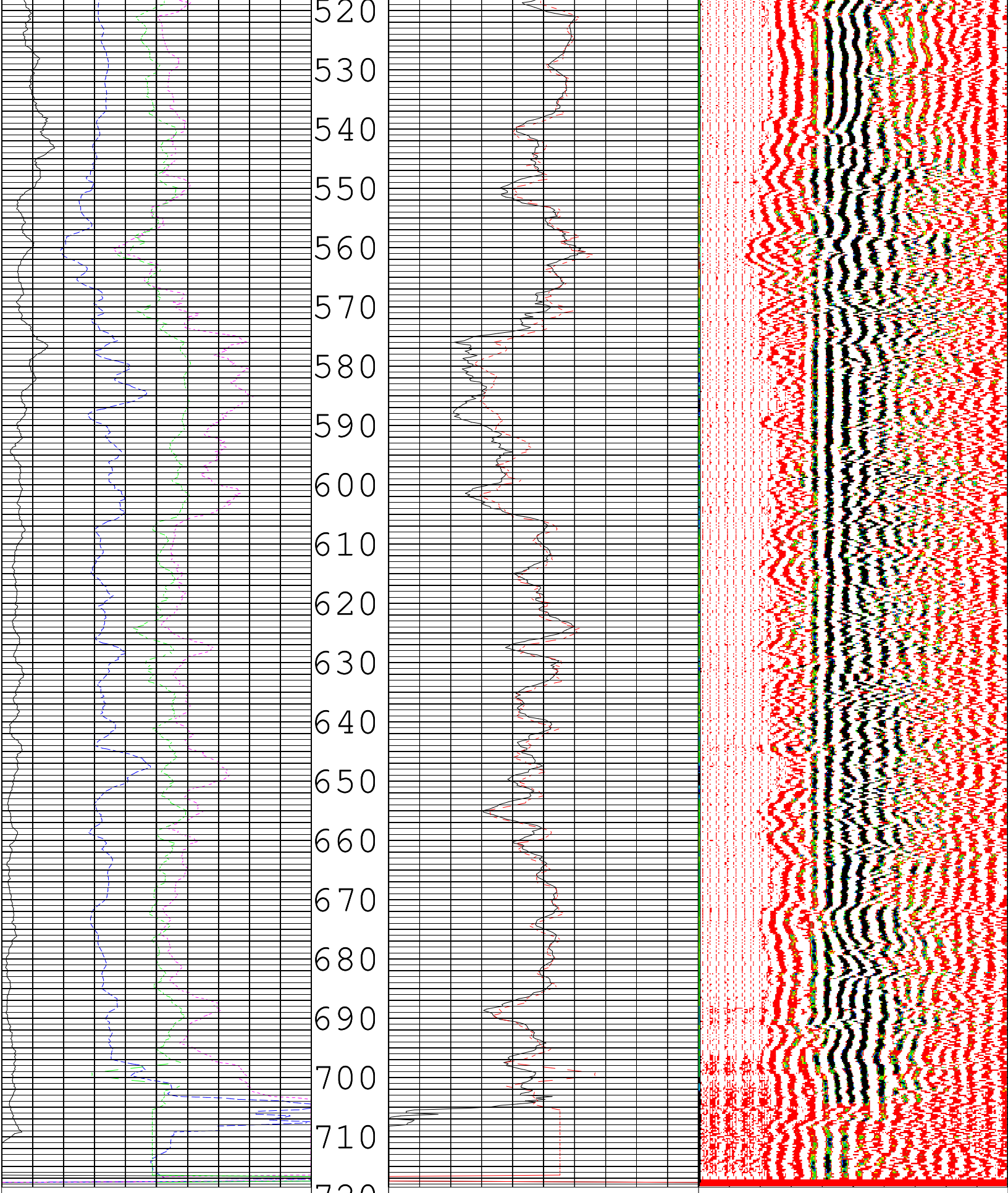


0	API-GR	300	300	USEC/FT	0	100	USEC	1200
GAMMA			BHC-DELT			SONIC(N)		
100	USEC	800	300	USEC/FT	0			
TIME(N)			DELTAT					

100	USEC	800	
	TIME(F)		
-100	PERCENT	100	
	POR(SON)		FEET

TOOL CALIBRATION WELL A-4 09/12/16 20:02
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

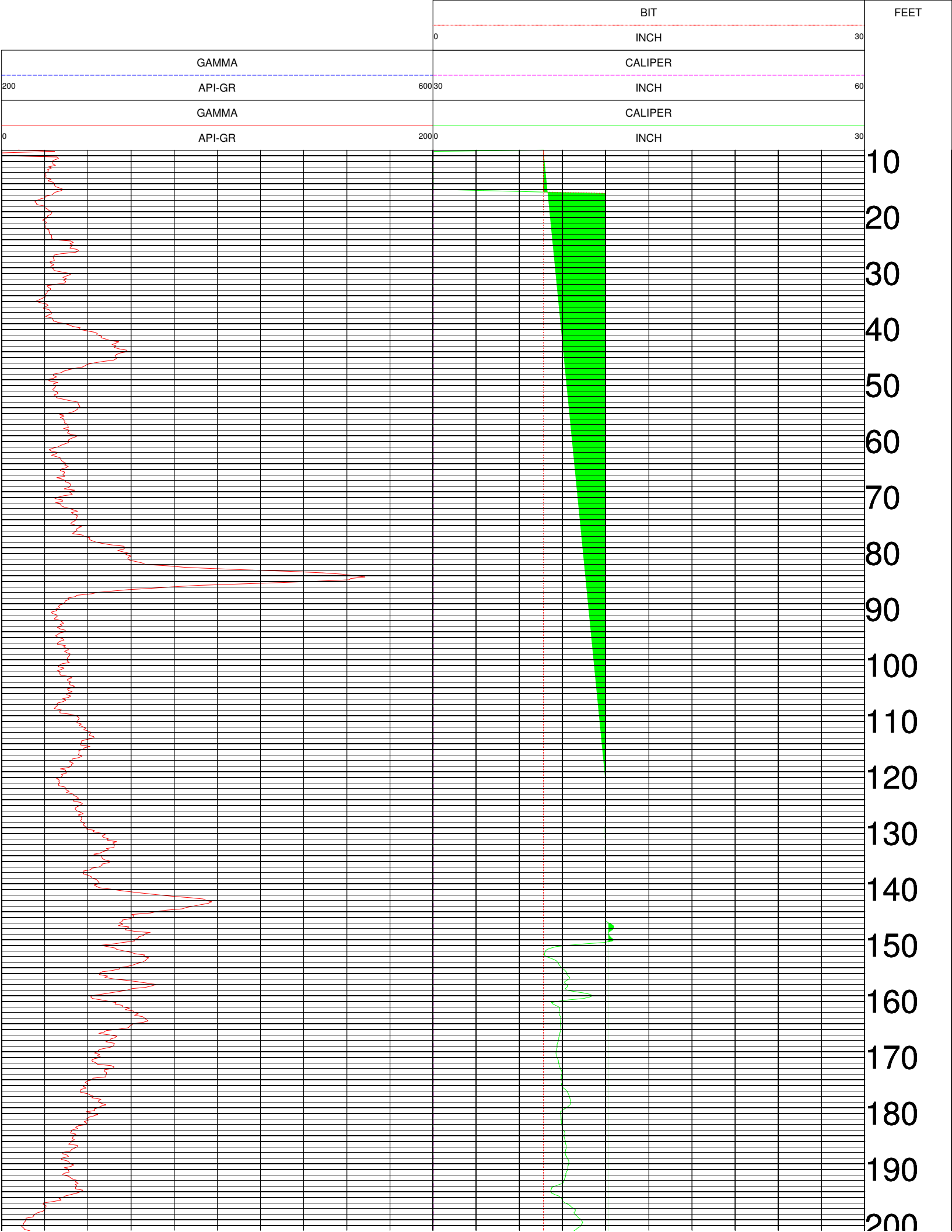
Advanced Borehole Services

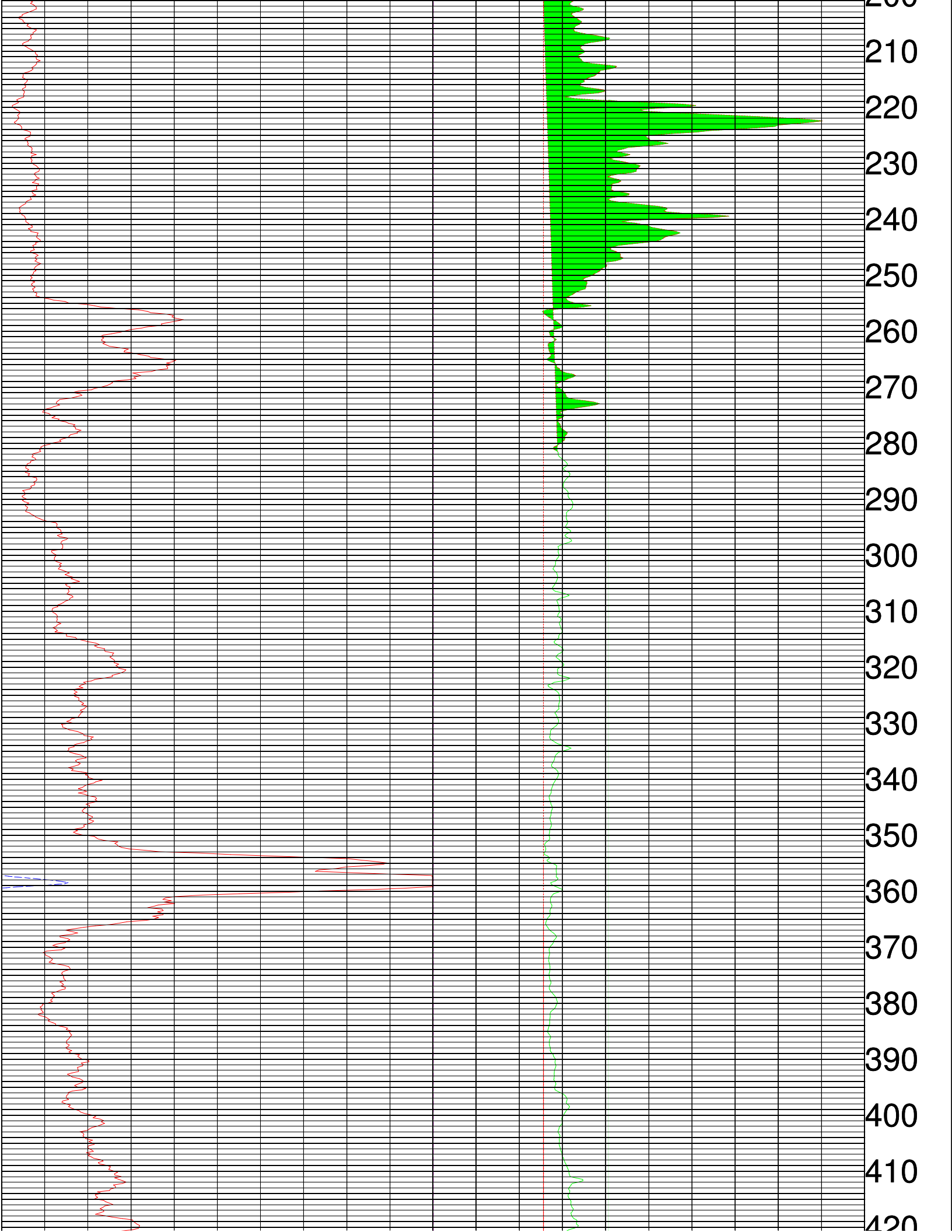
GAMMA RAY (API)-CALIPER

WELL A-4

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL A-4	EICHLER
FIELD	: BRUCE	DIL
COUNTY	: WALTON	BHCAVL
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	: 09/12/16		
DEPTH DRILLER	: 720		
BIT SIZE	: 7.8		
LOG TOP	: 8.00		
LOG BOTTOM	: 720.25		
CASING OD	:		
CASING BOTTOM	: 147		
CASING TYPE	: STEEL		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
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
130
140
150
160
170
180
190
200


210
220
230
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270
280
290
300
310
320
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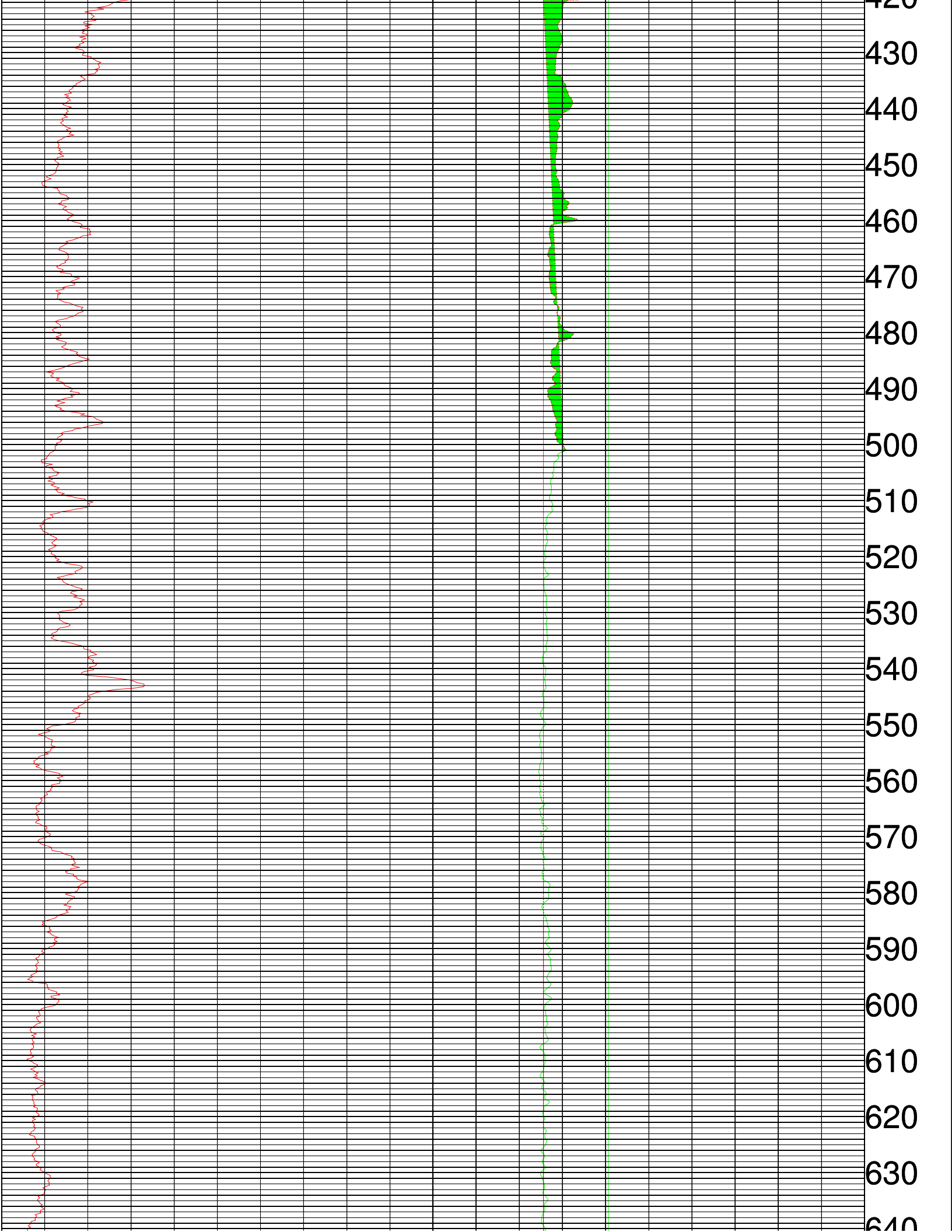
360
370
380
390
400
410
420


420
430
440
450
460
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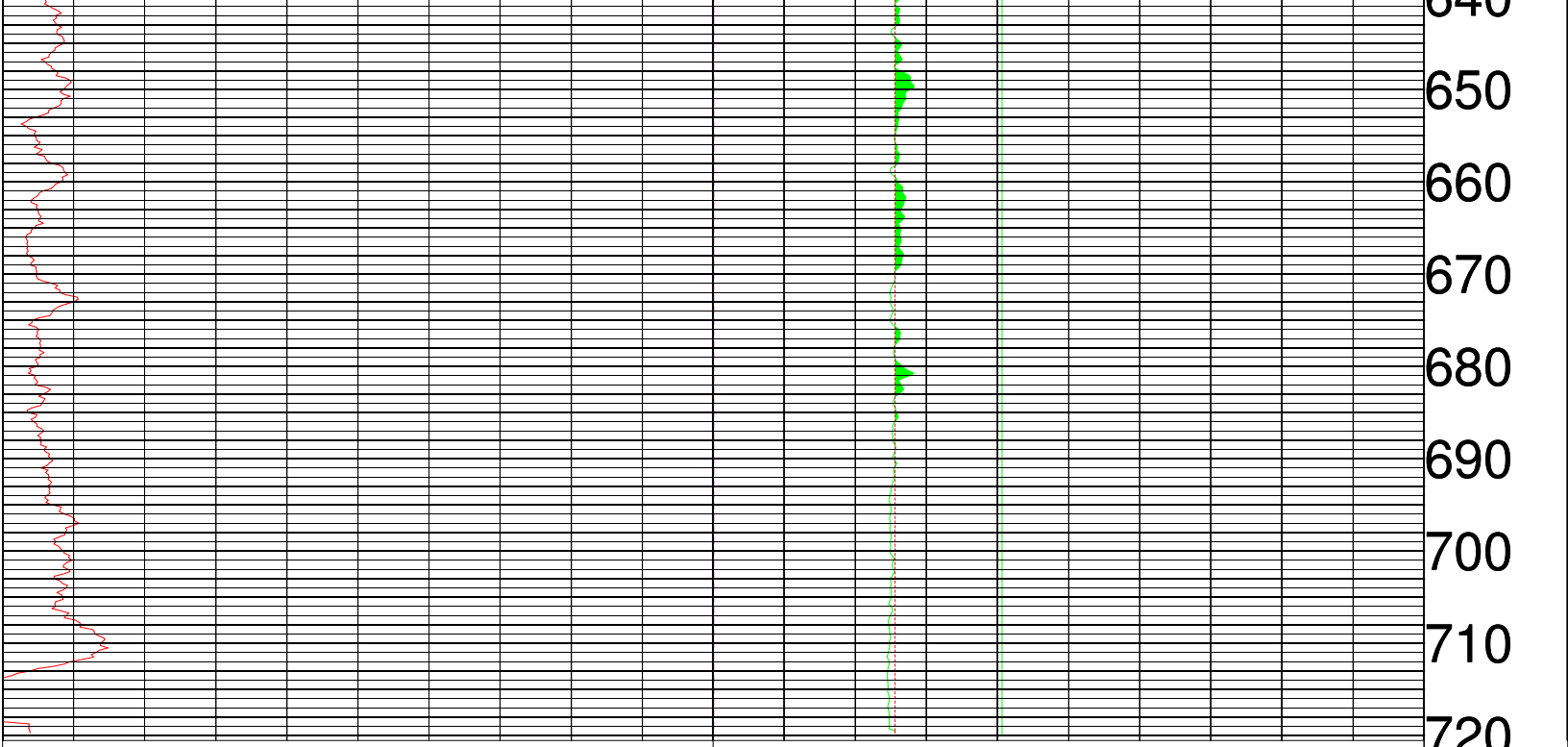
480
490
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640



