Task 7: Geophysical Investigation Report

Northwest Florida Water Management District

Planning Region II

E213001407

Cardno
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Document Information

Prepared for	Northwest Florida Water Management District
Project Name	Planning Region II Video and Geophysical Logging
Project Number	E213001407
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Date	12/02/15

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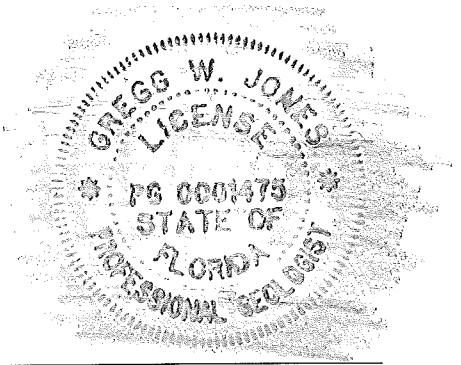

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Acronyms

bls	below land surface
Cardno	Cardno, Inc.
CBL	cement bond log
District	Northwest Florida Water Management District
EAFB	Eglin Air Force Base
GAPI	Gamma Ray American Petroleum Institute
LFAS	Lower Floridan aquifer system
MV	MV Geophysical, Inc.
PVC	polyvinylchloride
Rowe	Rowe Drilling, Inc.
UFAS	Upper Floridan aquifer system

1 Introduction

1.1 Purpose and Scope

In October of 2015, Cardno conducted a geophysical logging investigation to assess the condition of existing Floridan aquifer wells along the coastal areas of Santa Rosa, Okaloosa and Walton Counties. Geophysical logging services were performed by MV Geophysical, Inc. (MV) and logging support service was performed by Rowe Drilling, Inc. (Rowe). MV and Rowe were subcontracted by Cardno for the project. The well casing and open-hole conditions were assessed to provide the District with information to guide decision-making for potential use in proposed enhanced monitoring. Enhanced monitoring includes pumping tests, packer testing, water level measurements, and water quality sampling.

1.2 Well Locations and Specifications

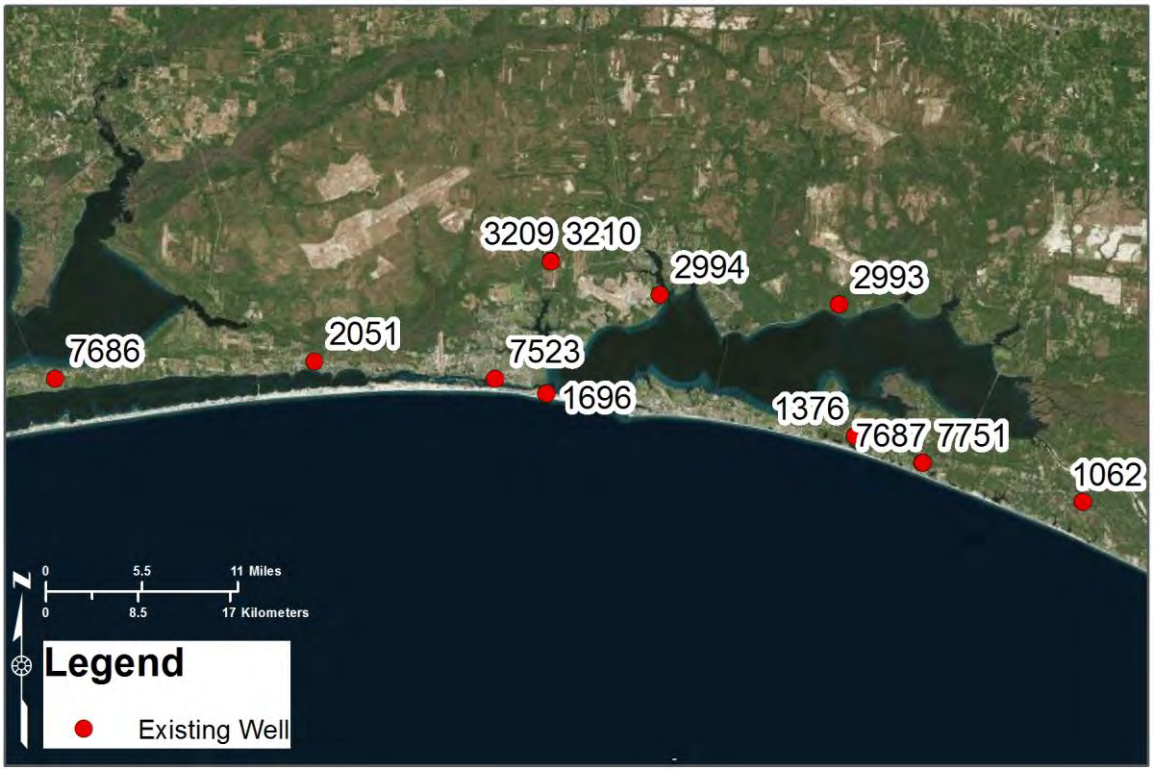
The list of wells identified for potential enhanced monitoring was determined by the District and Cardno during previous tasks with the intent of covering as wide a portion of coastal Region II as possible. During Task 5, Cardno and District staff performed a reconnaissance visit to selected well sites to assess the feasibility of access with large equipment and vehicles. The wells listed below in Table 1-1 were surveyed during this task. Wells are listed in the order surveyed and the reported specifications are also provided.

Table 1-1 Reported Specifications of Existing Wells Identified for Evaluation

NWFID	Well Name	Diameter (inches)	Cased Depth (feet)	Total Depth (feet)	Primary use – Open to Aquifer
7686	Tiger Point	6	1,140	1,310	Monitor – UFAS
2051	Colonial Pines	6	UNK	1,100	Former Supply – UFAS
7523	Liza Jackson	4	835	917	Monitor – UFAS
1696	OCWS ISL-1	6	536	890	Former Supply – UFAS
1062	Point Washington	6	295	610	Monitor - UFAS
7687	Seagrove Shallow	4	314	378	Monitor – UFAS
7751	Seagrove Deep	6	539	645	Monitor – UFAS
3209	EAFB Field 4 Upper	10	442	591	Former Supply – UFAS
3210	EAFB Field 4 Lower	4	938	1,371	Monitor – LFAS
2994	EAFB Post'l Point	6	300	510	Former Supply – UFAS
2993	EAFB Camp Rucker	6	201	880	Monitor – UFAS
1376	West Hewett	6	550	725	Monitor – UFAS

The map below (Figure 1-1) shows the relative locations of the wells for proposed enhanced monitoring. These wells are grouped near the coastal areas of Santa Rosa, Okaloosa, and Walton counties because these areas are more densely populated and most prone to saltwater intrusion risk.

Figure 1-1 Locations of Wells for Proposed Enhanced Monitoring



1.3 Geophysical Logging Documents

Geophysical logging included downhole video surveys, X-Y caliper logs, natural gamma logs, fluid conductivity logs, temperature logs and cement bond logs (CBL) as deemed necessary for each well. All logging was performed under static conditions on non-flowing wells. Electronic copies of each downhole video survey were provided to the District and copies of all other geophysical logs are included as appendices. X-Y caliper and natural gamma logs are included in Appendix A, fluid conductivity and temperature logs are included in Appendix B, and the CBLs are included in Appendix C. Cardno conducted a review of the logs and has provided geophysical observations, general well assessments, and recommendations for each well in this report.

Downhole video surveys were conducted with a video logging tool with color video recording capabilities. X-Y caliper logs utilized a four-armed caliper tool which expands along the well casing/wall to measure the diameter of the open space. Natural gamma logs recorded the gamma ray activity from the surrounding rock formation, measured in Gamma Ray – American Petroleum Institute (GAPI) counts. The X-Y caliper and natural gamma tools are contained in the same instrument and take readings simultaneously. Fluid conductivity was measured in micro Siemens per centimeter (µS/cm) and temperature logs allowed for a basic interpretation of overall water quality in the well. Fluid conductivity and temperature tools are also contained in the same instrument. CBLs measured the continuity of the cement bond between the casing and borehole wall. Logging tools were zeroed at land surface and all survey depths were referenced to feet below land surface (bls). All start and stop times were reported as Central Daylight Time (CDT).

2 Tiger Point (NWFID 7686)

2.1 Well Site Description

The Tiger Point monitoring well site is located in Santa Rosa County on the northeast corner of the ball fields at the Tiger Point Recreation Facility. The well is reported to have a 6-inch steel casing to 1,140 feet bls and a total depth of 1,310 feet bls. This Upper Floridan aquifer monitor well was drilled in 2000.

2.2 Observations

On October 1, 2015, the field team arrived onsite at 8:45 am to begin logging work. The team commenced a downhole video survey at 9:23 am, an X-Y caliper and natural gamma survey at 11:00 am, and a fluid conductivity and temperature survey at 12:00 pm. The team completed work and left the site at 1:10 pm. Depth ranges achieved for each type of survey are presented in Table 2-1 below.

Table 2-1 Depths at which Surveys were Achieved for Tiger Point (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 - 1,161	0 - 1,306	0 - 1,306	0 - 1,306	0 - 1,306	N/A

2.2.1 Downhole Video Survey

The video survey showed a 6-inch diameter straight seam steel casing from land surface to a depth of 1,137 feet, which is three feet less than the reported cased depth. The top of the casing was flush with land surface. The casing appeared to be in very good condition with no indication of a breach, degradation or irregularities. The open-hole interval was observed from the base of the casing at 1,137 feet bls to a depth of 1,161 feet bls. At 1,155 feet bls, a small cement bridge caused an obstruction. The bridge was brittle and the video logging tool easily broke through. However, all visibility was lost at that point due to sediment clouding. Although visibility was lost, the depth tracker on the screen showed that the video logging tool reached a depth of 1,161 feet bls in the open hole, which is 155 feet less than the reported total depth. The decision was made to discontinue the video survey due to poor visibility. The water level was observed at 27.06 feet bls and a light build-up of an unidentified material was observed on the casing wall below approximately 1,000 feet bls. Casing joints were observed at the following depths (feet bls):

-20 -62 -82 -103 -124 -145 -166 -187 -209 -230 -251 -272 -293
-314 -335 -356 -377 -419 -440 -472 -483 -504 -545 -567 -587 -609
-651 -714 -735 -756 -777 -798 -819 -840 -862 -883 -904 -924 -944
-967 -988 -1,030 -1,051 -1,093 -1,114 -1,137 (base of casing).

2.2.2 X-Y Caliper

The caliper log confirmed the base of the 6-inch diameter casing at a depth of 1,137 feet bls and open-hole interval extending to a total depth of 1,306 feet bls, which is four feet less than the reported total depth. The open-hole caliper log showed an oblong-shaped borehole over most of the interval with the borehole diameter ranging between 6 inches and 5 inches nearing the total depth. There were three washout features observed as wide as 9 inches in diameter just below the base of casing, 8 inches at a depth of 1,158 feet bls, and 8.5 inches at a depth of 1,228 feet bls.

2.2.3 Natural Gamma

The open-hole natural gamma log showed GAPI counts generally ranging between 20 to 30 from the base of casing to a depth of 1,270 feet bls. From 1,270 to the total depth of 1,306 feet bls, GAPI counts were

less than 10. There were two notable gamma spikes at 1,113 feet bls and 1,154 feet bls with GAPI counts peaking between 112 and 137. Three smaller gamma peaks were noted at 1,179 feet, 1,205 feet, and 1,244 feet bls, but none exceeded 50 GAPI counts.

2.2.4 Fluid Conductivity

The open-hole fluid conductivity log showed that conductivity ranged uniformly from approximately 2,600 µS/cm at the base of the casing to 2,800 µS/cm at a depth of 1,200 feet bls. At approximately 1,200 feet bls there was a slight shift to increased conductivity and between 1,200 feet bls and 1,300 feet bls, conductivity increased from 2,800 to 3,500 µS/cm and remained stable at 3,500 µS/cm to the total depth of 1,306 feet bls.

2.2.5 Temperature

The open hole temperature increased from 89.4°F (31.9°C) at the base of casing to 91.7°F (33.2°C) at the total depth of 1,306 feet bls. There was one notable anomaly in the open hole at 1,210 feet bls, which indicated a brief interruption of increasing temperature.

2.3 Assessment and Recommendation

Due to good observed conditions and the District's confidence in the performance of this well, a cement bond log was not performed. The video survey showed the casing to be in very good condition. The open-hole interval exists from the base of the casing at 1,137 feet bls to 1,306 feet bls, which is the total depth. The logged cased depth is three feet less than the reported cased depth. The total logged depth of the well is four feet less than the reported total depth. This may indicate sediment accumulation at the bottom of the borehole.

No rehabilitation measures are recommended. Review of the video, caliper, natural gamma, fluid conductivity, and temperature logs indicates that the Tiger Point well is suitable for use for enhanced monitoring.

3 Colonial Pines (NWFID 2051)

3.1 Well Site Description

The Colonial Pines monitoring well site is located in Colonial Pines Mobile Estates in eastern-most Santa Rosa County between the towns of Navarre and Mary Esther. The well is surrounded by a short fence and maintenance building and is somewhat difficult to access. The well is reported to have a 6-inch steel casing to 692 feet bls and a total depth to 939 feet bls. This former Upper Floridan aquifer supply well was drilled in 1968 and recently logged according to the District.

3.2 Observations

On October 1, 2015, the field team arrived onsite at 1:40 pm to begin logging work and commenced a downhole video survey at 3:36 pm. The team completed work and left the site at 4:00 pm. Depth ranges achieved for each type of survey are presented in Table 3-1 below. Because the video survey showed that the condition of the casing was very poor, it was decided not to run any of the other logs.

Table 3-1 Depths at which Surveys were Achieved for Colonial Pines (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 - 946	N/A	N/A	N/A	N/A	N/A

3.2.1 Downhole Video Survey

The video survey showed a 6-inch diameter steel casing from land surface to a depth of 699 feet bls, which is seven feet more than reported. The casing appeared to be in very poor condition overall with heavily scaled and degraded steel observed. The open-hole interval was observed from the base of the casing at 699 feet bls to a depth of 946 feet bls, which is seven feet more than reported. The water level was observed at 68.75 feet bls. Many casing joints and casing welds were unable to be observed due to the scale build-up and degradation. Casing joints were observed at the following depths (feet bls):

-109 -118 -158 -179 -199 -220 -256 -296 -319 -338 -358 -375 -393

-415 -435 -449 -458 -478 -501 -524 -586 -609 -632 -655 -676 -699 (base of casing).

In addition to extreme scaling at the top of the casing, there was a build-up of unidentified material on the casing wall with depth. The open hole was peanut-shaped indicating a connected dual borehole to 754 feet bls. Moderate washouts were observed between 882 feet and 884 feet bls. Significant secondary permeability was observed below 777 feet bls.

3.3 Assessment and Recommendation

Severe scale and degraded conditions were apparent from the video log in the upper 100 feet of casing and no additional logging was performed. The video survey showed the casing to be in very poor condition with signs of breaches in the uppermost 100 feet of casing, which may be allowing water penetration into the Upper Floridan aquifer from the Sand and Gravel aquifer. Due to the extreme scaling of the steel casing, the inside diameter was reduced to some degree. The logged cased depth and logged total depth of the well are seven feet greater than the reported depths.

The open-hole interval appears to be in good condition. However, because of the scaling and degradation of the casing, it is recommended that a casing liner be installed. The liner is operationally feasible but will

likely be expensive to install. Additionally, installation of a riser is recommended to make this well more visible and prevent infiltration of debris and surface water. However, this should only be considered if the riser will not interfere with activities in its immediate surroundings. The District should consider rehabilitation because of the lack of existing monitor wells in the region that could be substituted.

4 Liza Jackson (NWFID 7523)

4.1 Well Site Description

The Liza Jackson monitoring well is located in Liza Jackson Park in Fort Walton Beach in coastal Okaloosa County. The well is reported to have a 4-inch steel casing to 835 feet bls and a total depth of 917 feet bls. This Upper Floridan aquifer monitor well was drilled in 2000.

4.2 Observations

On October 1, 2015, the field team arrived onsite at 4:40 pm to begin logging work. The team commenced a downhole video survey at 4:55 pm and a fluid conductivity/temperature survey at 6:20 pm. The video logging tool was not able to pass the base of the casing. The team completed work and left the site at 7:00 pm. Depth ranges achieved for each type of survey are presented in Table 4-1 below.

Table 4-1 Depths at which Surveys were Achieved for Liza Jackson (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 - 835	N/A	N/A	0 - 899	0 - 899	N/A

4.2.1 Downhole Video Survey

The video survey showed a 4-inch diameter steel casing from land surface to a depth of 835 feet bls. The top of the casing was flush with land surface and the compression cap was not in place. It appears that surface water was entering the well and visibility was poor to approximately 140 feet bls. The video survey was performed to a depth of approximately 835 feet bls where the base of casing was encountered. The video logging tool would not pass through the base of the casing and into the open-hole interval due to a light build-up of an unidentified material on the casing wall, which reduced the inner diameter of the casing. A heavy build-up of the material was observed between 775 and 776 feet bls. The casing should be in acceptable condition for enhanced monitoring with no indication of a breach, degradation, or irregularities observed. The open-hole interval was not observed due to the build-up at the base of casing preventing the 3 ½-inch diameter video logging tool from passing through the 4-inch casing. The water level was observed at 72.36 feet bls. Casing joints were observed at the following depths (feet bls):

-368 -390 -433 -454 -475 -496 -517 -538 -559 -580 -601 -623 -644
-665 -684 -707 -728 -749 -770 -835 (base of casing).

4.2.2 Fluid Conductivity

The open-hole fluid conductivity ranged uniformly from approximately 450 µS/cm at the base of the casing to approximately 1,250 µS/cm at the logged depth of the well at 899 feet bls, which is 18 feet less than the reported total depth. Over the interval from 841 to 847 feet bls, the conductivity showed a significant shift and more rapidly increased from 500 to 750 µS/cm.

4.2.3 Temperature

The open-hole temperature increased from 80.5°F (26.9°C) at the base of casing to 81.5°F (27.5°C) at the logged depth of 899 feet bls. There was an anomaly in the open-hole interval at 846 feet bls which showed a slight and brief increase in temperature.

4.3 Assessment and Recommendation

The light build-up of unidentified material on the casing wall at the base of the casing reduced the diameter of the 4-inch casing to the degree that the 3.5-inch diameter video logging tool would not pass through. The fluid conductivity and temperature logs, which are run on a logging tool with a diameter of 1.9-inches, were successfully completed into the open hole. Review of the video survey showed the casing to be in fair condition. The open-hole interval is present from base of casing at 835 feet bls to 899 feet bls. The reported total depth of 917 feet bls is 18 feet deeper than the logged depth of 899 feet bls. This may indicate collapse or sediment infilling of the base of the borehole.

It is recommended that the well be rehabilitated by using a light to moderately aggressive steel brush to reduce or eliminate the build-up on the casing wall. After making a minimum of five passes of the brush over all parts of the casing wall, the open hole should be cleaned out to total depth using reverse air circulation with a rotating bit. A locking well cap or shelter should be installed to ensure the compression cap remains in place. Additionally, installation of a riser is recommended to make this well more visible and prevent infiltration of debris and surface water, but only if the riser will not interfere with activities in its immediate surroundings. Once the rehabilitation has been completed, the well should be suitable for enhanced monitoring.

5 OCWS (NWFID 1696)

5.1 Well Site Description

The OCWS monitoring well is located in a mounded right-of-way on Okaloosa Island adjacent to Destin West Beach and Bay Resort. The well is reported to have a 6-inch diameter steel casing liner to 536 feet bls and a total depth to 890 feet bls. This former Upper Floridan aquifer supply well was drilled in 1974.

5.2 Observations

On October 2, 2015, the field team arrived onsite at 6:45 am to begin logging work. The team commenced a downhole video survey at 7:35 am, a fluid conductivity and temperature survey at 9:36 am, an X-Y caliper and natural gamma survey at 10:03 am, and a CBL survey at 10:56 am. The team completed work and left the site at 12:15 pm. Depth ranges achieved for each type of survey are presented in Table 5-1 below.

Table 5-1 Depths at which Surveys were Achieved for OCWS (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 – 861	0 - 861	0 - 861	0 - 861	0 -861	0 - 539

5.2.1 Downhole Video Survey

The video survey showed a 6-inch diameter steel casing liner with screw-together, coupling joints from land surface to a depth of 539 feet bls, which was three feet more than the reported casing depth. The top of the casing was flush with the top of a small sand dune that is 2.67 feet above land surface. The casing appeared to be in fairly good condition with no indication of a breach, significant degradation, or irregularities observed. Some light scaling was evident in the uppermost 100 feet of casing. The water level was observed at 65.94 feet bls. Casing joints were observed at the following depths (feet bls):

-19 -40 -60 -80 -102 -122 -142 -168 -184 -203 -224 -245 -265 -285 -307 -329 -349 -369 -391 -411 -434 -474 -495 -516 -539 (base of casing).

The open-hole interval was observed from the base of the casing to a depth of 861 feet bls, which was 29 feet less than the reported total depth of 890 feet. The open hole showed significant moldic porosity throughout and likely good transmissivity. There appeared to be a significant amount of organic debris (leaves, etc.) at the base of the open hole which may have entered the well through the unsecured well cap.

5.2.2 X-Y Caliper

The caliper log confirmed the base of the 6-inch diameter steel casing liner at a depth of 539 feet bls and an open-hole interval extending to a depth of 861 feet bls. The caliper log showed a slightly erratic borehole over the interval from the base of casing to a depth of 682 feet bls with the borehole diameter ranging from 12 to 15 inches. Several washouts were noted at 634, 662, and 678 feet bls. From 682 to 764 feet bls, the borehole diameter was less erratic but had a slight oblong shape from 12 to 13 inches. Below 764 feet bls the borehole was well gauged at a 12-inch diameter.

5.2.3 Natural Gamma

The open-hole natural gamma log showed relatively low GAPI counts generally ranging from 10 to 30 over most of the logged interval to the logged total depth of 861 feet bls. There were two notable gamma spikes at 555 and 612 feet bls evidenced by a brief increase to approximately 95 GAPI counts.

5.2.4 Fluid Conductivity

The open-hole fluid conductivity ranged from approximately 300 µS/cm at the base of the casing to a maximum of approximately 884 µS/cm at the logged total depth of 861 feet bls. There was a slight increase from the base of casing to a depth of 790 feet bls where conductivity was recorded at 392 µS/cm. Between 790 and 821 feet bls, the conductance increased from 392 to 484 µS/cm and below 821 feet bls the sharpest increase in conductance was observed from 484 to 884 µS/cm.

5.2.5 Temperature

The open-hole temperature increased in a fairly linear fashion from 76.5°F (24.7°C) at the base of casing to 81.1°F (27.3°C) at the logged total depth of 861 feet bls. There were a few relatively minor temperature anomalies that did not appear to coincide with notable features of the other logs.

5.2.6 Cement Bond Log

The CBL indicated a good cement seal overall in the well annulus from near land surface to a depth of 505 feet bls. There was some indication of poor or un-cemented casing below that depth. However this may be due to the reported installation of the 6-inch diameter liner to 515 feet and associated packer/cement bridge. Based on the well modification report, the cement packer was installed at approximately 500 feet bls and the 6-inch steel liner below that depth is not grouted in place.

5.3 Assessment and Recommendation

The video log showed fairly good well casing conditions and a competent cement seal in the annulus was indicated in the CBL. No issues of concern were noted in the other logs. The casing has light scaling near the surface, however this is not of concern for the intended purposes of the well. The original drilled depth of the open hole was reported to be 890 feet bls, therefore the bottom 29 feet of well has either collapsed and/or filled in. It is recommended that the well be rehabilitated to the original drilled depth of 890 feet bls and the bottom 29 feet of debris removed. The debris could hinder flow into the lower portion of the borehole and potentially influence water quality and mute water level fluctuations.

Rehabilitation should be accomplished by using a light steel brush to reduce the build-up on the casing wall. After making a minimum of five passes of the brush over all parts of the casing wall, the open hole should be cleaned out to total depth with reverse air circulation with a rotating bit. A locking well cap or shelter should be installed to ensure the cap remains properly sealed. Additionally, installation of a riser is recommended to make this well more visible and prevent infiltration of debris and surface water, but only if the riser will not interfere with activities in its immediate surroundings. Once well rehabilitation is complete, the well will be suitable for enhanced monitoring.

6 Point Washington (NWFID 1062)

6.1 Well Site Description

The Point Washington monitor well is located along Forest Road 2 in Point Washington State Forest in coastal Walton County. This area is subject to occasional brushfire conditions as part of forest maintenance. The well is reported to have a 6-inch Polyvinylchloride (PVC) casing to a depth of 295 feet bls and a total depth of 610 feet bls. This Upper Floridan aquifer monitor well was drilled in 1983.

6.2 Observations

On October 2, 2015, the field team arrived onsite at 1:15 pm to begin logging work. The team commenced a downhole video survey at 1:29 pm and an X-Y caliper and natural gamma survey at 2:33 pm. The video survey tool could not advance beyond 314 feet bls due to the presence of what appeared to be an extensive build-up of unidentified material inside the borehole. Following removal of the video survey tool the team attempted to break through the build-up encountered at 314 feet bls with a weighted hammer tool. However, the hammer tool was unable to advance beyond this blockage and the video survey tool was not reinserted. The smaller-diameter X-Y caliper and natural gamma instrument was only successful at reaching a depth of 320 feet bls. The team completed work and left the site at 3:15 pm. Depth ranges achieved for each type of survey are presented in Table 6-1 below.

Table 6-1 Depths at which Surveys were Achieved for Point Washington (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 – 314	0 - 320	0 - 320	N/A	N/A	N/A

6.2.1 Downhole Video Survey

The video survey showed a 6-inch diameter PVC from land surface to a depth of 288 feet bls, which is seven feet less than the reported depth. The borehole was observed to a depth of 314 feet bls, which is 296 feet less than the reported total depth. The casing appears to be intact over the entire interval from land surface to the base of the casing at 288 feet bls, which is seven feet less than reported. The open borehole was observed to 314 feet bls, but visibility was poor throughout this interval. The water level was observed at 23.76 feet bls. Casing joints were observed at the following depths (feet bls):

-35 -74 -94 -113 -132 -152 -171 -190 -210 -230 -249 -269 -285 -288 (base of casing)

6.2.2 X-Y Caliper

The caliper log confirmed the base of the 6-inch diameter PVC liner at a depth of 288 feet bls and an open hole interval extending to a logged depth of 320 feet bls, which is 290 feet less than the reported depth. The caliper log showed an erratic borehole over the interval from the base of casing to a depth of 320 feet bls with the borehole diameter ranging from 4 to 6 inches. Two washouts were noted directly below the casing at 289 feet bls and at 293 feet bls.

6.2.3 Natural Gamma

The open-hole natural gamma log was limited because it could not be lowered below 320 feet bls. The open borehole gamma readings ranged between 25 and 40 GAPI counts and spiked to 70 counts corresponding with the washout at the base of the casing. Cased interval gamma readings were below 20 GAPI counts from the surface to 70 feet bls. Between 70 and 315 feet bls, GAPI counts were somewhat

erratic and fluctuated between 20 and 50 over most of the interval. There was one notable gamma spike at 186 feet bls to 123 GAPI counts.

6.3 Assessment and Recommendation

The video, X-Y caliper, and natural gamma logs indicate the casing is in acceptable condition from land surface to the observed base of casing at 288 feet bls. The reported cased depth is 295 feet bls and the total open hole depth is reported to be 610 feet bls. There is substantial growth inside the open hole from the base of the casing to a depth of 320 feet bls. The borehole is completely obstructed below 320 feet bls and none of the logging tools could be lowered below that depth.

It is recommended that the well be rehabilitated to the original drilled depth of 610 feet bls. Rehabilitation should be conducted using reverse air circulation to re-establish and recondition the open hole to 610 feet bls. The PVC casing should be brushed with a nylon brush with a minimum of five passes of the brush over all parts of the casing. After brushing is complete, all remaining debris in the well should be cleaned out with additional reverse air circulation. Once well rehabilitation is complete, the well will be suitable for enhanced monitoring.

7 Seagrove Shallow (NWFID 7687)

7.1 Well Site Description

The Seagrove Shallow monitoring well is located at a Regional Utilities water tower site off Satinwood Drive in southern Santa Rosa Beach. The well is reported to have a 4-inch diameter steel casing to 314 feet bls and a total depth of 378 feet bls. This Upper Floridan aquifer monitor well was drilled in 2000.

7.2 Observations

On October 2, 2015, the field team arrived onsite at 3:45 pm to begin logging work. The team commenced a downhole video survey at 4:18 pm and a fluid conductivity and temperature survey at 5:09 pm. The team completed work at 5:30 pm and moved to the Seagrove Deep (NWF7751) well located at the same site. Depth ranges achieved for each type of survey are presented in Table 7-1 below.

Table 7-1 Depths at which Surveys were Achieved for Seagrove Shallow (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 – 314	N/A	N/A	0 - 378	0 - 378	N/A

7.2.1 Downhole Video Survey

The video survey showed a 4-inch diameter steel casing from land surface to a depth of 314 feet bls. The top of the casing extends to 18 inches above land surface. The casing appeared to be in very good condition with no indication of a breach, degradation, or irregularities observed other than a slight build-up of unidentified material on the casing wall. Near the bottom of the logged interval, at the base of the casing, this build-up widened and prevented the video logging tool from proceeding further. The water level was observed at 23.04 feet bls. Screw-together casing joints were observed at the following depths (feet bls):

-38 -60 -82 -103 -123 -145 -167 -187 -209 -230 -251 -272 -294 -314 (base of casing).

The casing had thin dark-colored build-up of unidentified material along the upper 100 feet. Slight build-up of what appeared to be mineral deposits were observed around the casing joints. Overall, the casing was in very good condition.

7.2.2 Fluid Conductivity

The fluid conductivity logging tool, which is a smaller diameter than the video logging tool, was able to pass the above-referenced obstruction at 314 feet bls and reach the reported total depth of 378 feet bls. The open-hole fluid conductivity ranged from approximately 255 µS/cm at the base of the casing to approximately 365 µS/cm at the total depth of 378 feet bls. The increasing conductivity with depth throughout the open-hole interval was fairly uniform with the exception of a significant anomaly at 329 feet bls where the conductance briefly dropped from 260 µS/cm to 215 µS/cm before resuming the overall steady increase. Below 329 feet bls, conductivity increased more dramatically.

7.2.3 Temperature

The open hole temperature increased from 74.3°F (23.5°C) at the base of the casing to 75.2°F (24°C) at total depth with one exception at 329 feet bls. There was an anomalous temperature drop from 74.5°F (23.6°C) to 73.9°F (23.3°C) at that depth before the temperature gradient resumed the steady increase.

7.3 Assessment and Recommendation

Build-up of unidentified material on the casing wall, especially near the casing bottom, reduced the 4-inch diameter well to the degree that the video logging tool would not pass through. The only other logs completed were fluid conductivity and temperature. Review of the video survey showed the casing to be in very good condition. The logs indicated the open-hole interval extends from the base of the casing at 314 feet bls to the reported total depth of the borehole at 378 feet bls.

Rehabilitation is recommended using light to moderate aggressive brushing with a steel brush to greatly reduce or eliminate the build-up observed in the casing. After making a minimum of five passes of the brush over all parts of the casing wall, the open hole should be cleaned out to total depth using reverse air circulation with rotating bit to remove settled brushed material from the base of the open hole. Once the well has been rehabilitated it will be suitable for enhanced monitoring.

8 Seagrove Deep (NWFID 7751)

8.1 Well Site Description

The Seagrove Deep monitor well is directly adjacent to the Seagrove Shallow well at the Regional Utilities water tower site in southern Santa Rosa Beach. The well is reported to have a 6-inch diameter steel casing to 539 feet bls and a total depth of 645 feet bls. This Upper Floridan aquifer monitor well was drilled in 2000.

8.2 Observations

On October 2, 2015, subsequent to logging the Seagrove Shallow monitor well at the same site, the team set up at 5:35 pm to log Seagrove Deep. The team commenced a downhole video survey at 5:45 pm and a fluid conductivity and temperature survey at 6:59 pm. The team completed work and left the site at 7:35 pm. Depth ranges achieved for each type of survey are presented in Table 8-1 below.

Table 8-1 Depths at which Surveys were Achieved for Seagrove Deep (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 – 630	N/A	N/A	0 - 634	0 - 634	N/A

8.2.1 Downhole Video Survey

The video survey showed the 6-inch diameter steel casing from land surface to a depth of 539 feet bls. The top of the casing rises 22-inches above land surface. The casing appeared to be in very good condition and no irregularities, indications of a breach, or degradation were observed. The open hole was observed from the base of the casing at 539 feet bls to a depth of 630 feet bls where visibility was lost, which is 15 feet less than the reported total depth. The water level was observed at 29.41 feet bls. Welded casing joints were observed at the following depths:

-53 -74 -96 -117 -138 -181 -202 -223 -244 -265 -286 -307 -328
-349 -370 -391 -412 -433 -454 -476 -497 -517 -539 (base of casing).

A light build-up of unidentified material was observed on the casing wall above 135 feet bls. There was a noticeable build-up around the joint at 391 feet bls due to a ledge formed by a slight offset in the casing. The borehole diameter was only slightly larger than the casing. It is unknown if the bottom 15 feet of the borehole is collapsed or filled in.

