Technical Memorandum

Monitoring Well Installation and Site Groundwater Sampling
B.F. Goodrich Superfund Site
Rialto-Colton Groundwater Basin Remedial Investigation/Feasibility Study
San Bernardino County, California

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1.0 INTRODUCTION

This technical memorandum presents information regarding the installation of three groundwater-monitoring wells and results from groundwater elevation measurements and analytical sampling at the B.F. Goodrich Superfund Site (Site). This work was performed between June 2011 and September 2012 as part of the Remedial Investigation/ Feasibility Study (RI/FS) for the Site. The Site location is shown on Figure 1-1. Most or all of the Site is located in the Rialto-Colton Groundwater Basin (RCB).

1.1 Project Objectives

The general objectives of the U.S. Environmental Protection Agency (EPA) for the RI/FS work at the Site include characterization of the nature and extent of contamination and evaluation of appropriate remedial actions to address the contamination. The first priority for EPA was to limit migration of the most contaminated groundwater at the Site. EPA designated the Source Area Operable Unit (OU) to address migration of contaminated groundwater away from the 160-Acre source area. EPA completed an RI/FS that addressed groundwater contamination in the Source Area OU (CH2M Hill, 2010). Because highly contaminated groundwater has migrated downgradient beyond the Source Area OU, ITSI Gilbane was tasked with installing additional groundwater monitoring wells and sampling the new wells and the existing monitoring well network to provide data for additional characterization of the downgradient contaminant plume.

Data developed by ITSI Gilbane during this project were submitted in draft form periodically to EPA. Under the direction of EPA, CH2M Hill evaluated the data.

1.2 Site Background

This section provides a brief Site description and summarizes Site history, geology and hydrogeology, and previous investigations.

1.2.1 Site Description

The 40-square-mile RCB is located in western San Bernardino County, California, about 60 miles east of Los Angeles (Figure 1-1). It is bounded on the northwest and southeast by the San Gabriel Mountains and the Badlands, respectively. The San Jacinto Fault forms the northeastern boundary, and the Rialto-Colton Fault forms the southwestern boundary. With the exception of the southeastern part of the basin, the San Jacinto and Rialto-Colton Faults act as groundwater

barriers that impede groundwater flow into and out of the basin (U.S. Geological Survey [USGS], 1997).

The portion of the RCB that has been identified as the primary source of groundwater contamination for the Site has been designated as the 160 Acre Area (source area) as shown on Figure 1-1. Portions of the 160 Acre Area are used for commercial and/or industrial purposes. The County of San Bernardino's Mid-Valley Sanitary Landfill is located immediately south and west of the source area.

1.2.2 Site History

In aerial photographs taken in the 1930s, irrigated and non-irrigated agriculture appear to be the main land uses in developed areas of the RCB. In 1942, the U.S. Army (Army) acquired 2,822 acres of mostly undeveloped land for use as the Rialto Ammunition Backup Storage Point (RASP). The area developed by the Army includes most or all of the 160 Acre Area.

In 1946, the United States sold the RASP property. Since then, a portion of the former RASP site continues to be used by a variety of business that use perchlorate and/or chlorinated solvents in their manufacturing processes or in their products.

In the mid-1950s, West Coast Loading Corporation manufactured and tested photoflash flares and other products that contained potassium perchlorate and disposed of wastes onsite. Emhart Industries is believed to be the corporate successor to the West Coast Loading Corp. In 1957, the B.F. Goodrich Corporation (Goodrich) used ammonium perchlorate and chlorinated solvents in its operations and disposed of wastes in one or more on-site pits.

Since the 1960s, the 160 Acre Area has been used by companies that manufactured and/or handled fireworks and other pyrotechnics containing potassium perchlorate and disposed of wastes onsite

The County of San Bernardino (County) purchased property southwest of the 160 Acre Parcel area for expansion of the Mid-Valley Sanitary Landfill 1998. Groundwater contaminated with perchlorate and VOCs extends to the southeast of the area now occupied by the landfill.

1.2.3 Geology and Hydrogeology

Stratigraphic units in the Rialto-Colton Basin consist of the following (USGS, 1997):

- Unconsolidated dune sand (Holocene);
- River-channel deposits (Holocene);
- Younger alluvium (Holocene);
- Older alluvium (late Pleistocene);
- Partly consolidated Tertiary to Quaternary continental deposits (late Pliocene and early Pleistocene);

- Consolidated Tertiary continental deposits (Pliocene); and
- Basement complex (pre-Tertiary).

The unconsolidated alluvial material that fills the RCB consists of sand, gravel, and boulders interbedded with lenticular deposits of silt and clay (USGS, 1997).

Fine-grained beds within the basin do not separate the groundwater system into well-defined aquifers and confining beds (USGS, 1997). The groundwater system is divided into four water-bearing units: river-channel deposits and upper, middle, and lower water-bearing units. These water-bearing units may contain more than one stratigraphic unit. The water-bearing units are unconfined to partly confined and are in hydraulic connection with one another (USGS, 1997). Groundwater generally moves from northwest to southeast in the middle and lower water-bearing units. Two major interior faults, Barrier J and an unnamed fault, affect groundwater movement (USGS, 1997). The unnamed fault is a partial barrier to groundwater movement in the middle water-bearing unit and an effective barrier in the lower water-bearing unit.

1.2.3.1 Groundwater Contamination

Perchlorate and trichloroethene (TCE) contamination within groundwater has been detected at and downgradient of the 160 Acre Area. Contamination in this part of the RCB was first detected in the late 1980s. Investigations conducted on the 160 Acre Area have reported perchlorate concentrations in groundwater as high as 10,000 micrograms per liter (ug/L). TCE has been detected at a maximum concentration in groundwater of 1,500 ug/L. Perchlorate also has been detected in groundwater production wells operated by the city of Rialto, the city of Colton, and the West Valley Water District, which, when active, pump from the RCB downgradient of the 160 Acre Area.

The perchlorate contamination emanating from the 160 Acre Area has resulted in a groundwater plume extending several miles. The downgradient and lateral extent of the plume has not been fully delineated (see Figure 1-2).

1.2.4 Previous Site Investigations

Between 2003 and 2010, numerous investigations were conducted to characterize potential releases of contaminants at the Site.

A 2004 investigation by Geosyntec Consultants (Geosyntec) on behalf of Goodrich included installing temporary and permanent groundwater-monitoring wells and piezometers. The permanent monitoring wells are on or bordering the 160 Acre Area (source area), including one upgradient well (PW-1) and three downgradient wells (PW-2, PW-3, and PW-4, Figure 1-2). Geosyntec monitored the four wells and piezometers periodically between 2004 and 2008, and summarized the results in monthly reports prepared between May 2004 and March 2008 (Geosyntec Consultants, 2004 to 2008). The downgradient wells contain elevated concentrations of perchlorate and TCE.

In 2006, Geosyntec completed a second groundwater investigation. The investigation was designed to further investigate hydrogeologic conditions in the vicinity and downgradient of the 160 Acre Area and to evaluate the areal and vertical extent of contaminants including perchlorate and TCE in groundwater. The investigation included installing five permanent multi-port (MP) groundwater-monitoring wells (PW-5 through PW-9, Figure 1-2).

In 2006, Environ International Corporation (Environ) and Adverus completed a groundwater investigation at the Site on behalf of Emhart Industries and Pyro Spectaculars. The investigation included installing five monitoring-well clusters in the middle portion of the 160 Acre Area. These well clusters (CMW-01 through CMW-05) have confirmed the presence of elevated perchlorate and TCE in the middle of the 160 Acre Area.

In February 2008, the city of Colton conducted a groundwater investigation. The investigation included installing CPW-16 and CPW-17 within the city of Colton approximately 5 and 5.5 miles downgradient of the source area, respectively

EPA initiated installing six MP groundwater-monitoring wells (EPA-MP1 through EPA-MP6) in April 2009. These wells were installed to monitor groundwater flow directions and gradients and to further characterize the nature and extent of regional perchlorate and volatile organic compound (VOC) contamination downgradient of the 160 Acre Area. Initial groundwater samples collected from these MP wells in August (EPA-MP1 and EPA-MP2) and December (EPA-MP1 through EPA-MP6) indicated that perchlorate and/or VOCs are present at relatively low levels in all of these new wells at various depths.

Several investigations have focused on the groundwater contamination originating from the area now occupied by the Mid-Valley Sanitary Landfill. One of the suspected source areas for the contamination is known as the Former Bunker Area (Figure 1-2). The results of many of those investigations are summarized in a January 2005 *Draft Interim Remedial Investigation/Feasibility Study Report* (Geologic Associates, 2005). At the time the report was prepared, three phases of field investigation had been completed, and 18 groundwater-monitoring wells had been installed. The report indicates that groundwater downgradient of the Former Bunker Area had been impacted by elevated concentrations of perchlorate and multiple VOCs, including TCE (GeoLogic Associates, 2005). Groundwater impacts extended approximately 1.6 miles downgradient of the Former Bunker Area and reached depths of 600 feet below ground surface (bgs) or 200 feet below the groundwater table.

The Draft Interim RI/FS Report evaluated remedial alternatives to mitigate impacts to city of Rialto production well Rialto-3 (Figure 1-2), and recommended intercepting the groundwater contaminant plume with a groundwater extraction system, ex situ treatment, and delivery of treated water to the city's municipal supply system (GeoLogic Associates, 2005). The first phase of the remedy—installing a groundwater treatment plant and connection of Rialto-3 to that plant—was completed in 2006. Since 2006, two additional extraction wells have been installed and treatment plant upgrades have been completed, as described in *Groundwater Monitoring*

Report, Fourth Quarter (Fall 2010), Rialto Groundwater Treatment System Perchlorate and VOC Remediation (GeoLogic Associates, 2011).

2.0 GROUNDWATER MONITORING WELL INSTALLATION

This section presents the rationale for the locations of the three groundwater-monitoring wells installed by EPA in 2011 and 2012, as well as descriptions of the well installation activities performed by ITSI Gilbane during this effort. All well-installation activities were performed in conformance with the *Final Field Sampling Plan* (FSP) prepared by ITSI Gilbane and approved by EPA in June 2011 (ITSI, 2011).

2.1 Rationale for Monitoring Well Locations

The specific locations for monitoring wells EPA-MP7 and EPA-MP8 (Figure 1-2) were selected by EPA based on evaluation of existing data provided by CH2M Hill. The wells were installed to provide data for evaluation of the nature and extent of contamination (both laterally and vertically) of the downgradient portion of the contaminant plume.

Specifically, EPA-MP7 and EPA-MP8 were installed to better define groundwater flow directions and the lateral and vertical extent of groundwater contamination approximately 4 to 5 miles downgradient of the 160 Acre Area and to determine the extent of contamination detected at the city of Rialto production well Rialto-6 and groundwater monitoring well PW-9.

The specific location for EPA-MW9A and 9B (Figure 1-2) was selected by EPA based on evaluation of existing data provided CH2M Hill. This well was installed approximately 1.5 miles directly downgradient of the source area on the Rialto Municipal Airport to evaluate lithology and the vertical distribution of contaminants in the immediate vicinity of a potential groundwater-extraction point.

2.2 Monitoring Well Installation

Drilling and well installation services, including Westbay MP systems for EPA-MP7, EPA-MP8 and EPA-MW9A and 9B were provided by WDC Exploration and Wells (WDC) of Montclair, California. Underground Service Alert (USA), a utility notification service, was contacted prior to initiation of activities at each location. Appropriate utility companies identified and marked underground utility services in the drilling zones. In addition, the upper 10 feet of each boring was excavated by an air-knife machine as an added measure of utility identification. Sound control equipment was used during the drilling and well construction activities at EPA-MP8 to reduce ambient noise created by the drilling activities for nearby residences.

Drilling activities at each location began by installing 14-inch-diameter, low carbon steel (LCS) conductor casings in 20-inch-diameter, mud-rotary boreholes to approximately 25 feet bgs. Conductor casings were cemented in place and a 12-inch-diameter, mud-rotary borehole was then advanced at each location. The borehole for EPA-MP7 was drilled to a total depth of 789 feet bgs. The borehole for EPA-MP8 was drilled to a total depth of 770 feet bgs. The borehole for the dual-completion well EPA-MW9A and 9B was drilled to a total depth of 789 feet bgs.

Borehole cuttings were collected for lithologic logging at 10-foot intervals during drilling by the on-site ITSI Gilbane registered professional geologist. Geophysical surveys were completed in each borehole immediately upon completion of drilling. The following suite of geophysical logs was completed in all boreholes:

- Short (16-inch) and long (64-inch) normal resistivity;
- Spontaneous potential;
- Lateral resistivity;
- Natural gamma;
- Sonic; and
- Caliper.

Lithology logs and geophysical surveys for each borehole are presented in **Appendix A**.

2.2.1 Multi-Port Well Construction

In general, lithologic log descriptions and borehole geophysical survey data from the newly completed boreholes, as well as descriptions and geophysical and analytical data from existing MP wells, were used as supporting lines of information for the selection of screened intervals for EPA-MP7 and EPA-MP8 by EPA, ITSI Gilbane and CH2M Hill. WDC is certified by Schlumberger Water Systems of Burnaby, Vancouver, Canada, to install Westbay MP systems.

The outer well casings for the MP wells consist of alternating sections of 4-inch inside diameter (ID) Schedule 10S stainless steel (Type 304) and Schedule 40 mild steel casing. Number 3 silica sand was placed around each screened interval as a filter media, extending from 10 feet above to 10 feet below each screen, as shown on Figure 2-1. A minimum of 3 feet of Number 60 fine silica (transition) sand was placed directly above and below the filter media material to separate it from the strata seals.

Annular strata seals, consisting of a 50:50 mixture (dry volume) of bentonite chips and sand, were placed between the screened intervals. The bentonite and sand were mixed and blended with clean, potable water prior to placement. The uppermost strata seal (sanitary seal) in each well consisted of a mixture of 94 pounds of Portland type II cement to 6 gallons of potable water with 3% bentonite powder (by dry weight). Bentonite was added to the cement mixture to reduce the heat of hydration created during the sanitary seal curing process to prevent deformation (melting) of the polyvinyl chloride MP well casing.

After installing the 4-inch-diameter well casing and screen, each screened interval was developed by a combination of bailing, swabbing, and pumping. Initial well development consisted of bailing residual mud from the wells, followed by airlifting and swabbing with a surge block. Once the airlifting and swabbing phases were completed, a submersible pump with straddle packers was placed in the wells to develop each screened interval separately.

Development continued in each screened interval until a value of 5 nephelometric turbidity units (NTUs) was measured in the development water and it was relatively clear and sediment free. A video survey of the well casing and screens was performed to evaluate the need for further development. The MP instrumentation system was installed in both wells after the integrity of the well casing and screen assembly was confirmed through the video survey.

The MP instrumentation system consisted of casing, couplings with sampling and pumping ports, and inflatable packers. The bottom packer for each MP sampling zone was set within the blank stainless steel casing. The upper packer and a companion packer were set within blank mild steel casing immediately above the blank stainless steel casing of each zone. These two packers serve to isolate the measurement port (see below) to test the integrity of the packers between screened intervals. As-built diagrams for EPA-MP7 and EPA-MP8 are presented in **Appendix A**.

Typical MP construction details (**Figure 2-1**) are as follows.

- MP casing, couplings, and packer locations were dictated by individual screened interval depths.
- The MP casing serves as blank casing along the interior of the outer 4-inch-diameter well casing.
- The function of the special MP measurement port coupling is to allow measurement of fluid pressure and collection of water samples. A measurement port is also installed between perforated intervals to test the integrity of the inflatable packers.
- The MP pumping port coupling allows for a one-time purging of the zone to be sampled (if deemed necessary, additional purging can be done through the pumping ports).
- The inflatable packers provide a seal between screened intervals along the interior of the well casing, thereby precluding cross-contamination and vertical movement of fluids within the well. Three packers are used between adjacent perforated intervals.
- Within each screened monitoring zone, the instrumentation consists of a pumping coupling and a monitoring port coupling.
- The packers were installed at a maximum of 5 feet below each screened interval and at 15 and 25 feet above each screened interval.
- The sampling port couplings were installed adjacent to the pumping port coupling with 1 to 3 feet of blank MP casing separating the couplings. All ports were closed during installation so no water entered the center of the MP system.
- Both the pumping and monitoring couplings were located adjacent to the screened interval (i.e., within the 10-foot depth interval of the screen).

After the MP instrumentation was installed, one pumping port at a time was opened and pumped at the maximum available pumping rate (approximately 1 gallon per minute) for approximately 2

hours (or until the discharge was clear, as determined by the onsite ITSI Gilbane registered professional geologist).

2.2.2 Dual-Completion Well Construction

The well design for EPA-MW9A and 9B was developed by EPA, ITSI Gilbane and CH2M Hill based on the lithologic log description and borehole geophysical survey data as well as descriptions and geophysical and analytical data from existing wells downgradient of the source area.

Both well completions were constructed with 3-inch ID LCS Schedule 40 threaded water well casing and stainless steel (Type 304 steel), 0.040-inch, continuous v-slot threaded water well screen. Dielectric couplers were used to join the LCS casing and stainless steel well screens. Number 3 silica sand was placed around each screened interval. A strata seal consisting of a 50:50 mixture (dry volume) of bentonite chips and sand was placed between the bottom (EPA-MW9B) and top (EPA-MW9A) completion intervals. A bentonite chip grout infiltration bridge was placed above the filter media in the top completion and a cement/sand sanitary seal consisting of a mixture of 94 pounds of Portland type II cement to 188 pounds of sand to 7 gallons of potable water was pumped, under pressure, into the remaining portions of borehole annulus. An as-built well diagram for EPA-MW9A and 9B is included in **Appendix A**. After installation of the well casings and screens, each screened interval was developed by the methods described in the applicable portions of **Section 2.2.1**.

2.2.3 Wellhead Installation and Well Location Surveys

Following completion of well development activities, wellheads, as described in the FSP, were installed at EPA-MP7, EPA-MP8 and EPA-MW9A, and 9B. The locations and elevations of each well were surveyed by Calvada Surveying Inc., of Corona, California. Well location and elevation survey data are presented in **Appendix B**.

3.0 GROUNDWATER ELEVATION MEASUREMENT AND SAMPLING

Groundwater elevations were measured and groundwater samples were collected from existing groundwater wells throughout the RCB in June/July 2011 and April 2012. Wells are listed in Tables 4-2 and 4-3. Initial groundwater elevation measurements and groundwater samples were collected from EPA-MP7 and EPA-MP8 in January 2012. Initial elevation measurements and groundwater samples were collected from EPA-MW9A and 9B in July 2012, and the second round of groundwater elevation measurements and samples from EPA-MP7 and EPA-MP8 were collected in July 2012.

3.1 Groundwater Elevation Measurements

Procedures for the measurement of groundwater elevations in MP wells and conventional monitoring wells are presented in the FSP and briefly discussed below. ITSI Gilbane used Blaine Tech Services of Carson, California, to collect both MP and conventional well groundwater elevation measurements.

Groundwater elevations for individual screen intervals in MP wells are calculated using water pressure data collected outside of the MP system at the sample port within that screen interval. Water pressures are measured at the sample ports associated with each screen interval using the Westbay sampling/profiling tool. The water pressures that are measured prior to collection of groundwater samples from each sample port are used to calculate groundwater elevations. By using the initial pressure measured at each sample port during a specific gauging event, there is assurance that calculated groundwater elevations represent static conditions.

Groundwater elevation measurements in conventional wells are established by direct-recording of the depth to water from a reference point at the wellhead using an electric sounding device. The groundwater elevation is calculated by determining the difference between the reference point elevation and the depth to groundwater in the well.

3.2 Groundwater Sampling

Procedures for groundwater sampling are presented in the FSP and summarized in the following subsections. ITSI Gilbane used Blaine Tech Services to collect both MP and conventional well samples. Blaine Tech Services—certified by Schlumberger Water Services to collect samples from Westbay MP systems—used Westbay MP system sampling equipment to collect groundwater samples from the MP wells.

3.2.1 MP Well Sample Collection

The procedures for sampling MP wells are different from those for conventional monitoring wells. Groundwater samples were taken directly from the formation via the depth-discrete sampling ports, using a specially designed sampling tool. Standard quality control procedures were used during sampling. The Westbay sampling tool was lowered to the desired sampling port and activated from the surface to seat against and open the port. After the attached sampling vessel was filled, the port was closed and the tool was brought to the surface. A sampling tool containing four, 250-milliliter (mL), stainless-steel cylinders was used to sample MP wells. Once the filled sampling tool was at the surface, the contents of the tool were transferred directly into the appropriate sample containers for transport to the laboratory.

The first sample drawn from each depth was used to measure field parameters (temperature, pH, turbidity, and electrical conductivity) and to allow for some flushing of the sampling instrumentation. All field parameter measurements were recorded on a Low-flow Groundwater Purge and Sample form (provided in Appendix E of the FSP) along with the date, time, and location of each measurement. The second sample drawn from each depth was collected for VOCs, followed by a sample for perchlorate analysis. Groundwater was first transferred to the volatile organic analysis (VOA) sample bottles by means of a small-aperture valve located on the end of the 250-mL stainless-steel cylinder that permitted a small stream of groundwater to exit the cylinder. In this manner, the flow rate into the sample bottles was controlled, so that sampling became analogous to MicroPurge low-flow groundwater sampling. After all of the VOA vials were filled (with no headspace), the sample containers for perchlorate analyses were filled. The sampling procedure was repeated until sufficient water was obtained from each port and all sampling ports were sampled.

3.2.2 Conventional Well Sample Collection

With the exception of EPA-MW9A and 9B, groundwater samples from the city of Rialto production wells and monitoring wells without dedicated pumps were collected by the HydraSleeve sampling method. A bladder pump was used to collect groundwater samples from EPA-MW9A and 9B. Detailed descriptions of each sampling method are presented in the FSP and summarized below.

3.2.1.1 HydraSleeve Sampling

The HydraSleeve sampler was lowered into the well and filled as it was removed from the well. The HydraSleeve Standard Operating Procedure (GeoInsight Inc., 2010) and Field Manual (Cordry, 2006) included in the FSP contain diagrams illustrating the steps required for HydraSleeve deployment, retrieval, and sample recovery.

<u>HydraSleeve Assembly and Deployment</u>

The following steps were taken to deploy the HydraSleeves.

1. Removed the HydraSleeve from the packaging and creased the reinforced fins outward to open the top of the HydraSleeve.
2. Attached a calibrated tether to one of the holes at the top of the HydraSleeve.
3. Folded the bottom of the HydraSleeve, aligning the two holes, and attached the weight using the stainless steel clip.
4. Lowered the weighted HydraSleeve to the middle of the well screen.
5. Secured the HydraSleeve at the top of the well by attaching the tether to the well cap. Once the HydraSleeve was secured at the surface, the well was given 24 hours to equilibrate before the sample was collected.

<u>HydraSleeve Removal and Sample Collection</u>

The following steps were taken to collect the sample and retrieve the HydraSleeves.

1. The sampler was filled as it was pulled upward (out of the well) at a rate of 1 to 2 feet per second.
2. Once the HydraSleeve was at the surface, the sampler was grabbed just below the top to expel the water resting on top of the flexible one-way valve.
3. Using the supplied pointed discharge tube, the HydraSleeve was punctured approximately 3 to 4 inches below the white reinforcing strips at the top of the HydraSleeve.
4. Water was decanted from the HydraSleeve through the discharge tube into the appropriate containers for the desired laboratory analysis.

3.2.1.2 Bladder Pump Sampling

Sampling activities at EPA-MW9A and 9B were initiated by lowering the Sample Pro Bladder Pump and polyethylene discharge tubing into the appropriate well completion to the mid-point

(center) of the screened interval. Discharge tubing flow was directed to a flow cell for measurement of groundwater parameters during well purging. The pump speed on the bladder pump was set to 100 milliliters per minute. One system volume (volume of bladder and discharge tubing) was purged from the well before initiating water-quality parameter measurements for temperature, pH, conductivity, turbidity, dissolved oxygen, and oxidation reduction potential at 5-minute intervals.

During the purging process, the water level within the well completion was monitored. The water quality parameters were recorded to determine when the groundwater discharge had stabilized. Groundwater discharge was considered stable when three consecutive measurements met the following criteria.

- temperature was plus or minus 1 degree centigrade;
- pH was plus or minus 0.1;
- conductivity was plus or minus 3%;
- turbidity was measured at plus or minus 10%;
- dissolved oxygen was plus or minus 0.3 milligrams per liter; and
- oxidation reduction potential was plus or minus 10 millivolts.

When stable groundwater conditions had been achieved, the bladder pump discharge was disconnected from the flow cell and samples were collected in appropriate containers.

3.3 Laboratory Analytical Methods

The EPA Region 9 Laboratory in Richmond, California, analyzed primary and duplicate groundwater samples collected during all sampling events described in this technical memorandum for perchlorate (EPA Method 314).

Primary and duplicate groundwater samples collected during June/July 2011 were analyzed for VOCs (SOM01.2) by Liberty Analytical, Cary, North Carolina. Primary and duplicate groundwater samples collected in January and July 2012 were analyzed for VOCs (SOM01.2) by Mitkem Corporation, Warwick, Rhode Island. Primary and duplicate groundwater samples collected in April 2012 were analyzed VOCs (SOM01.2) by KAP Technologies Inc., The Woodlands, Texas.

Liberty Analytical, Mitkem Corporation, and KAP Technologies Inc., provided analytical services under EPA's Contract Laboratory Program.

3.4 Investigation-Derived Waste

Procedures for handling investigation-derived waste are presented in the FSP and summarized below.

Samples of drill cuttings and fluids were collected by WDC and submitted to A and R Laboratories, Riverside, California, for analytical profiling. Based on analytical results, drill

cuttings were transported by Haz Mat Trans, Inc., of Los Angeles, California, and disposed of as nonhazardous waste at Philadelphia Recycling Mine, Mira Loma, California.
Similarly, drilling and well-development fluids were transported by Haz Mat Trans and disposed of as nonhazardous waste at K Pure Waterworks, Rancho Cucamonga, California, and All American Asphalt, Corona, California.

4.0 GROUNDWATER ELEVATION MEASUREMENT AND SAMPLING RESULTS

Results of groundwater elevation measurements and groundwater sampling are presented in this section. These results were entered into the database developed by ITSI Gilbane for the Site. Analytical reports and draft data summary tables were periodically delivered as separate submittals to EPA.

4.1 Groundwater Elevation Measurement Results

Groundwater elevations measured and recorded during activities discussed in this technical memorandum are presented in **Table 4-1**. Groundwater elevations for selected wells, recorded by CH2M Hill during a previous measurement event (March/April 2010), also appear in **Table 4-1**.

4.2 Groundwater Sampling Results

Analytical results for the groundwater sampling events completed in June/July 2011 and April 2012 are presented in **Table 4-2**. Two of the wells included in the initial sampling list, for the June/July 2011 sampling event, PW2A and 1N/5W-34D4S, were dry. Similarly, PW2A, PW4A, 1N/5W-34D4S, and CPW-17A were also dry during the April 2012 sampling event.

Concentrations of perchlorate in excess of the California maximum contaminant level (MCL) were detected at or directly downgradient of the source area during the June/July 2011 sampling round in a number of wells including:

- PW-2 at 28 ug/L;
- PW-3 at 15 ug/L and 18 ug/L; and
- PW-4 at 36 ug/L.

Concentrations of perchlorate in excess of the California MCL were detected in the mid-portion of the downgradient contaminant plume in several wells during the June/July 2011 sampling round including EPA-MP6A at 35 ug/L.

Concentrations of perchlorate in excess of the California MCL were detected approximately 5 miles downgradient of the 160 Acre Area during the June/July 2011 sampling round in CPW-16 ranging in concentrations from 24 ug/L (port A) to 160 ug/L (port C).

Concentrations of TCE in excess of the federal MCL were detected at or directly downgradient of the source area in several wells during the June/July 2011 sampling including:

- PW-2 at 42 ug/L;
- PW-3 at 11 ug/L and 10 ug/L;

- PW-4 at 30 ug/L; and
- EPA-MP4C at 6.4 ug/L.

TCE in excess of the federal MCL was detected in an number of wells in the mid-portion of the downgradient contaminant plume during the June/July 2011 sampling round including PW-9 ranging in concentrations from 5.2 ug/L (port G) to 12 ug/L (port C).

Concentrations of perchlorate in excess of the California MCL were detected at or directly downgradient of the source area during the April 2012 sampling round in the following wells:

- PW-2 at 160 ug/L
- PW-3 at 16 ug/L; and
- PW-4 at 15 ug/L.

Concentrations of perchlorate in excess of the California MCL were detected in the mid-portion of the downgradient contaminant plume in a number of wells during the April 2012 sampling round including:

- 1S/5W-3A6S at 220 ug/L;
- EPA-MP6A at 34 ug/L; and
- PW-9 ranging in concentrations from 23 ug/L (port F) to 460 ug/L (port G).

Concentrations of perchlorate in excess of the California MCL were detected approximately 5 miles downgradient contaminant of the 160 Acre Area during the April 2012 sampling round in CPW-16 ranging in concentrations from 23 ug/L (port A) to 180 ug/L (port C).

Concentrations of TCE in excess of the federal MCL were detected in a number of wells at or directly downgradient of the source area during the April 2012 sampling round including:

- PW-2 at 58 ug/L and 47 ug/L (both results are “J” flagged);
- PW-4 at 17 ug/L;
- 1S/5W-3A6S at 6.5 ug/L (result is “J” flagged).

TCE was detected in the mid-portion of the downgradient contaminant plume in PW-9C at 6.4 ug/L during the April 2012 round of sampling.

Analytical results for groundwater samples collected from EPA-MP7 and EPA-MP8 in January 2012 and July 2012 as well as samples collected from EPA-MW9A and 9B in July 2012 are presented in **Table 4-3**. No concentrations of TCE in excess of the MCL were recorded during the January and July sampling events for these wells.

Perchlorate in excess of the California MCL was detected in EPA-MP7A (12 ug/L) and in EPA-MP7B (7.8 ug/L) during the January 2012 sampling round. Concentrations of perchlorate greater than the MCL were detected in EPA-MP7A (12 ug/L), EPA-MP7B (6.8 ug/L), and EPA-MW9A (180 ug/L) during the July 2012 sampling event.