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 WELL A-4 09/12/16 13:05
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	Jun08,16	17:32:30	CALIPERL	6.000	[INCH]	153643.00	[CPS]
	Jun08,16	17:32:30	CALIPERL	15.250	[INCH]	136504.00	[CPS]
4	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]

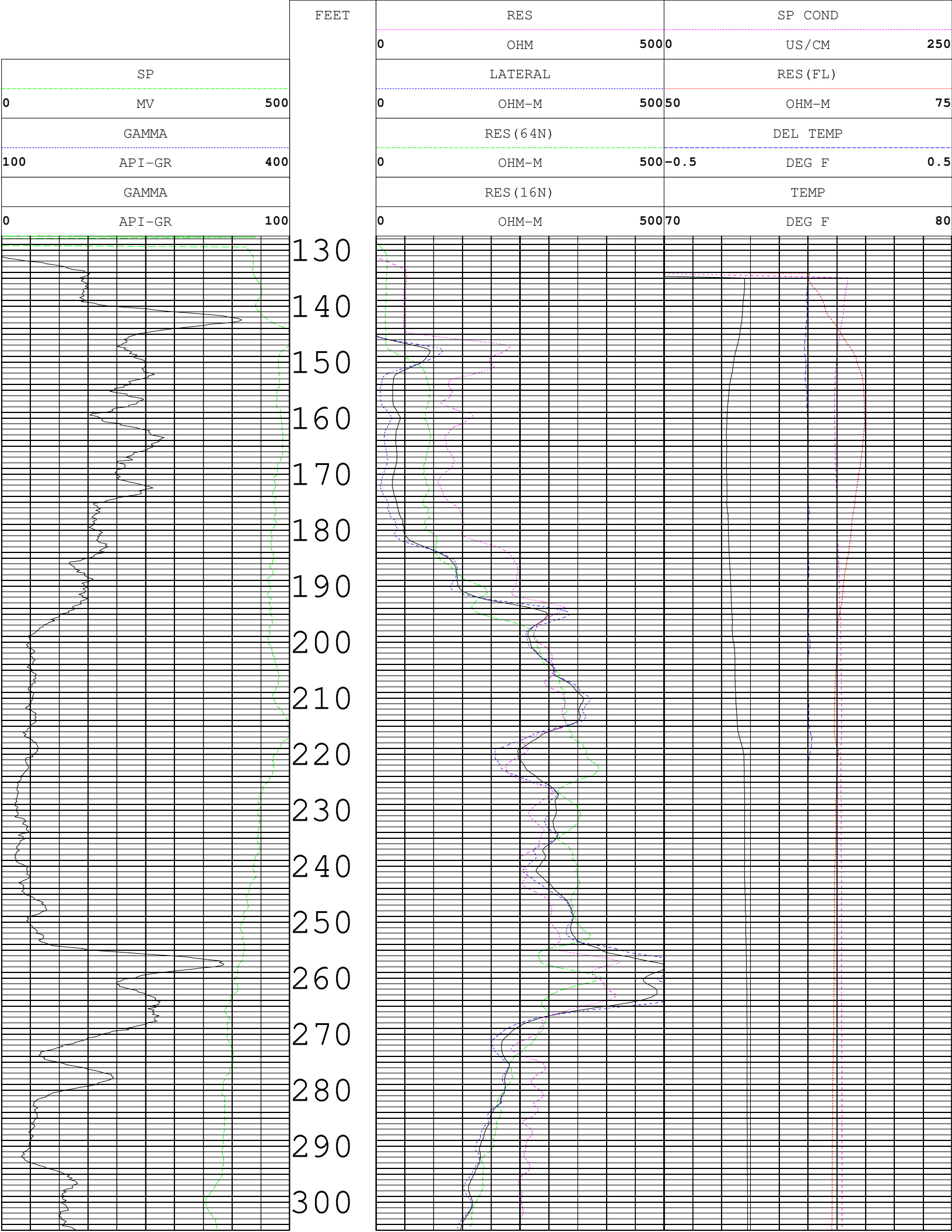
ABS

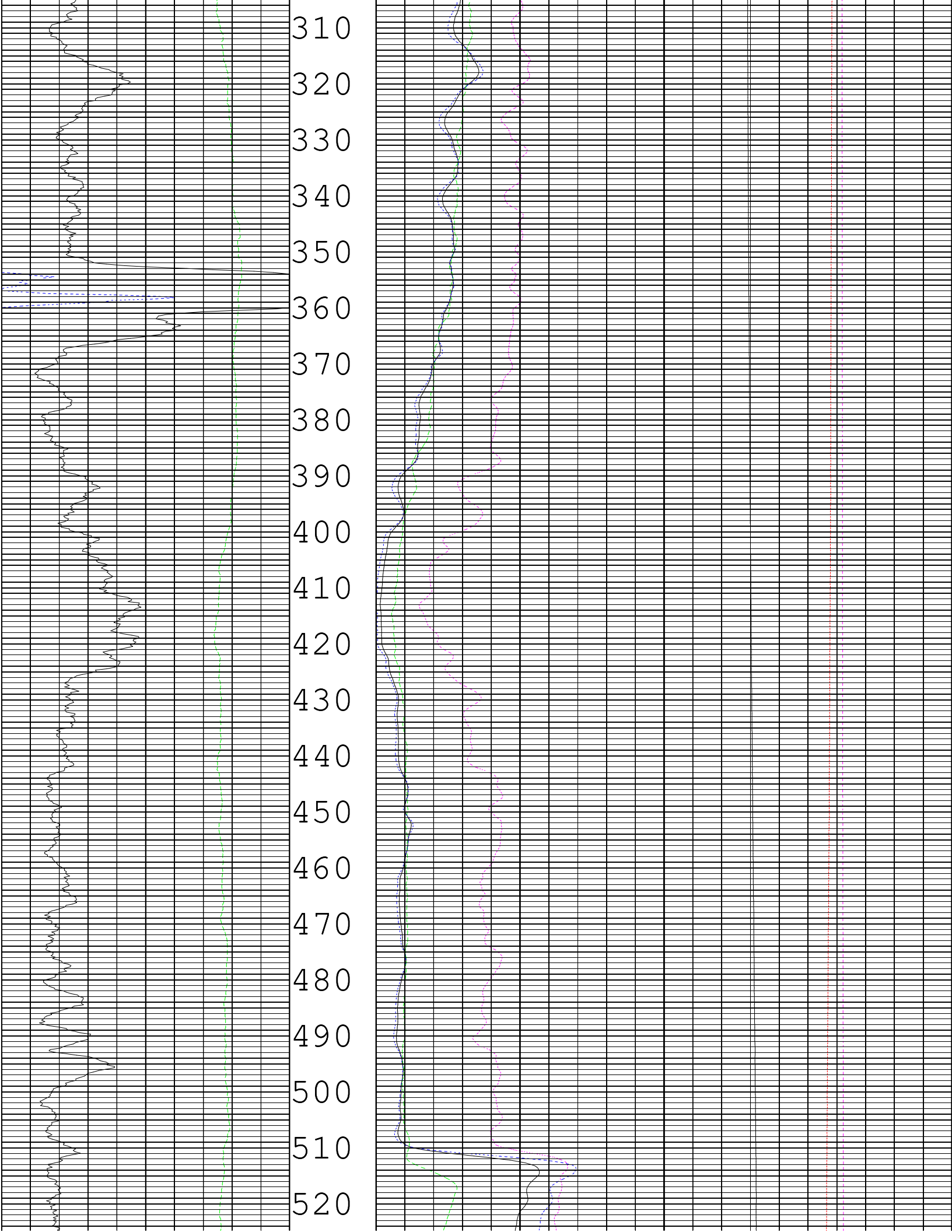
Advanced Borehole Services

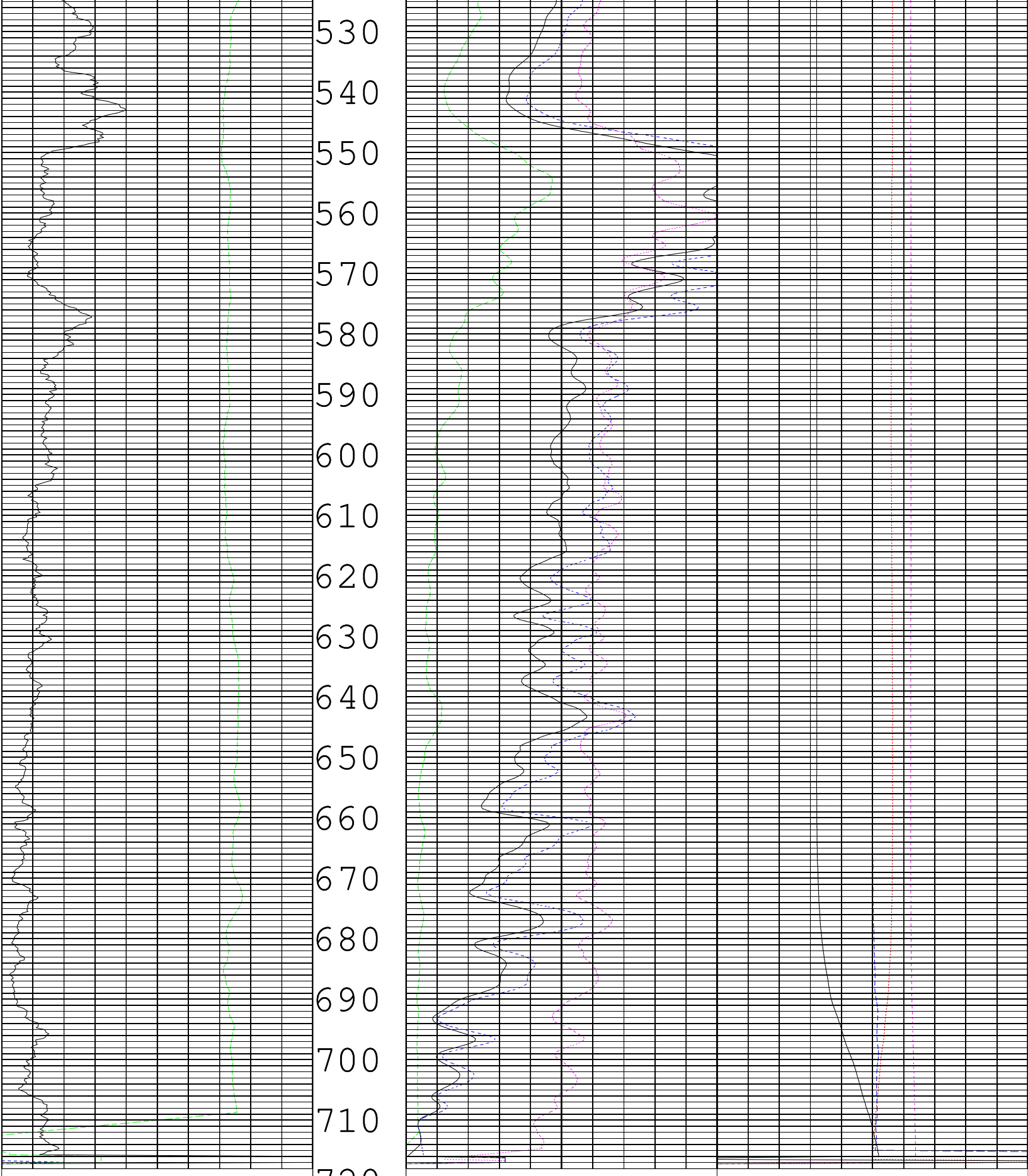
COMBINATION LOG
STATIC WATER QUALITY
WELL A-4

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL A-4	EICHLER
FIELD	: BRUCE	DIL
COUNTY	: WALTON	BHCAVL
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	: 09/12/16		
DEPTH DRILLER	: 720		
BIT SIZE	: 7.8		
LOG TOP	: 127.50		
LOG BOTTOM	: 717.75		
CASING OD	:		
CASING BOTTOM	: 147		
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
0 MV 500
GAMMA
100 API-GR 400
GAMMA
0 API-GR 100
RES
0 OHM 500
LATERAL
0 OHM-M 500
RES(64N)
0 OHM-M 500
RES(16N)
0 OHM-M 500
SP COND
0 US/CM 250
RES(FL)
50 OHM-M 75
DEL TEMP
-0.5 DEG F 0.5
TEMP
70 DEG F 80
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300


310
320
330
340
350
360
370
380
390
400
410
420
430
440
450
460
470
480
490
500
510
520



0	API-GR	100
	GAMMA	
100	API-GR	400
	GAMMA	
0	MV	500

0	OHM-M	500
	RES(16N)	
0	OHM-M	500
	RES(64N)	
0	OHM-M	500

70	DEG F	80
	TEMP	
-0.5	DEG F	0.5
	DEL TEMP	
50	OHM-M	75

SP		LATERAL		RES(FL)	
		0 OHM 500		0 US/CM	250
	FEET	RES		SP COND	

TOOL CALIBRATION WELL A-4 09/12/16 14:00
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	Aug26,16	15:29:54	RES(FL	41.600	[OHM-M]	54104.00	[CPS]
	Aug26,16	15:29:54	RES(FL	0.300	[OHM-M]	10639.00	[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]

