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

Northwest Florida Water Management District

E217002103

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Document Information

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Acronyms

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

1 Introduction

The Northwest Florida Water Management District (District) contracted Cardno to oversee exploratory drilling, construction, and testing activities at well site B-2 in support of development of minimum aquifer levels in the District's Planning Region II. The site is located in the southeast corner of the Holley-Navarre Water Systems, Inc. wastewater treatment plant in southern Santa Rosa County on Pepper Drive (Figure 1-1). The land surface elevation at the site ranges from 30 to 35 feet above sea level.

A single well was drilled on site B-2 for long-term monitoring of water quality and water levels in the upper Floridan aquifer. Well construction specifications and materials followed the Invitation to Bid (ITB) document (ITB No. 16B-007) and any deviations were noted and are described in this report.

Initial site conditions were documented during a pre-construction onsite meeting between District representatives, Cardno staff, Navarre Water Systems, Inc. staff, and the project manager and lead driller from Applied Drilling and Engineering, Inc. (Driller). The pre-construction site meeting took place on April 6, 2017. Appendix A provides the photo documentation of the initial site visit by Cardno staff.

Final site conditions were documented on October 09, 2017 after all heavy machinery was demobilized from the site. Appendix B shows the photo documentation of the final site visit by Applied Drilling Engineering (Driller) staff. No unacceptable conditions were noted.

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

2 Site Hydrogeology

Data obtained from Florida Geological Survey wells in the surrounding area and Pratt et al. (1996)[1] were used to anticipate hydrogeologic conditions. Formation descriptions were available for varying depths depending on well construction specifications of the surrounding wells. A detailed lithologic description for a public supply well (NWF 2318) located approximately 1.2 miles north of the project site was available for reference. Site B-2 formation samples were expected to be similar in appearance to the reference well's descriptions. A general description of the regional hydrogeology based on the reference well is provided below.

2.1 Surficial Aquifer

The surficial aquifer is made up of white sand and clay between land surface and 257 feet bls. Highly permeable sand dominates this unit with varying amounts of clay deposits throughout.

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 generally consists of thick clay units interbedded with sand. The Intermediate aquifer occurs between 257 and 832 feet bls.

2.3 Upper Floridan Aquifer

Regionally, the Floridan aquifer is differentiated by a middle confining unit into an upper and lower unit. The exploratory drilling associated with this project is only focused on the upper Floridan aquifer. The upper Floridan aquifer consists of consolidated carbonate sequences and clay that occur between 832 and 1,200 feet bls. These interbedded limestones and dolostones generally have high permeability and are well-indurated. The Bucatunna Clay confining unit is located below 1,200 feet bls and is comprised of clay interbedded with sand and thin limestone layers. The Bucatunna Clay confining unit is the local base of upper Floridan aquifer.

[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 prepared to begin drilling at site B-2 on April 25, 2017. A surficial aquifer monitor well was not constructed at this site. The Driller was able to connect to a nearby fire hydrant at the wastewater treatment plant and used water from the hydrant throughout well construction activities. The drilling rig was a Failing top-drive rig and heavy equipment included a Mud Puppy model MP-170-25C, a Versa-Matic air-operated double-diaphragm pump, portable air compressor, and a John Deere 310J standard backhoe. The air compressor and backhoe were rented from Sunbelt Rentals. As-built drawings for each well are included as Appendix C.

3.2 Long-Term Upper Floridan Monitor (B-2)

The drilling rig was set up over the location of B-2 on April 26, 2017 and a pilot hole 7 ⅞ inches in diameter was advanced to 325 feet bls. Shallow geophysical logs were run on April 27, 2017 and the results were used to specify the depths to which the 24-inch and 18-inch surface casings would be set. Geophysical logs are discussed under Section 4.2.

On May 3, 2017, a 29-inch drill-bit was used to ream the pilot hole to a depth of 63 feet bls. The Driller set and grouted 63 feet of 24-inch diameter steel pit casing. Between May 8 and May 17, 2017, the Driller reamed a 23-inch borehole to 327 feet bls to set 18-inch steel surface casing. On May 18, 2017, as the drillers were setting the 18-inch casing, the pipe became stuck at approximately 285 feet. Attempts to free the pipe with the drilling rig failed and a crane was brought to the site to facilitate pipe removal. While extracting the pipe with the crane, the borehole collapsed preventing further removal. Approximately 126 feet of 18-inch pipe was trapped in the ground. The borehole was declared abandoned and on May 23, 2017 the remaining open annular space and open space within the 18-inch pipe was properly filled with cement to land surface. The drilling rig was moved and set up over a new borehole location.

Due to the presence of buried debris in the shallow subsurface and difficulty drilling in the unconsolidated formation, changes to the well specifications were proposed by the Driller and approved by the District. Between May 24, 2017 and August 15, 2017, the Driller reamed, set and cemented a series of telescoping surface casings through the surficial aquifer and intermediate confining unit, and into the top of the Floridan aquifer. First, the Driller set and cemented 20 feet of 30-inch steel pit casing. Next, a 24-inch steel casing was set to 84 feet bls and cemented in place to prevent destabilization of the sandy formation during deeper drilling in the unconsolidated formation. Then, an 18-inch steel pipe was set to 319 feet bls and cemented in place as a secondary surface casing into the top of the intermediate confining unit. The 18-inch pipe was set using a vibration hammer technique to vibrate the casing down the borehole. Finally, the Driller set and cemented a 12-inch steel pipe as the primary surface casing into the top of the Floridan aquifer at a depth of 800 feet bls. Installation of the surface casing strings progressed slowly as some equipment issues and periodic severe weather conditions caused site activities to be suspended.

Between August 17, 2017 and August 29, 2017, an 11 ⅞-inch diameter pilot hole was drilled by reverse-air from 800 to 1,160 feet bls. Exploratory drilling was completed upon interception of the Bucatunna Clay confining unit (local base of upper Floridan aquifer). The saltwater interface was not encountered during drilling based on in-field water quality analysis that indicated the aquifer to be fresh to the bottom. The upper Floridan aquifer was fully penetrated and the Bucatunna Clay was encountered at 1,160 feet bls. On August 30, 2017, additional geophysical logs were run from the base of the 12-inch diameter surface casing to total depth (see Section 4.2).

On September 6, 2017, an eight-hour Constant Rate Drawdown Test was conducted on B-2 with the 12-inch diameter steel casing and 360-foot open-hole well design. The results of the Constant Rate Drawdown Test are discussed in Section 4.3.

Final construction of B-2 was resumed on September 18, 2017; B-2 was cased to 1,050 feet bls with 6-inch diameter PVC and cleaned out to a total open-hole depth of 1,150 feet bls. On October 3, 2017, a four-hour Step Drawdown Test and final well development were completed. On October 05, 2017, B-2 was completed approximately three feet above grade with a 12-inch diameter steel surface protector and expandable well seal. The surface protector was filled with coarse sand, completed in a 4-ft x 4-ft x 4-in concrete pad and secured with a lock. Concrete filled metal bollards were installed around the concrete pad for additional protection. The surface protector and bollards were painted bright yellow (see Appendix B).

4 Geologic Sampling and Testing

4.1 Lithologic Sampling

Drill cuttings were collected at ten-foot intervals, bagged, and provided to Cardno by the Driller. Cardno staff were on site throughout the exploratory drilling process to observe and note variations in drill speed, rig reactions, and lithologic changes. A hand lens and Munsell Chart were used to determine accurate texture and color of the drill cuttings. The lithologic descriptions for B-2 are presented in Appendix D. The sample cuttings collected were submitted to the Florida Geological Survey for description and formation identification. Significant clay content in the formation over the interval 325 – 370 feet bls produced little to no cuttings in the drilling returns. No cutting samples were collected over this interval. The general lithology is described in Table 4-1 below.

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

Depth Range (feet bls)	Lithology
0-190	sand
190-280	clay
280-310	sand
310-530	clay
530-790	clay/limestone
790-850	limestone
850-870	shell/clay
870-1,140	limestone/shell
1,160 (TD)	clay

Geophysical logging on August 30, 2017 showed the depth of the borehole was 1,160 feet bls. The depths of the lithologic samples may be 20 feet deeper than noted. This is believed to have occurred the week of August 7, 2017 during mud rotary drilling prior to switching to reverse air. The driller tripped rods in and out to total hole depth multiple times over the course of three days trying to clean out the bottom of the borehole. It is during this time that the discrepancy is believed to have occurred. Cardno was not onsite during this process.

4.2 Geophysical Logging

Geophysical logging was performed on well B-2 during initial exploratory drilling to a depth of 325 feet. Advanced Borehole Services ran natural gamma ray, electrical resistivity, dual induction and caliper logs on April 27, 2017, Cardno staff was present for logging. Cardno staff was also on site during additional logging of well B-2 on August 30, 2017 which included logs for natural gamma ray, caliper, electrical resistivity, spontaneous potential, single-point resistance, dual induction, static and pumping water quality, static and dynamic flow, and borehole-compensated sonic/density. The geophysical logs were used in conjunction with lithologic and water quality sampling results to determine final well construction for long term monitoring. Cardno compared the static and pumping water quality logs, which indicate a zone of lower quality water that occurs near 1,125 feet bls and extends to 1,160 ft bls at the bottom of the borehole. Specific conductance values appear to increase from approximately 800 µS/cm to approximately 1,700 µS/cm in this zone. Copies of the geophysical logs are provided in Appendix E.

4.3 Constant Rate and Step Drawdown Tests

The driller performed a constant rate pump test on September 6, 2017 on an open-hole interval of 360 feet to estimate transmissivity of the upper Floridan Aquifer. As part of the final well development, a single step drawdown test was conducted on October 3, 2017 for an open-hole interval of 100 feet. The setups of each aquifer performance test are detailed in the following sections.

4.3.1 Constant Rate Test

The Driller performed an eight-hour constant rate drawdown test on September 6, 2017. As indicated, B-2 was completed with 800 feet of 12-inch diameter steel casing and 360 feet of open hole at the time the constant rate drawdown test was conducted. A 50-horsepower John Deere Quiet Flow centrifugal pump was connected to a 90-degree elbow joint affixed to the top of the well casing with 120 feet of eight-inch diameter pipe in the casing. The discharge from the pump was monitored with a totalizing flow meter. A pretest was performed to determine the maximum sustainable pumping rate. The maximum pumping rate was determined to be 1,500 gallons per minute (gpm). The pump was shutoff and water levels were allowed to recover prior to initiating the constant rate drawdown test.

The constant rate drawdown test consisted of an average pumping rate of 1,200 gpm and the test was conducted for an interval of 8-hours. The initial pumping rate was 1,400 gpm. However, after two hours of pumping, the rate had dropped to approximately 1,200 gpm where it fluctuated between 1,200 and 1,300 gpm for the remainder of the test. Water levels were recorded at an interval of one second on well B-2 using a datalogger with an absolute pressure transducer. A barometric logger recorded atmospheric pressure to allow for the compensation of the absolute water level readings for barometric affects. The datalogger was preprogrammed to continuously record water levels before, during and after the constant rate test. Manual water level measurements were made in B-2 just prior to the start of the test and at 2-hour intervals. The manual water level measurements were within 0.1 ft and 0.2 ft of the pressure transducer readings. Background water level data was analyzed for sinusoidal variations associated with tidal effects on the water levels at the project site. Tidal effects were observed in the background data with maximum fluctuations of approximately 0.4 feet. Fluctuations of this magnitude are minor and would not have an impact on pump test data collected.

The transmissivity of the upper Floridan Aquifer was calculated using “Walton’s Estimate of Transmissivity from Specific Capacity” from the data collected during the B-2 constant rate drawdown test. The transmissivity was estimated using the equation for specific capacity (Q/s); where “Q” is the discharge rate in gpm and “s” is the measured drawdown in feet. A transmissivity is estimated and the specific capacity is calculated based on this value. The equation calculated specific capacity is compared to the field calculated specific capacity and the estimated transmissivity is adjusted until the equation specific capacity and the field derived specific capacity are similar. The water level measurements including the maximum drawdown recorded by the datalogger at the end the test were used to calculate the specific capacity and estimate the transmissivity of well B-2. This was calculated inside of an excel spreadsheet and utilized an estimated storage coefficient of 0.001 for a confined aquifer. Table 4-2 summarizes the drawdown at the end of the test and the specific capacity calculated from the transducer readings. Graphic results of the constant rate drawdown test are provided as Appendix F.

Table 4-2. Summary of B-2 Constant Rate Drawdown Test Results Based on Transducer Readings

Constant Rate Test Interval	Drawdown (feet)	Pumping Rate (gpm)	Specific Capacity (gpm/ft)	Estimated Transmissivity* (gpd/ft)
8 hours	25.9	1,200	47.51	116,300

*Walton, W.C. (1970) Groundwater Resource Evaluation. McGraw Hill Brook Co., New York, 664 p.

4.3.2 Step Drawdown Test

The Driller performed a four-hour, single step drawdown test on October 3, 2017. As indicated, B-2 was completed with 1,050 feet of 6-inch diameter PVC casing and 100 feet of open-hole (final construction parameters) at the time the step drawdown test was conducted. A 15-horsepower Goulds 300L submersible pump was connected to a 90-degree elbow joint affixed to the top of the well casing with 105 feet of four-inch diameter pipe in the casing. The discharge from the pump was monitored with a totalizing flow meter. A pretest was performed to determine the sustainable pumping rate. The maximum pumping rate was determined to be 280 gallons per minute (gpm). The pump was shutoff and water levels were allowed to recover prior to initiating the constant rate drawdown test.

The step drawdown test consisted of two pumping rates that were calculated based on meter readings at the end of each step (153 gpm and 292 gpm) at two hours each. Water levels were recorded at an interval of one second on well B-2 using a datalogger with an absolute pressure transducer. A barometric logger recorded atmospheric pressure to allow for the compensation of the absolute water level readings for barometric affects. The datalogger was preprogrammed to continuously record water levels before, during and after the step test. Manual water level measurements were made in each well just prior to the start of the test and at the end of each step.

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

Table 4-3. Summary of B-2 Step Drawdown Test Results Based on Manual Readings

Step Number	Drawdown (feet)	Pumping Rate (gpm)	Specific Capacity (gpm/foot)
1	9.72	153	15.74
2	28.77	292	10.15

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

Step Number	Drawdown (feet)	Pumping Rate (gpm)	Specific Capacity (gpm/foot)
1	9.79	153	15.63
2	28.74	292	10.16

Results of the constant-rate and step tests indicate that the 12-inch well casing open to the entire thickness of the upper Floridan aquifer had a specific capacity 3 – 4 times greater than that of the final 6-inch well open to the bottom one hundred feet of the same hydrogeologic unit.

4.4 Water Quality Sampling

Samples of produced water from the borehole were collected through the drill stem by reverse-air circulation throughout exploratory drilling. Water samples were collected every 20 feet for testing of field parameters. A total of nine laboratory samples were collected to verify field parameters at some but not all of the same depths (Table 4-4). Initial formation water quality samples collected between 823 ft and 943 ft bls may be influenced by municipal fire hydrant water used to flush out cuttings at those intervals. The borehole was unable to produce water during reverse air drilling at these depths and therefore the municipal fire hydrant was used as a source of makeup water. Field titration chloride values collected of the fire hydrant chase water indicated a chloride concentration of 50 mg/L and a specific conductance value of 271 µS/cm, at 25 degrees Celsius. Field chloride measurements at depths beyond 1,000 ft bls showed no changes in the chloride profile during drilling that would indicate contact with the saltwater-freshwater interface. Laboratory results, summarized in Table 4-5 and provided as Appendix G, confirm that the upper Floridan aquifer is mostly fresh throughout.

Water quality samples were collected at 2-hour intervals during the constant rate drawdown test. Field parameters were run for these samples in addition to collecting laboratory samples to confirm field results (Table 4-6). A total of four samples were collected for laboratory analysis. The field and laboratory results were comparable and did not indicate any water quality changes with an increase in pumping during the test.

Field parameters were monitored during well development and one set of water quality samples were collected at the end of final well development for laboratory analysis. The results of these analyses are summarized in Table 4-7. None of the parameters detected were above regulatory standards except for the pH, the secondary drinking water standard is 6.5 - 8.5 and the value of pH detected in B-2 is 8.71. The pH value of 8.71 is likely caused by extended contact with the carbonate materials found at 1,160 feet bls. Based on field observations and these results, the final well development was determined to be full and complete.

Table 4-5. Drill Stem Water Quality Screening during Exploratory Drilling

Sample ID	Depth (feet)	Field Results			Laboratory Results		
		Temperature (°C)	Specific Conductance (uS/cm)	Chloride (mg/L)	Specific Conductance (uS/cm)	Total Dissolved Solids (mg/L)	Chloride (mg/L)
B2-823FT	823	28.8	305.1	112.5	278	181	26.6
B2-843FT	843	28.8	418.4	75	388	234	41.2
	863	28.5	415.4	77.5			
	883	28.4	484.4	10			
B2-903FT	903	28.0	446.9	86.5	378	257	44.3
B2-923FT	923	27.5	153.6	30	156	97	7.31
B2-943FT	943	27.7	508	50	464	271	21.1
	963	28.3	643	70			
	983	27.8	641	65			
B2-1003FT	1,003	28.5	626	60	569	401	35
	1,023	28.5	615	65			
	1,043	28.1	607	55			
B2-1063FT	1,063	28.9	586	55	547	353	30.6
	1,083	29.0	655	85			
	1,103	29.0	674	85			
B2-1123FT	1,123	28.5	663	75	593	391	41.5
B2-1160FT	1,160	28.0	635	75	517	362	35.2

Notes: As noted in the Section 4.1, the water quality parameters may occur 20 feet deeper than the depths noted in this table. Chloride field values are calculated using manual titration and may not be indicative of lab-tested results. As noted in Section 4.4, the formation water quality samples collected between 823 ft and 943 ft may be influenced by municipal fire hydrant water used to flush out cuttings.

Table 4-6. Borehole Water Quality during Constant Rate Drawdown Testing

Sample ID	Field Results			Laboratory Results	
	Temperature (°C)	Chlorides (mg/L)	Specific Conductance (uS/cm)	Chlorides (mg/L)	Total Dissolved Solids (mg/L)
B2 9:07	29.1	70	721	130	356
B2 11:07	30.4	90	718	130	363
B2 13:07	30.4	76.5	725	130	357
B2 15:07	30.0	72.5	733	129	361

Table 4-7. Borehole Water Quality at End of Final Well Development

B-2	Parameter	Value
Field Results	Temperature (°C)	29.8
	Turbidity (NTU)	0.42
	pH	8.71
	Specific Conductance (µS/cm)	667
Laboratory Results	Specific Conductance (µS/cm)	666
	Total Dissolved Solids (mg/L)	369
	Chloride (mg/L)	78.7
	Turbidity (NTU)	0.507
	Sulfate (mg/L)	7.24
	Total Alkalinity (mg/L)	222
	Alkalinity Bicarbonate (mg/L)	211
	Calcium (mg/L)	2.19 V
	pH	8.71
	Iron (µg/L)	0.00886 I
	Magnesium (mg/L)	1.26
	Total Hardness (mg/L)	10.7
	Potassium (mg/L)	6.86
	Sodium (mg/L)	94

* I – value estimated to be between the Laboratory Detection and Reporting Limit, V – analyte equal to or above detection limit in the method blank.

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APPENDIX A

PRE-CONSTRUCTION PHOTO DOCUMENTATION

Initial Site Visit Photolog

Date Photos Taken: April 06, 2017 Photographer: D. Hire

Well Site: B-2 (Holley-Navarre WWTP)

Complier: D. Kelly

Looking North - Note small pile of debris, soil stockpile, and holding pond.

Meeting group is standing near well location and the chain link fence is on property boundary.

Standing water on the east side of the site at chain link fence.

Looking South - chain link fence on the south property boundary.

Initial Site Visit Photolog **Well Site: B-2 (Holley-Navarre WWTP)**

Date Photos Taken: April 06, 2017 Photographer: D. Hire Complier: D. Kelly

Looking West- back side of WWTP, access road located on the southwest side of WWTP.

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

APPENDIX B

POST-CONSTRUCTION PHOTO DOCUMENTATION

Site close out Photolog **Well Site: B-2 (Holley-Navarre WWTP)**

Date Photos Taken: October 09, 2017 Photographer: J.Sparks Complier: D. Kelly

Looking East - well pad site.

Looking northeast from well pad

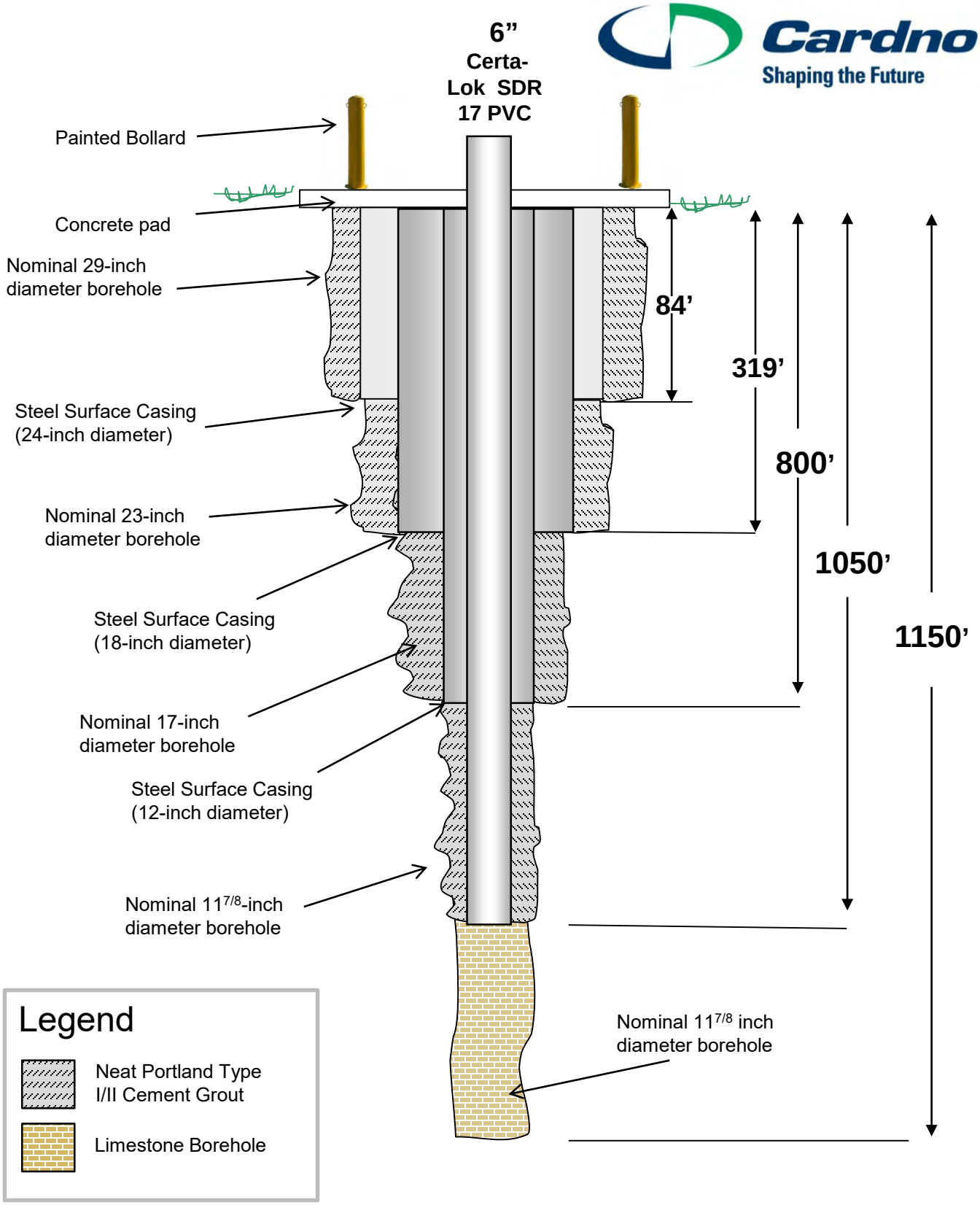
Looking East - Standing water on the east side of the site at chain link fence.

Looking southeast - well pad site.

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

APPENDIX C

AS-BUILT DRAWING OF WELLS



As-Built Well Schematic

B-2: Navarre

Santa Rosa County, Florida

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

APPENDIX D

LITHOLOGIC LOG

Project Name: B-2 Oversight

Project No.: E217002103

Well No.: B-2

Sampling Method: Strainer Collection

Described By: Gary Susdorf, David Kelly, Joshua Yates

Lithology Log

(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
0-30	30	Sand, grayish brown (5YR 3/2), fine to medium grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity, common organics.
30-40	10	Sand, grayish brown (5YR 3/2), fine to medium grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity, abundant fibrous organics, trace shell fragments.
40-50	10	Sand, dusky brown (5YR 2/2), fine to coarse grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity, minor organics, trace shell fragments.
50-60	10	Sand, pale brown (5YR 2/2) to grayish brown (5YR 3/2), fine to coarse grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity, minor organics.
60-70	10	Sand, dark yellowish brown (10YR 4/2), fine to medium grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity.
70-80	10	Sand, pale yellowish brown (10YR 6/2), fine to coarse grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity.
80-100	20	Sand, pale yellowish brown (10YR 6/2), fine to coarse grained, unconsolidated, sub-angular to well-rounded, moderate porosity, trace grayish yellow (5Y 8/4), sandy lime mud.
100-110	10	Sand, pale yellowish brown (10YR 6/2), medium to coarse grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity, minor sandy lime mud, yellowish gray (5Y 7/2), fine to medium grained quartz, low porosity.
110-120	10	Sand, pale yellowish brown (10YR 6/2), medium to coarse grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity, minor sandy lime mud, yellowish gray (5Y 7/2), fine to medium grained quartz, low porosity, minor fine phosphate.
120-160	40	Sand, light olive gray (5Y 5/2), very fine to fine grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity, trace fine phosphate.
160-190	30	Sand, light olive gray (5Y 5/2) to olive gray (5Y 3/2), very fine to fine grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity, trace fine phosphate.
190-200	10	Clayey sand, olive gray (5Y 3/2), very soft, very fine to fine grained quartz, unconsolidated, sub-angular to well-rounded, low porosity, trace coarse grained quartz.
200-210	10	Sandy clay, olive gray (5Y 3/2), very soft, very fine to fine grained quartz, unconsolidated, sub-angular to well-rounded, low porosity, abundant clayey sand as above.