5.0 REFERENCES

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TABLES

Table 4-1 BF Goodrich Superfund Site, San Bernardino County, California Groundwater Elevation Measurements						
	Well Screen Interval (ft bgs)	**Date**	**Depth to Water (ft)**	**Water Elevation (ft amsl)**	**Measuring Point Elevation (ft amsl)**	**Approximate Ground Surface Elevation (ft amsl)**
Conventional Wells						
Rialto-07	300-540	6/20/2011	329.86	973.14		1303
		4/10/2012	333.71	969.29		
PW-1	440-480	4/6/2010	432.05	1272.43	1704.48	
		6/20/2011	421.62	1282.86		
		4/12/2012	408.47	1296.01		
PW-2	455-495	4/5/2010	449.81	1189.55	1639.36	
		6/20/2011	457.05	1182.31		
		4/10/2012	441.35	1198.01		
PW-2A	622-642	4/5/2010	DRY	DRY	1639.58	
		6/20/2011	DRY	DRY		
		4/10/2012	DRY	DRY		
PW-3	456-496	4/6/2010	439.47	1172.34	1611.81	
		6/20/2011	447.51	1164.30		
		4/10/2012	436.92	1174.89		
PW-3A	606-626	4/6/2010	DRY	DRY	1611.81	
		6/20/2011	DRY	DRY		
		4/10/2012	603.00	1008.81		
PW-4	470-510	4/6/2010	454.56	1172.00	1626.56	
		6/20/2011	461.38	1165.18		
		4/10/2012	449.30	1177.26		
PW-4A	638-648	4/6/2010	631.41	995.15	1626.56	
		6/20/2011	640.40	986.16		
		4/10/2012	642.35	984.21		
TW-1	444-474	4/12/2010	441.70	1202.43	1644.13	
		4/12/2012	425.41	1218.72		
EPA-MW9A	520-540	7/26/2012	472.62	976.11	1448.73	1449.03
EPA-MW9B	715-735	7/26/2012	472.81	975.82	1448.63	1449.03
USGS Cluster Wells						
1S/4W-8E1S	970-990	3/29/2010	217.38	892.62	1110	
		6/20/2011	219.71	890.29		
1S/4W-8E2S	750-770	3/29/2010	217.93	892.07	1110	
		6/20/2011	220.54	889.46		
		4/11/2012	220.70	889.30		
1S/4W-8E3S	577-597	3/29/2010	218.54	891.46	1110	
		6/20/2011	221.26	888.74		
		4/11/2012	221.29	888.71		

	Well Screen Interval (ft bgs)	Date	Depth to Water (ft)	Water Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Approximate Ground Surface Elevation (ft amsl)
1S/4W-8E4S	310-330	3/29/2010	221.42	888.58	1110	
		6/20/2011	224.34	885.66		
		4/11/2012	224.33	885.67		
1S/5W-3A5S	660-680	3/29/2010	377.93	980.07	1358	
		6/20/2011	385.50	972.50		
		4/11/2012	390.62	967.38		
1S/5W-3A6S	500-520	3/29/2010	377.02	980.98	1358	
		6/20/2011	385.65	972.35		
		4/11/2012	390.74	967.26		
1S/5W-3A7S	400-420	3/29/2010	376.55	981.45	1358	
		6/20/2011	385.70	972.30		
		4/11/2012	390.78	967.22		
1S/5W-11F1S	930-950	3/29/2010	294.24	949.76	1244	
		6/20/2011	299.30	944.70		
1S/5W-11F3S	422-442	3/29/2010	275.83	968.17	1244	
		6/20/2011	282.80	961.20		
		4/11/2012	285.94	958.06		
1S/5W-11F4S	310-330	3/29/2010	275.97	968.03	1244	
		6/20/2011	282.92	961.08		
		4/11/2012	286.05	957.95		
1S/5W-13B2S	675-695	3/29/2010	252.55	907.45	1160	
		6/20/2011	262.30	897.70		
		4/11/2012	264.72	895.28		
1S/5W-13B3S	540-560	3/29/2010	267.74	892.26	1160	
		6/20/2011	276.05	883.95		
		4/11/2012	277.44	882.56		
1S/5W-13B4S	420-440	3/29/2010	266.73	893.27	1160	
		6/20/2011	275.02	884.98		
		4/11/2012	273.33	886.67		
1S/5W-13B5S	270-290	3/29/2010	256.83	903.17	1160	
		6/20/2011	265.95	894.17		
		4/11/2012	267.85	892.15		
1N/5W-34D2S	760-780	4/11/2012	490.72	966.28		1457
1N/5W-34D3S	590-610	4/11/2012	490.57	966.43		1457
1N/5W-34D4S	472-492	4/11/2012	490.40	966.60		1457
Multi-Port Wells						
EPA-MP1A	363-373	4/6/2010	279.01	947.04	1226.05	1226.52
		6/24/2011	286.67	939.38		
		4/2/2012	288.85	937.20		

	Well Screen Interval (ft bgs)	Date	Depth to Water (ft)	Water Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Approximate Ground Surface Elevation (ft amsl)
EPA-MP1B	459-469	4/6/2010	279.23	946.82	1226.05	1226.52
		6/24/2011	286.92	939.13		
		4/2/2012	289.23	936.82		
EPA-MP1C	559-569	4/6/2010	279.25	946.80	1226.05	1226.52
		6/24/2011	286.88	939.17		
		4/2/2012	289.22	936.83		
EPA-MP1D	730-740	4/6/2010	280.47	945.58	1226.05	1226.52
		6/24/2011	287.78	938.27		
		4/2/2012	290.16	935.89		
EPA-MP1E	795-805	4/6/2010	271.67	954.38	1226.05	1226.52
		6/24/2011	278.07	947.98		
EPA-MP2A	346-356	4/7/2010	301.79	968.20	1269.99	1270.57
		7/8/2011	309.40	960.59		
		4/3/2012	301.76	968.23		
EPA-MP2B	406-416	4/7/2010	301.97	968.02	1269.99	1270.57
		7/8/2011	309.58	960.41		
		4/3/2012	311.17	958.82		
EPA-MP2C	506-516	4/7/2010	302.25	967.74	1269.99	1270.57
		7/8/2011	309.88	960.11		
		4/3/2012	311.55	958.44		
EPA-MP2D	612-622	4/7/2010	303.12	966.87	1269.99	1270.57
		7/8/2011	310.88	959.11		
		4/3/2012	311.64	958.35		
EPA-MP2E	712-722	4/7/2010	303.51	966.48	1269.99	1270.57
		7/8/2011	310.95	959.04		
		4/3/2012	311.87	958.12		
EPA-MP2F	762-772	4/7/2010	288.34	981.65	1269.99	1270.57
		7/8/2011	293.38	976.61		
		4/3/2012	296.92	973.07		
EPA-MP3A	454-464	4/8/2010	386.27	976.83	1363.1	1363.73
		6/27/2011	394.37	968.73		
		4/4/2012	397.06	966.04		
EPA-MP3B	590-600	4/8/2010	386.46	976.64	1363.1	1363.73
		6/27/2011	394.61	968.49		
		4/4/2012	397.70	965.40		
EPA-MP3C	684-694	4/8/2010	386.77	976.33	1363.1	1363.73
		6/27/2011	394.85	968.25		
		4/4/2012	398.03	965.07		
EPA-MP3D	811-821	4/8/2010	387.47	975.63	1363.1	1363.73

	Well Screen Interval (ft bgs)	Date	Depth to Water (ft)	Water Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Approximate Ground Surface Elevation (ft amsl)
		6/27/2011	395.69	967.41		
EPA-MP3E	897-907	4/8/2010	388.09	975.01	1363.1	1363.73
		6/27/2011	395.84	967.26		
EPA-MP4A	411-421	4/13/2010	402.16	1055.66	1457.82	1458.00
		6/27/2011	403.65	1054.17		
		4/3/2012	402.53	1055.29		
EPA-MP4B	505-515	4/13/2010	466.84	990.98	1457.82	1458.00
		6/27/2011	474.78	983.04		
		4/3/2012	478.14	979.68		
EPA-MP4C	585-595	4/13/2010	467.18	990.64	1457.82	1458.00
		6/27/2011	474.94	982.88		
		4/3/2012	478.40	979.42		
EPA-MP4D	639-649	4/13/2010	467.27	990.55	1457.82	1458.00
		6/27/2011	475.16	982.66		
		4/3/2012	478.66	979.16		
EPA-MP4E	752-762	4/13/2010	467.93	989.89	1457.82	1458.00
		6/27/2011	475.52	982.30		
		4/3/2012	479.11	977.89		
EPA-MP5A	352-362	4/13/2010	309.79	975.37	1285.16	1284.96
		7/5/2011	316.81	968.35		
		4/4/2012	320.02	965.14		
EPA-MP5B	408-418	4/13/2010	309.85	975.31	1285.16	1284.96
		7/5/2011	316.89	968.27		
		4/4/2012	320.32	964.84		
EPA-MP5C	502-512	4/13/2010	310.15	975.01	1285.16	1284.96
		7/5/2011	316.11	969.05		
		4/4/2012	320.64	964.52		
EPA-MP5D	626-636	4/13/2010	310.52	974.64	1285.16	1284.96
		7/5/2011	318.66	966.50		
		4/4/2012	321.81	963.35		
EPA-MP5E	737-747	4/13/2010	310.79	974.37	1285.16	1284.96
		7/5/2011	319.19	965.97		
EPA-MP6A	351-361	4/15/2010	313.39	960.02	1273.41	1273.66
		6/28/2011	321.12	952.29		
		4/2/2012	323.19	950.22		
EPA-MP6B	445-455	4/15/2010	313.59	959.82	1273.41	1273.66
		6/28/2011	321.29	952.12		
		4/2/2012	323.59	949.82		
EPA-MP6C	569-579	4/15/2010	313.97	959.44	1273.41	1273.66

	Well Screen Interval (ft bgs)	Date	Depth to Water (ft)	Water Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Approximate Ground Surface Elevation (ft amsl)
		6/28/2011	321.68	951.73		
		4/2/2012	324.10	949.31		
EPA-MP6D	656-666	4/15/2010	314.16	959.25	1273.41	1273.66
		6/28/2011	321.89	951.52		
		4/2/2012	324.30	949.11		
EPA-MP6E	762-772	4/15/2010	314.20	959.21	1273.41	1273.66
		6/28/2011	321.84	951.57		
EPA-MP7A	355-365	1/17/2012	289.13	937.48	1226.61	1227.52
		7/24/2012	291.04	935.57		
EPA-MP7B	430-440	1/17/2012	290.74	935.87	1226.61	1227.52
		7/24/2012	292.60	934.01		
EPA-MP7C	500-510	1/17/2012	294.16	932.45	1226.61	1227.52
		7/24/2012	295.83	930.78		
EPA-MP7D	585-595	1/17/2012	291.44	935.17	1226.61	1227.52
		7/24/2012	293.26	933.35		
EPA-MP7E	700-710	1/17/2012	288.68	937.93	1226.61	1227.52
		7/24/2012	290.68	935.39		
EPA-MP8A	345-355	1/16/2012	290.80	929.17	1219.97	1221.08
		7/25/2012	292.58	927.39		
EPA-MP8B	395-405	1/16/2012	290.86	929.11	1219.97	1221.08
		7/25/2012	292.63	927.34		
EPA-MP8C	490-500	1/16/2012	291.24	928.73	1219.97	1221.08
		7/25/2012	292.86	927.11		
EPA-MP8D	605-615	1/16/2012	296.91	923.06	1219.97	1221.08
		7/25/2012	298.76	921.21		
EPA-MP8E	720-730	1/16/2012	296.57	923.40	1219.97	1221.08
		7/25/2012	289.57	930.40		
PW-5A	465-475	4/19/2010	437.90	985.74	1423.64	1424.69
		7/6/2011	446.08	977.56		
		4/6/2012	449.35	974.29		
PW-5B	510-520	4/19/2010	437.89	985.75	1423.64	1424.69
		7/6/2011	446.11	977.53		
		4/6/2012	449.48	974.16		
PW-5C	555-565	4/19/2010	438.16	985.48	1423.64	1424.69
		7/6/2011	446.08	977.56		
		4/6/2012	449.59	974.05		
PW-5D	615-625	4/19/2010	438.28	985.36	1423.64	1424.69

	Well Screen Interval (ft bgs)	Date	Depth to Water (ft)	Water Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Approximate Ground Surface Elevation (ft amsl)
		7/6/2011	446.15	977.49		
		4/6/2012	449.67	973.97		
PW-5E	670-680	4/19/2010	438.12	985.52	1423.64	1424.69
		7/6/2011	446.46	977.18		
		4/6/2012	449.93	973.71		
PW-6A	440-450	4/19/2010	425.34	983.82	1409.16	1410.26
		7/5/2011	432.82	976.34		
		4/9/2012	436.26	972.90		
PW-6B	475-485	4/19/2010	425.46	983.70	1409.16	1410.26
		7/5/2011	432.70	976.46		
		4/9/2012	436.35	972.81		
PW-6C	520-530	4/19/2010	425.45	983.71	1409.16	1410.26
		7/5/2011	432.74	976.42		
		4/9/2012	436.36	972.80		
PW-6D	600-610	4/19/2010	425.48	983.68	1409.16	1410.26
		7/5/2011	432.76	976.40		
		4/9/2012	436.50	972.66		
PW-6E	655-665	4/19/2010	425.62	983.54	1409.16	1410.26
		7/5/2011	432.82	976.34		
		4/9/2012	436.59	972357.00		
PW-7A	430440	4/16/2010	419.33	981.81	1401.14	1401.5
		7/7/2011	426.76	974.38		
		4/10/2012	429.88	971.26		
PW-7B	495-505	4/16/2010	419.62	981.52	1401.14	1401.5
		7/7/2011	428.30	972.84		
		4/10/2012	431.37	969.77		
PW-7C	565-575	4/16/2010	419.75	981.39	1401.14	1401.5
		7/7/2011	428.42	972.72		
		4/10/2012	431.86	969.28		
PW-7D	635-645	4/16/2010	419.88	981.26	1401.14	1401.5
		7/7/2011	428.51	972.63		
		4/10/2012	432.03	969.11		
PW-7E	685-695	4/16/2010	420.05	981.09	1401.14	1401.5
		7/7/2011	428.58	972.56		
		4/10/2012	432.22	968.92		
PW-7F	750-760	4/16/2010	420.23	980.91	1401.14	1401.5
		7/7/2011	427.75	973.39		
		4/10/2012	431.37	969.77		
PW-7G	815-825	4/16/2010	420.48	980.66	1401.14	1401.5
		7/7/2011	427.95	973.19		

	Well Screen Interval (ft bgs)	Date	Depth to Water (ft)	Water Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Approximate Ground Surface Elevation (ft amsl)
		4/10/2012	431.52	969.62		
PW-8A	440-445	4/23/2010	405.25	1110.17	1515.42	1516.30
		7/6/2011	409.85	1105.57		
		4/9/2012	406.75	1108.67		
PW-8B	545-555	4/23/2010	523.98	991.44	1515.42	1516.30
		7/6/2011	531.69	983.73		
		4/9/2012	535.07	980.35		
PW-8C	645-655	4/23/2010	524.39	991.03	1515.42	1516.30
		7/6/2011	531.90	983.52		
		4/9/2012	535.48	979.94		
PW-8D	720-730	4/23/2010	524.63	990.79	1515.42	1516.30
		7/6/2011	532.09	983.33		
		4/9/2012	535.83	979.59		
PW-8E	770-780	4/23/2010	525.17	990.25	1515.42	1516.30
		7/6/2011	532.25	983.17		
PW-9A	350-360	4/20/2010	337.67	966.49	1304.16	1304.70
		6/30/2011	344.68	959.48		
		4/6/2012	346.88	957.28		
PW-9B	410-420	4/20/2010	337.77	966.39	1304.16	1304.70
		6/30/2011	344.77	959.39		
		4/6/2012	346.83	957.33		
PW-9C	480-490	4/20/2010	338.01	966.15	1304.16	1304.70
		6/30/2011	345.14	959.02		
		4/6/2012	347.36	956.80		
PW-9D	560-570	4/20/2010	338.03	966.13	1304.16	1304.70
		6/30/2011	345.67	958.49		
		4/6/2012	347.52	956.64		
PW-9E	645-655	4/20/2010	338.56	965.60	1304.16	1304.70
		6/30/2011	347.05	957.11		
		4/6/2012	348.97	955.19		
PW-9F	715-725	4/20/2010	338.87	965.29	1304.16	1304.70
		6/30/2011	347.88	956.28		
		4/6/2012	349.62	954.54		
PW-9G	805-815	4/20/2010	340.08	964.08	1304.16	1304.70
		6/30/2011	348.42	955.74		
		4/6/2012	350.67	953.49		
CPW-16A	292-302	4/26/2010	254.54	926.44	1180.98	1181.52
		6/29/2011	264.35	916.63		
		4/5/2012	265.42	915.56		

	Well Screen Interval (ft bgs)	Date	Depth to Water (ft)	Water Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Approximate Ground Surface Elevation (ft amsl)
CPW-16B	375-385	4/26/2010	255.30	925.68	1180.98	
		6/29/2011	265.02	915.96		
		4/5/2012	266.30	914.68		
CPW-16C	414-424	4/26/2010	256.10	924.88	1180.98	
		6/29/2011	265.99	914.99		
		4/5/2012	266.79	914.19		
CPW-16D	510-520	4/26/2010	256.88	924.10	1180.98	
		6/29/2011	266.19	914.79		
		4/5/2012	267.51	913.47		
CPW-16E	635-645	4/26/2010	256.25	924.73	1180.98	
		6/29/2011	265.81	915.17		
		4/5/2012	267.22	913.76		
CPW-16F	715-725	4/26/2010	258.37	922.61	1180.98	
		6/29/2011	268.60	912.38		
		4/5/2012	270.14	910.84		
CPW-16G	750-760	4/26/2010	257.94	923.04	1180.98	
		6/29/2011	267.92	913.06		
CPW-17A	240-250	4/22/2010	DRY	DRY	1135.98	
		6/23/2011	242.20	893.78		
		4/5/2012	242.56	893.42		
CPW-17B	310-320	4/22/2010	250.00	885.98	1135.98	
		6/23/2011	254.62	881.36		
		4/5/2012	255.60	880.38		
CPW-17C	410-420	4/22/2010	249.08	886.90	1135.98	
		6/23/2011	254.02	881.96		
		4/5/2012	255.20	880.78		
CPW-17D	500-510	4/22/2010	245.77	890.21	1135.98	
		6/23/2011	251.37	884.61		
		4/5/2012	253.15	882.83		
CPW-17E	560-570	4/22/2010	245.95	890.03	1135.98	
		6/23/2011	251.50	884.48		
CPW-17F	608-618	4/22/2010	247.64	888.34	1135.98	
		6/23/2011	252.26	883.72		
CPW-17G	708-718	4/22/2010	239.31	896.67	1135.98	
		6/23/2011	246.14	889.84		
Notes:						
"Port" refers to the measurement port above magnetic collar						
ft amsl = feet above mean sea level						
ft bgs = feet below ground surface						

Table 4-2
BF Goodrich Superfund Site, San Bernardino County, California
Summary of Perchlorate and Volatile Organic Compounds[a] in Groundwater, June/July 2011 and April 2012

Location	Sample Date	Sample Type	Chloroform (ug/L)	cis-1,2-Dichloroethene (ug/L)	Methylene Chloride (ug/L)	Perchlorate (ug/L)	Tetrachloroethene (ug/L)	Trichloroethene (ug/L)	Carbon Tetrachloride (ug/L)
Regulatory Limits MCL			**80.0 ug/L[bc]**	**6.0 ug/L[c]**	**5.0 ug/L**	**6.0 ug/L[c]**	**5.0 ug/L**	**5.0 ug/L**	**0.5 ug/Lc**
Production Wells[d]									
Rialto-07	06/21/2011	N	<0.500	<0.500	<0.500	**2.5**	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	**2.5**	<0.500	<0.500	<0.500
Conventional Monitoring Wells[d]									
PW-2	06/22/2011	N	<0.500	<0.500	<0.500	**28**	**0.0650 J**	**42**	<0.500
	04/12/2012	N	<1.00	<1.00	**0.380J**	**150**	<1.00	**58J**	<1.00
	04/12/2012	FD	<1.00UJ	<1.00UJ	**0.800J**	**150**	<1.00UJ	**47J**	<1.00UJ
PW-3	06/21/2011	N	**0.660**	<0.500	<0.500	**15**	<0.500	**11**	<0.500
	06/21/2011	FD	**0.670**	<0.500	<0.500	**18**	<0.500	**10**	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	**16**	<0.500	**1.6**	<0.500
PW-4	06/21/2011	N	<0.500	<0.500	<0.500	**36**	<0.500	**30**	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	**15**	<0.500	**17**	<0.500
PW-4a	06/24/2011	N	<0.500	<0.500	<0.500	**2**	<0.500	<0.500	<0.500
USGS Cluster Wells[d]									
1S/5W-3A5S	06/22/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
1S/5W-3A6S	06/23/2011	N	<0.500	<0.500	**1.10 JB**	**220**	<0.500	**4**	<0.500
1S/5W-3A6S	06/23/2011	FD	<0.500	<0.500	<0.500	**220**	<0.500	**4**	<0.500
	04/12/2012	N	<0.500	<0.500	**0.400J**	**220**	<0.500	**6.5J**	<0.500
1S/5W-3A7S	06/22/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/12/2012	FD	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
1S/5W-11F1S	06/22/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
1S/5W-11F3S	06/22/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
1S/5W-11F4S	06/22/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	<2.00	<0.500UJ	<0.500UJ	<0.500UJ
1S/5W-13B2S	06/23/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
1S/5W-13B3S	06/22/2011	N	<0.500	<0.500	<0.500	**1.4J**	**0.410 J**	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	**1.5J**	<0.500	<0.500	<0.500
1S/5W-13B4S	06/22/2011	N	<0.500	<0.500	<0.500	**3.3J**	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	**5**	<0.500	<0.500	<0.500
1S/5W-13B5S	06/22/2011	N	<0.500	<0.500	<0.500	**1.1J**	**0.830**	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	<2.00	**0.5**	<0.500	<0.500
1S/5W-13B5S	06/22/2011	FD	<0.500	<0.500	<0.500	<2.00	**0.860**	<0.500	<0.500
1S/4W-8E1S	06/22/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
1S/4W-8E2S	06/22/2011	N	<0.500	<0.500	<0.500	**1.6J**	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	**0.450J**	<2.00	<0.500	<0.500UJ	<0.500
1S/4W-8E3S	06/22/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
1S/4W-8E4S	06/22/2011	N	<0.500	<0.500	<0.500	**1.5J**	<0.500	<0.500	<0.500
	04/12/2012	N	<0.500	<0.500	<0.500	**1.3J**	<0.500	<0.500	<0.500

Table 4-2
BF Goodrich Superfund Site, San Bernardino County, California
Summary of Perchlorate and Volatile Organic Compounds[a] in Groundwater, June/July 2011 and April 2012

Location	Sample Date	Sample Type	Chloroform (ug/L)	cis-1,2-Dichloroethene (ug/L)	Methylene Chloride (ug/L)	Perchlorate (ug/L)	Tetrachloroethene (ug/L)	Trichloroethene (ug/L)	Carbon Tetrachloride (ug/L)
Regulatory Limits MCL			**80.0 ug/L[bc]**	**6.0 ug/L[c]**	**5.0 ug/L**	**6.0 ug/L[c]**	**5.0 ug/L**	**5.0 ug/L**	**0.5 ug/Lc**
1N/5W-34D2S	04/12/2012	N	<0.500	<0.500	**0.9**	**19**	<0.500	<0.500UJ	<0.500
1N/5W-34D3S	04/12/2012	N	<0.500	<0.500	**0.41J**	**21**	<0.500	**0.52J**	<0.500
1N/5W-34D3S	04/12/2012	FD	<0.500	<0.500	**0.35J**	**21**	<0.500	**0.48J**	<0.500
EPA Multiport Monitoring Wells									
EPA-MP1a	06/24/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/02/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP1b	06/24/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/02/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP1c	06/24/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/02/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP1d	06/24/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/02/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP1e	06/24/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP2a	07/08/2011	N	<0.500	<0.500	<0.500	**3**	<0.500	<0.500	<0.500
	04/03/2012	N	<0.500	<0.500	<0.500	**2.8**	<0.500	<0.500	<0.500
EPA-MP2b	07/08/2011	N	<0.500	<0.500	<0.500	**5.4**	**1**	<0.500	<0.500
EPA-MP2b	07/08/2011	FD	<0.500	<0.500	<0.500	**5.4**	**0.92**	<0.500	<0.500
	04/03/2012	N	<0.500	<0.500	<0.500	**5**	<0.500	<0.500	<0.500
EPA-MP2c	07/08/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/03/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP2d	07/08/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/03/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/03/2012	FD	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP2e	07/08/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/03/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP2f	07/08/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP3a	06/27/2011	N	<0.500	<0.500	<0.500	**14**	<0.500	<0.500	<0.500
	04/04/2012	N	<0.500	<0.500	<0.500	**13**	<0.500	<0.500	<0.500
EPA-MP3b	06/27/2011	N	<0.500	<0.500	<0.500	**3**	<0.500	<0.500	<0.500
	04/04/2012	N	<0.500	<0.500	<0.500	**2.7**	<0.500	<0.500	<0.500
EPA-MP3c	06/27/2011	N	<0.500	<0.500	<0.500	**2.8**	<0.500	<0.500	<0.500
	04/04/2012	N	<0.500	<0.500	<0.500	**2.4**	<0.500	<0.500	<0.500
EPA-MP3d	06/27/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/04/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP3e	06/27/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP4a	06/28/2011	N	<0.500	<0.500	<0.500	**2.5**	<0.500	**0.83**	<0.500
	04/03/2012	N	<0.500	<0.500	<0.500	**2.3**	<0.500	**0.69**	<0.500
EPA-MP4b	06/28/2011	N	<0.500	<0.500	<0.500	**1.2J**	<0.500	**1**	<0.500
	04/03/2012	N	<0.500	<0.500	<0.500	**1.2J**	<0.500	**0.69**	<0.500
EPA-MP4c	06/28/2011	N	<0.500	<0.500	<0.500	**2.1**	<0.500	**6.4**	<0.500
	04/03/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	**3.4**	<0.500
	04/03/2012	FD	<0.500	<0.500	<0.500	**1.3J**	<0.500	**5.4J**	<0.500
EPA-MP4d	06/27/2011	N	<0.500	<0.500	<0.500	**2.6**	<0.500	**4.8**	**0.093J**

Table 4-2
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Summary of Perchlorate and Volatile Organic Compounds[a] in Groundwater, June/July 2011 and April 2012

Location	Sample Date	Sample Type	Chloroform (ug/L)	cis-1,2-Dichloroethene (ug/L)	Methylene Chloride (ug/L)	Perchlorate (ug/L)	Tetrachloroethene (ug/L)	Trichloroethene (ug/L)	Carbon Tetrachloride (ug/L)
Regulatory Limits MCL			**80.0 ug/L[bc]**	**6.0 ug/L[c]**	**5.0 ug/L**	**6.0 ug/L[c]**	**5.0 ug/L**	**5.0 ug/L**	**0.5 ug/Lc**
	04/03/2012	N	<0.500	<0.500	<0.500	**5.6**	<0.500	**4.6J**	<0.500
EPA-MP4e	06/27/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/03/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	<2.00	<0.500	<0.500UJ	<0.500UJ
EPA-MP5a	07/05/2011	N	<0.500	<0.500	<0.500	**1.7J**	<0.500	<0.500	<0.500
EPA-MP5a	07/05/2011	FD	<0.500	<0.500	<0.500	**3.2**	<0.500	<0.500	<0.500
	04/04/2012	N	<0.500	<0.500	<0.500	**3.1**	<0.500	<0.500	<0.500
EPA-MP5b	07/05/2011	N	<0.500	**0.560**	<0.500	**4.9**	**4.1**	**0.37J**	<0.500
	04/04/2012	N	<0.500	**0.54**	<0.500	**5.2**	**3.5**	**0.27J**	<0.500
EPA-MP5c	07/05/2011	N	**0.600**	<0.500	<0.500	<2.00	**0.720**	<0.500	<0.500
	04/04/2012	N	<0.500	<0.500	<0.500	<2.00	**0.44J**	<0.500	<0.500
EPA-MP5d	07/05/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/04/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP5e	07/05/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP6a	06/28/2011	N	<0.500	<0.500	<0.500	**35**	<0.500	<0.500	<0.500
	04/02/2012	N	<0.500	<0.500	<0.500	**34**	<0.500	<0.500	<0.500
EPA-MP6b	06/28/2011	N	<0.500	<0.500	<0.500	**3.4**	<0.500	<0.500	<0.500
EPA-MP6b	06/28/2011	FD	<0.500	<0.500	<0.500	**3.6**	<0.500	<0.500	<0.500
	04/02/2012	N	<0.500	<0.500	<0.500	**3.3**	<0.500	<0.500	<0.500
	04/02/2012	FD	<0.500	<0.500	<0.500	**3**	<0.500	<0.500	<0.500
EPA-MP6c	06/28/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/02/2012	N	<0.500	<0.500	<0.500	**1.1J**	<0.500	<0.500	<0.500
EPA-MP6d	06/28/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/02/2012		<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
EPA-MP6e	06/28/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
Non-EPA Multiport Monitoring Wells									
PW-5a	07/06/2011	N	<0.500	<0.500	<0.500	**150**	<0.500	**0.61**	<0.500
	04/06/2012	N	<0.500	<0.500	<0.500	**160**	<0.500	**0.3J**	<0.500
PW-5b	07/06/2011	N	<0.500	<0.500	<0.500	**150**	<0.500	**22**	<0.500
	04/06/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**180**	<0.500UJ	**14**	<0.500UJ
PW-5c	07/06/2011	N	<0.500	<0.500	<0.500	**140**	<0.500	**17**	<0.500
	04/06/2012	N	<0.500UJ	<0.500UJ	<0.500	**150**	<0.500UJ	**14**	<0.500UJ
PW-5d	07/06/2011	N	<0.500	<0.500	**2.70 JB**	**1100**	<0.500	**25**	<0.500
	04/06/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**1000**	<0.500UJ	**19**	<0.500UJ
PW-5e	07/06/2011	N	<0.500	<0.500	<0.500	**160**	<0.500	**0.48 J**	<0.500
	04/06/2012	N	<0.500	<0.500	<0.500	**560**	<0.500	**2.9**	<0.500
PW-6a	07/05/2011	N	<0.500	<0.500	<0.500	**35**	<0.500	**1.2**	<0.500
	04/09/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**35**	<0.500UJ	**1.5J**	<0.500UJ
PW-6b	07/05/2011	N	<0.500	<0.500	<0.500	**22**	<0.500	**0.27J**	<0.500
	04/09/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**41**	<0.500UJ	**0.47J**	<0.500UJ
	04/09/2012	FD	<0.500UJ	<0.500UJ	**0.230J**	**42**	<0.500UJ	**0.77J**	<0.500UJ
PW-6c	07/05/2011	N	<0.500	<0.500	<0.500	**10**	<0.500	**0.57**	<0.500
	04/09/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**18**	<0.500UJ	**0.3J**	<0.500UJ
PW-6d	07/05/2011	N	<0.500	<0.500	<0.500	**1.4J**	<0.500	<0.500	<0.500