ABS

Advanced Borehole Services

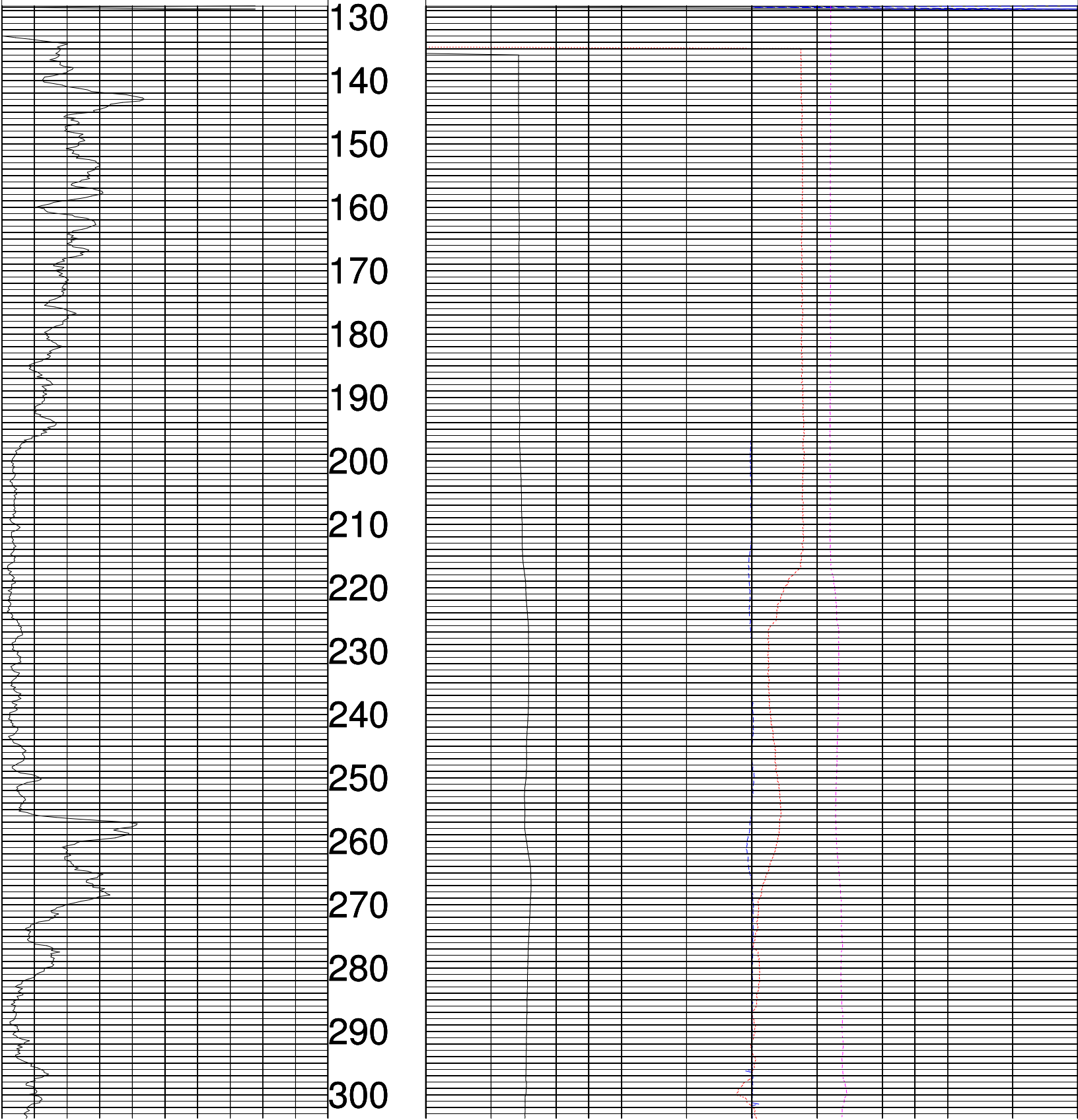
PUMPING WATER QUALITY

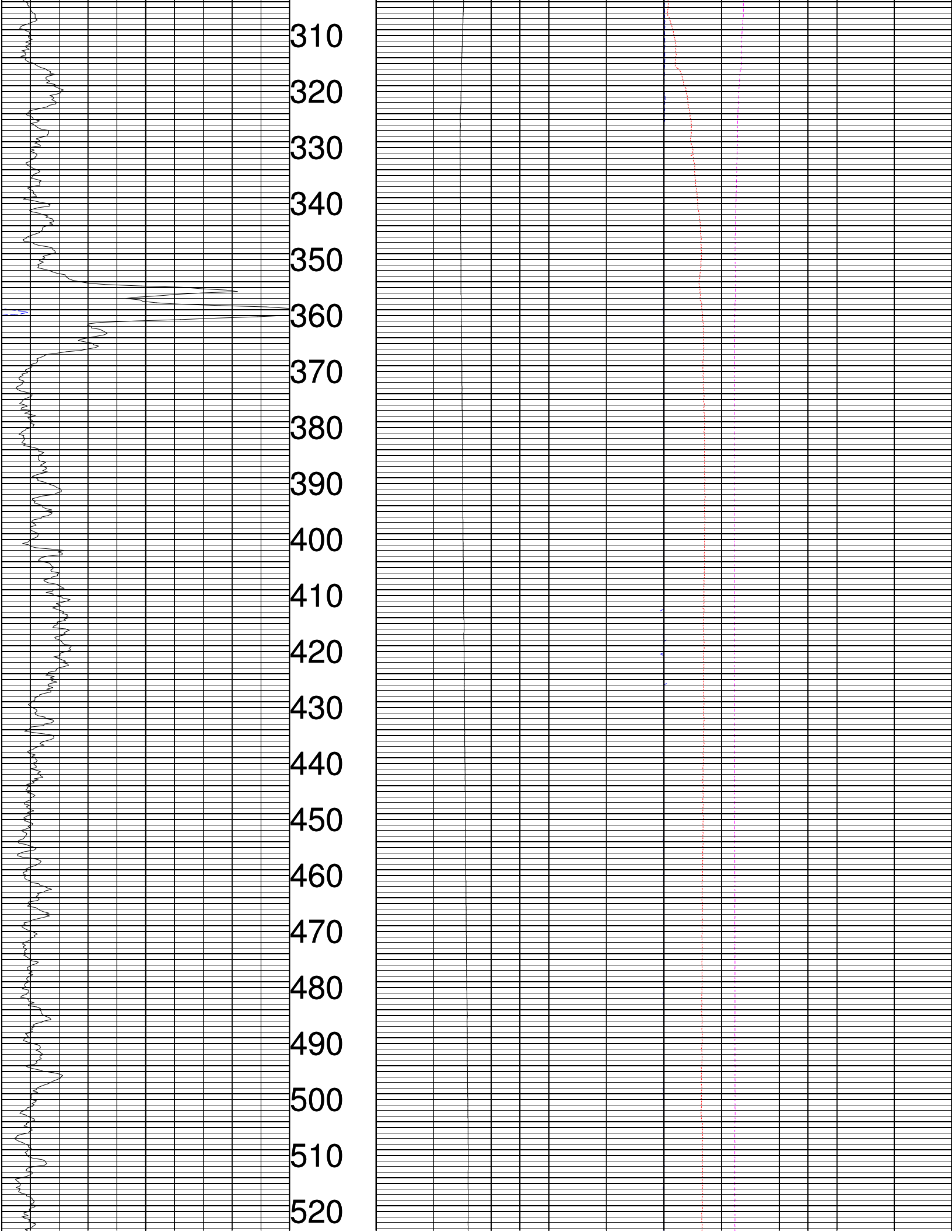
WELL A-4

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL A-4	EICHLER
FIELD	: BRUCE	DIL
COUNTY	: WALTON	BHCAVL
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	: 09/12/16		
DEPTH DRILLER	: 720		
BIT SIZE	: 7.8		
LOG TOP	: 128.25		
LOG BOTTOM	: 718.75		
CASING OD	:		
CASING BOTTOM	: 147		
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 250
COMMENTS1		RES(FL)
		50 OHM-M 75
GAMMA		DEL TEMP
200 API-GR 400		-0.5 DEG F 0.5
GAMMA		TEMP
0 API-GR 200		70 DEG F 90




310
320
330
340
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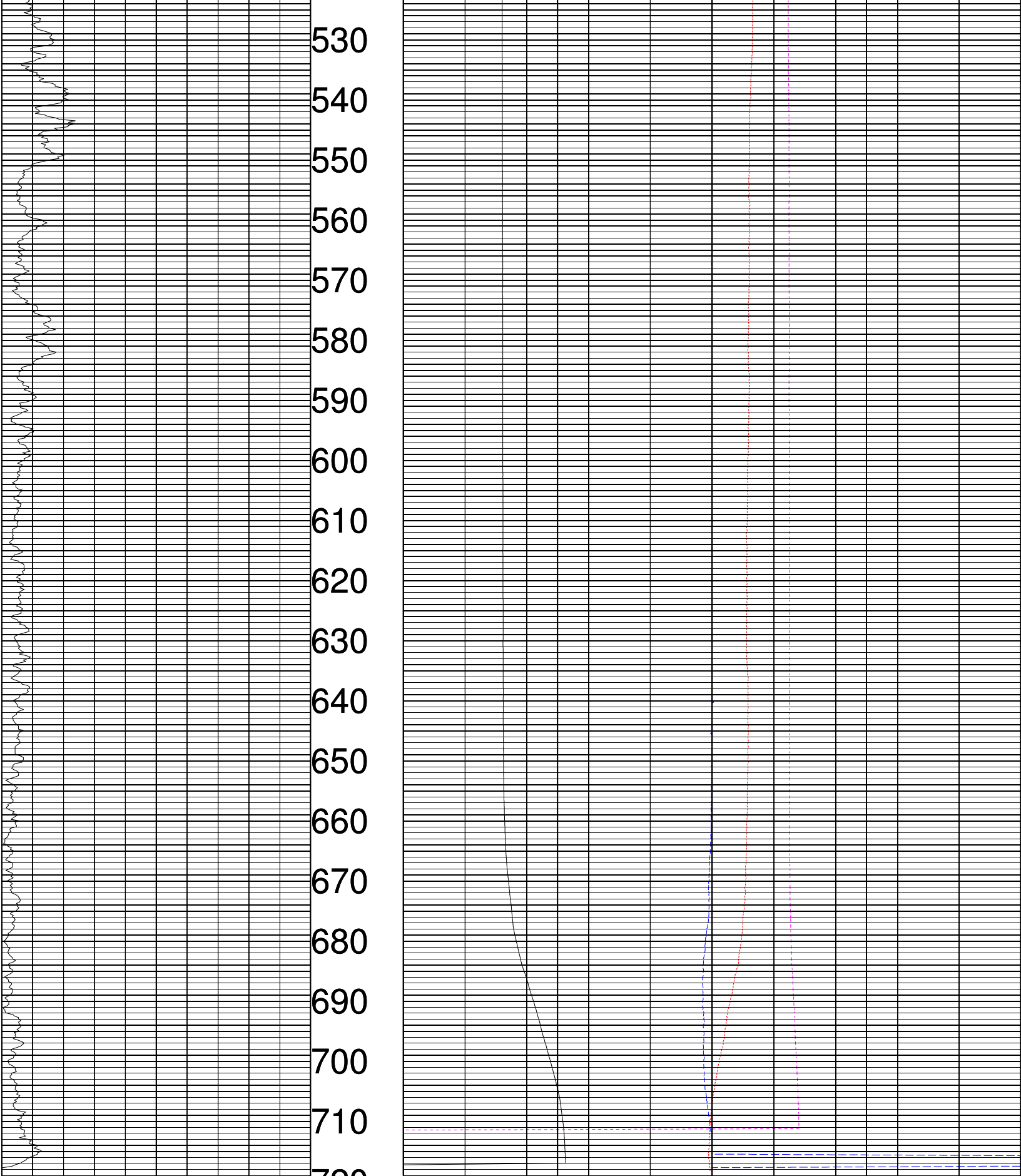
380
390
400
410
420
430
440
450
460
470
480
490
500
510
520



0	API-GR	200
	GAMMA	
200	API-GR	400
	GAMMA	
	COMMENTS	

70	DEG F	90
	TEMP	
-0.5	DEG F	0.5
	DEL TEMP	
	CHANNEL	

COMMENTS1

50	OHM-M	75
	RES(FL)	
0	US/CM	250
FEET	SP COND	

TOOL CALIBRATION WELL A-4 09/12/16 14:35
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	Aug26,16	15:29:54	RES(FL)	41.600	[OHM-M]	54104.00	[CPS]
	Aug26,16	15:29:54	RES(FL)	0.300	[OHM-M]	10639.00	[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

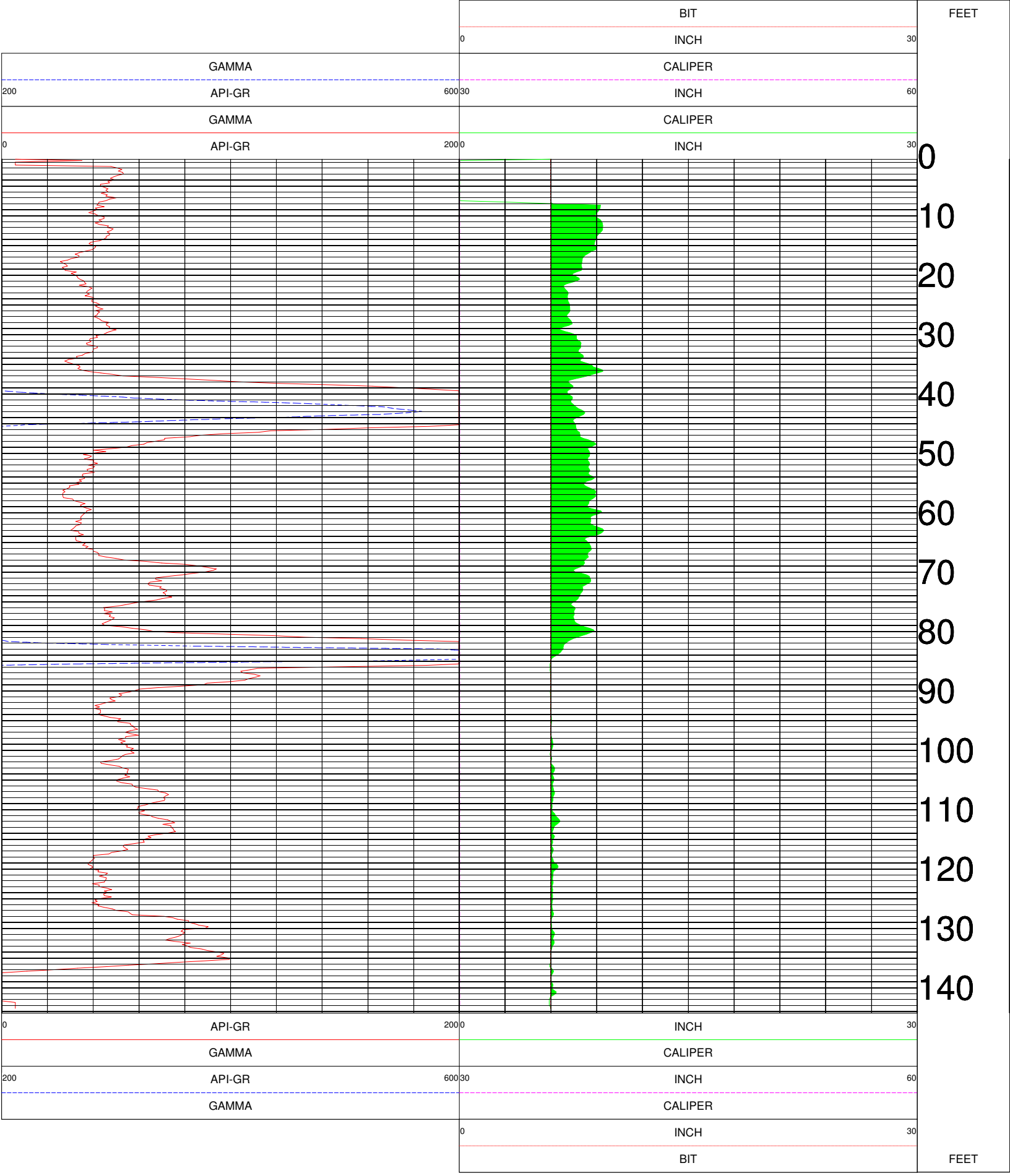
Advanced Borehole Services

GAMMA RAY (API)-CALIPER

A-4B

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: PILOT
WELL	: A-4B	
FIELD	: BLACK CREEK ROAD	
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:	GS	ELEVATION DF:	NA
DRL MEASURED FROM:	NA	ELEVATION GL:	NA
DATE	: 08/09/16		
DEPTH DRILLER	: 145		
BIT SIZE	: 6		
LOG TOP	: 0.50		
LOG BOTTOM	: 144.00		
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	: STATIC WELL		
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
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
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 A-4B 08/09/16 11:40
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	Jun08,16	17:32:30	CALIPERL	6.000	[INCH]	153643.00	[CPS]
	Jun08,16	17:32:30	CALIPERL	15.250	[INCH]	136504.00	[CPS]
4	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]

ABS

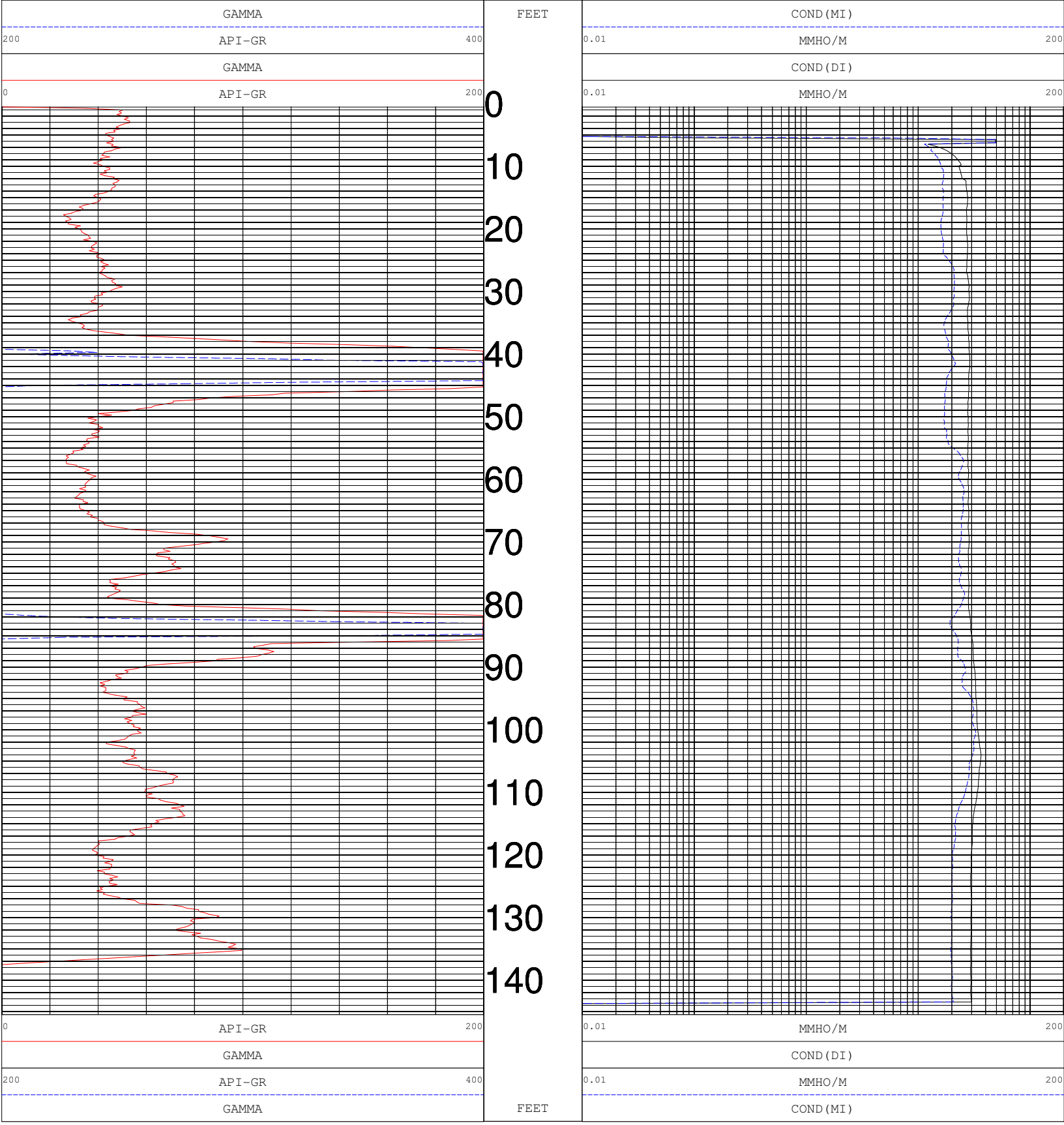
Advanced Borehole Services

DUAL INDUCTION-GAMMA RAY

A-4B

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: PILOT
WELL	: A-4B	
FIELD	: BLACK CREEK ROAD	
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:	GS	ELEVATION DF:	NA
DRL MEASURED FROM:	NA	ELEVATION GL:	NA
DATE	: 08/09/16		
DEPTH DRILLER	: 145		
BIT SIZE	: 6		
LOG TOP	: 0.50		
LOG BOTTOM	: 145.19		
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	: STATIC WELL		
REMARKS 2	:		