Project Name: B-2 Oversight

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Sampling Method: Strainer Collection

Described By: Gary Susdorf, David Kelly, Joshua Yates

Lithology Log

(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
210-220	10	Sandy clay, olive gray (5Y 3/2), soft, sticky, very fine to fine grained quartz, unconsolidated, sub-angular to well-rounded, low porosity, minor clayey sand as above.
220-240	20	Sandy clay, olive gray (5Y 3/2), slightly stiff, sticky, fine to medium grained quartz, unconsolidated, sub-angular to well-rounded, low porosity.
240-260	20	Sandy clay, olive gray (5Y 3/2), moderately stiff, sticky, fine to coarse grained quartz, unconsolidated, sub-angular to well-rounded, low porosity, minor medium to coarse grained phosphate.
260-270	10	Sandy clay, olive gray (5Y 3/2), moderately stiff, sticky, fine to coarse grained quartz, less coarse fraction than above, unconsolidated, sub-angular to well-rounded, low porosity, minor medium to coarse grained phosphate.
270-280	10	Clayey sand, light olive gray (5Y 5/2), fine to medium grained quartz, unconsolidated, sub-angular to well-rounded, low porosity.
280-300	20	Sand, light olive gray (5Y 5/2), very fine to fine grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity, minor fine phosphate, minor clayey sand as above.
300-310	10	Sand, light olive gray (5Y 5/2) to olive gray (5Y 3/2), very fine to fine grained quartz, unconsolidated, sub-angular to well-rounded, moderate porosity.
310-320	10	Sandy clay, grayish olive green (5GY 3/2), soft, sticky, fine to medium grained quartz, unconsolidated, sub-angular to well-rounded, low porosity, trace shell fragments, minor sand as above
320-325	5	Clay, olive gray (5Y 4/1) to medium dark gray (N4), very stiff, minor fine grained quartz sand. **BOTTOM OF 7 7/8-INCH PILOT HOLE**
325-370	45	Significant clay content in formation over this interval produced little to no cuttings in the drilling fluid returns; no cutting samples collect.
370-380	10	Clay dark greenish gray 5GY 4/1, very fine and soft.
380 - 390	10	Same as above.
390 - 400	10	Clay dark greenish gray 5GY 4/1, very fine and soft, intermixed with shell and greenish gray (5GY 6/1) Mudstone/Wackstone.
400 - 410	10	Clay greenish gray (5GY 6/1) with traces of light olive gray (5Y 5/2) Mudstone/Wackstone and shell.

Project Name: B-2 Oversight

Project No.: E217002103
Well No.: B-2
Sampling Method: Strainer Collection
Described By: Gary Susdorf, David Kelly, Joshua Yates

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
410 - 420	10	Same as above.
420 - 430	10	Same as above.
430 - 440	10	Same as above.
440 - 450	10	Same as above.
450 - 460	10	Clay greenish gray (5GY 6/1) with traces of light olive gray (5Y 5/2) Mudstone/Wackstone and shell.
460 - 470	10	Same as above.
470 - 480	10	Clay greenish gray (5GY 6/1), wackstone light olive gray (5Y 6/1) and shell.
480 - 490	10	Clay greenish gray (5GY 6/1), wackstone dark greenish gray (5GY 4/1) and shell.
490 - 500	10	Same as the above.
500 - 510	10	Clay greenish gray (5GY 6/1), shells, packstone olive gray (5Y 4/1), wackstone light olive gray (5Y 4/1).
510 - 520	10	Clay greenish gray (5Y 6/1) and shells.
520 - 530	10	Same as the above.
530 - 540	10	Wackstone greenish gray (5GY 6/1), shell, wackstone dark greenish gray (5GY 4/1), clay grayish olive (10Y 4/2), quartz.
540 - 550	10	Same as the above.

Project Name: B-2 Oversight

Project No.: E217002103
Well No.: B-2
Sampling Method: Strainer Collection
Described By: Gary Susdorf, David Kelly, Joshua Yates

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
550 - 560	10	Wackstone dark greenish gray (5GY 4/1), shell, clay grayish olive (10Y 4/2), quartz.
560 - 570	10	Wackstone greenish gray (5GY 6/1), shell, clay grayish olive (10Y 4/2), quartz.
570 - 580	10	Wackstone grayish olive (10Y 4/1), wackstone light olive gray (5Y 6/1) clay grayish olive (10Y 4/2).
580 - 590	10	Wackstone grayish olive (10Y 4/1), wackstone light olive gray (5Y 6/1) clay grayish olive (10Y 4/2).
590 - 600	10	Caly / mudstone-wackstone, greenisg grey (5GY 6/1).
600 - 610	10	Same as the above.
620-630	10	Same as the above.
630-640	10	Same as the above.
650-660	10	Little cuttings in reurns, Same as above: Caly / mudstone-wackstone, greenisg grey (5GY 6/1).
660-670	10	Same as above.
680-690	10	Same as above.
700-710	10	Same as above.
720-730	10	Clay / mudstone-wackstone, greenish grey (5GY 6/1).
740-750	10	Clay / mudstone-wackstone, greenish grey (5GY 6/1).

Project Name: B-2 Oversight

Project No.: E217002103
Well No.: B-2
Sampling Method: Strainer Collection
Described By: Gary Susdorf, David Kelly, Joshua Yates

Lithology Log
(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
750-760	10	Greenish Grey wackstone (5GY 6/1) with minor pinkish carbonate flakes (5yr 8/1).
770-780	10	Greenish Grey wackstone (5GY 6/1) with some pinkish carbonate flakes (5yr 8/1).
790-800	10	Same as above. Note at 795 ft. significant vibration on rig, hitting hard rock.
810-820	10	Limestone. Light olive grey (5y/G1), some clay yellowish grey (5y/81).
820-830	10	Limestone well indurated (5y/G1), some shell fragments.
830-840	10	Same as above.
850-860	10	Shell layer layer with some silty clay, lellowish grey (5Y / 81).
860-870	10	Shell layer layer with some silty clay, lellowish grey (5Y / 81).
870-880	10	Angular limestone well indurated (5y/4/1), olive grey.
880-890	10	Angular limestone well indurated (5y/4/1), olive grey.
890-900	10	Angular limestone well indurated (5y/4/1), olive grey with some clay, olive gray (5Y 4/1).
900 - 910	10	Yellowish gray (5Y 8/1) grainstone, low porosity and low induration, friable. Light olive gray (5Y 6/1) clay, white clay (N8), clay and shell.
910 - 920	10	Yellowish gray (5Y 8/1) grainstone, low - poor induration, fossiliferous, sub-angular. Light gray (N7) clay.
920 - 930	10	Light gray grainstone (N7), poor induration, sub-angular. Yellowish gray (5Y 8/1) grainstone, poor induration, sub-angular, shells.
930 - 940	10	Light gray grainstone (N7), poor induration, very small particles, almost sand sized. Yellowish gray (5Y 8/1) grainstone also very fine. Cuttings becoming larger as hole is cleaned out.

Project Name: B-2 Oversight

Project No.: E217002103

Well No.: B-2

Sampling Method: Strainer Collection

Described By: Gary Susdorf, David Kelly, Joshua Yates

Lithology Log

(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
940 - 950	10	Yellowish gray (5Y 8/1) grainstone, angular, poor induration. Very light gray (N8) grainstone, angular, moderate to poor induration.
950 - 960	10	Yellowish gray (5Y 8/1) grainstone, angular, poor to moderate induration, fossiliferous, shell.
960 - 970	10	very pale orange (10 YR 8/1) Calcite. Light gray (N7) packstone, fossiliferous, good porosity, angular to sub-angular. Yellowish gray (5Y 8/1) grainstone, sub-angular.
970 - 980	10	Light greenish gray (5Y 8/1) packstone, angular, fossiliferous, well indurated. Light gray (N7) wackstone, sub-angular, well indurated. Light olive gray (5Y6/1) dolostone, angular, moderate to poor induration.
980 - 990	10	Very light gray (N8) packestone, fossiliferous, angular to sub-angular, moderate induration, moderate porosity, fossilized shells.
990 - 1000	10	Very light gray (N8) clay. Yellowish gray (5Y 8/1) fossilized coral. Yellowish gray (5Y 8/1) grainstone, sub-angular, moderate porosity, moderate induration.
1000 - 1010	10	Yellowish gray (5Y 8/1) grainstone, sub-angular, fossiliferous, high porosity. Greenish gray (5Y 6/1) packstone fossiliferous, sub-angular, moderate porosity.
1010 - 1020	10	Yellowish gray (5Y 8/1) grainstone, fossiliferous, sub-angular, high porosity, poor induration.
1020 - 1030	10	Yellowish gray (5Y 8/1) grainstone, fossiliferous, sub-angular, high porosity. Light gray (N8) grainstone fossiliferous, high porosity.
1030 - 1040	10	Greenish gray (5Y 8/1) packstone, highly fossiliferous, high porosity, sub-angular. Shells and fossils.
1040 - 1050	10	Same as the above.
1050 - 1060	10	Very heterogenous, yellowish gray (5Y 8/1) grainstone, fossiliferous, poor induration, high porosity. Very light gray (N8) grainstone, fossiliferous, high porosity, moderate induration. Yellowish gray (5Y 8/1) calcite. Yellowish gray (5Y 8/1) dolostone. Pale olive (10Y 6/2) clay, shell.
1060 - 1070	10	Yellowish gray (5Y 8/1) dolomitic limestone, very cemented, fossiliferous, high porosity. Very light gray (N8) grainstone, high porosity, moderate induration, shell.
1070 -1080	10	Same as above. Note at 795 ft. significant vibration on rig, hitting hard rock.
1080 -1090	10	Pale olive (10Y 6/2) grainstone, highly cemented, fossiliferous, high porosity. Light greenish (5GY 8/1), Yellowish gray (5Y 8/1) dolomitic limestone, highly fossiliferous, high porosity.

Project Name: B-2 Oversight

Project No.: E217002103

Well No.: B-2

Sampling Method: Strainer Collection

Described By: Gary Susdorf, David Kelly, Joshua Yates

Lithology Log

(Drill Cuttings)

Depth Interval (feet bpl)	Thickness (feet)	Sample Description
1090 - 1100	10	Pale olive (10Y 6/2) dolomitic limestone, highly cemented, fossiliferous, high porosity. Light greenish (5GY 8/1) to Yellowish gray (5Y 8/1) dolomitic limestone, highly fossiliferous, high porosity, highly cemented. Shells.
1100 - 1110	10	Pale olive (10Y 6/2) dolomitic limestone, highly cemented, fossiliferous, high porosity, moderate induration.
1110 - 1120	10	Grayish yellow (5Y 6/1) and light olive gray (5Y 8/4) dolomitic limestone, highly cemented, fossiliferous, high porosity, moderate induration.
1120-1130	10	Dolomitic limestone, light olive gray (5Y 6/1) to olive gray (5Y 4/1), well lithified, common yellowish gray (5Y 8/1) limestone, minor moldic porosity, minor shell, good apparent permeability and porosity.
1130-1140	10	Dolomitic limestone as above, common yellowish gray (5Y 8/1) to very pale orange (10YR 8/2) limestone, minor moldic porosity, common shell, trace echinoderm fragments, trace light olive gray (5Y 5/2) moderately stiff clay good apparent permeability and porosity.
1160	--	Clay, olive gray (5Y 4/1) very stiff, resistant to penetration with bit present at base of borehole. BOTTOM OF 11 7/8-INCH BOREHOLE

Note: Geophysical logging on August 30, 2017 showed the depth of the borehole was 1160 feet bls. The depths of the lithologic samples may be 20 feet deeper than noted. This is believed to have occurred the week of August 7, 2017 during mud rotary drilling prior to switching to reverse air when Cardno wasn't onsite. The drillers tripped in and out of the hole multiple times over the course of three days.

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

APPENDIX E

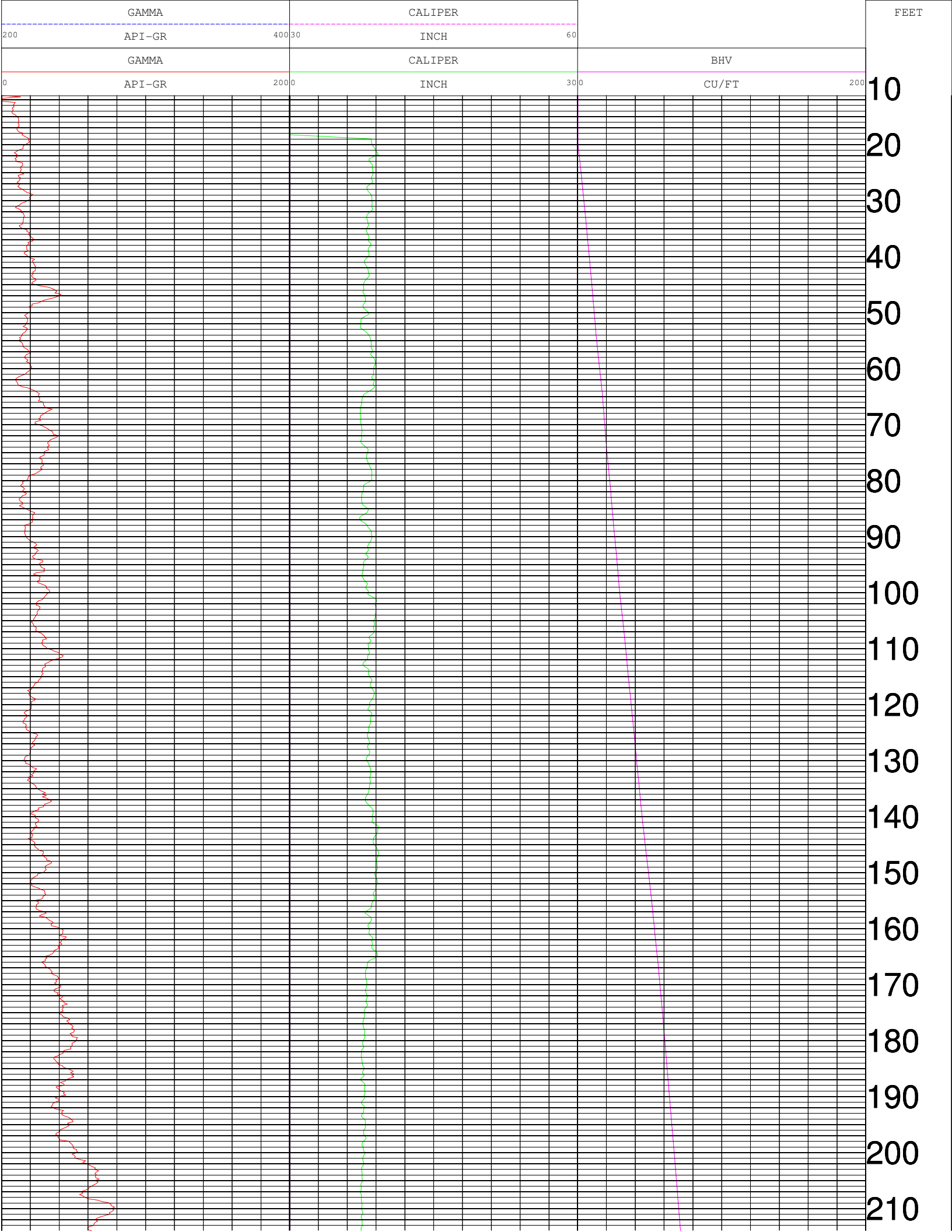
GEOPHYSICAL LOGS

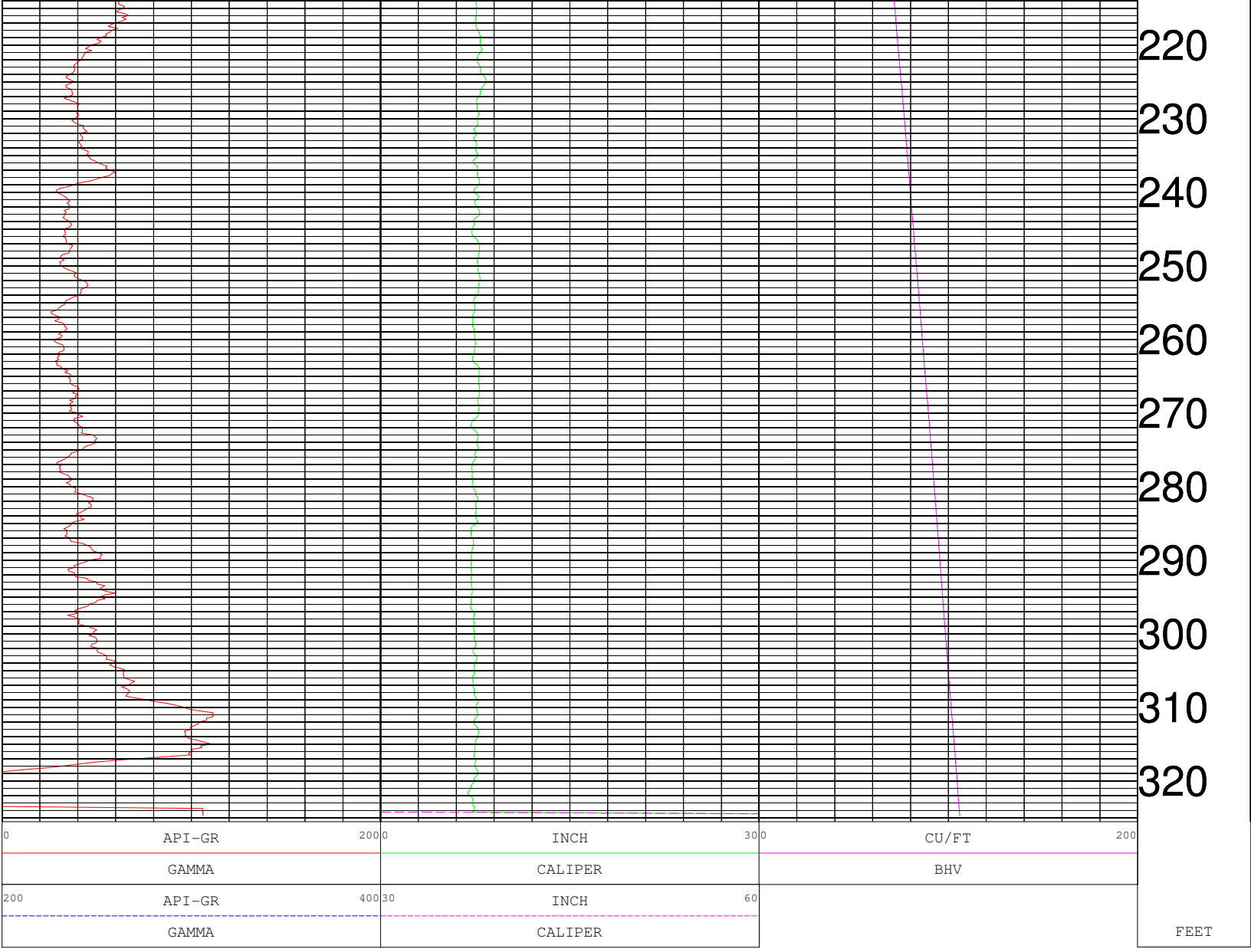
ABS
Advanced Borehole Services

GAMMA RAY (API)-CALIPER
BH-VOLUME
WELL B-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: PILOT
WELL	: WELL B-2	
FIELD	: NAVARRE	
COUNTY	: SANTA ROSA	
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	: 04/27/17		
DEPTH DRILLER	: 325		
BIT SIZE	: 6		
LOG TOP	: 11.25		
LOG BOTTOM	: 325.25		
CASING OD	:		
CASING BOTTOM	: 0		
CASING TYPE	: NA		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		


GAMMA
200
API-GR
400
CALIPER
30
INCH
60
FEET
GAMMA
0
API-GR
200
CALIPER
0
INCH
30
BHV
0
CU/FT
200
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210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230
240
250
260
270
280
290
300
310
320
0
API-GR
200
GAMMA
0
INCH
30
CALIPER
0
CU/FT
200
BHV
200
API-GR
400
GAMMA
30
INCH
60
CALIPER
FEET

TOOL CALIBRATION WELL B-2 04/27/17 13:23
TOOL 9074A1 TM VERSION 0
SERIAL NUMBER 857

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

ABS

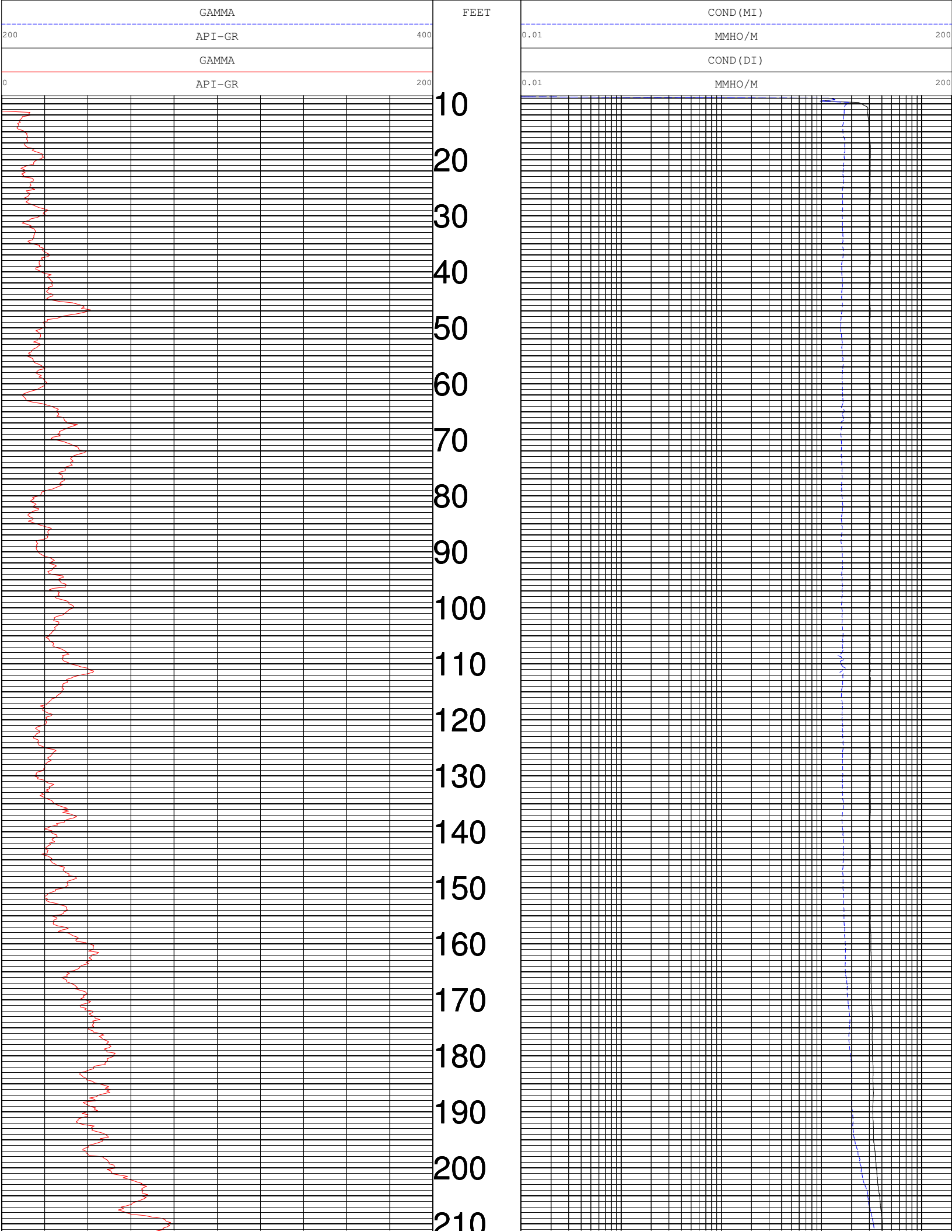
Advanced Borehole Services

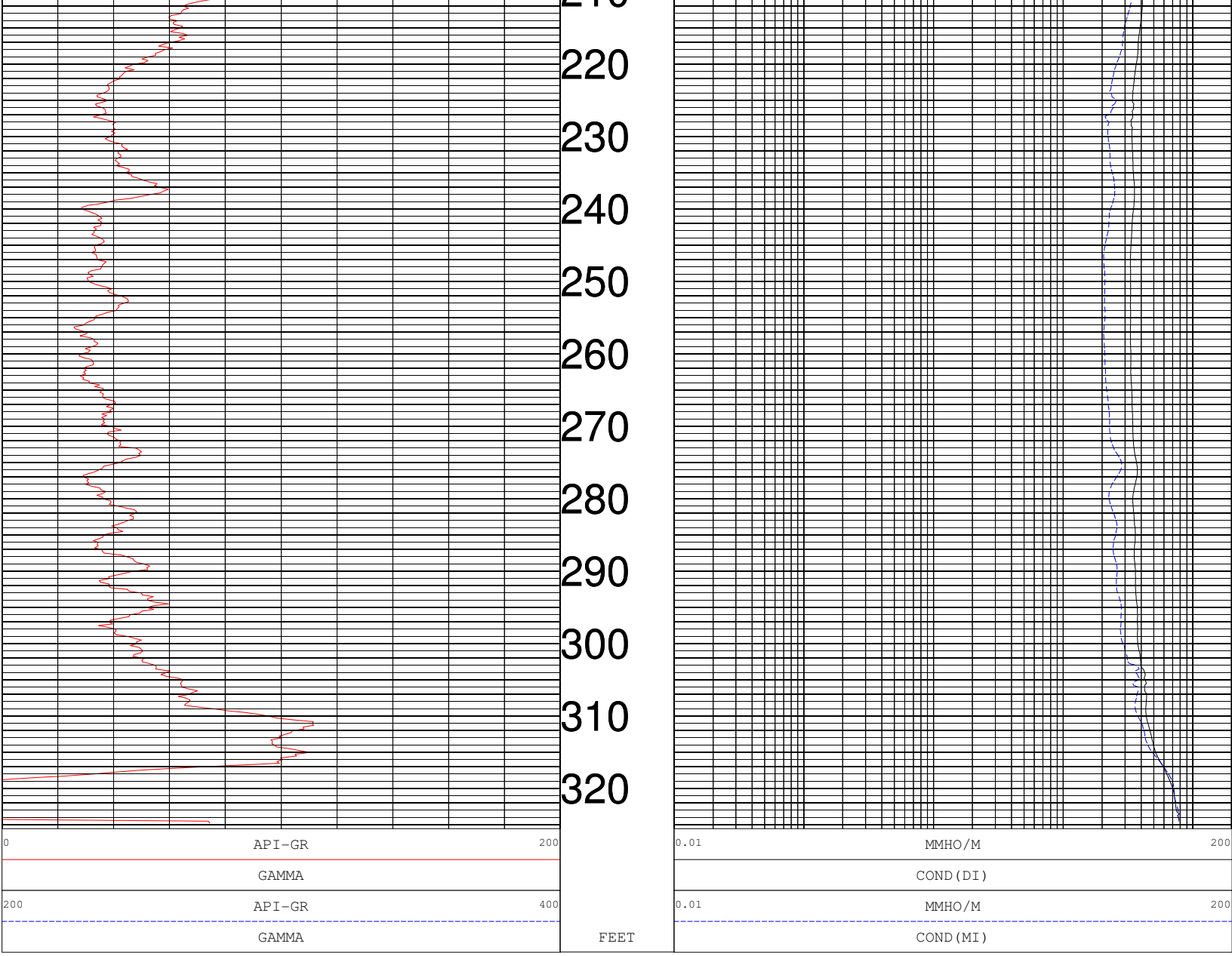
DUAL INDUCTION-GAMMA RAY

WELL B-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: PILOT
WELL	: WELL B-2	
FIELD	: NAVARRE	
COUNTY	: SANTA ROSA	
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	: 04/27/17		
DEPTH DRILLER	: 325		
BIT SIZE	: 6		
LOG TOP	: 8.52		
LOG BOTTOM	: 325.25		
CASING OD	:		
CASING BOTTOM	: 0		
CASING TYPE	: NA		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		