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Location	Sample Date	Sample Type	Chloroform (ug/L)	cis-1,2-Dichloroethene (ug/L)	Methylene Chloride (ug/L)	Perchlorate (ug/L)	Tetrachloroethene (ug/L)	Trichloroethene (ug/L)	Carbon Tetrachloride (ug/L)
Regulatory Limits MCL			**80.0 ug/L[bc]**	**6.0 ug/L[c]**	**5.0 ug/L**	**6.0 ug/L[c]**	**5.0 ug/L**	**5.0 ug/L**	**0.5 ug/Lc**
	04/09/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**16**	<0.500UJ	<0.500UJ	<0.500UJ
PW-6e	07/05/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/09/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	<2.00	<0.500UJ	<0.500UJ	<0.500UJ
PW-7a	07/07/2011	N	<0.500	<0.500	<0.500	**11**	<0.500	<0.500	<0.500
	04/10/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**9.4**	<0.500UJ	<0.500UJ	<0.500UJ
PW-7b	07/07/2011	N	<0.500	<0.500	<0.500	**2.7**	<0.500	<0.500	<0.500
	04/10/2012	N	<0.500	<0.500	<0.500	**2.6**	<0.500	<0.500UJ	<0.500
PW-7c	07/07/2011	N	<0.500	<0.500	<0.500	**2.6**	<0.500	<0.500	<0.500
	04/10/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**4.8**	<0.500UJ	0.180J	<0.500UJ
PW-7d	07/07/2011	N	<0.500	<0.500	<0.500	**4.2**	<0.500	**0.42J**	<0.500
	04/10/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**2.9**	<0.500UJ	**0.35J**	<0.500UJ
PW-7e	07/07/2011	N	<0.500	<0.500	<0.500	**50**	<0.500	**2.2**	<0.500
	04/10/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**60**	<0.500UJ	**2.2J**	<0.500UJ
PW-7f	07/07/2011	N	<0.500	<0.500	<0.500	**12**	<0.500	<0.500	<0.500
	04/10/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**20**	<0.500UJ	**0.22J**	<0.500UJ
PW-7g	07/07/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/10/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500UJ	<0.500
PW-8a	07/06/2011	N	**0.730**	<0.500	<0.500	**160**	<0.500	**70**	**0.19J**
	04/09/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**140**	<0.500UJ	**31J**	**0.28J**
PW-8b	07/06/2011	N	<0.840	<0.840	<0.840	**89**	<0.840	**24**	<0.840
PW-8b	07/06/2011	FD	<0.500	<0.500	<0.500	**90**	<0.500	**18**	<0.500
	04/09/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**100**	<0.500UJ	**21J**	<0.500UJ
PW-8c	07/06/2011	N	<0.500	<0.500	<0.500	**4.8**	<0.500	<0.500	<0.500
	04/09/2012	N	<0.500	<0.500	<0.500	**9.6**	<0.500	**0.20J**	<0.500
	04/09/2012	FD	<0.500	<0.500	<0.500	**10**	<0.500	**0.21J**	<0.500
PW-8d	07/06/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500UJ	<0.500
	04/09/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
PW-8e	07/06/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
PW-9a	06/30/2011	N	<0.500	<0.500	<0.500	**27**	<0.500	<0.500	<0.500
	04/06/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**25**	<0.500UJ	<0.500UJ	<0.500UJ
PW-9b	06/30/2011	N	<0.500	<0.500	<0.500	**140**	<0.500	**3**	<0.500
	04/06/2012	N	<0.500	<0.500	<0.500	**210**	<0.500	**1.9**	<0.500
PW-9c	06/30/2011	N	<0.500	<0.500	<0.500	**340**	<0.500	**12**	<0.500
	04/06/2012	N	<0.500UJ	<0.500UJ	<0.500UJ	**420**	<0.500UJ	**6.4**	<0.500UJ
PW-9d	06/30/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/06/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
PW-9e	06/30/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/06/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
PW-9f	06/30/2011	N	<0.500	<0.500	<0.500	**18**	<0.500	**0.28J**	<0.500
	04/06/2012	N	<0.500	<0.500	<0.500	**23**	<0.500	**0.19J**	<0.500
PW-9g	06/30/2011	N	<0.500	<0.500	<0.500	**290**	<0.500	**5.2**	<0.500
	04/06/2012	N	<0.500	<0.500	<0.500	**460**	<0.500	**4.3**	<0.500
CPW-16a	06/29/2011	N	<0.500	<0.500	<0.500	**24**	<0.500	<0.500	<0.500
CPW-16a	06/29/2011	FD	<0.500	<0.500	<0.500	**24**	<0.500	<0.500	<0.500

Table 4-2
BF Goodrich Superfund Site, San Bernardino County, California
Summary of Perchlorate and Volatile Organic Compounds[a] in Groundwater, June/July 2011 and April 2012

Location	Sample Date	Sample Type	Chloroform (ug/L)	cis-1,2-Dichloroethene (ug/L)	Methylene Chloride (ug/L)	Perchlorate (ug/L)	Tetrachloroethene (ug/L)	Trichloroethene (ug/L)	Carbon Tetrachloride (ug/L)
Regulatory Limits MCL			**80.0 ug/L[bc]**	**6.0 ug/L[c]**	**5.0 ug/L**	**6.0 ug/L[c]**	**5.0 ug/L**	**5.0 ug/L**	**0.5 ug/Lc**
	04/05/2012	N	<0.500	<0.500	<0.500	**23**	<0.500	<0.500	<0.500
CPW-16b	06/29/2011	N	<0.500	<0.500	<0.500	**74**	<0.500	**2**	<0.500
	04/05/2012	N	<0.500	<0.500	<0.500	**98**	<0.500	**0.97J**	<0.500
	04/05/2012	FD	<0.500	<0.500	<0.500	**84**	<0.500	**1.4**	<0.500
CPW-16c	06/29/2011	N	<0.500	<0.500	<0.500	**160**	<0.500	**4.1**	<0.500
	04/05/2012	N	<0.500	<0.500	<0.500	**180**	<0.500	**3J**	<0.500
CPW-16d	06/29/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/05/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
CPW-16e	06/29/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/05/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
CPW-16f	06/29/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/05/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
CPW-16g	06/29/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
CPW-17b	06/23/2011	N	<0.500	<0.500	<0.500	**2.9**	<0.500	<0.500	<0.500
	04/05/2012	N	<0.500	<0.500	<0.500	**3.3**	<0.500	<0.500	<0.500
CPW-17c	06/23/2011	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
	04/05/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500
CPW-17d	04/05/2012	N	<0.500	<0.500	<0.500	<2.00	<0.500	<0.500	<0.500

Detected chemicals are displayed in **bold** font

N Primary Sample

FD Field Duplicate

a Volatile Organic Compounds presented in this table represent chemicals most commonly detected during groundwater sampling events at the BF Goodrich Superfund Site and do not include all volatile organic compounds detected above analytical method reporting limits.

b MCL is for total trihalomethanes (chloroform, bromoform, bromodichloromethane, and dibromochloromethane)

c California Primary Maximum Contaminant Level (MCL)

d Hydrasleeve tool was used to collect sample

Data Qualifier Definitions:

J The analyte was positively identified, but the associated numerical value is estimated and represents the approximate concentration of the analyte in the sample.

JB The analyte was positively identified, but the numerical concentration is estimated because it is also identified in an associated laboratory blank.

UJ The analyte was not detected and the detection limit was estimated.

< The analyte was not detected above the reported sample quantitation limit.

Units:

ug/L = microgram per liter

Shaded result indicates exceedance of the MCL

Unless noted, MCLs represent both EPA and California primary regulatory levels

Table 4-3
BF Goodrich Superfund Site, San Bernardino County, California
Summary of Perchlorate and Volatile Organic Compounds in Groundwater for EPA-MP7, MP8 and MW9A and B

Location	Screen Depth (bgs)	Sample Date	Sample Type	Perchlorate (ug/L)	Trichloroethene (ug/L)	Other VOCs
Regulatory Limits MCL:				**6.0**	**5.0**	---
EPA Conventional Monitoring Wells						
EPA-MW9a	520-540	07/26/2012	N	180	1.7	see note 2
EPA-MW9b	715-735	07/26/2012	FD	<2/<2	<0.5/<0.5	see note 1
EPA Multiport Monitoring Wells						
EPA-MP7a	356-366	01/17/2012	FD	**12/12**	<0.50/<0.50	ND
	356-366	07/24/2012	FD	**11/12**	<0.50/<0.50	ND
EPA-MP7b	430-440	01/17/2012	N	**7.8**	<0.50	ND
	430-440	07/24/2012	N	**6.8**	<0.50	ND
EPA-MP7c	497-507	01/17/2012	N	**2.2**	<0.50	ND
	497-507	07/24/2012	N	**1.3J**	<0.50	ND
EPA-MP7d	584-594	01/17/2012	N	<2	<0.50	ND
	584-594	07/24/2012	N	<2	<0.50	ND
EPA-MP7e	700-710	01/17/2012	N	<2	<0.50	ND
	700-710	07/24/2012	N	<2	<0.50	ND
EPA-MP8a	345-355	01/16/2012	N	<2	<0.50	see note 3
	345-355	07/25/2012	N	<2	<0.50	ND
EPA-MP8b	395-405	01/16/2012	N	<2	<0.50	ND
	395-405	07/25/2012	N	<2	<0.50	ND
EPA-MP8c	490-500	01/16/2012	N	<2	<0.50	ND
	490-500	07/25/2012	N	<2	<0.50	ND
EPA-MP8d	605-615	01/16/2012	N	<2	<0.50	see note 4
	605-615	07/25/2012	N	<2	<0.50	see note 5
EPA-MP8e	720-730	01/16/2012	N	<2	<0.50	see note 6
	720-730	07/25/2012	N	<2	<0.50	ND

NOTES:

Detected chemicals are displayed in **bold** font

Analytical values shown in Table 4-3 for EPA-MW9A and 9B are correctly reported. However, the sample container IDs for the groundwater samples collected from EPA-MW9A and 9B were initially reversed. Therefore, the results for EPA MW9A are listed in the laboratory reports as sample ID EPA-MW9B. The results for EPA-MW9B are listed in laboratory reports as sample ID EPA-MW9A

NA: not analyzed

ND: not detected

N = Primary Sample; FD = Field Duplicate

Shaded result indicates exceedance of the MCL.

Units: ug/L = microgram per liter

Data Qualifier Definitions:

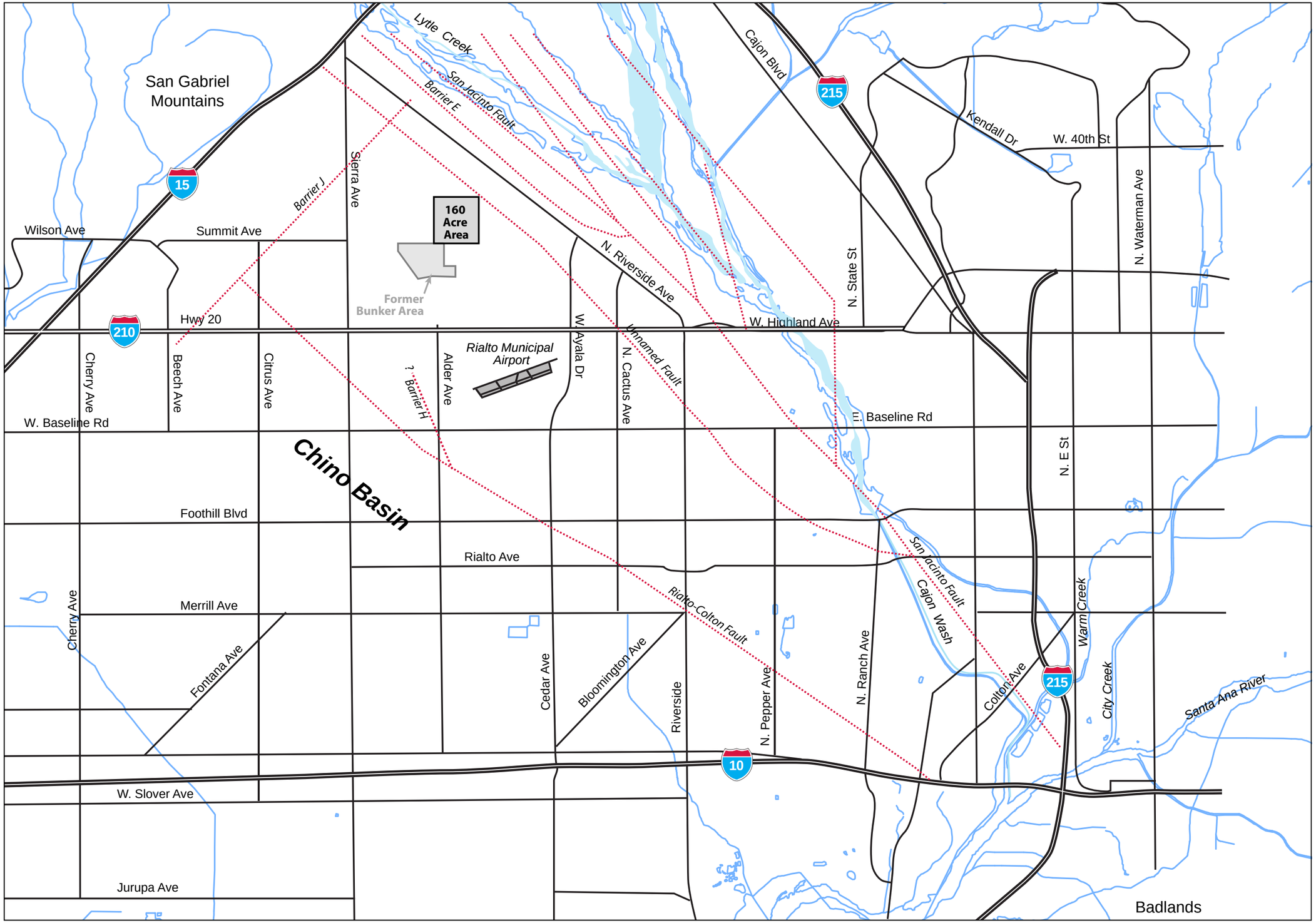
J The analyte was positively identified, but the associated numerical value is estimated and represents the approximate concentration of the analyte in the sample.

< The analyte was not detected above the reported sample quantitation limit.

Other VOCs detected (ug/L):

1. Acetone at 6.7/5.9
2. Toluene at 15
3. Toluene at 0.11J
4. Chloromethane at 0.14J, acetone at 4.1J, carbon disulfide at 0.63, toluene at 0.19J
5. Carbon disulfide at 0.89
6. Carbon disulfide at 0.14J

FIGURES

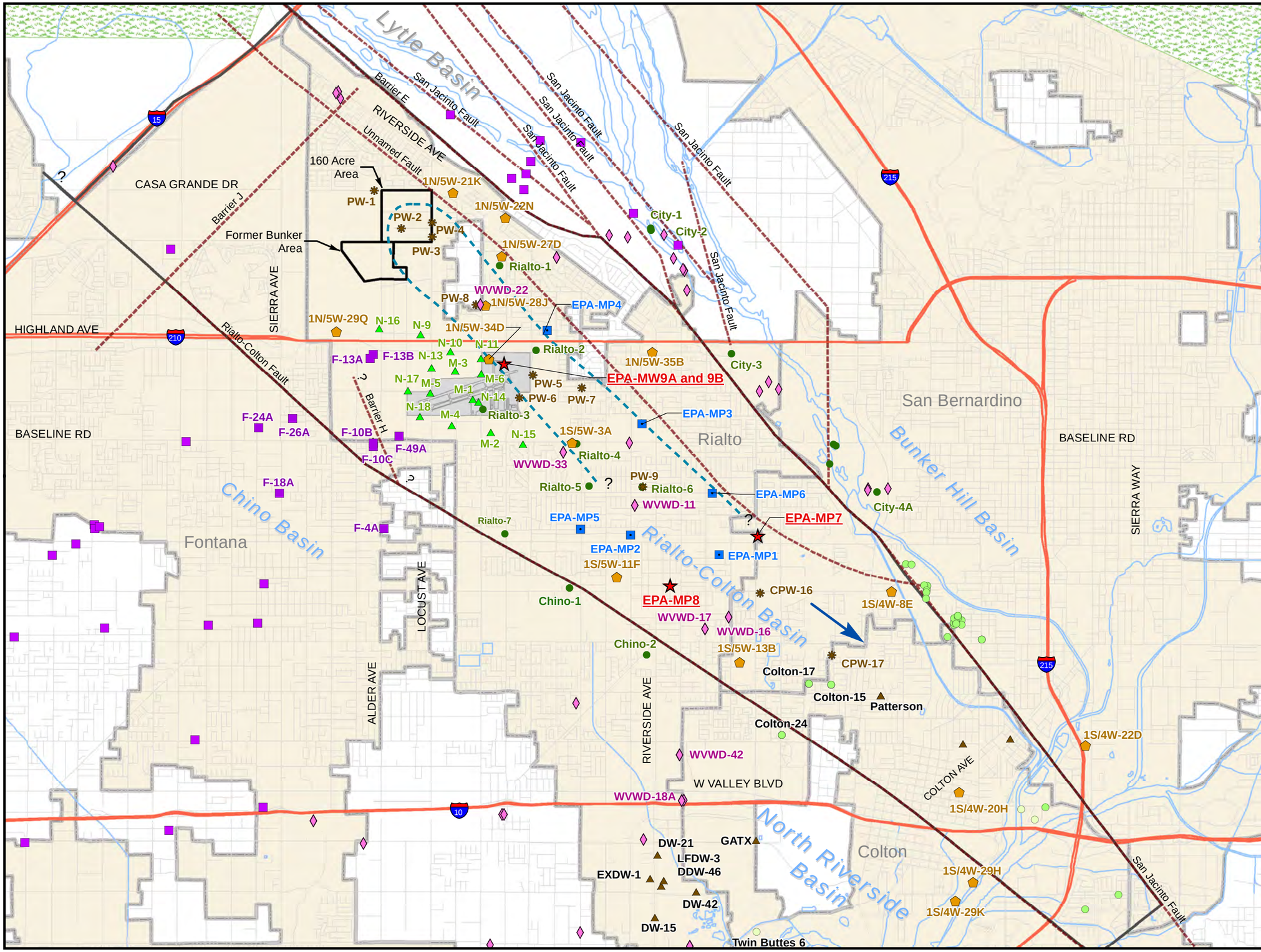


ITSI Gilbane

B.F. GOODRICH RI/FS
MONITORING WELL INSTALLATION AND SITE GROUNDWATER SAMPLING

FIGURE 1-1
SITE LOCATION MAP

Z:\0054 TO 53 RICO-09\W BF Goodrich RI-FS\Graphics\Site Location Mapai



ITSI Gilbane

FIGURE 1-2
WELL LOCATION MAP

B.F. GOODRICH RI/FS
MONITORING WELL INSTALLATION
AND SITE GROUNDWATER SAMPLING

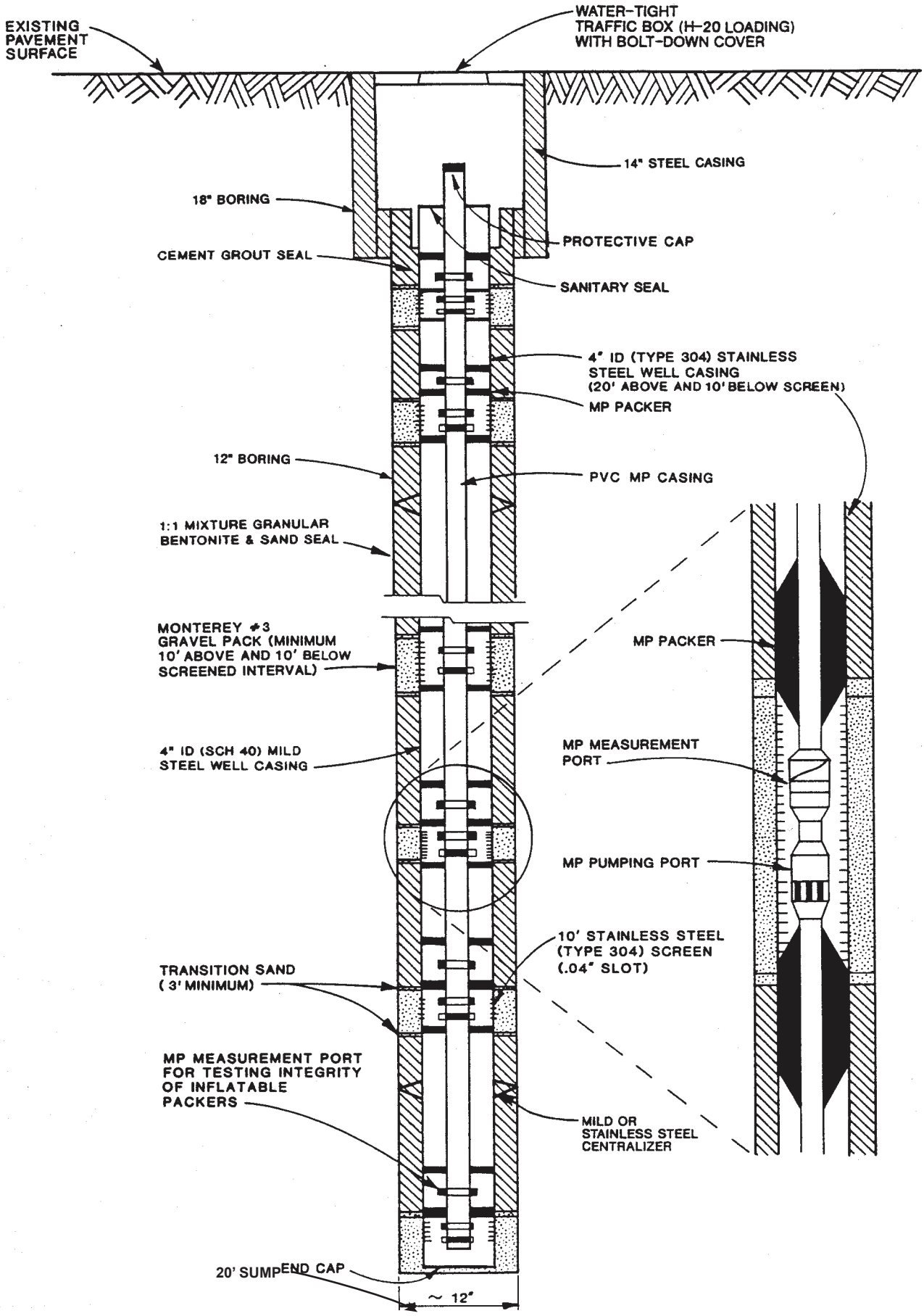


FIGURE NOT TO SCALE

ITSI Gilbane

B.F. GOODRICH RI/FS

MONITORING WELL INSTALLATION AND SITE GROUNDWATER SAMPLING

FIGURE 2-1

TYPICAL DESIGN DETAIL FOR MULTI-PORT MONITORING WELL

Z:\0054 TO 53 RICO-09JW BF Goodrich RI-FS\Graphics\Typical Design Detail.ai

APPENDIX A

Geophysical Surveys, Lithology Logs, and As-Built Diagrams

EPA-MP7

PACIFIC SURVEYS

CALIPER
BOREHOLE VOLUMES

Job No.
16187

File No.

Company	WDC EXPLORATION & WELLS
Well	EPA-MP7
Field	RIALTO
County	SAN BERNARDINO State CA

Location:
BF GOODRICH
FOOTHILL AND PEPPER
GPS: N 34o 06.505' W 117o 21.175'
Sec. Twp. Rge.

Other Services:
GR/LL3
ELOG
SONIC

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L. 0'		K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	10-10-2011		
Run Number	ONE		
Depth Driller	789'		
Depth Logger	789'		
Bottom Logged Interval	789'		
Top Log Interval	0'		
Casing Driller	14" @ 25'		
Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	MEASURE		
Rm @ Meas. Temp	11.17 @ 77F		
Rmf @ Meas. Temp	12.20 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	PIT		
Rm @ BHT	N/A		
Time Circulation Stopped	1.5 HOURS		
Time Logger on Bottom	1645		
Max. Recorded Temperature	N/A		
Equipment Number	PS-3		
Location	LA		
Recorded By	SCHUMACHER		
Witnessed By	C. MARVIN		

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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

Calibration Report

Database File: 16187.db
Dataset Pathname: CAL.1
Dataset Creation: Mon Oct 10 19:19:30 2011 by Calc Open-Cased 090629

Temperature Calibration Report

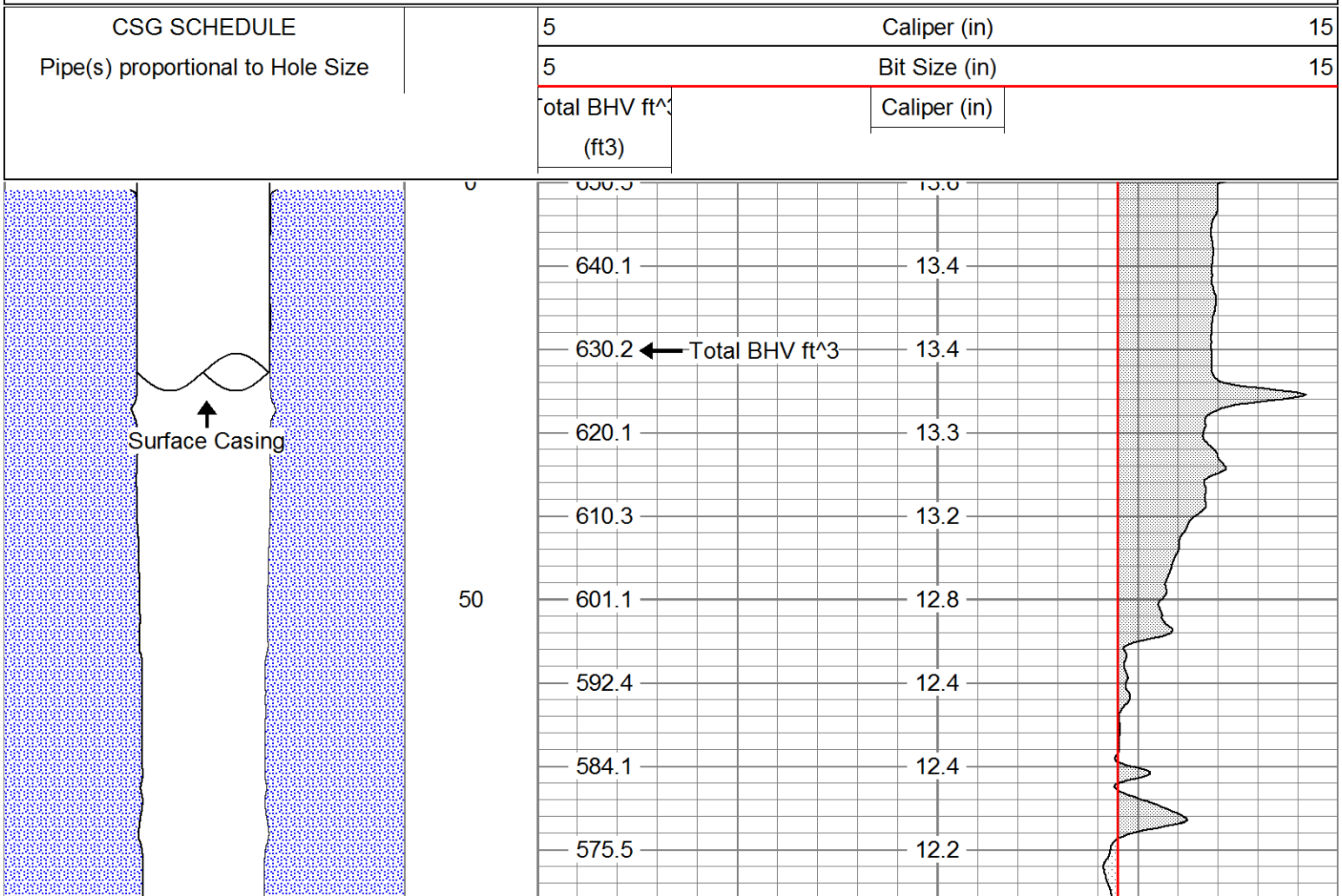
Serial Number:	PS-3_Short			
Tool Model:	Short_GPH			
Performed:	Sat Oct 30 12:23:45 2010			
	Reference		Reading	
Low Reference:	4.00	degF	437.62	cps
High Reference:	10.00	degF	850.00	cps
Gain:	0.01			
Offset:	-2.07			
Delta Spacing	1			

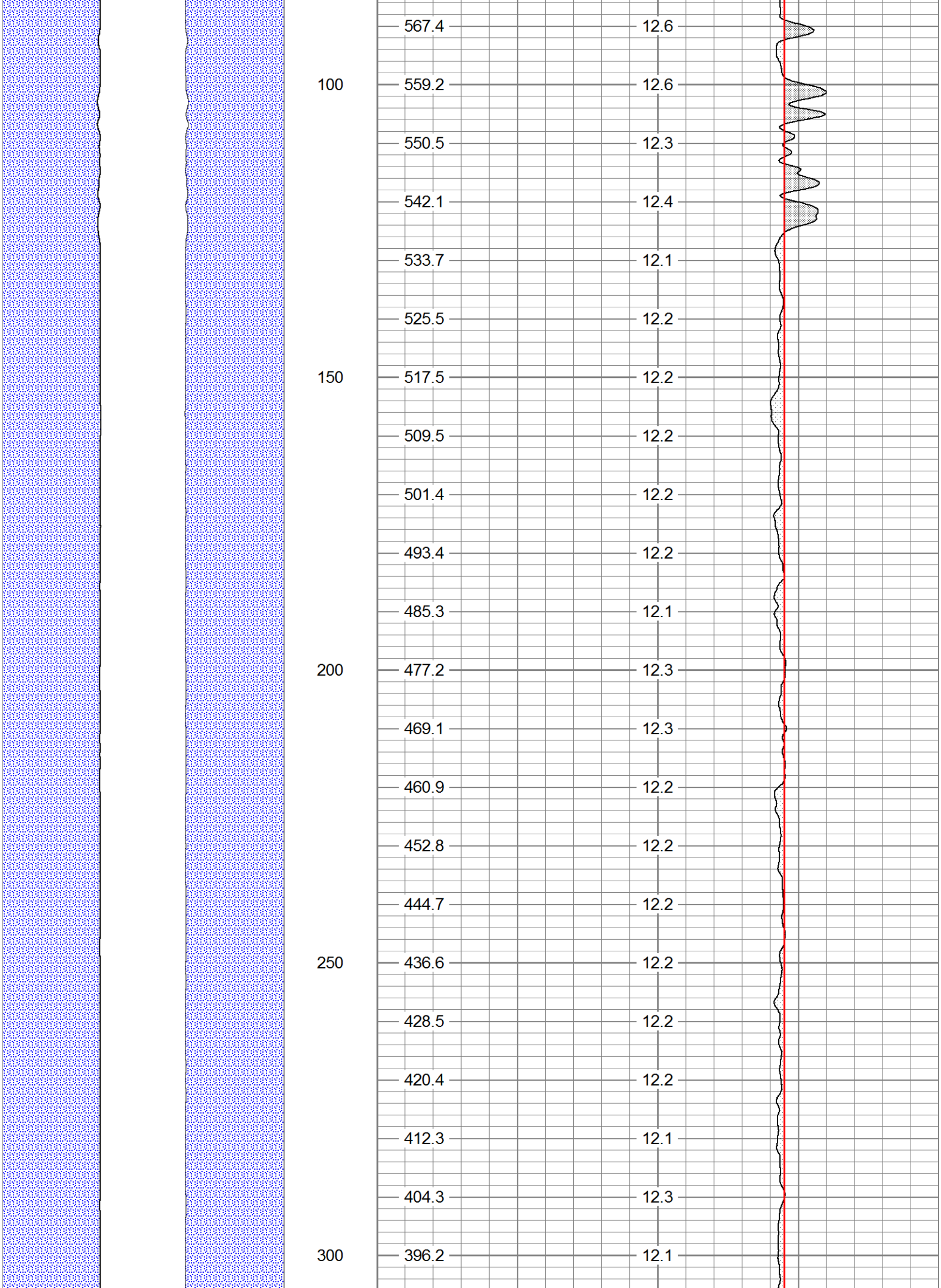
XY Caliper Calibration Report

Serial Number/Model:	Short-Comprobe
Performed:	Wed Jul 06 14:17:30 2011

Ring			X Caliper		Y Caliper	
1:	4	in	323.326	cps	323.326	cps
2:	8	in	446.363	cps	446.363	cps
3:	12	in	575.851	cps	575.851	cps
4:	16	in	703.014	cps	703.014	cps
5:	20	in	834.164	cps	834.164	cps
6:		in		cps		cps