GAMMA
200
API-GR
400
GAMMA
0
API-GR
200
FEET
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
COND(MI)
0.01
MMHO/M
200
COND(DI)
0.01
MMHO/M
200

ABS

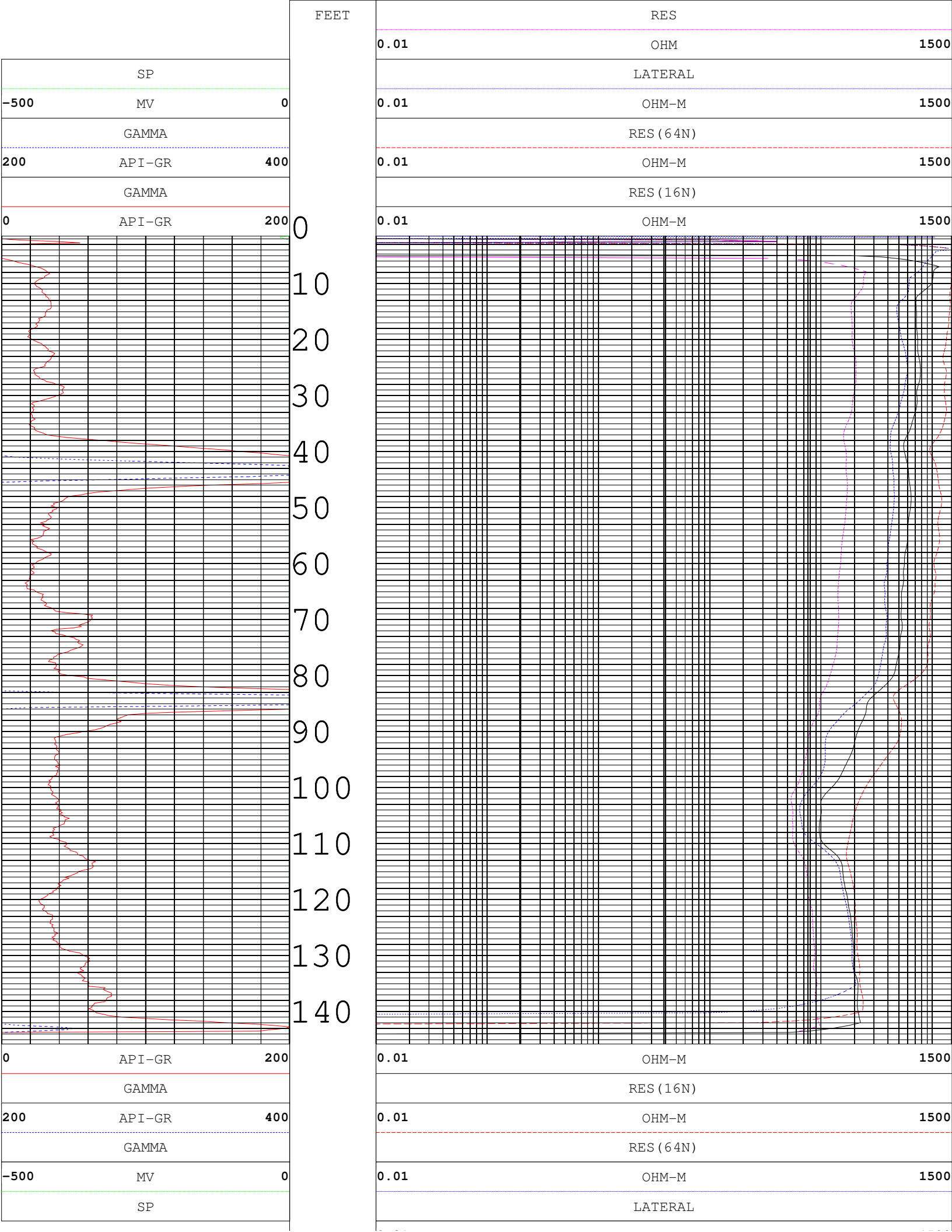
Advanced Borehole Services

GAMMA RAY-RESISTIVITY (16-64)

A-4B

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: PILOT
WELL	: A-4B	
FIELD	: BLACK CREEK ROAD	
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:	GS	ELEVATION DF:	NA
DRL MEASURED FROM:	NA	ELEVATION GL:	NA
DATE	: 08/09/16		
DEPTH DRILLER	: 145		
BIT SIZE	: 6		
LOG TOP	: 1.50		
LOG BOTTOM	: 145.50		
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	: STATIC WELL		
REMARKS 2	:		


FEET
RES
0.01
OHM
1500
LATERAL
OHM-M
RES(64N)
RES(16N)
SP
-500
MV
0
GAMMA
200
API-GR
400
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140

	0.01 OHM	**1500**
FEET	RES	

Region II Well Construction and
Testing Report for Site A-4

APPENDIX E

LITHOLOGIC LOG

Project Name: A-4 Oversight

Project No.: E213001409
Well No.: A-4
Sampling Method: Strainer Collection
Described By: Michelle Leonard
David Kelly

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
0-10	10	Yellowish gray (5Y 7/2) sand, medium to fine grained, unconsolidated Sub-angular to well-rounded, moderate porosity Accessory - medium sand size limestone fragments (1%), heavy minerals (1%)
10-20	10	Yellowish gray (5Y 7/2) sand, medium to fine grained, unconsolidated Sub-angular to well-rounded, moderate porosity Accessory - limestone fragments (2%), heavy minerals (2%)
20-30	10	Grayish yellow (5Y 8/4) sand, medium grained, unconsolidated Sub-angular to well-rounded, moderate porosity Accessory - limestone fragments (1%), heavy minerals (1%), shell fragments (1%)
30-40	10	Yellowish gray (5Y 7/2) sand, medium to fine grained, unconsolidated Sub-angular to well-rounded, moderate porosity Accessory - limestone fragments (1%), heavy minerals (2%), shell fragments (2%)
40-50	10	Light olive gray (5Y 5/2) sand, very coarse to medium grained, unconsolidated, clay matrix Angular to sub-rounded, moderate porosity Accessory - limestone fragments (2%), heavy minerals (<1%)
50-60	10	Yellowish gray (5Y 7/2) and sand, very coarse, unconsolidated Angular to sub-angular, low to moderate porosity Accessory - heavy minerals (1%)
60-70	10	Yellowish gray (5Y 8/1) sand, coarse, unconsolidated Angular to sub-angular, moderate porosity Accessory - shell fragments (5%), heavy minerals (2%)
70-80	10	Yellowish gray (5Y 7/2) clay (50%) Light olive gray (5Y 6/1) limestone, low to moderate porosity, angular to sub-angular (38%) Accessory - light brown (5YR 5/6) to very pale orange (10 YR 8/2) coarse sand (10%), heavy minerals (2%)
80-90	10	Light brown (5YR 5/6) to yellowish gray (5Y 8/1) very coarse sand, unconsolidated Angular to sub-angular, moderate porosity Accessory - light olive gray (5Y 6/1) limestone fragments (10%), heavy minerals (1%)
90-100	10	Pale olive (10Y 6/2) clayey, soft (60%) Light olive gray (5Y 6/1) limestone, low to moderate porosity (39%) Accessory - heavy minerals (<1%)

Project Name: A-4 Oversight

Project No.: E213001409
Well No.: A-4
Sampling Method: Strainer Collection
Described By: Michelle Leonard
David Kelly

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
100-110	10	Medium bluish gray (5B 5/1) clay, soft Light olive gray (5Y 6/1) limestone, low to moderate porosity, angular to sub-angular Accessory - heavy minerals (<1%)
110-120	10	Greenish gray (5G 5/1) clay, soft Light olive gray (5Y 6/1) limestone, low to moderate porosity, angular to sub-angular Accessory - heavy minerals (<1%)
120-130	10	Yellowish gray (5Y 8/1) sandy clay, soft, low to moderate porosity medium to fine grained sand, angular Accessory - heavy minerals (5%), shell fragments (<1%)
130-140	10	Light olive gray (5Y 6/1) limestone, calcarenite, low moldic porosity, moderate to high induration (70%) Yellowish gray (5Y 8/1) sandy clay, soft (25%) Accessory - heavy minerals (5%)
140-150	10	Light olive gray (5Y 6/1) limestone, calcarenite, low porosity, well-indurated (70%) Greenish black (5G 2/1) heavy mineral fragments, angular (25%) Grayish yellow (5Y 8/4) sand, coarse to medium grained, sub-rounded (5%)
150-160	10	Light gray (N7) sand clay, very cohesive, sticky
160-170	10	Light gray (N7) sand clay, very cohesive, sticky
170-180	10	Yellowish gray (5Y 8/1) sand, fine grained, sub-rounded to angular, heavy minerals (2%)
180-190	10	Yellowish gray (5Y 8/1) sand, fine grained, sub-rounded to angular, heavy minerals (2%)
190-200	10	Greenish gray (5G 5/1) sandy clay, limestone fragments, slightly cohesive
200-210	10	Yellowish gray (5Y 8/1) limestone, well indurated, low effective porosity, small vugs
210-220	10	Yellowish gray (5Y 8/1) limestone, well indurated, low effective porosity, small vugs
220-230	10	White (N9) limestone, packstone, sandy, well indurated, vuggy, fossiliferous, good porosity
230-240	10	White (N9) limestone, packstone, sandy, well indurated, vuggy, fossiliferous, good porosity
240-250	10	White (N9) limestone, wackestone, well indurated, secondary crystalization of calcite, low porosity, fossiliferous

Project Name: A-4 Oversight

Project No.: E213001409
Well No.: A-4
Sampling Method: Strainer Collection
Described By: Michelle Leonard
David Kelly

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
250-257	7	White (N9) limestone, wackestone, well indurated, secondary crystalization of calcite, low porosity, fossiliferous
257-260	3	Moderate yellowish brown (10YR 5/4) wackestone, moderately indurated, low porosity, few fossils
260-270	10	Moderate yellowish brown (10YR 5/4) wackestone, moderately indurated, low porosity, few fossils
270-280	10	Moderate olive brown (5Y 4/4) sandy packstone, well indurated, moderate porosity, vuggy
280-290	10	Grayish yellow (5Y 8/4) sandy packstone, well indurated, moderate porosity, vuggy
290-300	10	Dusky yellow (5Y 6/4) packstone, well indurated, good porosity, fossiliferous, vuggy
300-310	10	Dusky yellow (5Y 6/4) packstone, well indurated, good porosity, fossiliferous, vuggy
310-320	10	Dusky yellow (5Y 6/4) packstone, well indurated, good porosity, fossiliferous, vuggy
320-330	10	Dusky yellow (5Y 6/4) packstone, well indurated, very good porosity, fossiliferous, vuggy
330-340	10	Dusky yellow (5Y 6/4) packstone, well indurated, low porosity
340-350	10	Dusky yellow (5Y 6/4) packstone, moderately indurated, low porosity
350-360	10	Pale olive (10Y 6/2) wackstone, well indurated, moderate porosity, fossiliferous, vuggy, calcareous matrix
360-370	10	Yellowish gray (5Y 8/1) shell fragments (95%) Very light gray (N8) small fragments of coral limestone (3%) Accessory: heavy minerals (2%)
370-380	10	Yellowish gray (5Y 8/1) shell fragments (95%) Very light gray (N8) small fragments of coral limestone (3%) Accessory: heavy minerals (<2%), trace gray (N7) clay
380-390	10	Yellowish gray (5Y 8/1) shell fragments (95%) Very light gray (N8) small fragments of coral limestone (3%) Accessory: heavy minerals (2%)
390-400	10	Light olive gray (5Y 6/1) clay, cohesive and sticky, very little to trace sand
410-420	10	Interbedded yellowish gray (5Y 8/1) limestone, moderately indurated, moderate porosity, fossiliferous; dusky yellow (5Y 6/4) sandy limestone, poorly indurated, grainstone, good porosity, vuggy, few fossils; and yellowish gray (5Y 8/1)

Project Name: A-4 Oversight

Project No.: E213001409
Well No.: A-4
Sampling Method: Strainer Collection
Described By: Michelle Leonard
David Kelly

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
420-430	10	Light olive gray (5Y 6/1) clay, cohesive and sticky, very little to trace sand
430-440	10	Light olive gray (5Y 6/1) clay, cohesive and sticky, very little to trace sand
440-450	10	Light olive gray (5Y 6/1) clay, cohesive and sticky, very little to trace sand, with limestone fragments
450-460	10	Moderate brown (5YR 4/4) dolostone, low porosity, microcrystalline, very well indurated
460-470	10	Light olive gray (5Y 6/1) clay, cohesive and sticky, very little to trace sand, with limestone fragments
470-480	10	Moderate brown (5YR 4/4) dolostone, low porosity, microcrystalline, very well indurated
480-490	10	Light olive gray (5Y 6/1) clay, cohesive and sticky, very little to trace sand, with limestone fragments
490-500	10	Pale yellowish brown (10YR 6/2) limestone, low porosity, moerately indurated Accessory: glauconite (5%)
500-510	10	Very light gray (N8) clay, cohesive and sticky, very little to trace sand, with limestone fragments
510-520	10	Yellowish gray (5Y 8/1) shell fragments Accessory: fine to coarse sand (5%), glauconite (2%)
520-530	10	Yellowish gray (5Y 8/1) limestone, well indurated, very good porosity, vuggy, fossiliferous Accessory: glauconite (3%), heavy minerals (1%)
530-540	10	Yellowish gray (5Y 8/1) limestone, well indurated, very good porosity, vuggy, fossiliferous Accessory: glauconite (3%), heavy minerals (1%)
540-550	10	Yellowish gray (5Y 8/1) limestone, well indurated, very good porosity, vuggy, fossiliferous Accessory: glauconite (3%), heavy minerals (2%)
550-560	10	Dark yellowish orange (10YR 6/6) limestone, grainstone, very well indurated, good effective porosity Accessory: glauconite (3%)

Project Name: A-4 Oversight

Project No.: E213001409
Well No.: A-4
Sampling Method: Strainer Collection
Described By: Michelle Leonard
David Kelly

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
560-570	10	Yellowish gray (5Y 8/1) limestone, grainstone, fossiliferous, moderate porosity, well indurated Accessory: heavy minerals (2%)
570-580	10	Yellowish gray (5Y 8/1) limestone, grainstone, fossiliferous, moderate porosity, well indurated Accessory: heavy minerals (2%)
580-590	10	Yellowish gray (5Y 8/1) limestone, grainstone, fossiliferous, moderate porosity, well indurated Accessory: heavy minerals (2%)
590-600	10	Yellowish gray (5Y 8/1) limestone, grainstone, fossiliferous, moderate porosity, well indurated Accessory: heavy minerals (2%)
600-610	10	Yellowish gray (5Y 8/1) limestone, grainstone, fossiliferous, moderate porosity, well indurated Accessory: heavy minerals (5%)
610-620	10	Yellowish gray (5Y 8/1) limestone, grainstone, fossiliferous, moderate porosity, well indurated Accessory: heavy minerals (5%)
620-630	10	Light olive gray (5Y 6/1) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: glauconite (5%), heavy minerals (5%)
630-640	10	Yellowish gray (5Y 6/1) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: glauconite (5%), heavy minerals (5%)
640-650	10	Yellowish gray (5Y 6/1) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: glauconite (5%), heavy minerals (5%)
650-660	10	Yellowish gray (5Y 6/1) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: shell fragments (10%), glauconite (5%), heavy minerals (5%)
660-670	10	Yellowish gray (5Y 6/1) to light bluish gray (5B 7/1) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: glauconite (5%), heavy minerals (5%)
670-680	10	Yellowish gray (5Y 6/1) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: shell fragments (10%), glauconite (5%), heavy minerals (5%)

Project Name: A-4 Oversight

Project No.: E213001409
Well No.: A-4
Sampling Method: Strainer Collection
Described By: Michelle Leonard
David Kelly