GAMMA
200
API-GR
400
GAMMA
0
API-GR
200
FEET
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
COND(MI)
0.01
MMHO/M
200
COND(DI)
0.01
MMHO/M
200


220
230
240
250
260
270
280
290
300
310
320
0
API-GR
200
GAMMA
200
API-GR
400
GAMMA
FEET
0.01
MMHO/M
200
COND(DI)
0.01
MMHO/M
200
COND(MI)

ABS

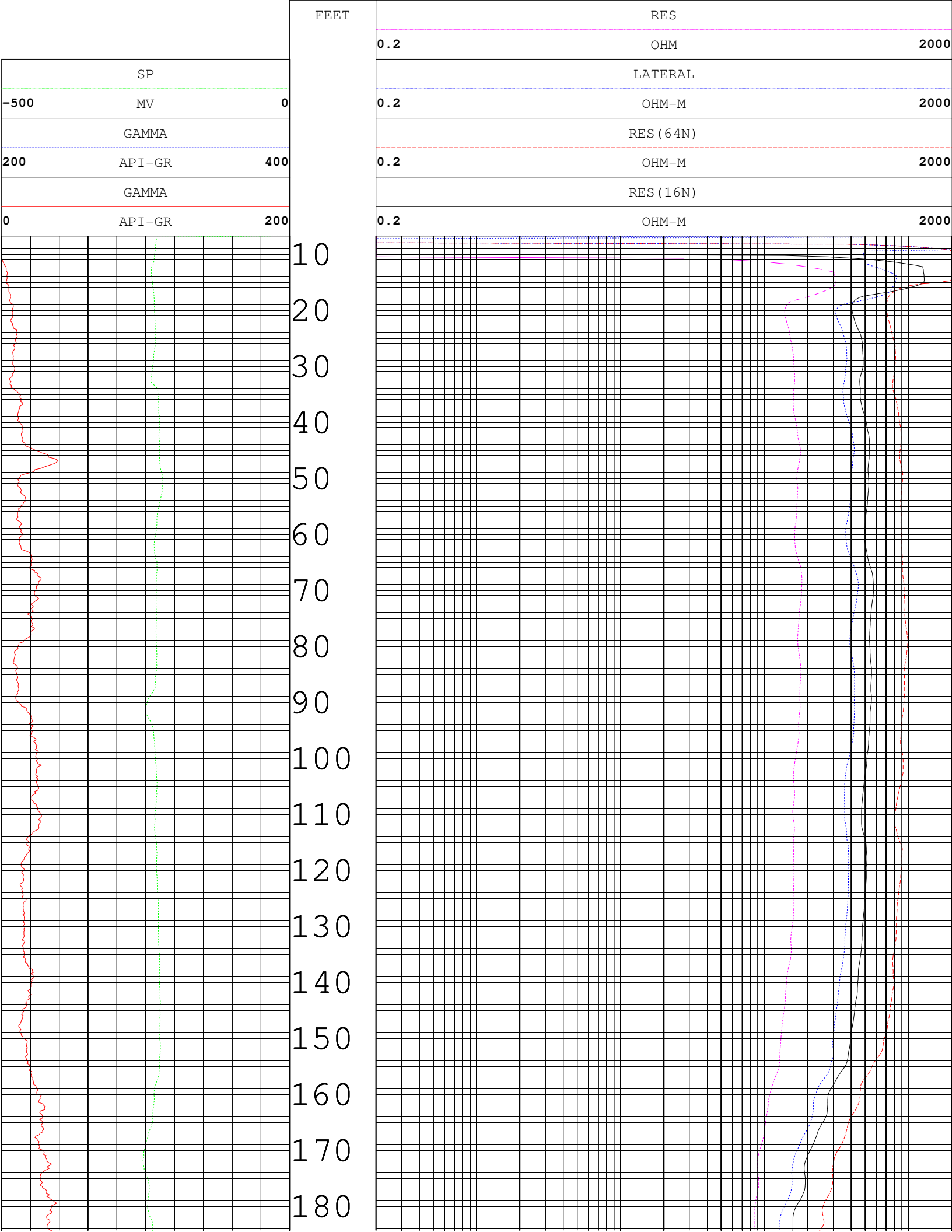
Advanced Borehole Services

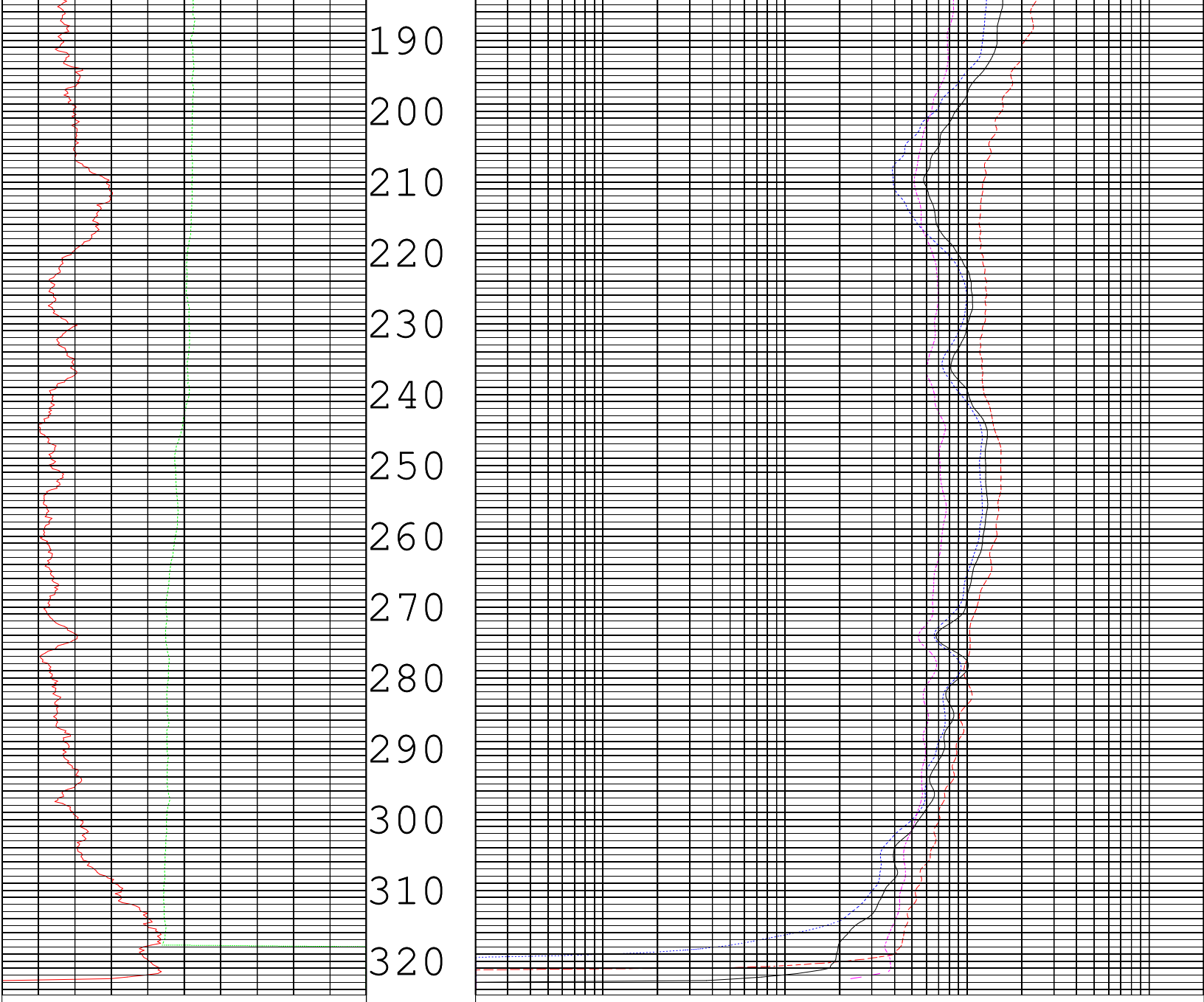
GAMMA RAY-RESISTIVITY (16-64)

WELL B-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES: PILOT
WELL	: WELL B-2	
FIELD	: NAVARRE	
COUNTY	: SANTA ROSA	
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	: 04/27/17		
DEPTH DRILLER	: 325		
BIT SIZE	: 6		
LOG TOP	: 6.75		
LOG BOTTOM	: 324.50		
CASING OD	:		
CASING BOTTOM	: 0		
CASING TYPE	: NA		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		


FEET
SP
-500
MV
0
GAMMA
200
API-GR
400
GAMMA
0
API-GR
200
RES
0.2
OHM
2000
LATERAL
0.2
OHM-M
2000
RES(64N)
0.2
OHM-M
2000
RES(16N)
0.2
OHM-M
2000
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180



0	API-GR	200
	GAMMA	
200	API-GR	400
	GAMMA	
-500	MV	0
	SP	

FEET

0.2	OHM-M	2000
	RES(16N)	
0.2	OHM-M	2000
	RES(64N)	
0.2	OHM-M	2000
	LATERAL	
0.2	OHM	2000
	RES	

TOOL CALIBRATION WELL B-2 04/27/17 12:14
TOOL 8044A TM VERSION 0
SERIAL NUMBER 938

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

ABS

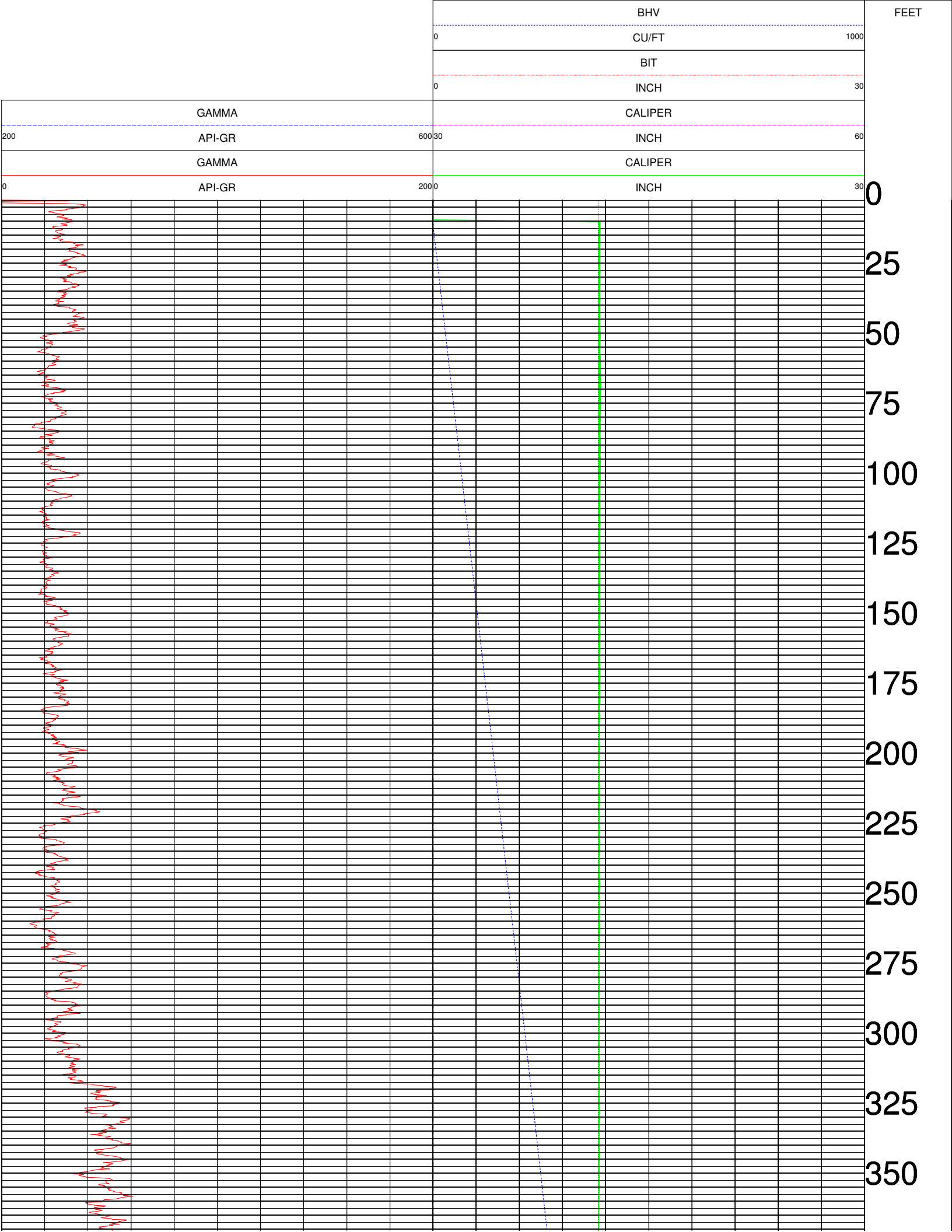
Advanced Borehole Services

GAMMA RAY (API)-CALIPER

WELL B-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL B-2	9074
FIELD	: NAVARRE	8044
COUNTY	: SANTA ROSA	
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	: 08/31/17		
DEPTH DRILLER	: 1140		
BIT SIZE	: 6		
LOG TOP	: 2.50		
LOG BOTTOM	: 1161.50		
CASING OD	:		
CASING BOTTOM	: 800		
CASING TYPE	: STEEL		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		


BHV
0
CU/FT
1000
BIT
0
INCH
30
FEET
GAMMA
CALIPER
200
API-GR
600
30
INCH
60
GAMMA
CALIPER
0
API-GR
200
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INCH
30
0
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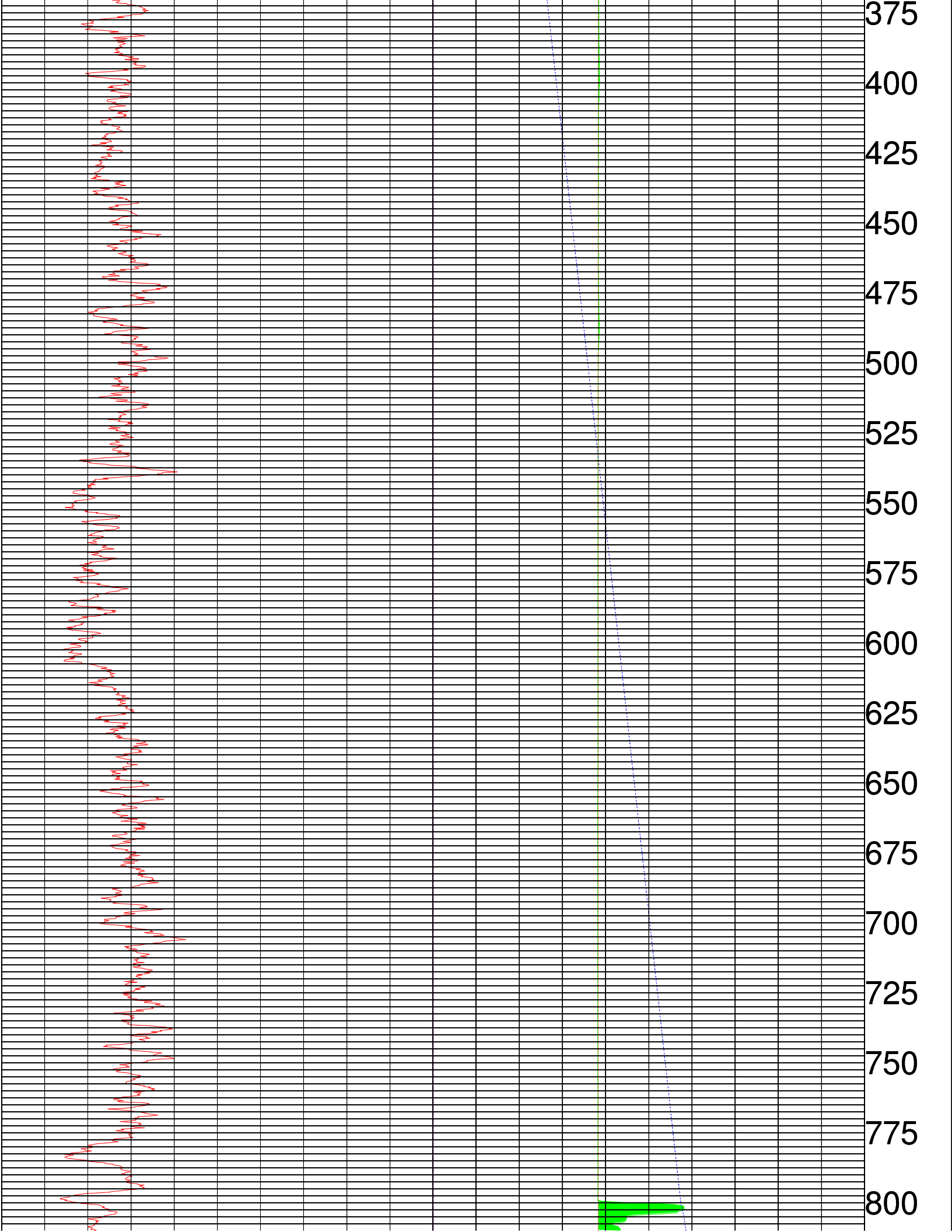
50
75
100
125
150
175
200
225
250
275
300
325
350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425
450
475
500
525
550
575
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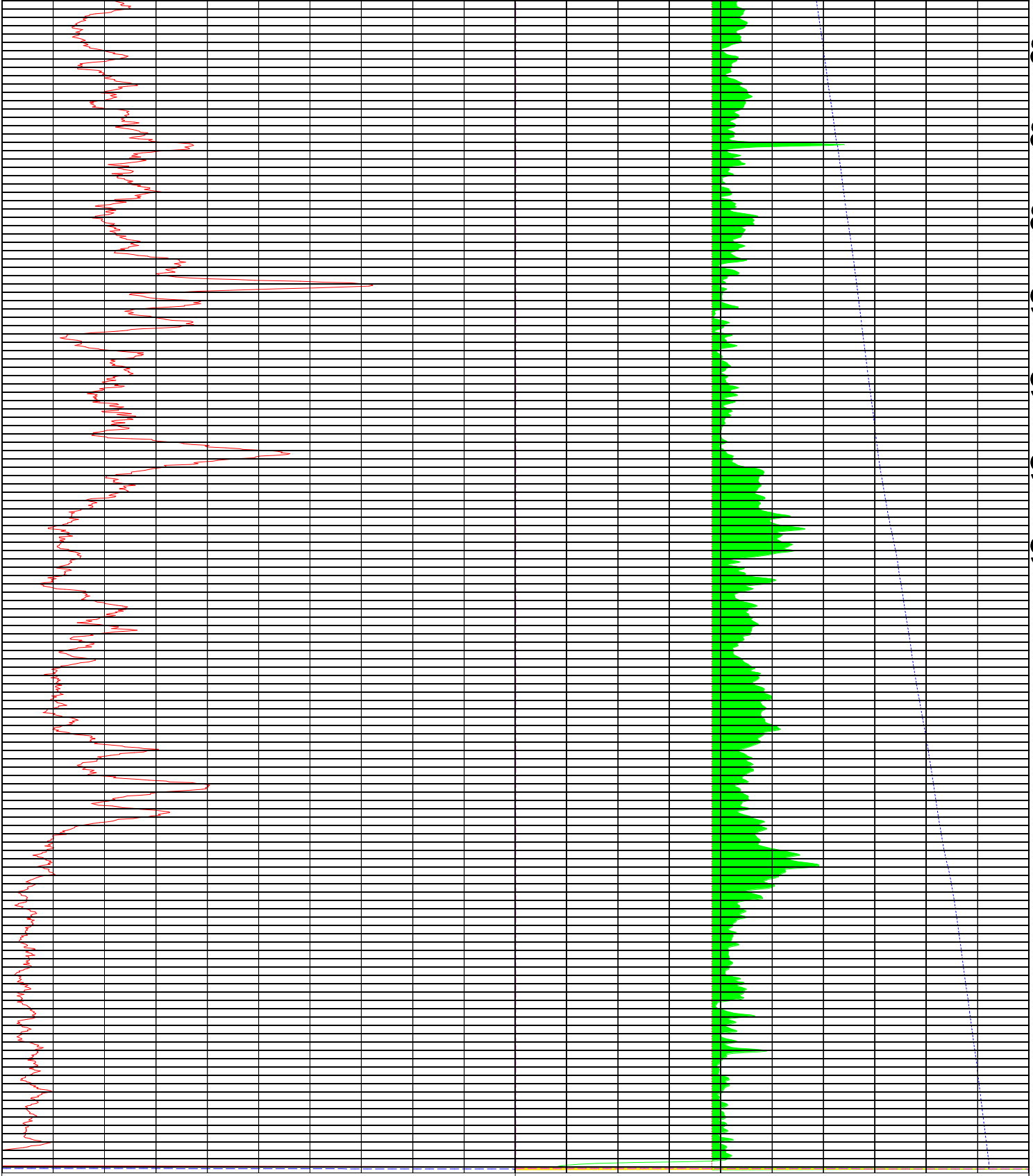
625
650
675
700
725
750
775
800



0	API-GR	200	0	INCH 30
	GAMMA			CALIPER
200	API-GR	600	30	INCH 60
	GAMMA			CALIPER
			0	INCH 30
				BIT
			0	CU/FT 1000
				BHV

FEET

TOOL CALIBRATION WELL B-2 08/31/17 01:49
TOOL 9074A1 TM VERSION 0
SERIAL NUMBER 857

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Aug05,17	21:37:02	GAMMA	Default	[CPS]	Default	[CPS]
	Aug05,17	18:37:02	GAMMA	180.000	[API-GR]	174.00	[CPS]
2	May11,17	21:01:04	CALIPER	3.000	[INCH]	156245.00	[CPS]
	May11,17	21:01:04	CALIPER	5.000	[INCH]	150790.00	[CPS]
3	Jul24,17	19:08:46	CALIPERL	8.000	[INCH]	148917.00	[CPS]
	Jul24,17	19:08:46	CALIPERL	35.500	[INCH]	86954.00	[CPS]
4	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]
	Dec13,00	22:19:45	CALIPERX	Default	[CPS]	Default	[CPS]