8.2.2 Fluid Conductivity

The open-hole fluid conductivity increased from approximately 369 µS/cm at the base of the casing to approximately 798 µS/cm at the logged total depth of 634 feet bls, which is 11 feet less than the reported total depth. The increasing conductivity with depth throughout the open hole interval was uniform with the exception of a small anomaly and slight interruption from 585 to 590 feet bls, where the conductance remained stable at approximately 560 µS/cm before resuming the steady increase.

8.2.3 Temperature

The open-hole temperature consistently increased from 77.6°F (25.3°C) at the base of casing to 79.2°F (26.2°C) at the logged total depth with one very minor exception. At 589 feet bls, a slight temperature drop of approximately 0.2°F (1°C) was recorded, which was also consistent with the depth of the small anomaly indicated on the fluid conductivity log.

8.3 Assessment and Recommendation

A slight build-up of unidentified material on the casing wall was observed. The logged total depth of the well based on the fluid conductivity log was 11 feet less than the reported total depth. This may indicate sediment accumulation at the bottom of the borehole.

No rehabilitation measures are recommended and the well is suitable for enhanced monitoring. The sediment accumulation in the bottom of the borehole probably does not have a significant effect on flow into the well.

9 Eglin AFB Field 4 Upper Floridan (NWFID 3209)

9.1 Well Site Description

The Eglin AFB Field 4 Upper Floridan well is located on Eglin property near an abandoned air field and active range. Military clearance is required to access the site. The well is reported to have a 10-inch diameter steel casing to 442 feet bls and a total depth of 591 feet bls. This former Upper Floridan aquifer supply well was drilled in 1942.

9.2 Observations

On October 3, 2015, the field team arrived onsite at 7:25 am to begin logging work. Prior to logging, an existing vertical turbine pump had to be removed. Rowe began pulling the pump and associated drop pipe from the well at 7:45 am. A small amount of iron oxide build-up and lubricating fluid fell into the well from the drop pipe as it was being removed. The well was left for a few hours to allow this material to settle out. Later that afternoon, the field team began logging the well. The team attempted to conduct a downhole video survey at 12:24 pm. During the survey, the video logging tool filled with water. After several hours were spent trying to dry the housing and repair the tool, the video survey was abandoned. An X-Y caliper and natural gamma survey commenced at 3:35 pm, a fluid conductivity and temperature survey at 3:45 pm, and a CBL survey at 3:54 pm. The team completed work and left the site at 5:30 pm.

The team returned to the site the following day to re-run the video survey. They arrived onsite at 10:21 am, surveyed the well at 10:35 am, and left the site at 2:30 pm. Depth ranges achieved for each type of survey are presented in Table 9-1 below.

Table 9-1 Depths at which Surveys were Achieved for Eglin AFB Field 4 Upper Floridan (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 – 586	0 - 591	0 - 591	0 - 586	0 - 586	0 - 442

9.2.1 Downhole Video Survey

The video survey showed 10-inch diameter steel casing extending to a depth of 442 feet bls. The top of the casing is built into a concrete, right-angle drive pump housing and includes a 5-inch flange welded to the top by Rowe subsequent to pulling the pump. The flange rises to 2.39 feet above land surface. The upper 70 feet of casing appears to be in very good condition with no irregularities or indications of a breach or degradation. However, a slight build-up of unidentified material on the casing wall was observed from 70 to 220 feet bls. The joints at 106, 128, and 150 feet bls were corroded and heavily coated with mineral deposits. The casing from 220 feet bls and below appeared to be in very good condition with no irregularities observed other than the build-up. The water level was observed at 118.43 feet bls. Visibility was limited below 250 feet bls due to pump removal and logging from the previous day. Screw-together casing joints were observed at the following depths:

-22 -41 -64 -85 -106 -128 -150 -171 -193 -214 -236 -258 -279
-301 -322 -344 -364 -385 -407 -428 -442 (base of casing).

The open hole was observed from the base of the casing at 442 feet bls to a logged total depth of 586 feet bls, which is five feet less than the reported total depth. The open hole appeared to have many large ledges and washouts. Distinct lithology changes were observed at 457, 485, and 500 feet bls.

9.2.2 X-Y Caliper

The caliper log confirmed the base of the 10-inch diameter casing at a depth of 442 feet bls and open hole interval extending to a total depth of 591 feet bls. The caliper log showed a significant washout feature immediately below the base of the casing and extending to approximately 448 feet bls. From 448 feet bls to total depth, the borehole average diameter was very near 10-inches with several small washouts.

9.2.3 Natural Gamma

The open-hole natural gamma log showed low to moderate GAPI counts generally ranging from 15 to 50 over most of the interval to the total depth of 591 feet bls. Immediately below the base of the casing and at a depth of 547 feet bls there were notable and brief increased counts of 95 GAPI counts. At a depth of 510 feet bls, there was a significant gamma spike which peaked at 191 GAPI counts. The gamma spikes coincided with washouts indicated on the caliper log.

9.2.4 Fluid Conductivity

The open-hole fluid conductivity ranged between 295 µS/cm at the base of the casing to 312 µS/cm at 515 feet bls. Between 515 feet bls and 586 feet bls, conductance steadily increased with a maximum conductivity of 450 µS/cm at the total logged depth. There was a slight and brief increase in conductivity at 551 feet bls, which is consistent with a small anomaly on the temperature log and a small washout on the caliper log at that depth.

9.2.5 Temperature

The open hole temperature log showed a very linear increase from 74.7°F (23.7°C) at the base of casing to 76.6° F (24.8°C) at the logged total depth of 586 feet bls. There was one brief and very minor temperature anomaly (approximately 0.2°F (1°C) increase) at a depth of 551 feet bls that did appear to coincide with similar features on the conductivity and caliper logs.

9.2.6 Cement Bond Log

The CBL indicated a fair cement seal in the well annulus to a depth of 342 feet bls. From 342 feet bls to the base of the casing the cement seal appeared to be very good with increasing reflectivity with depth. The cement seal appears to be intact and able to adequately isolate the lower portion of the casing.

9.3 Assessment and Recommendation

Good well casing conditions were observed in the video log, a competent cement seal in the annulus was indicated by the CBL, and there were no notable issues found in the other logs. The logs indicated the base of the casing at a depth of 442 feet bls, which corresponds to the reported casing depth. The caliper tool indicated that the open borehole exists from the base of the casing to a depth of 591 feet bls which is also consistent with the reported total depth of the well. However, the other logs were only able to reach a depth of 586 feet bls.

No rehabilitation measures are recommended. This well is suitable for enhanced monitoring.

10 Eglin AFB Field 4 Lower Floridan (NWFID 3210)

10.1 Well Site Description

The Eglin AFB Field 4 Lower Floridan monitor well is adjacent to the Field 4 former Upper Floridan supply well. Military clearance is required to access this well. The well has a reported 4-inch steel casing to 938 feet bls and a total depth of 1,371 feet bls. This Lower Floridan aquifer monitor well was drilled in 1979.

10.2 Observations

On October 3, 2015, the team set up at 10:30 am to log the Lower Floridan monitor well. The well casing was bent below grade and had to be straightened to allow tool access. The team attempted to commence a downhole video survey at 10:53 am, but logging was aborted because corroded nodules at 21.5 feet bls were blocking the video tool. The team commenced a fluid conductivity and temperature survey at 11:08 am and then attempted to clear out the corrosion with a weighted hammer tool. The hammer was able to pass the nodules but the work created poor visibility conditions. The casing was bent at 2 feet bls, which prevented the longer CBL tool from being deployed. The following day, the team returned to the well and commenced the downhole video survey at 12:34 pm. The team completed work and left the site at 2:30 pm. Depth ranges achieved for each type of survey are presented in Table 10-1 below.

Table 10-1 Depths at which Surveys were Achieved for Eglin AFB Field 4 Lower Floridan (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 - 1,133	N/A	N/A	0 - 1,128	0 - 1,128	N/A

10.2.1 Downhole Video Survey

The video survey showed a 4-inch diameter steel casing from land surface to a depth of 941 feet bls, which is three feet more than reported. The top of the casing is flush with land surface, but a riser pipe extending 2.84 feet above land surface was removed for this geophysical logging event. A heavily scaled nodule at 21.5 feet bls caused a slight obstruction but the other logging tools were able to pass through with some maneuvering. The casing appeared to be in very good condition with no irregularities other than a slight build-up of unidentified material on the casing wall and no indications of a breach or degradation were observed. The water level was observed at 118.73 feet bls. Visibility was limited below 200 feet bls because of logging activities the previous day. Screw-together casing joints were observed at the following depths (feet bls):

-43 -64 -85 -106 -145 -189 -210 -232 -251 -272 -314 -335 -356
-377 -398 -418 -439 -460 -481 -502 -523 -544 -565 -586 -607 -628
-649 -669 -690 -711 -732 -752 -773 -795 -815 -836 -857 -878 -889
-920 -941 (base of casing).

The open hole was observed from the base of the casing at 941 feet bls, which is three feet more than the reported cased depth, to a logged total depth of 1,133 feet bls, which is 238 feet less than the reported total depth. A ledge formed by a change in borehole diameter was observed at 959 feet bls and had a very heavy build-up of unidentified material.

10.2.2 Fluid Conductivity

The open-hole fluid conductivity showed a sharp increase from the base of the casing, where conductivity measured approximately 1,900 µS/cm, to 2,500 µS/cm at a depth of 952 feet bls. From 952 feet bls to logged total depth, the conductivity increased more gradually from 2,500 µS/cm to 2,800 µS/cm.

10.2.3 Temperature

The open-hole temperature increased from 82.5°F (28.1°C) to 84.2°F (29°C) from the base of the casing to a depth of 952 feet bls. From 952 feet bls to 1,128 feet bls, which is the depth this tool reached, the temperature increased gradually to a maximum of 85.0°F (29.4°C).

10.3 Assessment and Recommendation

Very good well casing conditions were observed in the video log and no issues of concern were noted in the conductivity or temperature logs. The open hole extends from the base of the casing at 941 feet bls to a logged total depth of 1,133 feet bls, which is 238 feet less than the reported total depth of 1,371 feet bls. The reported casing depth of the well was 938 feet bls, while the observed casing depth during logging was 941 feet bls.

Unless the well had been back-plugged for a specific reason, rehabilitation of the borehole to the original drilled depth is recommended to ensure full exposure of the intended aquifer. The preferred method would be to use reverse air circulation with a rotating bit to re-establish the open hole to the original drilled depth. The video, fluid conductivity and temperature logs indicate that this well is suitable for enhanced monitoring.

11 Eglin AFB Post'l Point (NWFID 2994)

11.1 Well Site Description

The Eglin AFB Post'l Point monitor well is located on the Eglin main base installation near the end of Post'l Point adjacent to Weekley Bayou. Military clearance is required to access the site. The well is reported to have a 6-inch steel casing to 300 feet bls and a total depth of 510 feet bls. This former Upper Floridan aquifer supply well was drilled in 1946.

11.2 Observations

On October 4, 2015, the field team arrived onsite at 7:30 am to begin logging work. The team commenced a downhole video survey at 7:41 am, a fluid conductivity and temperature survey at 8:53 am, and an X-Y caliper and natural gamma survey at 9:33 am. The team completed work and left the site at 10:00 am. Depth ranges achieved for each type of survey are presented in Table 11-1 below.

Table 11-1 Depths at which Surveys were Achieved for Eglin AFB Post'l Point (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 - 292	0 - 293	0 - 293	0 - 293	0 - 293	N/A

11.2.1 Downhole Video Survey

The video survey showed the 6-inch diameter steel casing from land surface to a depth of 292 feet bls, which is 8 feet less than reported. The top of the casing was flush with land surface with a steel flange riser extending to 1.27 feet above land surface. The casing was bent at 4 feet bls, which prevented the longer CBL tool from being deployed. Heavy scaling and degradation of the steel casing in the top 18 feet of casing had resulted in the joints at 7 and 18 feet bls being partially separated by 1 to 2 inches. Very heavy build-up of unidentified material was observed throughout the casing. Above 90 feet bls, the build-up was light in color and had a billowy texture and below 90 feet bls it was darker in color and had a pitted texture. No tools could pass the base of the casing so the open hole was not observed. The water level was observed at 56.38 feet bls. Screw-together casing joints were observed at the following depths (feet bls):

-2 -7 -18 -38 -149 -169 -189 -207 -227 -245 -263 -282 -292 (total logged depth).

11.2.2 X-Y Caliper

The caliper log was unable to confirm the base of the 6-inch diameter casing. The tool reached a depth of approximately 293 feet bls and would not pass through the base of the casing due to heavy build-up on the casing walls. The logged depth of 293 feet bls is 219 feet less than the total reported depth of 510 feet bls. Inside the casing, the caliper log reflected signs of heavy build-up.

11.2.3 Natural Gamma

The open-hole natural gamma log was not available because build-up of unidentified material on the casing wall near the base of the casing prevented the tool going below 293 feet bls. Cased interval gamma readings were generally low and between 25 and 60 GAPI counts with just two peaks reaching a maximum GAPI count of 75 over the entire interval.

11.2.4 Fluid Conductivity

The fluid conductivity tool reached a depth of 293 feet bls and was unable to obtain open hole readings. Conductivity in the cased interval increased from 212 to 316 µS/cm with depth to 293 feet bls.

11.2.5 Temperature

The temperature log also reached a depth of 293 feet bls and therefore was unable to obtain open hole temperature readings. Fluid temperature in the cased interval fluctuated between 72 and 73°F (22.2 to 22.8°C).

11.3 Assessment and Recommendation

The video survey indicated the base of casing depth at 292 feet bls which is 8 feet shallower than the reported casing depth of 300 feet bls. No logging tools were able to pass below 293 feet bls due to build up at the base of the casing, and therefore, it was not possible to confirm the reported total depth of 510 feet bls. Due to the excessive build-up of material on the casing walls and separations at joints in the upper portion of the casing, extensive rehabilitation of this well will be necessary.

Rehabilitation should be implemented first by using a moderately aggressive steel brush to greatly reduce or eliminate the build-up on the casing wall. After making a minimum of five passes of the brush over all parts of the casing wall, the open hole should be cleaned out to the reported total depth of 510 feet bls by reverse air circulation with a rotating bit. Following this procedure, it is recommended that due to separations in the casing, a liner casing be installed and cemented in place over the entire cased interval. Additionally, installation of a riser is recommended to make this well more visible and prevent infiltration of debris and surface water, but only if the riser will not interfere with activities in its immediate surroundings.

12 Eglin AFB Camp Rucker (NWFID 2993)

12.1 Well Site Description

The Eglin AFB Camp Rucker monitor well is located 36 feet east of Range Road 214 off Hwy 20 near Choctaw Beach in Walton County. The well is reported to have a 6-inch steel casing to 201 feet bls and a total depth of 880 feet bls. This Upper Floridan aquifer monitor well was drilled in 1979.

12.2 Observations

On October 4, 2015, the field team arrived onsite at 3:25 pm to begin logging work. The team commenced a fluid conductivity and temperature survey at 4:15 pm, an X-Y caliper and natural gamma survey at 4:28 pm, a CBL survey at 4:48 pm, and a downhole video survey at 5:26 pm. The team completed work and left the site at 6:20 pm. Depth ranges achieved for each type of survey are presented in Table 12-1 below.

Table 12-1 Depths at which Surveys were Achieved for Eglin AFB Camp Rucker (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 - 216	0 - 224	0 - 224	0 - 293	0 - 293	0 - 201

12.2.1 Downhole Video Survey

The video survey showed the 6-inch diameter steel casing from land surface to a depth of 201 feet bls. The top of the casing rises 3.54 feet above land surface. The casing appeared to be in very good condition with no indication of a breach, degradation, or irregularities other than a very light build-up of what appeared to be biological material at some casing joints. A small amount of leaching has occurred at the joint located 38 feet bls. The water level was observed at 20.04 feet bls. Silt was stirred up by the other tools which affected visibility. Welded casing joints were observed at the following depths (feet bls):

-15 -38 -62 -85 -106 -130 -178 -154 -201 (base of casing).

Many joints were not noted because of the reduced visibility. The open-hole interval was observed from the base of the casing at 201 feet bls to a logged total depth of 216 feet bls. Unidentified material has clogged the open hole so no tools could reach the reported total depth of 880 feet bls. The video survey was terminated at this depth due to the observed debris obstruction.

12.2.2 X-Y Caliper

The caliper log confirmed the base of the 6-inch diameter casing at a depth of 201 feet bls and a logged total depth of 224 feet bls. The caliper log showed an oval-shaped open hole with a 7- to 8-inch diameter on average. A small washout feature was noted at 220 feet bls.

12.2.3 Natural Gamma

The open-hole natural gamma log showed low to moderate GAPI counts ranging between 20 and 40 over most of the borehole. There was one notable gamma spike just above the base of the casing at a depth of 180 feet bls where the GAPI count reached 170.

12.2.4 Fluid Conductivity

The open-hole fluid conductivity tool reached a depth of 293 feet bls and conductivity ranged between approximately 267 µS/cm at the base of the casing to approximately 316 µS/cm at 293 feet bls. There were no anomalies or notable features in the fluid conductivity log.

12.2.5 Temperature

Similar to the fluid conductivity log, the open hole temperature showed a slow increase from 72.9°F (22.7°C) at the base of casing to 73.2°F (22.9°C) at the logged depth of 293 feet bls. There were no anomalies or notable features in the open-hole temperature log.

12.2.6 Cement Bond Log

The CBL indicated a questionable cement seal in the well annulus from water level (22 feet bls) to the base of the casing. The cement seal above 140 feet bls appears to be adequate, however, between 140 and 184 feet bls the seal appears to be poor. The log does indicate cement bond from 184 to 190 feet bls but from 190 feet bls to the base of the casing at 201 feet bls, the cement seal appears to be very poor with the possibility of no cement present at 196 feet bls.

12.3 Assessment and Recommendation

The well casing appears to be in very good condition with the exception of one potential leaching source through a joint at 38 feet bls. The cement bond appears to be questionable between 140 and 184 feet bls and at the base of the casing, which was observed at 201 feet bls and is consistent with the reported casing depth. The open hole was observed from 201 to 216 feet bls on the video and from 201 to 224 feet bls on the caliper and gamma logs. The conductivity and temperature tool measured the open hole from 201 to 293 feet bls. Debris was noted at a depth of 216 feet bls in the open hole during the video survey. No logging tools were able to pass below a depth of 293 feet bls. The reported total depth of the well was 880 feet bls.

Rehabilitation of the borehole to the original drilled depth is recommended. The preferred method of rehabilitation is to use reverse air circulation with a rotating bit to re-establish the original open-hole interval depth. The cement seal between the surface and 140 feet bls and from 184 to 190 feet bls appears to be adequate to ensure that the desired aquifer and interval is being represented. Due to an apparently good cement seal above a depth of 140 feet bls and from a depth of 184 to 190 feet bls, repair of the cement seal from 140 to 184 feet bls is not recommended because the casing would need to be windowed (cut out) to establish the cement. Windowing and attempting to establish cement over this interval would be costly and provide little added benefit. After reverse air rehabilitation, the well should be suitable for use in enhanced monitoring.

13 West Hewett (NWFID 1376)

13.1 Well Site Description

The West Hewett monitor well is located in the Topsail Hill Preserve State Park in coastal Walton County. The well is reported to have a 6-inch steel casing from land surface to 295 feet bls, a 4-inch steel casing from 285 to 550 feet bls, and a total depth of 725 feet bls. The top of the 6-inch diameter steel casing was flush with land surface and has a steel protective outer riser that extends 2.38 feet above land surface. A PVC extension slips onto the top of the 6-inch casing inside the steel protective riser and extends 1.7 feet above land surface. This well is subject to frequent controlled burns for forest maintenance. This Upper Floridan aquifer monitor well was drilled in 1983.

13.2 Observations

On October 5, 2015, the field team arrived onsite at 7:45 am to begin logging work. The team commenced a downhole video survey at 8:19 am, a fluid conductivity and temperature survey at 9:05 am, an X-Y caliper and natural gamma survey at 9:33 am, and a CBL survey at 10:08 am. The team completed work and left the site at 11:15 am. Depth ranges achieved for each type of survey are presented in Table 13-1 below.

Table 13-1 Depths at which Surveys were Achieved for West Hewett (feet bls)

Video	X-Y Caliper	Natural Gamma	Fluid Conductivity	Temperature	Cement Bond
0 - 281	0 - 720	0 - 720	0 - 720	0 - 720	0 - 280

13.2.1 Downhole Video Survey

The video survey showed the 6-inch diameter steel casing from land surface to a depth of 273 feet bls, which is 22 feet less than reported. There is no practical way to determine the base of the 6-inch casing because of the obstructed view from the configuration of the 4-inch casing within it. At 273 feet bls, the video logging tool entered the 4-inch diameter steel casing. There was considerable accumulation of what appeared to be biological material and sediment observed on the wall of the 4-inch casing. The buildup restricted access by the video logging tool, which could not be lowered below 281 feet bls. The video logging tool was removed and smaller centralizers where installed to facilitate passage through the 4-inch casing. However, as the video logging tool was being lowered, its housing filled with water and the video survey was aborted.

From what could be observed to a depth of 281 feet bls, the 6-inch steel casing appeared to be in fairly good condition with no indication of a breach, degradation, or irregularities other than light to moderate build-up of material on the casing wall. This build-up increased below 200 feet bls. Significant build-up was observed settling around the upper part of the inner 4-inch casing. The water level was observed at 27.12 feet bls. Welded casing joints were observed at the following depths (feet bls):

-40 -61 -82 -103 -124 -145 -166 -187 -208 -229 -251 -272 -275 (base of casing).

The open hole was not observed because the video tool could not be lowered below 281 feet bls.

13.2.2 X-Y Caliper

The caliper log showed the transition from the 6-inch diameter outer casing to the 4-inch diameter inner casing occurring at a depth of approximately 273 feet bls, which is 12 feet less than reported, and the base of the 4-inch casing at a depth of 547 feet bls, which is three feet less than reported. There was an anomaly

on the X and Y arms inside the casing at a depth of 499 feet bls. The open hole caliper log showed a fairly well-gauged 4-inch diameter borehole with few minor features over the interval from the base of the 4-inch casing to a depth of 705 feet bls. The tool reached the bottom of the borehole at 720 feet bls, which is five feet less than reported.

13.2.3 Natural Gamma

The open-hole natural gamma log showed low GAPI counts from 20 to 45 over most of the interval. There were two notable gamma spikes at depths of 369 feet bls and 587 feet bls where GAPI counts peaked at 158 and 77, respectively. Overall, gamma was low throughout the open hole to a logged depth of 720 feet bls.

13.2.4 Fluid Conductivity

The open-hole fluid conductivity log reached a depth of 720 feet bls, which is five feet less than the reported total depth. Conductivity increased from 850 µS/cm at the base of the casing to 1,300 µS/cm at the logged total depth of 720 feet bls. There were no significant anomalies or notable features other than a rate of change increase in conductivity between 650 and 688 feet bls. Between 688 and 720 feet bls the rate of change decreased to that observed above 650 feet bls.

13.2.5 Temperature

Similar to the fluid conductivity log, the open-hole temperature increased from 76.8°F (24.9°C) at the base of 4-inch casing, to 80.5° F (26.9°C) at the logged total depth of 720 feet bls. There were no anomalies or notable features other than a rate of change increase between 650 and 688 feet bls. Between 688 and 720 feet bls the rate of change decreased to that observed above 650 feet bls. This correlates with the small increase indicated on the conductivity log.

13.2.6 Cement Bond Log

The CBL indicated an excellent cement seal in the 6-inch diameter outer casing. The CBL tool could not be lowered below a depth of 280 feet bls within the 4-inch casing. The log does indicate a lack of cement in the upper portion of the 4-inch liner casing.

13.3 Assessment and Recommendation

The 6-inch well casing appears to be in fairly good condition with the exception of moderate build-up on the casing wall below 200 feet bls. The cement bond appears to be in very good condition in the annulus of the 6-inch diameter outer casing. The well casing reduces to a 4-inch diameter starting at approximately 273 feet bls, which is 12 feet less than the reported top of 4-inch diameter casing of 285 feet bls. There is also considerable build up inside the 4-inch diameter casing. The video survey tool was unable to confirm the base of 4-inch casing depth, however, the X-Y caliper log indicated the base of the casing at 547 feet bls, which is three feet shallower than the reported casing depth.

The quality of the cement seal in the annulus of the 4-inch casing is largely undetermined because the CBL tool could not be lowered below 280 feet bls. However, the CBL suggests poor cement at the top of the 4-inch casing. The open-hole interval could not be observed on the video, although the caliper and fluid conductivity tools were able to reach a depth of 720 feet bls. The reported total depth of the well is 725 feet bls, so the bottom 5 feet of the open hole may be filled with sediment.

The well appears to be viable for enhanced monitoring. However, the 4-inch diameter casing needs brushing. If brushing is performed inside the 4-inch diameter casing, due to the unknown and possibly non-existent cement seal, extreme caution should be taken so that the casing is not moved or pulled up by the brushing effort.

14 Recommendations

Of the 12 wells surveyed, only two wells require extensive rehabilitation. The Colonial Pines and Post'l Point well casings show extreme degradation and require brushing and cleaning out of the casings and boreholes and the installation of casing liners. The remaining 10 wells are either immediately ready for enhanced monitoring or require moderate rehabilitation. Moderate rehabilitation includes brushing of the casing and cleaning out of the borehole with reverse air circulation. Two wells require a locking well cap or shelter to ensure an adequate seal from debris and the addition of a riser is recommended for Colonial Pines, Liza Jackson, OCWS, and Post'l Point to make the wells more visible and prevent infiltration of debris and surface water. If the riser would interfere with other uses of the surrounding property it would not be practical to install it. The status of each well is shown below in Table 14-1 and listed in order of increasing need for rehabilitation.

Table 14-1 Geophysical Logging Summary Table

NWFID	Well Name	Logging Performed*	Recommendation	Notes
7686	Tiger Point	XY/NG/FC/T/V	Ready for Use	
7751	Seagrove Deep	FC/T/V	Ready for Use	
3209	Eglin AFB Upper Floridan	XY/NG/FC/T/CBL/V	Ready for use	
3210	Eglin AFB Lower Floridan	FC/T/V	Ready for use (pending)	Appears to be mechanically acceptable, may need clean out to total depth
1376	West Hewett	XY/NG/FC/T/CBL/V	Minimal Rehab	Brush
7523	Liza Jackson	FC/T/V	Moderate Rehab	Brush, clean out, install well shelter or locking cap, install riser
1696	OCWS	XY/NG/FC/T/CBL/V	Moderate Rehab	Brush, clean out, install well shelter or locking cap, install riser
1062	Point Washington	XY/NG/V	Moderate Rehab	Brush, clean out, and post-rehab video
7687	Seagrove Shallow	FC/T/V	Moderate Rehab	Brush and clean out
2993	Camp Rucker	XY/NG/FC/T/CBL/V	Moderate Rehab	Clean out
2051	Colonial Pines	V	Extensive Rehab	Brush, clean out, install well shelter or locking cap, install casing liner and riser
2994	Post'l Point	XY/NG/FC/T/V	Extensive Rehab	Brush, clean out, install well shelter or locking cap, install casing liner and riser

*XY=X-Y Caliper; NG=Natural Gamma; FC=Fluid Conductivity; T=Temperature; CBL=Cement Bond Log; V=Video Survey

Planning Region II Video and Geophysical Logging

APPENDIX A

X-Y CALIPER AND NATURAL GAMMA LOGS

MV Geophysical

X-Y CALIPER GAMMA RAY LOG

Company	Northwest Florida Water Management District
Well	Tiger Point (NWF ID 7686)
Field	Gulf Breeze
County	Santa Rosa
State	Florida
Country	USA

Location: Tiger Point Park, 1370 Tiger Park Lane, Gulf Breeze, FL 32563
Lat: N 30 23' 14.514" Long: W87 03' 24.347"
SEC 28 TWP 2S RGE 28W

API # : FLUID: AAD9021

Other Services: XY/GR, DHTV, FCT

Permanent Datum	G.L.	Elevation	17'
Log Measured From	G.L.		
Drilling Measured From	G.L.		

Elevation: K.B. D.F. G.L. 17'

Date	1-OCT-2015
Run Number	ONE
Depth Driller	1310'
Depth Logger	1306'
Bottom Logged Interval	1306'
Top Log Interval	1050'
Open Hole Size	5.5"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT down
Estimated Cement Top	NA
Time Well Ready	09:30 10/1/2015
Time Logger on Bottom	11:00 10/1/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW) M.Black (Cardno) R.Putnall (Cardno)

Borehole Record

Run Number	Bit	From	To
ONE	5.5"	1140'	1310'
		1137'Logger	1306'Logger

Tubing Record

Size	Weight	From	To

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	6" Steel	6" ID	SURFACE	1140'
Prot. String				1137'Logger
Production String				
Liner				

Invoice No. 2015144	2x/15x/pdf/las	nwfw7686.db	* FIELD PRINT *

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Comments

MAXIMUM ARM EXTENSION: 33"

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

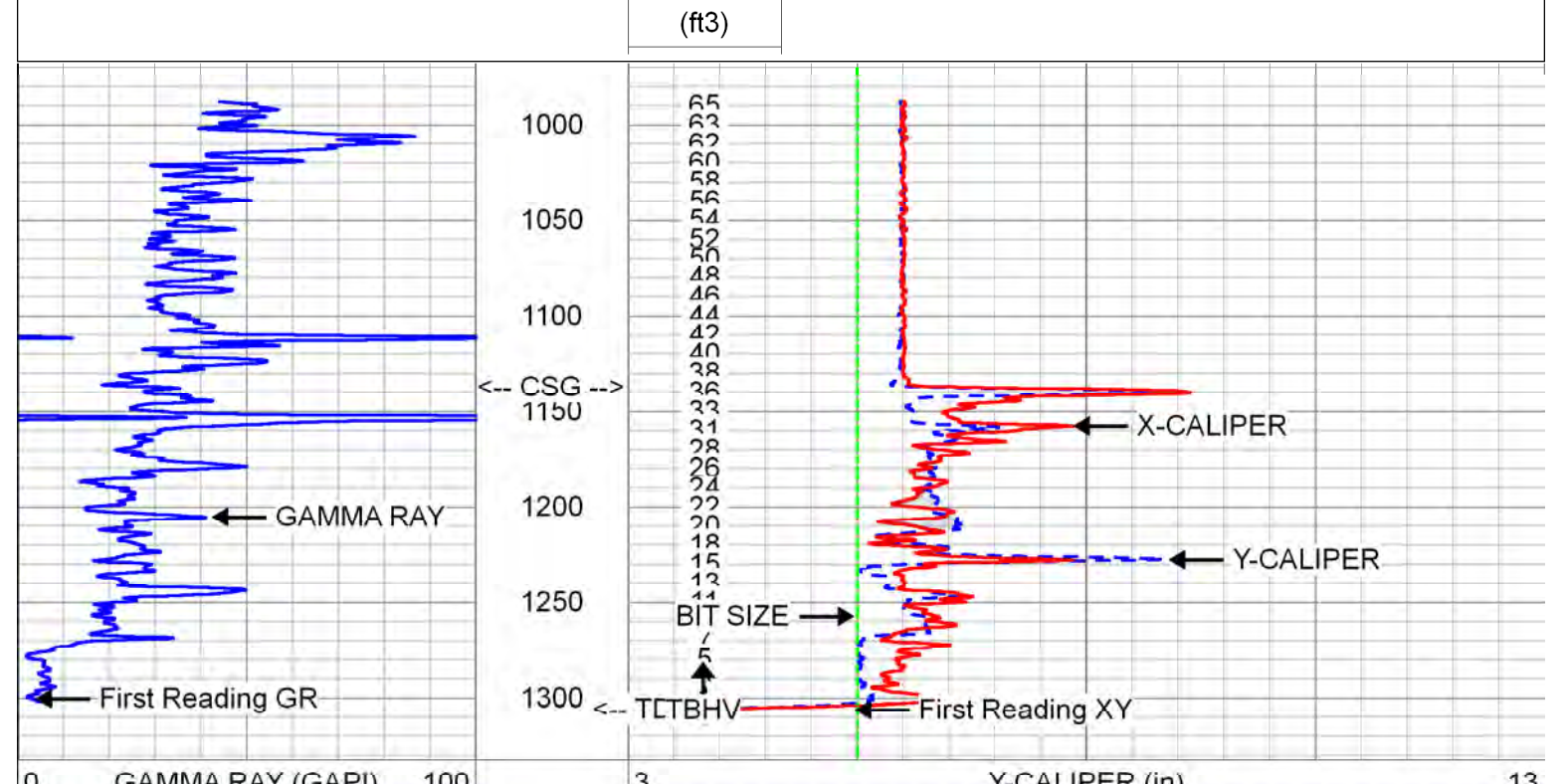
Hydro Firm: Cardno

Drilling Contractor: Rowe Drilling Company

MAIN PASS

Database File	nwfw7686.db
Dataset Pathname	MXYG
Presentation Format	xy313-5
Dataset Creation	Tue Oct 06 17:26:54 2015
Charted by	Depth in Feet scaled 1:1200