Database File:	16187.db
Dataset Pathname:	CAL.1
Presentation Format:	xyc_gph
Dataset Creation:	Mon Oct 10 19:19:30 2011 by Calc Open-Cased 090629
Charted by:	Depth in Feet scaled 1:240

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501.4
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493.4
12.2
485.3
12.1
200
477.2
12.3
469.1
12.3
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444.7
12.2
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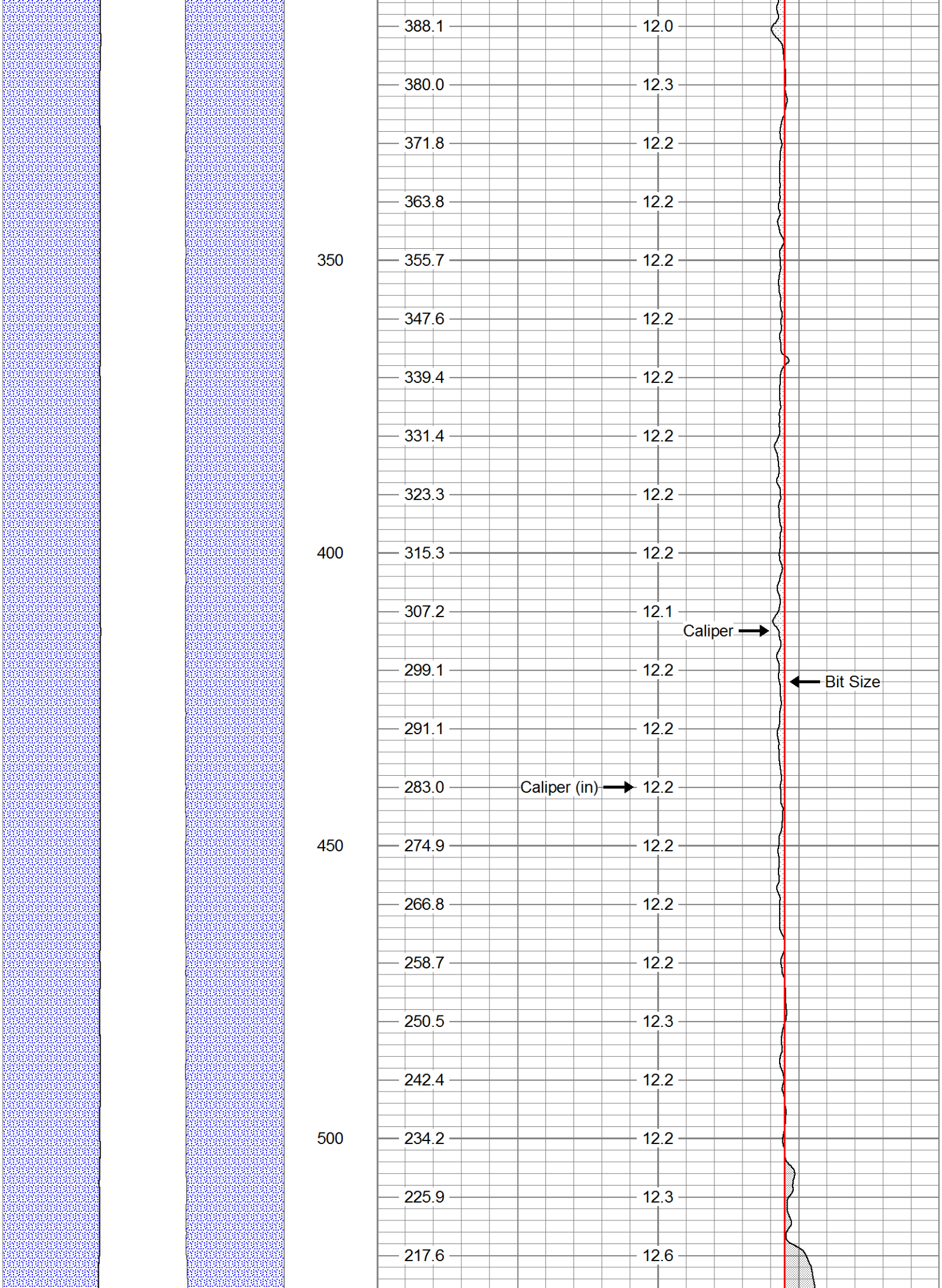
12.3
300
396.2
12.1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12.2
331.4
12.2
323.3
12.2
400
315.3
12.2
307.2
12.1
Caliper
299.1
12.2
Bit Size
291.1
12.2
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Caliper (in)
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274.9
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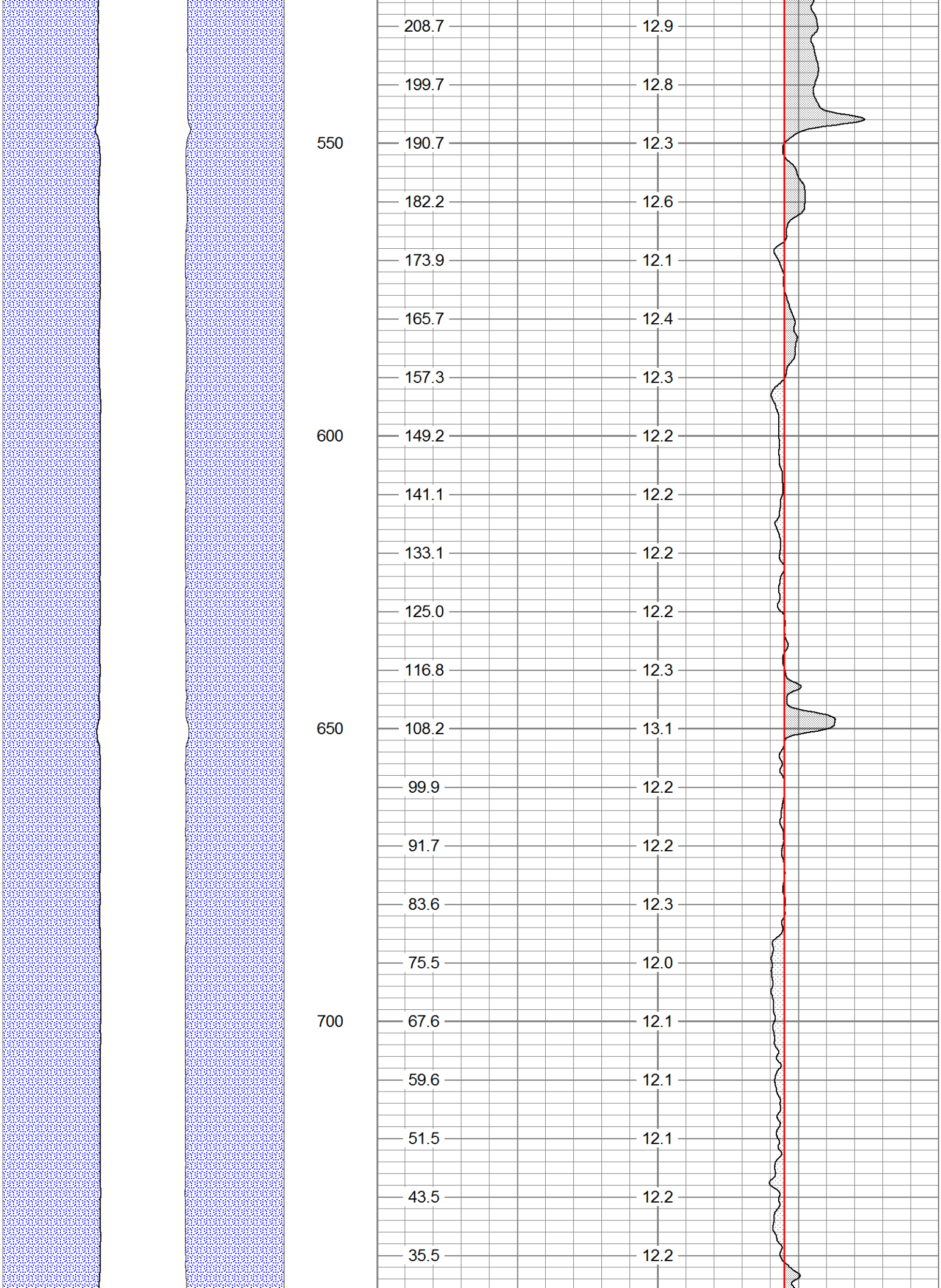
12.6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12.2
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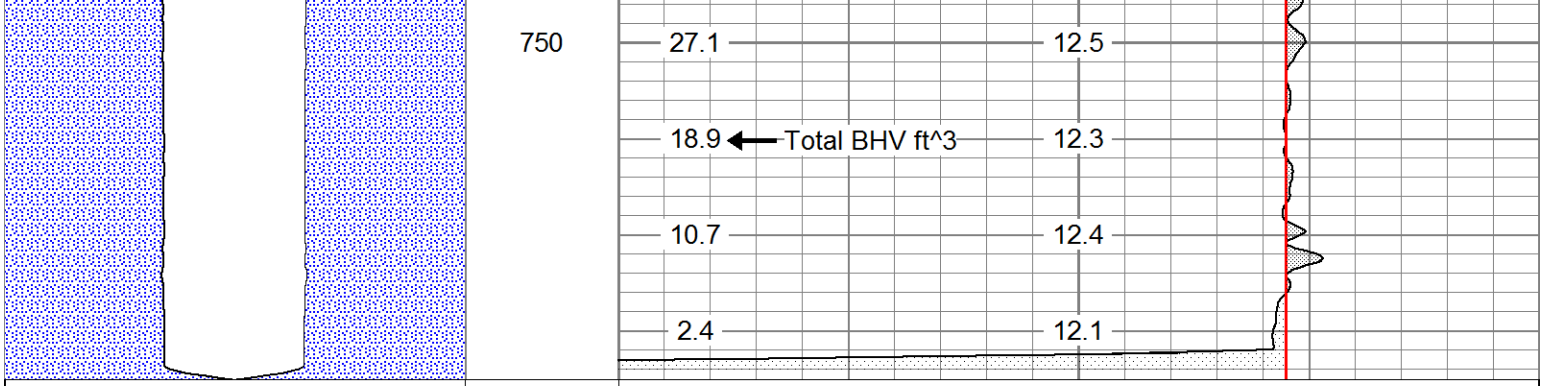
12.2



CSG SCHEDULE

Pipe(s) proportional to Hole Size

5 Caliper (in) 15

5 Bit Size (in) 15

Total BHV ft^3 (ft3)

Caliper (in)

PACIFIC SURVEYS

LATEROLOG 3
GAMMA-RAY

Job No.
16187

File No.

Company	WDC EXPLORATION & WELLS
Well	EPA-MP7
Field	RIALTO
County	SAN BERNARDINO State CA

Location:
BF GOODRICH
FOOTHILL AND PEPPER
GPS: N 34o 06.505' W 117o 21.175'
Sec. Twp. Rge.

Other Services:
GR/ELOG
SONIC
CAL

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L. 0'		K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	10-10-2011		
Run Number	ONE		
Depth Driller	789'		
Depth Logger	789'		
Bottom Logged Interval	789'		
Top Log Interval	0'		
Casing Driller	14" @ 25'		
Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	MEASURE		
Rm @ Meas. Temp	11.17 @ 77F		
Rmf @ Meas. Temp	12.20 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	PIT		
Rm @ BHT	N/A		
Time Circulation Stopped	1.5 HOURS		
Time Logger on Bottom	1645		
Max. Recorded Temperature	N/A		
Equipment Number	PS-3		
Location	LA		
Recorded By	SCHUMACHER		
Witnessed By	C. MARVIN		

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Comments

Calibration Report

Database File: 16187.db
Dataset Pathname: LL3
Dataset Creation: Mon Oct 10 17:36:13 2011 by Log Open-Cased 090629

Gamma Ray Calibration Report

Serial Number:	12	
Tool Model:	GROH	
Performed:	Wed Aug 31 18:41:03 2011	
Calibrator Value:	162.0	GAPI
Background Reading:	41.2	
Calibrator Reading:	182.5	
Sensitivity:	1.1460	GAPI/

RLL3 (Resistivity Laterolog 3) Calibration Report:

Serial Number:	231	
Tool Model:	M&W	
Performed:	Wed Aug 31 18:40:12 2011	

System Reading	Calibration Reference	
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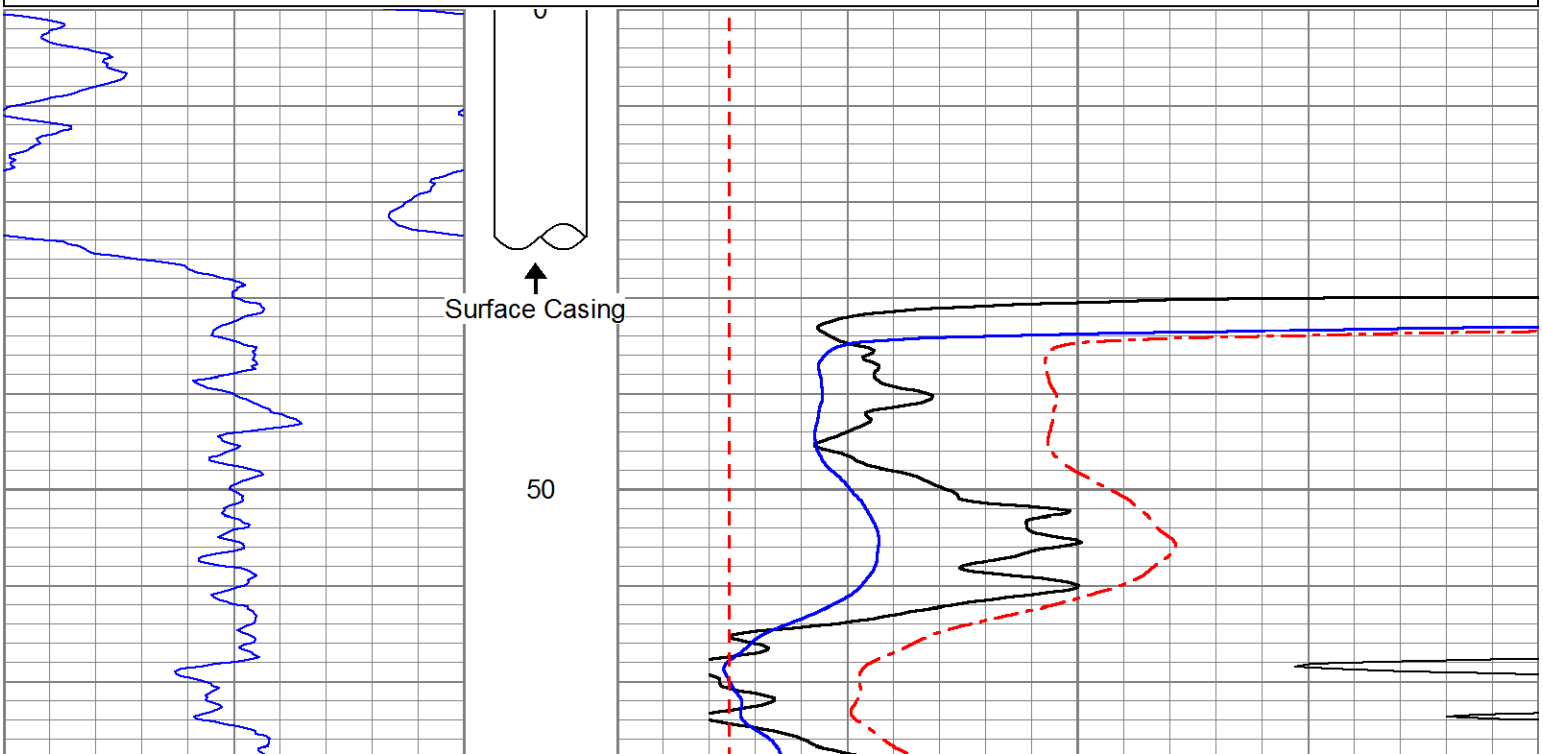
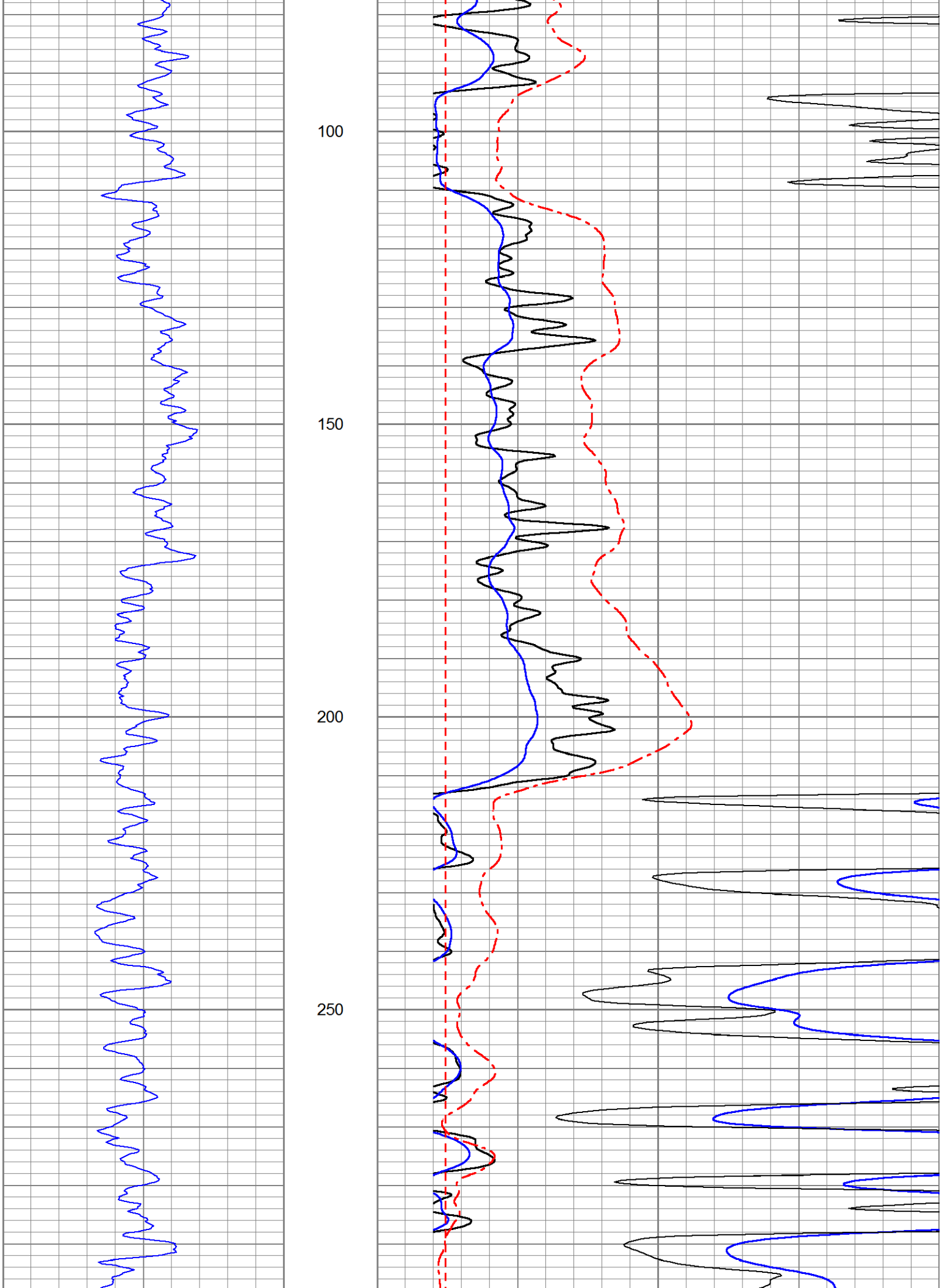
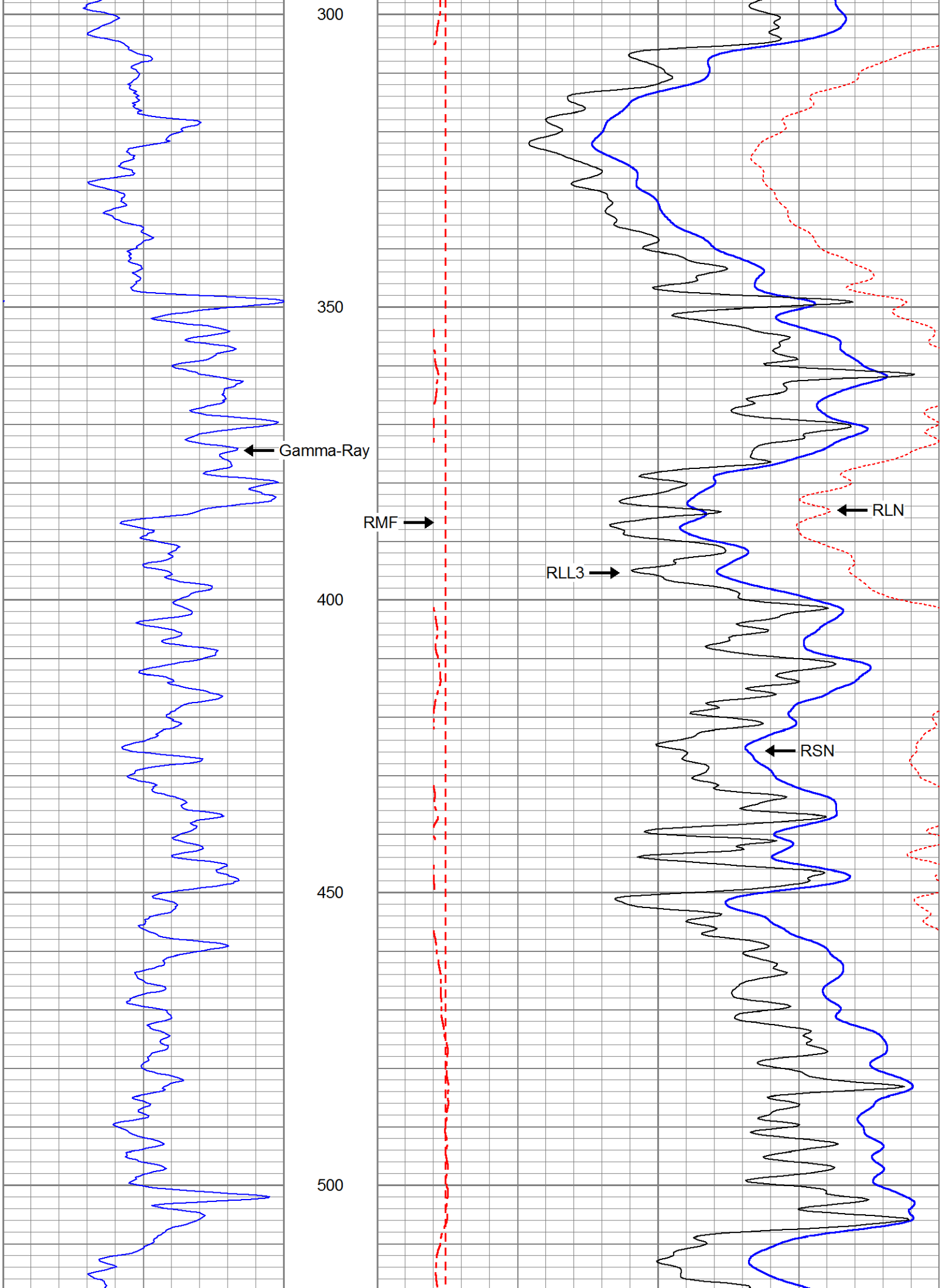
0.009	5.000	
0.101	50.000	
0.535	250.000	
0.942	500.000	

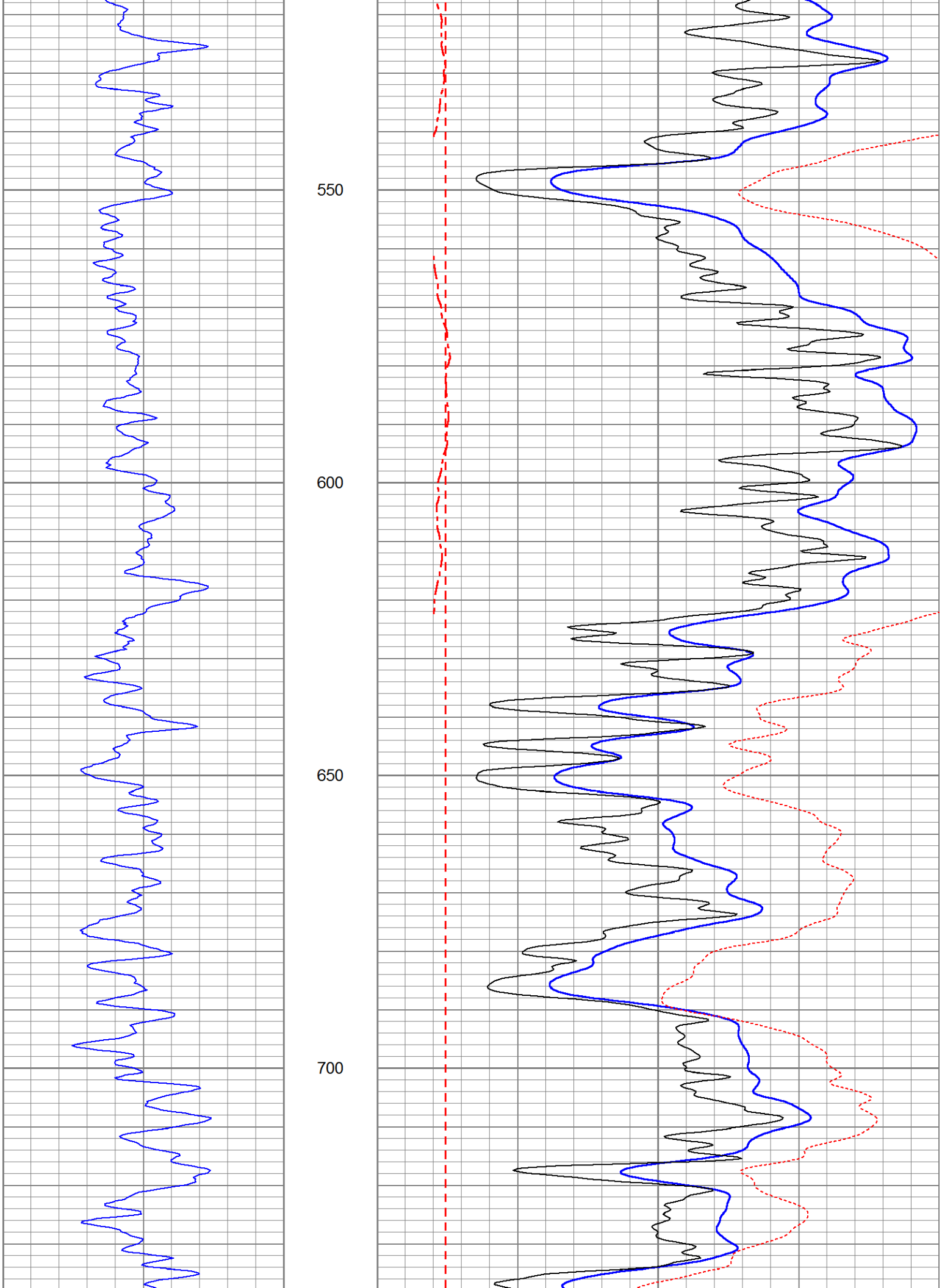
Database File:	16187.db
Dataset Pathname:	LL3
Presentation Format:	guard
Dataset Creation:	Mon Oct 10 17:36:13 2011 by Log Open-Cased 090629
Charted by:	Depth in Feet scaled 1:240

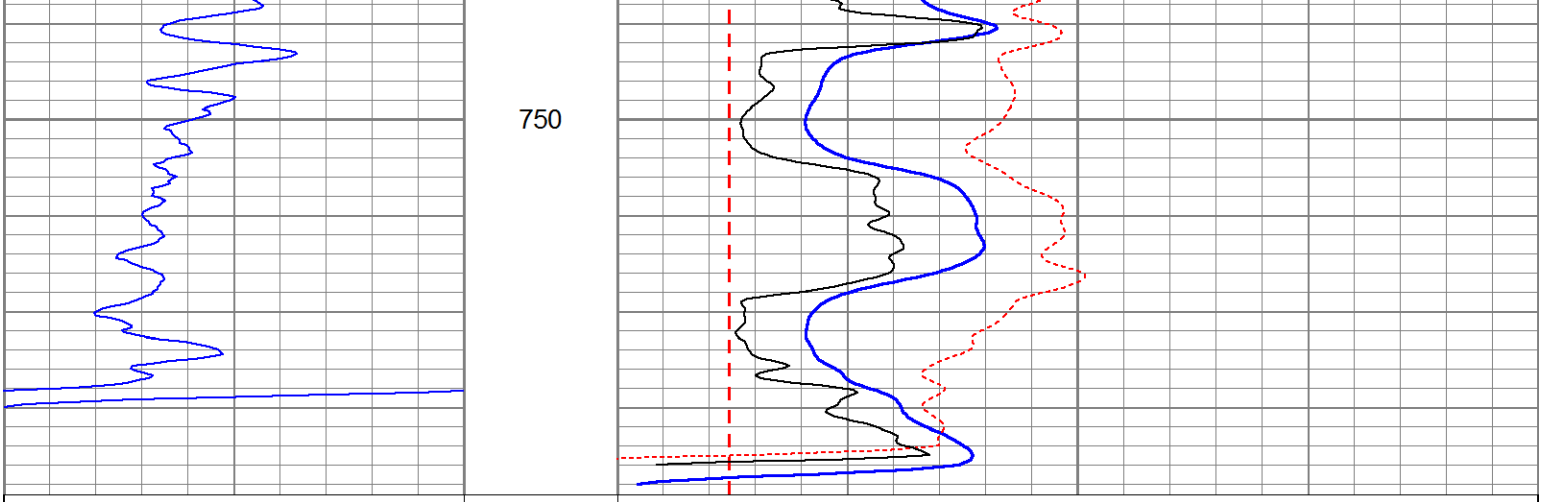
50	Gamma-Ray (GAPI)	100
0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
0	RLL3 (Ohm-m)	100
100	RLL3 x 10 (Ohm-m)	1000
100	RSN x 10 (Ohm-m)	1000
100	RLN x 10 (Ohm-m)	1000




100
150
200
250


300
350
400
450
500
Gamma-Ray
RMF
RLL3
RLN
RSN


550
600
650
700



50	Gamma-Ray (GAPI)	100
0	RSN (Ohm-m)	100
0	RLN (Ohm-m)	100
0	RMF (Ohm-m)	100
0	RLL3 (Ohm-m)	100
100	RLL3 x 10 (Ohm-m)	1000
100	RSN x 10 (Ohm-m)	1000
100	RLN x 10 (Ohm-m)	1000

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG 3
GAMMA-RAY

Job No.
16187

File No.