ABS

Advanced Borehole Services

FULL WAVE BHC ACOUSTIC-VDL

WELL B-2

COMPANY	:	APPLIED DRILLING ENGINEERING
WELL	:	WELL B-2
FIELD	:	NAVARRE
COUNTY	:	SANTA ROSA
STATE	:	FLORIDA

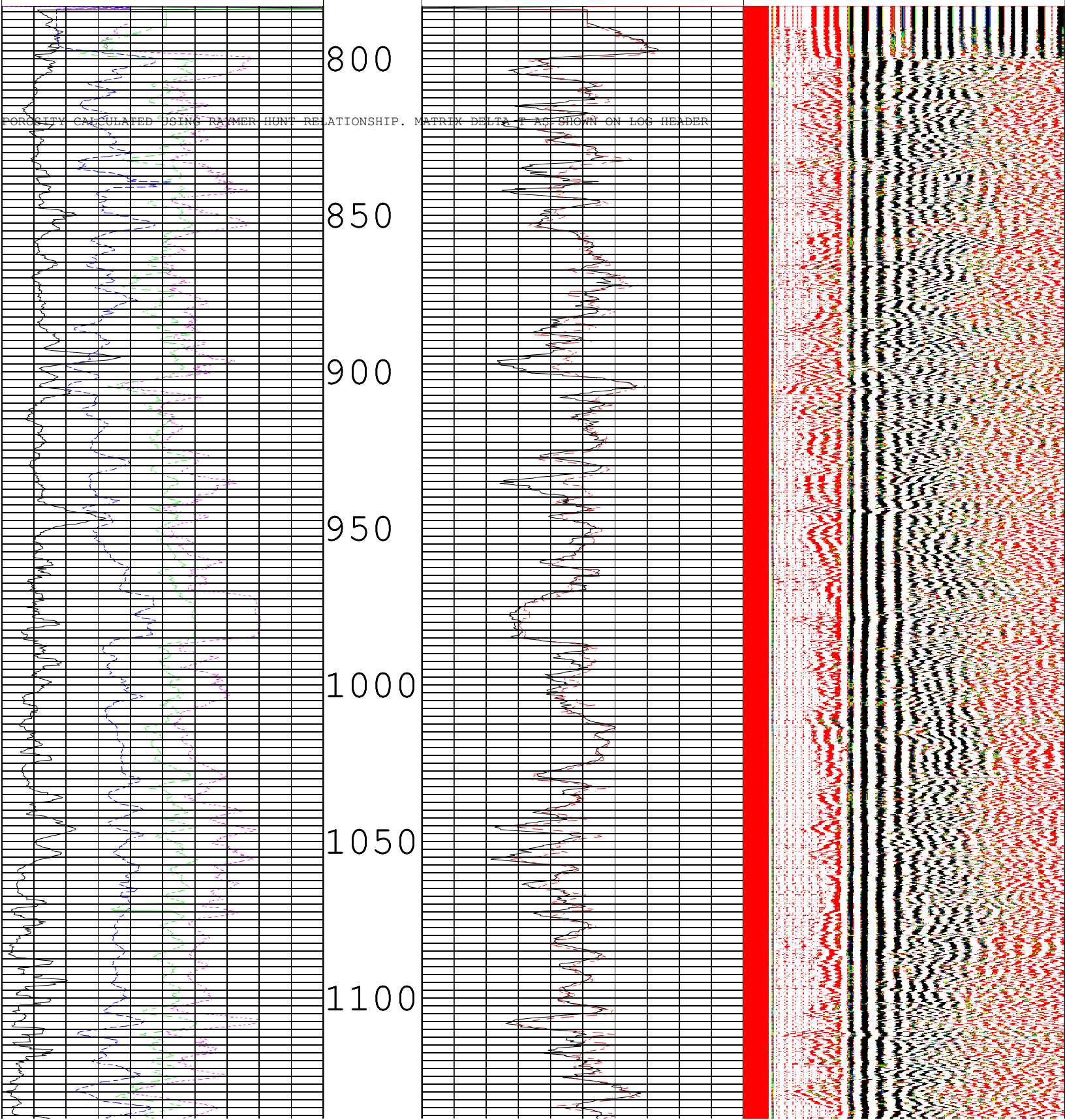
OTHER SERVICES:
9074
8044

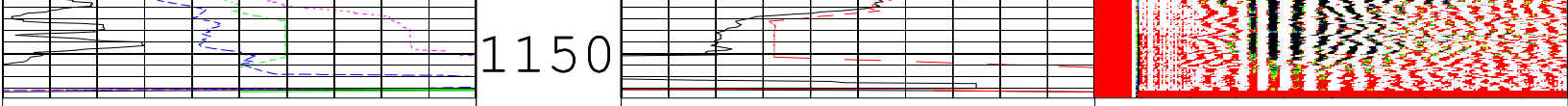
LOCATION	:			
SECTION	:	None		
TOWNSHIP	:	None		
RANGE	:	None		
API NO.	:			
UNIQUE WELL ID.	:			
PERMANENT DATUM	:	MSL	ELEVATION KB:	None
LOG MEASURED FROM:		GS	ELEVATION DF:	NA
DRL MEASURED FROM:		NA	ELEVATION GL:	NA
DATE	:	08/31/17		
DEPTH DRILLER	:	1160		
BIT SIZE	:	6		
LOG TOP	:	783.25		
LOG BOTTOM	:	1159.25		
CASING OD	:			
CASING BOTTOM	:	800		
CASING TYPE	:	STEEL		
BOREHOLE FLUID	:	FOR		
RM TEMPERATURE	:	0		
MUD RES	:	0		
MUD WEIGHT	:			
WITNESSED BY	:			
RECORDED BY	:	AFB		
REMARKS 1	:			
REMARKS 2	:			

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

DELTAT		
300	USEC/FT	0
BHC-DELT		SONIC(N)
300	USEC/FT 0	100 USEC 1200

POROSITY CALCULATED USING RAYMER HUNT RELATIONSHIP. MATRIX DELTA T AS SHOWN ON LOG HEADER





0	API-GR	300	1150	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 B-2 08/31/17 04:27
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

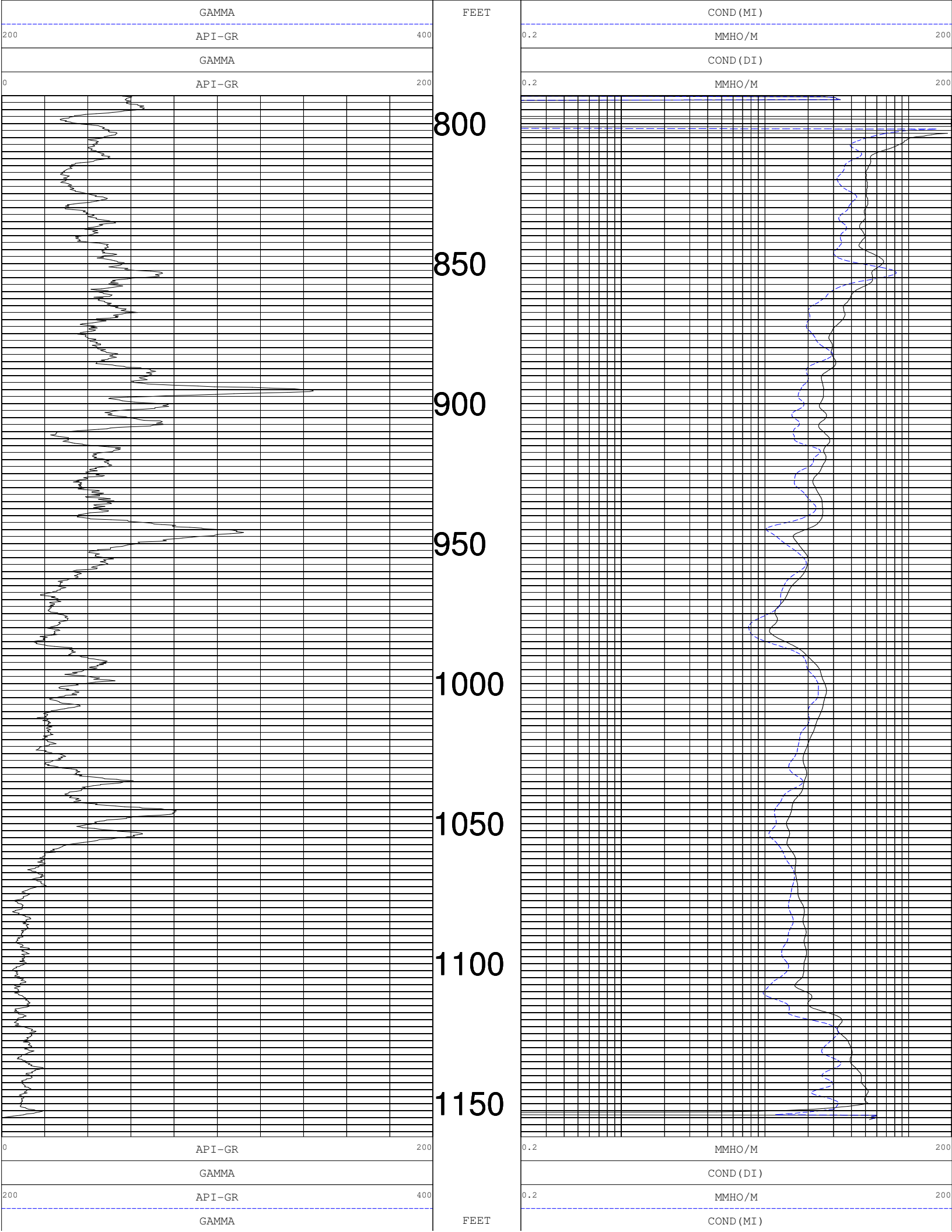
Advanced Borehole Services

DUAL INDUCTION-GAMMA RAY

WELL B-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL B-2	9074
FIELD	: NAVARRE	8044
COUNTY	: SANTA ROSA	
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	: 08/31/17		
DEPTH DRILLER	: 1160		
BIT SIZE	: 6		
LOG TOP	: 2.50		
LOG BOTTOM	: 1161.50		
CASING OD	:		
CASING BOTTOM	: 800		
CASING TYPE	: STEEL		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		


GAMMA
FEET
COND(MI)
200
API-GR
400
0.2
MMHO/M
200
GAMMA
COND(DI)
0
API-GR
200
0.2
MMHO/M
200
800
850
900
950
1000
1050
1100
1150
0
API-GR
200
0.2
MMHO/M
200
GAMMA
COND(DI)
200
API-GR
400
0.2
MMHO/M
200
GAMMA
FEET
COND(MI)

ABS

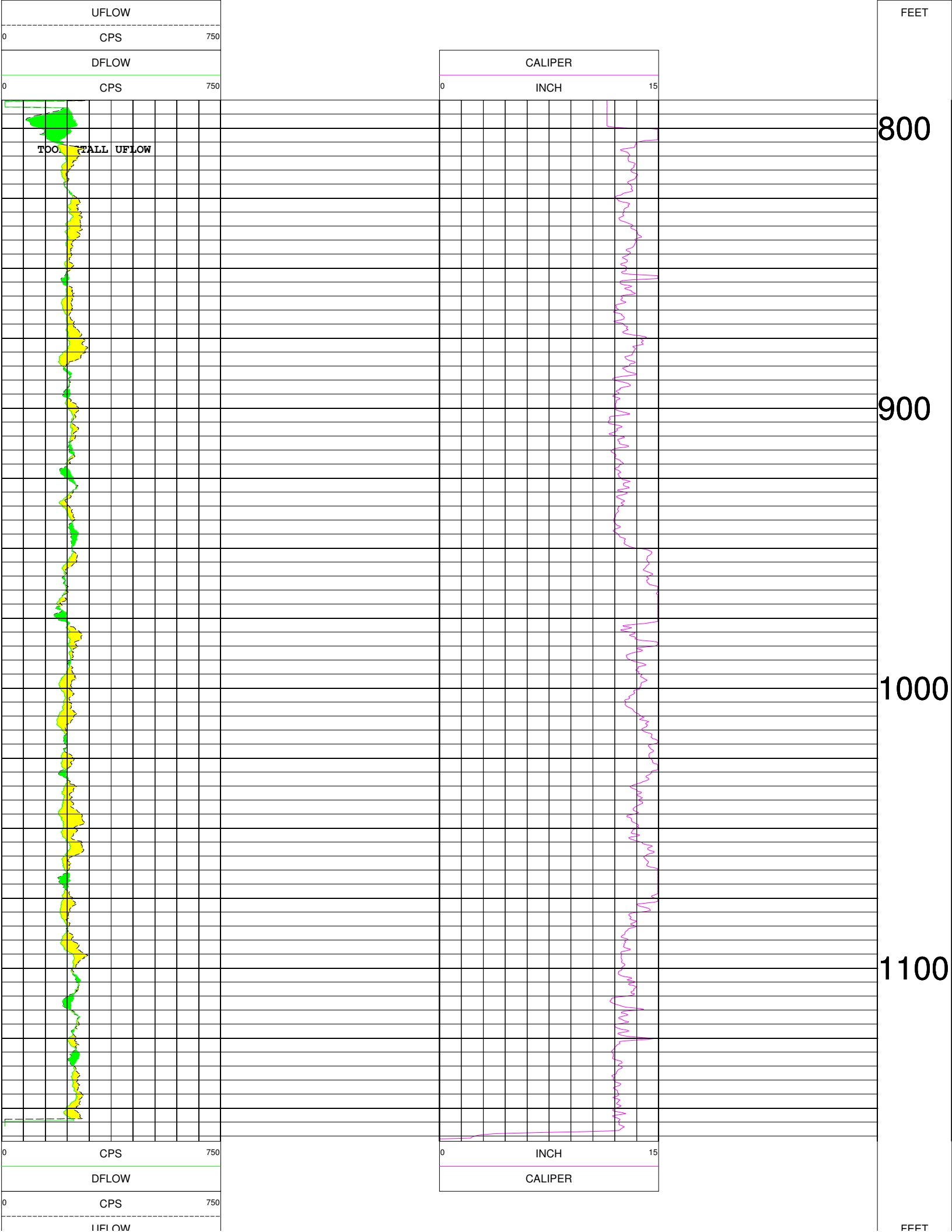
Advanced Borehole Services

PRODUCTION-STATIC-PUMPING

WELL B-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL B-2	9074
FIELD	: NAVARRE	8044
COUNTY	: SANTA ROSA	
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	: 08/31/17		
DEPTH DRILLER	: 1160		
BIT SIZE	: 6		
LOG TOP	: 2.50		
LOG BOTTOM	: 1161.50		
CASING OD	:		
CASING BOTTOM	: 800		
CASING TYPE	: STEEL		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	:		
REMARKS 2	:		


UFLOW
0
CPS
750
DFLOW
0
CPS
750
TOO TALL UFLOW
CALIPER
0
INCH
15
FEET
800
900
1000
1100
0
CPS
750
DFLOW
0
CPS
750
UFLOW
0
INCH
15
CALIPER
FEET

CFS

FEET

ABS

Advanced Borehole Services

FLOW STATIONS

WELL B-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL B-2	9074
FIELD	: NAVARRE	8044
COUNTY	: SANTA ROSA	DIL
STATE	: FLORIDA	

LOCATION	:		
SECTION	: None		
TOWNSHIP	: None		
RANGE	: None		
API NO.	:		
UNIQUE WELL ID.	:		
PERMANENT DATUM	: MSL	ELEVATION KB:	None
LOG MEASURED FROM:	GS	ELEVATION DF:	NA
DRL MEASURED FROM:	NA	ELEVATION GL:	NA
DATE	: 08/31/17		
DEPTH DRILLER	: 1160		
BIT SIZE	: 6		
LOG TOP	: -0.08		
LOG BOTTOM	: 1.92		
CASING OD	:		
CASING BOTTOM	: 800		
CASING TYPE	: STEEL		
BOREHOLE FLUID	: FOR		
RM TEMPERATURE	: 0		
MUD RES	: 0		
MUD WEIGHT	:		
WITNESSED BY	:		
RECORDED BY	: AFB		
REMARKS 1	: PUMPING		
REMARKS 2	:		

FLOW STA @ 780 WELL B-2 08/31/17

LOG PARAMETERS

MATRIX DENSITY : 2.71

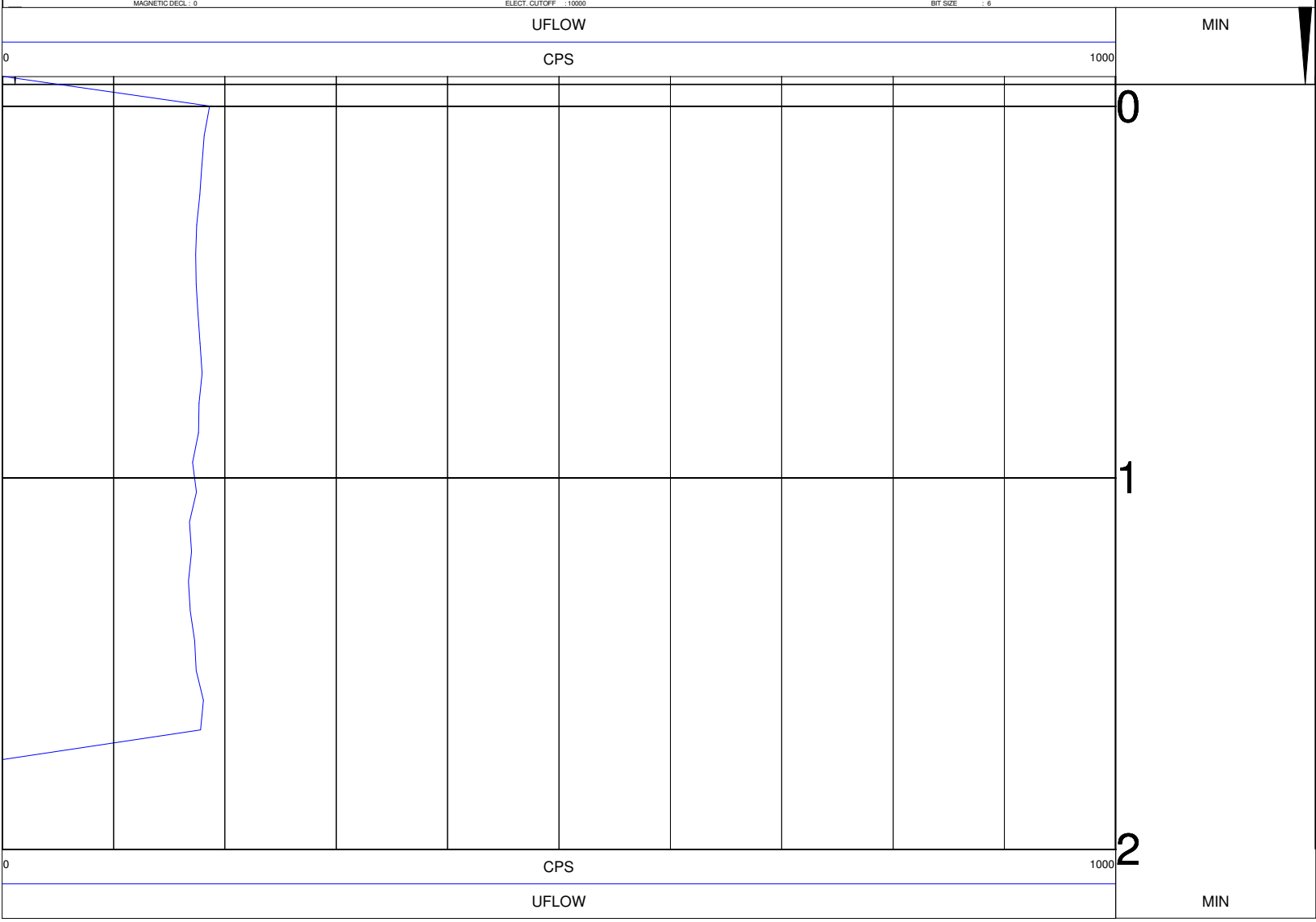
NEUTRON MATRIX : Dolomite

MATRIX DELTA T : 140

MAGNETIC DECL : 0

ELECT. CUTOFF : 10000

BIT SIZE : 6

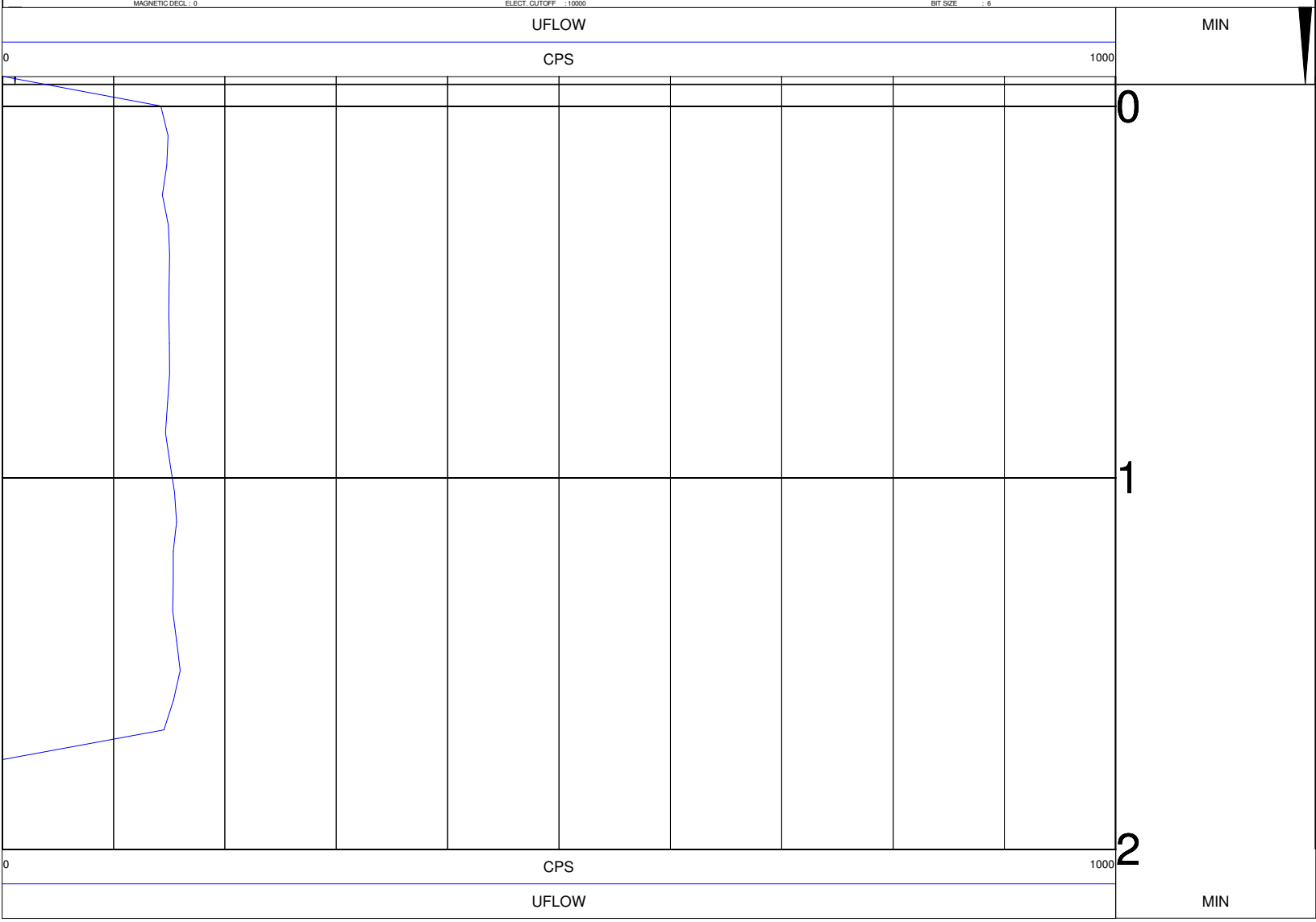


FLOW TA @ 855 WELL B-2855 08/31/17

LOG PARAMETERS

MATRIX DENSITY : 2.71 | NEUTRON MATRIX : Dolomite | MATRIX DELTA T : 140

MAGNETIC DECL : 0 | ELECT. CUTOFF : 10000 | BIT SIZE : 6



FLOW STA @ 900 WELL B-2900 08/31/17

LOG PARAMETERS

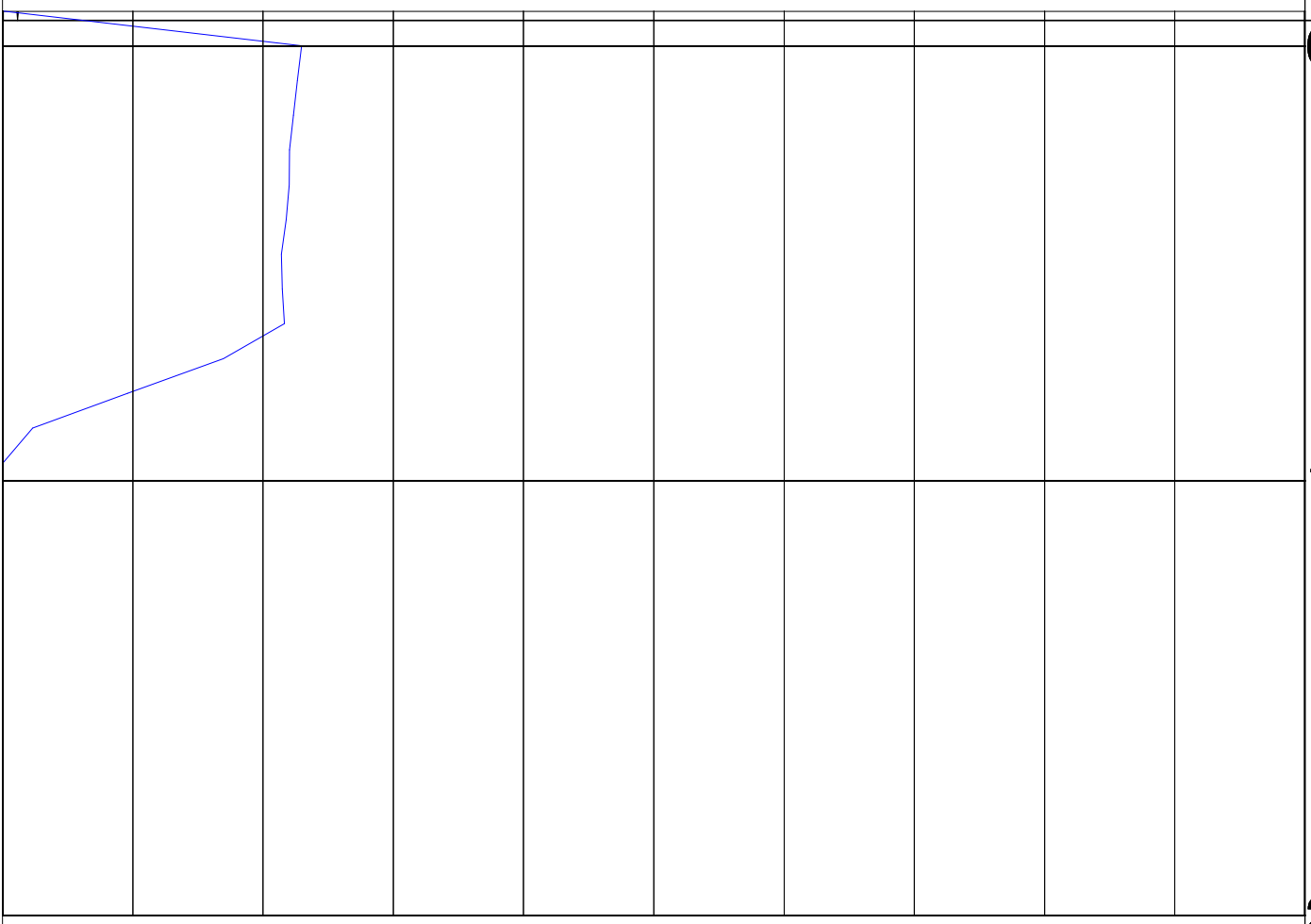
MATRIX DENSITY : 2.71 | NEUTRON MATRIX : Dolomite | MATRIX DELTA T : 140