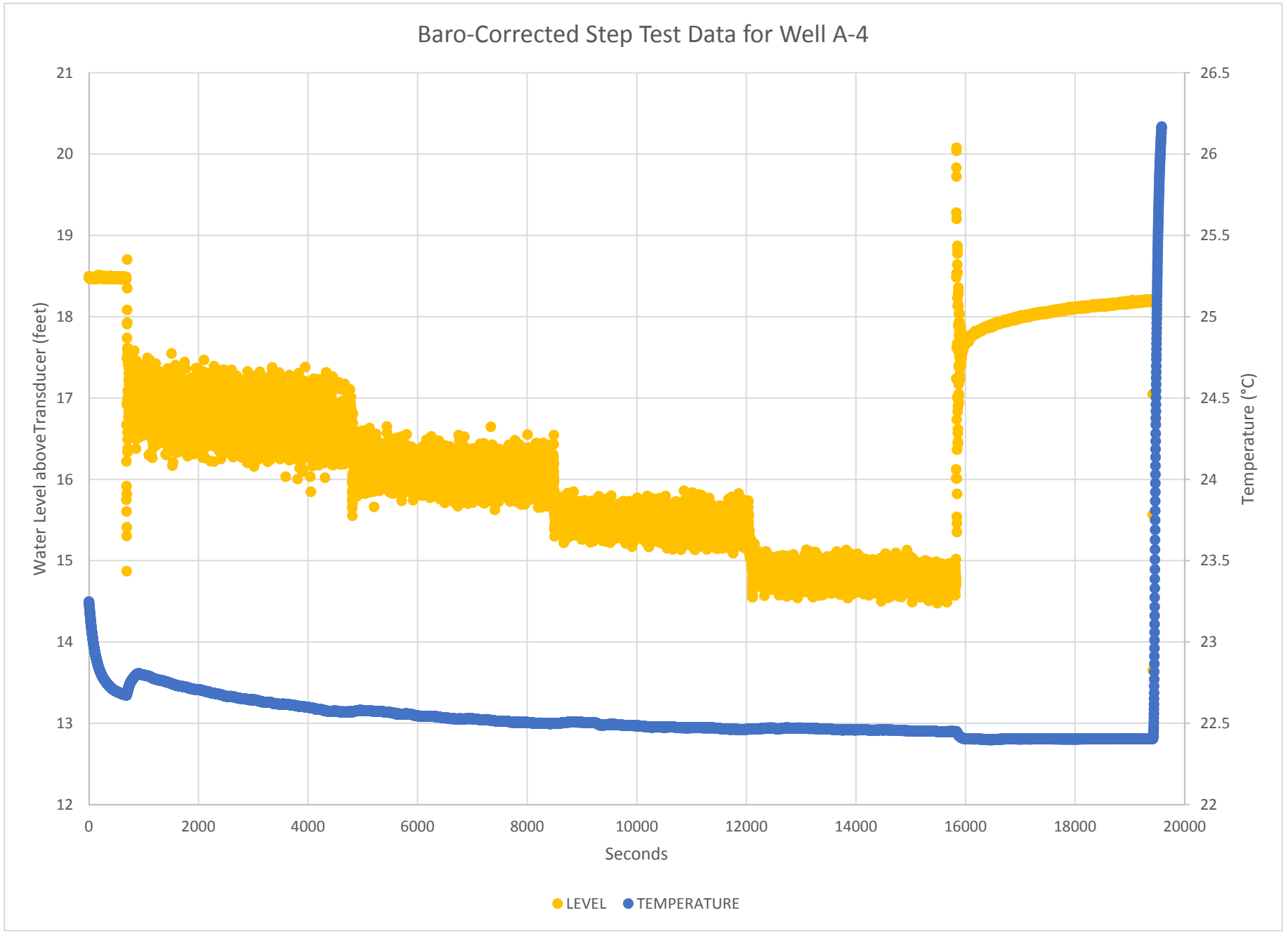
Lithology Log
(Drill Cuttings)

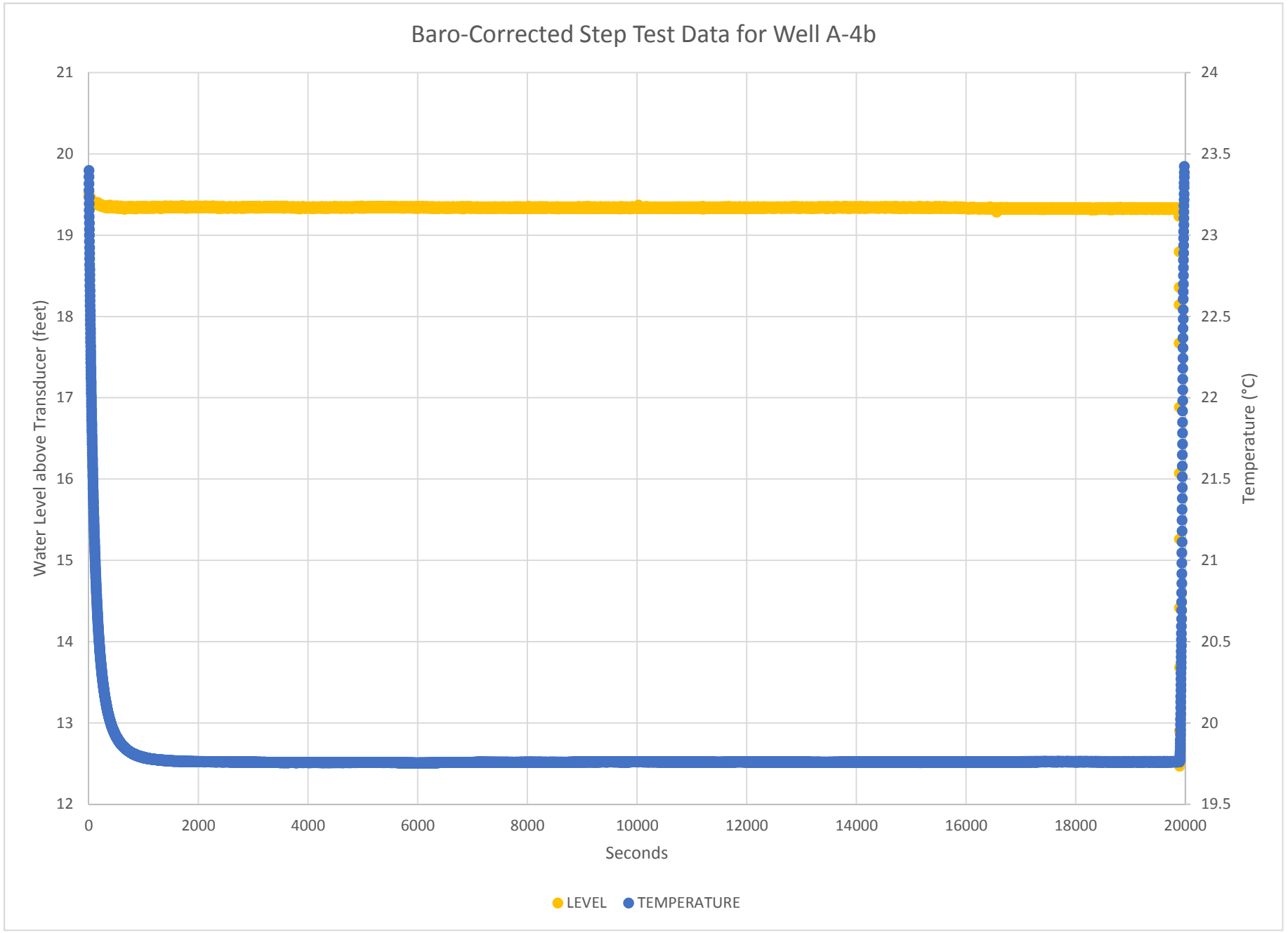
Depth Interval (feet bpl)	Thickness (feet)	Sample Description
680-690	10	Yellowish gray (5Y 6/1) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: shell fragments (10%), glauconite (5%), heavy minerals (5%)
690-700	10	Yellowish gray (5Y 6/1) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: shell fragments (10%), glauconite (5%), heavy minerals (5%)
700-710	10	Yellowish gray (5Y 6/1) to light olive gray (5Y 5/2) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: shell fragments (10%), glauconite (5%), heavy minerals (5%)
710-715	5	Yellowish gray (5Y 6/1) to light olive gray (5Y 5/2) limestone, wackestone, fossiliferous, moderate porosity, well indurated Accessory: shell fragments (10%), glauconite (5%), heavy minerals (5%)
715-720	5	Light olive brown (5Y 5/6) sand, fine grained, well sorted, sub-rounded to sub-angular

Region II Well Construction and Testing Report for Site A-4

APPENDIX F

STEP-TEST GRAPHICS


Baro-Corrected Step Test Data for Well A-4
Water Level aboveTransducer (feet)
Temperature (°C)
Seconds
21
20
19
18
17
16
15
14
13
12
26.5
26
25.5
25
24.5
24
23.5
23
22.5
22
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
LEVEL
TEMPERATURE


Baro-Corrected Step Test Data for Well A-4b
Water Level above Transducer (feet)
Temperature (°C)
Seconds
21
20
19
18
17
16
15
14
13
12
24
23.5
23
22.5
22
21.5
21
20.5
20
19.5
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
LEVEL
TEMPERATURE

Region II Well Construction and Testing Report for Site A-4

APPENDIX G

LABORATORY REPORTS

Analytical Report

L6H0408

Project

A-4

Project Number

E213001409

September 13, 2016
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

September 13, 2016

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

RE: A-4

We are reporting the results of the analyses performed on the samples recieved on 8/31/2016 under the project name referenced above and identified as the lab Work Order L6H0408. 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 L6H0408 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,

Amy Atkins
Senior Project Manager

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:25

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L6H0408-01	A-4-1	Water	29-Aug-2016 14:35	31-Aug-2016 08:30

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:25

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-4-1

Lab ID: L6H0408-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**184**		1.00	0.00	mg/L	1	8/31/16 13:30		SM 2510B
TDS, Total Dissolved Solids	**94.0**		5.00	1.78	mg/L	1	9/1/16 17:31		SM 2540C
Chloride	**8.48**		2.00	0.104	mg/L	1	9/1/16 9:37	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:25

Sample Results

Client Sample ID: A-4-1
Lab Sample ID: L6H0408-01 (Water) **Sampled:8/29/16 14:35**

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	9/1/16 9:00	9/1/16 9:37	16887-00-6
Conductance by Method 2510B									
Specific conductance	**184**		1.00	0.00	mg/L	1	8/31/16 13:30	8/31/16 13:30	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**94.0**		5.00	1.78	mg/L	1	9/1/16 17:31	9/1/16 17:31	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:25

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0018											
Blank (B6I0018-BLK1)						Prepared & Analyzed: 9/1/2016					
Chloride	0.104	U,	2.00	0.104	mg/L						
LCS (B6I0018-BS1)						Prepared & Analyzed: 9/1/2016					
Chloride	19.6		2.00	0.104	mg/L	20.0		98	90-110		
LCS Dup (B6I0018-BSD1)						Prepared & Analyzed: 9/1/2016					
Chloride	20.2		2.00	0.104	mg/L	20.0		101	90-110	3	20
Duplicate (B6I0018-DUP1)		**Source: L6H0408-01**				Prepared & Analyzed: 9/1/2016					
Chloride	6.81		2.00	0.104	mg/L		8.48			22	20
Matrix Spike (B6I0018-MS1)		**Source: L6H0408-01**				Prepared & Analyzed: 9/1/2016					
Chloride	27.8		2.00	0.104	mg/L	20.0	8.48	97	80-120		
Matrix Spike Dup (B6I0018-MSD1)		**Source: L6H0408-01**				Prepared & Analyzed: 9/1/2016					
Chloride	26.8		2.00	0.104	mg/L	20.0	8.48	91	80-120	4	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:25

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0057											
Blank (B6I0057-BLK1)						Prepared & Analyzed: 9/1/2016					
TDS, Total Dissolved Solids	1.78	U,	5.00	1.78	mg/L						
LCS (B6I0057-BS1)						Prepared & Analyzed: 9/1/2016					
TDS, Total Dissolved Solids	568		5.00	1.78	mg/L	618		92	80-120		
LCS Dup (B6I0057-BSD1)						Prepared & Analyzed: 9/1/2016					
TDS, Total Dissolved Solids	608		5.00	1.78	mg/L	618		98	80-120	7	20
Duplicate (B6I0057-DUP2)		**Source: L6H0408-01**				Prepared & Analyzed: 9/1/2016					
TDS, Total Dissolved Solids	90.0		5.00	1.78	mg/L		94.0			4	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:25

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6H0752											
Blank (B6H0752-BLK1)					Prepared & Analyzed: 8/31/2016						
Specific conductance	0.00	U,	1.00	0.00	mg/L						
LCS (B6H0752-BS1)					Prepared & Analyzed: 8/31/2016						
Specific conductance	611		1.00	0.00	mg/L	618		99	80-120		
LCS Dup (B6H0752-BSD1)					Prepared & Analyzed: 8/31/2016						
Specific conductance	611		1.00	0.00	mg/L	618		99	80-120	0	20
Duplicate (B6H0752-DUP1)		**Source: L6H0367-01**			Prepared & Analyzed: 8/31/2016						
Specific conductance	204		1.00	0.00	mg/L		204			0	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:25

List of Certifications for FTS Analytical Services - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
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	Estimated Value
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

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 Dr Riverview, FL
Results Sent to: Michelle Leonard
Email address: michelle.leonard@cardno.com
Contact Phone #: 813-352-1626 Cell#:
Project Name (Site): A-4
Project Number (ID): E213001409
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: C / 1-8
Custody Seal(s): Y N Lab Work Order # L6H0408
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	Specific Conductance	TDS	Chloride	Container Type	Preservation Code
1	A-4-1	240	8/29/16 11:35	GW		✓	3	✓	✓	✓		
2												
3												
4												
5												
6												
7												
8												
9												
10												

Analysis Requested

	Relinquished By:	Date / Time	Received By:	Date / Time
1)		8/30/16 16:45		8/31/16 8:30
3)			4)	
5)			6)	

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

L6I0006

Project

A-4

Project Number

E213001409

September 13, 2016
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

September 13, 2016

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

RE: A-4

We are reporting the results of the analyses performed on the samples recieved on 9/1/2016 under the project name referenced above and identified as the lab Work Order L6I0006. 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 L6I0006 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,

Amy Atkins
Senior Project Manager

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:54

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L6I0006-01	A-4-2	Water	30-Aug-2016 14:05	01-Sep-2016 09:54

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:54

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-4-2

Lab ID: L6I0006-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**176**		1.00	0.00	mg/L	1	9/1/16 16:30		SM 2510B
TDS, Total Dissolved Solids	**86.0**		5.00	1.78	mg/L	1	9/1/16 17:31		SM 2540C
Chloride	**8.82**		2.00	0.104	mg/L	1	9/1/16 17:57	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:54

Sample Results

Client Sample ID: A-4-2
Lab Sample ID: L6I0006-01 (Water) **Sampled:8/30/16 14:05**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**8.82**		2.00	0.104	mg/L	1	9/1/16 9:00	9/1/16 17:57	16887-00-6
Conductance by Method 2510B									
Specific conductance	**176**		1.00	0.00	mg/L	1	9/1/16 16:30	9/1/16 16:30	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**86.0**		5.00	1.78	mg/L	1	9/1/16 17:31	9/1/16 17:31	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:54

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0018											
Blank (B6I0018-BLK1)						Prepared & Analyzed: 9/1/2016					
Chloride	0.104	U,	2.00	0.104	mg/L						
LCS (B6I0018-BS1)						Prepared & Analyzed: 9/1/2016					
Chloride	19.6		2.00	0.104	mg/L	20.0		98	90-110		
LCS Dup (B6I0018-BSD1)						Prepared & Analyzed: 9/1/2016					
Chloride	20.2		2.00	0.104	mg/L	20.0		101	90-110	3	20
Duplicate (B6I0018-DUP1)		**Source: L6H0408-01**				Prepared & Analyzed: 9/1/2016					
Chloride	6.81		2.00	0.104	mg/L		8.48			22	20
Matrix Spike (B6I0018-MS1)		**Source: L6H0408-01**				Prepared & Analyzed: 9/1/2016					
Chloride	27.8		2.00	0.104	mg/L	20.0	8.48	97	80-120		
Matrix Spike Dup (B6I0018-MSD1)		**Source: L6H0408-01**				Prepared & Analyzed: 9/1/2016					
Chloride	26.8		2.00	0.104	mg/L	20.0	8.48	91	80-120	4	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:54

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0057											
Blank (B6I0057-BLK1)						Prepared & Analyzed: 9/1/2016					
TDS, Total Dissolved Solids	1.78	U,	5.00	1.78	mg/L						
LCS (B6I0057-BS1)						Prepared & Analyzed: 9/1/2016					
TDS, Total Dissolved Solids	568		5.00	1.78	mg/L	618		92	80-120		
LCS Dup (B6I0057-BSD1)						Prepared & Analyzed: 9/1/2016					
TDS, Total Dissolved Solids	608		5.00	1.78	mg/L	618		98	80-120	7	20
Duplicate (B6I0057-DUP2)		**Source: L6H0408-01**				Prepared & Analyzed: 9/1/2016					
TDS, Total Dissolved Solids	90.0		5.00	1.78	mg/L		94.0			4	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:54

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0185											
Blank (B6I0185-BLK1)						Prepared & Analyzed: 9/1/2016					
Specific conductance	0.00	U,	1.00	0.00	mg/L						
LCS (B6I0185-BS1)						Prepared & Analyzed: 9/1/2016					
Specific conductance	612		1.00	0.00	mg/L	618		99	80-120		
LCS Dup (B6I0185-BSD1)						Prepared & Analyzed: 9/1/2016					
Specific conductance	612		1.00	0.00	mg/L	618		99	80-120	0	20
Duplicate (B6I0185-DUP1)		**Source: L6I0006-01**				Prepared & Analyzed: 9/1/2016					
Specific conductance	176		1.00	0.00	mg/L		176			0	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/13/16 12:54

List of Certifications for FTS Analytical Services - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
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	Estimated Value
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 1 of 1