Company	WDC EXPLORATION & WELLS
Well	EPA-MP7
Field	RIALTO
County	SAN BERNARDINO State CA

Location:
BF GOODRICH
FOOTHILL AND PEPPER
GPS: N 34o 06.505' W 117o 21.175'
Sec. Twp. Rge.

Other Services:
GR/LL3
SONIC
CAL

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L. 0'		K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	10-10-2011		
Run Number	ONE		
Depth Driller	789'		
Depth Logger	789'		
Bottom Logged Interval	789'		
Top Log Interval	0'		
Casing Driller	14" @ 25'		
Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	MEASURE		
Rm @ Meas. Temp	11.17 @ 77F		
Rmf @ Meas. Temp	12.20 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	PIT		
Rm @ BHT	N/A		
Time Circulation Stopped	1.5 HOURS		
Time Logger on Bottom	1645		
Max. Recorded Temperature	N/A		
Equipment Number	PS-3		
Location	LA		
Recorded By	SCHUMACHER		
Witnessed By	C. MARVIN		

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Comments

Calibration Report

Database File: 16187.db
Dataset Pathname: ELOG
Dataset Creation: Mon Oct 10 16:59:09 2011 by Log Open-Cased 090629

ELOG Calibration Report

Serial:	D4
Model:	DTQ
Shop Calibration Performed:	Fri Sep 02 15:34:18 2011
Before Survey Verification Performed:	Sun Sep 09 13:17:43 2007
After Survey Verification Performed:	Sun Sep 09 13:17:48 2007

Shop Calibration

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	9.321	100.380		10.200	102.200	Ohm-m	1.010	0.782
Long	8.948	97.855		10.200	102.200	Ohm-m	1.035	-17.100
IEE	88.740	5882.980	counts	0.097	6.438	A		
VSN	104.920	6618.800	counts	2.001	126.246	V		
VLN	77.120	1684.980	counts	1.471	32.139	V		

Before Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	40.249	101.201		40.505	101.206	Ohm-m	0.996	0.422
Long	142.638	102.842		102.858	102.858	Ohm-m	1.024	-2.408
IEE	212.960	7070.960	counts	0.233	7.738	A		
VSN	96.300	8039.720	counts	1.837	153.348	V		
VLN	85.320	2042.520	counts	1.627	38.959	V		

After Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	40.270	101.200		40.249	101.201	Ohm-m	1.000	-0.035
Long	142.491	102.843		102.842	102.842	Ohm-m	1.004	-0.383
IEE	213.380	7077.580	counts	0.234	7.746	A		
VSN	96.540	8047.160	counts	1.841	153.490	V		
VLN	85.400	2044.440	counts	1.629	38.995	V		

After Survey Verification compared to Before Survey Calibration

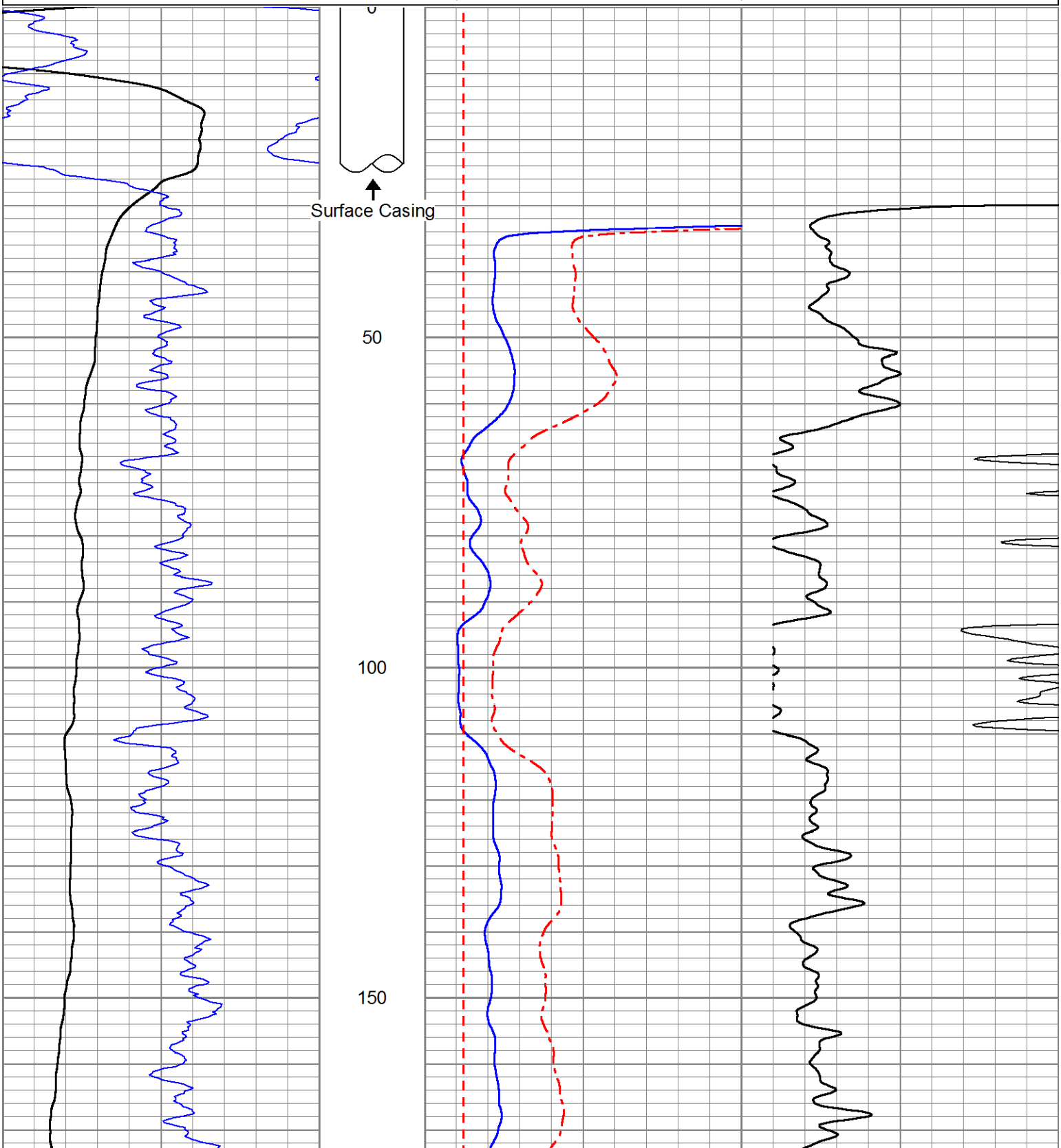
	Zero			Cal		
	Before	After		Before	After	
Short	40.505	40.249	Ohm-m	101.206	101.201	Ohm-m
Long	143.592	142.638	Ohm-m	102.858	102.842	Ohm-m

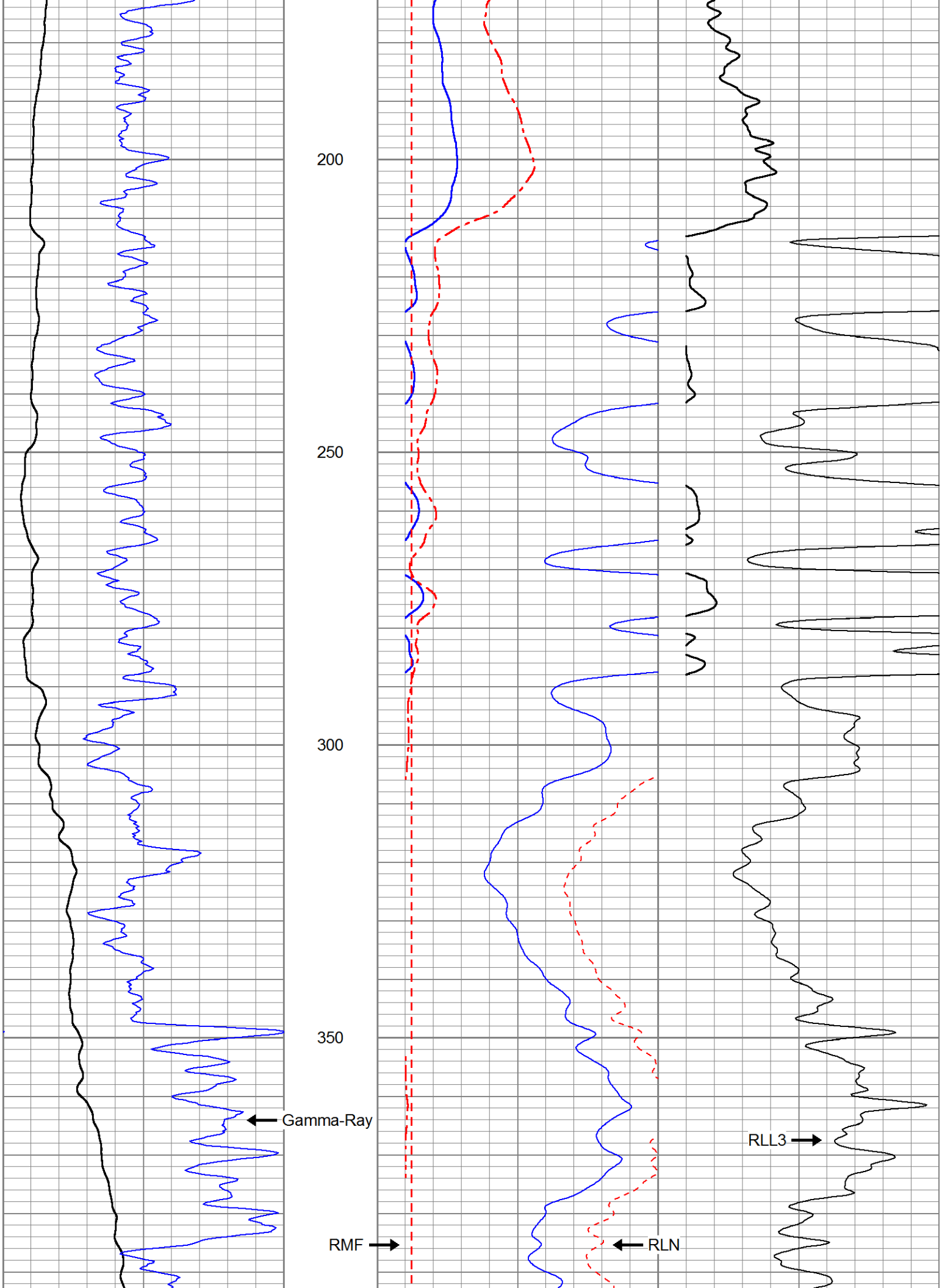
Gamma Ray Calibration Report

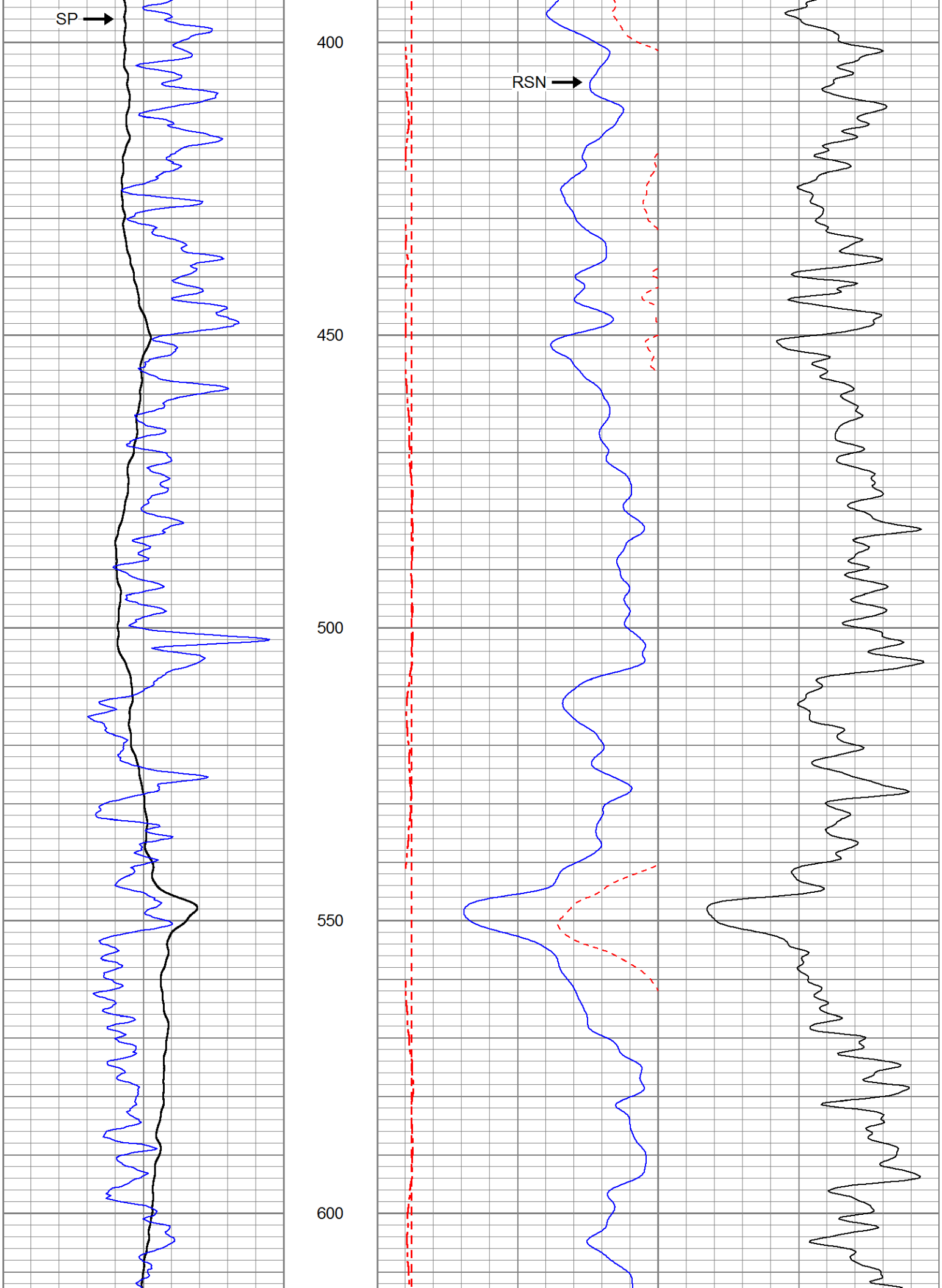
Serial Number:	D4	
Tool Model:	ELOG	
Performed:	Tue Jul 15 15:58:21 2008	
Calibrator Value:	162.0	GAPI
Background Reading:	198.6	cps
Calibrator Reading:	742.0	cps
Sensitivity:	0.2982	GAPI/cps

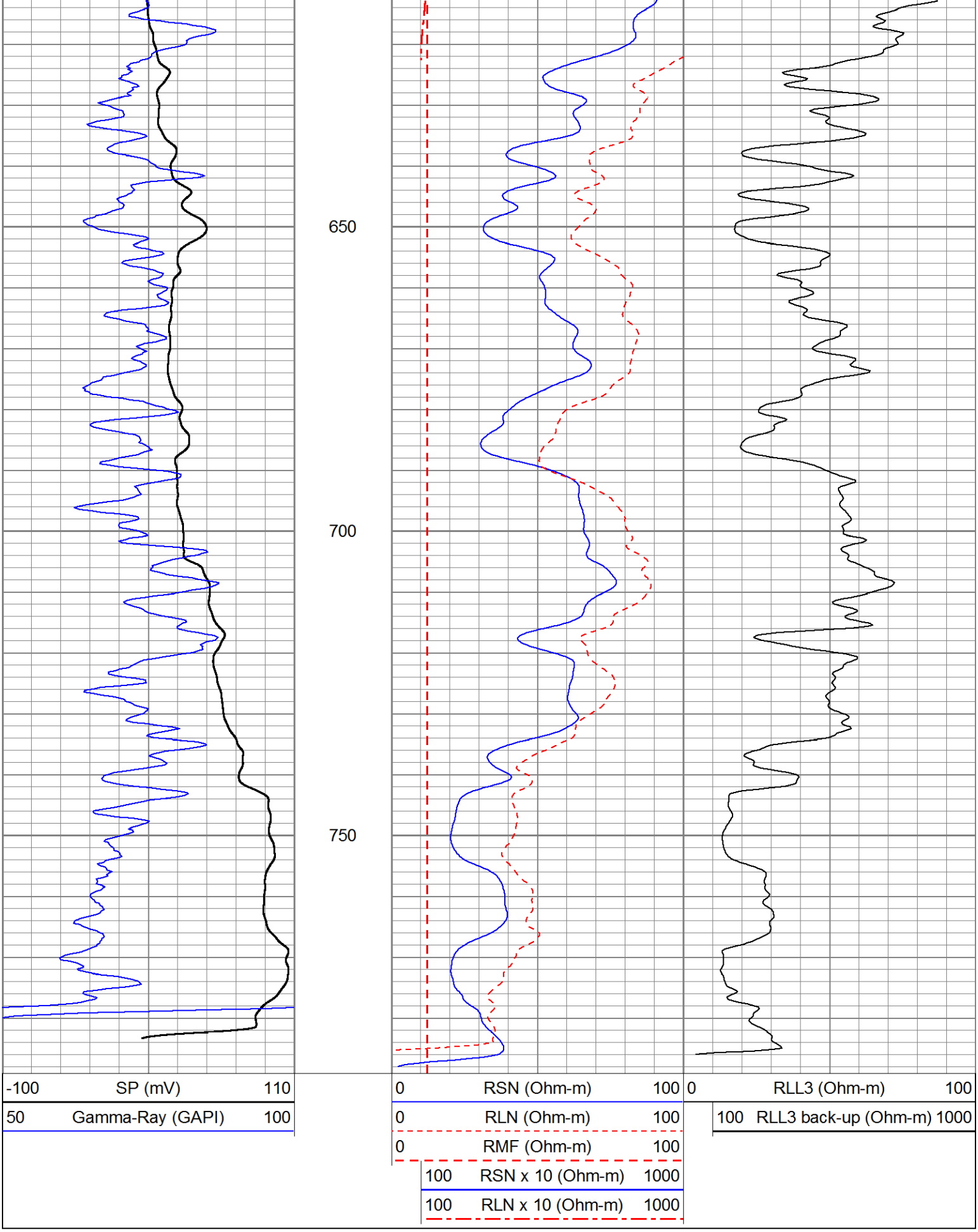
Database File: 16187.db
Dataset Pathname: ELOG
Presentation Format: elog
Dataset Creation: Mon Oct 10 16:59:09 2011 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

-100	SP (mV)	110	0	RSN (Ohm-m)	100	0	RLL3 (Ohm-m)	100
50	Gamma-Ray (GAPI)	100	0	RLN (Ohm-m)	100	100	RLL3 back-up (Ohm-m)	1000
			0	RMF (Ohm-m)	100			
			100	RSN x 10 (Ohm-m)	1000			
			100	RLN x 10 (Ohm-m)	1000			




200
250
300
350
Gamma-Ray
RMF
RLN
RLL3


SP
400
RSN
450
500
550
600


650
700
750
-100 SP (mV) 110
50 Gamma-Ray (GAPI) 100
0 RSN (Ohm-m) 100
0 RLN (Ohm-m) 100
0 RMF (Ohm-m) 100
100 RSN x 10 (Ohm-m) 1000
100 RLN x 10 (Ohm-m) 1000
0 RLL3 (Ohm-m) 100
100 RLL3 back-up (Ohm-m) 1000

PACIFIC SURVEYS

SONIC VELOCITY VARIABLE DENSITY

Job No.
16187

File No.

Company WDC EXPLORATION & WELLS
Well EPA-MP7
Field RIALTO
County SAN BERNARDINO State CA

Location:
BF GOODRICH
FOOTHILL AND PEPPER
GPS: N 34o 06.505' W 117o 21.175'
Sec. Twp. Rge.

Other Services:
GR/LL3
ELOG
CAL

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L. 0'		K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	10-10-2011		
Run Number	ONE		
Depth Driller	789'		
Depth Logger	789'		
Bottom Logged Interval	789'		
Top Log Interval	0'		
Casing Driller	14" @ 25'		
Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	MEASURE		
Rm @ Meas. Temp	11.17 @ 77F		
Rmf @ Meas. Temp	12.20 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	PIT		
Rm @ BHT	N/A		
Time Circulation Stopped	1.5 HOURS		
Time Logger on Bottom	1645		
Max. Recorded Temperature	N/A		
Equipment Number	PS-3		
Location	LA		
Recorded By	SCHUMACHER		
Witnessed By	C. MARVIN		

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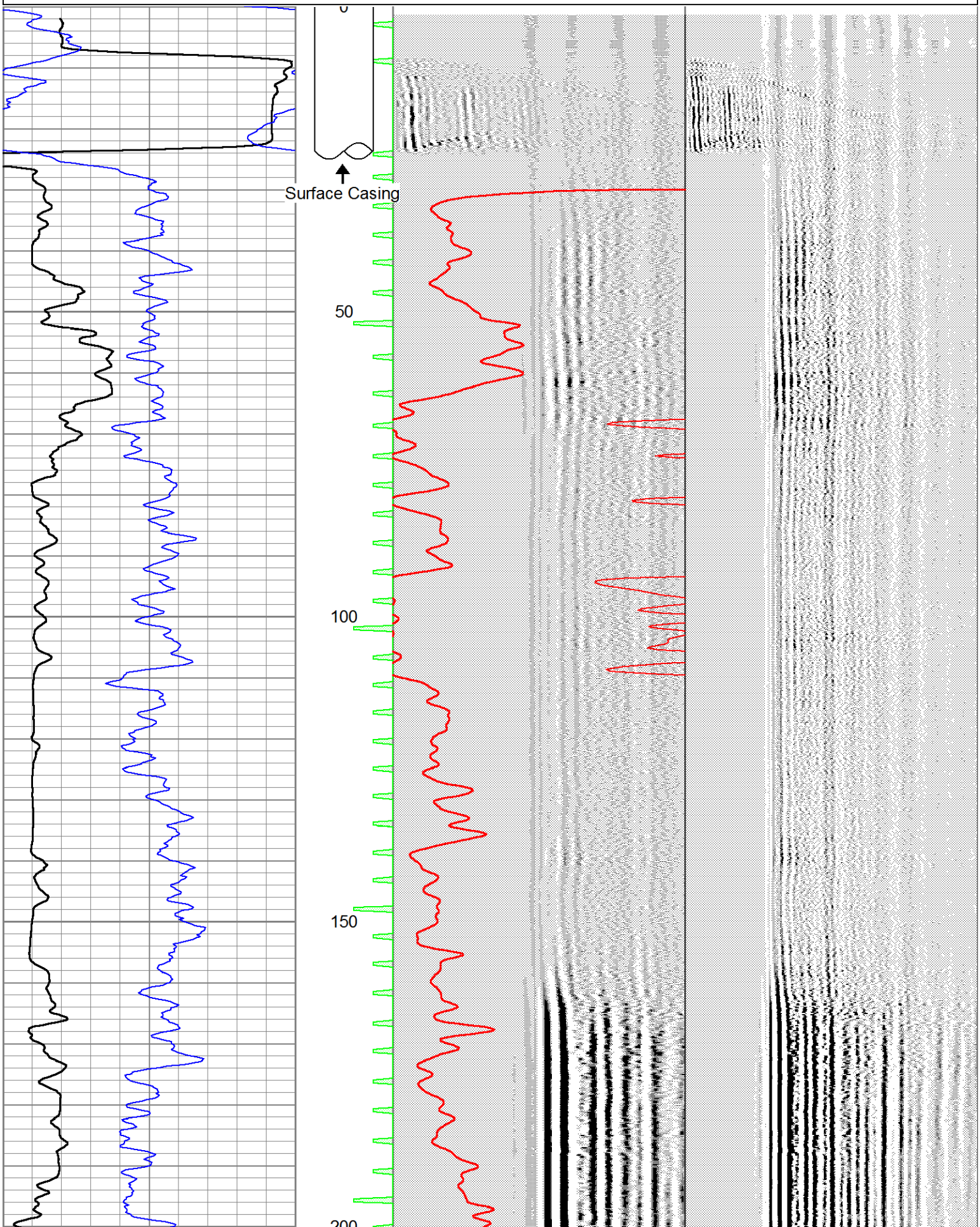
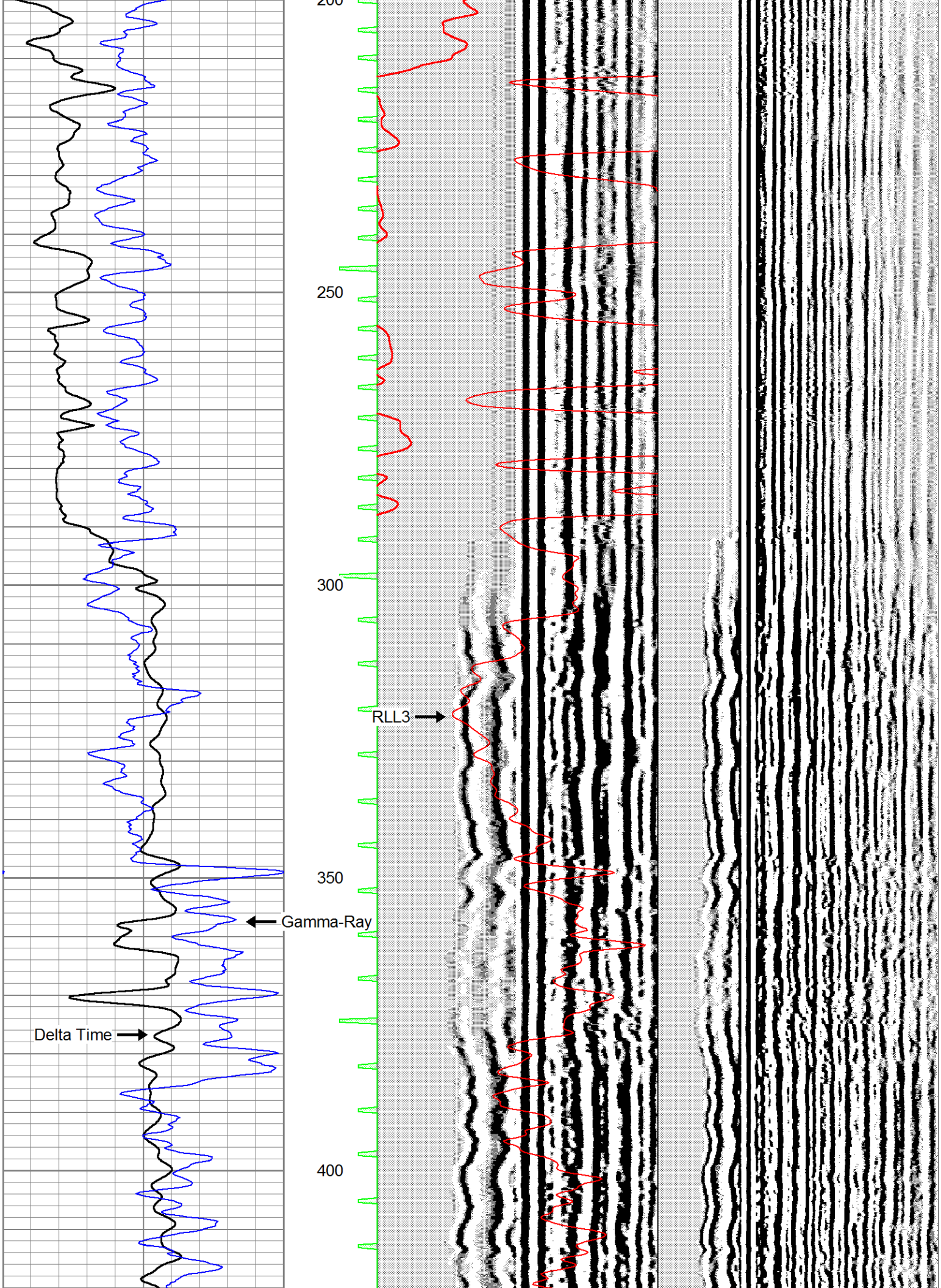
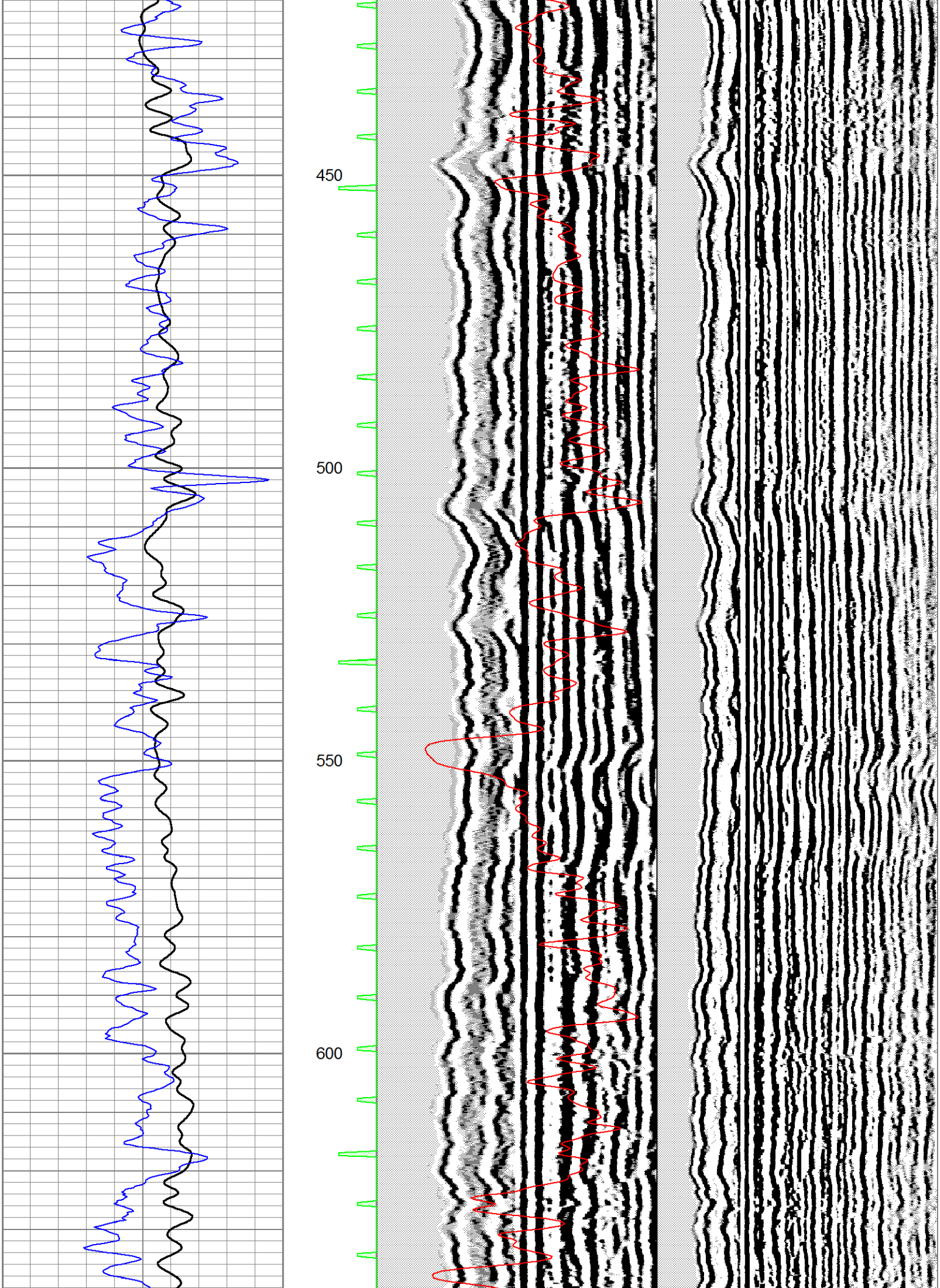
Comments