MAGNETIC DECL : 0 | ELECT. CUTOFF : 10000 | BIT SIZE : 6

UFLOW

MIN

0 CPS 1000



0

1

2

0 CPS 1000

UFLOW

MIN

FLOW STA @ 950 WELL B-2950 08/31/17

LOG PARAMETERS

MATRIX DENSITY : 2.71

NEUTRON MATRIX : Dolomite

MATRIX DELTA T : 140

MAGNETIC DECL : 0

ELECT. CUTOFF : 10000

BIT SIZE : 6

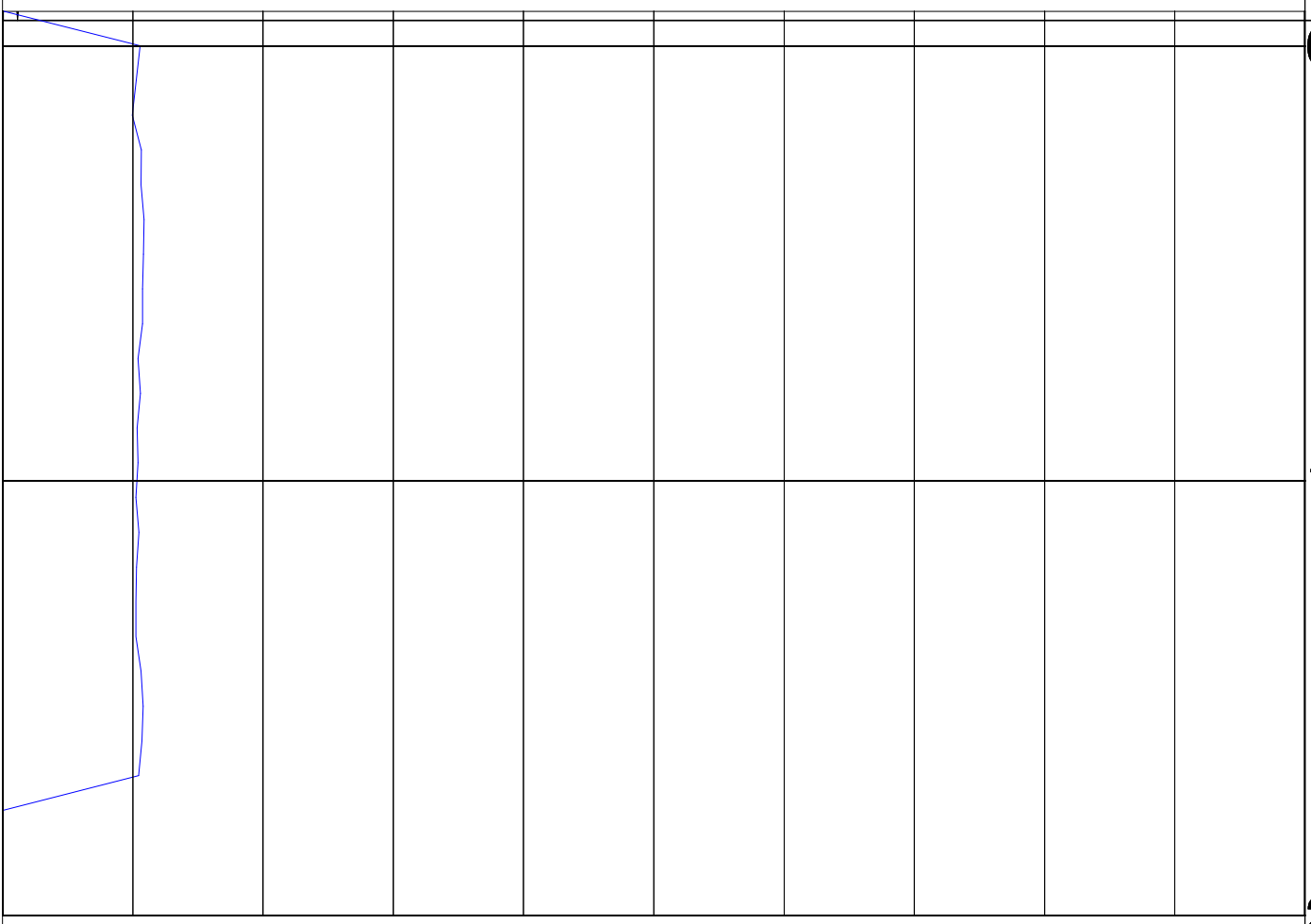
UFLOW

MIN

0

CPS

1000



0

1

2

0

CPS

1000

UFLOW

MIN

FLOW STA @ 980 WELL B-2980 08/31/17

LOG PARAMETERS

MATRIX DENSITY : 2.71

NEUTRON MATRIX : Dolomite

MATRIX DELTA T : 140

MAGNETIC DECL : 0

ELECT. CUTOFF : 10000

BIT SIZE : 6

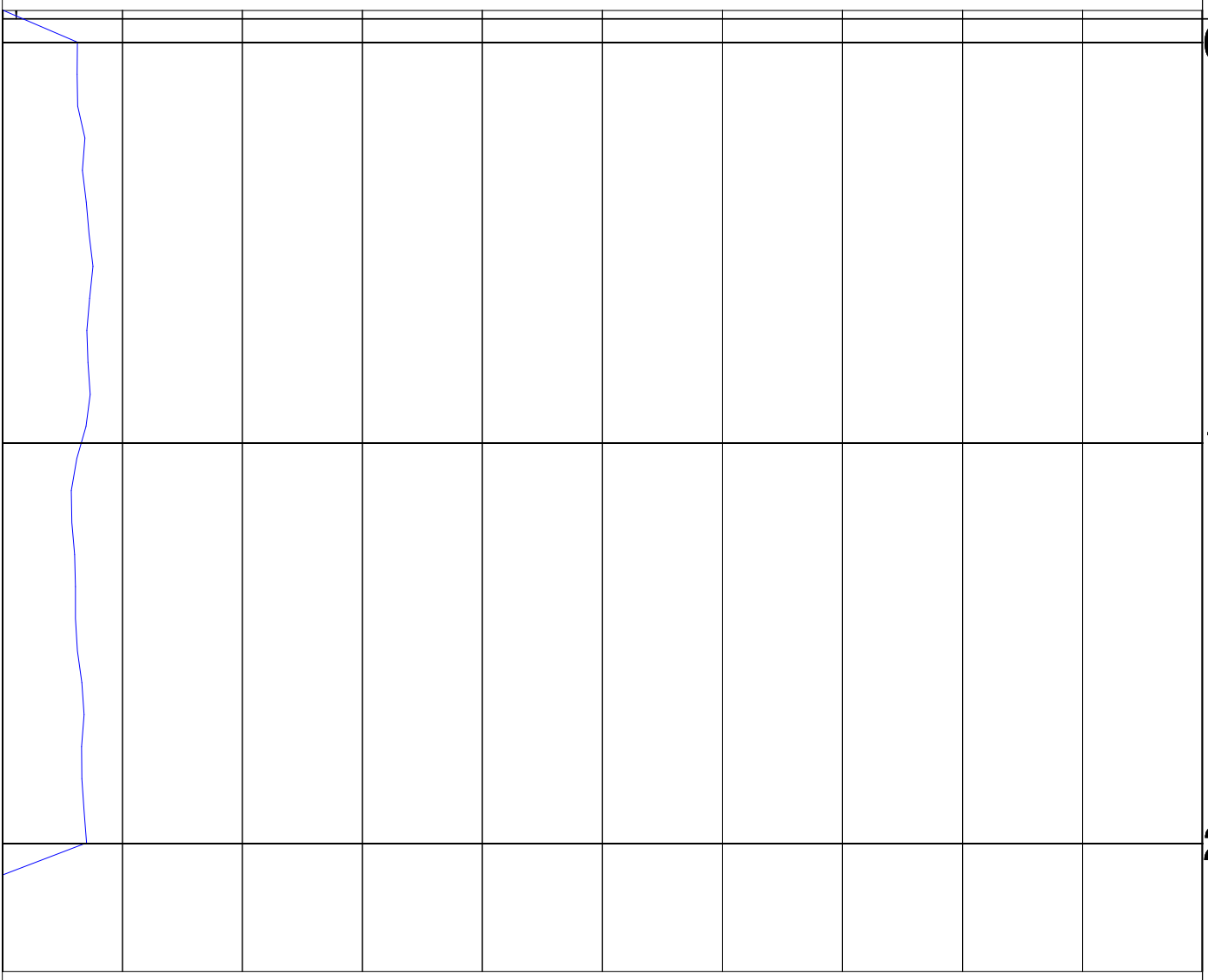
UFLOW

MIN

0

CPS

1000



0

CPS

1000

UFLOW

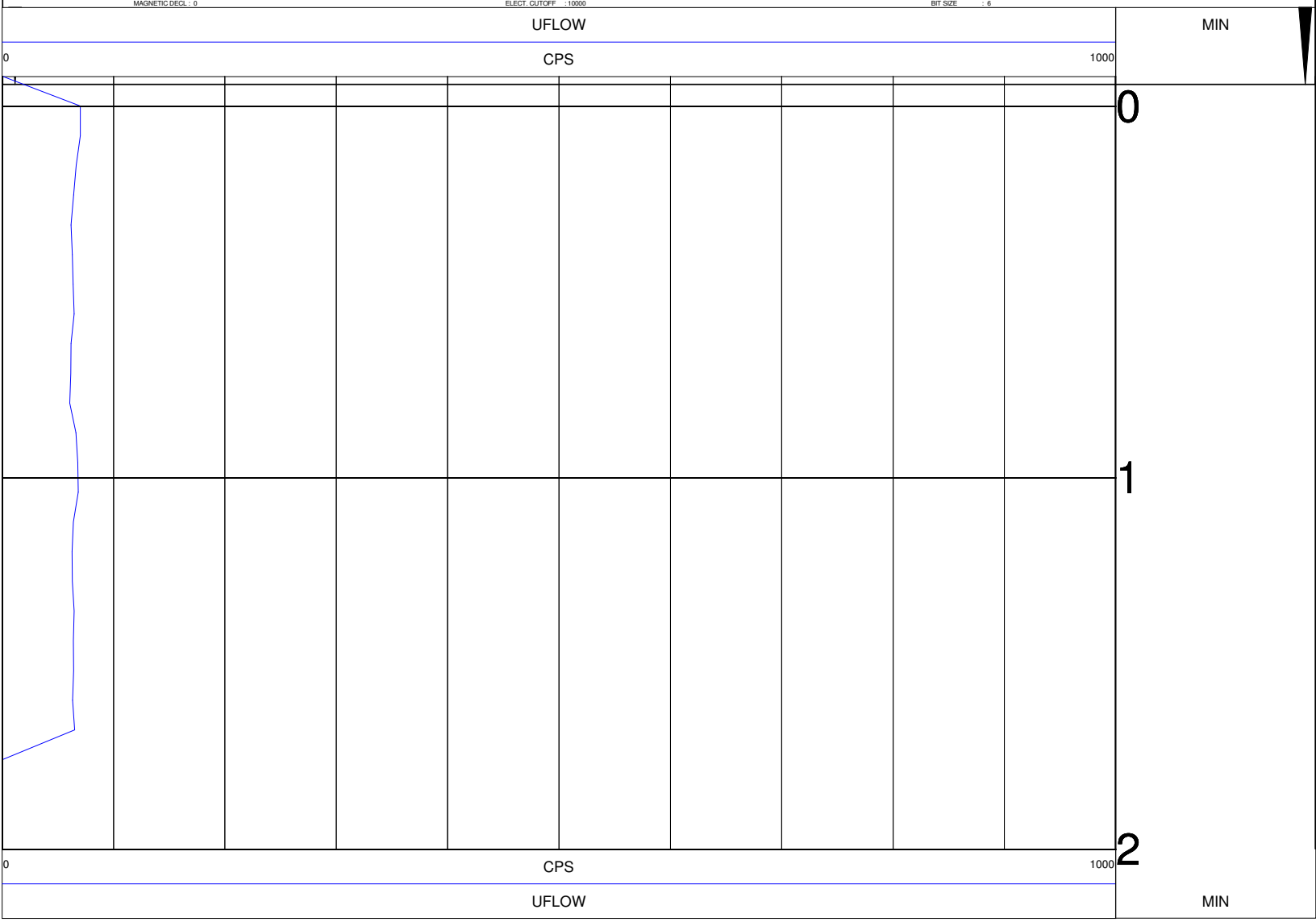
MIN

FLOW STA @ 1055 WELL B-21055 08/31/17

LOG PARAMETERS

MATRIX DENSITY : 2.71 | NEUTRON MATRIX : Dolomite | MATRIX DELTA T : 140

MAGNETIC DECL : 0 | ELECT. CUTOFF : 10000 | BIT SIZE : 6

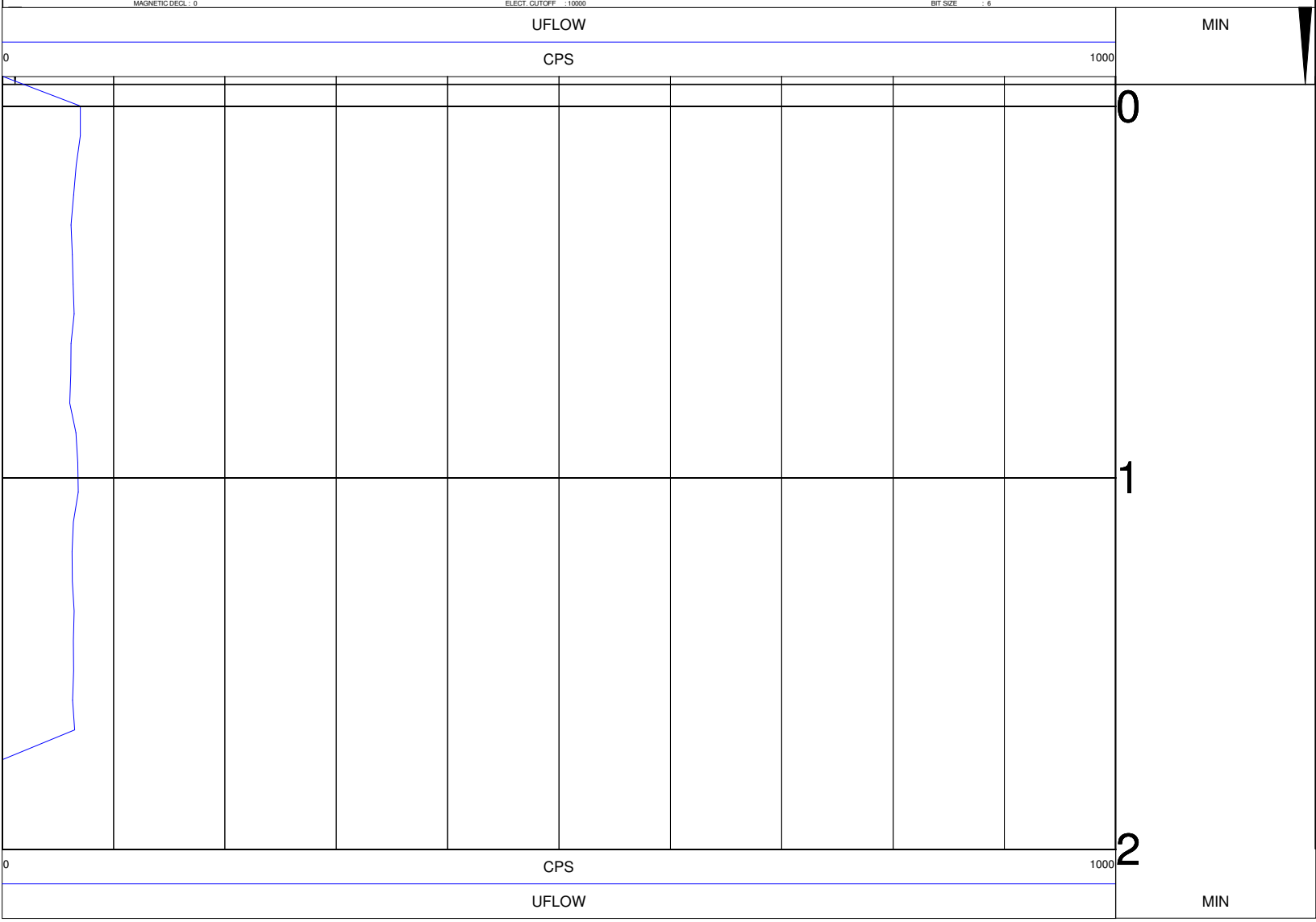


FLOW STA @ 1080 WELL B-21055 08/31/17

LOG PARAMETERS

MATRIX DENSITY : 2.71 | NEUTRON MATRIX : Dolomite | MATRIX DELTA T : 140

MAGNETIC DECL : 0 | ELECT. CUTOFF : 10000 | BIT SIZE : 6



FLOW STA @ 1140 WELL B-21140 09/01/17

LOG PARAMETERS

MATRIX DENSITY : 2.71

NEUTRON MATRIX : Dolomite

MATRIX DELTA T : 140

MAGNETIC DECL : 0

ELECT. CUTOFF : 10000

BIT SIZE : 6

UFLOW

MIN

0

CPS

1000

0

1

2

0

CPS

1000

UFLOW

MIN

ABS

Advanced Borehole Services

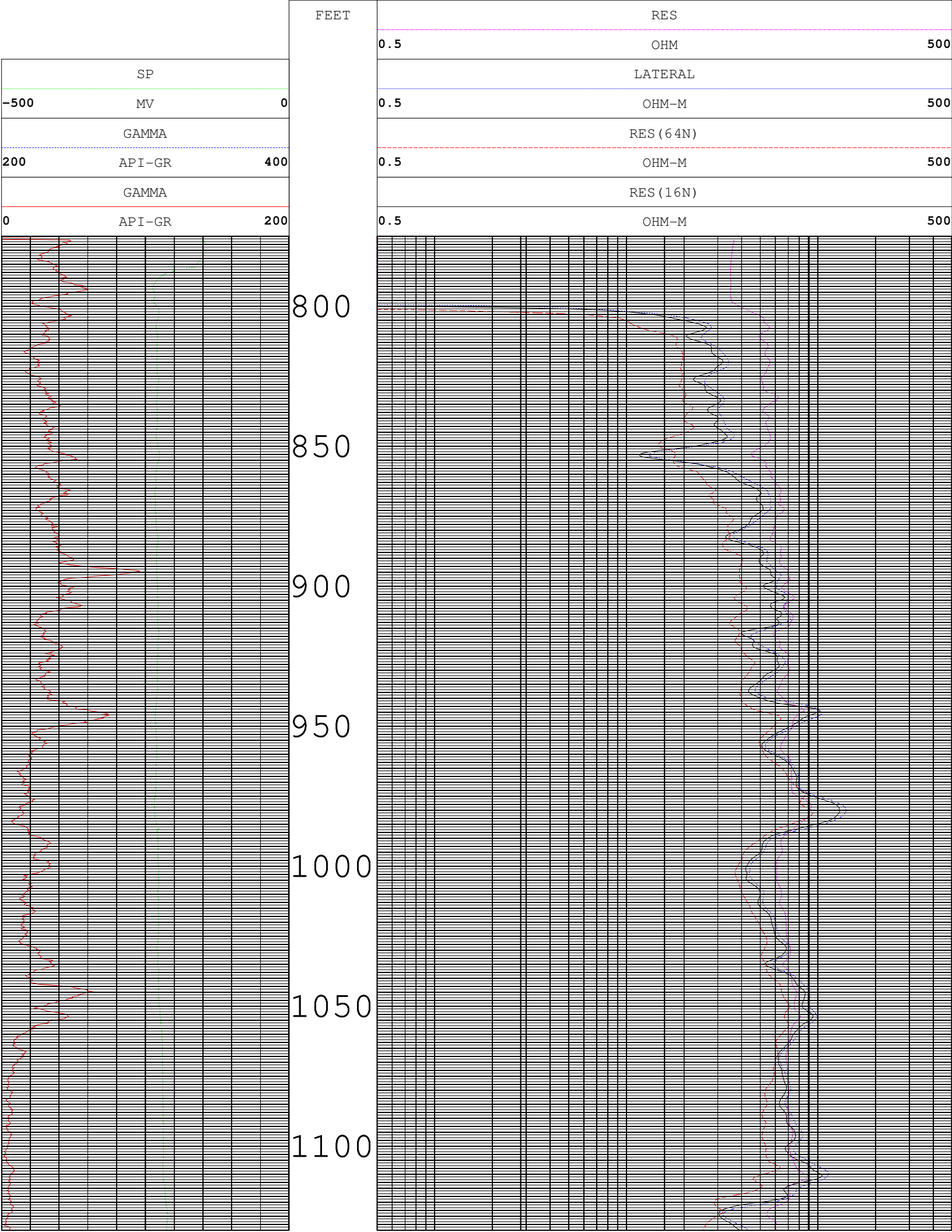
GAMMA RAY-RESISTIVITY (16-64)

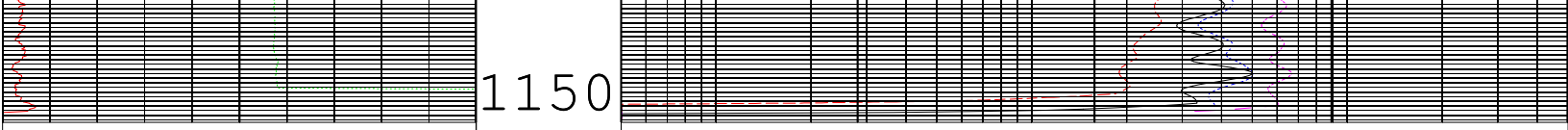
WELL B-2

COMPANY	:	APPLIED DRILLING ENGINEERING
WELL	:	WELL B-2
FIELD	:	NAVARRE
COUNTY	:	SANTA ROSA
STATE	:	FLORIDA

OTHER SERVICES:
9074
8044

LOCATION	:			
SECTION	:	None		
TOWNSHIP	:	None		
RANGE	:	None		
API NO.	:			
UNIQUE WELL ID.	:			
PERMANENT DATUM	:	MSL	ELEVATION KB:	None
LOG MEASURED FROM:		GS	ELEVATION DF:	NA
DRL MEASURED FROM:		NA	ELEVATION GL:	NA
DATE	:	08/31/17		
DEPTH DRILLER	:	1160		
BIT SIZE	:	6		
LOG TOP	:	752.50		
LOG BOTTOM	:	1156.25		
CASING OD	:			
CASING BOTTOM	:	800		
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
-500 MV 0
GAMMA
200 API-GR 400
GAMMA
0 API-GR 200
RES
0.5 OHM 500
LATERAL
0.5 OHM-M 500
RES(64N)
0.5 OHM-M 500
RES(16N)
0.5 OHM-M 500
800
850
900
950
1000
1050
1100



1150

0	API-GR	200	0.5	OHM-M	500
	GAMMA			RES(16N)	
200	API-GR	400	0.5	OHM-M	500
	GAMMA			RES(64N)	
-500	MV	0	0.5	OHM-M	500
	SP			LATERAL	
			0.5	OHM	500
		FEET		RES	

TOOL CALIBRATION WELL B-2 08/31/17 02:48
TOOL 8044A TM VERSION 0
SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Aug05,17	21:41:59	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Aug05,17	18:41:59	GAMMA	180.000	[API-GR]	142.00	[CPS]
2	May16,17	19:08:20	RES(FL	41.600	[OHM-M]	54104.00	[CPS]
	May16,17	19:08:20	RES(FL	0.100	[OHM-M]	11978.00	[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	Jul25,17	06:42:26	RES(16	0.000	[OHM-M]	4284.00	[CPS]
	Jul25,17	06:42:26	RES(16	1996.000	[OHM-M]	138447.00	[CPS]
5	Jul25,17	06:42:50	RES(64	0.000	[OHM-M]	4160.00	[CPS]
	Jul25,17	06:42:50	RES(64	1990.000	[OHM-M]	176008.00	[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