0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

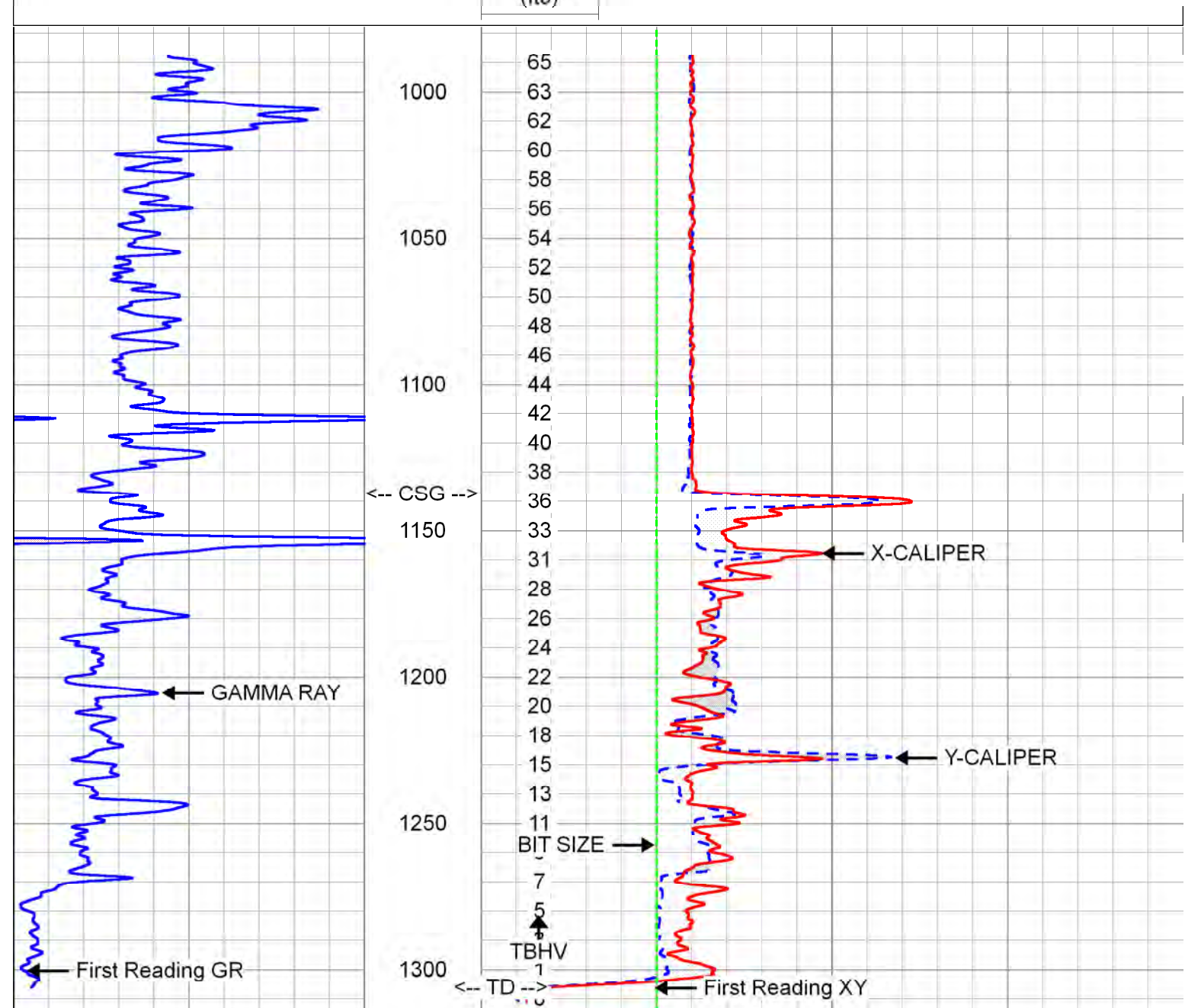


0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

MAIN PASS

Database File	nwfw7686.db
Dataset Pathname	MXYG
Presentation Format	xy313-5
Dataset Creation	Tue Oct 06 17:26:54 2015
Charted by	Depth in Feet scaled 1:600

0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

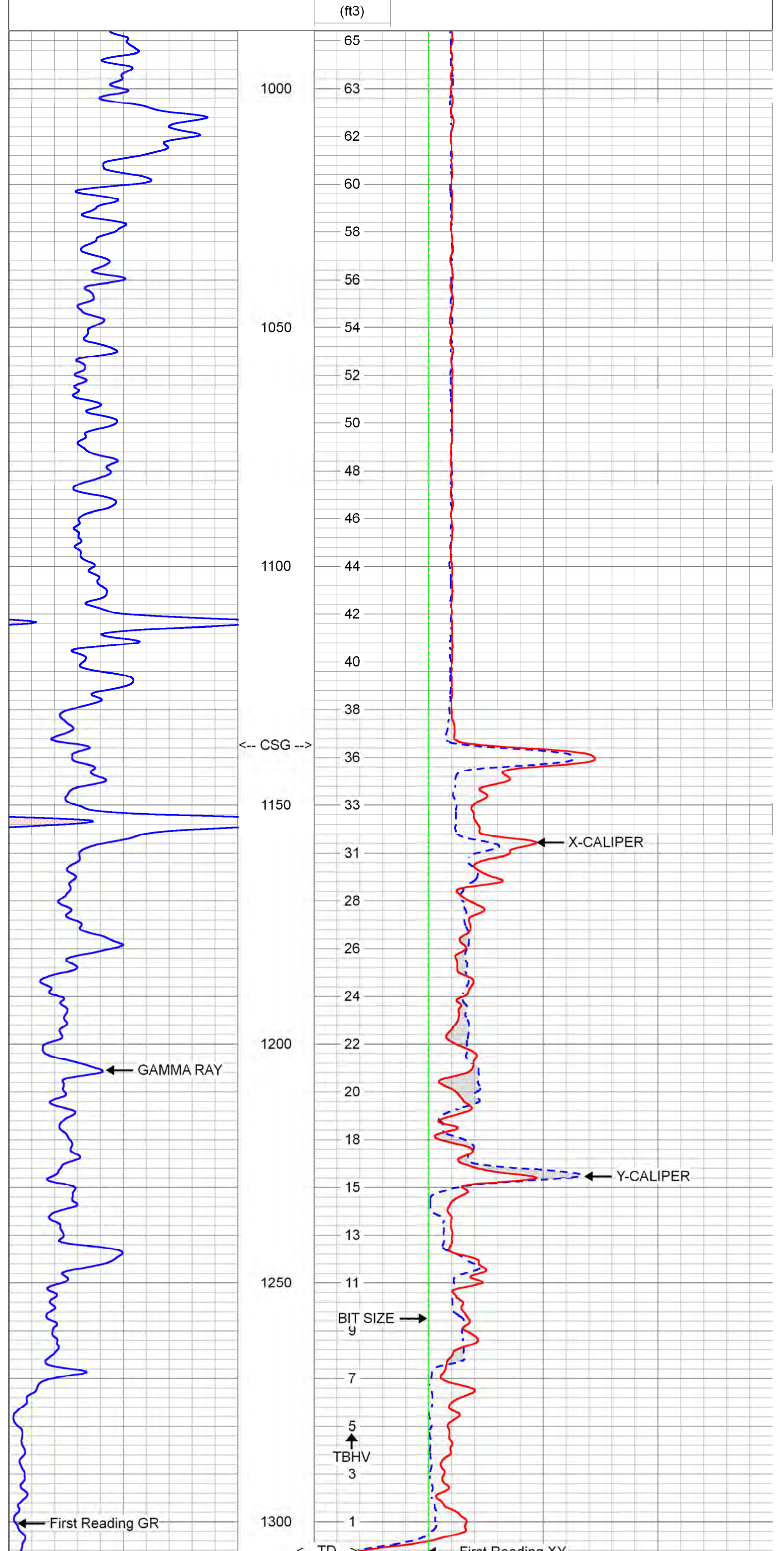


0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

MAIN PASS

Database File	nwfw7686.db
Dataset Pathname	MXYG
Presentation Format	xy313-5
Dataset Creation	Tue Oct 06 17:26:54 2015
Charted by	Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

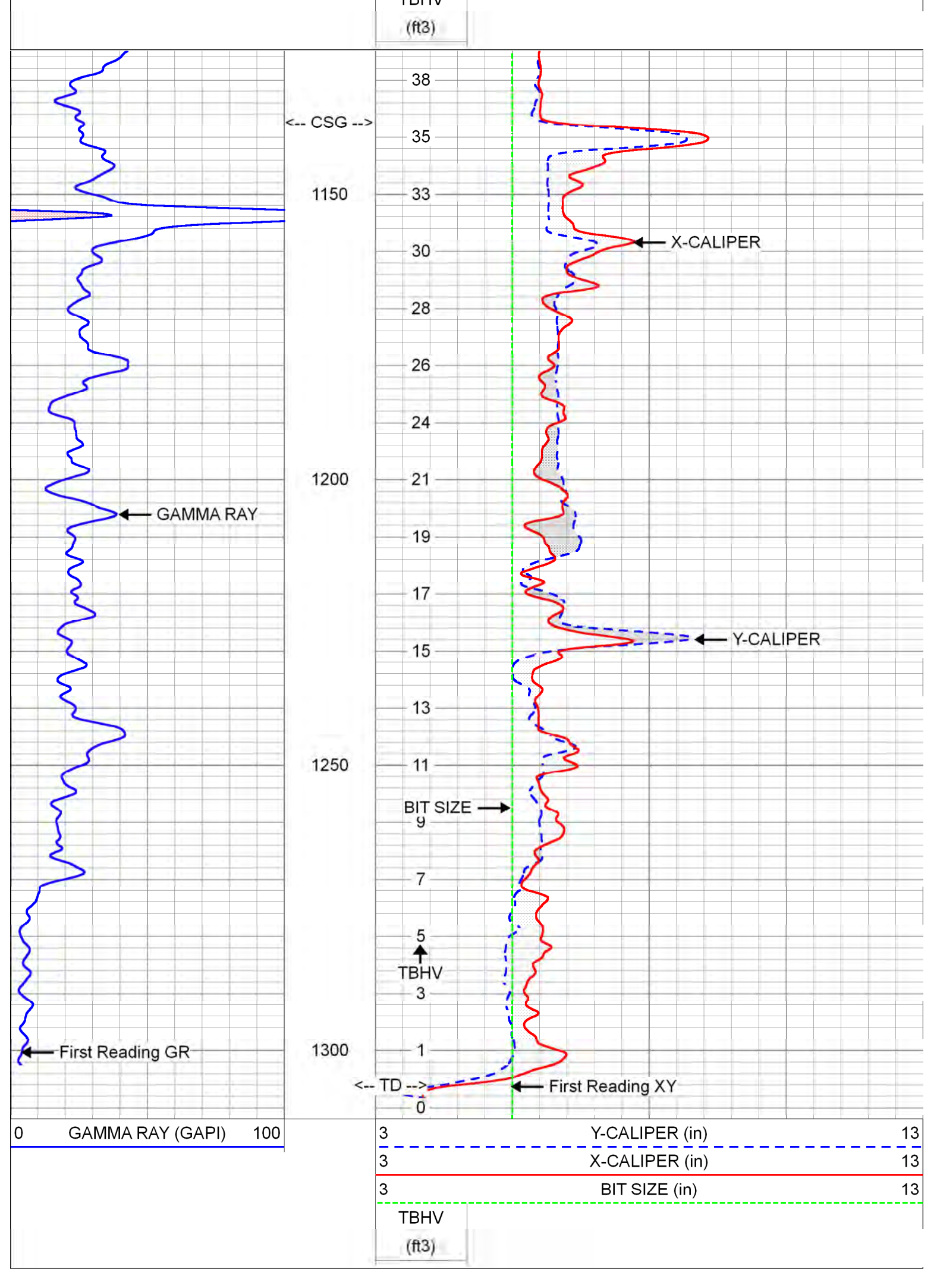


0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

REPEAT SECTION

Database File	nwfw7686.db
Dataset Pathname	RXY
Presentation Format	xy313-5
Dataset Creation	Thu Oct 01 13:52:33 2015
Charted by	Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)



0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

Calibration Report

Database File	nwfw7686.db
Dataset Pathname	pass2
Dataset Creation	Thu Oct 01 12:30:29 2015

XY Caliper Calibration Report

Serial Number:	01S		
Tool Model:	XYCS		
Performed:	Thu Oct 01 12:36:58 2015		
Small Ring:	6	in	
Large Ring:	33	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	585.5	613.3	cps
Reading with Large Ring:	1136.33	1086.6	cps
Gain:	0.0490169	0.0570463	
Offset:	-22.6994	-28.9865	

Gamma Ray Calibration Report

Serial Number:	01	
Tool Model:	GROH	
Performed:	Thu Oct 01 12:14:14 2015	
Calibrator Value:	120.0	GAPI
Background Reading:	15.1	cps
Calibrator Reading:	135.5	cps
Sensitivity:	0.9964	GAPI/cps

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
			GR-GROH (01)	2.75	3.50	40.00
GR	5.90					
			XYC-XYCS (01S)	6.60	3.50	110.00
YCAL	0.50					
XCAL	0.50					

Dataset:	nwfw7686.db: field/well/run1/pass2
Total length:	9.35 ft
Total weight:	150.00 lb
O.D.:	3.50 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	Tiger Point (NWF ID 7686)
Field	Gulf Breeze
County	Santa Rosa
State	Florida
Country	USA

MV Geophysical

X-Y CALIPER GAMMA RAY LOG

Company	Northwest Florida Water Management District
Well	OCWS ISL-1 Monitor (NWF ID 1696)
Field	Fort Walton Beach
County	Okaloosa
State	Florida
Country	USA

Location: API #: FLUID: AAB2467
Gulf Islands National Seashore - Okaloosa Island
1333 Miracle Strip Parkway SE, Fort Walton Beach, FL
Lat: N 30 23' 45.47" Long: W 86 35' 08.68"
SEC 19 TWP 2S RGE 23W

Other Services: XY/GR, FCT,CBL, DHTV

Permanent Datum	G.L.	Elevation 6.73'	Elevation: K.B. / D.F. / G.L. 6.73'
Log Measured From	Top of Casing		
Drilling Measured From	G.L.		

Date	2-OCT-2015
Run Number	ONE
Depth Driller	890'
Depth Logger	864'
Bottom Logged Interval	864'
Top Log Interval	436'
Open Hole Size	11.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT down
Estimated Cement Top	NA
Time Well Ready	07:00 10/2/2015
Time Logger on Bottom	10:00 10/2/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW), M.Black (Cardno), R.Putnall (Cardno)

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To
ONE	11.875"	515'	890'				
			864' Logger				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	12" Steel	12" ID	SURFACE	515
Prot. String	6" Steel	6" ID	SURFACE	536
Production String				538' Logger
Liner				
Invoice No.	2015147	2x/15x/pdf/las	nwfw1696.db	* FIELD PRINT *

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Comments

MAXIMUM ARM EXTENSION: 33"

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

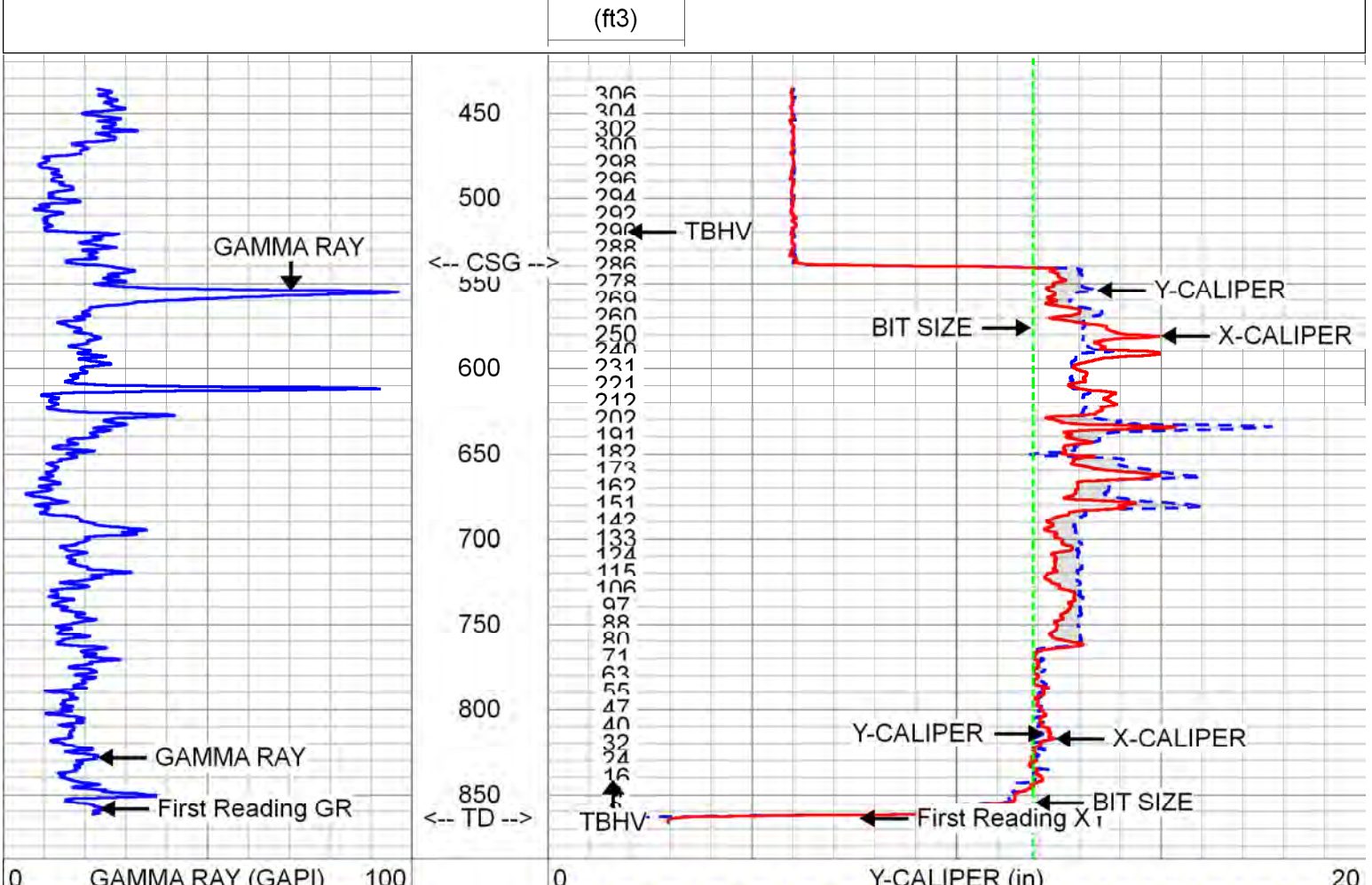
Hydro Firm: Cardno

Drilling Contractor: Rowe Drilling Company

MAIN PASS

Database File	nwfw1696.db
Dataset Pathname	MXY
Presentation Format	xy020-5
Dataset Creation	Fri Oct 02 23:16:26 2015
Charted by	Depth in Feet scaled 1:1200

0 GAMMA RAY (GAPI) 100 | 0 Y-CALIPER (in) 20 | 0 X-CALIPER (in) 20 | 0 BIT SIZE (in) 20 | TBHV (ft3)

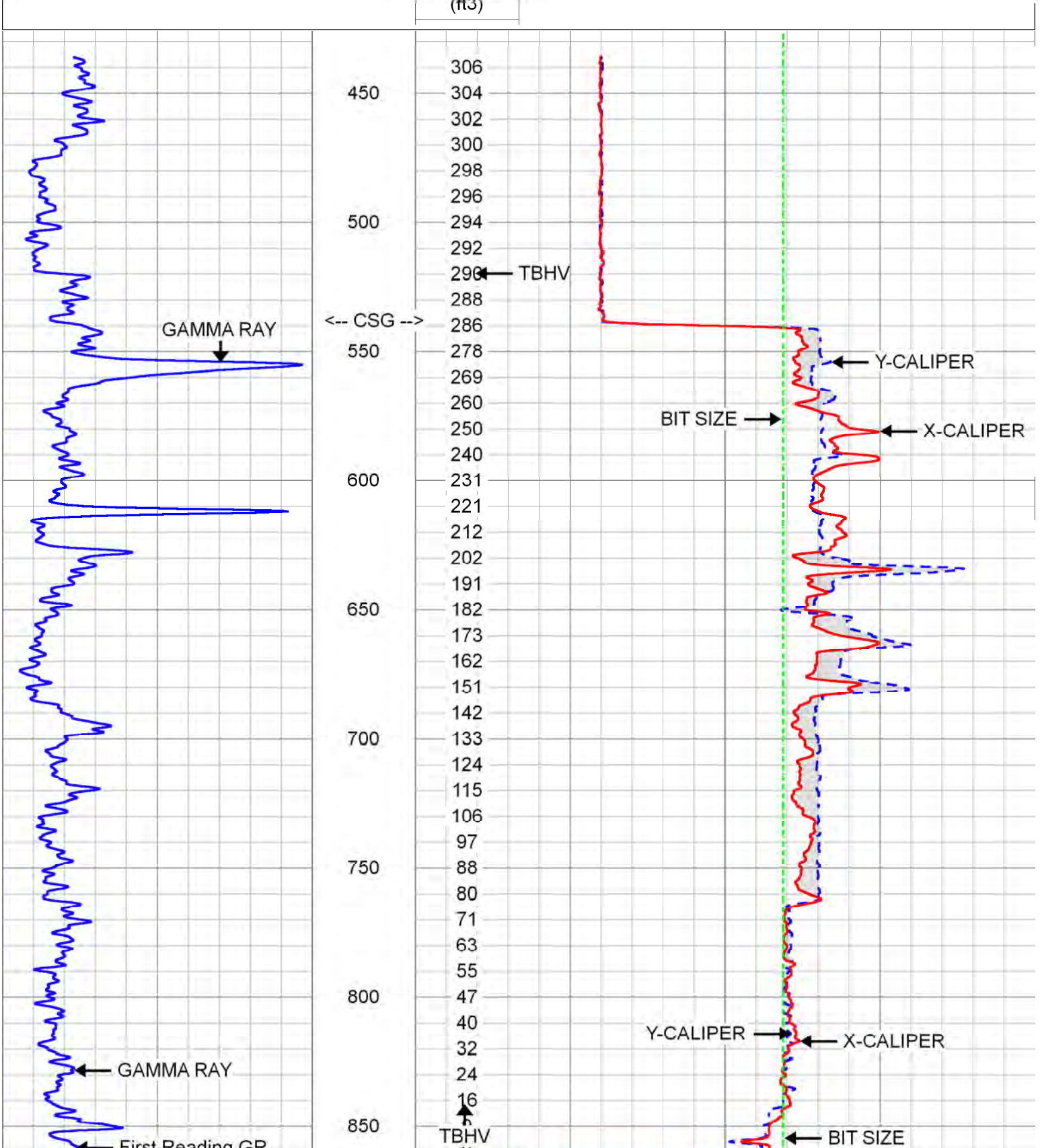


0 GAMMA RAY (GAPI) 100 | 0 Y-CALIPER (in) 20 | 0 X-CALIPER (in) 20 | 0 BIT SIZE (in) 20 | TBHV (ft3)

MAIN PASS

Database File	nwfw1696.db
Dataset Pathname	MXY
Presentation Format	xy020-5
Dataset Creation	Fri Oct 02 23:16:26 2015
Charted by	Depth in Feet scaled 1:600

0 GAMMA RAY (GAPI) 100 | 0 Y-CALIPER (in) 20 | 0 X-CALIPER (in) 20 | 0 BIT SIZE (in) 20 | TBHV (ft3)

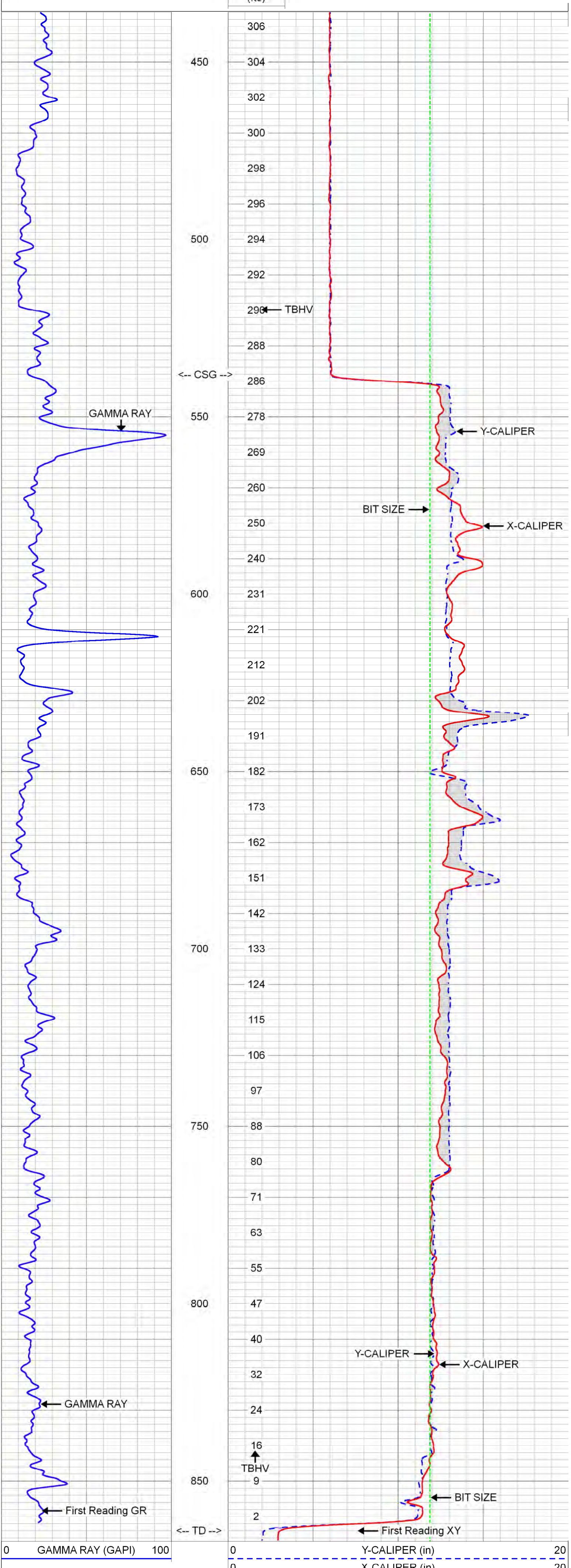


0 GAMMA RAY (GAPI) 100 | 0 Y-CALIPER (in) 20 | 0 X-CALIPER (in) 20 | 0 BIT SIZE (in) 20 | TBHV (ft3)

MAIN PASS

Database File	nwfw1696.db
Dataset Pathname	MXY
Presentation Format	xy020-5
Dataset Creation	Fri Oct 02 23:16:26 2015
Charted by	Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100 | 0 Y-CALIPER (in) 20 | 0 X-CALIPER (in) 20 | 0 BIT SIZE (in) 20 | TBHV (ft3)

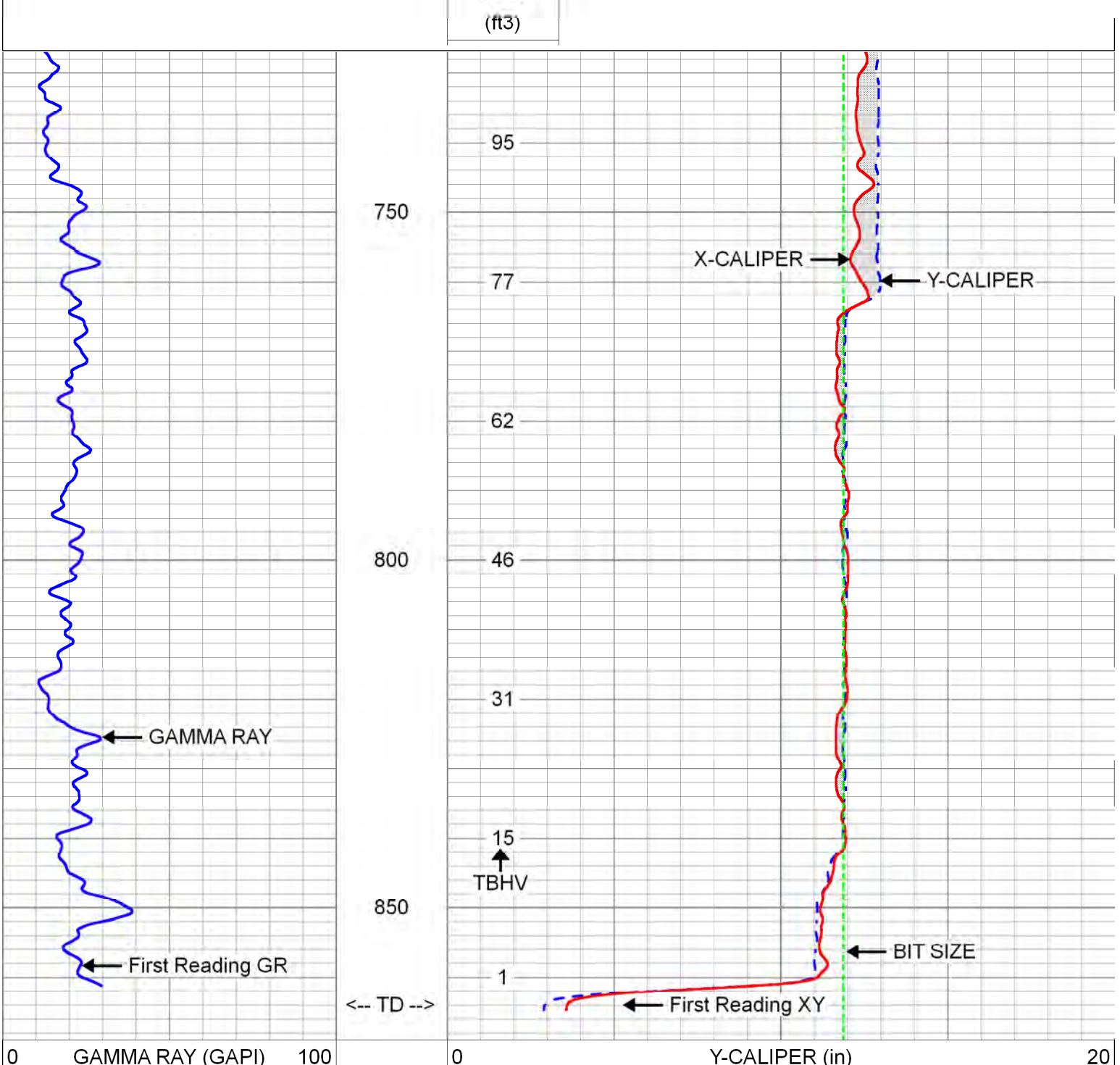


0 GAMMA RAY (GAPI) 100 | 0 Y-CALIPER (in) 20 | 0 X-CALIPER (in) 20 | 0 BIT SIZE (in) 20 | TBHV (ft3)

REPEAT SECTION

Database File	nwfw1696.db
Dataset Pathname	RXY
Presentation Format	xy020-5
Dataset Creation	Fri Oct 02 23:27:08 2015
Charted by	Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100 | 0 Y-CALIPER (in) 20 | 0 X-CALIPER (in) 20 | 0 BIT SIZE (in) 20 | TBHV (ft3)



0 GAMMA RAY (GAPI) 100 | 0 Y-CALIPER (in) 20 | 0 X-CALIPER (in) 20 | 0 BIT SIZE (in) 20 | TBHV (ft3)

Calibration Report

Database File	nwfw1696.db
Dataset Pathname	pass3
Dataset Creation	Fri Oct 02 10:12:25 2015

XY Caliper Calibration Report

Serial Number:	01S		
Tool Model:	XYCS		
Performed:	Fri Oct 02 10:22:22 2015		
Small Ring:	6	in	
Large Ring:	33	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	577.5	605.3	cps
Reading with Large Ring:	1136.33	1086.6	cps
Gain:	0.0483152	0.0560981	
Offset:	-21.902	-27.9562	

Gamma Ray Calibration Report

Serial Number:	01	
Tool Model:	GROH	
Performed:	Fri Oct 02 10:02:13 2015	
Calibrator Value:	120.0	GAPI
Background Reading:	15.0	cps
Calibrator Reading:	134.3	cps
Sensitivity:	1.0055	GAPI/cps

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
			GR-GROH (01)	2.75	3.50	40.00
GR	5.90					
			XYC-XYCS (01S)	6.60	3.50	110.00
YCAL	0.50					
XCAL	0.50					

Dataset:	nwfw1696.db: field/well/run1/pass3
Total length:	9.35 ft
Total weight:	150.00 lb
O.D.:	3.50 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	OCWS ISL-1 Monitor (NWF ID 1696)
Field	Fort Walton Beach
County	Okaloosa
State	Florida
Country	USA

X-Y CALIPER GAMMA RAY LOG

MV Geophysical

Company: Northwest Florida Water Management District
Well: Point Washington Floridan APT (NWF ID 1062)
Field: Point Washington
County: Walton
State: Florida
Country: USA

API #: FLUID: AAA0304
Washington State Forest, Forest Road 2
Lat: 30 19' 37.043" Long: W 86 04' 00.871"
SEC 17 TWP 3S RGE 18W
Elevation 41.93'
Other Services: XY/GR, Hammer, DHTV
K.B. D.F. G.L. 41.93'

2-OCT-2015, ONE, 610', 320', 320', SURFACE, 5.875", H2O, NA/NA, NA, NA, 13:00 10/2/2015, 14:30 10/2/2015, MVGS-1, Fort Myers, S.Miller/C.Miller, Countryman (NWFW), M.Black (Cardno), R.Putnall (Cardno)