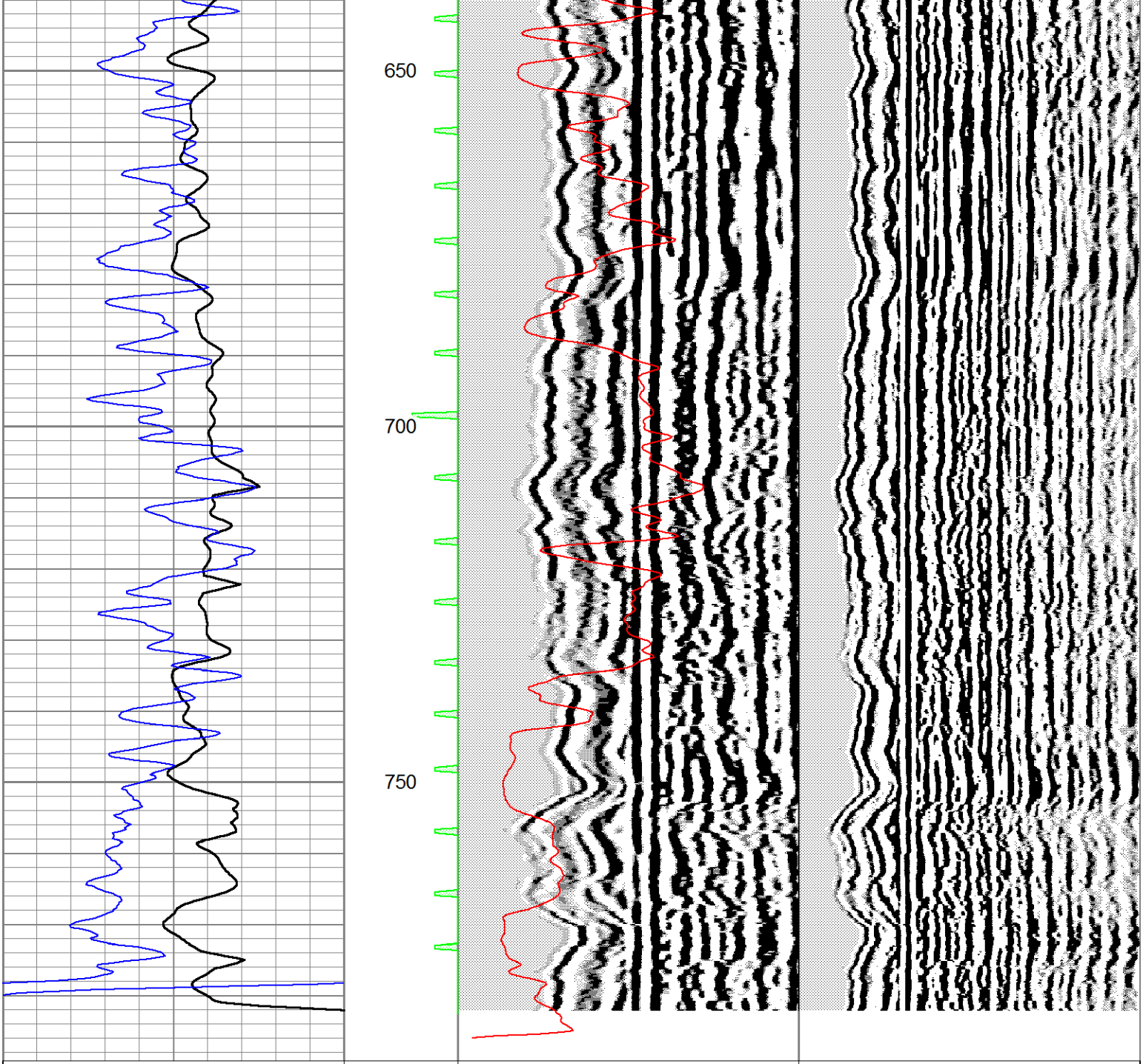
Database File: 16187.db
Dataset Pathname: SNC
Presentation Format: slt
Dataset Creation: Mon Oct 10 18:10:51 2011 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

240	Delta Time (usec/ft)	40	ITT	500	Variable Density 5 ft	1600	500	Variable Density 5 ft	2400
50	Gamma-Ray (GAPI)	100	5 (msec) 0	0	RLL3 (Ohm-m)	100			
100	GR back-up (GAPI)	500		100	RLL3 back-up (Ohm-m)	1000			




200
250
300
350
400
RLL3
Gamma-Ray
Delta Time


450
500
550
600



240	Delta Time (usec/ft)	40	ITT	500	Variable Density 5 ft	1600	500	Variable Density 5 ft	2400
50	Gamma-Ray (GAPI)	100	5 (msec) 0	0	RLL3 (Ohm-m)	100			
100	GR back-up (GAPI)	500		100	RLL3 back-up (Ohm-m)	1000			

Project:	**BF Goodrich RI/FS**	Start Date:	**09-12-2011**
Project Number:	**07163.0054**	End Date:	**11-08-2011**
Location:	**Rialto, CA**	Total Depth (ft. bgs):	**789**
Client:	**EPA**	Surface Elevation (ft msl):	**1227.52**
Drilling Contractor:	**WDC**	Longitude:	**-177.3529891**
Drilling Method:	**Mud Rotary**	Latitude:	**34.1083424**
		Logged By:	**Chad Marvin**
		Review By:	**Pete Phillips**

ITSI Gilbane

Boring ID:

EPA-MP7

Depth (feet)	Lithology	*LITHOLOGY DESCRIPTION*	*COMMENTS*
0–5		Sand with Gravel: Yellowish brown (10 YR 5/6) fine to coarse grained sand with gravel	
5–15		Sand with Gravel: Dark brown (10 YR 3/3) fine to medium grained sand with minor gravel	
15–25		Sand with Gravel: Dark brown (10 YR 3/3) medium grained sand with minor gravel	
25–45		Sand: Yellowish brown (10 YR 5/4) medium to coarse grained sand with trace gravel	
45–65		Sand with Gravel: Brown (10 YR 4/3) coarse grained sand with gravel	
65–85		Sand with Gravel: Yellowish brown (10 YR 5/4) medium to coarse grained sand with minor gravel	
85–105		Sand with Gravel: Brown (10 YR 5/3) coarse grained sand with minor gravel	
105–115		Silty Sand with Gravel: Brown (10 YR 5/3) silty, fine to medium grained sand with very minor gravel	
115–135		Silty Sand: Brown (10 YR 5/3) silty, medium to coarse grained sand with trace gravel	
135–155		Silty Sand: Brown (10 YR 5/3) silty, fine to medium grained sand	
155–165		Sandy Silt: Olive brown (2.5 Y 4/3) sandy silt	

Silty Sand: Olive brown (2.5 Y 4/3) silty, fine grained sand	
Silty Sand: Light olive brown (2.5 Y 5/4) silty, fine grained sand	
Silty Sand: Light olive brown (2.5 Y 5/4) silty, fine to medium grained sand	

380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590

Silty Sand: Light olive brown (2.5 Y 5/4) silty, fine to medium grained sand with trace gravel

Sandy Silt: Light olive brown (2.5 Y 5/4) sandy silt

Silty Sand: Light olive brown (2.5 Y 5/4) silty, fine to medium grained sand

595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785

Silty Sand: Light olive brown (2.5 Y 5/4) silty, fine to medium grained sand with trace gravel

Silty Sand: Light olive brown (2.5 Y 5/4) silty, fine grained sand

Silty Sand: Light olive brown (2.5 Y 5/4) silty, well cemented fine grained sand

Silty Sand: Light olive brown (2.5 Y 5/4) silty, fine grained sand

Legend

(Qty) MP Components

(Library - WD Library 7/27/00)

(2) 0203 - MP38 End Cap

(4) 020102 - MP38 Casing 3 (2F/0.6M)

(1) 020101 - MP38 Casing 4 (1F/0.3M)

(21) 020105 - MP38 Casing 2 (5F/1.5M)

(54) 020110 - MP38 Casing 1 (10F/3M)

(15) 0239 - MP38 Packer 82mm (5F/1.5M)

(75) 0202 - MP38 Regular Coupling

(15) 0205 - MP38 Measurment Port

(5) 0224 - MP38 Pumping Port

(5) 0216 - Magnetic Location Collar

Geology

Backfill/Casing

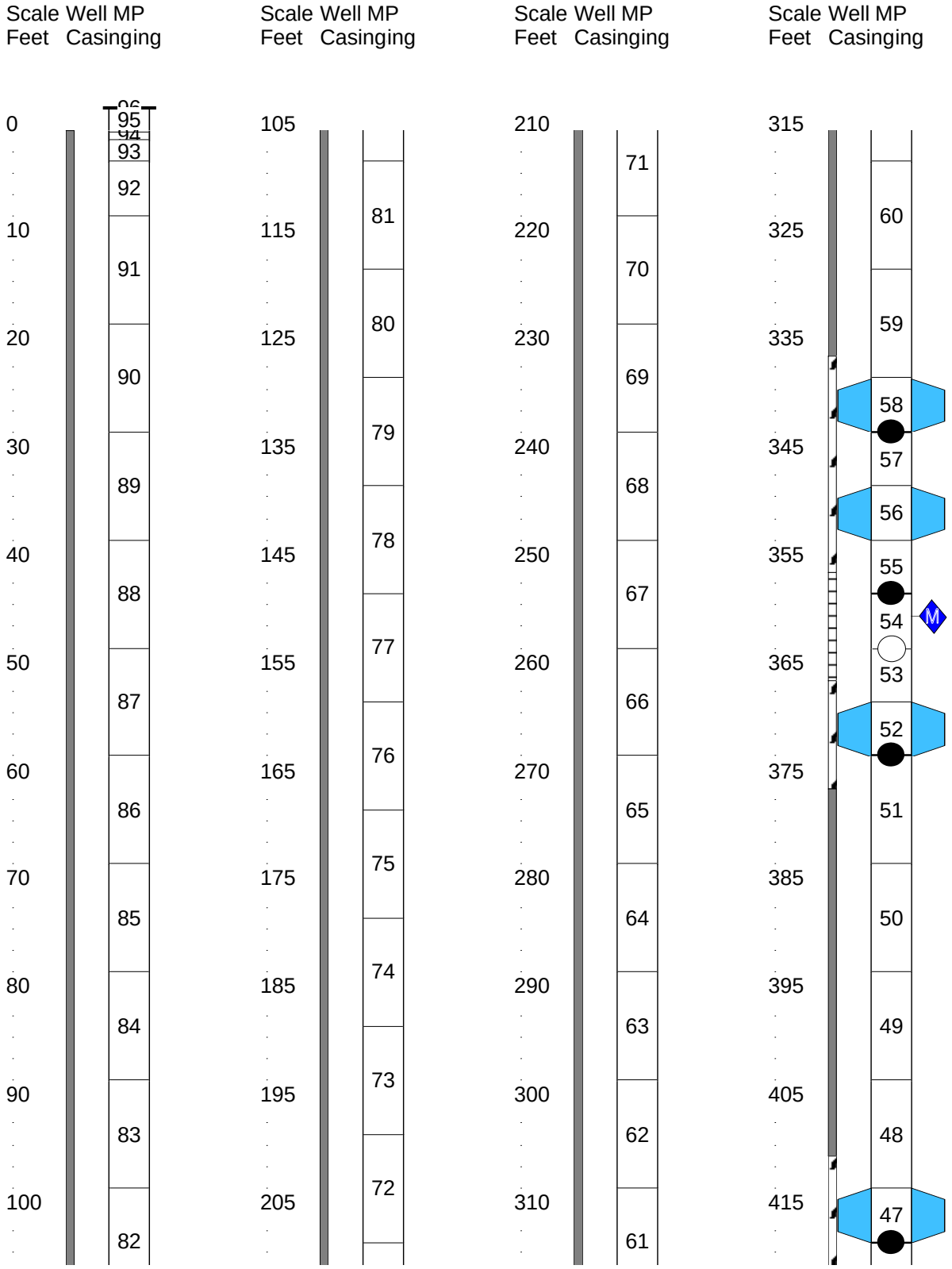
Mild Steel

Stainless Steel

Well Screen

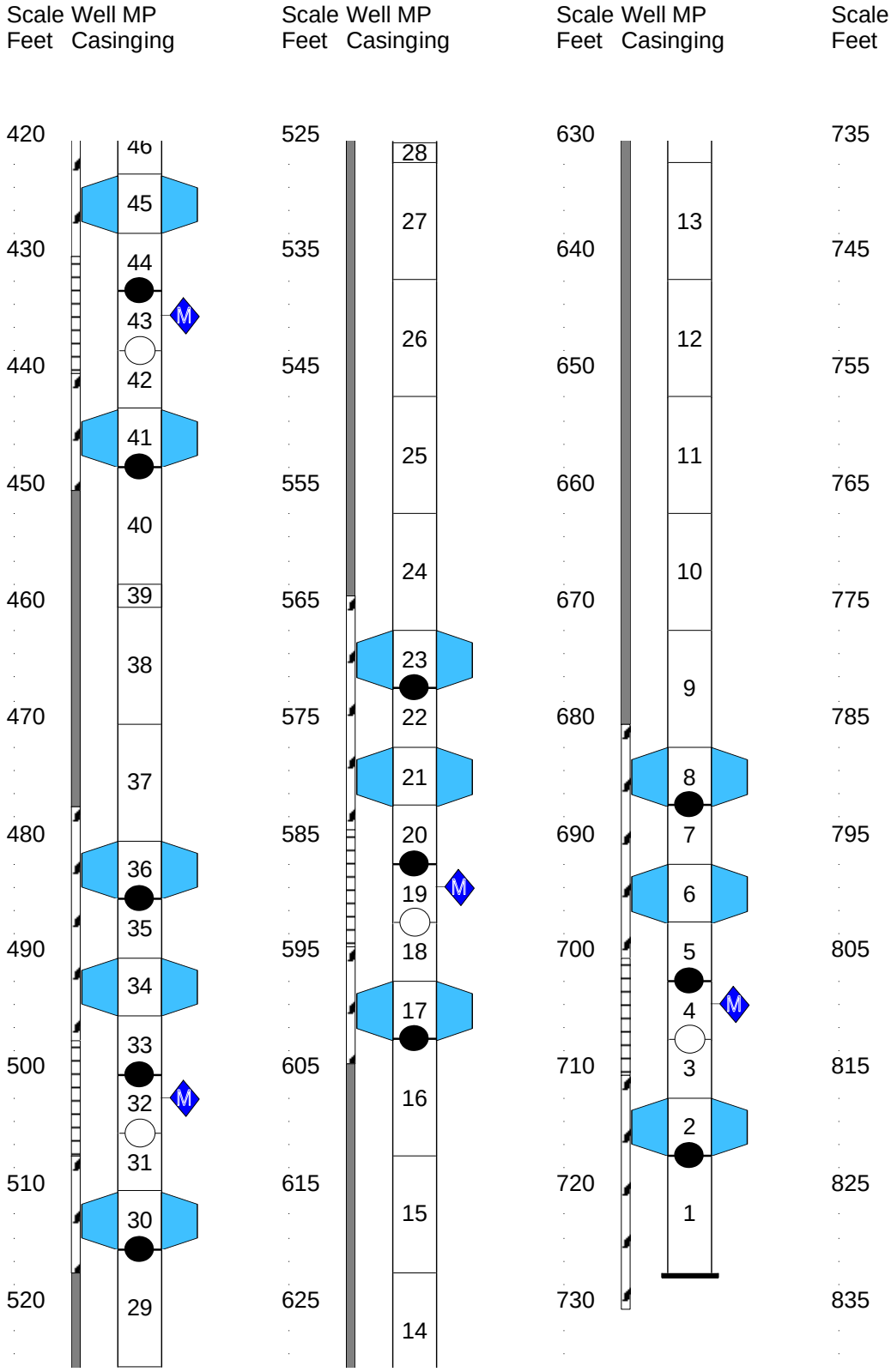
Summary Casing Log

Job No: WB 885
Well: EPA-MP7



Summary Casing Log

Job No: WB 885
Well: EPA-MP7



EPA-MP8

PACIFIC SURVEYS

CALIPER
BOREHOLE VOLUMES

Job No.
16232

File No.

Company	WDC EXPLORATION & WELLS
Well	EPA-MP8
Field	RIALTO
County	SAN BERNARDINO State CA

Location:

N34o06.031' W117o22.107'

Sec. Twp. Rge.

Other Services:

ELOG
GR/LL3
SNC/VDL

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L. 0'		K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	10-28-2011		
Run Number	ONE		
Depth Driller	770'		
Depth Logger	768'		
Bottom Logged Interval	768'		
Top Log Interval	25'		
Casing Driller	14" @ 25'		
Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	9.9 @ 77F		
Rmf @ Meas. Temp	10.7 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEASURE		
Rm @ BHT	N/A		
Time Circulation Stopped	2 HOURS		
Time Logger on Bottom	5:10 PM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-4		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	T. WATCHERS		

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Comments

Calibration Report

Database File: 16232.db
Dataset Pathname: CAL.1
Dataset Creation: Fri Oct 28 18:18:22 2011 by Calc Open-Cased 090629

Temperature Calibration Report

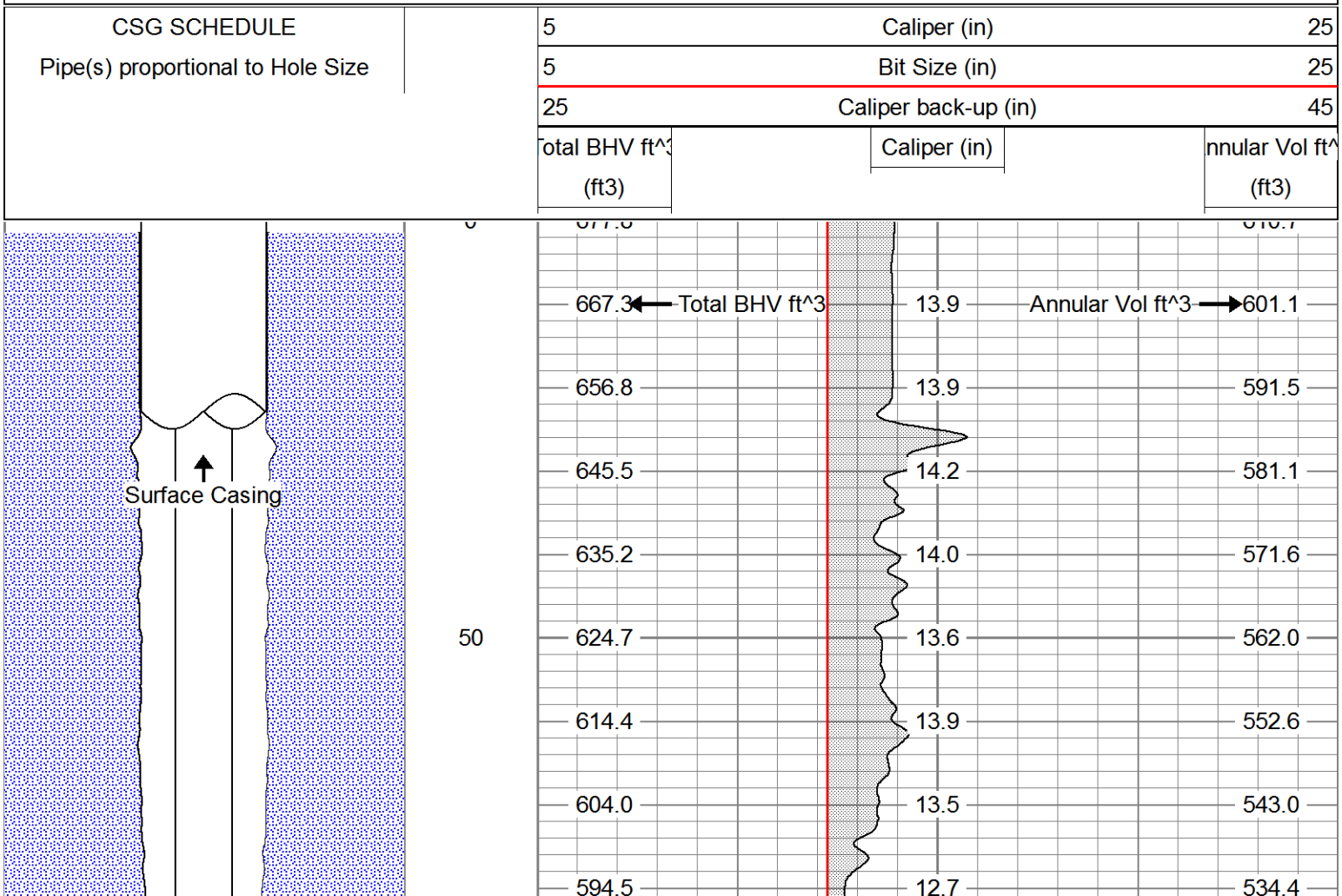
Serial Number:	PS-4_Short			
Tool Model:	Short_GPH			
Performed:	Tue Oct 18 12:20:14 2011			
	Reference		Reading	
Low Reference:	4.00	degF	292.42	cps
High Reference:	7.00	degF	898.75	cps
Gain:	0.00			
Offset:	2.55			
Delta Spacing	1			

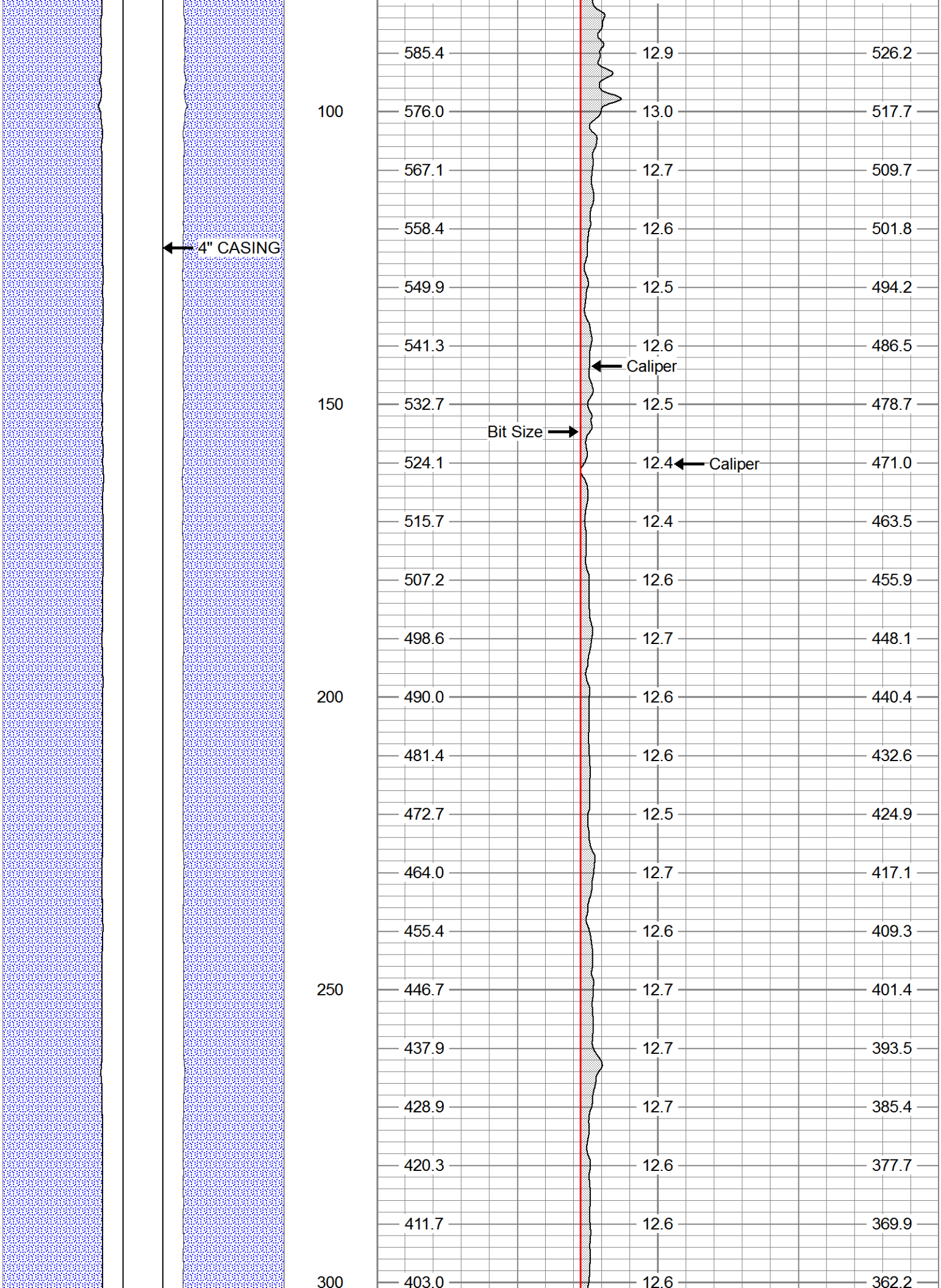
XY Caliper Calibration Report

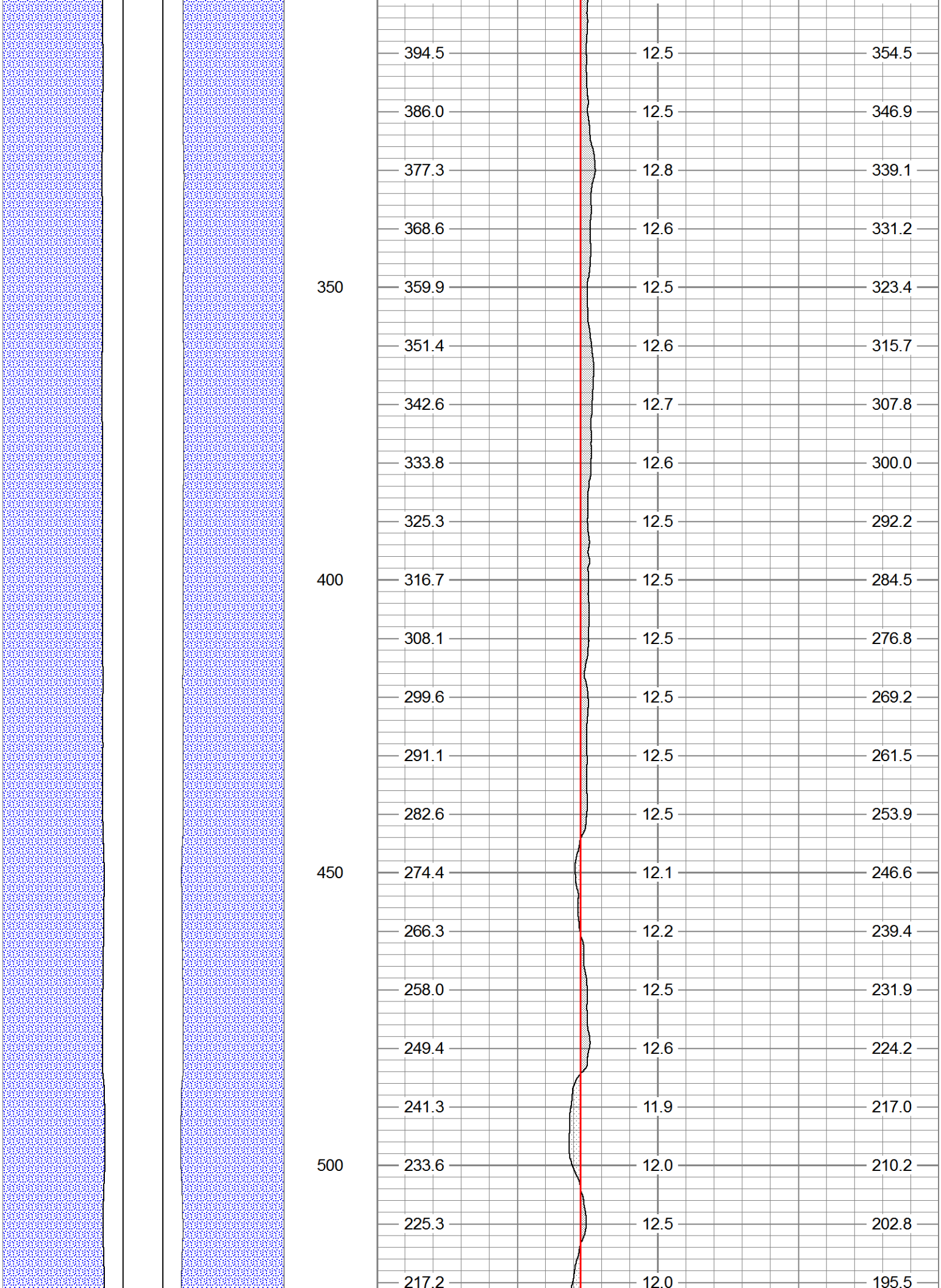
Serial Number/Model: Short-Comprobe
Performed: Tue Oct 18 12:18:41 2011