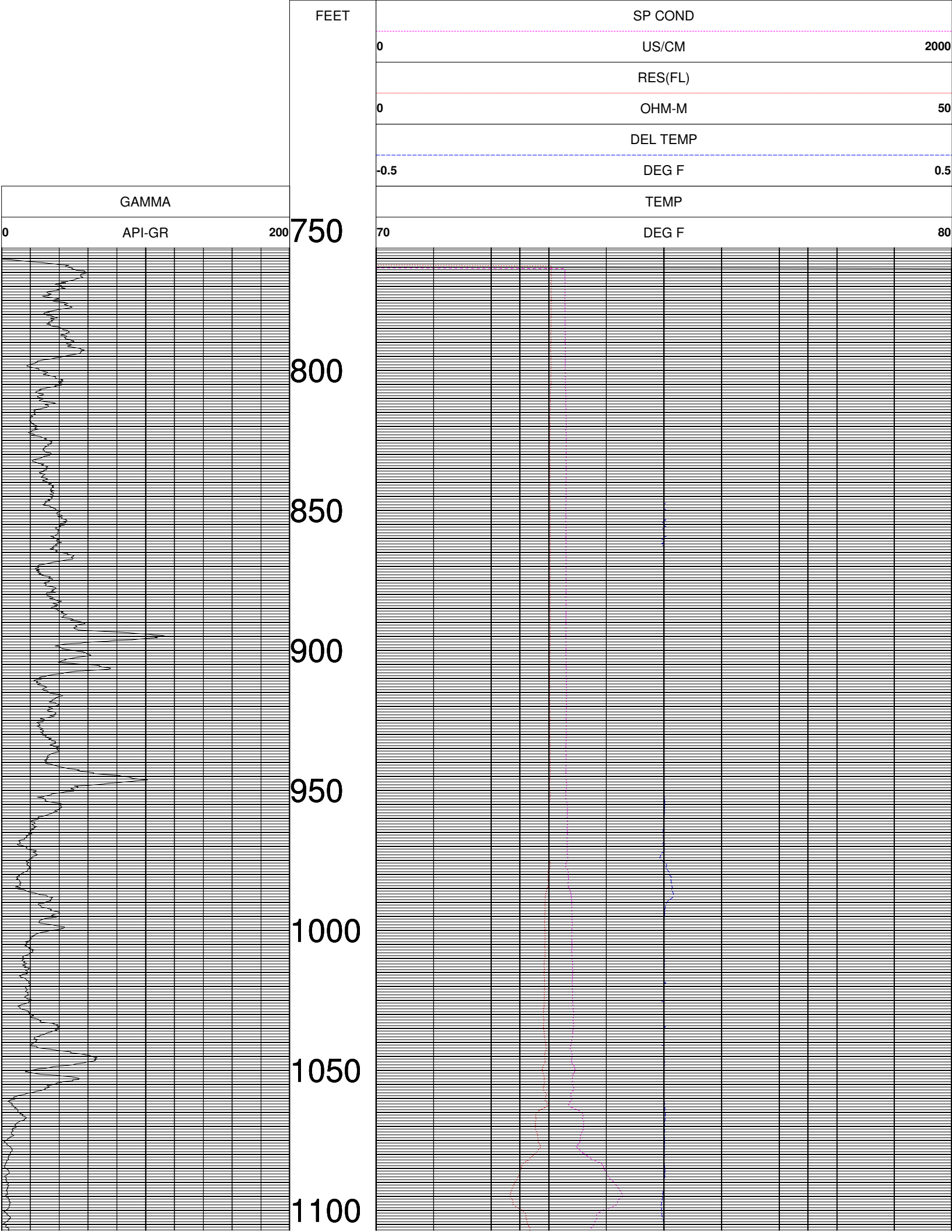
PUMPING WATER QUALITY

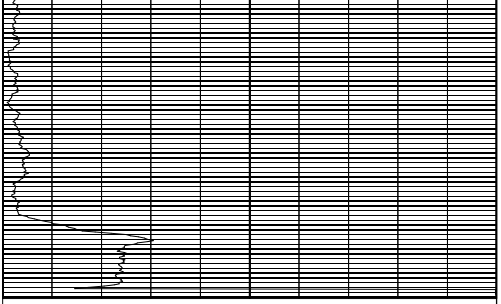
WELL B-2

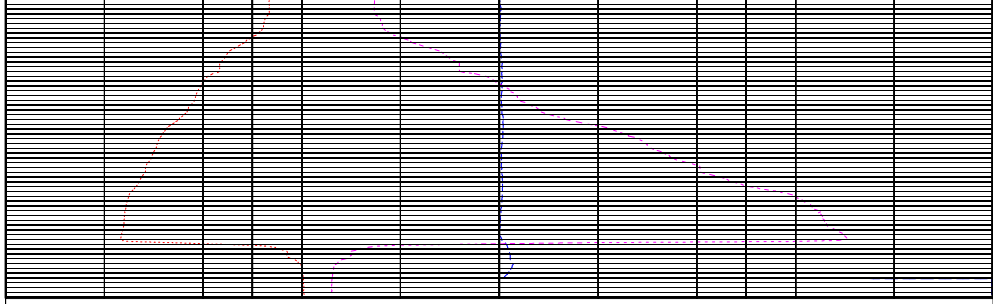
COMPANY	:	APPLIED DRILLING ENGINEERING
WELL	:	WELL B-2
FIELD	:	NAVARRE
COUNTY	:	SANTA ROSA
STATE	:	FLORIDA

OTHER SERVICES:
9074
8044
DIL

LOCATION	:			
SECTION	:	None		
TOWNSHIP	:	None		
RANGE	:	None		
API NO.	:			
UNIQUE WELL ID.	:			
PERMANENT DATUM	:	MSL	ELEVATION KB:	None
LOG MEASURED FROM:		GS	ELEVATION DF:	NA
DRL MEASURED FROM:		NA	ELEVATION GL:	NA
DATE	:	08/31/17		
DEPTH DRILLER	:	1160		
BIT SIZE	:	6		
LOG TOP	:	756.25		
LOG BOTTOM	:	1169.00		
CASING OD	:			
CASING BOTTOM	:	800		
CASING TYPE	:	STEEL		
BOREHOLE FLUID	:	FOR		
RM TEMPERATURE	:	0		
MUD RES	:	0		
MUD WEIGHT	:			
WITNESSED BY	:			
RECORDED BY	:	AFB		
REMARKS 1	:	PUMPING		
REMARKS 2	:			


FEET
SP COND
0
US/CM
2000
RES(FL)
0
OHM-M
50
DEL TEMP
-0.5
DEG F
0.5
GAMMA
TEMP
0
API-GR
200
70
DEG F
80
750
800
850
900
950
1000
1050
1100





1150

0	API-GR	200
	GAMMA	

70	DEG F	80
	TEMP	
-0.5	DEG F	0.5
	DEL TEMP	
0	OHM-M	50
	RES(FL)	
0	US/CM	2000
	SP COND	

FEET

TOOL CALIBRATION WELL B-2 08/31/17 21:38
TOOL 8044A TM VERSION 0
SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Aug05,17	21:41:59	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Aug05,17	18:41:59	GAMMA	180.000	[API-GR]	142.00	[CPS]
2	May16,17	19:08:20	RES(FL)	41.600	[OHM-M]	54104.00	[CPS]
	May16,17	19:08:20	RES(FL)	0.100	[OHM-M]	11978.00	[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	Jul25,17	06:42:26	RES(16N)	0.000	[OHM-M]	4284.00	[CPS]
	Jul25,17	06:42:26	RES(16N)	1996.000	[OHM-M]	138447.00	[CPS]
5	Jul25,17	06:42:50	RES(64N)	0.000	[OHM-M]	4160.00	[CPS]
	Jul25,17	06:42:50	RES(64N)	1990.000	[OHM-M]	176008.00	[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]

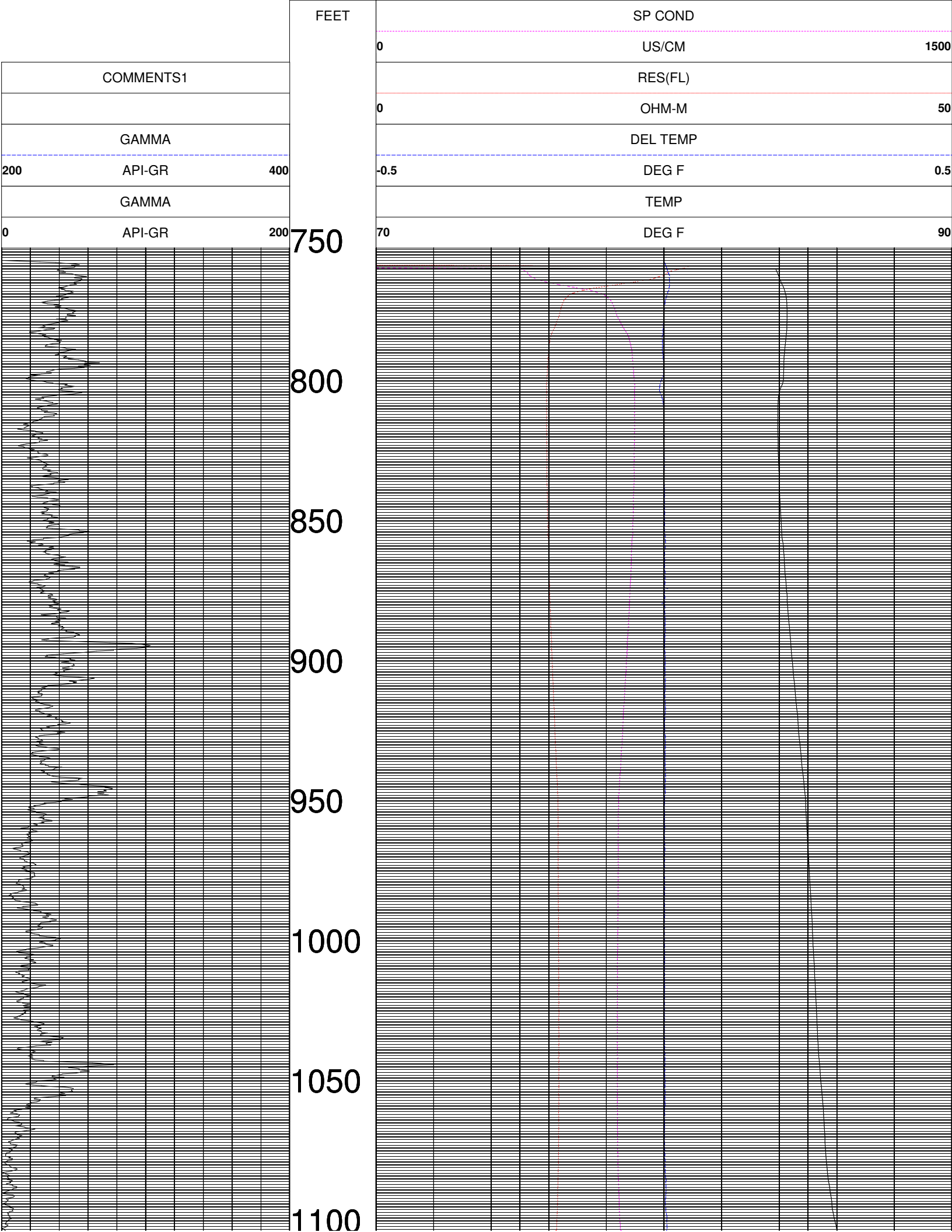
ABS
Advanced Borehole Services

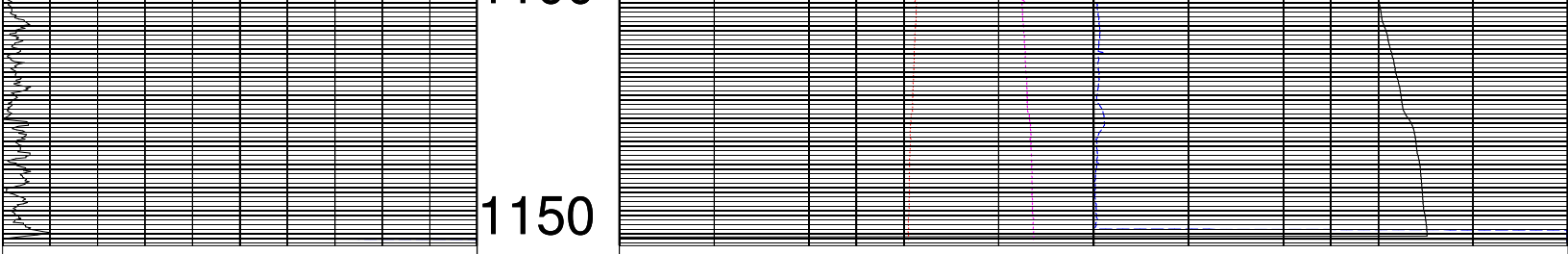
STATIC WATER QUALITY

WELL B-2

COMPANY	: APPLIED DRILLING ENGINEERING	OTHER SERVICES:
WELL	: WELL B-2	9074
FIELD	: NAVARRE	8044
COUNTY	: SANTA ROSA	
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	: 08/31/17		
DEPTH DRILLER	: 1160		
BIT SIZE	: 6		
LOG TOP	: 752.50		
LOG BOTTOM	: 1156.25		
CASING OD	:		
CASING BOTTOM	: 800		
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
1500
COMMENTS1
RES(FL)
0
OHM-M
50
GAMMA
DEL TEMP
200
API-GR
400
-0.5
DEG F
0.5
GAMMA
TEMP
0
API-GR
200
70
DEG F
90
750
800
850
900
950
1000
1050
1100



1150

0	API-GR	200	70	DEG F	90
	GAMMA			TEMP	
200	API-GR	400	-0.5	DEG F	0.5
	GAMMA			DEL TEMP	
	COMMENTS1		0	OHM-M	50
				RES(FL)	
			0	US/CM	1500
		FEET		SP COND	

TOOL CALIBRATION WELL B-2 08/31/17 02:48
TOOL 8044A TM VERSION 0
SERIAL NUMBER 938

	DATE	TIME	SENSOR	STANDARD		RESPONSE	
1	Aug05,17	21:41:59	GAMMA	0.001	[API-GR]	0.00	[CPS]
	Aug05,17	18:41:59	GAMMA	180.000	[API-GR]	142.00	[CPS]
2	May16,17	19:08:20	RES(FL)	41.600	[OHM-M]	54104.00	[CPS]
	May16,17	19:08:20	RES(FL)	0.100	[OHM-M]	11978.00	[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	Jul25,17	06:42:26	RES(16N)	0.000	[OHM-M]	4284.00	[CPS]
	Jul25,17	06:42:26	RES(16N)	1996.000	[OHM-M]	138447.00	[CPS]
5	Jul25,17	06:42:50	RES(64N)	0.000	[OHM-M]	4160.00	[CPS]
	Jul25,17	06:42:50	RES(64N)	1990.000	[OHM-M]	176008.00	[CPS]
6	Aug17,14	17:19:05	TEMP	71.700	[DEG F]	63355.00	[CPS]
	Aug17,14	17:19:05	TEMP	81.500	[DEG F]	58740.00	[CPS]
7	Aug17,14	15:39:11	RES	0.000	[OHM]	9855.00	[CPS]
	Aug17,14	15:39:11	RES	988.000	[OHM]	58788.00	[CPS]

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

APPENDIX F

AQUIFER PERFORMNACE TEST GRAPHICS

Table 2

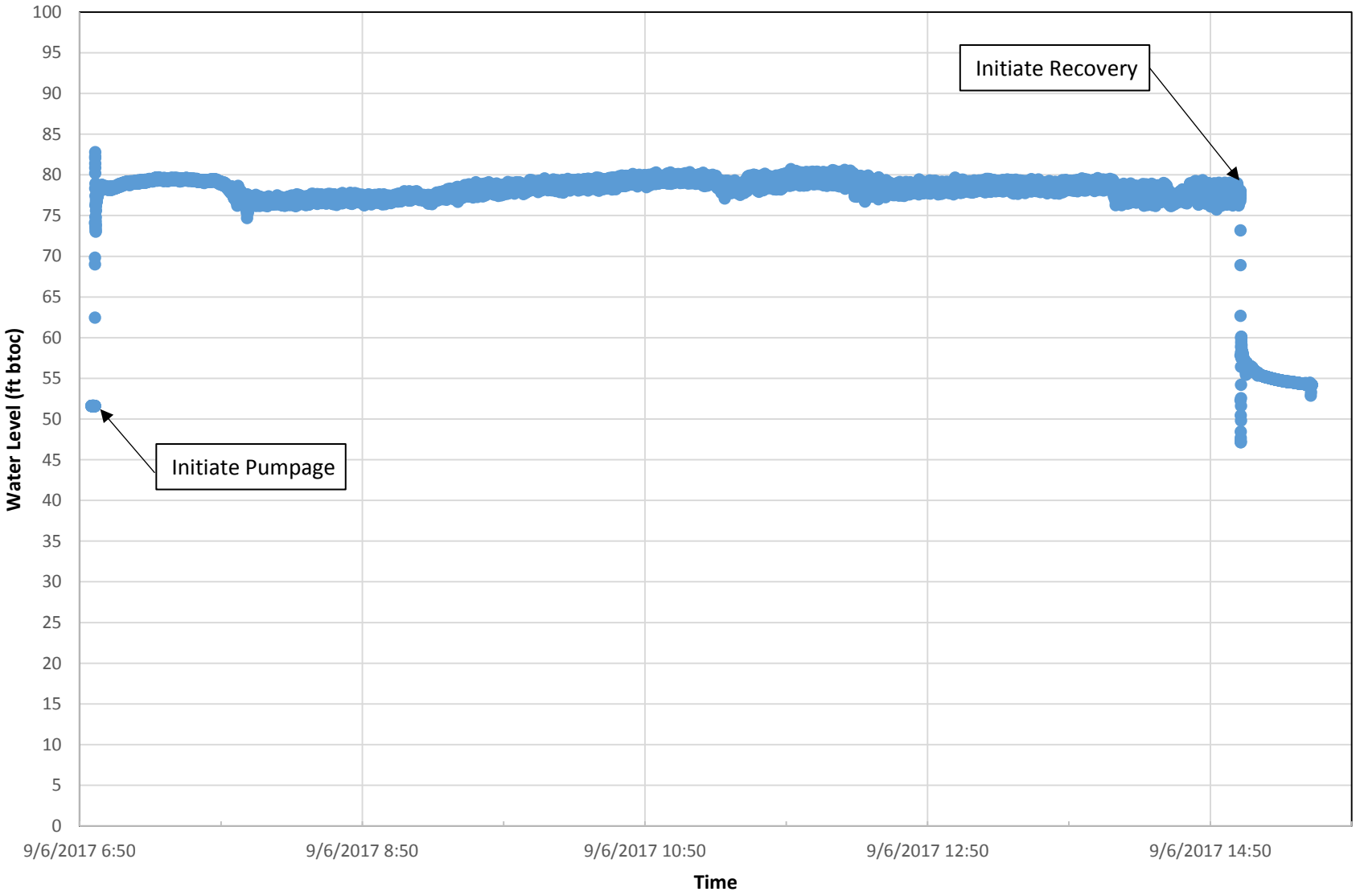
WELL B-2
CONSTANT RATE TEST

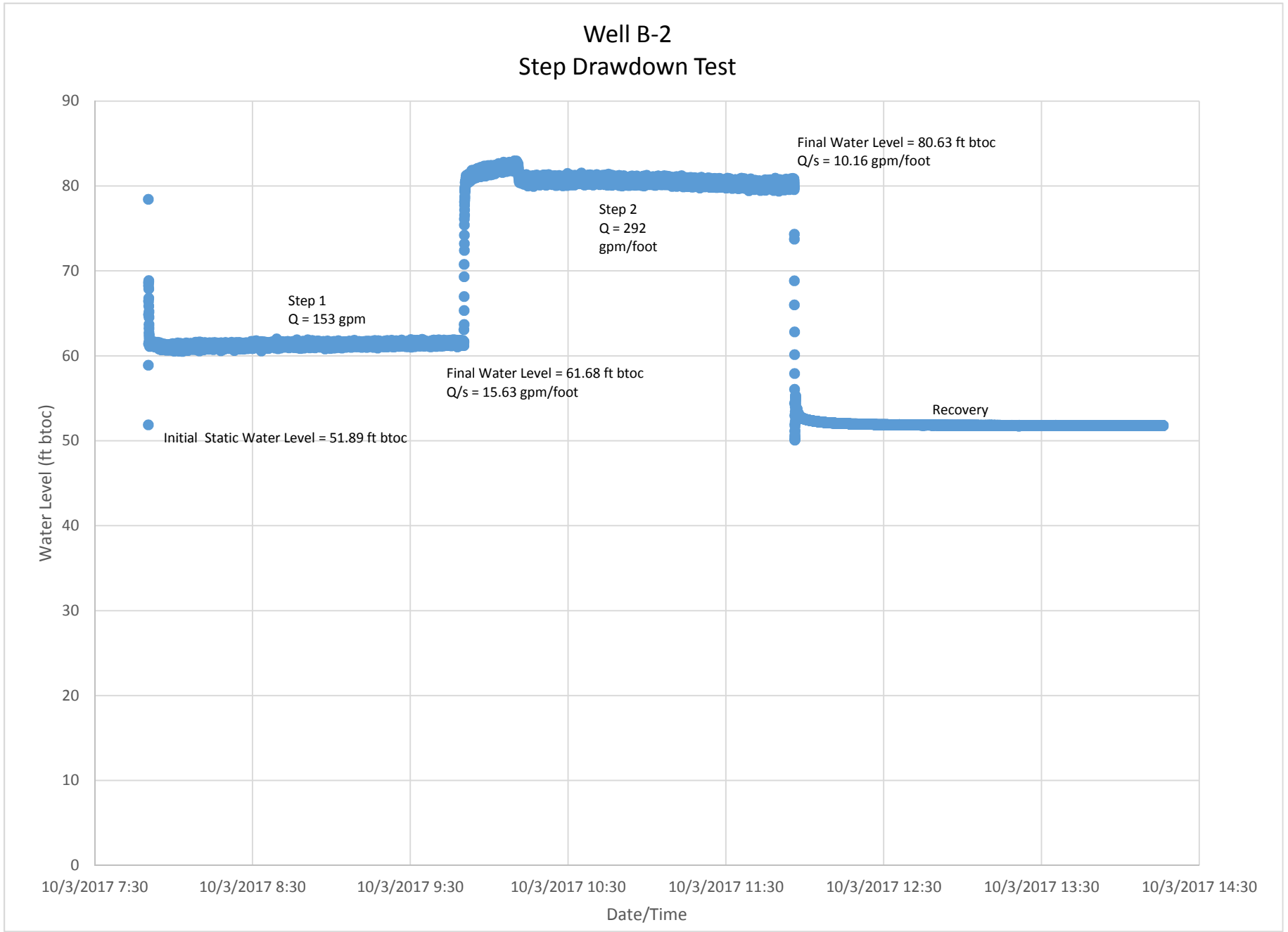
WALTON'S ESTIMATE OF TRANSMISSIVITY FROM SPECIFIC CAPACITY

Enter values in green or highlighted cells:			Q/s gpm/ft	T gpd/ft	Q/s gpm/ft	T gpd/ft
T =	116300	gpd/ft	47.51	116300		
t =	480	min				
well r =	0.25	feet	47.12	115300	47.55	116400
S =	0.001		47.16	115400	47.59	116500
			47.20	115500	47.63	116600
delta T =	100	gpd/ft	47.24	115600	47.66	116700
			47.28	115700	47.70	116800
			47.31	115800	47.74	116900
			47.35	115900	47.78	117000
			47.39	116000	47.82	117100
			47.43	116100	47.86	117200
month	day	year	47.47	116200	47.90	117300
10	6	17	47.51	116300		

Figure 1

WELL B- 2 CONSTANT RATE TEST
WATER LEVEL
(feet below top of casing)




Well B-2
Step Drawdown Test
Water Level (ft btoc)
90
80
70
60
50
40
30
20
10
0
10/3/2017 7:30
10/3/2017 8:30
10/3/2017 9:30
10/3/2017 10:30
10/3/2017 11:30
10/3/2017 12:30
10/3/2017 13:30
10/3/2017 14:30
Date/Time
Step 1
Q = 153 gpm
Initial Static Water Level = 51.89 ft btoc
Final Water Level = 61.68 ft btoc
Q/s = 15.63 gpm/foot
Step 2
Q = 292
gpm/foot
Final Water Level = 80.63 ft btoc
Q/s = 10.16 gpm/foot
Recovery

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

APPENDIX G

LABORATORY RESULTS

Analytical Report

L7H0222

Project

B-2

Project Number

[none]

August 30, 2017
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

1412 Tech Blvd
Tampa, FL 33619

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

August 30, 2017

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

RE: B-2

We are reporting the results of the analyses performed on the samples recieved on 8/21/2017 under the project name referenced above and identified as the lab Work Order L7H0222. 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 L7H0222 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

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

Sincerely,

Nancy Robertson
Project Manager

MWBE SDBE
NELAC DoD Accredited

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	8/30/17 9:42

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L7H0222-01	B2-823FT	Water	17-Aug-2017 12:11	21-Aug-2017 12:04
L7H0222-02	B2-843FT	Water	17-Aug-2017 12:25	21-Aug-2017 12:04
L7H0222-03	B2-903FT	Water	18-Aug-2017 08:43	21-Aug-2017 12:04