Tubing Record: Size, Weight, From, To

Wgt/Ft 6" ID; Top SURFACE; Bottom 295'; 320' Logger; 288' Logger

nwfw1062.db * FINAL PRINT *

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

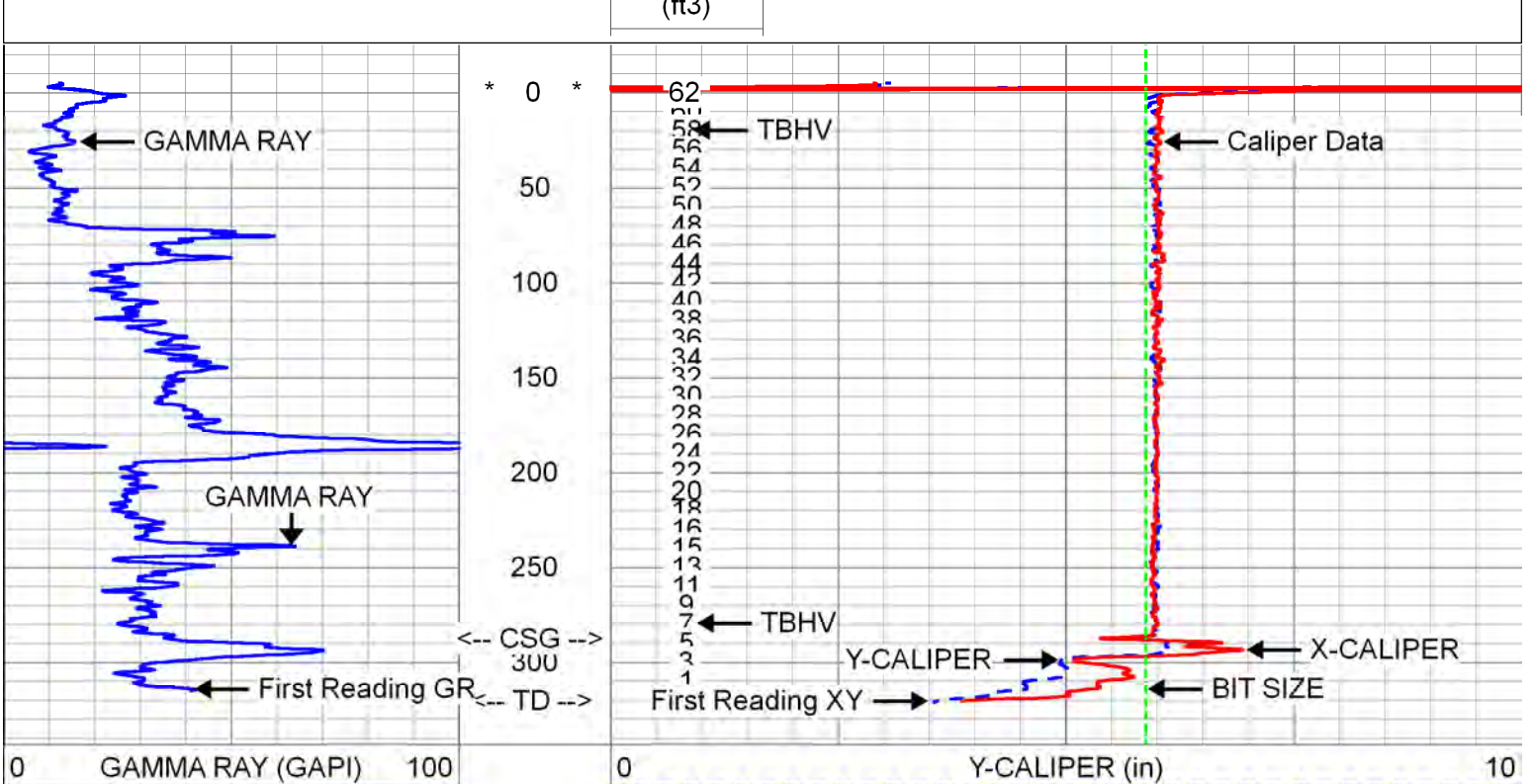
MAXIMUM ARM EXTENSION: 33"

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

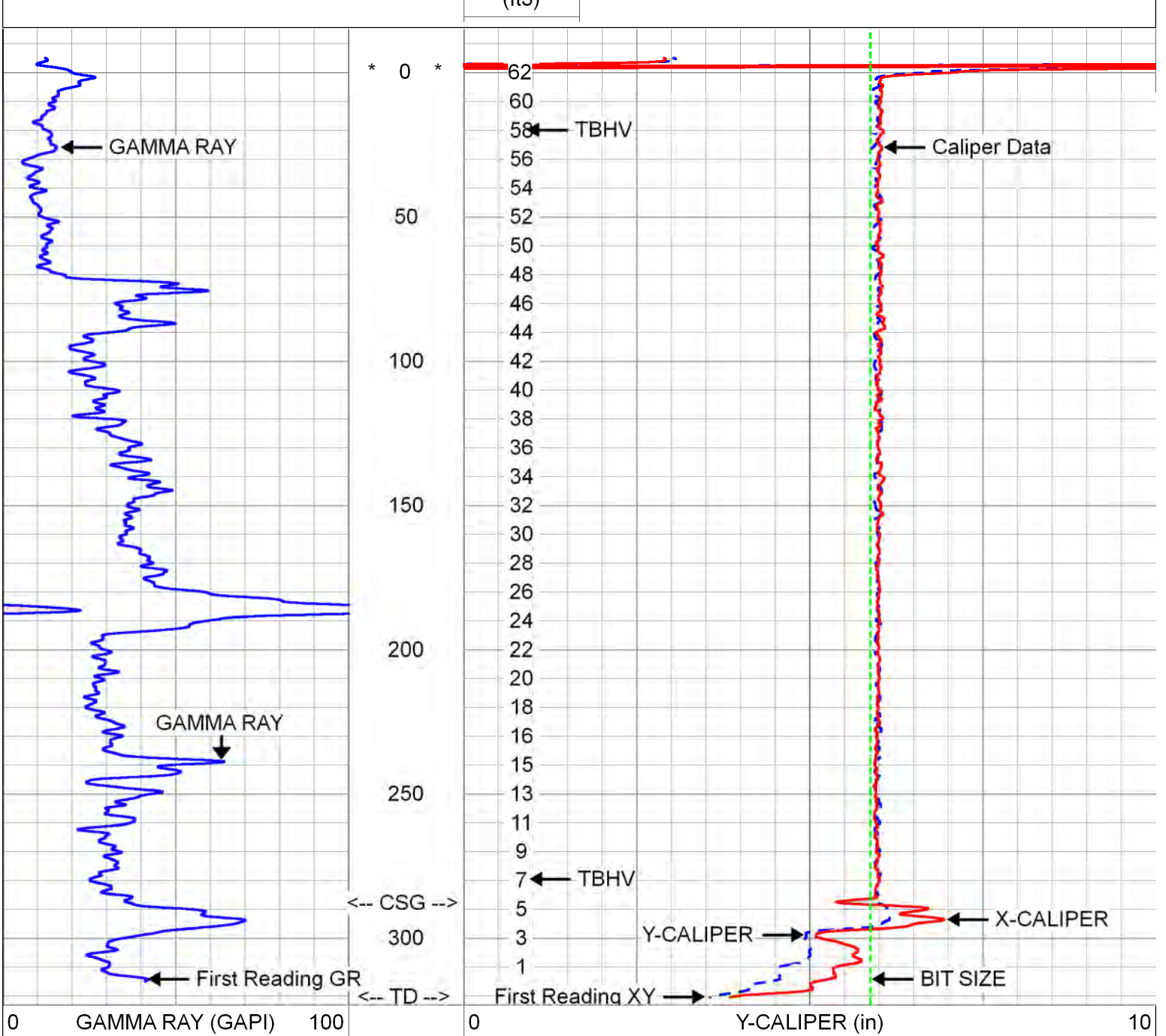
Hydro Firm: Cardno

Drilling Contractor: Rowe Drilling Company

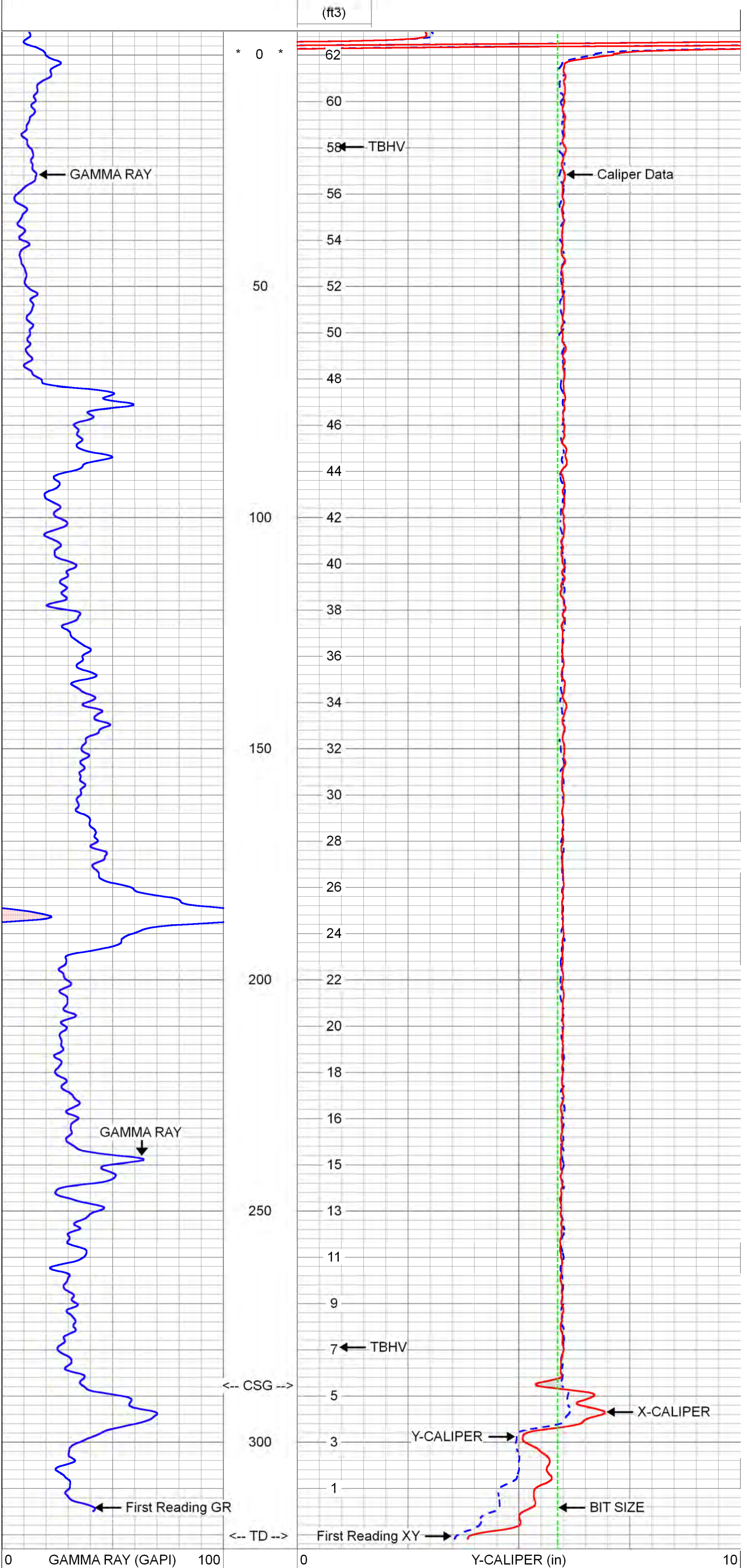
Database File: nwfw1062.db
Dataset Pathname: MAIN
Presentation Format: xy010-5
Dataset Creation: Sun Oct 11 16:55:41 2015
Charted by: Depth in Feet scaled 1:1200



Database File: nwfw1062.db
Dataset Pathname: MAIN
Presentation Format: xy010-5
Dataset Creation: Sun Oct 11 16:55:41 2015
Charted by: Depth in Feet scaled 1:500



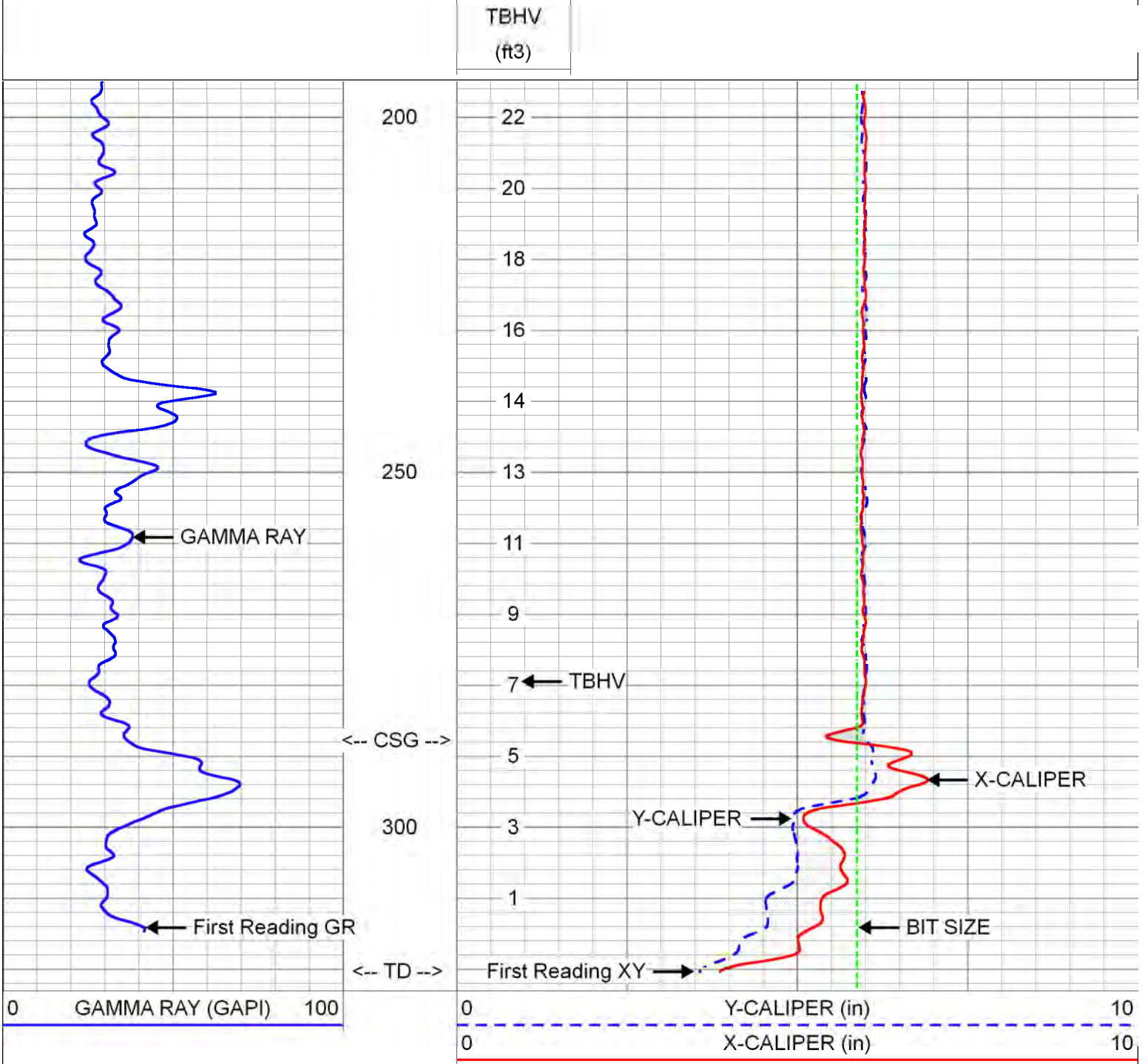
Database File: nwfw1062.db
Dataset Pathname: MAIN
Presentation Format: xy010-5
Dataset Creation: Sun Oct 11 16:55:41 2015
Charted by: Depth in Feet scaled 1:240



MV Geophysical

REPEAT SECTION

Database File: nwfw1062.db
Dataset Pathname: REPEAT
Presentation Format: xy010-5
Dataset Creation: Sun Oct 11 16:41:42 2015
Charted by: Depth in Feet scaled 1:240



Calibration Report

Database File: nwfw1062.db
Dataset Pathname: pass1
Dataset Creation: Fri Oct 02 14:37:03 2015

XY Caliper Calibration Report

Serial Number:	01S		
Tool Model:	XYCS		
Performed:	Fri Oct 02 14:46:59 2015		
Small Ring:	6	in	
Large Ring:	33	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	574	599.3	cps
Reading with Large Ring:	1125.4	1073.6	cps
Gain:	0.0489663	0.056926	
Offset:	-22.1066	-28.1157	

Gamma Ray Calibration Report

Serial Number:	01	
Tool Model:	GROH	
Performed:	Fri Oct 02 10:02:13 2015	
Calibrator Value:	120.0	GAPI
Background Reading:	15.0	cps
Calibrator Reading:	134.3	cps
Sensitivity:	1.0055	GAPI/cps

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
			GR-GROH (01)	2.75	3.50	40.00
GR	5.90					
			XYC-XYCS (01S)	6.60	3.50	110.00
YCAL	0.50					
XCAL	0.50					

Dataset: nwfw1062.db: field/well/run1/pass1
Total length: 9.35 ft
Total weight: 150.00 lb
O.D.: 3.50 in

MV Geophysical

Company: Northwest Florida Water Management District
Well: Point Washington Floridan APT (NWF ID 1062)
Field: Point Washington
County: Walton
State: Florida
Country: USA

MV Geophysical

X-Y CALIPER GAMMA RAY LOG

Company	Northwest Florida Water Management District
Well	EAFB Fld #4 Well #2 (NWF ID: 3209)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida
Country	USA

Location: Eglin Air Force Base
Lat: N 30 30' 22.002" Long: W 86 35' 16.073"
SEC 18 TWP 1S RGE 23W
API # : FLUID: AAA0413

Other Services: XY/GR, FCT,CBL, DHTV(10/4)

Permanent Datum: G.L. Elevation 89.33'
Log Measured From: Top of 6" Flange
Drilling Measured From: G.L.
Elevation: K.B. D.F. G.L. 89.33'

Date	3-OCT-2015
Run Number	ONE
Depth Driller	591'
Depth Logger	590'
Bottom Logged Interval	590'
Top Log Interval	SURFACE
Open Hole Size	9.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT log
Estimated Cement Top	NA
Time Well Ready	12:00 10/3/2015
Time Logger on Bottom	14:30 10/3/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW) R.Putnall (Cardno)

Borehole Record

Run Number	Bit	From	To
ONE	9.875"	442'	591' 590' Logger

Tubing Record

Size	Weight	From	To

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	10" Steel	10" ID	SURFACE	442'
Prot. String				
Production String				
Liner				

Invoice No. 2015152 nwfw3209.db *FINAL PRINT*

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Comments

MAXIMUM ARM EXTENSION: 33"

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

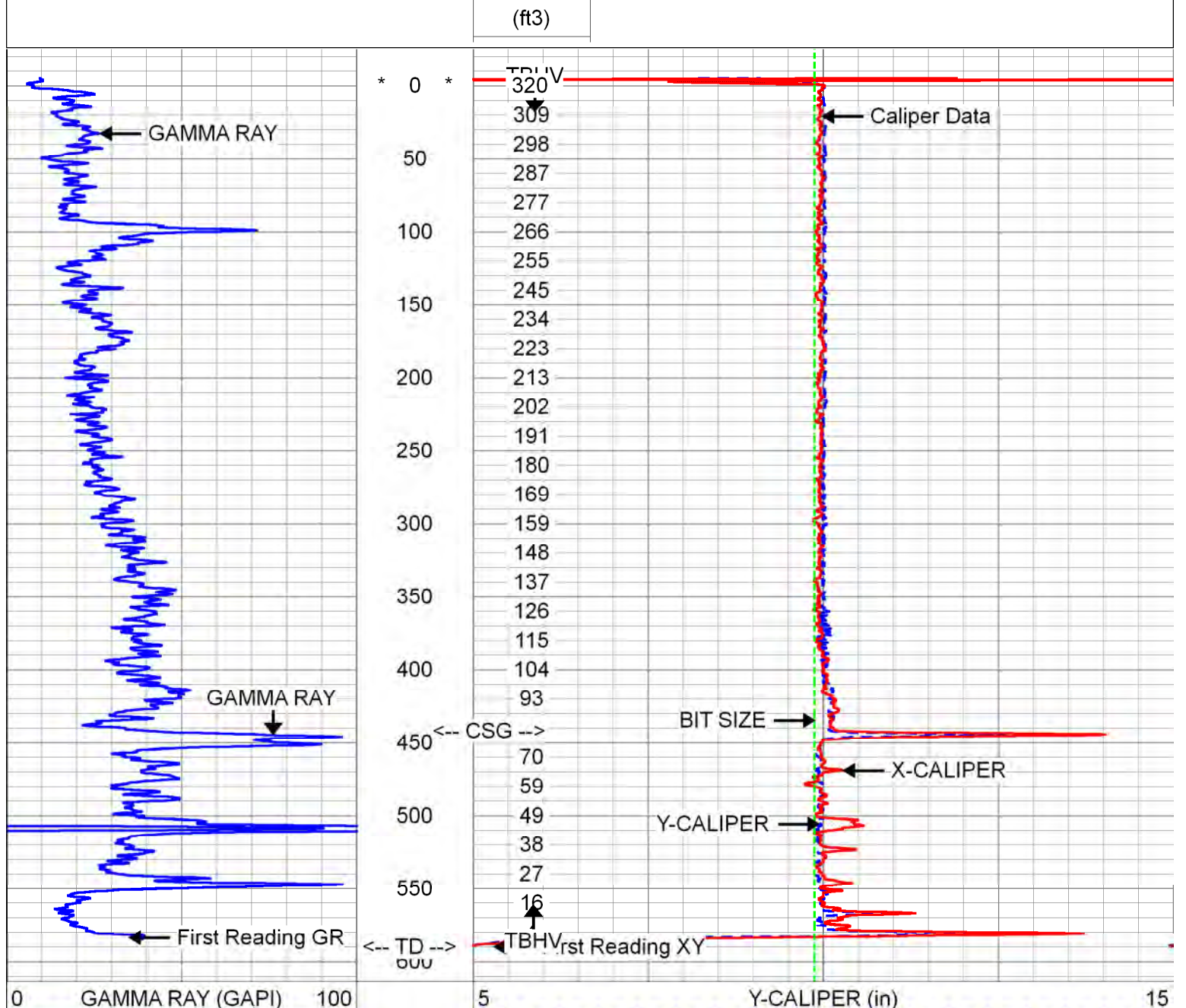
Hydro Firm: Cardno

Drilling Contractor: Rowe Drilling Company

MV Geophysical — MAIN PASS

Database File	nwfw3209.db
Dataset Pathname	MXY
Presentation Format	xy515-5
Dataset Creation	Sun Oct 11 21:31:13 2015
Charted by	Depth in Feet scaled 1:1200

0 GAMMA RAY (GAPI) 100 | 5 Y-CALIPER (in) 15 | 5 X-CALIPER (in) 15 | 5 BIT SIZE (in) 15 | TBHV (ft3)

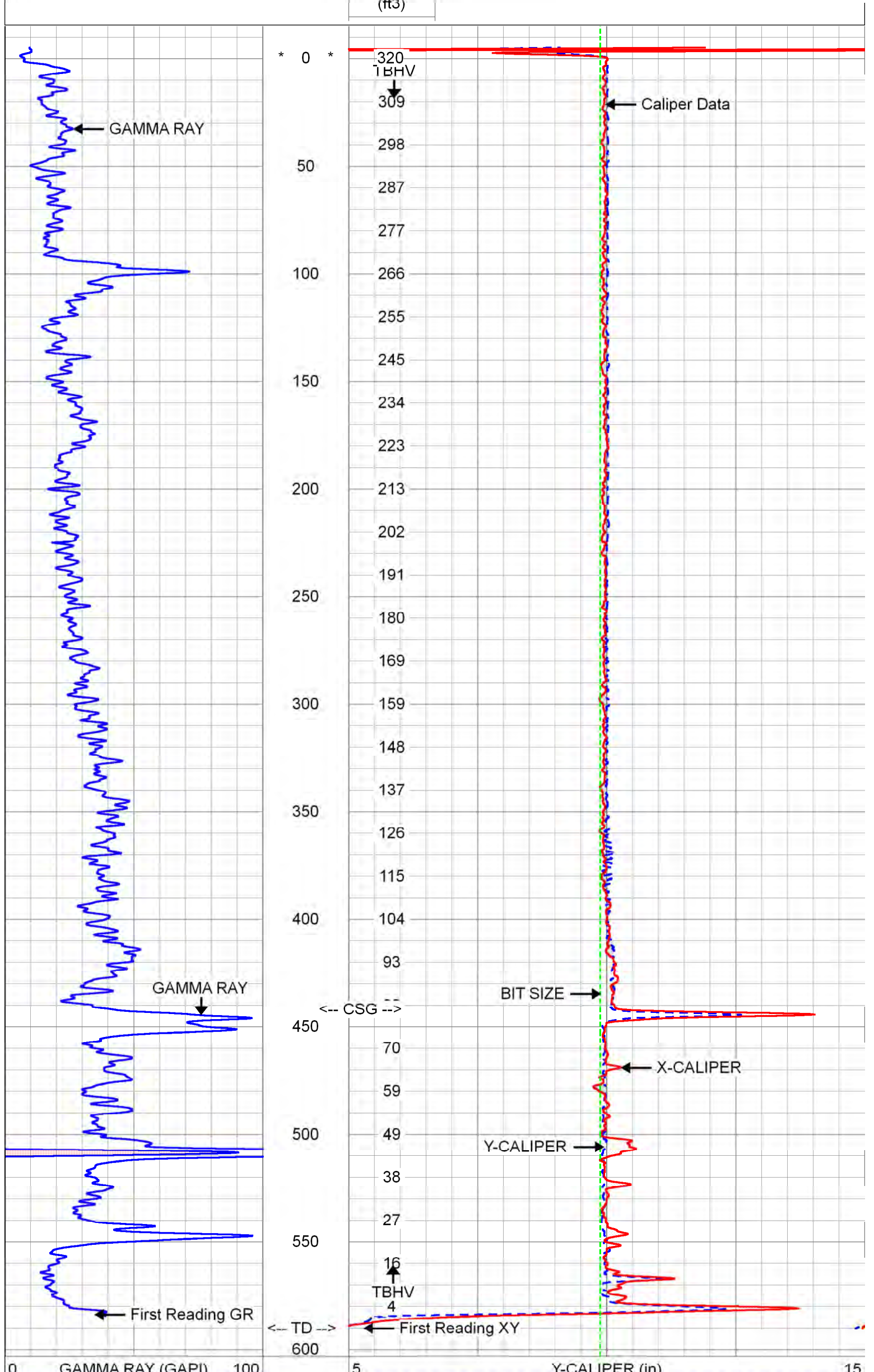


0 GAMMA RAY (GAPI) 100 | 5 Y-CALIPER (in) 15 | 5 X-CALIPER (in) 15 | 5 BIT SIZE (in) 15 | TBHV (ft3)

MV Geophysical — MAIN PASS

Database File	nwfw3209.db
Dataset Pathname	MXY
Presentation Format	xy515-5
Dataset Creation	Sun Oct 11 21:31:13 2015
Charted by	Depth in Feet scaled 1:600

0 GAMMA RAY (GAPI) 100 | 5 Y-CALIPER (in) 15 | 5 X-CALIPER (in) 15 | 5 BIT SIZE (in) 15 | TBHV (ft3)

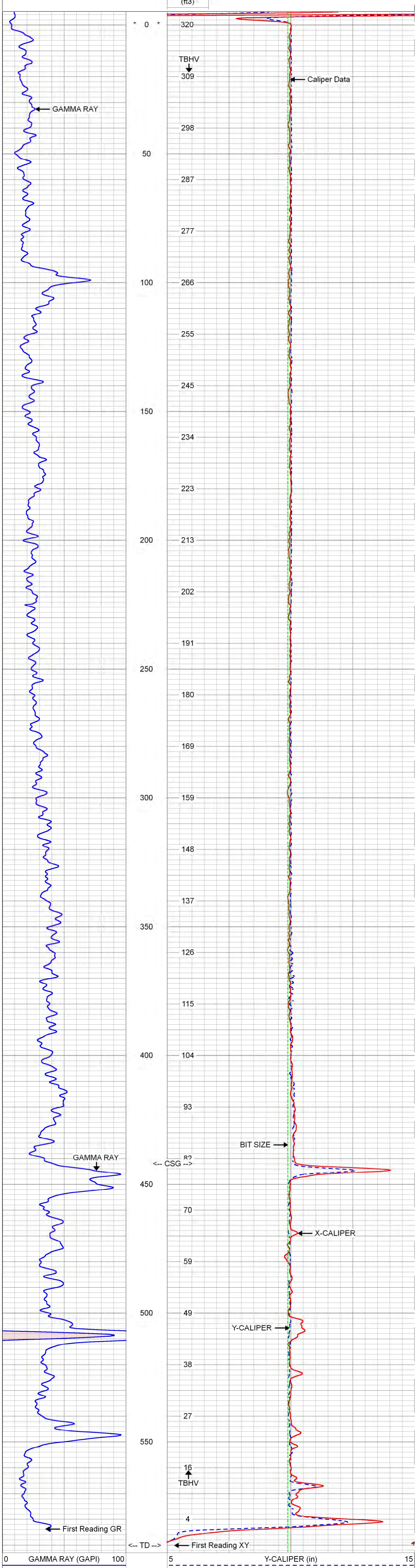


0 GAMMA RAY (GAPI) 100 | 5 Y-CALIPER (in) 15 | 5 X-CALIPER (in) 15 | 5 BIT SIZE (in) 15 | TBHV (ft3)

MV Geophysical — MAIN PASS

Database File	nwfw3209.db
Dataset Pathname	MXY
Presentation Format	xy515-5
Dataset Creation	Sun Oct 11 21:31:13 2015
Charted by	Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100 | 5 Y-CALIPER (in) 15 | 5 X-CALIPER (in) 15 | 5 BIT SIZE (in) 15 | TBHV (ft3)

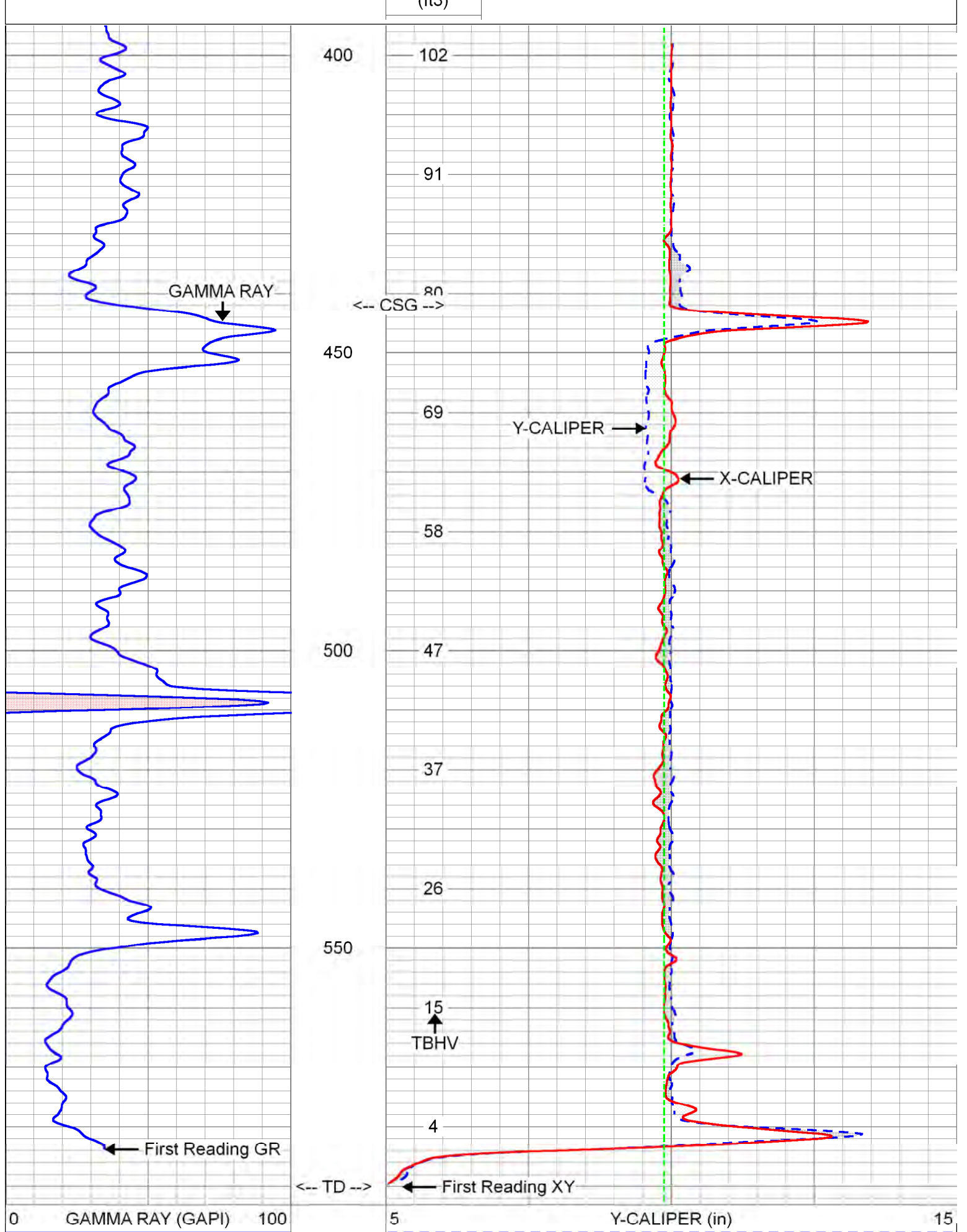


0 GAMMA RAY (GAPI) 100 | 5 Y-CALIPER (in) 15 | 5 X-CALIPER (in) 15 | 5 BIT SIZE (in) 15 | TBHV (ft3)

MV Geophysical — REPEAT SECTION

Database File	nwfw3209.db
Dataset Pathname	RXY
Presentation Format	xy515-5
Dataset Creation	Sun Oct 11 21:08:46 2015
Charted by	Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100 | 5 Y-CALIPER (in) 15 | 5 X-CALIPER (in) 15 | 5 BIT SIZE (in) 15 | TBHV (ft3)



0 GAMMA RAY (GAPI) 100 | 5 Y-CALIPER (in) 15 | 5 X-CALIPER (in) 15 | 5 BIT SIZE (in) 15 | TBHV (ft3)

Calibration Report

Database File	nwfw3209.db
Dataset Pathname	pass3
Dataset Creation	Sat Oct 03 15:12:42 2015

XY Caliper Calibration Report

Serial Number:	01S		
Tool Model:	XYCS		
Performed:	Sat Oct 03 14:56:55 2015		
Small Ring:	10	in	
Large Ring:	33	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	643	653.5	cps
Reading with Large Ring:	1125.4	1673.6	cps
Gain:	0.0476783	0.0225468	
Offset:	-20.6571	-4.73434	

Gamma Ray Calibration Report

Serial Number:	01	
Tool Model:	GROH	
Performed:	Sat Oct 03 14:42:55 2015	
Calibrator Value:	120.0	GAPI
Background Reading:	13.5	cps
Calibrator Reading:	134.0	cps
Sensitivity:	0.9952	GAPI/cps

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
			GR-GROH (01)	2.75	3.50	40.00
GR	5.90					
			XYC-XYCS (01S)	6.60	3.50	110.00
YCAL	0.50					
XCAL	0.50					

Dataset:	nwfw3209.db: field/well/run1/pass2
Total length:	9.35 ft
Total weight:	150.00 lb
O.D.:	3.50 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	EAFB Fld #4 Well #2 (NWF ID: 3209)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida
Country	USA

MV Geophysical

X-Y CALIPER GAMMA RAY LOG

Company	Northwest Florida Water Management District		
Well	EAFB NR Camp Rucker (NWF ID: 2993)		
Field	Eglin Air Force Base		
County	Walton		
State	Florida	Country	USA

Company	Northwest Florida Water Management District		
Well	EAFB NR Camp Rucker (NWF ID: 2993)		
Field	Eglin Air Force Base		
County	Walton	Country	USA
State	Florida		
Location:	API #: FLUID: AAA0564 Eglin Air Force Base Camp Rucker Lat: N 30 28' 53.880" Long: W 86 18' 33.796" SEC 24 TWP 1S RGE 21W	Other Services	FCT,CBL XY/GR DHTV
Permanent Datum	G.L.	Elevation 18.2'	Elevation K.B. D.F. G.L. 18.2'
Log Measured From	G.L.		
Drilling Measured From	G.L.		