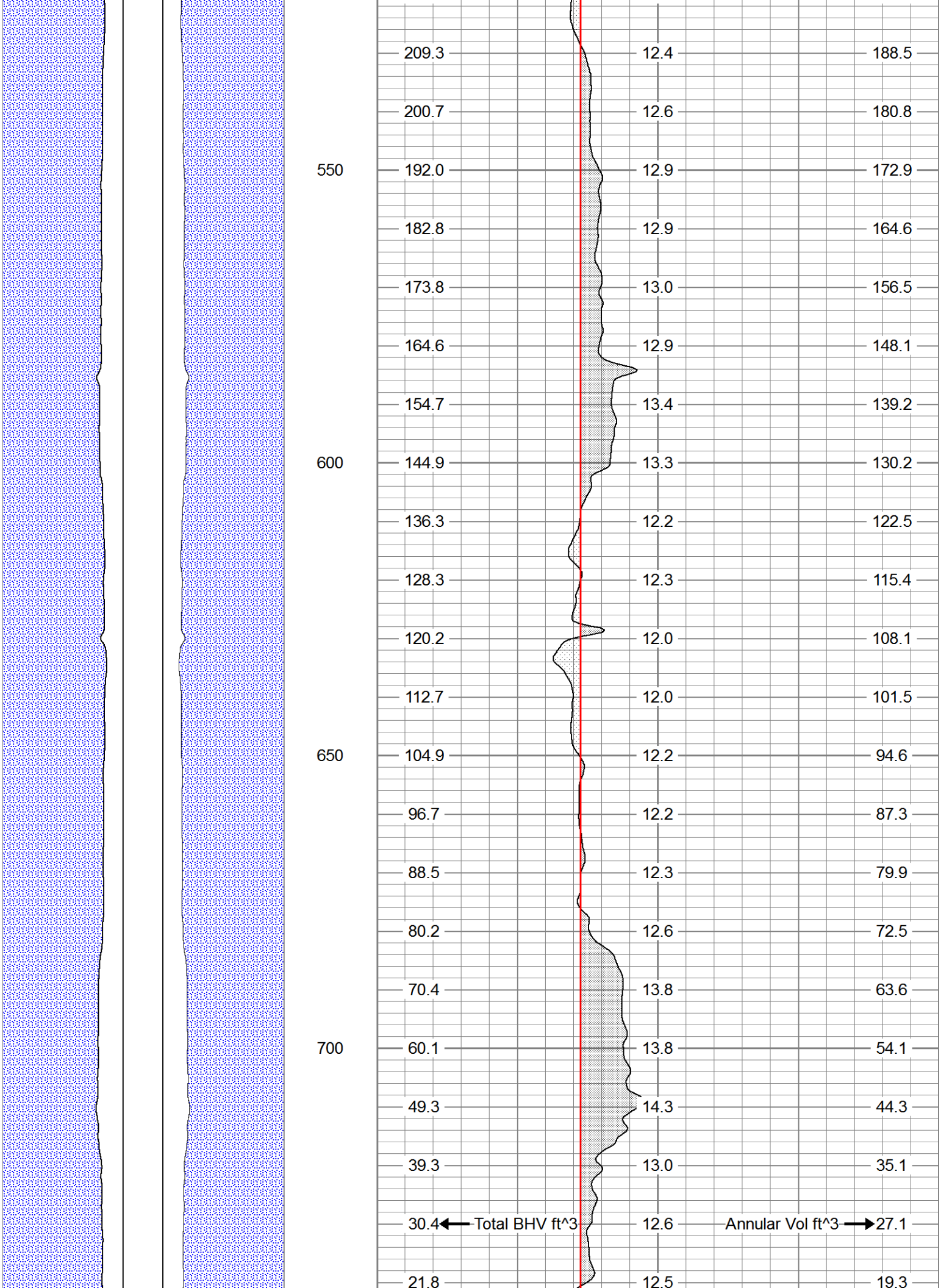
	Ring		X Caliper		Y Caliper	
1:	6	in	80.1582	cps	80.1582	cps
2:	8	in	292.415	cps	292.415	cps
3:	10	in	506.311	cps	506.311	cps
4:	14	in	898.75	cps	898.75	cps
5:	18	in	1299.97	cps	1299.97	cps
6:	22	in	1699.56	cps	1699.56	cps

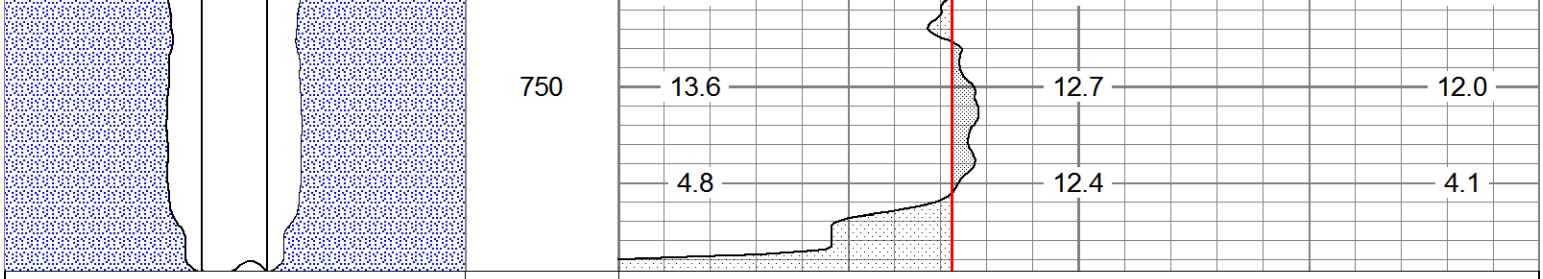
Database File:	16232.db
Dataset Pathname:	CAL.1
Presentation Format:	xyc_gph
Dataset Creation:	Fri Oct 28 18:18:22 2011 by Calc Open-Cased 090629
Charted by:	Depth in Feet scaled 1:240




4" CASING
100
150
200
250
300
585.4
576.0
567.1
558.4
549.9
541.3
532.7
524.1
515.7
507.2
498.6
490.0
481.4
472.7
464.0
455.4
446.7
437.9
428.9
420.3
411.7
403.0
12.9
13.0
12.7
12.6
12.5
12.6
12.5
12.4
12.4
12.6
12.7
12.6
12.6
12.5
12.7
12.6
12.7
12.7
12.6
12.6
526.2
517.7
509.7
501.8
494.2
486.5
478.7
471.0
463.5
455.9
448.1
440.4
432.6
424.9
417.1
409.3
401.4
393.5
385.4
377.7
369.9
362.2
Caliper
Bit Size
Caliper


394.5 12.5 354.5
386.0 12.5 346.9
377.3 12.8 339.1
368.6 12.6 331.2
350
359.9 12.5 323.4
351.4 12.6 315.7
342.6 12.7 307.8
333.8 12.6 300.0
325.3 12.5 292.2
400
316.7 12.5 284.5
308.1 12.5 276.8
299.6 12.5 269.2
291.1 12.5 261.5
282.6 12.5 253.9
450
274.4 12.1 246.6
266.3 12.2 239.4
258.0 12.5 231.9
249.4 12.6 224.2
241.3 11.9 217.0
500
233.6 12.0 210.2
225.3 12.5 202.8
217.2 12.0 195.5


550
600
650
700
209.3
200.7
192.0
182.8
173.8
164.6
154.7
144.9
136.3
128.3
120.2
112.7
104.9
96.7
88.5
80.2
70.4
60.1
49.3
39.3
30.4
21.8
Total BHV ft^3
12.4
12.6
12.9
12.9
13.0
12.9
13.4
13.3
12.2
12.3
12.0
12.0
12.2
12.2
12.3
12.6
13.8
13.8
14.3
13.0
12.6
12.5
Annular Vol ft^3
188.5
180.8
172.9
164.6
156.5
148.1
139.2
130.2
122.5
115.4
108.1
101.5
94.6
87.3
79.9
72.5
63.6
54.1
44.3
35.1
27.1
19.3



CSG SCHEDULE

Pipe(s) proportional to Hole Size

5	Caliper (in)	25
5	Bit Size (in)	25
25	Caliper back-up (in)	45

Total BHV ft^3 (ft3)	Caliper (in)	nnular Vol ft^ (ft3)

PACIFIC SURVEYS

LATEROLOG 3
GAMMA RAY

Job No.
16232

File No.

Company	WDC EXPLORATION & WELLS
Well	EPA-MP8
Field	RIALTO
County	SAN BERNARDINO State CA

Location:

N34o06.031' W117o22.107'

Sec. Twp. Rge.

Other Services:

ELOG
SONIC/VDL
CALIPER

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L. 0'		K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	10-28-2011		
Run Number	ONE		
Depth Driller	770'		
Depth Logger	768'		
Bottom Logged Interval	768'		
Top Log Interval	25'		
Casing Driller	14" @ 25'		
Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	9.9 @ 77F		
Rmf @ Meas. Temp	10.7 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEASURE		
Rm @ BHT	N/A		
Time Circulation Stopped	2 HOURS		
Time Logger on Bottom	5:10 PM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-4		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	T. WATCHERS		

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Comments

Calibration Report

Database File: 16232.db
Dataset Pathname: LL3
Dataset Creation: Fri Oct 28 17:39:08 2011 by Log Open-Cased 090629

Gamma Ray Calibration Report

Serial Number:	12	
Tool Model:	GROH	
Performed:	Thu Jan 20 09:04:17 2011	
Calibrator Value:	162.0	GAPI
Background Reading:	30.6	
Calibrator Reading:	128.2	
Sensitivity:	1.6595	GAPI/

RLL3 (Resistivity Laterolog 3) Calibration Report:

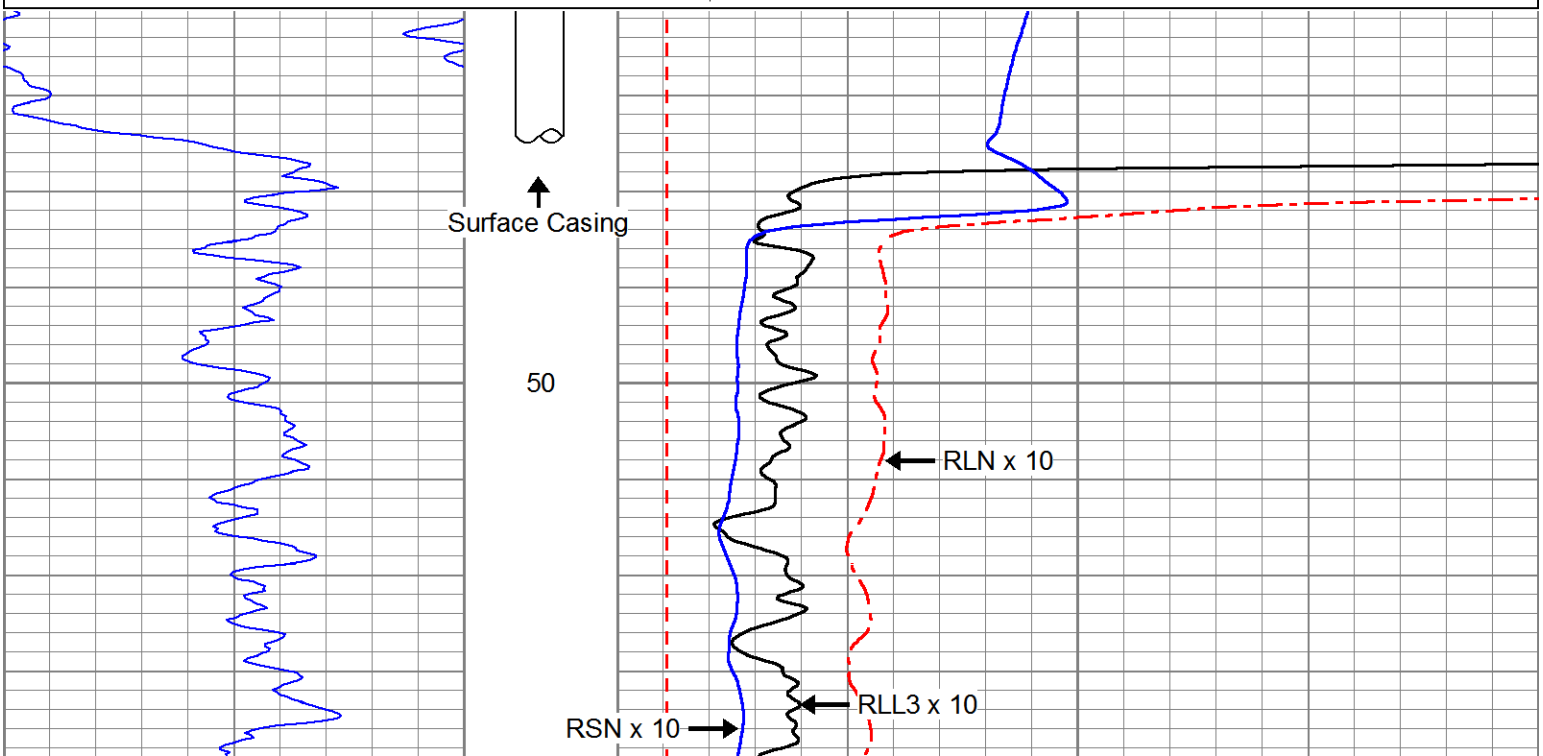
Serial Number:	883
Tool Model:	M&W
Performed:	Wed Feb 09 14:18:47 2011

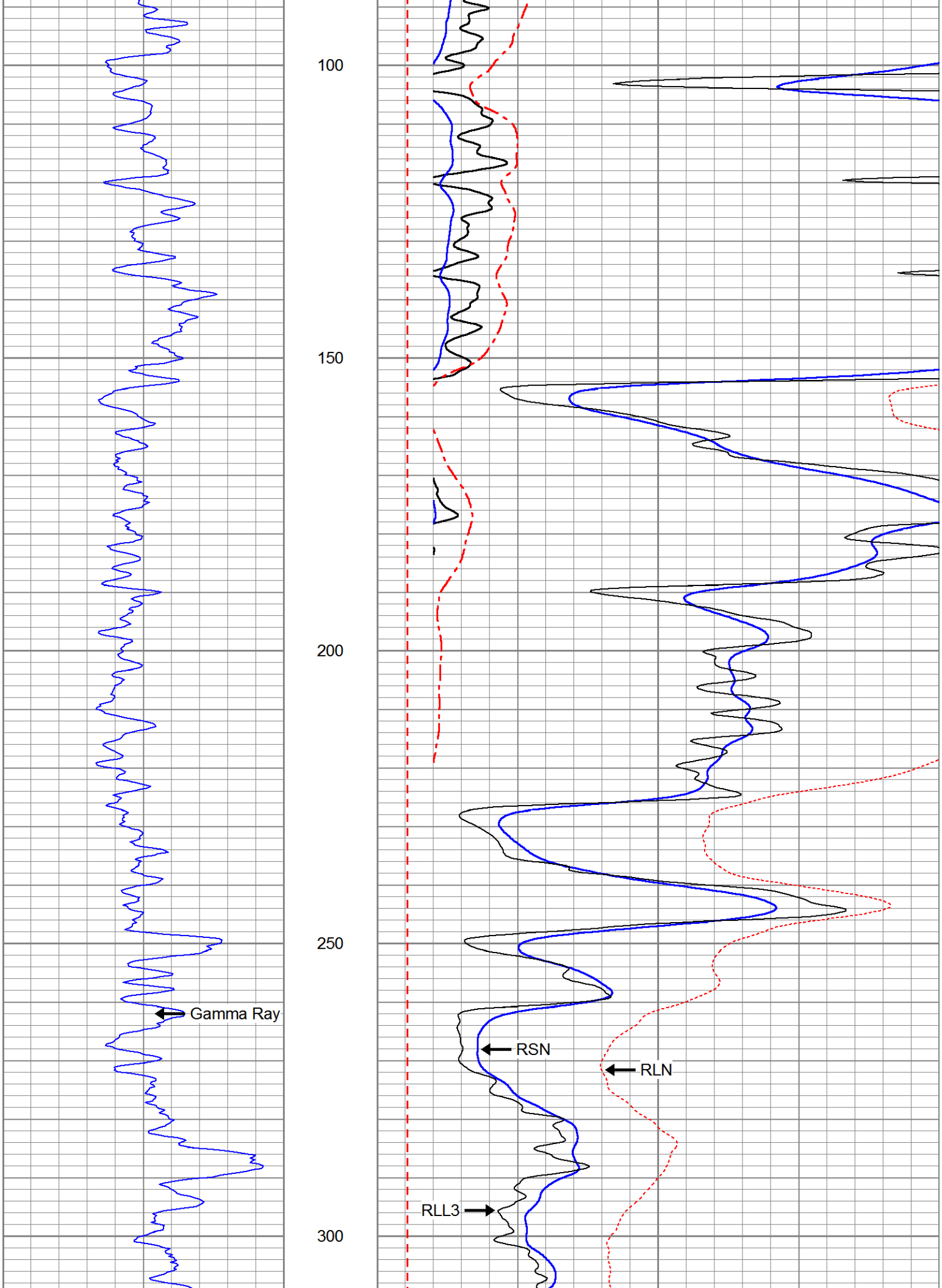
System Reading	Calibration Reference	
0.013	2.500	Ohm-m
0.025	5.000	
0.236	50.000	
1.108	250.000	
2.034	500.000	

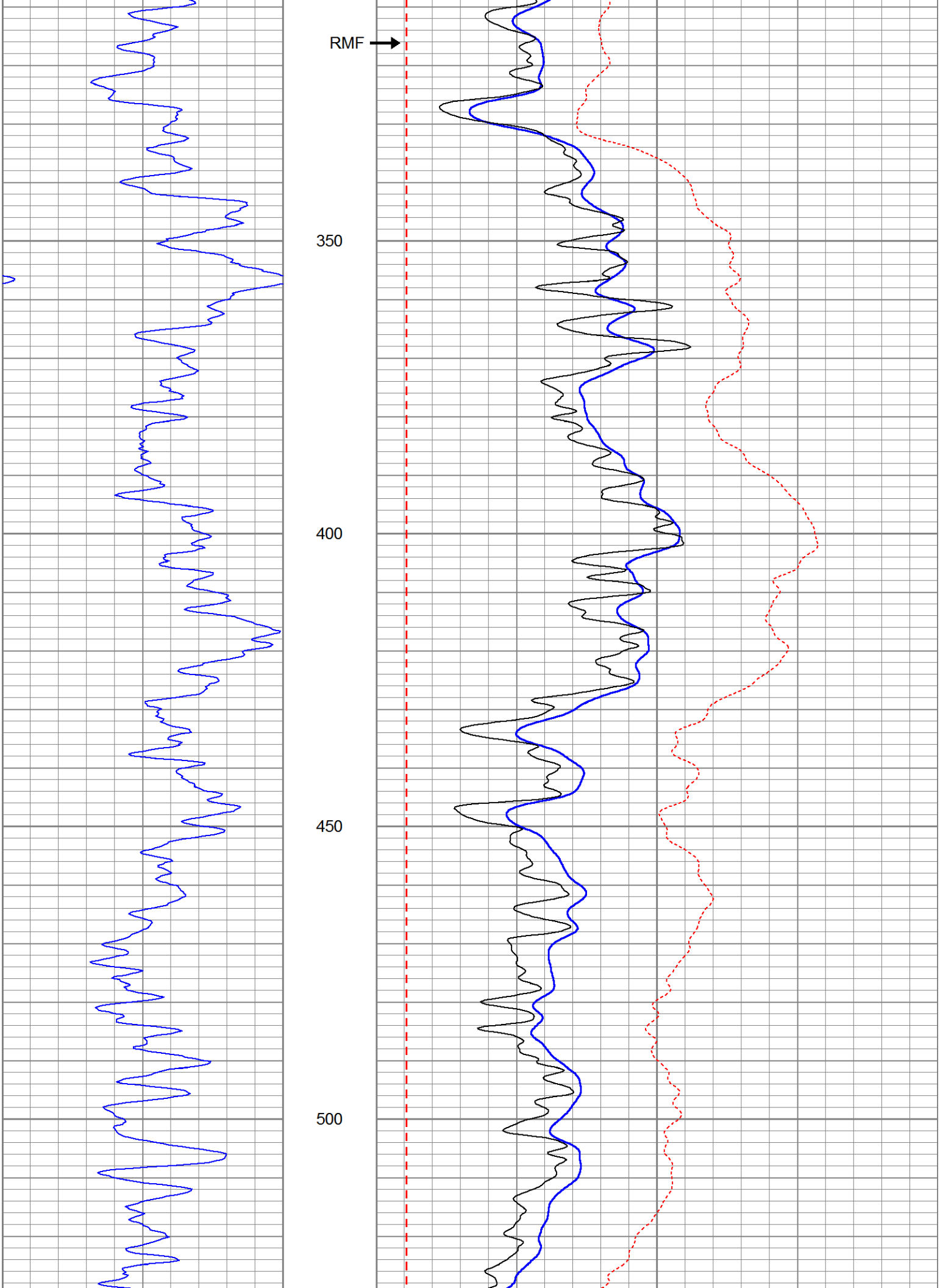
Database File:	16232.db
Dataset Pathname:	LL3
Presentation Format:	guard
Dataset Creation:	Fri Oct 28 17:39:08 2011 by Log Open-Cased 090629
Charted by:	Depth in Feet scaled 1:240

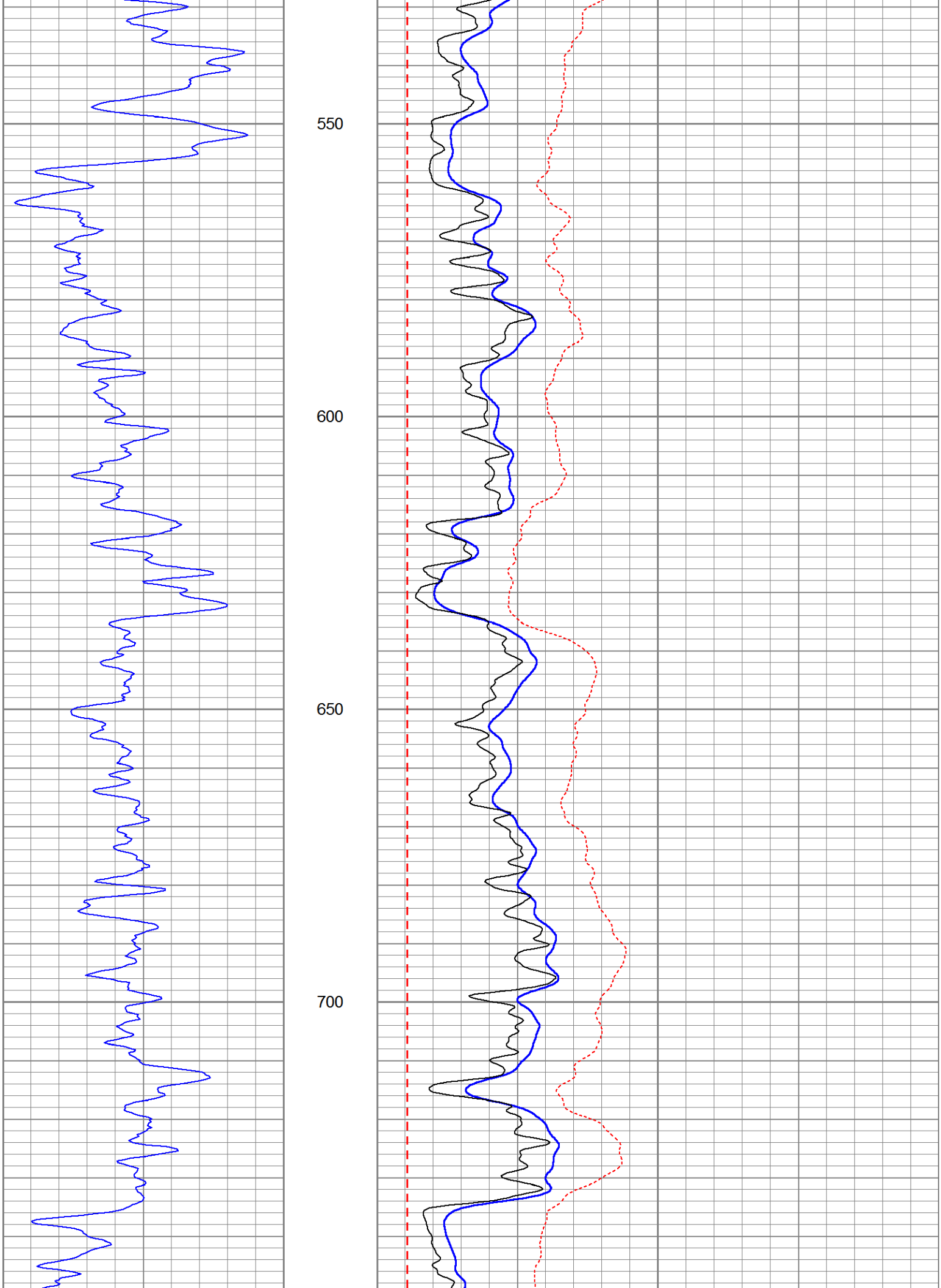
60	Gamma-Ray (GAPI)	110

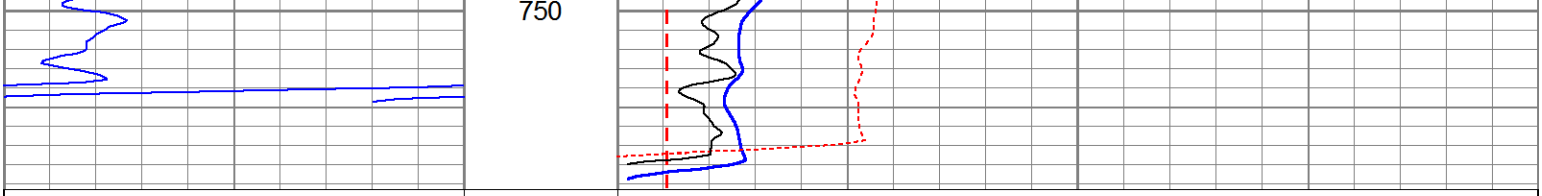
0	RSN (Ohm-m)	200
0	RLN (Ohm-m)	200
0	RMF (Ohm-m)	200
0	RLL3 (Ohm-m)	200
200	RLL3 x 10 (Ohm-m)	2000
200	RSN x 10 (Ohm-m)	2000
200	RLN x 10 (Ohm-m)	2000




100
150
200
250
300
Gamma Ray
RSN
RLN
RLL3


RMF
350
400
450
500


550
600
650
700



60	Gamma-Ray (GAPI)	110	0	RSN (Ohm-m)		200
			0	RLN (Ohm-m)		200
			0	RMF (Ohm-m)		200
			0	RLL3 (Ohm-m)		200
			200	RLL3 x 10 (Ohm-m)		2000
			200	RSN x 10 (Ohm-m)		2000
			200	RLN x 10 (Ohm-m)		2000

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG 3
GAMMA RAY

Job No.
16232

File No.

Company WDC EXPLORATION & WELLS
Well EPA-MP8
Field RIALTO
County SAN BERNARDINO State CA

Location:

N34o06.031' W117o22.107'

Sec. Twp. Rge.

Other Services:

GR/LL3
SONIC/VDL
CALIPER

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L. 0'		K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	10-28-2011		
Run Number	ONE		
Depth Driller	770'		
Depth Logger	768'		
Bottom Logged Interval	768'		
Top Log Interval	25'		
Casing Driller	14" @ 25'		
Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	9.9 @ 77F		
Rmf @ Meas. Temp	10.7 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEASURE		
Rm @ BHT	N/A		
Time Circulation Stopped	2 HOURS		
Time Logger on Bottom	5:10 PM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-4		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	T. WATCHERS		

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Comments

Calibration Report

Database File: 16232.db
Dataset Pathname: elog2
Dataset Creation: Fri Oct 28 17:08:40 2011 by Log Open-Cased 090629

ELOG Calibration Report

Serial:	D4
Model:	DTQ
Shop Calibration Performed:	Mon Mar 28 13:43:51 2011
Before Survey Verification Performed:	Sun Sep 09 13:17:43 2007
After Survey Verification Performed:	Sun Sep 09 13:17:48 2007

Shop Calibration

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	9.071	100.688		10.200	102.200	Ohm-m	1.004	1.091
Long	7.302	96.917		10.200	102.200	Ohm-m	1.027	-7.000
IEE	22.700	5501.220	counts	0.025	6.021	A		
VSN	175.940	6234.840	counts	3.356	118.922	V		
VLN	70.000	1565.500	counts	1.335	29.860	V		

Before Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	40.249	101.201		40.505	101.206	Ohm-m	0.996	0.422
Long	142.638	102.842		102.858	102.858	Ohm-m	1.024	-2.408
IEE	212.960	7070.960	counts	0.233	7.738	A		
VSN	96.300	8039.720	counts	1.837	153.348	V		
VLN	85.320	2042.520	counts	1.627	38.959	V		

After Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	40.270	101.200		40.249	101.201	Ohm-m	1.000	-0.035
Long	142.491	102.843		102.842	102.842	Ohm-m	1.004	-0.383
IEE	213.380	7077.580	counts	0.234	7.746	A		
VSN	96.540	8047.160	counts	1.841	153.490	V		
VLN	85.400	2044.440	counts	1.629	38.995	V		

After Survey Verification compared to Before Survey Calibration

	Zero			Cal		
	Before	After		Before	After	
Short	40.505	40.249	Ohm-m	101.206	101.201	Ohm-m
Long	143.592	142.638	Ohm-m	102.858	102.842	Ohm-m

Gamma Ray Calibration Report

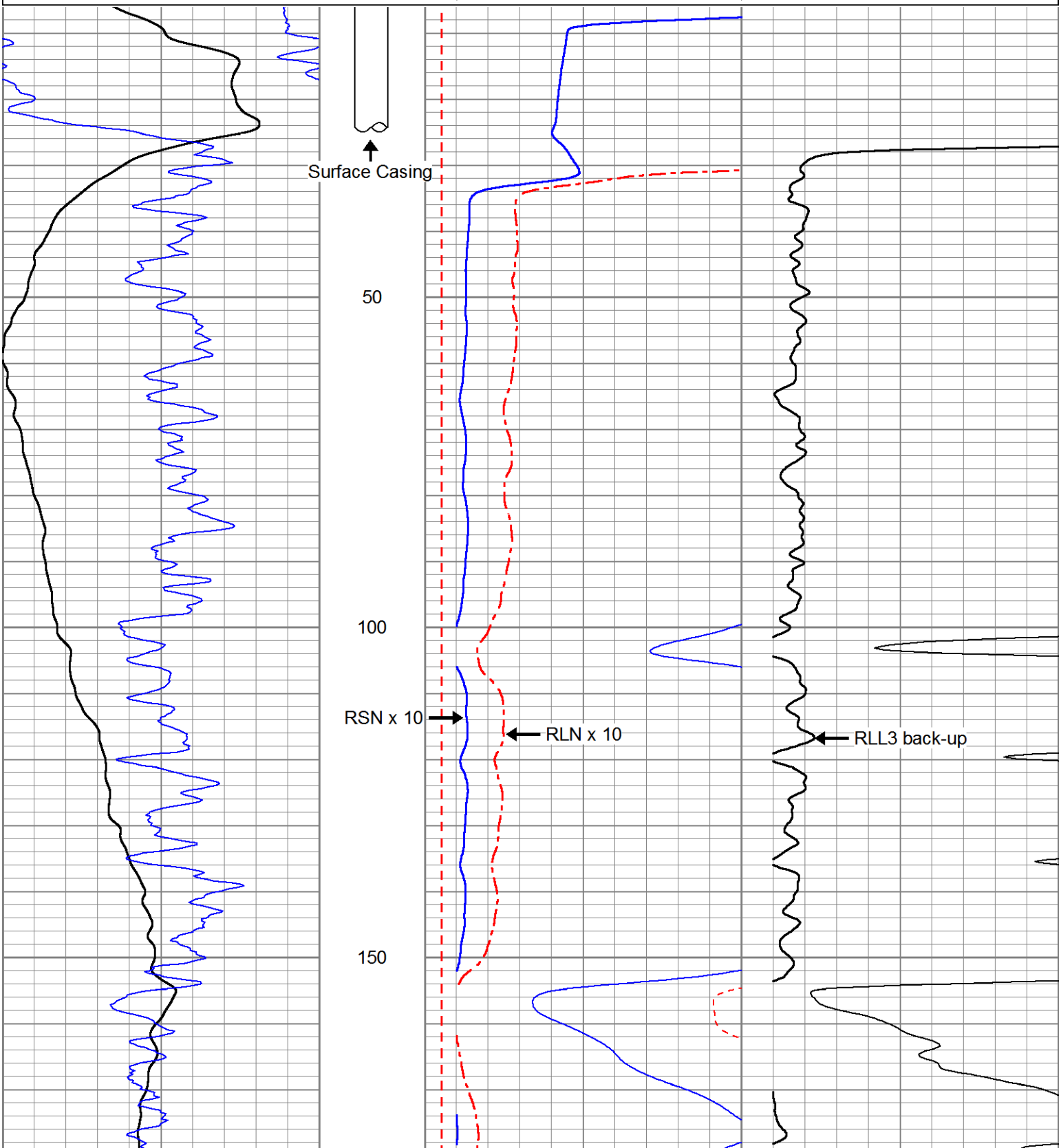
Serial Number:	D4	
Tool Model:	ELOG	
Performed:	Thu Jan 20 08:42:38 2011	
Calibrator Value:	162.0	GAPI
Background Reading:	173.2	cps
Calibrator Reading:	678.3	cps
Sensitivity:	0.3207	GAPI/cps