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: ~~Michelle~~ 3105 Crescent Park Dr
Results Sent to: Michelle Leonard
Email address: michelle.leonard@cardno.com
Contact Phone #: 8133521626 Cell#: same
Project Name (Site): A-4
Project Number (ID): E213001409
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: _____ / _____
Custody Seal(s): Y N Lab Work Order # L6I0006
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	Spec. cond	chlorides	TDS	Container Type	Preservation Code
1	A-4-2	320	8/30/16 14:05	GW		✓	3	1	1	1		
2												
3												
4												
5												
6												
7												
8												
9												
10												

Analysis Requested

	Relinquished By:	Date / Time	Received By:	Date / Time
1)		9/1/16 1615		9/6/16 0954
3)				
5)				

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

L6I0023

Project

A-4

Project Number

E213001409

September 19, 2016
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

September 19, 2016

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

RE: A-4

We are reporting the results of the analyses performed on the samples recieved on 9/1/2016 under the project name referenced above and identified as the lab Work Order L6I0023. 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 L6I0023 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,

Amy Atkins
Senior Project Manager

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/19/16 10:40

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L6I0023-01	A-4-3	Water	31-Aug-2016 07:55	01-Sep-2016 14:37
L6I0023-02	A-4-4	Water	31-Aug-2016 09:15	01-Sep-2016 14:37
L6I0023-03	A-4-6	Water	31-Aug-2016 15:06	01-Sep-2016 14:37

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/19/16 10:40

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-4-3

Lab ID: L6I0023-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**178**		1.00	0.00	mg/L	1	9/2/16 17:10		SM 2510B
TDS, Total Dissolved Solids	**72.0**		5.00	1.78	mg/L	1	9/7/16 16:13		SM 2540C
Chloride	**17.6**		2.00	0.104	mg/L	1	9/2/16 17:47	16887-00-6	EPA 300.0

Sample: A-4-4

Lab ID: L6I0023-02

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**181**		1.00	0.00	mg/L	1	9/2/16 17:10		SM 2510B
TDS, Total Dissolved Solids	**66.0**		5.00	1.78	mg/L	1	9/7/16 16:13		SM 2540C
Chloride	**6.89**		2.00	0.104	mg/L	1	9/2/16 18:05	16887-00-6	EPA 300.0

Sample: A-4-6

Lab ID: L6I0023-03

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**183**		1.00	0.00	mg/L	1	9/2/16 17:10		SM 2510B
TDS, Total Dissolved Solids	**78.0**		5.00	1.78	mg/L	1	9/7/16 16:13		SM 2540C
Chloride	**6.74**		2.00	0.104	mg/L	1	9/2/16 18:24	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/19/16 10:40

Sample Results

Client Sample ID: A-4-3
Lab Sample ID: L6I0023-01 (Water) **Sampled:8/31/16 7:55**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**17.6**		2.00	0.104	mg/L	1	9/2/16 12:50	9/2/16 17:47	16887-00-6
Conductance by Method 2510B									
Specific conductance	**178**		1.00	0.00	mg/L	1	9/2/16 17:10	9/2/16 17:10	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**72.0**		5.00	1.78	mg/L	1	9/7/16 16:13	9/7/16 16:13	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/19/16 10:40

Sample Results
(Continued)

Client Sample ID: A-4-4
Lab Sample ID: L6I0023-02 (Water) **Sampled:8/31/16 9:15**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**6.89**		2.00	0.104	mg/L	1	9/2/16 12:50	9/2/16 18:05	16887-00-6
Conductance by Method 2510B									
Specific conductance	**181**		1.00	0.00	mg/L	1	9/2/16 17:10	9/2/16 17:10	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**66.0**		5.00	1.78	mg/L	1	9/7/16 16:13	9/7/16 16:13	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/19/16 10:40

Sample Results
(Continued)

Client Sample ID: A-4-6
Lab Sample ID: L6I0023-03 (Water) **Sampled:8/31/16 15:06**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**6.74**		2.00	0.104	mg/L	1	9/2/16 12:50	9/2/16 18:24	16887-00-6
Conductance by Method 2510B									
Specific conductance	**183**		1.00	0.00	mg/L	1	9/2/16 17:10	9/2/16 17:10	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**78.0**		5.00	1.78	mg/L	1	9/7/16 16:13	9/7/16 16:13	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/19/16 10:40

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0089											
Blank (B6I0089-BLK1)						Prepared: 9/1/2016 Analyzed: 9/2/2016					
Chloride	0.104	U,	2.00	0.104	mg/L						
LCS (B6I0089-BS1)						Prepared: 9/1/2016 Analyzed: 9/2/2016					
Chloride	19.7		2.00	0.104	mg/L	20.0		98	90-110		
LCS Dup (B6I0089-BSD1)						Prepared: 9/1/2016 Analyzed: 9/2/2016					
Chloride	20.2		2.00	0.104	mg/L	20.0		101	90-110	3	20
Duplicate (B6I0089-DUP1)		**Source: L6I0021-01**				Prepared: 9/1/2016 Analyzed: 9/2/2016					
Chloride	420		2.00	0.104	mg/L		420			0	20
Matrix Spike (B6I0089-MS1)		**Source: L6I0021-01**				Prepared: 9/1/2016 Analyzed: 9/2/2016					
Chloride	439		2.00	0.104	mg/L	20.0	420	93	80-120		
Matrix Spike Dup (B6I0089-MSD1)		**Source: L6I0021-01**				Prepared: 9/1/2016 Analyzed: 9/2/2016					
Chloride	440		2.00	0.104	mg/L	20.0	420	100	80-120	0.3	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/19/16 10:40

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0267											
Blank (B6I0267-BLK1)						Prepared & Analyzed: 9/7/2016					
TDS, Total Dissolved Solids	1.78	U,	5.00	1.78	mg/L						
LCS (B6I0267-BS1)						Prepared & Analyzed: 9/7/2016					
TDS, Total Dissolved Solids	528		5.00	1.78	mg/L	618		85	80-120		
LCS Dup (B6I0267-BSD1)						Prepared & Analyzed: 9/7/2016					
TDS, Total Dissolved Solids	584		5.00	1.78	mg/L	618		94	80-120	10	20
Duplicate (B6I0267-DUP1)		**Source: L6I0021-03**				Prepared & Analyzed: 9/7/2016					
TDS, Total Dissolved Solids	435		5.00	1.78	mg/L		415			5	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/19/16 10:40

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0188											
Blank (B6I0188-BLK1)						Prepared & Analyzed: 9/2/2016					
Specific conductance	0.00	U,	1.00	0.00	mg/L						
LCS (B6I0188-BS1)						Prepared & Analyzed: 9/2/2016					
Specific conductance	611		1.00	0.00	mg/L	618		99	80-120		
LCS Dup (B6I0188-BSD1)						Prepared & Analyzed: 9/2/2016					
Specific conductance	611		1.00	0.00	mg/L	618		99	80-120	0	20
Duplicate (B6I0188-DUP1)		**Source: L6I0023-03**				Prepared & Analyzed: 9/2/2016					
Specific conductance	183		1.00	0.00	mg/L		183			0	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/19/16 10:40

List of Certifications for FTS Analytical Services - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
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 1 of 1

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 3521626 Cell#: same
Project Name (Site): A-4
Project Number (ID): E21300140 9
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: kt / 31°C
Custody Seal(s): Y N Lab Work Order # 46J00
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	Chlorides	spec. cond	Container Type	Preservation Code
							Analysis Requested					
1	A-4-3	360	8/31/16 7:55	GW		√	3	1	1	1		
2	A-4-4	400	8/31/16 9:15	GW		√	3	1	1	1		
3	A-4-5	420	8/31/16 14:04	GW		√	3	1	1	1		
4	A-4-6	440	8/31/16 15:06	GW		√	3	1	1	1		
5	A-4-7	460	8/31/16 15:45	GW		√	3	1	1	1		
6												
7												
8												
9												
10												

1) Relinquished By:	Date / Time 9/1/16 14:37	2) Received By:	Date / Time 9/1/16 1437
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

L6I0067

Project

A-4

Project Number

E213001409

September 29, 2016
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

September 29, 2016

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

RE: A-4

We are reporting the results of the analyses performed on the samples recieved on 9/8/2016 under the project name referenced above and identified as the lab Work Order L6I0067. 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 L6I0067 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,

Amy Atkins
Senior Project Manager

MWBE SDBE
NELAC DoD Accredited

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:00

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L6I0067-01	A-4-8	Water	06-Sep-2016 15:56	08-Sep-2016 08:26

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:00

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-4-8

Lab ID: L6I0067-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**179**		1.00	0.00	mg/L	1	9/8/16 13:04		SM 2510B
TDS, Total Dissolved Solids	**98.0**		5.00	1.78	mg/L	1	9/13/16 15:35		SM 2540C
Chloride	**7.43**		2.00	0.104	mg/L	1	9/8/16 12:38	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:00

Sample Results

Client Sample ID: A-4-8
Lab Sample ID: L6I0067-01 (Water) **Sampled:9/6/16 15:56**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**7.43**		2.00	0.104	mg/L	1	9/8/16 10:46	9/8/16 12:38	16887-00-6
Conductance by Method 2510B									
Specific conductance	**179**		1.00	0.00	mg/L	1	9/8/16 13:04	9/8/16 13:04	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**98.0**		5.00	1.78	mg/L	1	9/13/16 15:35	9/13/16 15:35	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:00

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0243											
Blank (B6I0243-BLK1)						Prepared & Analyzed: 9/8/2016					
Chloride	0.104	U,	2.00	0.104	mg/L						
LCS (B6I0243-BS1)						Prepared & Analyzed: 9/8/2016					
Chloride	18.3		2.00	0.104	mg/L	20.0		91	90-110		
LCS Dup (B6I0243-BSD1)						Prepared & Analyzed: 9/8/2016					
Chloride	18.7		2.00	0.104	mg/L	20.0		93	90-110	2	20
Duplicate (B6I0243-DUP1)		**Source: L6I0067-01**				Prepared & Analyzed: 9/8/2016					
Chloride	7.34		2.00	0.104	mg/L		7.43			1	20
Matrix Spike (B6I0243-MS1)		**Source: L6I0067-01**				Prepared & Analyzed: 9/8/2016					
Chloride	30.2		2.00	0.104	mg/L	20.0	7.43	114	80-120		
Matrix Spike Dup (B6I0243-MSD1)		**Source: L6I0067-01**				Prepared & Analyzed: 9/8/2016					
Chloride	30.5		2.00	0.104	mg/L	20.0	7.43	115	80-120	0.9	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:00

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0549											
Blank (B6I0549-BLK1)						Prepared & Analyzed: 9/13/2016					
TDS, Total Dissolved Solids	1.78	U,	5.00	1.78	mg/L						
LCS (B6I0549-BS1)						Prepared & Analyzed: 9/13/2016					
TDS, Total Dissolved Solids	600		5.00	1.78	mg/L	618		97	80-120		
LCS Dup (B6I0549-BSD1)						Prepared & Analyzed: 9/13/2016					
TDS, Total Dissolved Solids	648		5.00	1.78	mg/L	618		105	80-120	8	20
Duplicate (B6I0549-DUP1)		**Source: L6I0056-01**				Prepared & Analyzed: 9/13/2016					
TDS, Total Dissolved Solids	330		5.00	1.78	mg/L		330			0	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:00

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0215											
Blank (B6I0215-BLK1)						Prepared & Analyzed: 9/8/2016					
Specific conductance	0.00	U,	1.00	0.00	mg/L						
LCS (B6I0215-BS1)						Prepared & Analyzed: 9/8/2016					
Specific conductance	611		1.00	0.00	mg/L	618		99	80-120		
LCS Dup (B6I0215-BSD1)						Prepared & Analyzed: 9/8/2016					
Specific conductance	611		1.00	0.00	mg/L	618		99	80-120	0	20
Duplicate (B6I0215-DUP1)		**Source: L6I0067-01**				Prepared & Analyzed: 9/8/2016					
Specific conductance	179		1.00	0.00	mg/L		179			0	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:00

List of Certifications for FTS Analytical Services - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
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 1 of 1

1412 Tech Blvd, Tampa, FL 33619 (813-620-2000) / 5075 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 #: 813-397-2626 Cell#: [illegible]
Project Name (Site): A-4
Project Number (ID): E21300467
Regulations: FL PRP Dry-Ch ADaPT SC NC DOD RPDES

Receiver's Initials/Temp: 3.2 /
Custody Seal(s): Y N Lab Work Order # L61I0067
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				No. of Containers	Analysis Requested: 1 = TDS, SPC	Analysis Requested: 1 = Chlorides	Container Type	Preservation Code
1	A-4-8	810	9/6/16 1536	GW			2	1	1		
2											
3											
4											
5											
6											
7											
8											
9											
10											

1) Relinquished By: [signature] Date / Time 9/8/16 Received By: [signature] Date / Time 9/8/16 10:30
Delivered by: (Circle One) Fed Ex / UPS / Courier / Lab Pickup / Hand / Other

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

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

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) 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

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: Michelle Leonard
Email address: michelle.leonard@cardno.com
Contact Phone #: 813-352-1626 Cell#: Same
Project Name (Site): A-4
Project Number (ID): E213001409
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: 3.2 / _____
Custody Seal(s): Y N Lab Work Order # L1I0067
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	Analysis Requested: TDS, SPC	Analysis Requested: Chlorides	Container Type	Preservation Code
1	A-4-8	520	9/6/16 15:56	GW		✓	2	1	1		
2											
3											
4											
5											
6											
7											
8											
9											
10											

1) Relinquished By:	Date / Time 9/7/16 6:05	2) Received By:	Date / Time 9/8/16 10:30
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

L6I0087

Project

A-4

Project Number

E213001409

September 29, 2016
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

September 29, 2016

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

RE: A-4

We are reporting the results of the analyses performed on the samples recieved on 9/9/2016 under the project name referenced above and identified as the lab Work Order L6I0087. 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 L6I0087 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,

Amy Atkins
Senior Project Manager

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L6I0087-01	A-4-9	Water	07-Sep-2016 08:29	09-Sep-2016 10:50
L6I0087-02	A-4-10	Water	07-Sep-2016 10:43	09-Sep-2016 10:50
L6I0087-03	A-4-11	Water	07-Sep-2016 12:18	09-Sep-2016 10:50
L6I0087-04	A-4-12	Water	07-Sep-2016 13:50	09-Sep-2016 10:50
L6I0087-05	A-4-13	Water	07-Sep-2016 15:32	09-Sep-2016 10:50

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-4-9

Lab ID: L6I0087-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**179**		1.00	0.00	mg/L	1	9/9/16 11:15		SM 2510B
TDS, Total Dissolved Solids	**98.0**		5.00	1.78	mg/L	1	9/13/16 15:35		SM 2540C
Chloride	**7.16**		2.00	0.104	mg/L	1	9/9/16 16:34	16887-00-6	EPA 300.0

Sample: A-4-10

Lab ID: L6I0087-02

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**187**		1.00	0.00	mg/L	1	9/9/16 11:15		SM 2510B
TDS, Total Dissolved Solids	**112**		5.00	1.78	mg/L	1	9/13/16 15:35		SM 2540C
Chloride	**7.30**		2.00	0.104	mg/L	1	9/9/16 13:55	16887-00-6	EPA 300.0

Sample: A-4-11

Lab ID: L6I0087-03

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**187**		1.00	0.00	mg/L	1	9/9/16 11:15		SM 2510B
TDS, Total Dissolved Solids	**110**		5.00	1.78	mg/L	1	9/13/16 15:35		SM 2540C
Chloride	**7.12**		2.00	0.104	mg/L	1	9/9/16 14:51	16887-00-6	EPA 300.0

Sample: A-4-12

Lab ID: L6I0087-04

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**189**		1.00	0.00	mg/L	1	9/9/16 11:15		SM 2510B
TDS, Total Dissolved Solids	**94.0**		5.00	1.78	mg/L	1	9/13/16 15:35		SM 2540C
Chloride	**7.18**		2.00	0.104	mg/L	1	9/9/16 15:09	16887-00-6	EPA 300.0

Sample: A-4-13

Lab ID: L6I0087-05

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**189**		1.00	0.00	mg/L	1	9/9/16 11:15		SM 2510B
TDS, Total Dissolved Solids	**110**		5.00	1.78	mg/L	1	9/13/16 15:35		SM 2540C
Chloride	**7.11**		2.00	0.104	mg/L	1	9/9/16 15:28	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Sample Results

Client Sample ID: A-4-9
Lab Sample ID: L6I0087-01 (Water) **Sampled:9/7/16 8:29**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**7.16**		2.00	0.104	mg/L	1	9/9/16 9:02	9/9/16 16:34	16887-00-6
Conductance by Method 2510B									
Specific conductance	**179**		1.00	0.00	mg/L	1	9/9/16 11:15	9/9/16 11:15	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**98.0**		5.00	1.78	mg/L	1	9/13/16 15:35	9/13/16 15:35	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Sample Results
(Continued)

Client Sample ID: A-4-10
Lab Sample ID: L6I0087-02 (Water) **Sampled:9/7/16 10:43**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**7.30**		2.00	0.104	mg/L	1	9/9/16 9:02	9/9/16 13:55	16887-00-6
Conductance by Method 2510B									
Specific conductance	**187**		1.00	0.00	mg/L	1	9/9/16 11:15	9/9/16 11:15	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**112**		5.00	1.78	mg/L	1	9/13/16 15:35	9/13/16 15:35	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Sample Results
(Continued)