Date	4-OCT-2015
Run Number	ONE
Depth Driller	880'
Depth Logger	224'
Bottom Logged Interval	224'
Top Log Interval	SURFACE
Open Hole Size	5.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT log
Estimated Cement Top	NA
Time Well Ready	16:00 10/4/2015
Time Logger on Bottom	16:30 10/4/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW) R.Putnall (Cardno)

Borehole Record / **Tubing Record**

Run Number	Bit	From	To	Size	Weight	From	To
ONE	5.875"	201'	880'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	6" Steel	6" ID	SURFACE	201'
Prot. String				
Production String				
Liner				

Invoice No. 2015156 nwfw2993.db * FINAL PRINT *

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Comments

MAXIMUM ARM EXTENSION: 33"

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

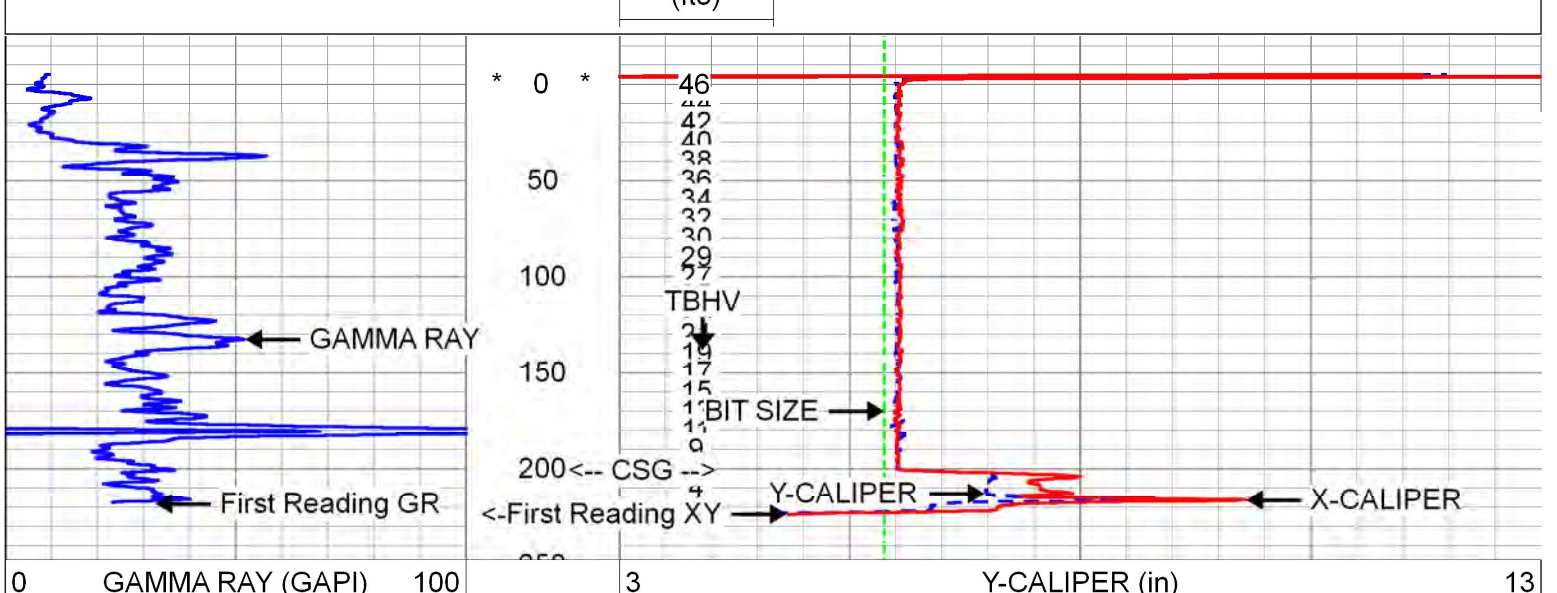
Hydro Firm: Cardno

Drilling Contractor: Rowe Drilling Company

MV Geophysical — MAIN PASS

Database File	nwfw2993.db
Dataset Pathname	MXY
Presentation Format	xy313-5
Dataset Creation	Mon Oct 12 01:36:54 2015
Charted by	Depth in Feet scaled 1:1200

0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

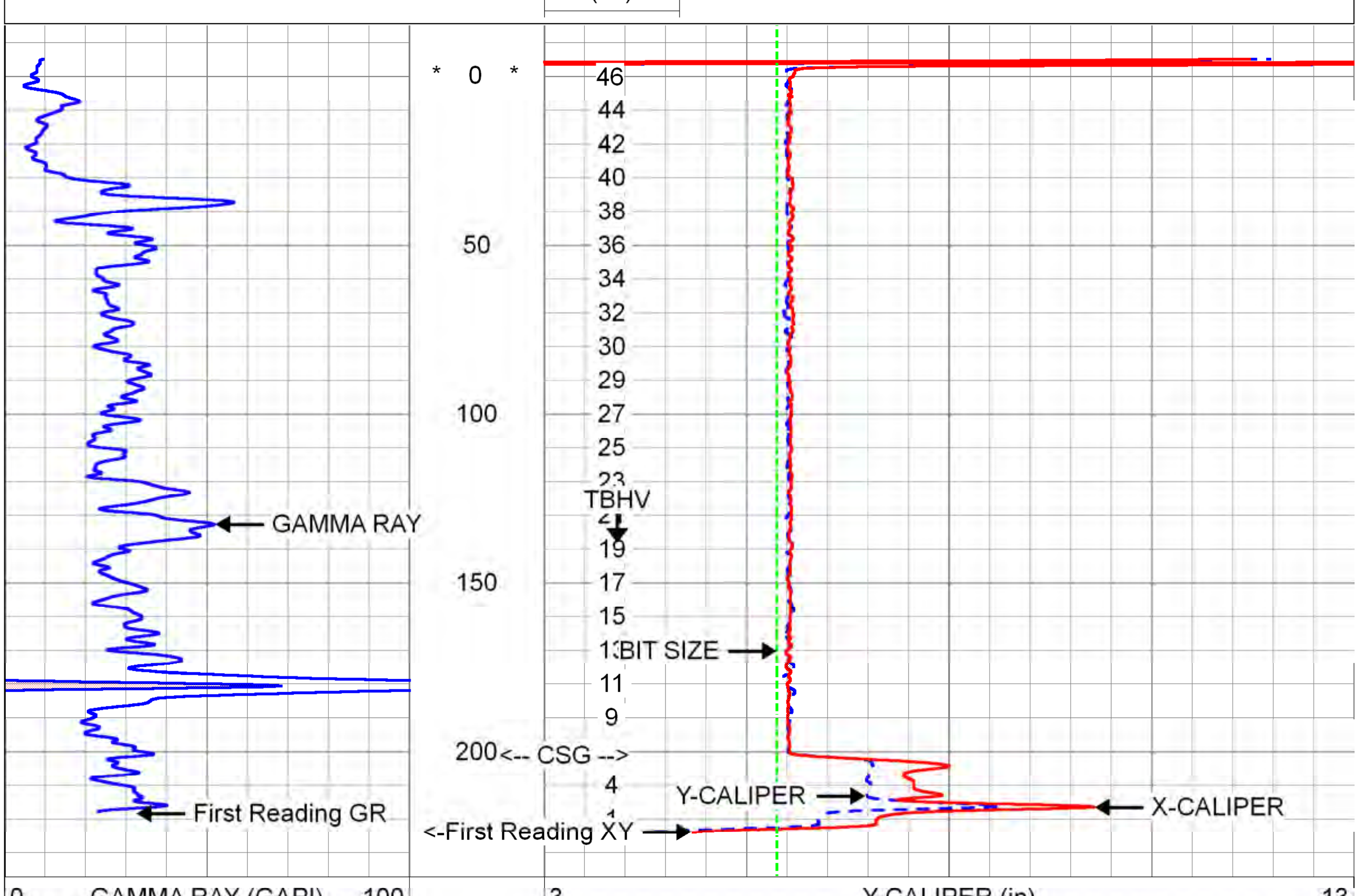


0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

MV Geophysical — MAIN PASS

Database File	nwfw2993.db
Dataset Pathname	MXY
Presentation Format	xy313-5
Dataset Creation	Mon Oct 12 01:36:54 2015
Charted by	Depth in Feet scaled 1:600

0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

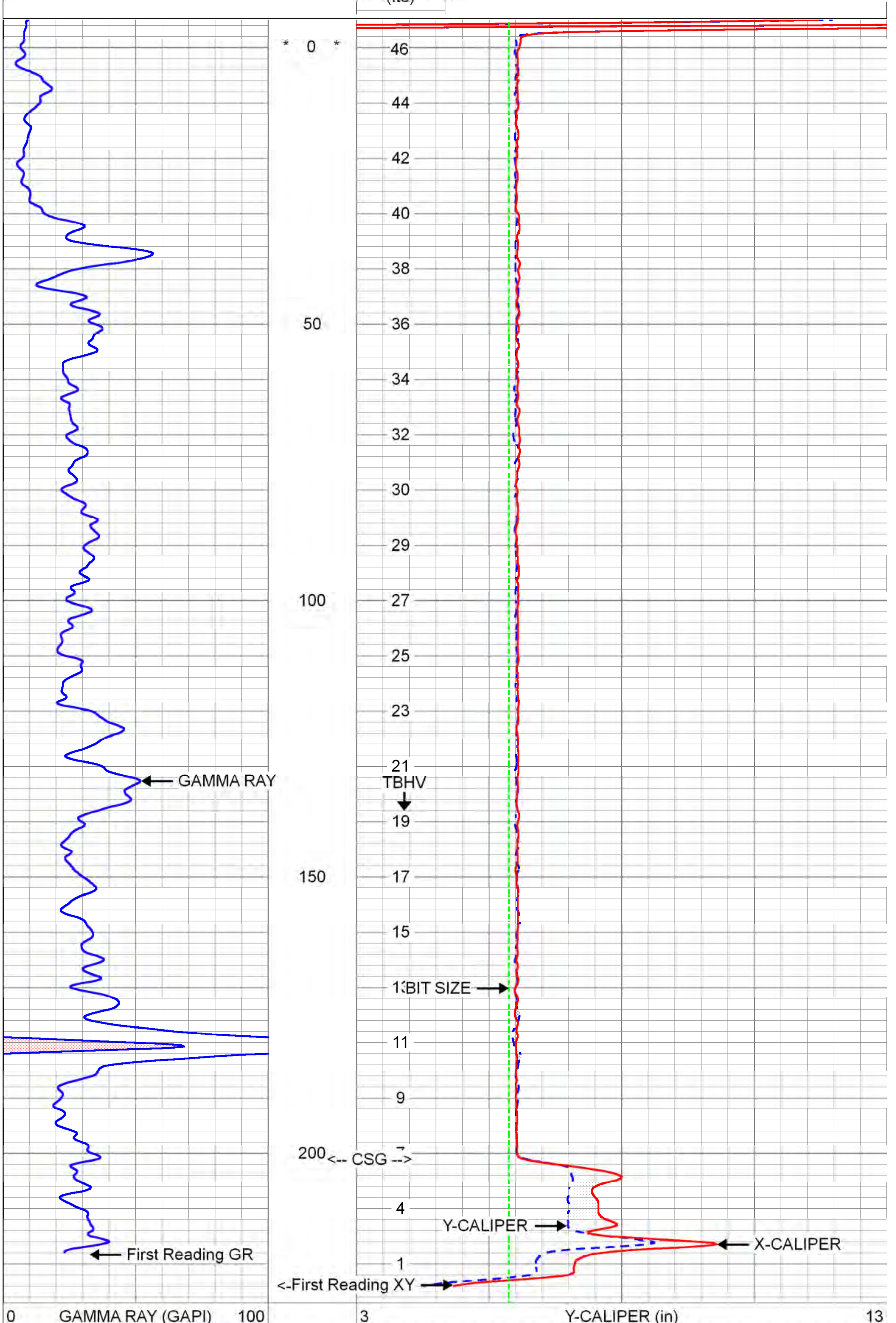


0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

MV Geophysical — MAIN PASS

Database File	nwfw2993.db
Dataset Pathname	MXY
Presentation Format	xy313-5
Dataset Creation	Mon Oct 12 01:36:54 2015
Charted by	Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

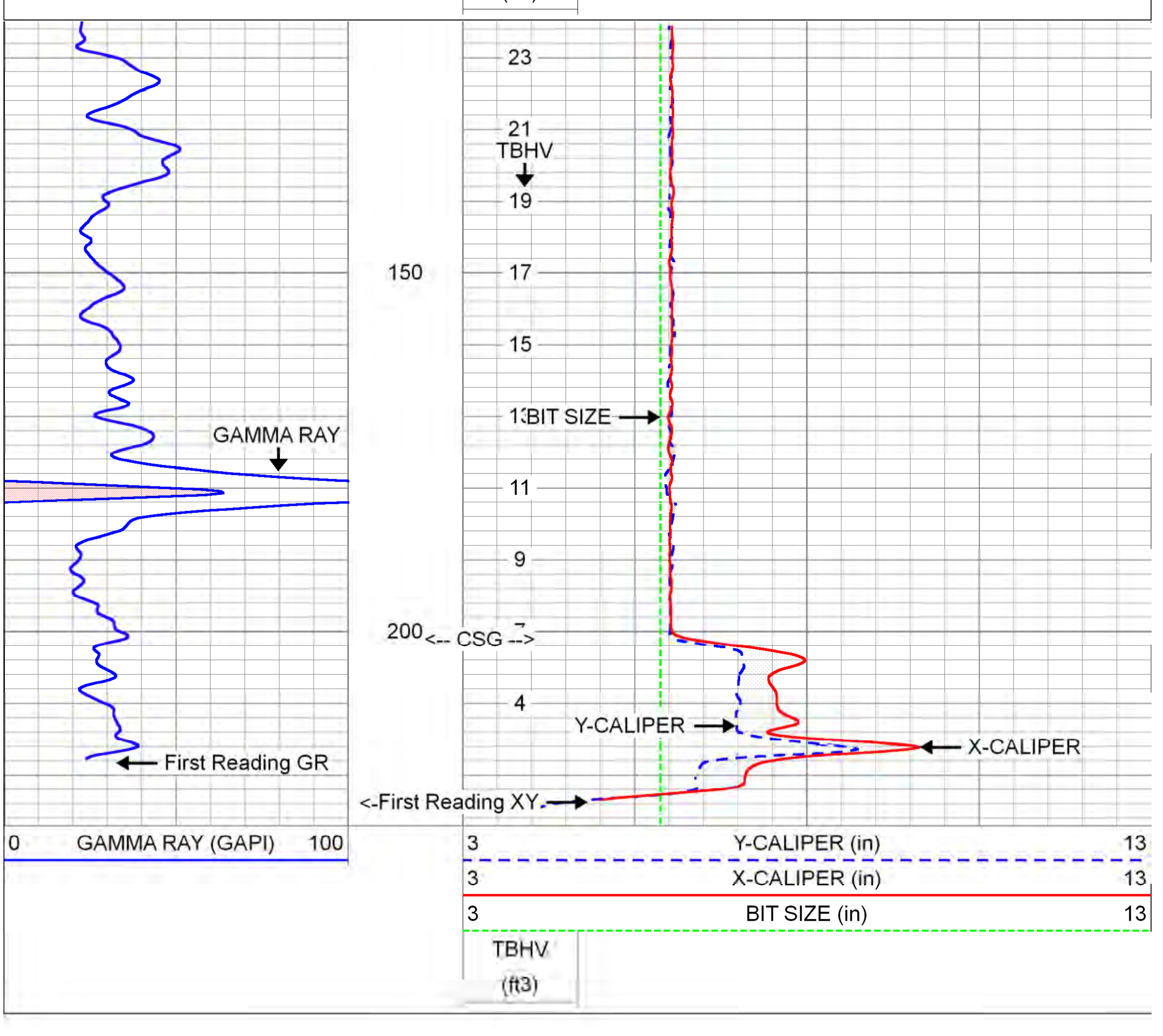


0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

MV Geophysical — REPEAT SECTION

Database File	nwfw2993.db
Dataset Pathname	RXY
Presentation Format	xy313-5
Dataset Creation	Mon Oct 12 01:48:29 2015
Charted by	Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)



0 GAMMA RAY (GAPI) 100 | 3 Y-CALIPER (in) 13 | 3 X-CALIPER (in) 13 | 3 BIT SIZE (in) 13 | TBHV (ft3)

Calibration Report

Database File	nwfw2993.db
Dataset Pathname	pass2
Dataset Creation	Sun Oct 04 16:31:44 2015

XY Caliper Calibration Report

Serial Number:	01S		
Tool Model:	XYCS		
Performed:	Sun Oct 04 16:33:30 2015		
Small Ring:	6	in	
Large Ring:	33	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	567.7	592.8	cps
Reading with Large Ring:	1125.4	1073.6	cps
Gain:	0.0484131	0.0561564	
Offset:	-21.4841	-27.2895	

Gamma Ray Calibration Report

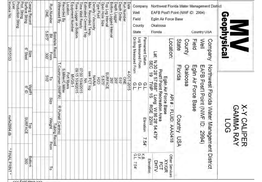
Serial Number:	01	
Tool Model:	GROH	
Performed:	Sat Oct 03 14:42:55 2015	
Calibrator Value:	120.0	GAPI
Background Reading:	13.5	cps
Calibrator Reading:	134.0	cps
Sensitivity:	0.9952	GAPI/cps

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
			GR-GROH (01)	2.75	3.50	40.00
GR	5.90					
			XYC-XYCS (01S)	6.60	3.50	110.00
YCAL	0.50					
XCAL	0.50					

Dataset:	nwfw2993.db: field/well/run1/pass2
Total length:	9.35 ft
Total weight:	150.00 lb
O.D.:	3.50 in

MV Geophysical

Company	Northwest Florida Water Management District		
Well	EAFB NR Camp Rucker (NWF ID: 2993)		
Field	Eglin Air Force Base		
County	Walton		
State	Florida	Country	USA



All interpretations are opinions based on inferences from electrical or other measurements and are carried out do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretations made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

MAXIMUM ARM EXTENSION: 33"

Caliper and Gamma Ray tools were run separately.

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

Hydro Firm: Cardno

Drilling Contractor: Rowe Drilling Company

MAIN PASS

Database File nwfw2994.db
Dataset Pathname MXY
Presentation Format xy31r3-5
Dataset Creation Mon Oct 12 00:28:08 2015
Charted by Depth in Feet scaled 1:320

0 GAMMA RAY (GAPI) 100
3 Y-CALIPER (in) 13
3 X-CALIPER (in) 13
3 BIT SIZE (in) 13
TBHV (ft1)
" 0 "
50
100
150
200
250
300
GAMMA RAY
Caliper Data
First Reading GR
<-- BLI -->
First Reading XY
0 GAMMA RAY (GAPI) 100
3 Y-CALIPER (in) 13
3 X-CALIPER (in) 13
3 BIT SIZE (in) 13
TBHV (ft1)

MAIN PASS

Database File nwfw2994.db
Dataset Pathname MXY
Presentation Format xy31r3-5
Dataset Creation Mon Oct 12 00:28:08 2015
Charted by Depth in Feet scaled 1:600

0 GAMMA RAY (GAPI) 100
3 Y-CALIPER (in) 13
3 X-CALIPER (in) 13
3 BIT SIZE (in) 13
TBHV (ft1)
" 0 "
50
100
150
200
250
300
GAMMA RAY
Caliper Data
First Reading GR
<-- BLI -->
First Reading XY
0 GAMMA RAY (GAPI) 100
3 Y-CALIPER (in) 13
3 X-CALIPER (in) 13
3 BIT SIZE (in) 13
TBHV (ft1)

MAIN PASS

Database File nwfw2994.db
Dataset Pathname MXY
Presentation Format xy31r3-5
Dataset Creation Mon Oct 12 00:28:08 2015
Charted by Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100
3 Y-CALIPER (in) 13
3 X-CALIPER (in) 13
3 BIT SIZE (in) 13
TBHV (ft1)
" 0 "
100
200
300
400
500
600
GAMMA RAY
Caliper Data
First Reading GR
<-- BLI -->
First Reading XY
0 GAMMA RAY (GAPI) 100
3 Y-CALIPER (in) 13
3 X-CALIPER (in) 13
3 BIT SIZE (in) 13
TBHV (ft1)

REPEAT SECTION

Database File nwfw2994.db
Dataset Pathname RXY
Presentation Format xy31r3-5
Dataset Creation Mon Oct 12 00:27:26 2015
Charted by Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100
3 Y-CALIPER (in) 13
3 X-CALIPER (in) 13
3 BIT SIZE (in) 13
TBHV (ft1)
150
200
250
300
350
400
450
500
550
600
650
700
GAMMA RAY
Caliper Data
First Reading GR
<-- BLI -->
First Reading XY
0 GAMMA RAY (GAPI) 100
3 Y-CALIPER (in) 13
3 X-CALIPER (in) 13
3 BIT SIZE (in) 13
TBHV (ft1)

Calibration Report

Database File nwfw2994.db
Dataset Pathname gain4
Dataset Creation Sun Oct 04 09:15:31 2015

XY Caliper Calibration Report

Serial Number:	0155		
Tool Model:	XYCS		
Performed:	Sun Oct 04 09:17:19 2015		
Small Ring:	6	in	
Large Ring:	33	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	562	588	cps
Reading with Large Ring:	1125.4	1073.6	cps
Gain:	0.0479233	0.0534019	
Offset:	-20.9329	-24.3023	

Calibration Report

Database File nwfw2994.db
Dataset Pathname gain4
Dataset Creation Sun Oct 04 09:36:05 2015

Gamma Ray Calibration Report

Serial Number:	01	
Tool Model:	GRCH	
Performed:	Sat Oct 03 14:42:55 2015	
Calibrator Value:	120.0	GAPI
Background Reading:	13.5	cps
Calibrator Reading:	134.0	cps
Sensitivity:	0.9952	GAPI/cps

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
			XYC-XYCS (0155)	6.60	3.50	110.00
TCAL	0.50					
XCAL	0.50					

Dataset: nwfw2994.db: fieldtest\run1\pass3
Total length: 6.60 ft
Total weight: 110.00 lb
O.D.: 3.50 in

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
			GR-GROH (01)	2.75	3.50	40.00
GR	1.00					

Dataset: nwfw2994.db: fieldtest\run1\pass4
Total length: 2.75 ft
Total weight: 40.00 lb
O.D.: 3.50 in

MV Geophysical
Company: Northwest Florida Water Management District
Well: EAFB Pruitt Field (MAF ID: 2944)
Field: Eglin Air Force Base
County: Okaloosa
State: Florida
Country: USA

Company	Northwest Florida Water Management District
Well	West Hewett Floridan (NWF ID: 1376)
Field	Topsail Hill Preserve
County	Walton
State	Florida Country USA

MV Geophysical

X-Y CALIPER GAMMA RAY LOG

Company: Northwest Florida Water Management District
Well: West Hewett Floridan (NWF ID: 1376)
Field: Topsail Hill Preserve
County: Walton
State: Florida Country: USA

Location: API # : FLUID: AAA0564
Topsail Hill Preserve
Lat: N 30 23' 23.541" Long: W 86 17' 17.128"
SEC 31 TWP 2S RGE 20W

Other Services: DHTV, FCT,CBL, XY/GR

Permanent Datum: G.L. Elevation: 18'
Log Measured From: G.L.
Drilling Measured From: G.L.

Elevation: K.B. / D.F. / G.L. 18'

Date	5-OCT-2015
Run Number	ONE
Depth Driller	725'
Depth Logger	720'
Bottom Logged Interval	712'
Top Log Interval	465'
Open Hole Size	3.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT log
Estimated Cement Top	NA
Time Well Ready	08:00 10/5/2015
Time Logger on Bottom	09:30 10/5/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW) R.Putnall (Cardno)

Borehole Record

Run Number	Bit	From	To
ONE	3.875"	550'	725'
		546' Logger	720' Logger

Tubing Record

Size	Weight	From	To

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	6" Steel	6" ID	SURFACE	285
Prot. String	4" Steel	4" ID	273'	550
Production String				546' Logger
Liner				

Invoice No. 2015157 nwfw1376.db * FINAL PRINT *

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Comments

MAXIMUM ARM EXTENSION: 33"

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

Hydro Firm: Cardno

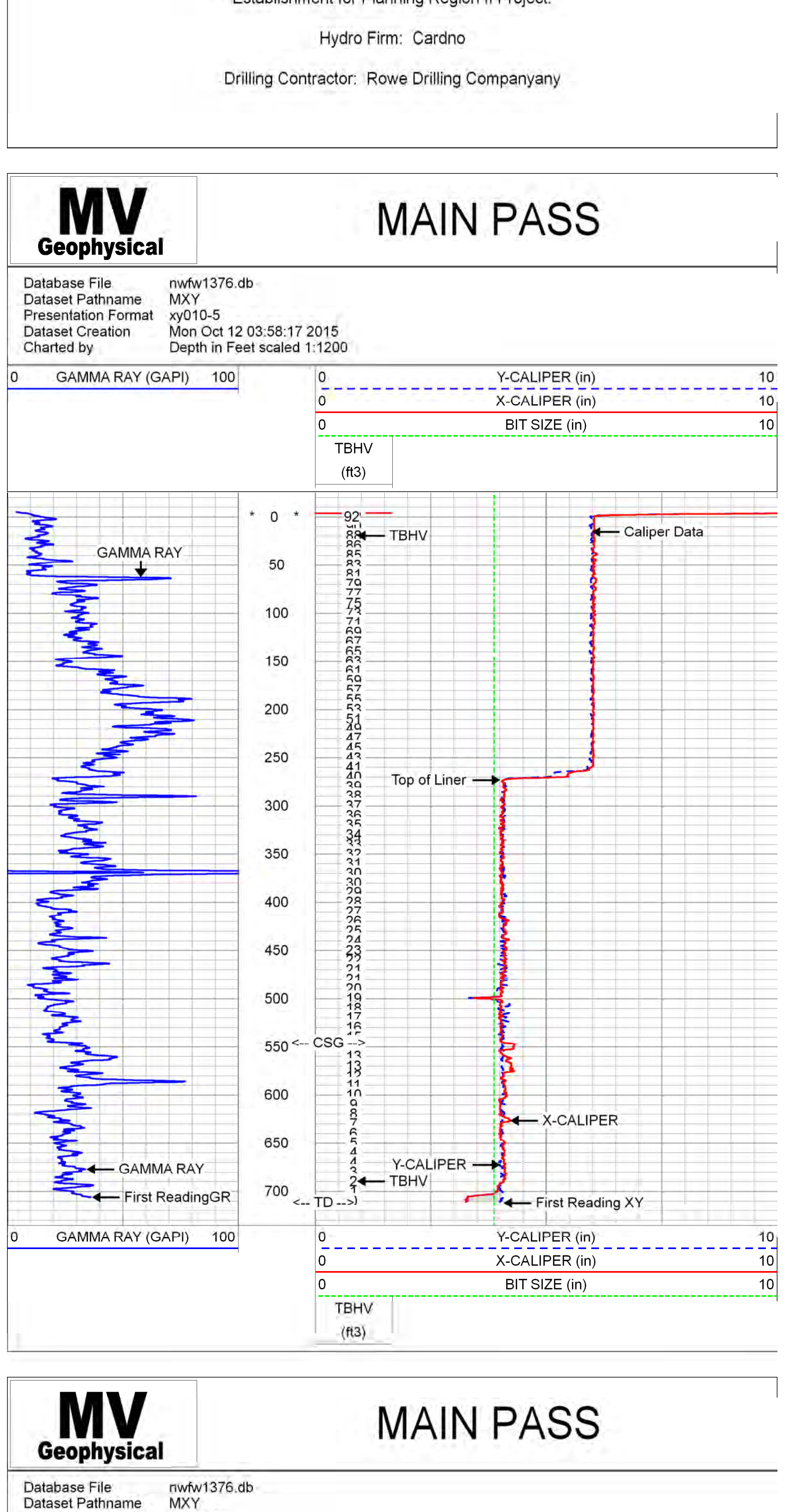
Drilling Contractor: Rowe Drilling Companyany

MV Geophysical

MAIN PASS

Database File nwfw1376.db
Dataset Pathname MXY
Presentation Format xy010-5
Dataset Creation Mon Oct 12 03:58:17 2015
Charted by Depth in Feet scaled 1:1200