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	8/30/17 9:42

Hits Summary

(Not Including Subcontracted Analysis)

Sample: B2-823FT

Lab ID: L7H0222-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**278**		1.00	0.00	umhos/cm	1	8/21/17 17:43		SM 2510B
TDS, Total Dissolved Solids	**181**		5.00	1.78	mg/L	1	8/23/17 15:04		SM 2540C
Chloride	**26.6**		2.00	0.104	mg/L	1	8/23/17 7:40	16887-00-6	EPA 300.0

Sample: B2-843FT

Lab ID: L7H0222-02

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**388**		1.00	0.00	umhos/cm	1	8/21/17 17:43		SM 2510B
TDS, Total Dissolved Solids	**234**		5.00	1.78	mg/L	1	8/23/17 15:04		SM 2540C
Chloride	**41.2**		2.00	0.104	mg/L	1	8/23/17 7:51	16887-00-6	EPA 300.0

Sample: B2-903FT

Lab ID: L7H0222-03

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**378**		1.00	0.00	umhos/cm	1	8/21/17 17:43		SM 2510B
TDS, Total Dissolved Solids	**257**		5.00	1.78	mg/L	1	8/23/17 15:04		SM 2540C
Chloride	**44.3**		2.00	0.104	mg/L	1	8/23/17 8:03	16887-00-6	EPA 300.0

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	8/30/17 9:42

Sample Results

FTS - Florida

Client Sample ID: B2-823FT
Lab Sample ID: L7H0222-01 (Water) **Sampled:8/17/17 12:11**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**26.6**		2.00	0.104	mg/L	1	8/23/17 5:48	8/23/17 7:40	16887-00-6
Conductance by Method 2510B									
Specific conductance	**278**		1.00	0.00	umhos/cm	1	8/21/17 17:30	8/21/17 17:43	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**181**		5.00	1.78	mg/L	1	8/23/17 15:04	8/23/17 15:04	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	8/30/17 9:42

Sample Results

(Continued)

FTS - Florida

Client Sample ID: B2-843FT
Lab Sample ID: L7H0222-02 (Water) **Sampled:8/17/17 12:25**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**41.2**		2.00	0.104	mg/L	1	8/23/17 5:48	8/23/17 7:51	16887-00-6
Conductance by Method 2510B									
Specific conductance	**388**		1.00	0.00	umhos/cm	1	8/21/17 17:30	8/21/17 17:43	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**234**		5.00	1.78	mg/L	1	8/23/17 15:04	8/23/17 15:04	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	8/30/17 9:42

Sample Results
(Continued)

FTS - Florida

Client Sample ID: B2-903FT
Lab Sample ID: L7H0222-03 (Water) **Sampled:8/18/17 8:43**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**44.3**		2.00	0.104	mg/L	1	8/23/17 5:48	8/23/17 8:03	16887-00-6
Conductance by Method 2510B									
Specific conductance	**378**		1.00	0.00	umhos/cm	1	8/21/17 17:30	8/21/17 17:43	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**257**		5.00	1.78	mg/L	1	8/23/17 15:04	8/23/17 15:04	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	8/30/17 9:42

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7H0287											
Blank (B7H0287-BLK1)						Prepared & Analyzed: 8/23/2017					
Chloride	0.104	U	2.00	0.104	mg/L						
LCS (B7H0287-BS1)						Prepared & Analyzed: 8/23/2017					
Chloride	19.5		2.00	0.104	mg/L	20.0		97	90-110		
LCS Dup (B7H0287-BSD1)						Prepared & Analyzed: 8/23/2017					
Chloride	19.7		2.00	0.104	mg/L	20.0		99	90-110	1	20
Duplicate (B7H0287-DUP1)		**Source: L7H0221-03**				Prepared & Analyzed: 8/23/2017					
Chloride	7.40		2.00	0.104	mg/L		7.29			1	20
Matrix Spike (B7H0287-MS1)		**Source: L7H0221-03**				Prepared & Analyzed: 8/23/2017					
Chloride	27.0		2.00	0.104	mg/L	20.0	7.29	99	80-120		
Matrix Spike Dup (B7H0287-MSD1)		**Source: L7H0221-03**				Prepared & Analyzed: 8/23/2017					
Chloride	27.2		2.00	0.104	mg/L	20.0	7.29	100	80-120	0.8	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	8/30/17 9:42

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7H0307											
Blank (B7H0307-BLK1)						Prepared & Analyzed: 8/23/2017					
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7H0307-BS1)						Prepared & Analyzed: 8/23/2017					
TDS, Total Dissolved Solids	90.0		5.00	1.78	mg/L	100		90	80-120		
LCS Dup (B7H0307-BSD1)						Prepared & Analyzed: 8/23/2017					
TDS, Total Dissolved Solids	92.0		5.00	1.78	mg/L	100		92	80-120	2	20
Duplicate (B7H0307-DUP1)		**Source: L7H0199-09**				Prepared & Analyzed: 8/23/2017					
TDS, Total Dissolved Solids	297		5.00	1.78	mg/L		292			2	20
Duplicate (B7H0307-DUP2)		**Source: L7H0222-03**				Prepared & Analyzed: 8/23/2017					
TDS, Total Dissolved Solids	258		5.00	1.78	mg/L		257			0.4	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	8/30/17 9:42

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7H0288											
Duplicate (B7H0288-DUP1)		**Source: L7H0222-01**			Prepared & Analyzed: 8/21/2017						
Specific conductance	280		1.00	0.00	umhos/cm		278			0.7	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	8/30/17 9:42

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
E84098	FL MICROBIOLOGY Lakeland CERT	LFLNELAC	FTSL	06/30/2018
E87429	FL NELAC CERT Tampa	AFLNELAC	FTSL	06/30/2018
LI0-135	DoD CERTIFICATE	DOD	FTSL	11/28/2017
P330-07-00105	USDA CERTIFICATE	USDA	FTSL	

Notes and Definitions

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

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

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

Page _____ of _____

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: CARDO	Receiver's Initials/Temp: DK / 3.7
Address: 3905 Crescent Park Drive.	Custody Seal(s): ___ Y N Lab Work Order # L7H0222
Results Sent to: David Kelly	P.O.# (if required):
Email address: David.P.Kelly@cardno.com	Field Comments / Lab Precautions:
Contact Phone #: 813-291-9507 Cell#: 813-291-9507	
Project Name (Site): B-2 Valrico FL.	
Project Number (ID):	Container Type:
Regulatory Program:	Preservation Code:
Sampler(s): (signature)	Sampler(s): (printed)

Analysis Requested

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix (See below)	Composite	Grab	No. of Containers	Chloride	TDS	Sp. Cond.
1	B2-823Ft.	823	8/17/17 12:11 pm				1	✓	✓	✓
2	B2-843Ft.	843	8/17/17 2:25 pm				1	✓	✓	✓
3	B2-903Ft	903	8/18/17 9:43 Am				1	✓	✓	✓
4										
5										
6										
7										
8										
9										
10										

1) Relinquished By:	Date / Time 8/21/17 12:04	2) Received By: Date / Time 8/21/17 12:04
3) Relinquished By:	Date / Time	4) Received By: Date / Time
5) Relinquished By:	Date / Time	6) Received By: Date / Time

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

Turnaround Time (business days)

___10 Days ; ___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

L7H0279

Project

B-2

Project Number

[none]

September 06, 2017
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

1412 Tech Blvd
Tampa, FL 33619

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

September 06, 2017

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

RE: B-2

We are reporting the results of the analyses performed on the samples recieved on 8/28/2017 under the project name referenced above and identified as the lab Work Order L7H0279. 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 L7H0279 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

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

Sincerely,

Nancy Robertson
Project Manager

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L7H0279-01	B2-903FT	Water	22-Aug-2017 07:20	28-Aug-2017 11:00
L7H0279-02	B2-923FT	Water	22-Aug-2017 09:25	28-Aug-2017 11:00
L7H0279-03	B2-943FT	Water	22-Aug-2017 15:38	28-Aug-2017 11:00
L7H0279-04	B2-1003FT	Water	23-Aug-2017 11:45	28-Aug-2017 11:00
L7H0279-05	B2-1063FT	Water	24-Aug-2017 11:43	28-Aug-2017 11:00
L7H0279-06	B2-1123FT	Water	25-Aug-2017 09:15	28-Aug-2017 11:00

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Hits Summary

(Not Including Subcontracted Analysis)

Sample: B2-903FT

Lab ID: L7H0279-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**251**		1.00	0.00	umhos/cm	1	8/28/17 14:30		SM 2510B
TDS, Total Dissolved Solids	**748**		5.00	1.78	mg/L	1	8/29/17 15:52		SM 2540C
Chloride	**9.91**		2.00	0.104	mg/L	1	8/29/17 18:55	16887-00-6	EPA 300.0
pH	**7.99**		0.100	0.100	SU	1	8/28/17 11:52		SM 4500-H

Sample: B2-923FT

Lab ID: L7H0279-02

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**156**		1.00	0.00	umhos/cm	1	8/28/17 14:30		SM 2510B
TDS, Total Dissolved Solids	**97.0**		5.00	1.78	mg/L	1	8/29/17 15:52		SM 2540C
Chloride	**7.31**		2.00	0.104	mg/L	1	8/29/17 19:07	16887-00-6	EPA 300.0
pH	**7.77**		0.100	0.100	SU	1	8/28/17 11:52		SM 4500-H

Sample: B2-943FT

Lab ID: L7H0279-03

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**464**		1.00	0.00	umhos/cm	1	8/28/17 14:30		SM 2510B
TDS, Total Dissolved Solids	**271**		5.00	1.78	mg/L	1	8/29/17 15:52		SM 2540C
Chloride	**21.1**		2.00	0.104	mg/L	1	8/29/17 19:18	16887-00-6	EPA 300.0
pH	**8.13**		0.100	0.100	SU	1	8/28/17 11:52		SM 4500-H

Sample: B2-1003FT

Lab ID: L7H0279-04

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**569**		1.00	0.00	umhos/cm	1	8/28/17 14:30		SM 2510B
TDS, Total Dissolved Solids	**401**		5.00	1.78	mg/L	1	8/29/17 15:52		SM 2540C
Chloride	**35.0**		2.00	0.104	mg/L	1	8/29/17 19:30	16887-00-6	EPA 300.0
pH	**8.23**		0.100	0.100	SU	1	8/28/17 11:52		SM 4500-H

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Hits Summary

(Not Including Subcontracted Analysis)

(Continued)

Sample: B2-1063FT

Lab ID: L7H0279-05

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**547**		1.00	0.00	umhos/cm	1	8/28/17 14:30		SM 2510B
TDS, Total Dissolved Solids	**353**		5.00	1.78	mg/L	1	8/29/17 15:52		SM 2540C
Chloride	**30.6**		2.00	0.104	mg/L	1	8/29/17 19:41	16887-00-6	EPA 300.0
pH	**8.37**		0.100	0.100	SU	1	8/28/17 11:52		SM 4500-H

Sample: B2-1123FT

Lab ID: L7H0279-06

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**593**		1.00	0.00	umhos/cm	1	8/28/17 14:30		SM 2510B
TDS, Total Dissolved Solids	**391**		5.00	1.78	mg/L	1	8/29/17 15:52		SM 2540C
Chloride	**41.5**		2.00	0.104	mg/L	1	8/29/17 19:53	16887-00-6	EPA 300.0
pH	**8.48**		0.100	0.100	SU	1	8/28/17 11:52		SM 4500-H

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Sample Results

FTS - Florida

Client Sample ID: B2-903FT
Lab Sample ID: L7H0279-01 (Water) **Sampled:8/22/17 7:20**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**9.91**		2.00	0.104	mg/L	1	8/29/17 15:53	8/29/17 18:55	16887-00-6
Conductance by Method 2510B									
Specific conductance	**251**		1.00	0.00	umhos/cm	1	8/28/17 14:30	8/28/17 14:30	
pH by Method 4500-H+-B									
pH	**7.99**		0.100	0.100	SU	1	8/28/17 11:00	8/28/17 11:52	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**748**		5.00	1.78	mg/L	1	8/29/17 15:52	8/29/17 15:52	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Sample Results
(Continued)

FTS - Florida

Client Sample ID: B2-923FT
Lab Sample ID: L7H0279-02 (Water) **Sampled:8/22/17 9:25**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**7.31**		2.00	0.104	mg/L	1	8/29/17 15:53	8/29/17 19:07	16887-00-6
Conductance by Method 2510B									
Specific conductance	**156**		1.00	0.00	umhos/cm	1	8/28/17 14:30	8/28/17 14:30	
pH by Method 4500-H+-B									
pH	**7.77**		0.100	0.100	SU	1	8/28/17 11:00	8/28/17 11:52	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**97.0**		5.00	1.78	mg/L	1	8/29/17 15:52	8/29/17 15:52	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Sample Results
(Continued)

FTS - Florida

Client Sample ID: B2-943FT
Lab Sample ID: L7H0279-03 (Water) **Sampled:8/22/17 15:38**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**21.1**		2.00	0.104	mg/L	1	8/29/17 15:53	8/29/17 19:18	16887-00-6
Conductance by Method 2510B									
Specific conductance	**464**		1.00	0.00	umhos/cm	1	8/28/17 14:30	8/28/17 14:30	
pH by Method 4500-H+-B									
pH	**8.13**		0.100	0.100	SU	1	8/28/17 11:00	8/28/17 11:52	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**271**		5.00	1.78	mg/L	1	8/29/17 15:52	8/29/17 15:52	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Sample Results
(Continued)

FTS - Florida

Client Sample ID: B2-1003FT
Lab Sample ID: L7H0279-04 (Water) **Sampled:8/23/17 11:45**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**35.0**		2.00	0.104	mg/L	1	8/29/17 15:53	8/29/17 19:30	16887-00-6
Conductance by Method 2510B									
Specific conductance	**569**		1.00	0.00	umhos/cm	1	8/28/17 14:30	8/28/17 14:30	
pH by Method 4500-H+-B									
pH	**8.23**		0.100	0.100	SU	1	8/28/17 11:00	8/28/17 11:52	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**401**		5.00	1.78	mg/L	1	8/29/17 15:52	8/29/17 15:52	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Sample Results
(Continued)

FTS - Florida

Client Sample ID: B2-1063FT
Lab Sample ID: L7H0279-05 (Water) **Sampled:8/24/17 11:43**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**30.6**		2.00	0.104	mg/L	1	8/29/17 15:53	8/29/17 19:41	16887-00-6
Conductance by Method 2510B									
Specific conductance	**547**		1.00	0.00	umhos/cm	1	8/28/17 14:30	8/28/17 14:30	
pH by Method 4500-H+-B									
pH	**8.37**		0.100	0.100	SU	1	8/28/17 11:00	8/28/17 11:52	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**353**		5.00	1.78	mg/L	1	8/29/17 15:52	8/29/17 15:52	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Sample Results
(Continued)

FTS - Florida

Client Sample ID: B2-1123FT
Lab Sample ID: L7H0279-06 (Water) **Sampled:8/25/17 9:15**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**41.5**		2.00	0.104	mg/L	1	8/29/17 15:53	8/29/17 19:53	16887-00-6
Conductance by Method 2510B									
Specific conductance	**593**		1.00	0.00	umhos/cm	1	8/28/17 14:30	8/28/17 14:30	
pH by Method 4500-H+-B									
pH	**8.48**		0.100	0.100	SU	1	8/28/17 11:00	8/28/17 11:52	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**391**		5.00	1.78	mg/L	1	8/29/17 15:52	8/29/17 15:52	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7H0353											
Blank (B7H0353-BLK1)						Prepared & Analyzed: 8/29/2017					
Chloride	0.104	U	2.00	0.104	mg/L						
LCS (B7H0353-BS1)						Prepared & Analyzed: 8/29/2017					
Chloride	21.0		2.00	0.104	mg/L	20.0		105	90-110		
LCS Dup (B7H0353-BSD1)						Prepared & Analyzed: 8/29/2017					
Chloride	20.5		2.00	0.104	mg/L	20.0		102	90-110	3	20
Matrix Spike (B7H0353-MS1)		**Source: L7H0280-01**				Prepared & Analyzed: 8/29/2017					
Chloride	25.2		2.00	0.104	mg/L	20.0	5.33	99	80-120		
Matrix Spike Dup (B7H0353-MSD1)		**Source: L7H0280-01**				Prepared & Analyzed: 8/29/2017					
Chloride	23.9		2.00	0.104	mg/L	20.0	5.33	93	80-120	5	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7H0368											
Blank (B7H0368-BLK1)						Prepared & Analyzed: 8/29/2017					
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7H0368-BS1)						Prepared & Analyzed: 8/29/2017					
TDS, Total Dissolved Solids	99.0		5.00	1.78	mg/L	100		99	80-120		
LCS Dup (B7H0368-BSD1)						Prepared & Analyzed: 8/29/2017					
TDS, Total Dissolved Solids	109		5.00	1.78	mg/L	100		109	80-120	10	20
Duplicate (B7H0368-DUP1)		**Source: L7H0226-01**				Prepared & Analyzed: 8/29/2017					
TDS, Total Dissolved Solids	816		5.00	1.78	mg/L		792			3	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

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: B7H0342											
Duplicate (B7H0342-DUP1)			**Source: L7H0279-01**			Prepared & Analyzed: 8/28/2017					
pH	7.98		0.100	0.100	SU		7.99			0.1	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7H0341											
Duplicate (B7H0341-DUP1)		**Source: L7H0279-01**			Prepared & Analyzed: 8/28/2017						
Specific conductance	253		1.00	0.00	umhos/cm		251			0.8	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/6/17 12:27

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
E84098	FL MICROBIOLOGY Lakeland CERT	LFLNELAC	FTSL	06/30/2018
E87429	FL NELAC CERT Tampa	AFLNELAC	FTSL	06/30/2018
LI0-135	DoD CERTIFICATE	DOD	FTSL	11/28/2017
P330-07-00105	USDA CERTIFICATE	USDA	FTSL	

Notes and Definitions

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

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

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

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

Page _____ of _____

Company Name: Cardno

Address: 3905 Crescent Park Drive, Riverview, FL 33578

Results Sent to: David P. Kelly

Email address: davidp.kelly@cardno.com

Contact Phone #: **813-257-0031** Cell#: 813-295-9507

Project Name (Site): B-2

Project Number (ID):

Regulatory Program:

Receiver's Initials/Temp: X / 2.3

Custody Seal(s): ___ Y N Lab Work Order # L7H0279

P.O.# (if required):

Field Comments / Lab Precautions:

Sampler(s): (signature)

Sampler(s): (printed) Joshua Ft

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix (See below)	Composite	Grab	No. of Containers	Container Type:	Preservation Code:	TDS	Chloride	Spec. Cond.	pH	Analysis Requested
1	903 FT	903.00	8/22/2017 - 7:20	GW		X	1			X	X	X	X	
2	923 FT	923.00	08/22/2017 - 9:25	GW		X	1			X	X	X	X	
3	943 FT	943.00	08/22/2017 - 3:38	GW		X	1			X	X	X	X	
4	1003 FT	1003.00	08/23/2017 - 11:45	GW		X	1			X	X	X	X	
5	1063 FT	1063.00	8/24/2017 - 11:43	GW		X	1			X	X	X	X	
6	1123 FT	1123.00	08/25/2017 - 9:15	GW		X	1			X	X	X	X	
7														
8														
9														
10														

1) Relinquished By:	Date / Time 8/25/17 11:00	2) Received By: Date / Time 8/28/17 11:00
3) Relinquished By:	Date / Time	4) Received By: Date / Time
5) Relinquished By:	Date / Time	6) Received By: Date / Time

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

Turnaround Time (business days)

___10 Days ; ___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

L7I0021

Project

B-2

Project Number

[none]

September 20, 2017
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

1412 Tech Blvd
Tampa, FL 33619

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

September 20, 2017

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

RE: B-2

We are reporting the results of the analyses performed on the samples recieved on 9/5/2017 under the project name referenced above and identified as the lab Work Order L7I0021. 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 L7I0021 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,

Chad Bechtold For Nancy Robertson
Project Manager

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 16:59

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L7I0021-01	B2 - 1160FT	Water	29-Aug-2017 11:45	05-Sep-2017 10:24

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 16:59

Hits Summary

(Not Including Subcontracted Analysis)

Sample: B2 - 1160FT

Lab ID: L7I0021-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**517**		1.00	1.00	umhos/cm	1	9/9/17 11:30		SM 2510B
TDS, Total Dissolved Solids	**362**		5.00	1.78	mg/L	1	9/5/17 17:35		SM 2540C
Chloride	**35.2**		2.00	0.104	mg/L	1	9/15/17 10:03	16887-00-6	EPA 300.0

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 16:59

Sample Results

FTS - Florida

Client Sample ID: B2 - 1160FT
Lab Sample ID: L7I0021-01 (Water) **Sampled:8/29/17 11:45**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**35.2**		2.00	0.104	mg/L	1	9/15/17 10:03	9/15/17 10:03	16887-00-6
Conductance by Method 2510B									
Specific conductance	**517**		1.00	1.00	umhos/cm	1	9/9/17 11:30	9/9/17 11:30	
TDS by Method 2540C									
TDS, Total Dissolved Solids	**362**		5.00	1.78	mg/L	1	9/5/17 17:35	9/5/17 17:35	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 16:59

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7I0144											
Blank (B7I0144-BLK1)						Prepared & Analyzed: 9/15/2017					
Chloride	0.104	U	2.00	0.104	mg/L						
LCS (B7I0144-BS1)						Prepared & Analyzed: 9/15/2017					
Chloride	19.9		2.00	0.104	mg/L	20.0		100	90-110		
LCS Dup (B7I0144-BSD1)						Prepared & Analyzed: 9/15/2017					
Chloride	21.6		2.00	0.104	mg/L	20.0		108	90-110	8	20
Matrix Spike (B7I0144-MS1)		**Source: A7I0044-31**				Prepared & Analyzed: 9/15/2017					
Chloride	33.6		2.00	0.104	mg/L	20.0	12.0	108	80-120		
Matrix Spike Dup (B7I0144-MSD1)		**Source: A7I0044-31**				Prepared & Analyzed: 9/15/2017					
Chloride	32.9		2.00	0.104	mg/L	20.0	12.0	104	80-120	2	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 16:59

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7I0033											
Blank (B7I0033-BLK1)						Prepared & Analyzed: 9/5/2017					
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7I0033-BS1)						Prepared & Analyzed: 9/5/2017					
TDS, Total Dissolved Solids	92.0		5.00	1.78	mg/L	100		92	80-120		
LCS Dup (B7I0033-BSD1)						Prepared & Analyzed: 9/5/2017					
TDS, Total Dissolved Solids	93.0		5.00	1.78	mg/L	100		93	80-120	1	20
Duplicate (B7I0033-DUP1)		**Source: L7I0021-01**				Prepared & Analyzed: 9/5/2017					
TDS, Total Dissolved Solids	367		5.00	1.78	mg/L		362			1	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 16:59

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7I0088											
Blank (B7I0088-BLK1)					Prepared: 9/9/2017 Analyzed: 9/15/2017						
Specific conductance	1.00	U	1.00	1.00	umhos/cm						
Duplicate (B7I0088-DUP1)			**Source: L7I0049-02**		Prepared & Analyzed: 9/9/2017						
Specific conductance	4030		1.00	1.00	umhos/cm		4030			0.02	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 16:59

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
E84098	FL MICROBIOLOGY Lakeland CERT	LFLNELAC	FTSL	06/30/2018
E87429	FL NELAC CERT Tampa	AFLNELAC	FTSL	06/30/2018
LI0-135	DoD CERTIFICATE	DOD	FTSL	11/28/2017
P330-07-00105	USDA CERTIFICATE	USDA	FTSL	

Notes and Definitions

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

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

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

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

Page 1 of 1

Company Name: Cardno

Address: 3905 Crescent Park Drive, Riverview, FL 33578

Results Sent to: David P. Kelly

Email address: davidp.kelly@cardno.com

Contact Phone #: **813-257-0031** Cell#: 813-295-9507

Project Name (Site): B-2

Project Number (ID):

Regulatory Program:

Receiver's Initials/Temp: DK / _____

Custody Seal(s): ___ Y N Lab Work Order # L7I0021

P.O.# (if required):

Field Comments / Lab Precautions:

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

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix (See below)	Composite	Grab	No. of Containers	TDS	Chloride	Spec. Cond.
1	B-2 1160 FT	1160.00	8/29/2017 - 11:45	GW		X	1	X	X	X
7										
8										
9										
10										

Analysis Requested

Container Type:

Preservation Code:

1) Relinquished By: _____ Date / Time 9/1/2017 - 17:00

2) Received By: _____ Date / Time 9/1/17 17:00

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

3) Relinquished By: _____ Date / Time 9/5/17 10:23

4) Received By: _____ Date / Time 9/5/17 10:24

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

L7I0060

Project

B-2

Project Number

[none]

September 20, 2017
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

1412 Tech Blvd
Tampa, FL 33619

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

September 20, 2017

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

RE: B-2

We are reporting the results of the analyses performed on the samples recieved on 9/7/2017 under the project name referenced above and identified as the lab Work Order L7I0060. 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 L7I0060 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,

Chad Bechtold For Nancy Robertson
Project Manager

MWBE SDBE
NELAC DoD Accredited

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 17:07

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L7I0060-01	B2 9:07	Water	06-Sep-2017 09:07	07-Sep-2017 15:29
L7I0060-02	B2 11:07	Water	06-Sep-2017 11:07	07-Sep-2017 15:29
L7I0060-03	B2 13:07	Water	06-Sep-2017 13:07	07-Sep-2017 15:29
L7I0060-04	B2 15:07	Water	06-Sep-2017 15:07	07-Sep-2017 15:29