Client Sample ID: A-4-11
Lab Sample ID: L6I0087-03 (Water) **Sampled:9/7/16 12:18**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**7.12**		2.00	0.104	mg/L	1	9/9/16 9:02	9/9/16 14:51	16887-00-6
Conductance by Method 2510B									
Specific conductance	**187**		1.00	0.00	mg/L	1	9/9/16 11:15	9/9/16 11:15	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**110**		5.00	1.78	mg/L	1	9/13/16 15:35	9/13/16 15:35	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Sample Results
(Continued)

Client Sample ID: A-4-12
Lab Sample ID: L6I0087-04 (Water) **Sampled:9/7/16 13:50**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**7.18**		2.00	0.104	mg/L	1	9/9/16 9:02	9/9/16 15:09	16887-00-6
Conductance by Method 2510B									
Specific conductance	**189**		1.00	0.00	mg/L	1	9/9/16 11:15	9/9/16 11:15	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**94.0**		5.00	1.78	mg/L	1	9/13/16 15:35	9/13/16 15:35	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Sample Results
(Continued)

Client Sample ID: A-4-13
Lab Sample ID: L6I0087-05 (Water) **Sampled:9/7/16 15:32**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**7.11**		2.00	0.104	mg/L	1	9/9/16 9:02	9/9/16 15:28	16887-00-6
Conductance by Method 2510B									
Specific conductance	**189**		1.00	0.00	mg/L	1	9/9/16 11:15	9/9/16 11:15	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**110**		5.00	1.78	mg/L	1	9/13/16 15:35	9/13/16 15:35	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0214											
Blank (B6I0214-BLK1)						Prepared & Analyzed: 9/9/2016					
Chloride	0.104	U,	2.00	0.104	mg/L						
LCS (B6I0214-BS1)						Prepared & Analyzed: 9/9/2016					
Chloride	18.0		2.00	0.104	mg/L	20.0		90	90-110		
LCS Dup (B6I0214-BSD1)						Prepared & Analyzed: 9/9/2016					
Chloride	19.1		2.00	0.104	mg/L	20.0		95	90-110	6	20
Duplicate (B6I0214-DUP1)		**Source: L6I0087-01**				Prepared & Analyzed: 9/9/2016					
Chloride	7.17		2.00	0.104	mg/L		7.16			0.1	20
Matrix Spike (B6I0214-MS1)		**Source: L6I0087-01**				Prepared & Analyzed: 9/9/2016					
Chloride	29.5		2.00	0.104	mg/L	20.0	7.16	112	80-120		
Matrix Spike Dup (B6I0214-MSD1)		**Source: L6I0087-01**				Prepared & Analyzed: 9/9/2016					
Chloride	29.4		2.00	0.104	mg/L	20.0	7.16	111	80-120	0.1	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0549											
Blank (B6I0549-BLK1)						Prepared & Analyzed: 9/13/2016					
TDS, Total Dissolved Solids	1.78	U,	5.00	1.78	mg/L						
LCS (B6I0549-BS1)						Prepared & Analyzed: 9/13/2016					
TDS, Total Dissolved Solids	600		5.00	1.78	mg/L	618		97	80-120		
LCS Dup (B6I0549-BSD1)						Prepared & Analyzed: 9/13/2016					
TDS, Total Dissolved Solids	648		5.00	1.78	mg/L	618		105	80-120	8	20
Duplicate (B6I0549-DUP1)		**Source: L6I0056-01**				Prepared & Analyzed: 9/13/2016					
TDS, Total Dissolved Solids	330		5.00	1.78	mg/L		330			0	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0216											
Blank (B6I0216-BLK1)						Prepared & Analyzed: 9/9/2016					
Specific conductance	0.00	U,	1.00	0.00	mg/L						
LCS (B6I0216-BS1)						Prepared & Analyzed: 9/9/2016					
Specific conductance	610		1.00	0.00	mg/L	618		99	80-120		
LCS Dup (B6I0216-BSD1)						Prepared & Analyzed: 9/9/2016					
Specific conductance	610		1.00	0.00	mg/L	618		99	80-120	0	20
Duplicate (B6I0216-DUP1)		**Source: L6I0087-04**				Prepared & Analyzed: 9/9/2016					
Specific conductance	189		1.00	0.00	mg/L		189			0	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 12:18

List of Certifications for FTS Analytical Services - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
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 1 of 1

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: Michelle Leonard
Email address: Michelle.leonard@cardno.com
Contact Phone #: 813 3521626 Cell#: same
Project Name (Site): A-4
Project Number (ID): E213001409
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: FH / 33°
Custody Seal(s): Y N Lab Work Order # L61008?
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	Analysis Requested: Chloride	Analysis Requested: TDS	Analysis Requested: SPC	Container Type	Preservation Code
1	A-4-9	560	9/7/16 8:29	GW		✓	2	1	1			
2	A-4-10	600	9/7/16 10:43	GW		✓	2	1	1			
3	A-4-11	640	9/7/16 12:18	GW		✓	2	1	1			
4	A-4-12	680	9/7/16 13:50	GW		✓	2	1	1			
5	A-4-13	720	9/7/16 15:32	GW		✓	2	1	1			
6												
7												
8												
9												
10												

1) Relinquished By: Date / Time 9/9/16 10:50
2) Received By: Date / Time 9/9/16 1050
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

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: Michelle Leonard
Email address: michelle.leonard@cardno.com
Contact Phone #: 813-357-1626 Cell#: same
Project Name (Site): A-4
Project Number (ID): E21300409
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: RH / 3.3°
Custody Seal(s): Y N Lab Work Order # 16I0087
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	Analysis Requested: Chloride	Analysis Requested: TDS	Analysis Requested: SPC
1	A-4-9	560	9/7/16 8:29	GW		√	2	1	1	
2	A-4-10	600	9/7/16 10:43	GW		√	2	1	1	
3	A-4-11	640	9/7/16 12:18	GW		√	2	1	1	
4	A-4-12	680	9/7/16 13:50	GW		√	2	1	1	
5	A-4-13	720	9/7/16 15:32	GW		√	2	1	1	
6										
7										
8										
9										
10										

Container Type
Preservation Code

1) Relinquished By: Date / Time 9/9/16 10:50
2) Received By: Date / Time 9/9/16 1050
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

L6I0219

Project

A-4

Project Number

E213001409

September 29, 2016
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

September 29, 2016

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

RE: A-4

We are reporting the results of the analyses performed on the samples recieved on 9/16/2016 under the project name referenced above and identified as the lab Work Order L6I0219. 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 L6I0219 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,

Amy Atkins
Senior Project Manager

MWBE SDBE
NELAC DoD Accredited

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 14:51

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L6I0219-01	A-4-14	Water	14-Sep-2016 13:23	16-Sep-2016 15:00

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 14:51

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-4-14

Lab ID: L6I0219-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
TDS, Total Dissolved Solids	**62.0**		5.00	1.78	mg/L	1	9/19/16 15:09		SM 2540C
Chloride	**7.69**		2.00	0.104	mg/L	1	9/20/16 16:51	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 14:51

Sample Results

Client Sample ID: A-4-14
Lab Sample ID: L6I0219-01 (Water) **Sampled:9/14/16 13:23**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**7.69**		2.00	0.104	mg/L	1	9/20/16 11:08	9/20/16 16:51	16887-00-6
TDS by Method 2540C									
TDS, Total Dissolved Solids	**62.0**		5.00	1.78	mg/L	1	9/19/16 15:09	9/19/16 15:09	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 14:51

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0442											
Blank (B6I0442-BLK1)					Prepared & Analyzed: 9/20/2016						
Chloride	0.104	U,	2.00	0.104	mg/L						
LCS (B6I0442-BS1)					Prepared & Analyzed: 9/20/2016						
Chloride	20.8		2.00	0.104	mg/L	20.0		104	90-110		
LCS Dup (B6I0442-BSD1)					Prepared & Analyzed: 9/20/2016						
Chloride	20.5		2.00	0.104	mg/L	20.0		103	90-110	1	20
Duplicate (B6I0442-DUP1)		**Source: L6I0219-01**			Prepared & Analyzed: 9/20/2016						
Chloride	7.67		2.00	0.104	mg/L		7.69			0.4	20
Matrix Spike (B6I0442-MS1)		**Source: L6I0219-01**			Prepared & Analyzed: 9/20/2016						
Chloride	28.7		2.00	0.104	mg/L	20.0	7.69	105	80-120		
Matrix Spike Dup (B6I0442-MSD1)		**Source: L6I0219-01**			Prepared & Analyzed: 9/20/2016						
Chloride	28.4		2.00	0.104	mg/L	20.0	7.69	103	80-120	1	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 14:51

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0482											
Blank (B6I0482-BLK1)						Prepared & Analyzed: 9/19/2016					
TDS, Total Dissolved Solids	6.00		5.00	1.78	mg/L						
LCS (B6I0482-BS1)						Prepared & Analyzed: 9/19/2016					
TDS, Total Dissolved Solids	508		5.00	1.78	mg/L	618		82	80-120		
LCS Dup (B6I0482-BSD1)						Prepared & Analyzed: 9/19/2016					
TDS, Total Dissolved Solids	620		5.00	1.78	mg/L	618		100	80-120	20	20
Duplicate (B6I0482-DUP1)		**Source: L6I0168-02**					Prepared & Analyzed: 9/19/2016				
TDS, Total Dissolved Solids	64.0		5.00	1.78	mg/L		68.0			6	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	9/29/16 14:51

List of Certifications for FTS Analytical Services - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
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

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)

Page 1 of 1

Company Name: Cardno
Address: 3905 Crescent Park Dr
Results Sent to: Michelle Leonard
Email address: michelle.leonard@cardno.com
Contact Phone #: 813-352-1626 Cell#: same
Project Name (Site): A-4
Project Number (ID): E213001409
Regulatory Program:

Receiver's Initials/Temp: RH / 2.6°
Custody Seal(s): ___ Y N Lab Work Order # L6I0219
P.O.# (if required):
Field Comments / Lab Precautions:
NH3 Chloride and TDS only

Container Type:
Preservation Code:

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

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix (See below)	Composite	Grab	No. of Containers	Analysis Requested: Chloride	Analysis Requested: TDS
1	~~ATT~~ A-4-14	n/a	9/14/16 13:23	GW		✓	2	1	1
2									
3									
4									
5									
6									
7									
8									
9									
10									

1) Relinquished By: Date / Time 15:00
2) Received By: Date / Time 15:00 9/16
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

L6J0311

Project

A-4

Project Number

E213001409

November 04, 2016
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

November 04, 2016

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

RE: A-4

We are reporting the results of the analyses performed on the samples recieved on 10/25/2016 under the project name referenced above and identified as the lab Work Order L6J0311. 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 L6J0311 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,

Amy Atkins
Senior Project Manager

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	11/4/16 13:10

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L6J0311-01	A-4-15	Water	18-Oct-2016 08:15	25-Oct-2016 14:50
L6J0311-02	A-4-16	Water	21-Oct-2016 08:35	25-Oct-2016 14:50

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	11/4/16 13:10

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-4-15

Lab ID: L6J0311-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**154**		1.00	0.00	mg/L	1	10/26/16 13:00		SM 2510B
TDS, Total Dissolved Solids	**68.0**		5.00	1.78	mg/L	1	10/26/16 10:00		SM 2540C
Chloride	**8.55**		2.00	0.104	mg/L	1	10/26/16 22:37	16887-00-6	EPA 300.0

Sample: A-4-16

Lab ID: L6J0311-02

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**150**		1.00	0.00	mg/L	1	10/26/16 13:00		SM 2510B
TDS, Total Dissolved Solids	**70.0**		5.00	1.78	mg/L	1	10/26/16 10:00		SM 2540C
Chloride	**7.12**		2.00	0.104	mg/L	1	10/26/16 22:54	16887-00-6	EPA 300.0

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	11/4/16 13:10

Sample Results

Client Sample ID: A-4-15
Lab Sample ID: L6J0311-01 (Water) **Sampled:10/18/16 8:15**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**8.55**		2.00	0.104	mg/L	1	10/26/16 16:51	10/26/16 22:37	16887-00-6
Conductance by Method 2510B									
Specific conductance	**154**		1.00	0.00	mg/L	1	10/26/16 13:00	10/26/16 13:00	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**68.0**		5.00	1.78	mg/L	1	10/25/16 19:00	10/26/16 10:00	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	11/4/16 13:10

Sample Results
(Continued)

Client Sample ID: A-4-16
Lab Sample ID: L6J0311-02 (Water) **Sampled:10/21/16 8:35**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**7.12**		2.00	0.104	mg/L	1	10/26/16 16:51	10/26/16 22:54	16887-00-6
Conductance by Method 2510B									
Specific conductance	**150**		1.00	0.00	mg/L	1	10/26/16 13:00	10/26/16 13:00	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**70.0**		5.00	1.78	mg/L	1	10/25/16 19:00	10/26/16 10:00	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	11/4/16 13:10

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6K0019											
Blank (B6K0019-BLK1)					Prepared & Analyzed: 10/26/2016						
Chloride	0.104	U,	2.00	0.104	mg/L						
LCS (B6K0019-BS1)					Prepared & Analyzed: 10/26/2016						
Chloride	22.0		2.00	0.104	mg/L	20.0		110	90-110		
LCS Dup (B6K0019-BSD1)					Prepared & Analyzed: 10/26/2016						
Chloride	21.8		2.00	0.104	mg/L	20.0		109	90-110	0.9	20
Duplicate (B6K0019-DUP1)		**Source: L6J0320-08**			Prepared & Analyzed: 10/26/2016						
Chloride	4.25		2.00	0.104	mg/L		4.33			2	20
Matrix Spike (B6K0019-MS1)		**Source: L6J0320-08**			Prepared & Analyzed: 10/26/2016						
Chloride	26.9		2.00	0.104	mg/L	20.0	4.33	113	80-120		
Matrix Spike Dup (B6K0019-MSD1)		**Source: L6J0320-08**			Prepared & Analyzed: 10/26/2016						
Chloride	27.3		2.00	0.104	mg/L	20.0	4.33	115	80-120	2	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	11/4/16 13:10

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6J0578											
Blank (B6J0578-BLK1)					Prepared: 10/25/2016 Analyzed: 10/26/2016						
TDS, Total Dissolved Solids	6.00		5.00	1.78	mg/L						
LCS (B6J0578-BS1)					Prepared: 10/25/2016 Analyzed: 10/26/2016						
TDS, Total Dissolved Solids	100		5.00	1.78	mg/L	100		100	80-120		
LCS Dup (B6J0578-BSD1)					Prepared: 10/25/2016 Analyzed: 10/26/2016						
TDS, Total Dissolved Solids	92.0		5.00	1.78	mg/L	100		92	80-120	8	20
Duplicate (B6J0578-DUP1)		**Source: L6J0311-02**			Prepared: 10/25/2016 Analyzed: 10/26/2016						
TDS, Total Dissolved Solids	76.0		5.00	1.78	mg/L		70.0			8	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	11/4/16 13:10

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6J0556											
Duplicate (B6J0556-DUP1)		**Source: L6J0311-01**			Prepared & Analyzed: 10/26/2016						
Specific conductance	154		1.00	0.00	mg/L		154			0	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	11/4/16 13:10

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
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

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 Dr. Riverview, FL
Results Sent to: Michelle Leonard
Email address: michelle.leonard@cardno.com
Contact Phone #: 813-352-1626 Cell#: —
Project Name (Site): A-4
Project Number (ID): E213001409
Regulatory Program:

Receiver's Initials/Temp: JB / 4.1°
Custody Seal(s): __ Y N Lab Work Order # L6J0311
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 (See below)	Composite	Grab	No. of Containers	Container Type:	Preservation Code:	Analysis Requested: TDS	Chloride	Conductivity
1	A-4-15	N/a	10/18/16 8:15	GW		✓	1			1	1	1
2	A-4-16	N/a	10/21/16 8:35	GW		✓	1			1	1	1
3												
4												
5												
6												
7												
8												
9												
10												

1) Relinquished By: Michelle Leonard Date / Time 10/25/16 14:50
2) Received By: John Burke Date / Time 10/25/16
3) Relinquished By: Date / Time
4) Received By: Date / Time 14:50
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 ; ___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

L6K0176

Project

A-4

Project Number

E213001409

December 06, 2016
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

December 06, 2016

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

RE: A-4

We are reporting the results of the analyses performed on the samples recieved on 11/11/2016 under the project name referenced above and identified as the lab Work Order L6K0176. 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 L6K0176 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,

Amy Atkins
Senior Project Manager

MWBE SDBE
NELAC DoD Accredited

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L6K0176-01	A-4-17	Water	09-Nov-2016 17:33	11-Nov-2016 12:22

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

Hits Summary

(Not Including Subcontracted Analysis)

Sample: A-4-17

Lab ID: L6K0176-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**6010**		1.00	0.00	mg/L	1	11/11/16 16:25		SM 2510B
TDS, Total Dissolved Solids	**3100**		5.00	1.78	mg/L	1	11/16/16 13:00		SM 2540C
Chloride	**789**		20.0	1.04	mg/L	10	12/5/16 13:24	16887-00-6	EPA 300.0
Sulfate	**26.1**		2.00	0.168	mg/L	1	11/15/16 12:40	14808-79-8	EPA 300.0
Alkalinity, Total (as CaCO3)	**119**		2.00	0.500	mg/L	1	11/16/16 17:30		SM 2320B
pH	**8.07**		1.00	1.00	SU	1	11/11/16 16:30		SM 4500-H
Alkalinity, Bicarbonate (as CaCO3)	**119**		2.00	0.500	mg/L	1	11/16/16 17:30		SM 2320B
Calcium	**47600**		500	7.30	ug/L	1	11/17/16 12:22	7440-70-2	EPA 6010C
Magnesium	**49800**		500	5.40	ug/L	1	11/17/16 12:22	7439-95-4	EPA 6010C
Hardness, Total as (Ca + Mg)	**307000**		500	7.30	ug/L	1	11/17/16 12:22		EPA 6010C
Potassium	**27700**		500	2.20	ug/L	1	11/17/16 12:22	9/7/7440	EPA 6010C
Sodium	**405000**		10000	46.0	ug/L	20	11/17/16 13:24	7440-23-5	EPA 6010C