0 GAMMA RAY (GAPI) 100
0 Y-CALIPER (in) 10
0 X-CALIPER (in) 10
0 BIT SIZE (in) 10
TBHV (ft3)

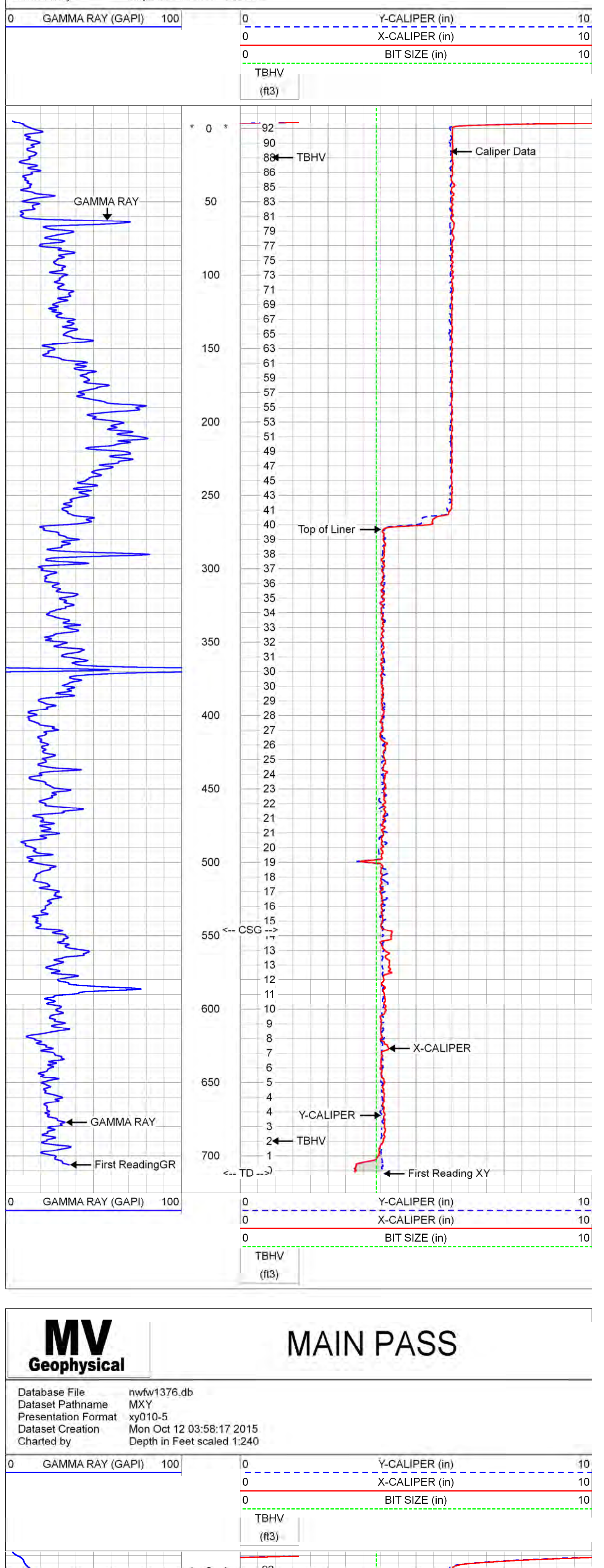


MV Geophysical

MAIN PASS

Database File nwfw1376.db
Dataset Pathname MXY
Presentation Format xy010-5
Dataset Creation Mon Oct 12 03:58:17 2015
Charted by Depth in Feet scaled 1:600

0 GAMMA RAY (GAPI) 100
0 Y-CALIPER (in) 10
0 X-CALIPER (in) 10
0 BIT SIZE (in) 10
TBHV (ft3)

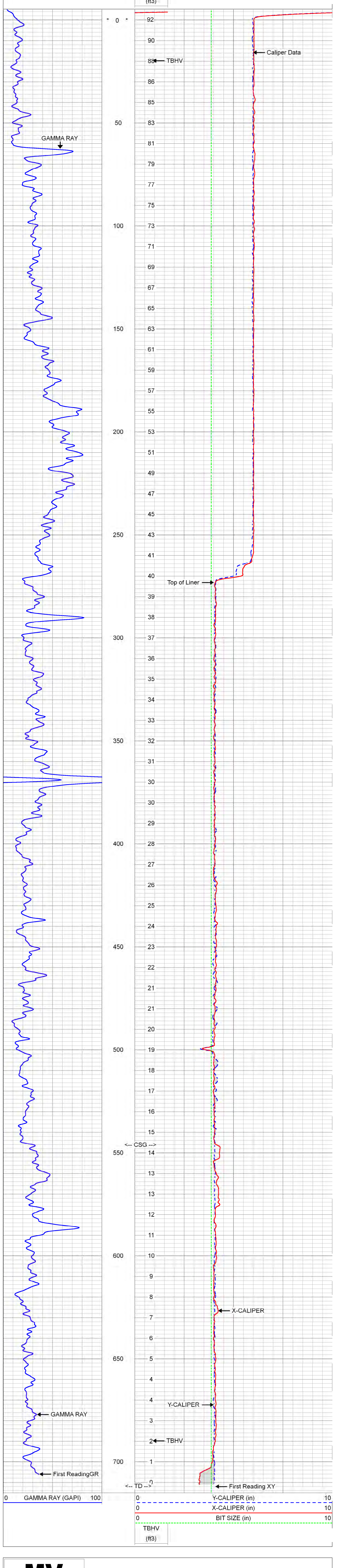


MV Geophysical

MAIN PASS

Database File nwfw1376.db
Dataset Pathname MXY
Presentation Format xy010-5
Dataset Creation Mon Oct 12 03:58:17 2015
Charted by Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100
0 Y-CALIPER (in) 10
0 X-CALIPER (in) 10
0 BIT SIZE (in) 10
TBHV (ft3)

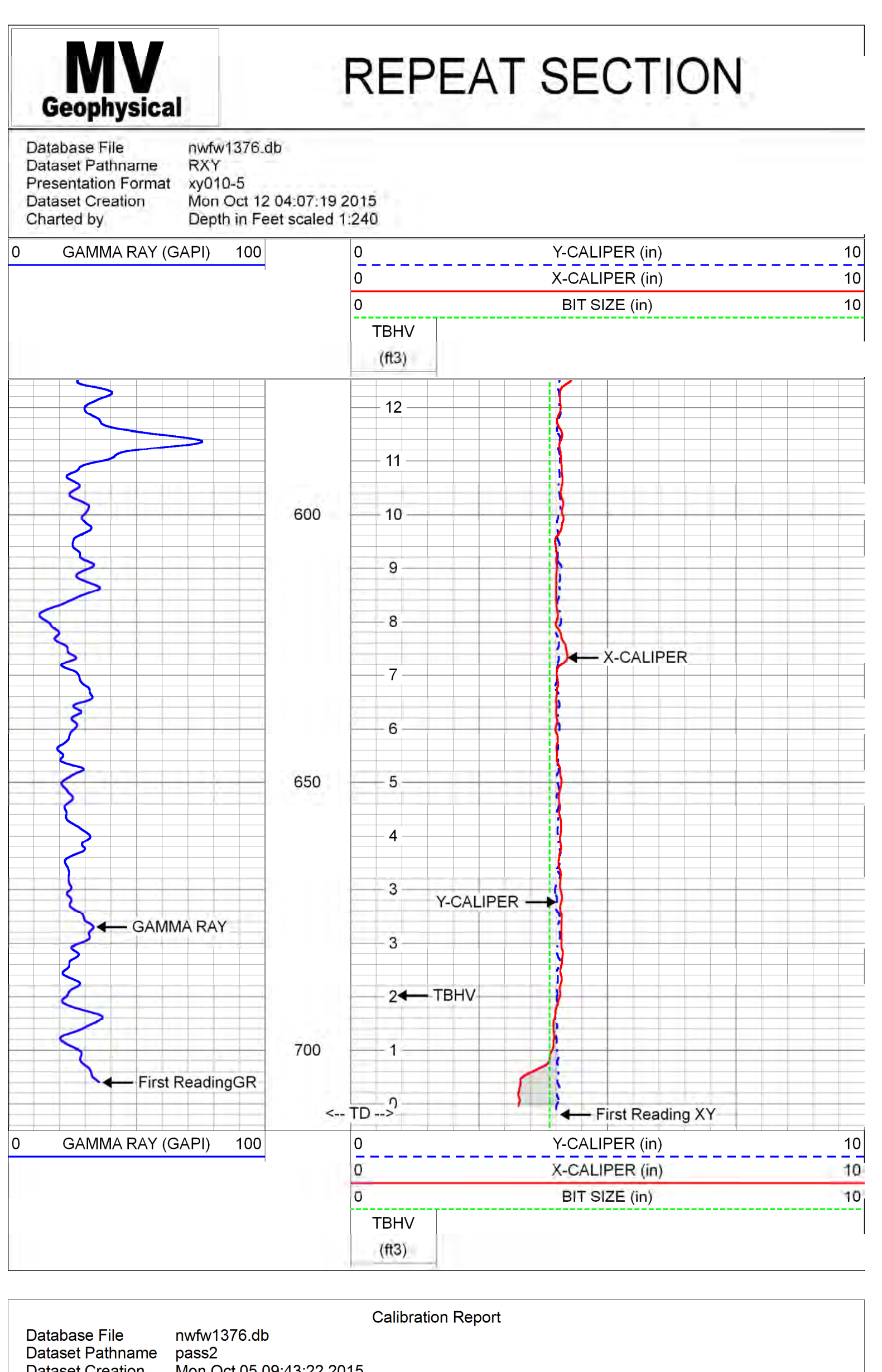


MV Geophysical

REPEAT SECTION

Database File nwfw1376.db
Dataset Pathname RXY
Presentation Format xy010-5
Dataset Creation Mon Oct 12 04:07:19 2015
Charted by Depth in Feet scaled 1:240

0 GAMMA RAY (GAPI) 100
0 Y-CALIPER (in) 10
0 X-CALIPER (in) 10
0 BIT SIZE (in) 10
TBHV (ft3)



Calibration Report

Database File nwfw1376.db
Dataset Pathname pass2
Dataset Creation Mon Oct 05 09:43:22 2015

XY Caliper Calibration Report

Serial Number:	01S		
Tool Model:	XYCS		
Performed:	Mon Oct 05 09:38:25 2015		
Small Ring:	3.5	in	
Large Ring:	33	in	
	X Caliper	Y Caliper	
Reading with Small Ring:	507	556	cps
Reading with Large Ring:	1125.4	1073.6	cps
Gain:	0.0477038	0.0569938	
Offset:	-20.6858	-28.1886	

Gamma Ray Calibration Report

Serial Number:	01	
Tool Model:	GROH	
Performed:	Mon Oct 05 09:38:06 2015	
Calibrator Value:	120.0	GAPI
Background Reading:	13.4	cps
Calibrator Reading:	134.0	cps
Sensitivity:	0.9951	GAPI/cps

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
			GR-GROH (01)	2.75	3.50	40.00
GR	5.90					
			XYC-XYCS (01S)	6.60	3.50	110.00
YCAL	0.50					
XCAL	0.50					

Dataset: nwfw2993.db: field/well/run1/pass2
Total length: 9.35 ft
Total weight: 150.00 lb
O.D.: 3.50 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	West Hewett Floridan (NWF ID: 1376)
Field	Topsail Hill Preserve
County	Walton
State	Florida Country USA

Planning Region II Video and Geophysical Logging

APPENDIX

B

FLUID CONDUCTIVITY AND TEMPERATURE LOGS

MV Geophysical

FLUID CONDUCTIVITY TEMPERATURE LOG

Company	Northwest Florida Water Management District
Well	Tiger Point (NWF ID 7686)
Field	Gulf Breeze
County	Santa Rosa
State	Florida
Country	USA

Company	Northwest Florida Water Management District
Well	Tiger Point (NWF ID 7686)
Field	Gulf Breeze
County	Santa Rosa
State	Florida
Country	USA
Location:	API # : FLUID: AAD9021
	Tiger Point Park
	1370 Tiger Park Lane, Gulf Breeze, FL 32563
	Lat: N 30 23' 14.514" Long: W87 03' 24.347"
	SEC 28 TWP 2S RGE 28W

Permanent Datum	G.L.	Elevation 17'	K.B.
Log Measured From	G.L.		D.F.
Drilling Measured From	G.L.		G.L. 17'

Other Services: XY/GR, DHTV, FCT

Date	1-OCT-2015
Run Number	ONE
Depth Driller	1310'
Depth Logger	1306'
Bottom Logged Interval	1306'
Top Log Interval	1050'
Open Hole Size	5.5"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT down
Estimated Cement Top	NA
Time Well Ready	09:30 10/1/2015
Time Logger on Bottom	11:45 10/1/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW)

Borehole Record					Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To	
ONE	5.5"	1140'	1310'					
		1137'Logger	1306'Logger					

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	6" Steel	6" ID	SURFACE	1140'
Prot. String				1137'Logger
Production String				
Liner				

M.Black (Cardno) | R.Putnall (Cardno)

Invoice No.	2015144
	2x/15x/pdf/las
	nwfw7686.db
	* FIELD PRINT *

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Comments

A STATIC down pass was performed. No Sample Available.

FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

degF	CPS
38.9	147.1
143.4	2670.0

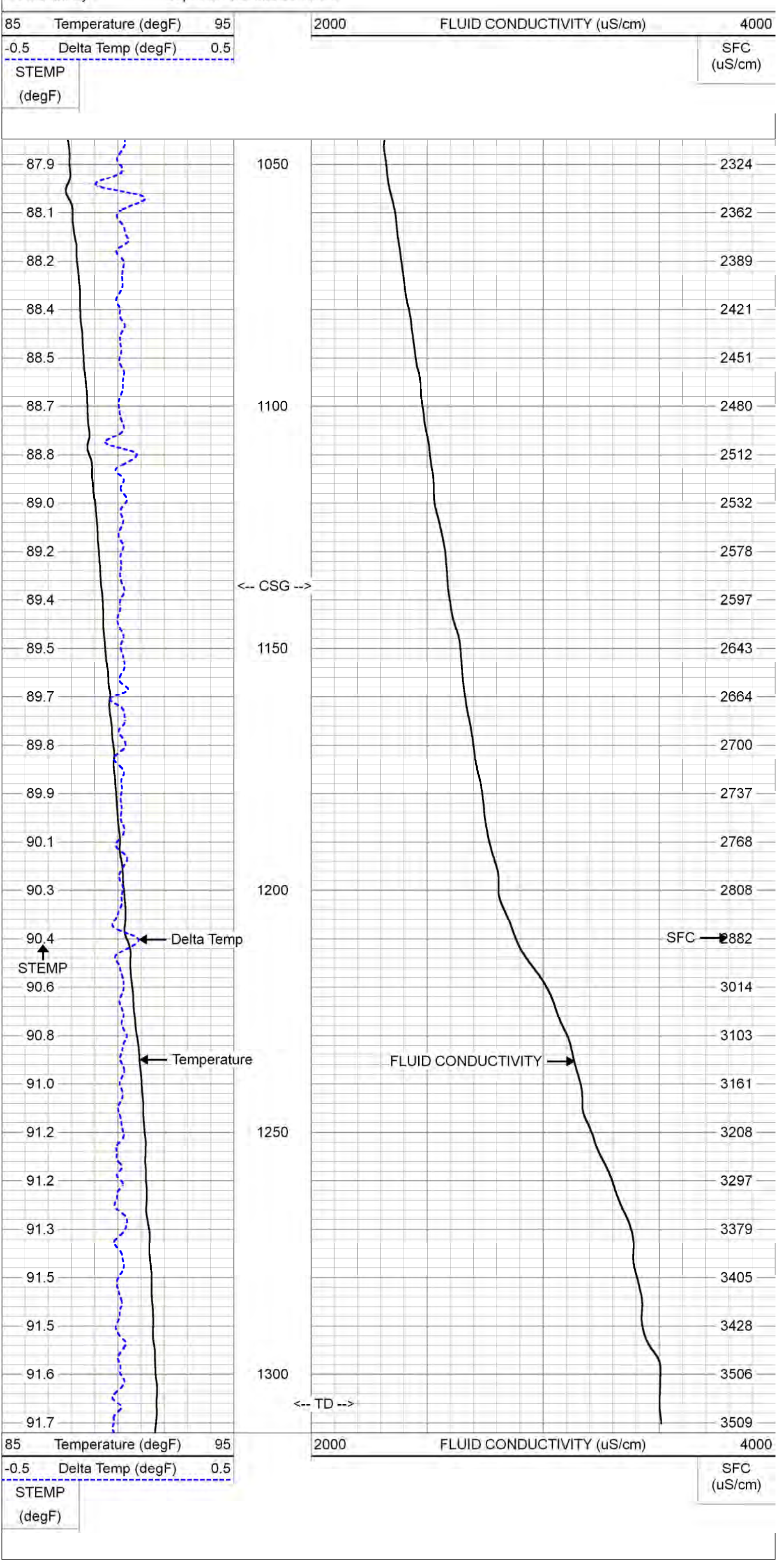
NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project

Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw7686.db
Dataset Pathname	SFCT
Presentation Format	fct-stat
Dataset Creation	Thu Oct 01 23:45:46 2015
Charted by	Depth in Feet scaled 1:240



Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset:	nwfw7686.db: field/well/run1/pass4
Total length:	5.12 ft
Total weight:	20.00 lb
O.D.:	1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	Tiger Point (NWF ID 7686)
Field	Gulf Breeze
County	Santa Rosa
State	Florida
Country	USA

MV Geophysical

FLUID CONDUCTIVITY TEMPERATURE LOG

Company	Northwest Florida Water Management District
Well	Liza Jackson Park (NWF ID 7523)
Field	Fort Walton
County	Okaloosa
State	Florida
Country	USA

Company	Northwest Florida Water Management District
Well	Liza Jackson Park (NWF ID 7523)
Field	Fort Walton
County	Okaloosa
State	Florida
Country	USA
Location:	API # : FLUID: AAD9903
	Liza Jackson Park
	U.S.Highway 98, Fort Walton, FL
	Lat: N 30 24' 21.392" Long: W86 38' 07.701"
	SEC 15 TWP 2S RGE 24W

Date	1-OCT-2015		
Run Number	ONE		
Depth Driller	919'		
Depth Logger	899'		
Bottom Logged Interval	899'		
Top Log Interval	785'		
Open Hole Size	3.5" ?		
Type Fluid	H2O		
Density / Viscosity	NA/NA		
Max. Recorded Temp.	see FCT down		
Estimated Cement Top	NA		
Time Well Ready	16:30 10/1/2015		
Time Logger on Bottom	18:30 10/1/2015		
Equipment Number	MVGS-1		
Location	Fort Myers		
Recorded By	S.Miller/C.Miller		
Witnessed By	T.Countryman (NWFW)	M.Black (Cardno)	R.Putnall (Cardno)

Permanent Datum	G.L.	Elevation	3'
Log Measured From	G.L.		
Drilling Measured From	G.L.		

Other Services
DHTV
FCT

Elevation
K.B.
D.F.
G.L. 3'

Borehole Record

Run Number	Bit	From	To
ONE	3.5" ?	835'	919'
			899' Logger

Tubing Record

Size	Wgt/Ft	Top	Bottom
4" Steel	4" ID	SURFACE	835'

Casing Record

Size	Weight	From	To
Surface String			
Prot. String			
Production String			
Liner			

Invoice No.	2015146	2x/15x/pdf/las	nwfw7523.db	* FIELD PRINT *

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Comments

A STATIC down pass was performed. No Sample Available.

FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

degF	CPS
38.9	147.1
143.4	2670.0

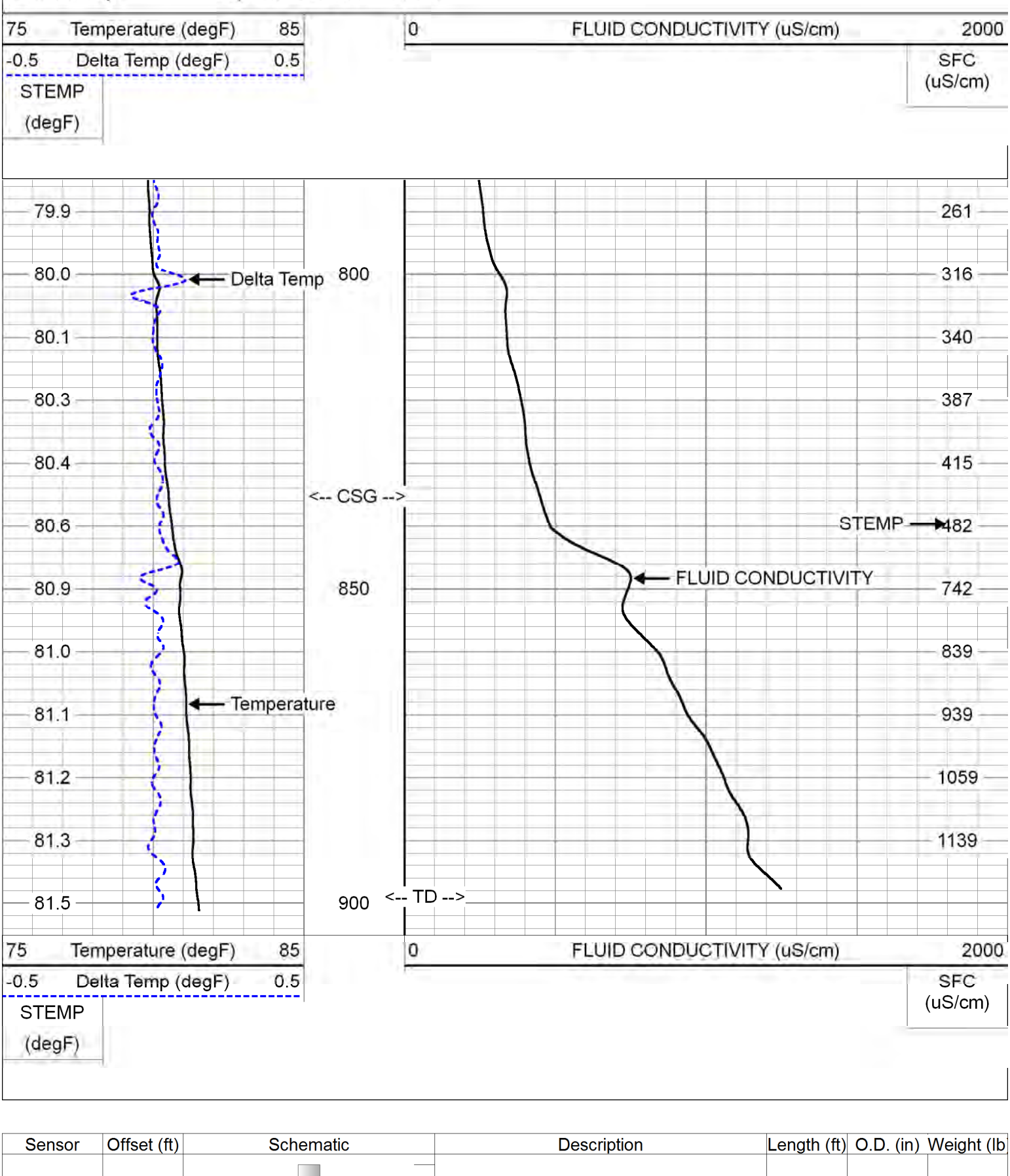
NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project

Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw7523.db
Dataset Pathname	SFCT
Presentation Format	fct-stat2
Dataset Creation	Fri Oct 02 00:20:23 2015
Charted by	Depth in Feet scaled 1:240

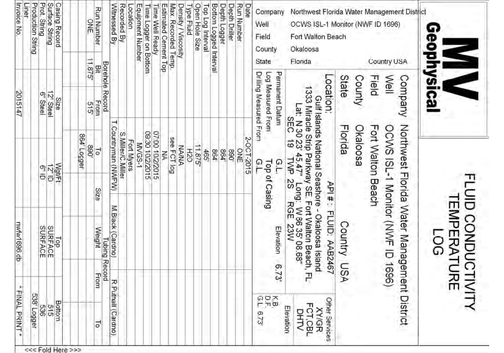


Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset:	nwfw7686.db: field/well/run1/pass4
Total length:	5.12 ft
Total weight:	20.00 lb
O.D.:	1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	Liza Jackson Park (NWF ID 7523)
Field	Fort Walton
County	Okaloosa
State	Florida
Country	USA



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Comments

A STATIC down pass was performed. No Sample Available.

FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

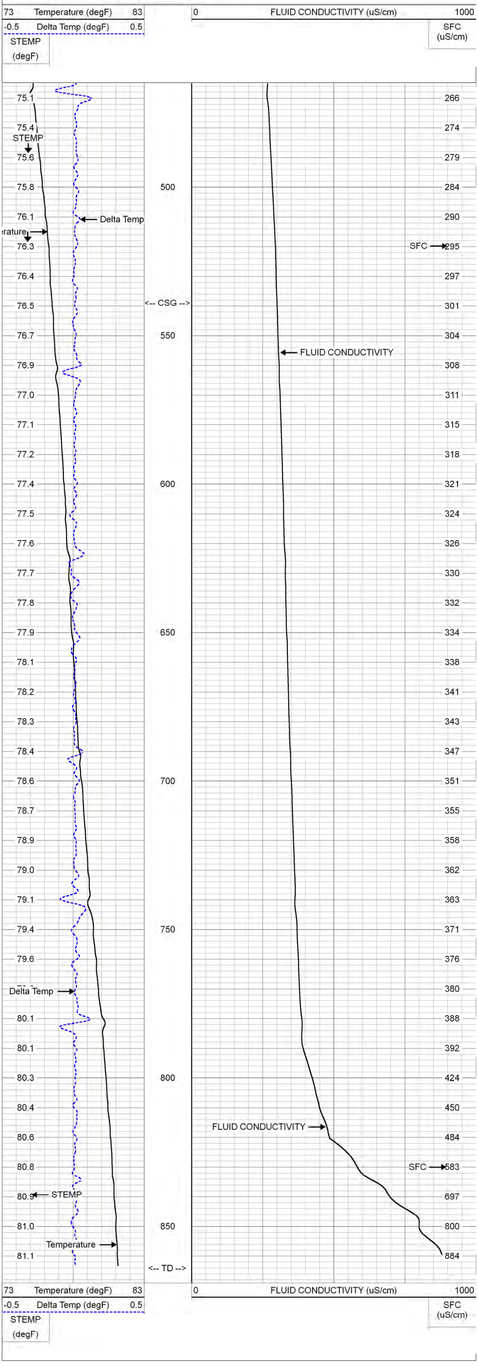
degF	CPS
38.9	147.1
143.4	2670.0

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.
Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw1696.db
Dataset Pathname	SFCT
Presentation Format	fct-stat2
Dataset Creation	Sat Oct 03 00:29:20 2015
Charted by	Depth in Feet scaled 1:240



Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset: nwfw1696.db: field/well/run1/pass1
Total length: 5.12 ft
Total weight: 20.00 lb
O.D.: 1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	OCWS ISL-1 Monitor (NWF ID 1696)
Field	Fort Walton Beach
County	Okaloosa
State	Florida Country USA

MV Geophysical

FLUID CONDUCTIVITY TEMPERATURE LOG

Company	Northwest Florida Water Management District
Well	Seagrove Shallow Floridan (NWF ID 7687)
Field	Seagrove
County	Walton
State	Florida
Country	USA

Company	Northwest Florida Water Management District
Well	Seagrove Shallow Floridan (NWF ID 7687)
Field	Seagrove
County	Walton
State	Florida
Country	USA
Location:	API # : FLUID: AAD9905
	Water Tower - near intersection of Sea Croft Drive and Sea Pond Road, Seagrove, FL Lat: N 30 21' 11.635" Long: W86 13' 19.897" SEC 2 TWP 3S RGE 20W

Other Services: DHTV, FCT

Permanent Datum	G.L.	Elevation	35.2'
Log Measured From	G.L.		
Drilling Measured From	G.L.		

Elevation: K.B. , D.F. , G.L. 35.2'

Date	2-OCT-2015
Run Number	ONE
Depth Driller	378'
Depth Logger	377'
Bottom Logged Interval	377'
Top Log Interval	245'
Open Hole Size	3.5" ?
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT down
Estimated Cement Top	NA
Time Well Ready	15:30 10/2/2015
Time Logger on Bottom	17:00 10/1/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW)

Run Number	Borehole Record Bit	From	To
ONE	3.5" ?	314'	378'
			377' Logger

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	4" Steel	4" ID	SURFACE	314'
Prot. String				
Production String				
Liner				

Run Number	Tubing Record Size	Weight	From	To

R.Putnall (Cardno)

Invoice No.	
	2015149
	nwfw7687.db
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Comments

A STATIC down pass was performed. No Sample Available.

FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

degF	CPS
38.9	147.1
143.4	2670.0

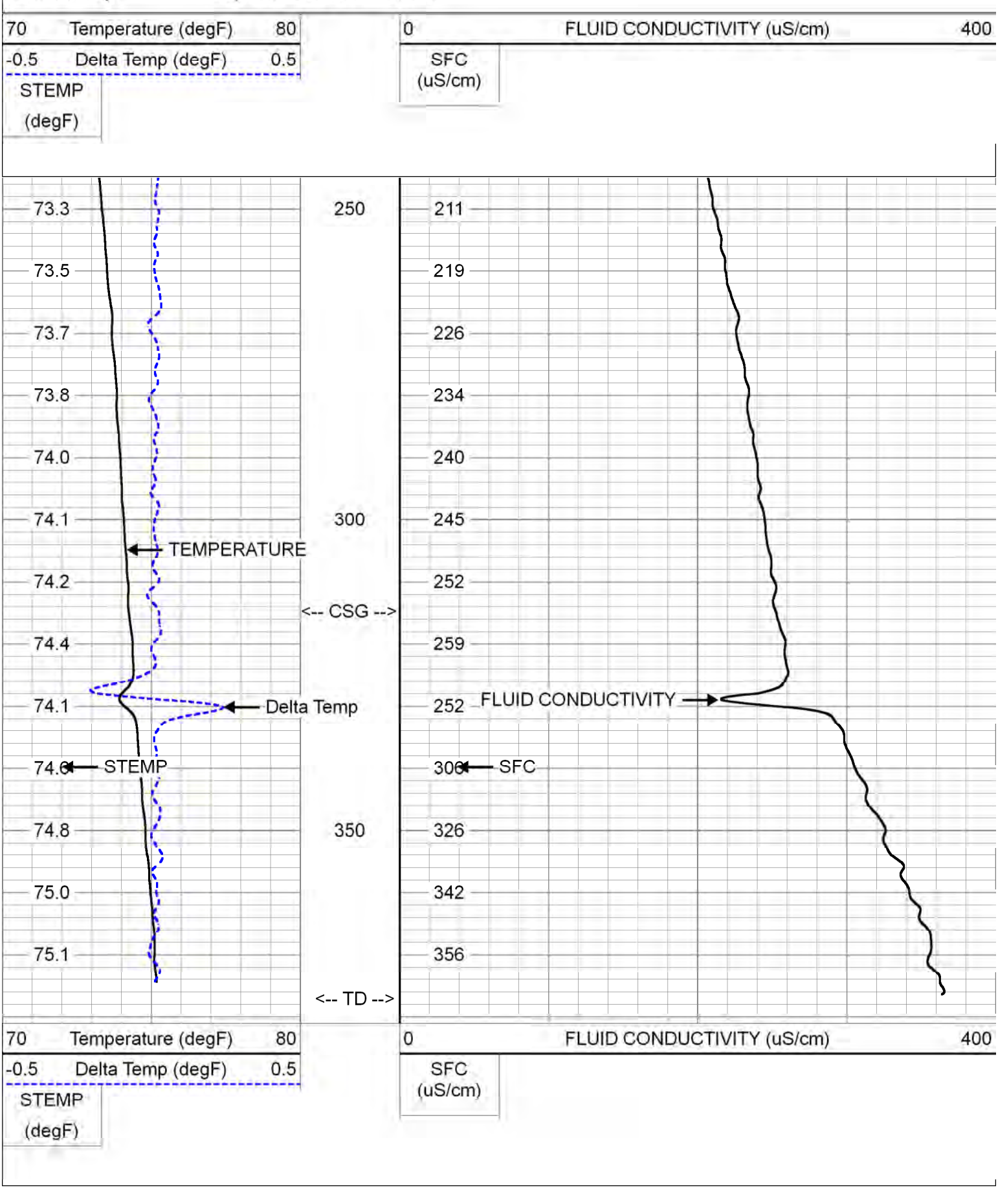
NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project

Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw7687.db
Dataset Pathname	SFCT
Presentation Format	fct-stat3
Dataset Creation	Sun Oct 11 17:37:44 2015
Charted by	Depth in Feet scaled 1:240



Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset:	nwfw7687.db: field/well/run1/pass1
Total length:	5.12 ft
Total weight:	20.00 lb
O.D.:	1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	Seagrove Shallow Floridan (NWF ID 7687)
Field	Seagrove
County	Walton
State	Florida
Country	USA

MV Geophysical

FLUID CONDUCTIVITY TEMPERATURE LOG

Company	Northwest Florida Water Management District
Well	Seagrove Deep Floridan (NWF ID 7751)
Field	Seagrove
County	Walton
State	Florida
Country	USA

Location: API # : FLUID: AAD9904
Water Tower - near intersection of
Sea Croft Drive and Sea Pond Road, Seagrove, FL
Lat: N 30 21' 11.620" Long: W 86 13' 19.366"
SEC 2 TWP 3S RGE 20W

Other Services: DHTV, FCT

		Elevation
Permanent Datum	G.L.	32'
Log Measured From	G.L.	K.B.
Drilling Measured From	G.L.	D.F.
		G.L. 32'

Date	2-OCT-2015
Run Number	ONE
Depth Driller	645'
Depth Logger	634'
Bottom Logged Interval	634'
Top Log Interval	445'
Open Hole Size	5.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT down
Estimated Cement Top	NA
Time Well Ready	17:30 10/2/2015
Time Logger on Bottom	19:00 10/1/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW) / R.Putnall (Cardno)

Borehole Record

Run Number	Bit	From	To
ONE	5.875"	539'	645'
			634' Logger

Tubing Record

Size	Wgt/Ft	Size	Weight	From	To
6" Steel	4" ID		Top SURFACE		Bottom 539'

Casing Record	
Surface String	
Prot. String	
Production String	
Liner	
Invoice No.	2015150

nwfw7751.db

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Comments

A STATIC down pass was performed. No Sample Available.

FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

degF	CPS
38.9	147.1
143.4	2670.0

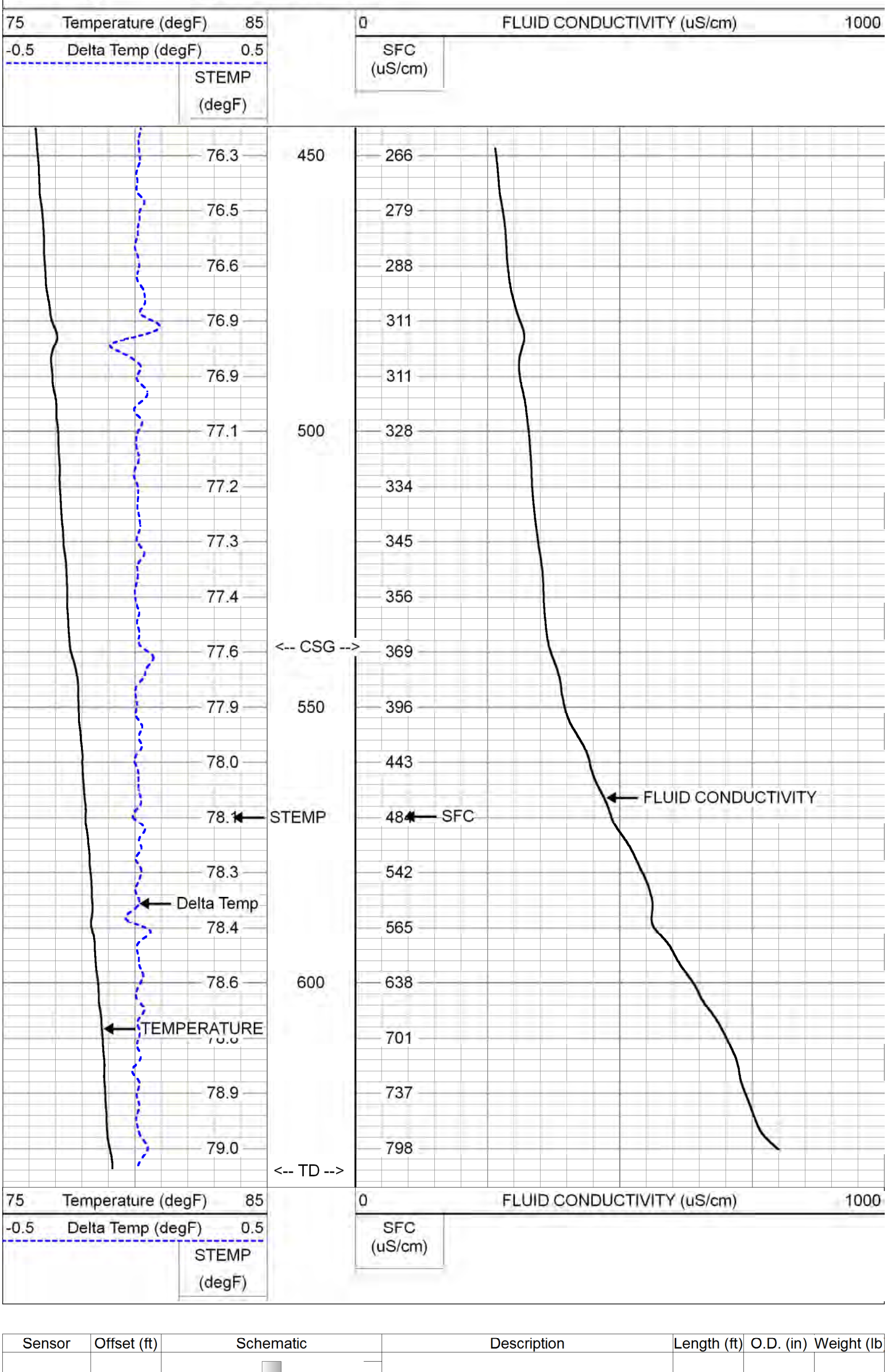
NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project

Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw7751.db
Dataset Pathname	SFCT
Presentation Format	fct-stat4
Dataset Creation	Sun Oct 11 18:21:07 2015
Charted by	Depth in Feet scaled 1:240



Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset:	nwfw7751.db: field/well/run1/pass1
Total length:	5.12 ft
Total weight:	20.00 lb
O.D.:	1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	Seagrove Deep Floridan (NWF ID 7751)
Field	Seagrove
County	Walton
State	Florida
Country	USA

MV Geophysical

FLUID CONDUCTIVITY TEMPERATURE LOG

Company	Northwest Florida Water Management District
Well	EAFB Fld #4 Well #2 (NWF ID: 3209)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida Country USA

Location: API # : FLUID: AAA0413

Eglin Air Force Base
Lat: N 30 30' 22.002" Long: W 86 35' 16.073"
SEC 18 TWP 1S RGE 23W

Other Services: XY/GR, FCT,CBL, DHTV(10/4)

Permanent Datum	G.L.	Elevation	89.33'
Log Measured From	Top of 6" Flange		K.B.
Drilling Measured From	G.L.		D.F.
			G.L. 89.33'

Date	3-OCT-2015
Run Number	ONE
Depth Driller	591'
Depth Logger	590'
Bottom Logged Interval	590'
Top Log Interval	375'
Open Hole Size	9.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT log
Estimated Cement Top	NA
Time Well Ready	12:00 10/3/2015
Time Logger on Bottom	15:30 10/3/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW)

Run Number	Borehole Record Bit	From	To
ONE	9.875"	442'	591'
			590' Logger

	Casing Record Size	Wgt/Ft	Size	Top
Surface String	10" Steel	10" ID		SURFACE
Prot. String				
Production String				
Liner				

Run Number	Tubing Record Weight	From	To
			Bottom 442'

Invoice No.	2015152
	nwfw3209.db
	* FINAL PRINT *

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Comments

A STATIC down pass was performed. No Sample Available.

FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

degF	CPS
38.9	147.1
143.4	2670.0

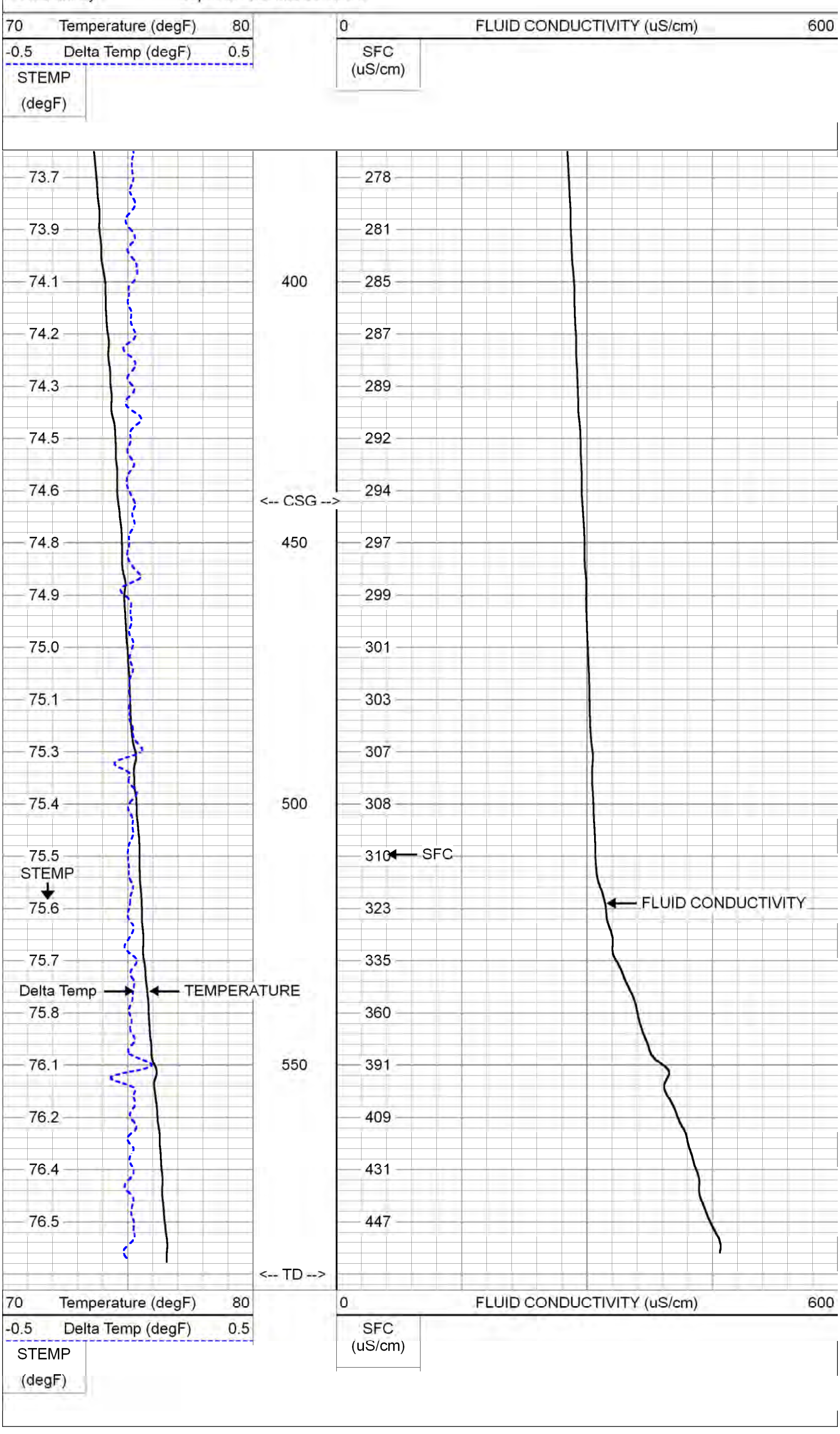
NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw3209.db
Dataset Pathname	SFCT
Presentation Format	fct-stat5
Dataset Creation	Sun Oct 11 22:01:44 2015
Charted by	Depth in Feet scaled 1:240



Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset:	nwfw3209.db: field/well/run1/pass4
Total length:	5.12 ft
Total weight:	20.00 lb
O.D.:	1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	EAFB Fld #4 Well #2 (NWF ID: 3209)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida Country USA

MV Geophysical

FLUID CONDUCTIVITY TEMPERATURE LOG

Company	Northwest Florida Water Management District
Well	EAFB Fld #4 Lowermost Floridan (NWF
Field	Eglin Air Force Base
County	Okaloosa
State	Florida Country USA

Company	Northwest Florida Water Management District
Well	EAFB Fld #4 Lowermost Floridan (NWF ID: 3210)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida Country USA
Location:	API #: FLUID: AAA0306
	Eglin Air Force Base
	Lat: N 30 30' 21.159" Long: W86 35' 15.301"
	SEC 18 TWP 1S RGE 23W

Other Services: DHTV, FCT, Hammer

		Elevation
Permanent Datum	G.L.	Elevation 88.3'
Log Measured From	G.L.	K.B.
Drilling Measured From	G.L.	D.F.
		G.L. 88.3'

Date	3-OCT-2015
Run Number	ONE
Depth Driller	1371'
Depth Logger	1128'
Bottom Logged Interval	1128
Top Log Interval	875'
Open Hole Size	3.5"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT down
Estimated Cement Top	NA
Time Well Ready	10:00 10/3/2015
Time Logger on Bottom	11:00 10/3/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW) R.Putnall (Cardno)

Borehole Record

Run Number	Bit	From	To
ONE	3.5"	938'	1371'
			1128' Logger

Tubing Record

Size	Wgt/Ft	Top	Bottom
4" Steel	4" ID	SURFACE	938'

Casing Record

Size	From	To
Surface String		
Prot. String		
Production String		
Liner		

Invoice No. 2015151 nwfw3210.db * FINAL PRINT *

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Comments

A STATIC down pass was performed. No Sample Available.

FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

degF	CPS
38.9	147.1
143.4	2670.0

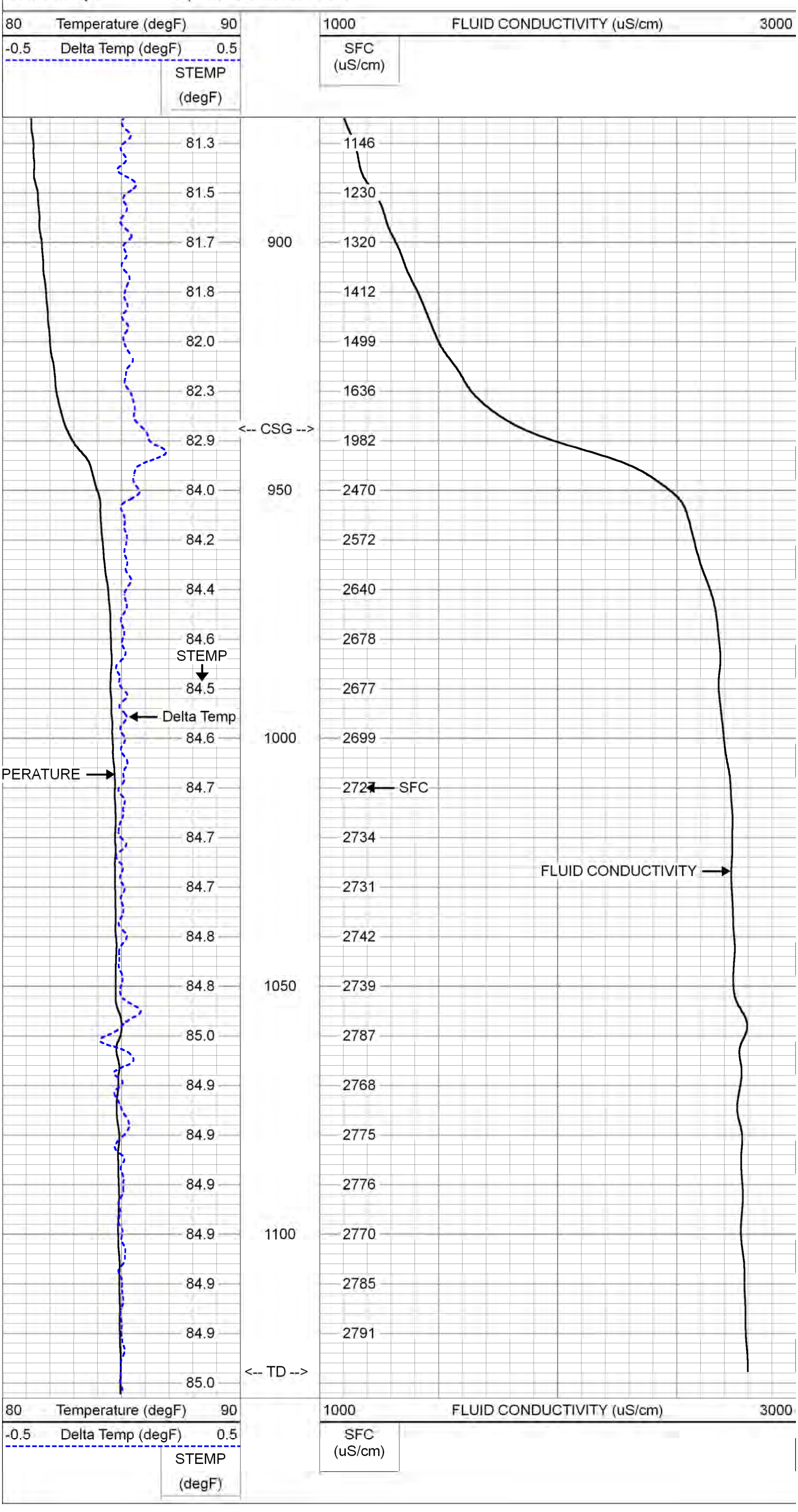
NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project

Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw3210.db
Dataset Pathname	SFCT
Presentation Format	fct-stat1
Dataset Creation	Sun Oct 11 19:30:39 2015
Charted by	Depth in Feet scaled 1:240



Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset:	nwfw3210.db: field/well/run1/pass1
Total length:	5.12 ft
Total weight:	20.00 lb
O.D.:	1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	EAFB Fld #4 Lowermost Floridan (NWF ID: 3210)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida Country USA

MV Geophysical

FLUID CONDUCTIVITY TEMPERATURE LOG

Company	Northwest Florida Water Management District
Well	EAFB NR Camp Rucker (NWF ID: 2993)
Field	Eglin Air Force Base
County	Walton
State	Florida
Country	USA

Company Northwest Florida Water Management District
Well EAFB NR Camp Rucker (NWF ID: 2993)
Field Eglin Air Force Base
County Walton
State Florida Country USA

Location: API # : FLUID: AAA0564
Eglin Air Force Base
Camp Rucker
Lat: N 30 28' 53.880" Long: W 86 18' 33.796"
SEC 24 TWP 1S RGE 21W

Other Services: FCT,CBL XY/GR DHTV

			Elevation
Permanent Datum	G.L.	Elevation 18.2'	K.B.
Log Measured From	G.L.		D.F.
Drilling Measured From	G.L.		G.L. 18.2'

Date	4-OCT-2015
Run Number	ONE
Depth Driller	880'
Depth Logger	224'
Bottom Logged Interval	224'
Top Log Interval	SURFACE
Open Hole Size	5.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT log
Estimated Cement Top	NA
Time Well Ready	16:00 10/4/2015
Time Logger on Bottom	16:15 10/4/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW) R.Putnall (Cardno)

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To
ONE	5.875"	201'	880'				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	6" Steel	6" ID	SURFACE	201'
Prot. String				
Production String				
Liner				

Invoice No. 2015156 nwfw2993.db * FINAL PRINT *

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Comments

A STATIC down pass was performed. No Sample Available.
FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

degF	CPS
38.9	147.1
143.4	2670.0

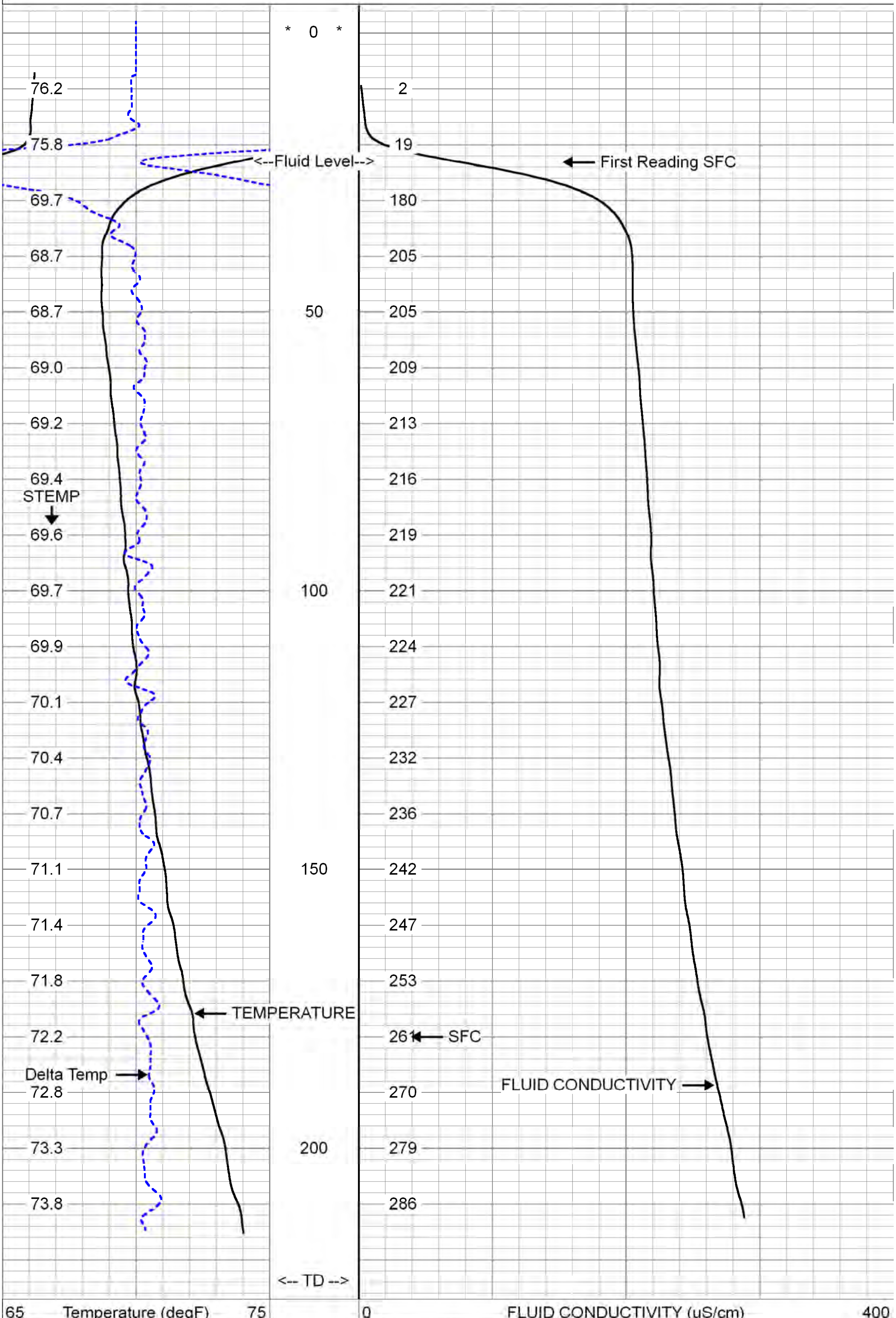
NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project
Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw2993.db
Dataset Pathname	SFCT
Presentation Format	fct-stat6
Dataset Creation	Mon Oct 12 02:25:17 2015
Charted by	Depth in Feet scaled 1:240

65 Temperature (degF) 75 | 0 FLUID CONDUCTIVITY (uS/cm) 400
-0.5 Delta Temp (degF) 0.5 | SFC (uS/cm)
STEMP (degF)



65 Temperature (degF) 75 | 0 FLUID CONDUCTIVITY (uS/cm) 400
-0.5 Delta Temp (degF) 0.5 | SFC (uS/cm)
STEMP (degF)

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset: nwfw2994.db: field/well/run1/pass2
Total length: 5.12 ft
Total weight: 20.00 lb
O.D.: 1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	EAFB NR Camp Rucker (NWF ID: 2993)
Field	Eglin Air Force Base
County	Walton
State	Florida
Country	USA

MV Geophysical

FLUID CONDUCTIVITY TEMPERATURE LOG

Company	Northwest Florida Water Management District
Well	EAFB Post'l Point (NWF ID: 2994)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida Country USA

Company	Northwest Florida Water Management District
Well	EAFB Post'l Point (NWF ID: 2994)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida Country USA
Location:	API # : FLUID: AAA0418
	Eglin Air Force Base
	Post'l Point Recreation Area
	Lat: N 30 28' 57.688" Long: W 86 28' 54.479"
	SEC 19 TWP 1S RGE 22W

Other Services: XY/GR, FCT, DHTV

Permanent Datum	G.L.	Elevation 7.54'
Log Measured From	G.L.	
Drilling Measured From	G.L.	

Elevation: K.B. , D.F. , G.L. 7.54'

Date	4-OCT-2015
Run Number	ONE
Depth Driller	510'
Depth Logger	293'
Bottom Logged Interval	293'
Top Log Interval	SURFACE
Open Hole Size	5.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT log
Estimated Cement Top	NA
Time Well Ready	12:00 10/4/2015
Time Logger on Bottom	15:30 10/4/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW)

Borehole Record				
Run Number	Bit	From	To	
ONE	5.875"	300'	510'	

Tubing Record				
	Size	Wgt/Ft	Top	Bottom
Casing Record				
Surface String	6" Steel	6" ID	SURFACE	300'
Prot. String				
Production String				
Liner				

Invoice No. 2015153 nwfw2994.db * FINAL PRINT *

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Comments

A STATIC down pass was performed. No Sample Available.

FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

degF	CPS
38.9	147.1
143.4	2670.0

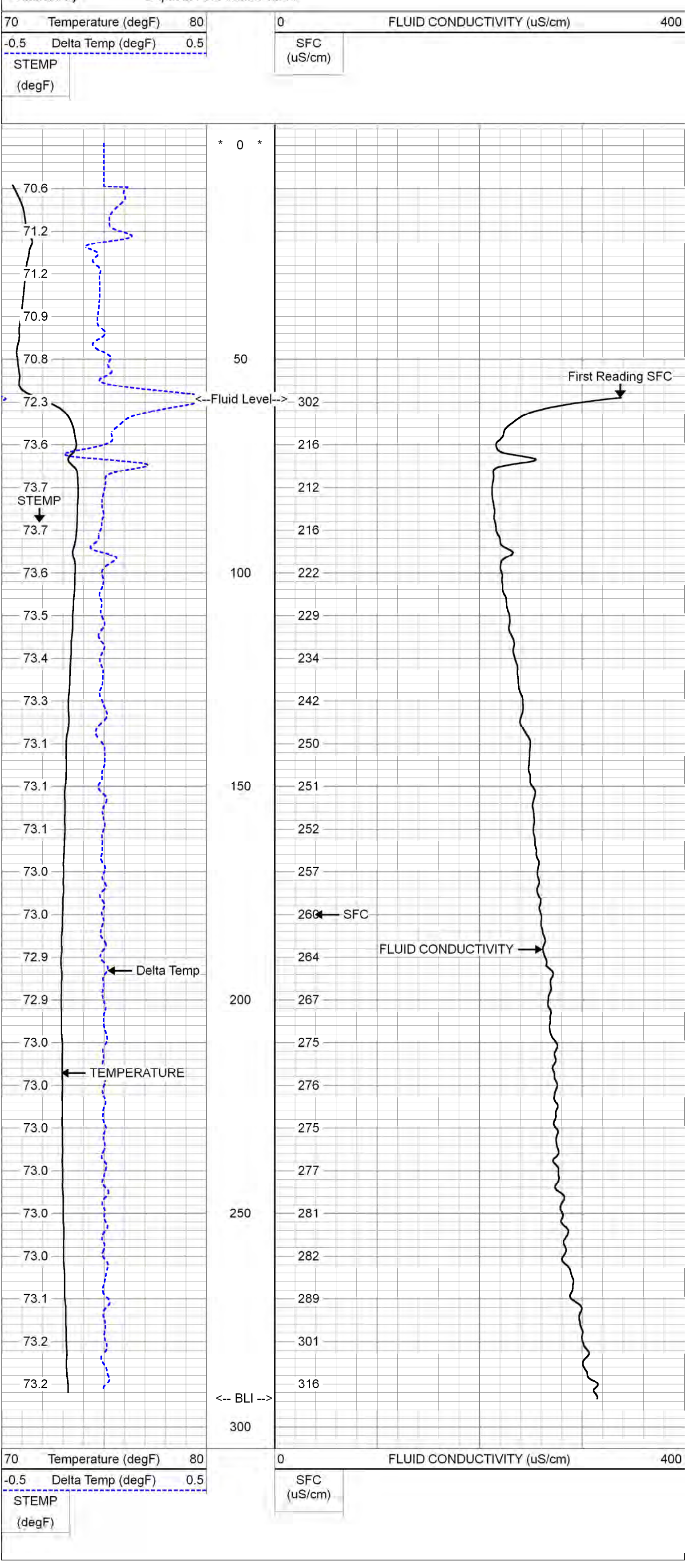
NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project

Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw2994.db
Dataset Pathname	SFCT
Presentation Format	fct-stat3
Dataset Creation	Mon Oct 12 00:51:27 2015
Charted by	Depth in Feet scaled 1:240



Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset:	nwfw2994.db: field/well/run1/pass2
Total length:	5.12 ft
Total weight:	20.00 lb
O.D.:	1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	EAFB Post'l Point (NWF ID: 2994)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida Country USA

MV Geophysical

FLUID CONDUCTIVITY TEMPERATURE LOG

Company	Northwest Florida Water Management District
Well	West Hewett Floridan (NWF ID: 1376)
Field	Topsail Hill Preserve
County	Walton
State	Florida
Country	USA

Company	Northwest Florida Water Management District
Well	West Hewett Floridan (NWF ID: 1376)
Field	Topsail Hill Preserve
County	Walton
State	Florida
Country	USA
Location:	API # : FLUID: AAA0564
	Topsail Hill Preserve
	Lat: N 30 23' 23.541" Long: W 86 17' 17.128"
	SEC 31 TWP 2S RGE 20W

Other Services: DHTV FCT,CBL XY/GR

Permanent Datum	G.L.	Elevation 18'	K.B.
Log Measured From	G.L.		D.F.
Drilling Measured From	G.L.		G.L. 18'

Elevation

Date	5-OCT-2015
Run Number	ONE
Depth Driller	725'
Depth Logger	720'
Bottom Logged Interval	720'
Top Log Interval	465'
Open Hole Size	3.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT log
Estimated Cement Top	NA
Time Well Ready	08:00 10/5/2015
Time Logger on Bottom	09:00 10/5/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW)

Run Number	Borehole Record Bit	From	To
ONE	3.875"	550'	725'
		546' Logger	720' Logger

	Size	Wgt/Ft	Top
Casing Record	6" Steel	6" ID	SURFACE
Surface String	4" Steel	4" ID	273'
Prot. String			
Production String			
Liner			

Size	Tubing Record Weight	From	To

	Bottom
	285'
	550'
	546' Logger

Invoice No. 2015157 nwfw1376.db * FINAL PRINT *

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Comments

A STATIC down pass was performed. No Sample Available.

FLUID CONDUCTIVITY CALIBRATION REPORT (Performed: 9-SEP-2015, 09:15)

uS/cm	CPS
1,221.3	2551.6
22,100.2	1926.8
125,000	1503.8

TEMPERATURE CALIBRATION REPORT (Performed: 9-SEP-2015, 09:45)

degF	CPS
38.9	147.1
143.4	2670.0

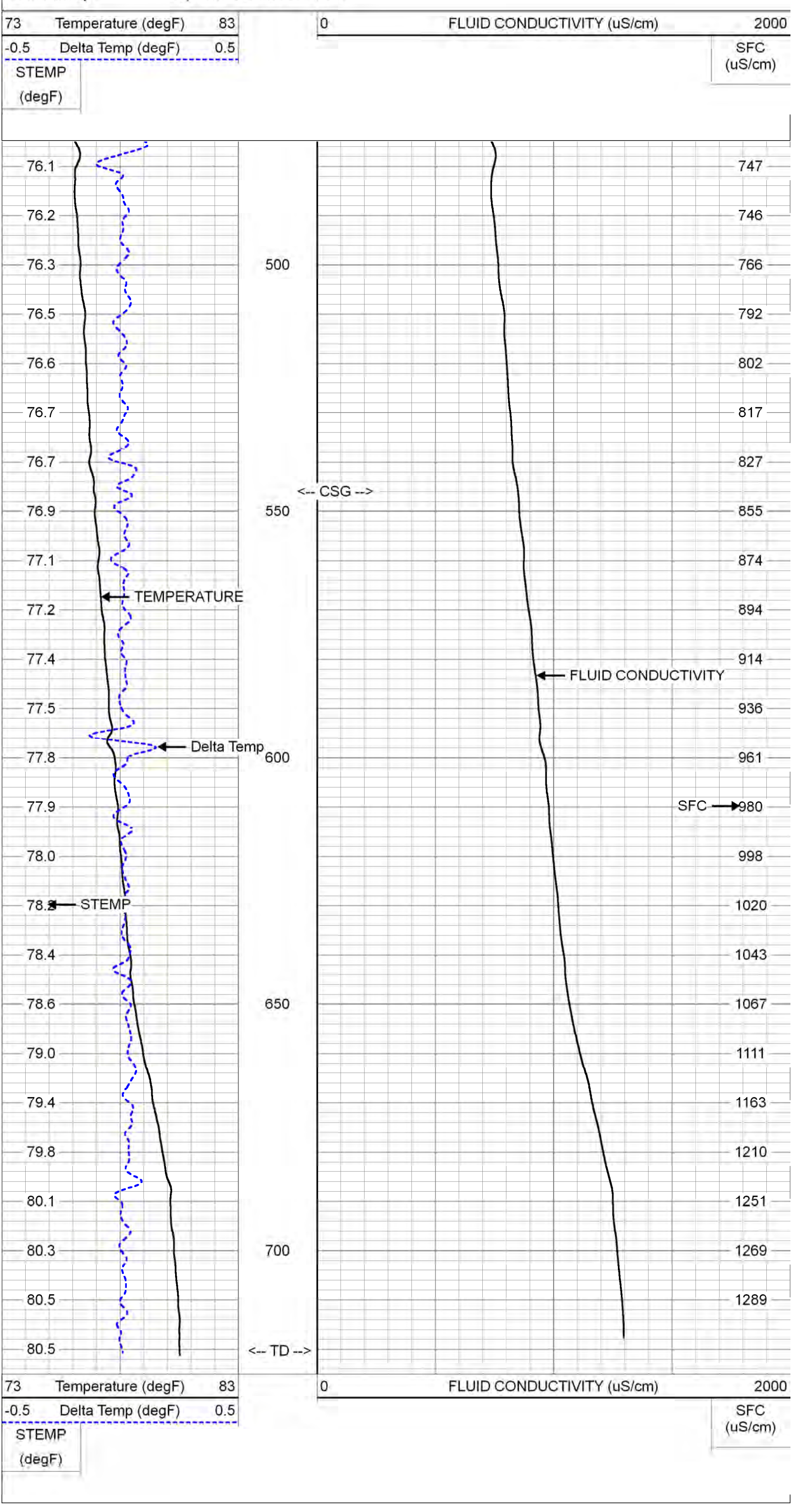
NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project

Hydro Firm: Cardno Drilling Contractor: Rowe Drilling Company

MV Geophysical

Static FCT Down

Database File	nwfw1376.db
Dataset Pathname	SFCT
Presentation Format	fct-stat2
Dataset Creation	Mon Oct 12 04:32:31 2015
Charted by	Depth in Feet scaled 1:240



Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb
CCL	4.46		CCL-MVGS 1.9 (RTS-CCL-1)	1.33	1.90	8.00
			GR #2 -RTSB (MV01B)	3.33	1.90	10.00
GR#2	1.15					
TEMP	0.10		TEMP-RTS (MV01)	0.46	1.90	2.00

Dataset:	nwfw1376.db: field/well/run1/pass1
Total length:	5.12 ft
Total weight:	20.00 lb
O.D.:	1.90 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	West Hewett Floridan (NWF ID: 1376)
Field	Topsail Hill Preserve
County	Walton
State	Florida
Country	USA

Planning Region II Video and Geophysical Logging

APPENDIX C

CEMENT BOND LOGS

CEMENT BOND w/VARIABLE DENSITY LOG

MV Geophysical

Company	Northwest Florida Water Management District
Well	OCWS ISL-1 Monitor (NWF ID 1696)
Field	Fort Walton Beach
County	Okaloosa
State	Florida
Country	USA

Location: API #: FLUID: AAB2467
Gulf Islands National Seashore - Okaloosa Island
1333 Miracle Strip Parkway SE, Fort Walton Beach, FL
Lat: N 30 23' 45.47" Long: W 86 35' 08.68"
SEC 19 TWP 2S RGE 23W

Other Services: XY/GR, FCT,CBL, DHTV

Permanent Datum	G.L.	Elevation 6.73'	Elevation: K.B. / D.F. / G.L. 6.73'
Log Measured From	Top of Casing		
Drilling Measured From	G.L.		