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 17:07

Hits Summary

(Not Including Subcontracted Analysis)

Sample: B2 9:07

Lab ID: L7I0060-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
TDS, Total Dissolved Solids	**356**		5.00	1.78	mg/L	1	9/13/17 16:25		SM 2540C
Chloride	**130**		2.00	0.104	mg/L	1	9/8/17 0:02	16887-00-6	EPA 300.0

Sample: B2 11:07

Lab ID: L7I0060-02

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
TDS, Total Dissolved Solids	**363**		5.00	1.78	mg/L	1	9/13/17 16:25		SM 2540C
Chloride	**130**		2.00	0.104	mg/L	1	9/8/17 0:16	16887-00-6	EPA 300.0

Sample: B2 13:07

Lab ID: L7I0060-03

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
TDS, Total Dissolved Solids	**357**		5.00	1.78	mg/L	1	9/13/17 16:25		SM 2540C
Chloride	**130**		2.00	0.104	mg/L	1	9/8/17 0:31	16887-00-6	EPA 300.0

Sample: B2 15:07

Lab ID: L7I0060-04

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
TDS, Total Dissolved Solids	**361**		5.00	1.78	mg/L	1	9/13/17 16:25		SM 2540C
Chloride	**129**		2.00	0.104	mg/L	1	9/8/17 1:29	16887-00-6	EPA 300.0

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 17:07

Sample Results

FTS - Florida

Client Sample ID: B2 9:07
Lab Sample ID: L7I0060-01 (Water) **Sampled:9/6/17 9:07**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**130**		2.00	0.104	mg/L	1	9/7/17 11:56	9/8/17 0:02	16887-00-6
TDS by Method 2540C									
TDS, Total Dissolved Solids	**356**		5.00	1.78	mg/L	1	9/13/17 16:25	9/13/17 16:25	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 17:07

Sample Results

(Continued)

FTS - Florida

Client Sample ID: B2 11:07
Lab Sample ID: L7I0060-02 (Water) **Sampled:9/6/17 11:07**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**130**		2.00	0.104	mg/L	1	9/7/17 11:56	9/8/17 0:16	16887-00-6
TDS by Method 2540C									
TDS, Total Dissolved Solids	**363**		5.00	1.78	mg/L	1	9/13/17 16:25	9/13/17 16:25	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 17:07

Sample Results

(Continued)

FTS - Florida

Client Sample ID: B2 13:07
Lab Sample ID: L7I0060-03 (Water) **Sampled:9/6/17 13:07**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**130**		2.00	0.104	mg/L	1	9/7/17 11:56	9/8/17 0:31	16887-00-6
TDS by Method 2540C									
TDS, Total Dissolved Solids	**357**		5.00	1.78	mg/L	1	9/13/17 16:25	9/13/17 16:25	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 17:07

Sample Results

(Continued)

FTS - Florida

Client Sample ID: B2 15:07
Lab Sample ID: L7I0060-04 (Water) **Sampled:9/6/17 15:07**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Anions by Method 300.0									
Chloride	**129**		2.00	0.104	mg/L	1	9/7/17 11:56	9/8/17 1:29	16887-00-6
TDS by Method 2540C									
TDS, Total Dissolved Solids	**361**		5.00	1.78	mg/L	1	9/13/17 16:25	9/13/17 16:25	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 17:07

Quality Control

Anions by Method 300.0

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7I0078											
Blank (B7I0078-BLK1)						Prepared & Analyzed: 9/7/2017					
Chloride	0.104	U	2.00	0.104	mg/L						
LCS (B7I0078-BS1)						Prepared & Analyzed: 9/7/2017					
Chloride	21.7		2.00	0.104	mg/L	20.0		108	90-110		
LCS Dup (B7I0078-BSD1)						Prepared: 9/7/2017 Analyzed: 9/8/2017					
Chloride	20.0		2.00	0.104	mg/L	20.0		100	90-110	8	20
Duplicate (B7I0078-DUP1)		**Source: L7I0029-03**				Prepared & Analyzed: 9/7/2017					
Chloride	314		2.00	0.104	mg/L		314			0	20
Matrix Spike (B7I0078-MS1)		**Source: L7I0029-03**				Prepared & Analyzed: 9/7/2017					
Chloride	336		2.00	0.104	mg/L	20.0	314	110	80-120		
Matrix Spike Dup (B7I0078-MSD1)		**Source: L7I0029-03**				Prepared & Analyzed: 9/7/2017					
Chloride	337		2.00	0.104	mg/L	20.0	314	115	80-120	0.3	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 17:07

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7I0110											
Blank (B7I0110-BLK1)						Prepared & Analyzed: 9/13/2017					
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7I0110-BS1)						Prepared & Analyzed: 9/13/2017					
TDS, Total Dissolved Solids	91.0		5.00	1.78	mg/L	100		91	80-120		
LCS Dup (B7I0110-BSD1)						Prepared & Analyzed: 9/13/2017					
TDS, Total Dissolved Solids	99.0		5.00	1.78	mg/L	100		99	80-120	8	20
Duplicate (B7I0110-DUP1)		**Source: L7I0060-04**				Prepared & Analyzed: 9/13/2017					
TDS, Total Dissolved Solids	366		5.00	1.78	mg/L		361			1	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	9/20/17 17:07

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
E84098	FL MICROBIOLOGY Lakeland CERT	LFLNELAC	FTSL	06/30/2018
E87429	FL NELAC CERT Tampa	AFLNELAC	FTSL	06/30/2018
LI0-135	DoD CERTIFICATE	DOD	FTSL	11/28/2017
P330-07-00105	USDA CERTIFICATE	USDA	FTSL	

Notes and Definitions

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

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

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

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

Page _____ of _____

L7I0060

Company Name: Cardno - Riverview
Address: 3905 Crescent Park Drive FL 33578
Results Sent to:
Email address:
Contact Phone #: 813-257-0031 Cell#: 813-295-9507
Project Name (Site): B-2
Project Number (ID):
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: X / 3.9
Custody Seal(s): Y N Lab Work Order #
P.O.# (if required):
Field Comments / Lab Precautions:

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

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix	Composite	Grab	No. of Containers	TDS	Chloride	Container Type	Preservation Code
1	B2 9:07 am	76 bls	9/6/17 9:07 am	GW		X	2	U	U		
2	B 2 11:07 am	78.1 bls	9/6/17 11:07	GW		X	2	U	U		
3	B2 13:07	77 bls	9/6/17 13:07	GW		X	2	U	U		
4	B2 15:07	76.1 bls	9/6/17 15:07	GW		X	2	U	U		
5											
6											
7											
8											
9											
10											

Analysis Requested

	Date / Time
1) Relinquished By:	9/7/17 3:29
2) Received By:	9/7/17 3:29
3) Relinquished By:	
4) Received By:	
5) Relinquished By:	
6) Received By:	

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

L7J0069

Project

B-2

Project Number

[none]

October 18, 2017
Cardno - Riverview
3905 Crescent Park Drive
Riverview, FL 33578

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

1412 Tech Blvd
Tampa, FL 33619

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

October 18, 2017

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

RE: B-2

We are reporting the results of the analyses performed on the samples recieved on 10/5/2017 under the project name referenced above and identified as the lab Work Order L7J0069. 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 L7J0069 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

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

Sincerely,

Nancy Robertson
Project Manager

MWBE SDBE
NELAC DoD Accredited

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
L7J0069-01	FD B-2	Water	02-Oct-2017 11:53	05-Oct-2017 10:05

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

Analysis Case Narrative

Turbidity was analyzed on sample L7J0069-01 on the same day that it was received.

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

Hits Summary

(Not Including Subcontracted Analysis)

Sample: FD B-2

Lab ID: L7J0069-01

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Analyzed	CAS #	Method
Specific conductance	**666**		1.00	1.00	umhos/cm	1	10/5/17 7:31		SM 2510B
TDS, Total Dissolved Solids	**369**		5.00	1.78	mg/L	1	10/9/17 15:11		SM 2540C
Chloride	**78.7**		2.00	0.104	mg/L	1	10/6/17 21:16	16887-00-6	EPA 300.0
Sulfate	**7.24**		2.00	0.168	mg/L	1	10/6/17 21:16	14808-79-8	EPA 300.0
Alkalinity, Total (as CaCO3)	**222**		2.00	0.500	mg/L	1	10/6/17 13:45		SM 2320B
pH	**8.71**		0.100	0.100	SU	1	10/5/17 11:30		SM 4500-H
Alkalinity, Bicarbonate (as CaCO3)	**211**		2.00	0.500	mg/L	1	10/6/17 13:45		SM 2320B
Alkalinity, Carbonate (as CaCO3)	**10.4**		2.00	0.500	mg/L	1	10/6/17 13:45		SM 2320B
Calcium	**2.19**	V	0.500	0.00730	mg/L	1	10/10/17 12:12	7440-70-2	EPA 6010C
Iron	**0.00886**	I	0.100	0.00310	mg/L	1	10/10/17 12:12	7439-89-6	EPA 6010C
Magnesium	**1.26**		0.500	0.00540	mg/L	1	10/10/17 12:12	7439-95-4	EPA 6010C
Hardness, Total as (Ca + Mg)	**10.7**		0.500	0.00730	mg/L	1	10/10/17 12:12		EPA 6010C
Potassium	**6.86**		0.500	0.00220	mg/L	1	10/10/17 12:12	9/7/7440	EPA 6010C
Sodium	**94.0**		0.500	0.00230	mg/L	1	10/10/17 12:12	7440-23-5	EPA 6010C

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

Sample Results

Client Sample ID: FD B-2
Lab Sample ID: L7J0069-01 (Water) **Sampled:10/2/17 11:53**

Analyte	Result	Qual	PQL	MDL	Units	Dil	Date Prepared	Date Analyzed	CAS #
Alkalinity, Total by Method 2320B	**FTSL**						**Analyst:NS**		
Alkalinity, Total (as CaCO3)	**222**		2.00	0.500	mg/L	1	10/6/17 11:30	10/6/17 13:45	
Alkalinity, Bicarbonate (as CaCO3)	**211**		2.00	0.500	mg/L	1	10/6/17 11:30	10/6/17 13:45	
Alkalinity, Carbonate (as CaCO3)	**10.4**		2.00	0.500	mg/L	1	10/6/17 11:30	10/6/17 13:45	
Anions by Method 300.0	**FTSL**						**Analyst:NS/JL**		
Chloride	**78.7**		2.00	0.104	mg/L	1	10/6/17 8:24	10/6/17 21:16	16887-00-6
Sulfate	**7.24**		2.00	0.168	mg/L	1	10/6/17 8:24	10/6/17 21:16	14808-79-8
Conductance by Method 2510B	**FTSL**						**Analyst:NS**		
Specific conductance	**666**		1.00	1.00	umhos/cm	1	10/4/17 10:25	10/5/17 7:31	
pH by Method 4500-H+-B	**FTSL**						**Analyst:NS**		
pH	**8.71**		0.100	0.100	SU	1	10/4/17 17:00	10/5/17 11:30	
TDS by Method 2540C	**FTSL**						**Analyst:RGH**		
TDS, Total Dissolved Solids	**369**		5.00	1.78	mg/L	1	10/9/17 15:11	10/9/17 15:11	
Total Metal Analysis by Method 6010C	**FTSL**						**Analyst:ZZZ**		
Calcium	**2.19**	V	0.500	0.00730	mg/L	1	10/9/17 13:20	10/10/17 12:12	7440-70-2
Iron	**0.00886**	I	0.100	0.00310	mg/L	1	10/9/17 13:20	10/10/17 12:12	7439-89-6
Magnesium	**1.26**		0.500	0.00540	mg/L	1	10/9/17 13:20	10/10/17 12:12	7439-95-4
Hardness, Total as (Ca + Mg)	**10.7**		0.500	0.00730	mg/L	1	10/9/17 13:20	10/10/17 12:12	
Potassium	**6.86**		0.500	0.00220	mg/L	1	10/9/17 13:20	10/10/17 12:12	9/7/7440
Sodium	**94.0**		0.500	0.00230	mg/L	1	10/9/17 13:20	10/10/17 12:12	7440-23-5
Turbidity by Method 180.1	**FTSL**						**Analyst:NS**		
Turbidity	0.507	UQ	1.00	0.507	NTU	1	10/5/17 19:21	10/5/17 19:25	

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

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: B7J0110											
Blank (B7J0110-BLK1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	0.201	I	0.500	0.00730	mg/L						
LCS (B7J0110-BS1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	10.6		0.500	0.00730	mg/L	10.0		106	80-120		
LCS Dup (B7J0110-BSD1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	10.6		0.500	0.00730	mg/L	10.0		106	80-120	0.3	20
Duplicate (B7J0110-DUP1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	15.4		0.500	0.00730	mg/L		15.4			0.09	20
Matrix Spike (B7J0110-MS1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	27.1		0.500	0.00730	mg/L	10.0	15.4	117	80-120		
Matrix Spike Dup (B7J0110-MSD1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	26.9		0.500	0.00730	mg/L	10.0	15.4	115	80-120	0.6	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

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: B7J0110											
Blank (B7J0110-BLK1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	0.201	I	0.500	0.00730	mg/L						
Magnesium	0.00540	U	0.500	0.00540	mg/L						
Hardness, Total as (Ca + Mg)	0.0500	U	0.500	0.0500	mg/L						
LCS (B7J0110-BS1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	10.6		0.500	0.00730	mg/L	10.0		106	80-120		
Magnesium	10.6		0.500	0.00540	mg/L	10.0		106	85-115		
LCS Dup (B7J0110-BSD1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	10.6		0.500	0.00730	mg/L	10.0		106	80-120	0.3	20
Magnesium	10.6		0.500	0.00540	mg/L	10.0		106	85-115	0.2	20
Duplicate (B7J0110-DUP1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	15.4		0.500	0.00730	mg/L		15.4			0.09	20
Magnesium	6.00		0.500	0.00540	mg/L		6.05			0.7	20
Hardness, Total as (Ca + Mg)	63.3		0.500	0.00730	mg/L		63.4			0.2	200
Matrix Spike (B7J0110-MS1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	27.1		0.500	0.00730	mg/L	10.0	15.4	117	80-120		
Magnesium	16.5		0.500	0.00540	mg/L	10.0	6.05	104	85-115		
Matrix Spike Dup (B7J0110-MSD1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Calcium	26.9		0.500	0.00730	mg/L	10.0	15.4	115	80-120	0.6	20
Magnesium	16.4		0.500	0.00540	mg/L	10.0	6.05	104	85-115	0.3	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

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: B7J0110											
Blank (B7J0110-BLK1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Potassium	0.00220	U	0.500	0.00220	mg/L						
LCS (B7J0110-BS1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Potassium	10.4		0.500	0.00220	mg/L	10.0		104	80-120		
LCS Dup (B7J0110-BSD1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Potassium	10.4		0.500	0.00220	mg/L	10.0		104	80-120	0.1	20
Duplicate (B7J0110-DUP1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Potassium	23.8		0.500	0.00220	mg/L		23.8			0.1	20
Matrix Spike (B7J0110-MS1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Potassium	35.4		0.500	0.00220	mg/L	10.0	23.8	116	80-120		
Matrix Spike Dup (B7J0110-MSD1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Potassium	35.0		0.500	0.00220	mg/L	10.0	23.8	112	80-120	1	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

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: B7J0110											
Blank (B7J0110-BLK1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Iron	0.00310	U	0.100	0.00310	mg/L						
LCS (B7J0110-BS1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Iron	10.8		0.100	0.00310	mg/L	10.0		108	80-120		
LCS Dup (B7J0110-BSD1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Iron	10.8		0.100	0.00310	mg/L	10.0		108	80-120	0.2	20
Duplicate (B7J0110-DUP1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Iron	0.00431	I	0.100	0.00310	mg/L		0.00408			6	20
Matrix Spike (B7J0110-MS1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Iron	10.8		0.100	0.00310	mg/L	10.0	0.00408	108	80-120		
Matrix Spike Dup (B7J0110-MSD1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Iron	10.8		0.100	0.00310	mg/L	10.0	0.00408	108	80-120	0.5	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

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: B7J0110											
Blank (B7J0110-BLK1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Magnesium	0.00540	U	0.500	0.00540	mg/L						
LCS (B7J0110-BS1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Magnesium	10.6		0.500	0.00540	mg/L	10.0		106	80-120		
LCS Dup (B7J0110-BSD1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Magnesium	10.6		0.500	0.00540	mg/L	10.0		106	80-120	0.2	20
Duplicate (B7J0110-DUP1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Magnesium	6.00		0.500	0.00540	mg/L		6.05			0.7	20
Matrix Spike (B7J0110-MS1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Magnesium	16.5		0.500	0.00540	mg/L	10.0	6.05	104	80-120		
Matrix Spike Dup (B7J0110-MSD1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Magnesium	16.4		0.500	0.00540	mg/L	10.0	6.05	104	80-120	0.3	20

Cardno - Riverview	Project: B-2	
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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: B7J0110											
Blank (B7J0110-BLK1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Sodium	0.00230	U	0.500	0.00230	mg/L						
LCS (B7J0110-BS1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Sodium	9.99		0.500	0.00230	mg/L	10.0		100	80-120		
LCS Dup (B7J0110-BSD1)					Prepared: 10/9/2017 Analyzed: 10/10/2017						
Sodium	10.0		0.500	0.00230	mg/L	10.0		100	80-120	0.1	20
Duplicate (B7J0110-DUP1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Sodium	54.1		0.500	0.00230	mg/L		54.2			0.1	20
Matrix Spike (B7J0110-MS1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Sodium	65.2		0.500	0.00230	mg/L	10.0	54.2	111	80-120		
Matrix Spike Dup (B7J0110-MSD1)		**Source: A7J0004-01**			Prepared: 10/9/2017 Analyzed: 10/10/2017						
Sodium	65.2		0.500	0.00230	mg/L	10.0	54.2	110	80-120	0.06	20

Cardno - Riverview	Project: B-2	
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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: B7J0109											
Blank (B7J0109-BLK1)					Prepared & Analyzed: 10/6/2017						
Alkalinity, Total (as CaCO3)	0.500	U	2.00	0.500	mg/L						
Alkalinity, Bicarbonate (as CaCO3)	0.500	U	2.00	0.500	mg/L						
Alkalinity, Carbonate (as CaCO3)	0.500	U	2.00	0.500	mg/L						
LCS (B7J0109-BS1)					Prepared & Analyzed: 10/6/2017						
Alkalinity, Total (as CaCO3)	68.2		2.00	0.500	mg/L	69.0		99	90-110		
LCS Dup (B7J0109-BSD1)					Prepared & Analyzed: 10/6/2017						
Alkalinity, Total (as CaCO3)	67.2		2.00	0.500	mg/L	69.0		97	90-110	2	20
Duplicate (B7J0109-DUP1)		**Source: L7J0069-01**			Prepared & Analyzed: 10/6/2017						
Alkalinity, Total (as CaCO3)	132	J	2.00	0.500	mg/L		222			50	20
Alkalinity, Bicarbonate (as CaCO3)	132	J	2.00	0.500	mg/L		211			46	20
Alkalinity, Carbonate (as CaCO3)	0.649	IJ	2.00	0.500	mg/L		10.4			176	20

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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: B7J0096											
Blank (B7J0096-BLK1)					Prepared & Analyzed: 10/6/2017						
Chloride	0.104	U	2.00	0.104	mg/L						
Blank (B7J0096-BLK2)					Prepared: 10/6/2017 Analyzed: 10/7/2017						
Chloride	0.104	U	2.00	0.104	mg/L						
LCS (B7J0096-BS1)					Prepared & Analyzed: 10/6/2017						
Chloride	19.0		2.00	0.104	mg/L	20.0		95	90-110		
LCS (B7J0096-BS2)					Prepared: 10/6/2017 Analyzed: 10/7/2017						
Chloride	20.5		2.00	0.104	mg/L	20.0		103	90-110		
LCS Dup (B7J0096-BSD1)					Prepared: 10/6/2017 Analyzed: 10/7/2017						
Chloride	20.0		2.00	0.104	mg/L	20.0		100	90-110	5	20
LCS Dup (B7J0096-BSD2)					Prepared: 10/6/2017 Analyzed: 10/7/2017						
Chloride	20.7		2.00	0.104	mg/L	20.0		104	90-110	1	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
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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: B7J0096											
Blank (B7J0096-BLK1)					Prepared & Analyzed: 10/6/2017						
Sulfate	0.168	U	2.00	0.168	mg/L						
Blank (B7J0096-BLK2)					Prepared: 10/6/2017 Analyzed: 10/7/2017						
Sulfate	0.168	U	2.00	0.168	mg/L						
LCS (B7J0096-BS1)					Prepared & Analyzed: 10/6/2017						
Sulfate	20.6		2.00	0.168	mg/L	20.0		103	90-110		
LCS (B7J0096-BS2)					Prepared: 10/6/2017 Analyzed: 10/7/2017						
Sulfate	20.7		2.00	0.168	mg/L	20.0		103	90-110		
LCS Dup (B7J0096-BSD1)					Prepared: 10/6/2017 Analyzed: 10/7/2017						
Sulfate	20.7		2.00	0.168	mg/L	20.0		104	90-110	0.7	20
LCS Dup (B7J0096-BSD2)					Prepared: 10/6/2017 Analyzed: 10/7/2017						
Sulfate	20.2		2.00	0.168	mg/L	20.0		101	90-110	3	20

Cardno - Riverview	Project: B-2	
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Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

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: B7J0198											
Blank (B7J0198-BLK1)						Prepared & Analyzed: 10/5/2017					
Turbidity	0.507	U	1.00	0.507	NTU						
LCS (B7J0198-BS1)						Prepared & Analyzed: 10/5/2017					
Turbidity	19.8		1.00	0.507	NTU	20.0		99	80-120		
Duplicate (B7J0198-DUP1)		**Source: L7J0069-01**				Prepared & Analyzed: 10/5/2017					
Turbidity	0.507	U	1.00	0.507	NTU		ND				20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
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Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7J0115											
Blank (B7J0115-BLK1)					Prepared & Analyzed: 10/9/2017						
TDS, Total Dissolved Solids	1.78	U	5.00	1.78	mg/L						
LCS (B7J0115-BS1)					Prepared & Analyzed: 10/9/2017						
TDS, Total Dissolved Solids	91.0		5.00	1.78	mg/L	100		91	80-120		
LCS Dup (B7J0115-BSD1)					Prepared & Analyzed: 10/9/2017						
TDS, Total Dissolved Solids	86.0		5.00	1.78	mg/L	100		86	80-120	6	20
Duplicate (B7J0115-DUP1)		**Source: L7J0070-01**			Prepared & Analyzed: 10/9/2017						
TDS, Total Dissolved Solids	3170		5.00	1.78	mg/L		3100			2	20

Cardno - Riverview	Project: B-2	
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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: B7J0074											
Duplicate (B7J0074-DUP1)		**Source: L7J0042-02**			Prepared & Analyzed: 10/4/2017						
pH	7.32		0.100	0.100	SU		7.31			0.1	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

Quality Control
(Continued)

Conductance by Method 2510B

Analyte	Result	Qual	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B7J0066											
Blank (B7J0066-BLK1)					Prepared: 10/4/2017 Analyzed: 10/6/2017						
Specific conductance	1.00	U	1.00	1.00	umhos/cm						
Duplicate (B7J0066-DUP1)			**Source: L7I0330-01**		Prepared & Analyzed: 10/4/2017						
Specific conductance	1.70		1.00	1.00	umhos/cm		1.80			6	20

Cardno - Riverview	Project: B-2	
3905 Crescent Park Drive	Project Number:	**Reported:**
Riverview, FL 33578	Project Manager: David Kelly	10/18/17 12:12

List of Certifications for FTS - Florida

Number	Description	Code	Facility	Expires
E84098	FL MICROBIOLOGY Lakeland CERT	LFLNELAC	FTSL	06/30/2018
E871002	Xenco FL CERT	FLNELAC	FTSL	06/30/2018
E87429	FL NELAC CERT Tampa	AFLNELAC	FTSL	06/30/2018
LI0-135	DoD CERTIFICATE	DOD	FTSL	11/28/2017
P330-07-00105	USDA CERTIFICATE	USDA	FTSL	

Notes and Definitions

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

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

FTS ANALYTICAL SERVICES
CHAIN OF CUSTODY

Page _____ of _____

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

Company Name: Cardno
Address: 3905 Crescent Park Drive, Riverview, FL 33578
Results Sent to: David P. Kelly
Email address: david.p.kelly@cardno.com
Contact Phone #: Cell#:
Project Name (Site): B-2 Nature
Project Number (ID):
Regulations: FL PRP Dry-Cln ADaPT SC NC DOD NPDES

Receiver's Initials/Temp: _____ 13.0
Custody Seal(s): Y N Lab Work Order # LTJ0069
P.O.# (if required):
Field Comments / Lab Precautions:

Sampler(s): (signature)
Sampler(s): (printed) Joshua Yates

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix	Composite	Grab	No. of Containers	Spec. Conductance	pH	TDS	Total Hardness	Ca, Mg, Na	K, Cl, SO4	HCO3, Fe	Turbidity	Container Type	Preservation Code
1	FD B-2	1160	10/02/17 11:53	GW		X	5	X	X	X	X	X	X	X	X		
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Analysis Requested

	Date / Time
1) Relinquished By:	10/05/17 10:05
2) Received By:	10/05/17 10:05
3) Relinquished By:	
4) Received By:	
5) Relinquished By:	
6) Received By:	

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