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

Sample Results

Client Sample ID: A-4-17
Lab Sample ID: L6K0176-01 (Water) **Sampled:11/9/16 17:33**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Alkalinity, Total by Method 2320B									
Alkalinity, Total (as CaCO3)	**119**		2.00	0.500	mg/L	1	11/16/16 15:30	11/16/16 17:30	
Alkalinity, Bicarbonate (as CaCO3)	**119**		2.00	0.500	mg/L	1	11/16/16 15:30	11/16/16 17:30	
Anions by Method 300.0									
Chloride	**789**		20.0	1.04	mg/L	10	11/15/16 9:54	12/5/16 13:24	16887-00-6
Sulfate	**26.1**		2.00	0.168	mg/L	1	11/15/16 9:54	11/15/16 12:40	14808-79-8
Conductance by Method 2510B									
Specific conductance	**6010**		1.00	0.00	mg/L	1	11/11/16 16:25	11/11/16 16:25	
pH by Method 4500-H+-B									
pH	**8.07**		1.00	1.00	SU	1	11/11/16 16:30	11/11/16 16:30	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**3100**		5.00	1.78	mg/L	1	11/16/16 13:00	11/16/16 13:00	
Total Metal Analysis by Method 6010C									
Calcium	**47600**		500	7.30	ug/L	1	11/14/16 7:45	11/17/16 12:22	7440-70-2
Iron	3.10	U	100	3.10	ug/L	1	11/14/16 7:45	11/17/16 12:22	7439-89-6
Magnesium	**49800**		500	5.40	ug/L	1	11/14/16 7:45	11/17/16 12:22	7439-95-4
Hardness, Total as (Ca + Mg)	**307000**		500	7.30	ug/L	1	11/14/16 7:45	11/17/16 12:22	
Potassium	**27700**		500	2.20	ug/L	1	11/14/16 7:45	11/17/16 12:22	9/7/7440
Sodium	**405000**		10000	46.0	ug/L	20	11/14/16 7:45	11/17/16 13:24	7440-23-5
Turbidity by Method 180.1									
Turbidity	0.507	U	1.00	0.507	NTU	1	11/11/16 16:20	11/11/16 16:20	

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

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: B6K0254											
Blank (B6K0254-BLK1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
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 (B6K0254-BS1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Calcium	96500		500	7.30	ug/L	100000		97	80-120		
Magnesium	9640		500	5.40	ug/L	10000		96	85-115		
LCS Dup (B6K0254-BSD1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Calcium	96900		500	7.30	ug/L	100000		97	80-120	0.4	20
Magnesium	9680		500	5.40	ug/L	10000		97	85-115	0.4	20
Duplicate (B6K0254-DUP1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Calcium	5070		500	7.30	ug/L		5290			4	20
Magnesium	1280		500	5.40	ug/L		1350			5	20
Hardness, Total as (Ca + Mg)	7.30	U,	500	7.30	ug/L		ND				200
Matrix Spike (B6K0254-MS1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Calcium	103000		500	7.30	ug/L	100000	5290	97	80-120		
Magnesium	11200		500	5.40	ug/L	10000	1350	98	85-115		
Matrix Spike Dup (B6K0254-MSD1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Calcium	103000		500	7.30	ug/L	100000	5290	98	80-120	0.6	20
Magnesium	11100		500	5.40	ug/L	10000	1350	98	85-115	0.3	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

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: B6K0254											
Blank (B6K0254-BLK1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Potassium	2.20	U,	500	2.20	ug/L						
LCS (B6K0254-BS1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Potassium	9330		500	2.20	ug/L	10000		93	80-120		
LCS Dup (B6K0254-BSD1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Potassium	9380		500	2.20	ug/L	10000		94	80-120	0.5	20
Duplicate (B6K0254-DUP1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Potassium	1840		500	2.20	ug/L		1900			3	20
Matrix Spike (B6K0254-MS1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Potassium	11600		500	2.20	ug/L	10000	1900	97	80-120		
Matrix Spike Dup (B6K0254-MSD1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Potassium	11800		500	2.20	ug/L	10000	1900	99	80-120	2	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

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: B6K0254											
Blank (B6K0254-BLK1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Iron	3.10	U,	100	3.10	ug/L						
LCS (B6K0254-BS1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Iron	9370		100	3.10	ug/L	10000		94	80-120		
LCS Dup (B6K0254-BSD1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Iron	9450		100	3.10	ug/L	10000		94	80-120	0.8	20
Duplicate (B6K0254-DUP1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Iron	511		100	3.10	ug/L		545			6	20
Matrix Spike (B6K0254-MS1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Iron	10000		100	3.10	ug/L	10000	545	95	80-120		
Matrix Spike Dup (B6K0254-MSD1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Iron	10000		100	3.10	ug/L	10000	545	95	80-120	0.2	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

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: B6K0254											
Blank (B6K0254-BLK1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Sodium	2.30	U,	500	2.30	ug/L						
LCS (B6K0254-BS1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Sodium	9810		500	2.30	ug/L	10000		98	80-120		
LCS Dup (B6K0254-BSD1)					Prepared: 11/14/2016 Analyzed: 11/17/2016						
Sodium	9830		500	2.30	ug/L	10000		98	80-120	0.2	20
Duplicate (B6K0254-DUP1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Sodium	3350		500	2.30	ug/L		3410			2	20
Matrix Spike (B6K0254-MS1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Sodium	13800		500	2.30	ug/L	10000	3410	103	80-120		
Matrix Spike Dup (B6K0254-MSD1)		**Source: L6K0157-50**			Prepared: 11/14/2016 Analyzed: 11/17/2016						
Sodium	13800		500	2.30	ug/L	10000	3410	104	80-120	0.4	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

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: B6K0351											
Blank (B6K0351-BLK1)					Prepared & Analyzed: 11/16/2016						
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 (B6K0351-BS1)					Prepared & Analyzed: 11/16/2016						
Alkalinity, Total (as CaCO3)	66.0		2.00	0.500	mg/L	69.0		96	90-110		
Alkalinity, Bicarbonate (as CaCO3)	66.0		2.00	0.500	mg/L	69.0		96	90-110		
LCS Dup (B6K0351-BSD1)					Prepared & Analyzed: 11/16/2016						
Alkalinity, Total (as CaCO3)	65.0		2.00	0.500	mg/L	69.0		94	90-110	2	20
Alkalinity, Bicarbonate (as CaCO3)	65.0		2.00	0.500	mg/L	69.0		94	90-110	2	20
Duplicate (B6K0351-DUP1)		**Source: L6K0191-02**			Prepared & Analyzed: 11/16/2016						
Alkalinity, Total (as CaCO3)	108		2.00	0.500	mg/L		107			0.9	20
Alkalinity, Bicarbonate (as CaCO3)	108		2.00	0.500	mg/L		107			1	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

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: B6K0454											
Blank (B6K0454-BLK1)					Prepared & Analyzed: 11/15/2016						
Chloride	0.104	U,	2.00	0.104	mg/L						
LCS (B6K0454-BS1)					Prepared & Analyzed: 11/15/2016						
Chloride	19.9		2.00	0.104	mg/L	20.0		100	90-110		
LCS Dup (B6K0454-BSD1)					Prepared & Analyzed: 11/15/2016						
Chloride	19.7		2.00	0.104	mg/L	20.0		99	90-110	1	20
Duplicate (B6K0454-DUP1)		**Source: L6K0171-02**			Prepared & Analyzed: 11/15/2016						
Chloride	8.44		2.00	0.104	mg/L		8.40			0.5	20
Matrix Spike (B6K0454-MS1)		**Source: L6K0171-02**			Prepared & Analyzed: 11/15/2016						
Chloride	29.0		2.00	0.104	mg/L	20.0	8.40	103	80-120		
Matrix Spike Dup (B6K0454-MSD1)		**Source: L6K0171-02**			Prepared & Analyzed: 11/15/2016						
Chloride	30.5		2.00	0.104	mg/L	20.0	8.40	111	80-120	5	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

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: B6K0454											
Blank (B6K0454-BLK1)					Prepared & Analyzed: 11/15/2016						
Sulfate	0.168	U,	2.00	0.168	mg/L						
LCS (B6K0454-BS1)					Prepared & Analyzed: 11/15/2016						
Sulfate	20.0		2.00	0.168	mg/L	20.0		100	90-110		
LCS Dup (B6K0454-BSD1)					Prepared & Analyzed: 11/15/2016						
Sulfate	20.6		2.00	0.168	mg/L	20.0		103	90-110	3	20
Duplicate (B6K0454-DUP1)		**Source: L6K0171-02**			Prepared & Analyzed: 11/15/2016						
Sulfate	0.291		2.00	0.168	mg/L		0.271			7	20
Matrix Spike (B6K0454-MS1)		**Source: L6K0171-02**			Prepared & Analyzed: 11/15/2016						
Sulfate	23.7		2.00	0.168	mg/L	20.0	0.271	117	80-120		
Matrix Spike Dup (B6K0454-MSD1)		**Source: L6K0171-02**			Prepared & Analyzed: 11/15/2016						
Sulfate	23.2		2.00	0.168	mg/L	20.0	0.271	114	80-120	2	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

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: B6K0349											
Blank (B6K0349-BLK1)					Prepared & Analyzed: 11/11/2016						
Turbidity	0.507	U,	1.00	0.507	NTU						
LCS (B6K0349-BS1)					Prepared & Analyzed: 11/11/2016						
Turbidity	198		1.00	0.507	NTU	200		99	80-120		
LCS Dup (B6K0349-BSD1)					Prepared & Analyzed: 11/11/2016						
Turbidity	198		1.00	0.507	NTU	200		99	80-120	0	20
Duplicate (B6K0349-DUP1)		**Source: L6K0176-01**			Prepared & Analyzed: 11/11/2016						
Turbidity	0.507	U,	1.00	0.507	NTU		ND				20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6K0487											
Blank (B6K0487-BLK1)						Prepared & Analyzed: 11/16/2016					
TDS, Total Dissolved Solids	1.78	U,	5.00	1.78	mg/L						
LCS (B6K0487-BS1)						Prepared & Analyzed: 11/16/2016					
TDS, Total Dissolved Solids	116		5.00	1.78	mg/L	100		116	80-120		
LCS Dup (B6K0487-BSD1)						Prepared & Analyzed: 11/16/2016					
TDS, Total Dissolved Solids	96.0		5.00	1.78	mg/L	100		96	80-120	19	20
Duplicate (B6K0487-DUP1)		**Source: L6K0176-01**				Prepared & Analyzed: 11/16/2016					
TDS, Total Dissolved Solids	3200		5.00	1.78	mg/L		3100			3	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

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: B6K0353											
Duplicate (B6K0353-DUP1)		**Source: L6K0176-01**			Prepared & Analyzed: 11/11/2016						
pH	8.06		1.00	1.00	SU		8.07			0.1	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6K0354											
Duplicate (B6K0354-DUP1)		**Source: L6K0176-01**			Prepared & Analyzed: 11/11/2016						
Specific conductance	5980		1.00	0.00	mg/L		6010			0.5	20

Cardno - Riverview	Project: A-4	
3905 Crescent Park Drive	Project Number: E213001409	**Reported:**
Riverview, FL 33578	Project Manager: Michelle Leonard	12/6/16 13:48

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
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 1 of 1

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, Riverview
Results Sent to: Michelle Leonard
Email address: Michelle.leonard@cardno.com
Contact Phone #: 813-352-1626 Cell#: Same
Project Name (Site): A-4
Project Number (ID): E213001409
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: 3.1 °C
Custody Seal(s): Y N Lab Work Order # L6K0176
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	Analysis Requested: TDS	Ca, Mg, Na, K, Fe, Total Hardness	Cl, SO4, NO3	pH, turb, Spec Cond									Container Type
								P	P	P	P									
								9	2	9	9									Preservation Code
1	A-4-17	N/a	11/9/16 17:33	GW		X	4	1	1	1	1									
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

1) Relinquished By: Date / Time 11/11/16 11:19
2) Received By: Date / Time 11/11/16 11:19
Delivered by: (Circle One)
Fed Ex / UPS / Courier / Lab Pickup / Hand / Other

3) Relinquished By: Date / Time
4) Received By: Date / Time
MSA or FTS terms and conditions apply

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

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

Page 1 of 1

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Receiver's Initials/Temp: 3.1 °C
Custody Seal(s): Y N Lab Work Order # L6K0176
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	Analysis Requested: TDS	Ca, Mg, Na, K, Fe, Total Hardness	Cl, SO4, NO3	pH, turb, Spec Cond	Container Type	Preservation Code
								P	P	P	P		
								9	2	9	9		
1	A-4-17	n/a	11/9/16 17:33	GW		X	4	1	1	1	1		
2													
3													
4													
5													
6													
7													
8													
9													
10													

1) Relinquished By: Date / Time 11/11/16 11:19
2) Received By: Date / Time 11/11/16 11:19
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

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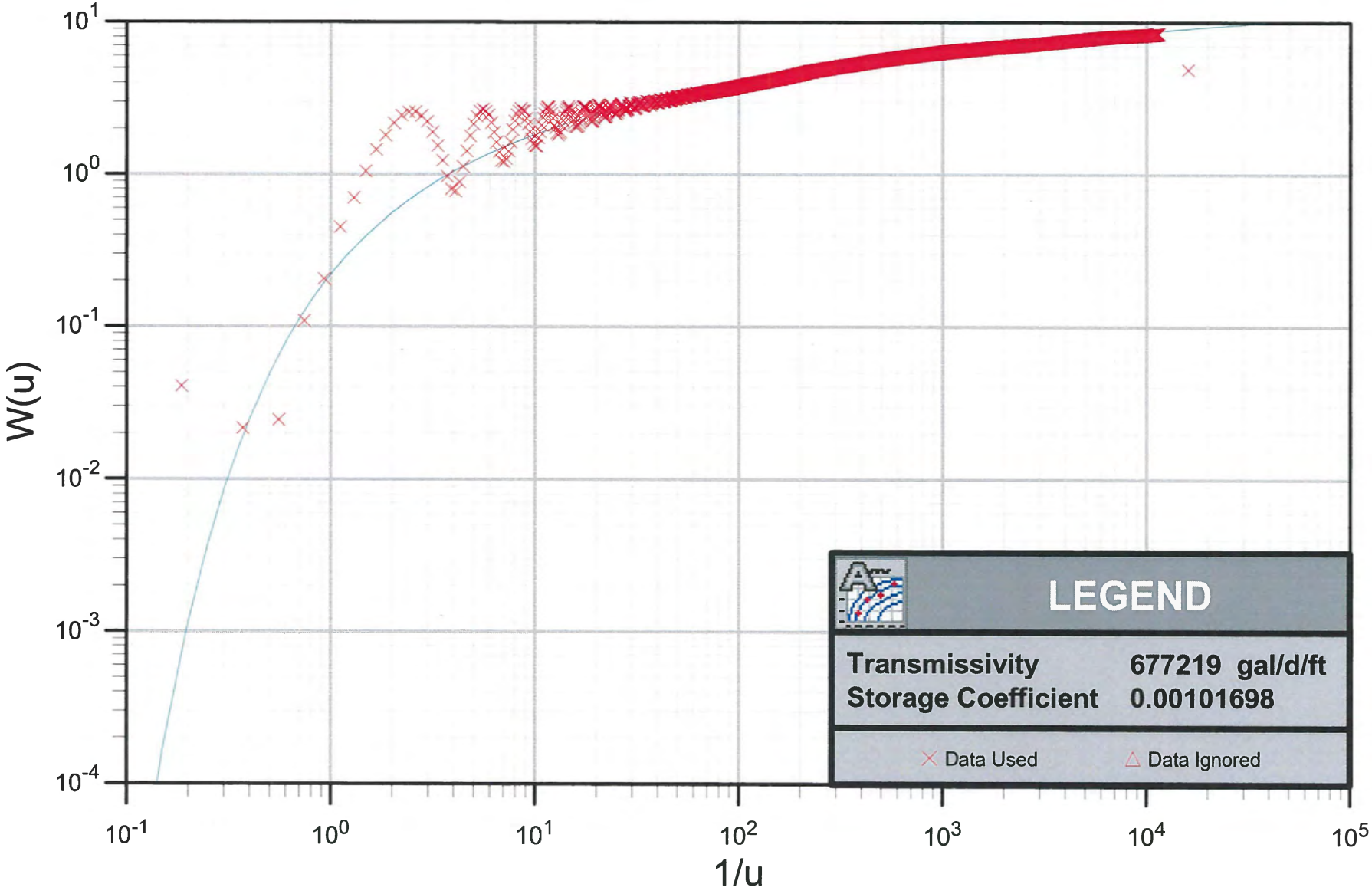
Container Type: VC=Vial (Clear); VA =Vial (Amber); GC=Glass (Clear); GA=Glass (Amber); P=Plastic (HDPE); TB=Tedlar Bag; ES=EnCore Sampler; ZB=Ziploc Bag; O=Other

Region II Well Construction and Testing Report for Site A-4

APPENDIX H

APT RESULTS

Theis


W(u)
1/u
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
LEGEND
Transmissivity 677219 gal/d/ft
Storage Coefficient 0.00101698
Data Used
Data Ignored