Date	2-OCT-2015
Run Number	ONE
Depth Driller	890'
Depth Logger	864'
Bottom Logged Interval	538'
Top Log Interval	68.5'
Open Hole Size	11.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT down
Estimated Cement Top	NA
Time Well Ready	07:00 10/2/2015
Time Logger on Bottom	11:00 10/2/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW), M.Black (Cardno), R.Putnall (Cardno)

Borehole Record				Tubing Record			
Run Number	Bit	From	To	Size	Weight	From	To
ONE	11.875"	515'	890'				
			864' Logger				

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	12" Steel	12" ID	SURFACE	515'
Prot. String	6" Steel	6" ID	SURFACE	536'
Production String				538' Logger
Liner				
Invoice No.	2015147	2x/15x/pdf/las	nwfw1696.db	* FIELD PRINT *

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Comments

CBL Sonic tool was run centralized.

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

Hydro Firm: Cardno

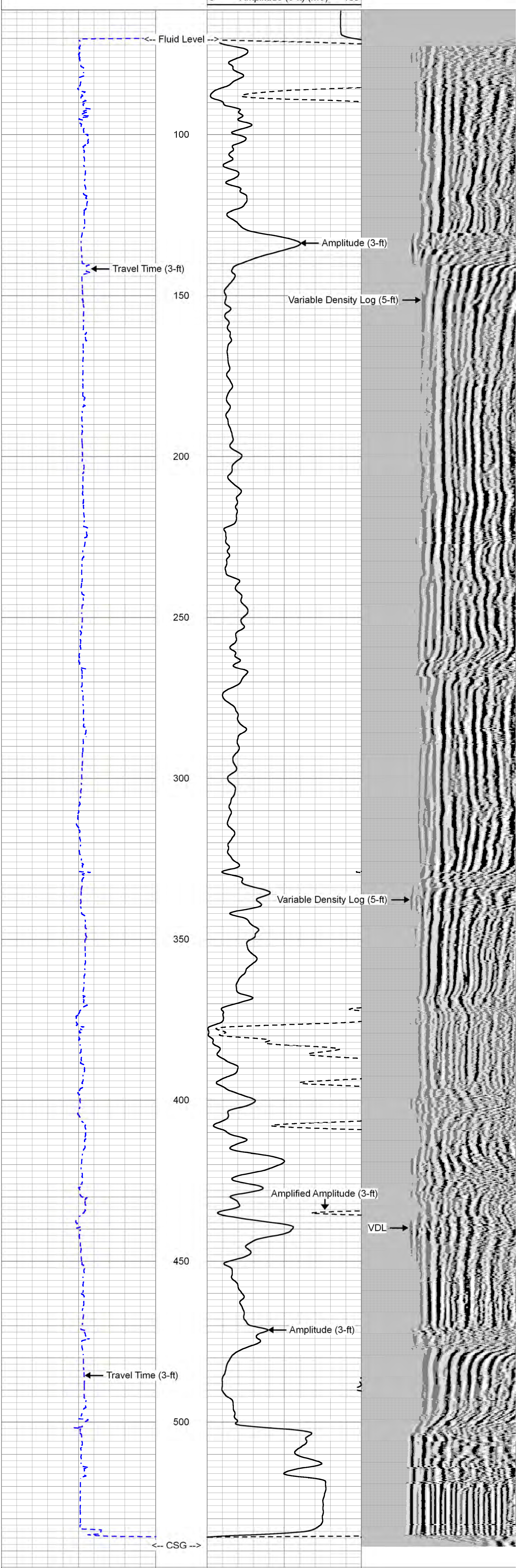
Drilling Contractor: Rowe Drilling Company

MV Geophysical

MAIN PASS

Database File	nwfw1696.db
Dataset Pathname	MCBL
Presentation Format	cbl6
Dataset Creation	Fri Oct 02 22:51:45 2015
Charted by	Depth in Feet scaled 1:240

200 Travel Time (3-ft) (usec) 600 | Amplified Amplitude (3-ft) 0 (mV) 10 | 0 Amplitude (3-ft) (mV) 100 | Variable Density Log (5-ft) 200 1200



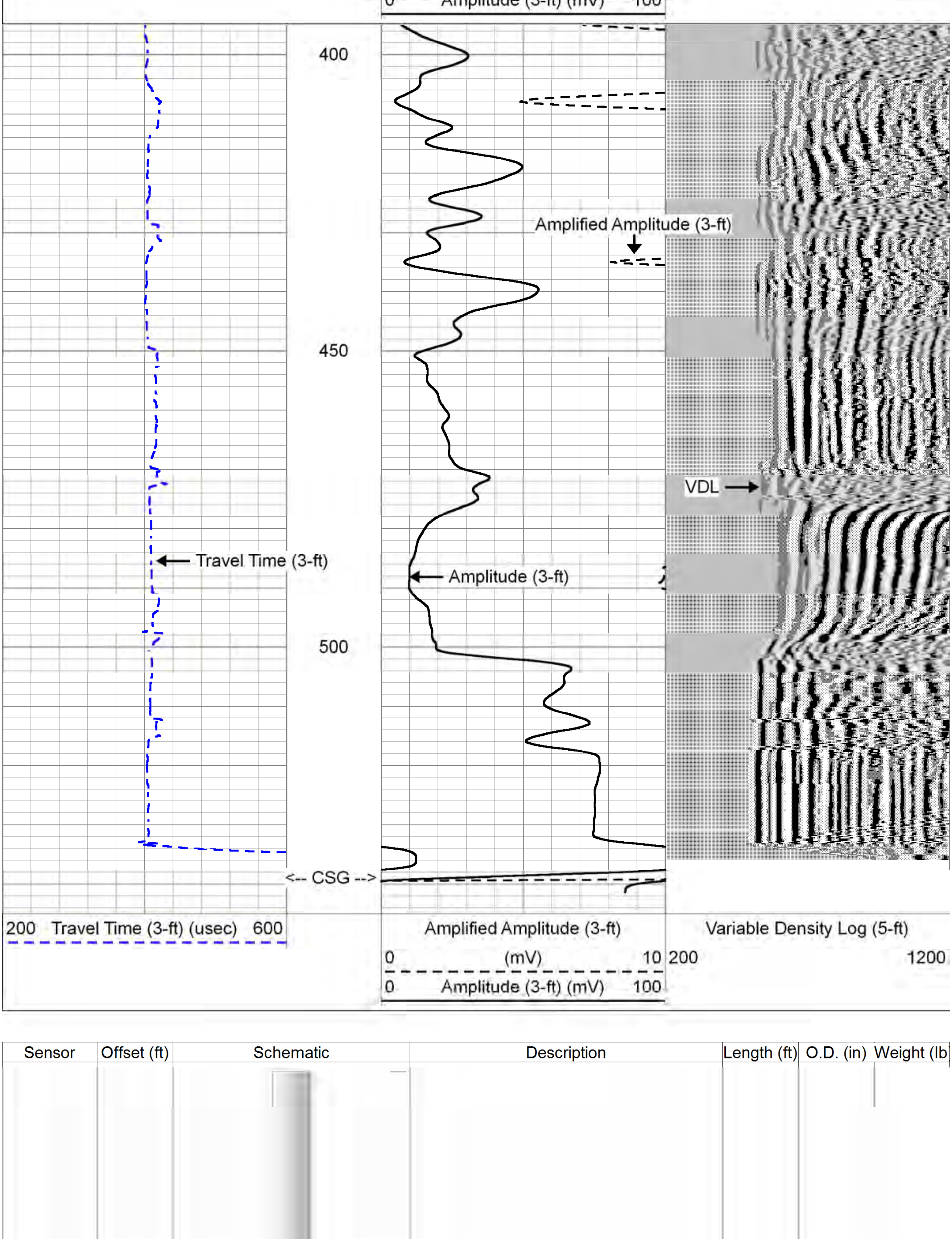
200 Travel Time (3-ft) (usec) 600 | Amplified Amplitude (3-ft) 0 (mV) 10 | 0 Amplitude (3-ft) (mV) 100 | Variable Density Log (5-ft) 200 1200

MV Geophysical

REPEAT SECTION

Database File	nwfw1696.db
Dataset Pathname	RCBL
Presentation Format	cbl6
Dataset Creation	Fri Oct 02 23:40:39 2015
Charted by	Depth in Feet scaled 1:240

200 Travel Time (3-ft) (usec) 600 | Amplified Amplitude (3-ft) 0 (mV) 10 | 0 Amplitude (3-ft) (mV) 100 | Variable Density Log (5-ft) 200 1200



200 Travel Time (3-ft) (usec) 600 | Amplified Amplitude (3-ft) 0 (mV) 10 | 0 Amplitude (3-ft) (mV) 100 | Variable Density Log (5-ft) 200 1200

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
WVF3 WVF1	8.50 8.50		SLT-GO (245)	16.00	3.50	127.00
WVF4 WVF2	6.50 6.50					

Dataset:	nwfw1696.db: field/well/run1/pass8
Total length:	16.00 ft
Total weight:	127.00 lb
O.D.:	3.50 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	OCWS ISL-1 Monitor (NWF ID 1696)
Field	Fort Walton Beach
County	Okaloosa
State	Florida
Country	USA

CEMENT BOND W/VARIABLE DENSITY LOG

MV Geophysical

Company	Northwest Florida Water Management District
Well	EAFB Fld #4 Well #2 (NWF ID: 3209)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida
Country	USA

Location: API # : FLUID: AAA0413

Eglin Air Force Base
Lat: N 30 30' 22.002" Long: W 86 35' 16.073"
SEC 18 TWP 1S RGE 23W

Other Services: XY/GR, FCT,CBL, DHTV(10/4)

Permanent Datum	G.L.	Elevation	89.33'
Log Measured From	Top of 6" Flange		
Drilling Measured From	G.L.		

Elevation: K.B. / D.F. / G.L. 89.33'

Date	3-OCT-2015
Run Number	ONE
Depth Driller	591'
Depth Logger	590'
Bottom Logged Interval	442'
Top Log Interval	120'
Open Hole Size	9.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT log
Estimated Cement Top	NA
Time Well Ready	12:00 10/3/2015
Time Logger on Bottom	16:00 10/3/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW) / R.Putnall (Cardno)

Borehole Record

Run Number	Bit	From	To
ONE	9.875"	442'	591'
			590' Logger

Tubing Record

Size	Weight	From	To

Casing Record	Size	Wgt/Ft	Top	Bottom
Surface String	10" Steel	10" ID	SURFACE	442'
Prot. String				
Production String				
Liner				

Invoice No. 2015152 nwfw3209.db * FINAL PRINT *

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Comments

CBL Sonic tool was run centralized.

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

Hydro Firm: Cardno

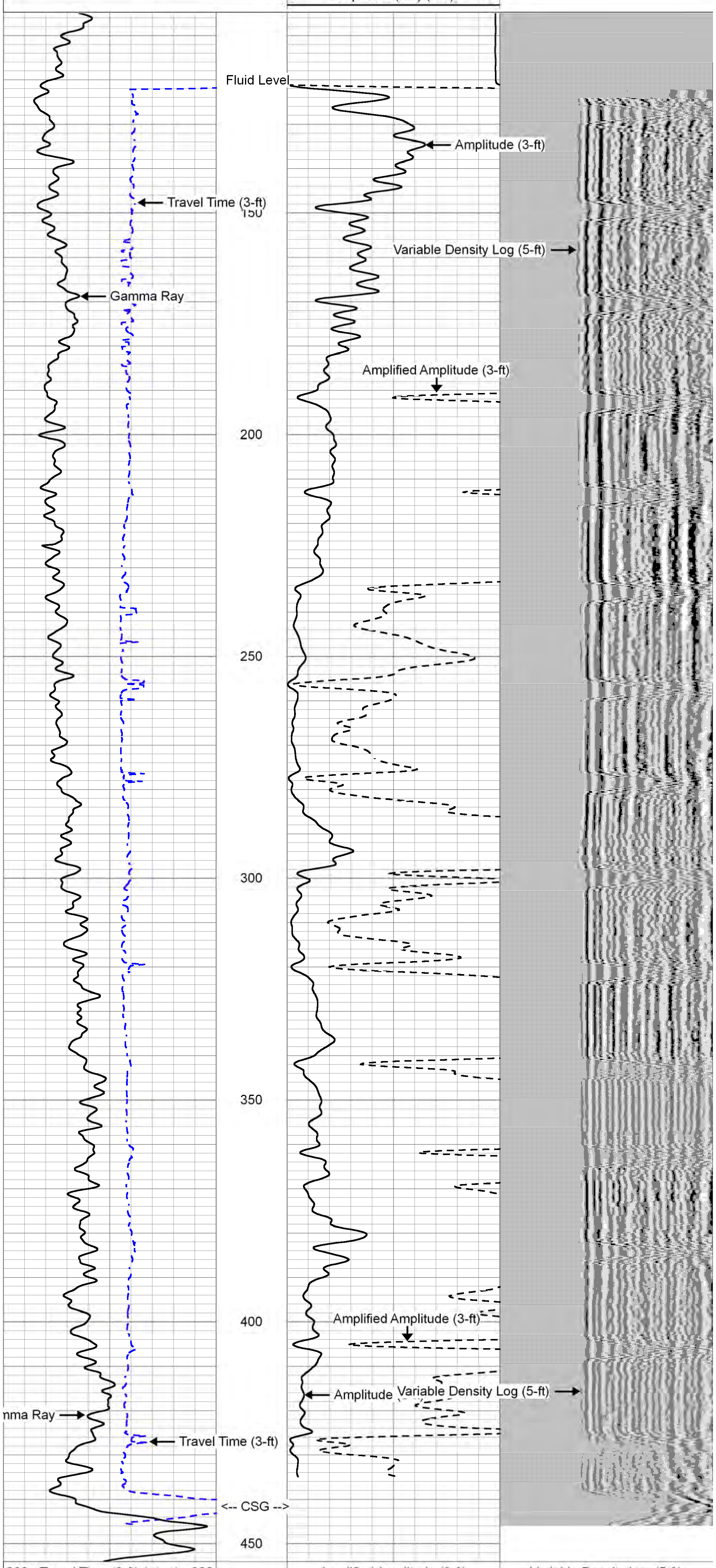
Drilling Contractor: Rowe Drilling Company

MV Geophysical

MAIN PASS

Database File	nwfw3209.db
Dataset Pathname	MCBL
Presentation Format	cbl6
Dataset Creation	Sun Oct 11 23:00:37 2015
Charted by	Depth in Feet scaled 1:240

200 Travel Time (3-ft) (usec) 600 | 0 Gamma Ray (GAPI) 100 | Amplified Amplitude (3-ft) | 0 (mV) 10 | 0 Amplitude (3-ft) (mV) 100 | Variable Density Log (5-ft) 200 1200



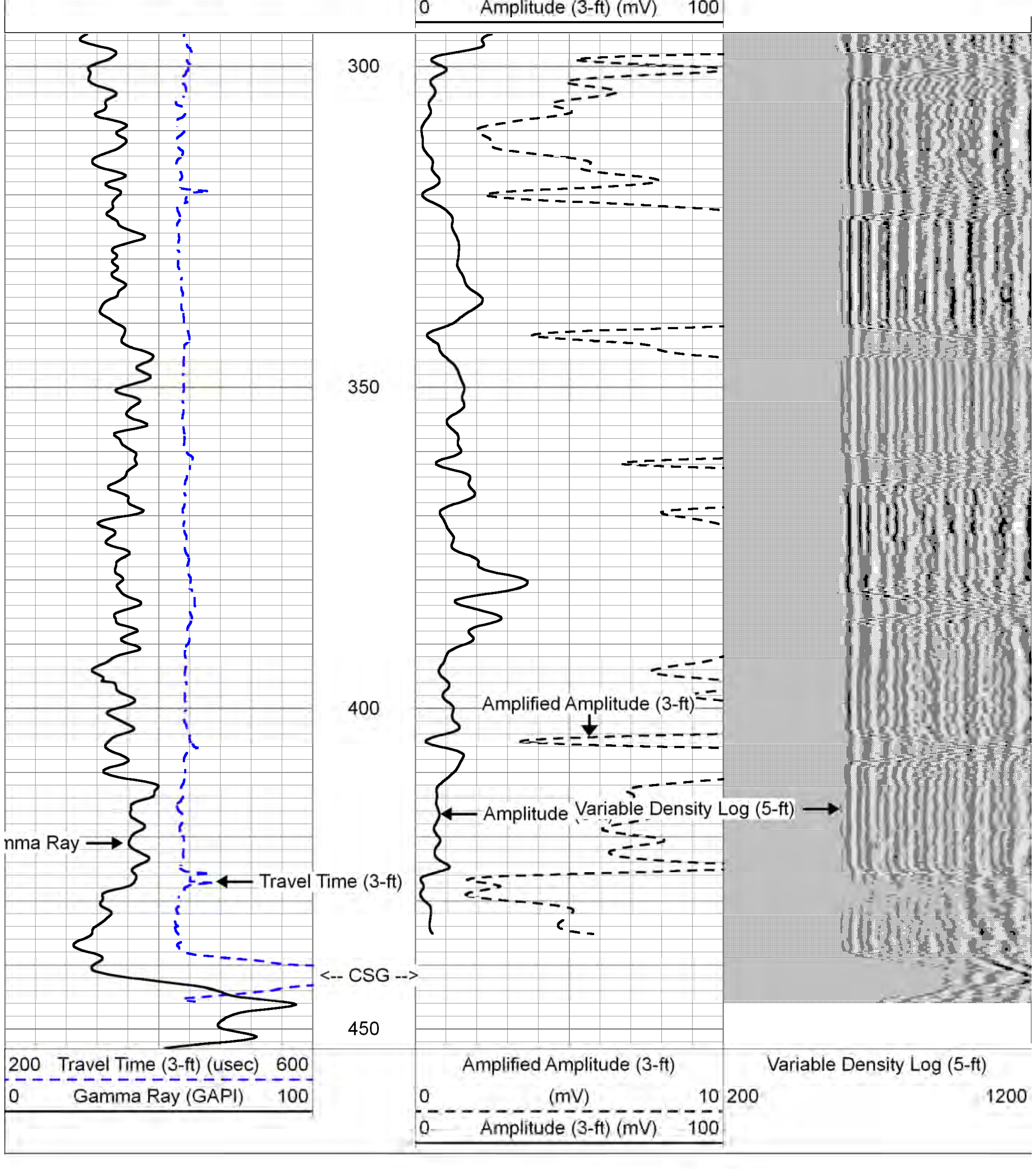
200 Travel Time (3-ft) (usec) 600 | 0 Gamma Ray (GAPI) 100 | Amplified Amplitude (3-ft) | 0 (mV) 10 | 0 Amplitude (3-ft) (mV) 100 | Variable Density Log (5-ft) 200 1200

MV Geophysical

REPEAT SECTION

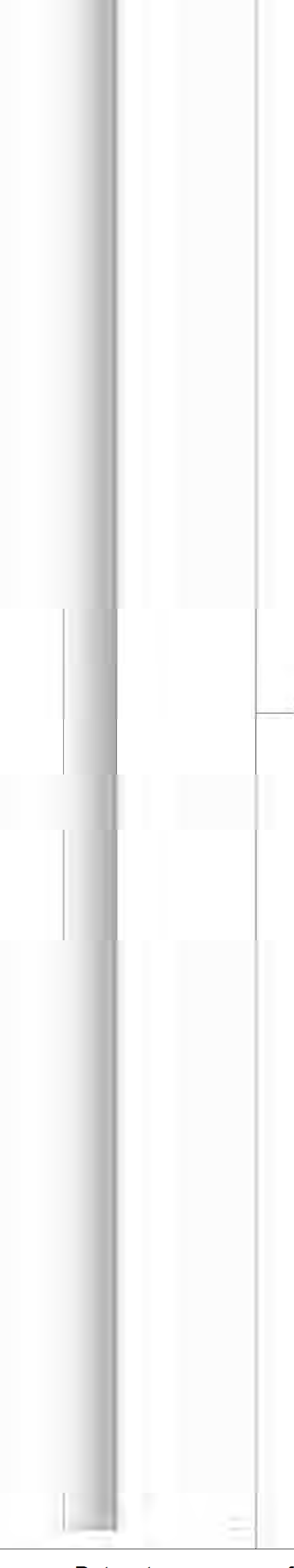
Database File	nwfw3209.db
Dataset Pathname	RCBL
Presentation Format	cbl6
Dataset Creation	Sun Oct 11 23:04:34 2015
Charted by	Depth in Feet scaled 1:240

200 Travel Time (3-ft) (usec) 600 | 0 Gamma Ray (GAPI) 100 | Amplified Amplitude (3-ft) | 0 (mV) 10 | 0 Amplitude (3-ft) (mV) 100 | Variable Density Log (5-ft) 200 1200



200 Travel Time (3-ft) (usec) 600 | 0 Gamma Ray (GAPI) 100 | Amplified Amplitude (3-ft) | 0 (mV) 10 | 0 Amplitude (3-ft) (mV) 100 | Variable Density Log (5-ft) 200 1200

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
WVF3	8.50		SLT-GO (245)	16.00	3.50	127.00
WVF1	8.50					
WVF4	6.50					
WVF2	6.50					



Dataset: nwfw3209.db: field/well/run1/pass12
Total length: 16.00 ft
Total weight: 127.00 lb
O.D.: 3.50 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	EAFB Fld #4 Well #2 (NWF ID: 3209)
Field	Eglin Air Force Base
County	Okaloosa
State	Florida
Country	USA

MV Geophysical

CEMENT BOND w/VARIABLE DENSITY LOG

Company	Northwest Florida Water Management District
Well	EAFB NR Camp Rucker (NWF ID: 2993)
Field	Eglin Air Force Base
County	Walton
State	Florida
Country	USA
Location:	API # : FLUID: AAA0564
	Eglin Air Force Base
	Camp Rucker
	Lat: N 30 28' 53.880" Long: W 86 18' 33.796"
	SEC 24 TWP 1S RGE 21W
Permanent Datum	G.L. Elevation 18.2'
Log Measured From	G.L. 18.2' Above Perm. Datum
Drilling Measured From	G.L.

Other Services: FCT,CBL XY/GR DHTV

Elevation: K.B. D.F. G.L. 18.2'

Date	4-OCT-2015
Run Number	ONE
Depth Driller	880'
Depth Logger	224'
Bottom Logged Interval	201'
Top Log Interval	23'
Open Hole Size	5.875"
Type Fluid	H2O
Density / Viscosity	NA/NA
Max. Recorded Temp.	see FCT log
Estimated Cement Top	NA
Time Well Ready	16:00 10/4/2015
Time Logger on Bottom	16:45 10/4/2015
Equipment Number	MVGS-1
Location	Fort Myers
Recorded By	S.Miller/C.Miller
Witnessed By	T.Countryman (NWFW)

Borehole Record

Run Number	Bit	From	To
ONE	5.875"	201'	880'

Casing Record

	Size	Wgt/Ft	Top
Surface String	6" Steel	6" ID	SURFACE
Prot. String			
Production String			
Liner			

Tubing Record

Size	Weight	From	To
R.Putnall (Cardno)			

Invoice No.	2015156

Bottom: 201

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Comments

CBL Sonic tool was run centralized.

NWFWMD's Saltwater Intrusion Minimum Aquifer Level Establishment for Planning Region II Project.

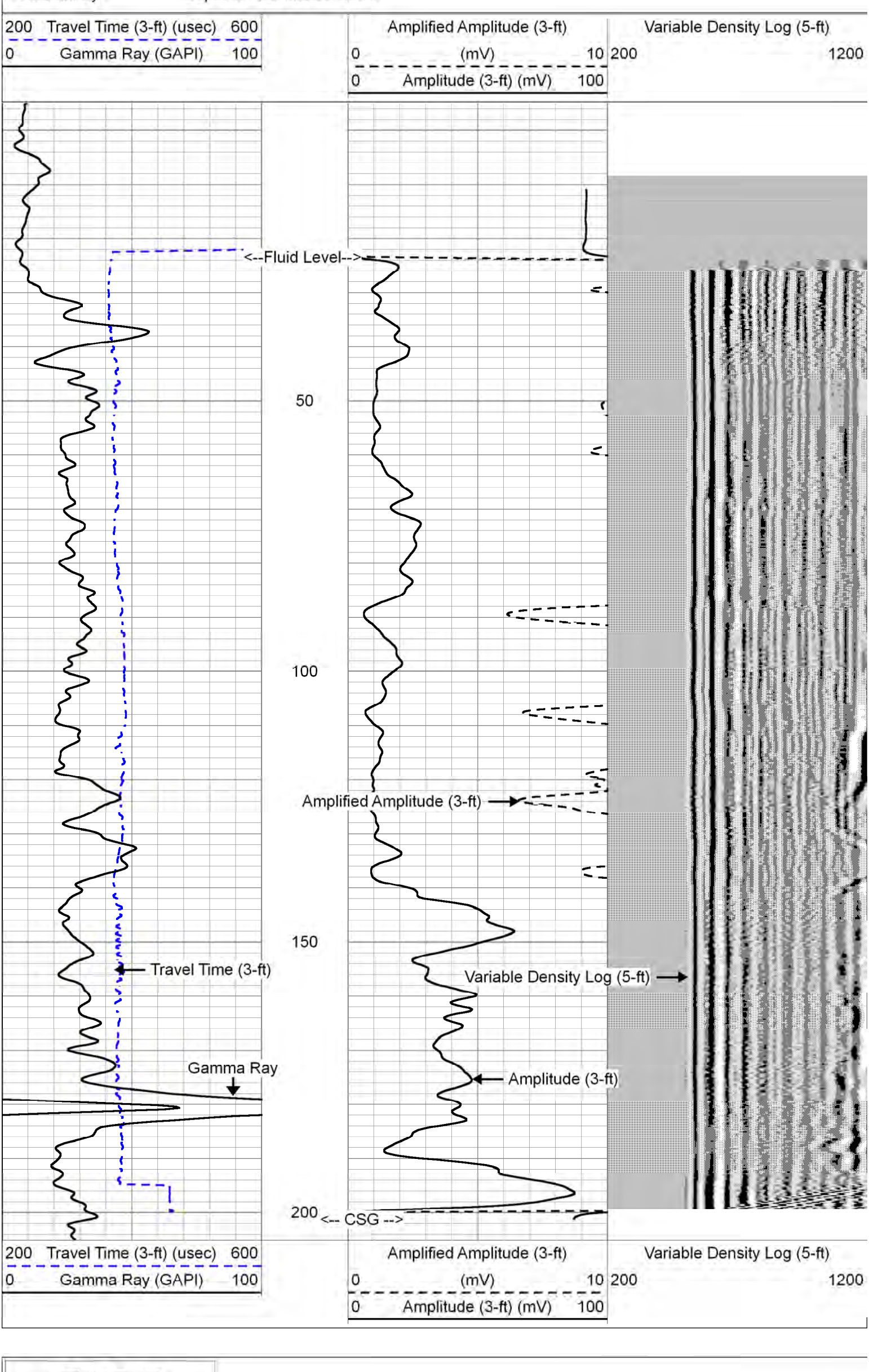
Hydro Firm: Cardno

Drilling Contractor: Rowe Drilling Company

MV Geophysical

MAIN PASS

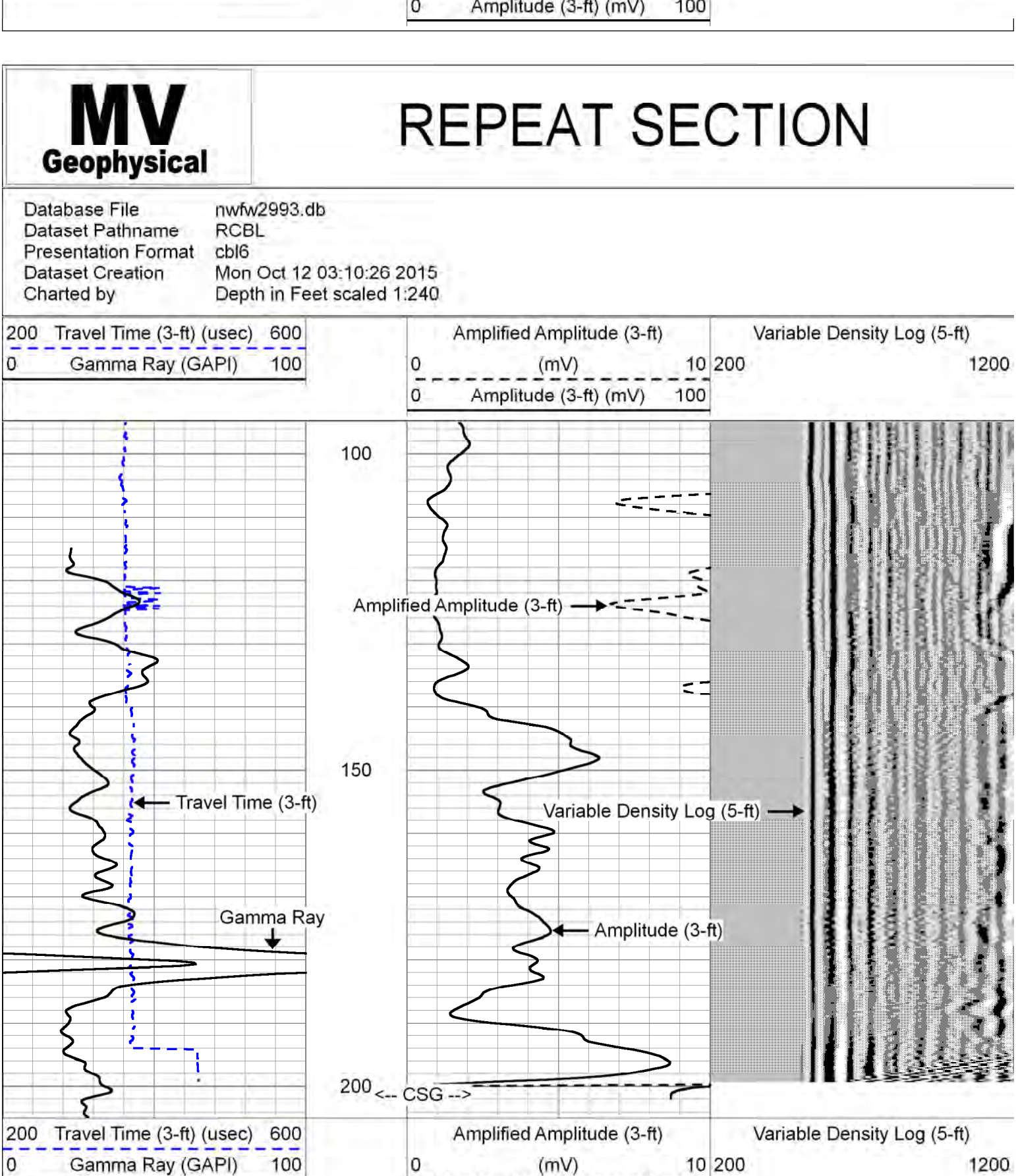
Database File	nwfw2993.db
Dataset Pathname	MCBL
Presentation Format	cbl6
Dataset Creation	Mon Oct 12 03:09:26 2015
Charted by	Depth in Feet scaled 1:240



MV Geophysical

REPEAT SECTION

Database File	nwfw2993.db
Dataset Pathname	RCBL
Presentation Format	cbl6
Dataset Creation	Mon Oct 12 03:10:26 2015
Charted by	Depth in Feet scaled 1:240



Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
GR	1.00		GR-GROH (01)	2.75	3.50	40.00

Dataset:	nwfw2994.db: field/well/run1/pass4
Total length:	2.75 ft
Total weight:	40.00 lb
O.D.:	3.50 in

MV Geophysical

Company	Northwest Florida Water Management District
Well	EAFB NR Camp Rucker (NWF ID: 2993)
Field	Eglin Air Force Base
County	Walton
State	Florida
Country	USA