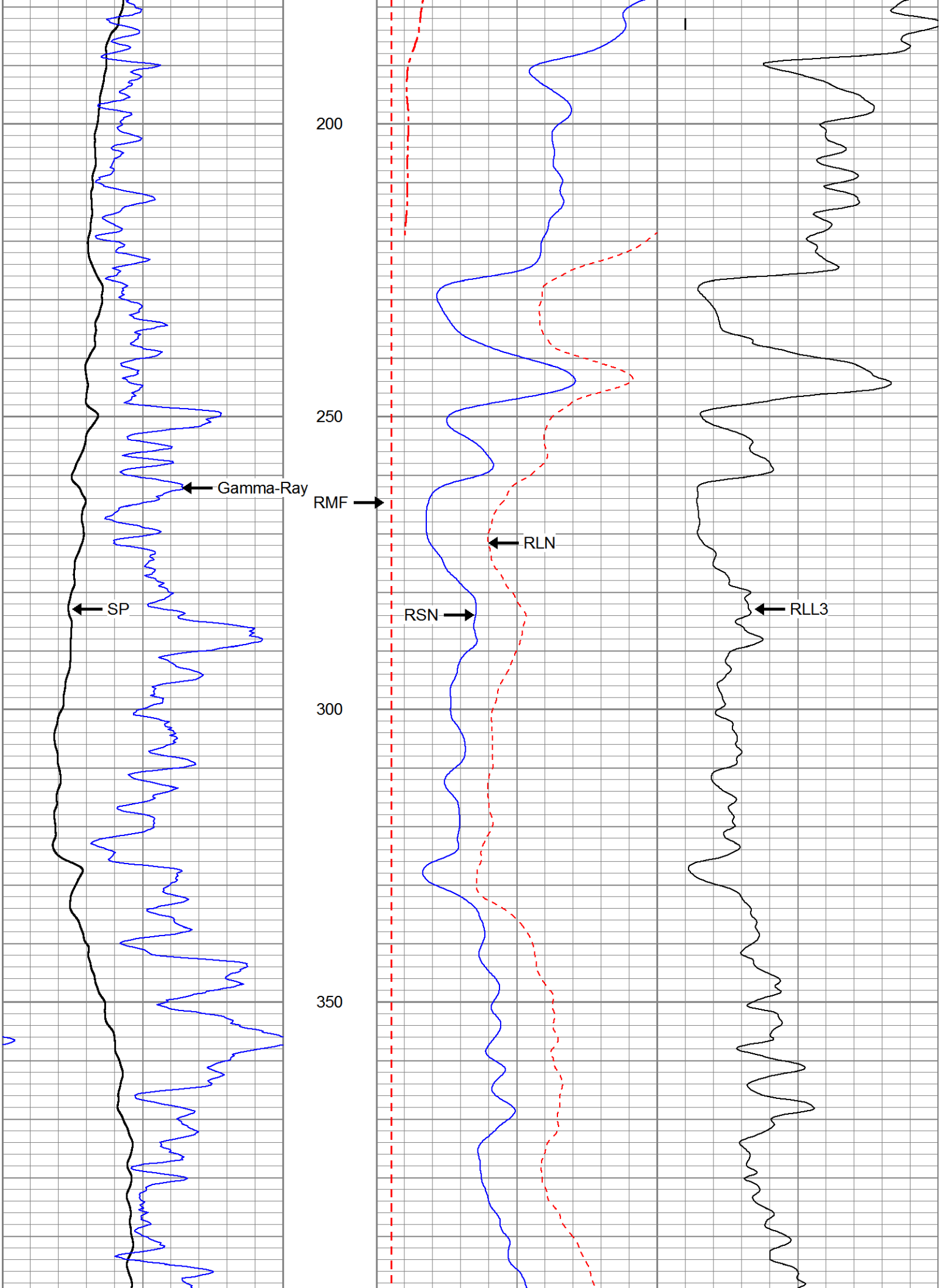
Database File: 16232.db
Dataset Pathname: elog2
Presentation Format: elog
Dataset Creation: Fri Oct 28 17:08:40 2011 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

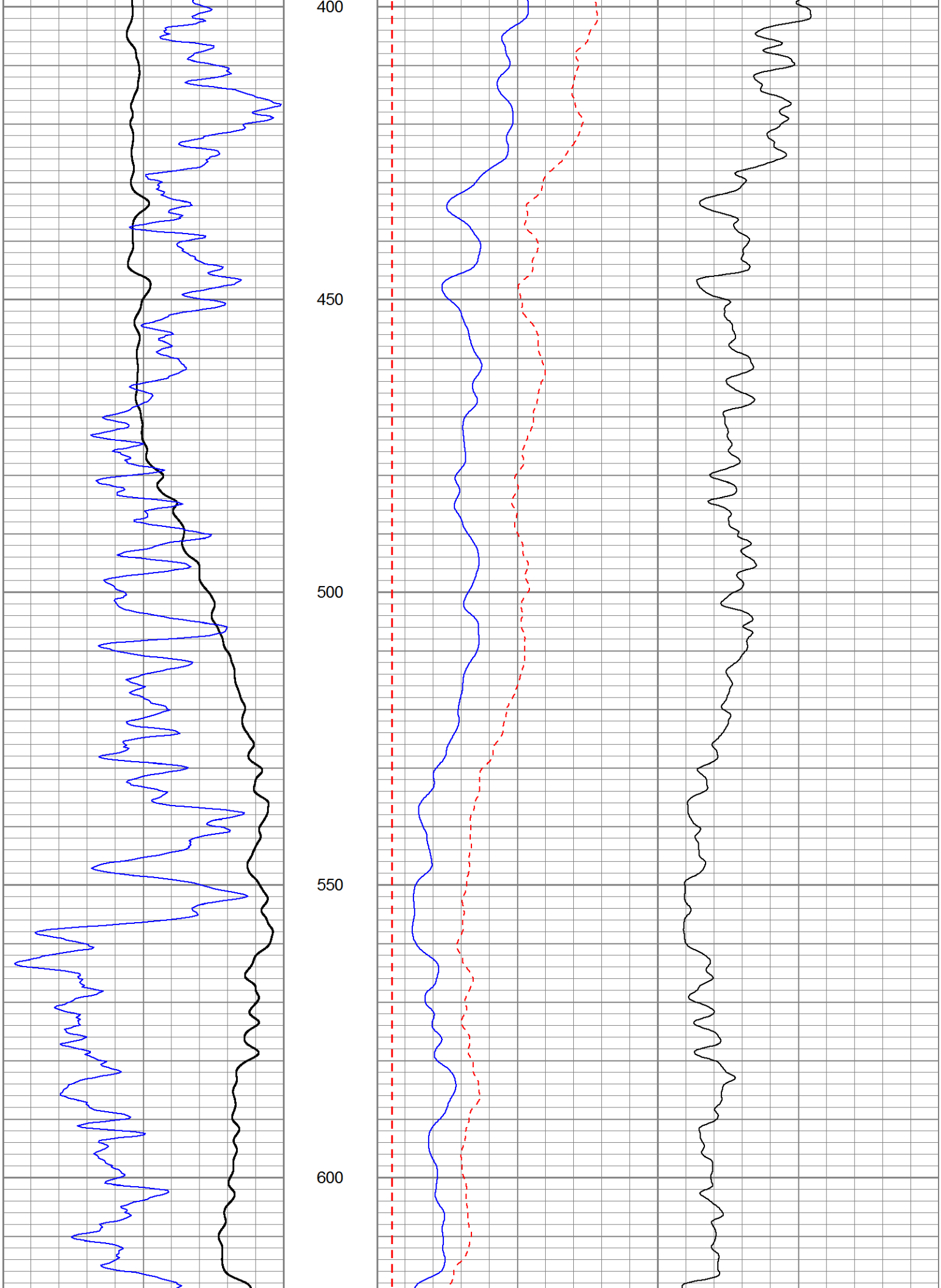
-160	SP (mV)	90
0	Line Speed (ft/min)	100
60	Gamma-Ray (GAPI)	110

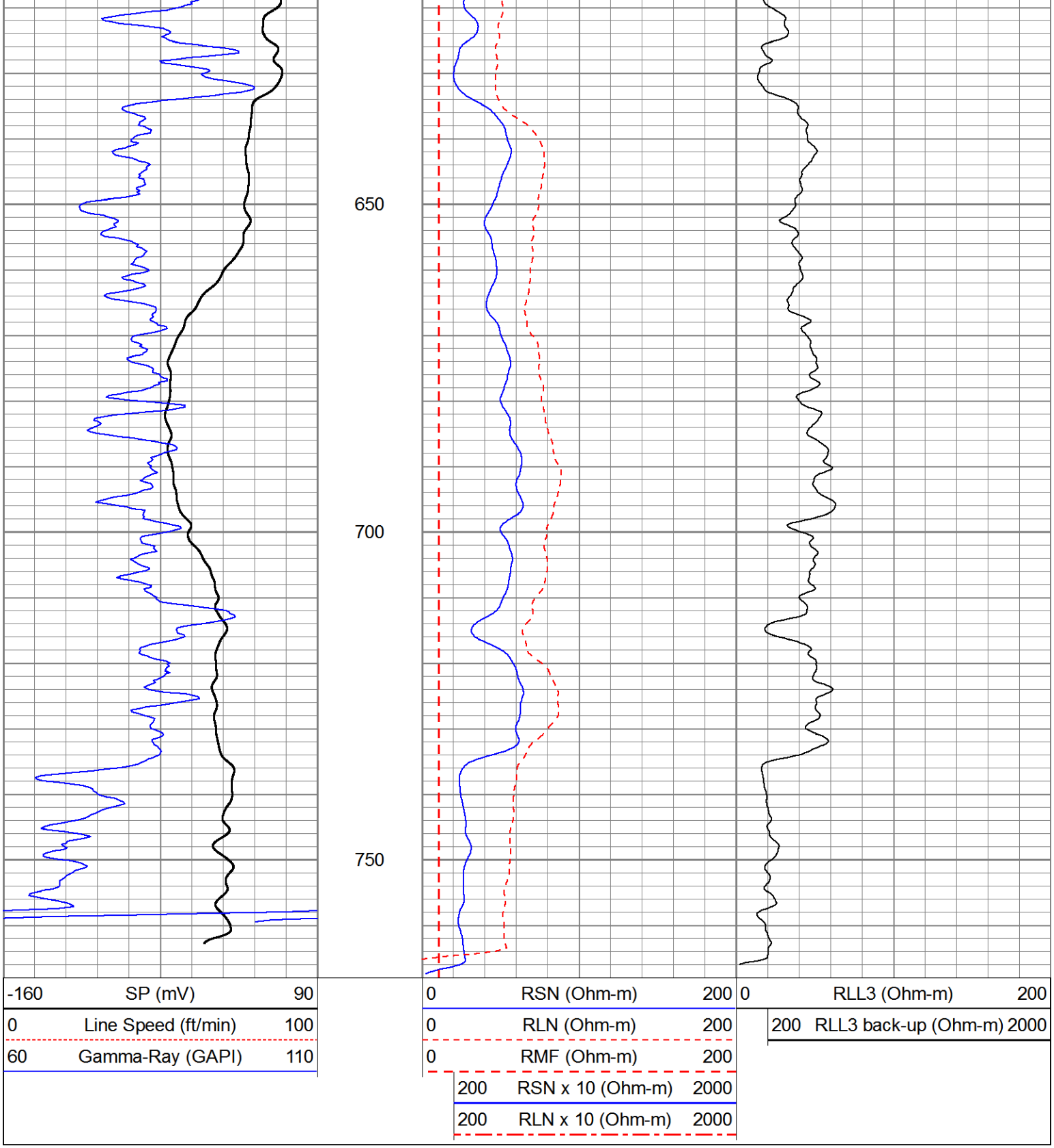
0	RSN (Ohm-m)	200
0	RLN (Ohm-m)	200
0	RMF (Ohm-m)	200
200	RSN x 10 (Ohm-m)	2000
200	RLN x 10 (Ohm-m)	2000

0	RLL3 (Ohm-m)	200
200	RLL3 back-up (Ohm-m)	2000




200
250
300
350
Gamma-Ray
SP
RMF
RLN
RSN
RLL3


400
450
500
550
600


650
700
750
-160 SP (mV) 90
0 Line Speed (ft/min) 100
60 Gamma-Ray (GAPI) 110
0 RSN (Ohm-m) 200
0 RLN (Ohm-m) 200
0 RMF (Ohm-m) 200
200 RSN x 10 (Ohm-m) 2000
200 RLN x 10 (Ohm-m) 2000
0 RLL3 (Ohm-m) 200
200 RLL3 back-up (Ohm-m) 2000

PACIFIC SURVEYS

SONIC VELOCITY VARIABLE DENSITY

Job No.
16232

File No.

Company WDC EXPLORATION & WELLS
Well EPA-MP8
Field RIALTO
County SAN BERNARDINO State CA

Location:
N34o06.031' W117o22.107'
Sec. Twp. Rge.

Other Services:
ELOG
GR/LL3
CALIPER

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L. 0'		K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	10-28-2011		
Run Number	ONE		
Depth Driller	770'		
Depth Logger	768'		
Bottom Logged Interval	768'		
Top Log Interval	25'		
Casing Driller	14" @ 25'		
Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	9.9 @ 77F		
Rmf @ Meas. Temp	10.7 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEASURE		
Rm @ BHT	N/A		
Time Circulation Stopped	2 HOURS		
Time Logger on Bottom	5:10 PM		
Max. Recorded Temperature	N/A		
Equipment Number	PS-4		
Location	L.A.		
Recorded By	ABREAU/NELSON		
Witnessed By	T. WATCHERS		

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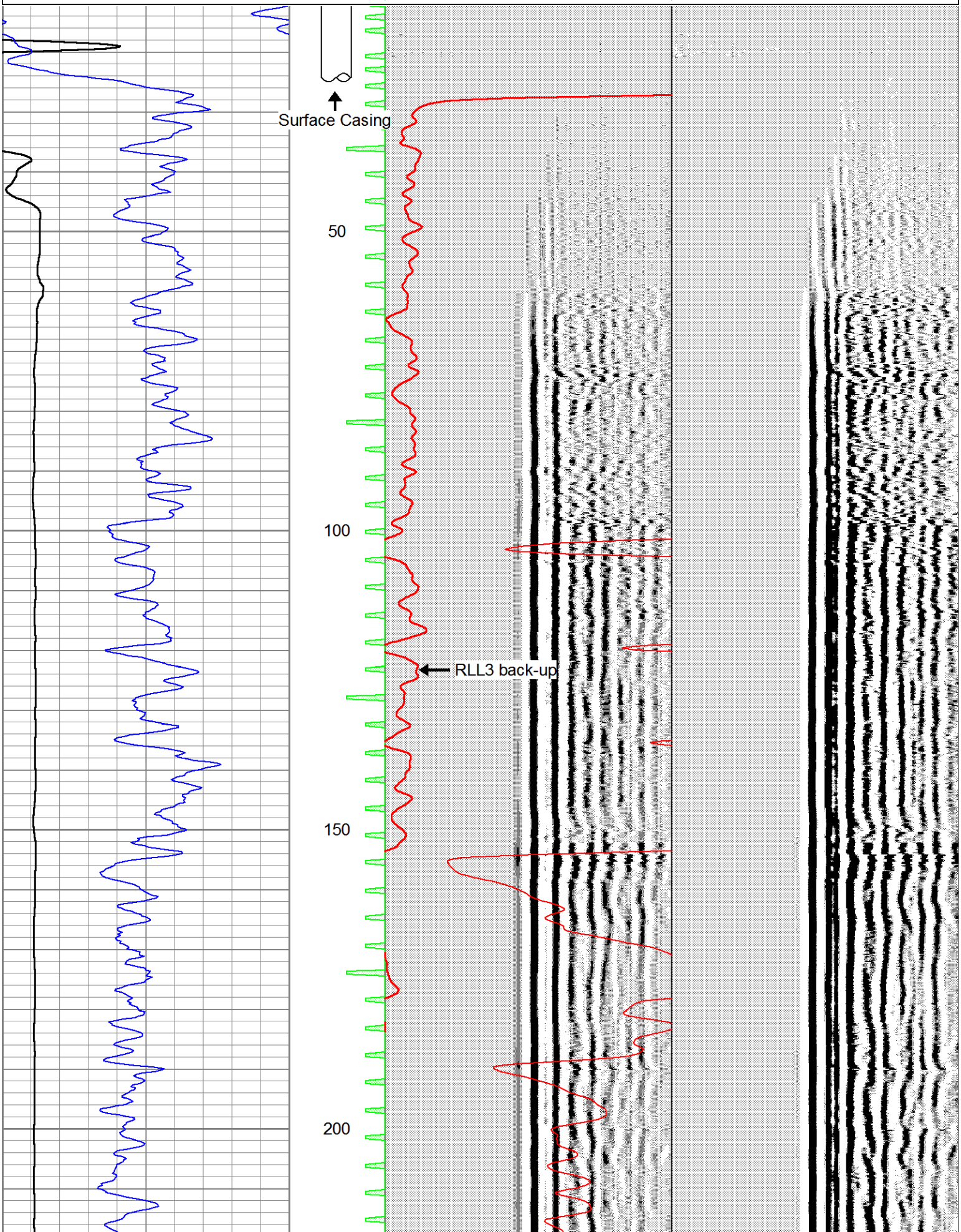
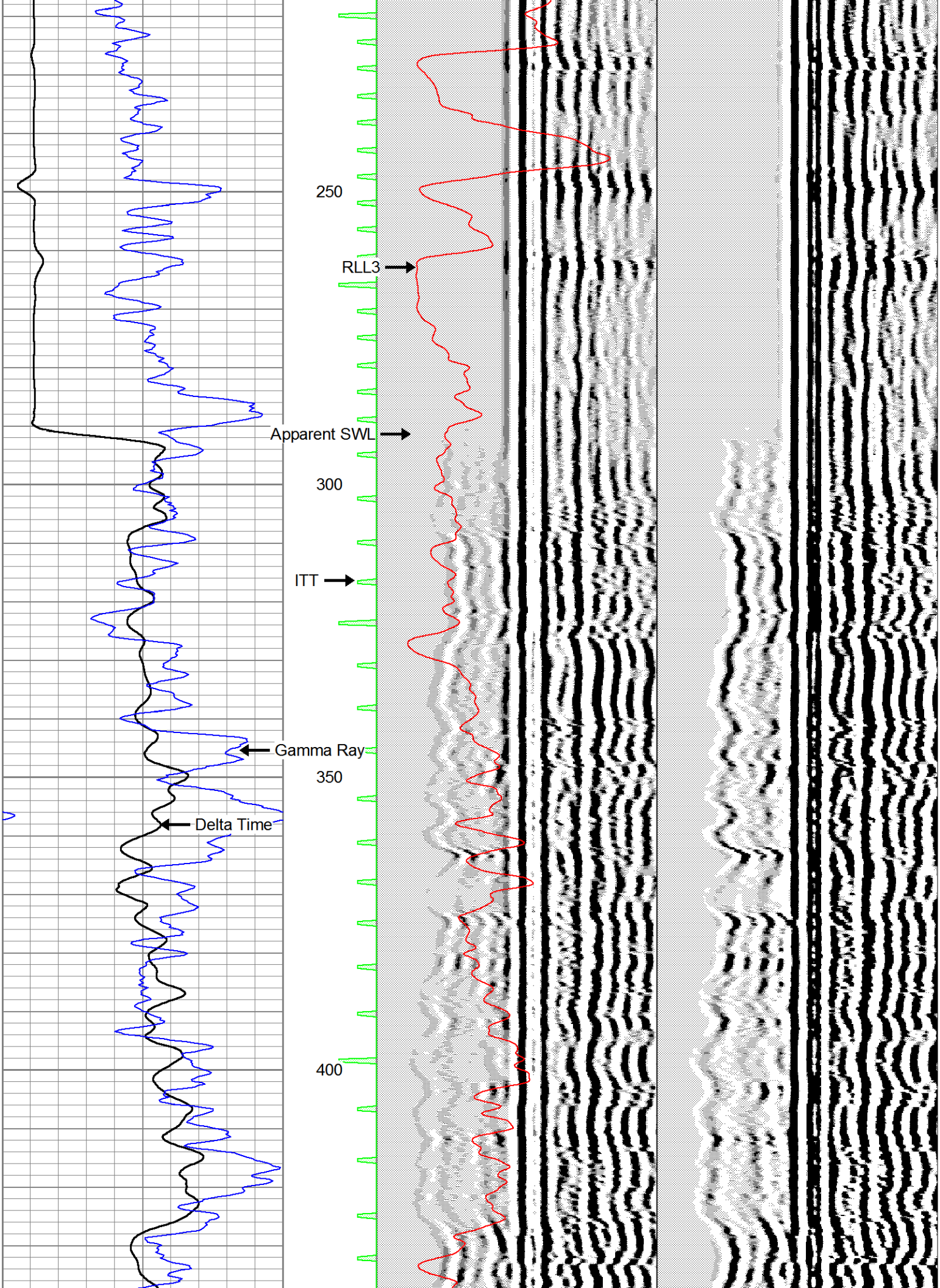
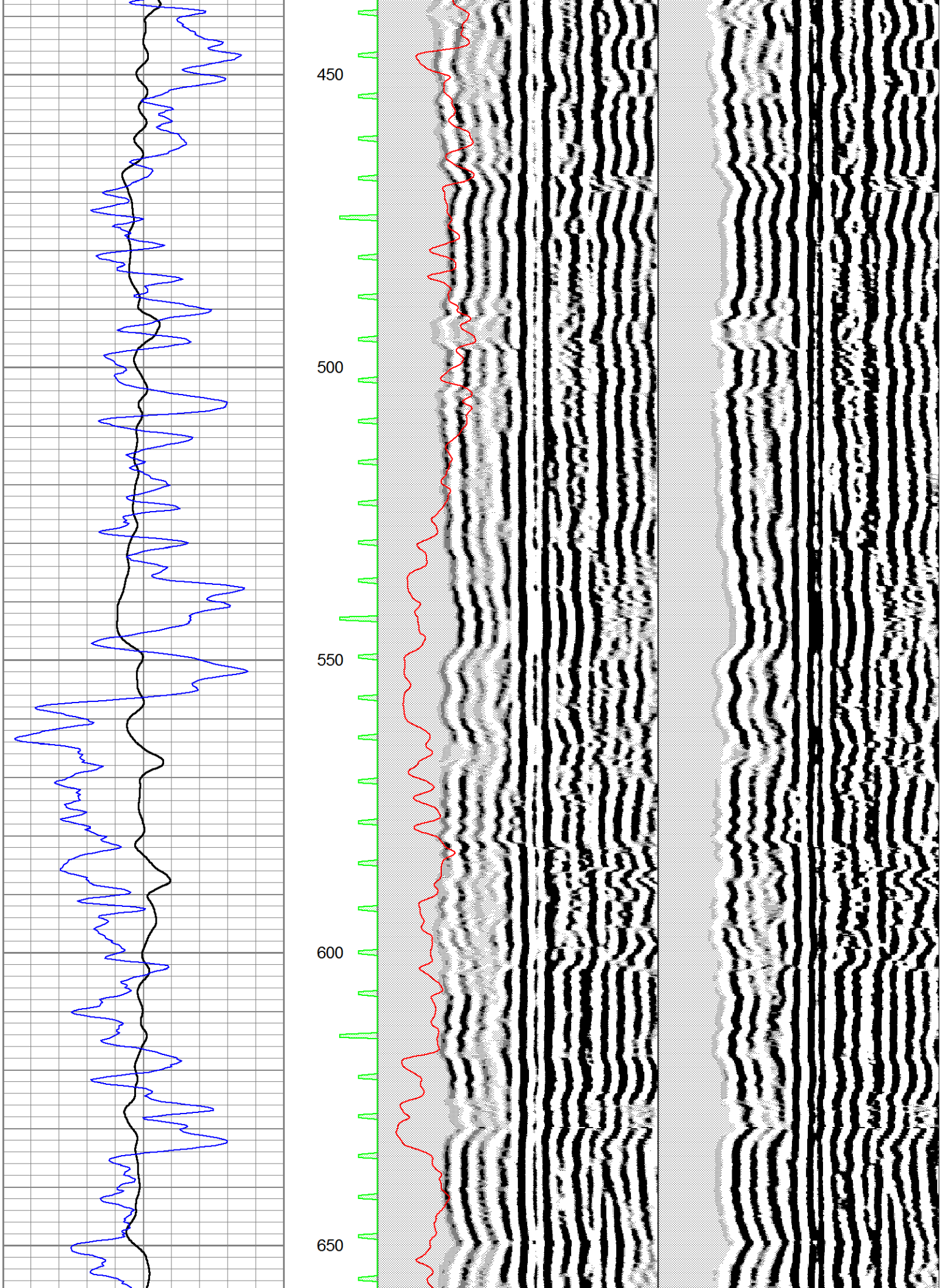
Comments

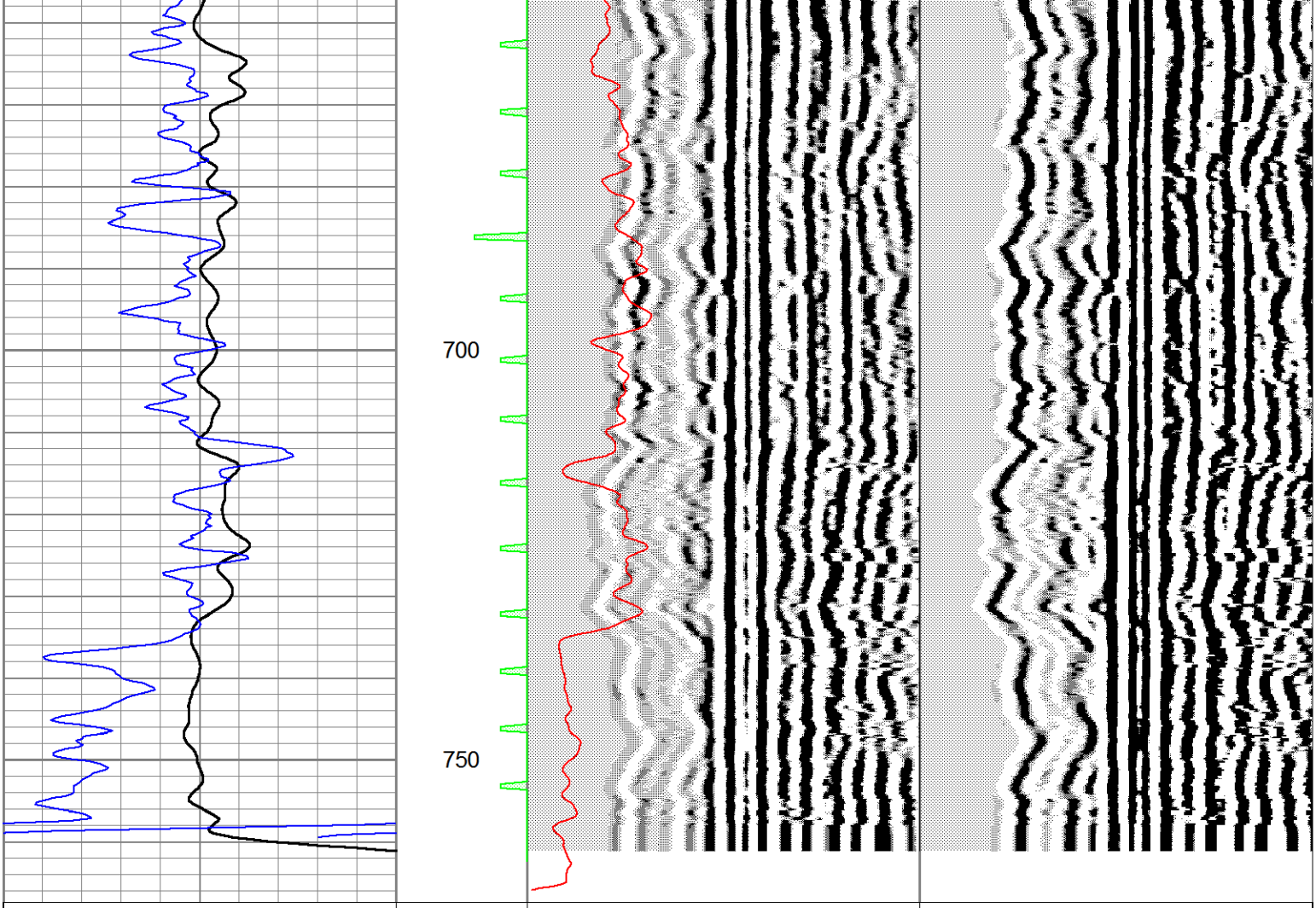
Database File: 16232.db
Dataset Pathname: SNC
Presentation Format: slt
Dataset Creation: Fri Oct 28 18:23:00 2011 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

240	Delta Time (usec/ft)	40	ITT	600	Variable Density 5 ft	1600	600	Variable Density 5 ft	1600
60	Gamma-Ray (GAPI)	110	5 (msec) 0	0	RLL3 (Ohm-m)	200			
				200	RLL3 back-up (Ohm-m)	2000			




250
RLL3
Apparent SWL
300
ITT
Gamma Ray
350
Delta Time
400


450
500
550
600
650



240	Delta Time (usec/ft)	40	ITT	600	Variable Density 5 ft	1600	600	Variable Density 5 ft	1600
60	Gamma-Ray (GAPI)	110	5 (msec) 0	0	RLL3 (Ohm-m)	200			
				200	RLL3 back-up (Ohm-m)	2000			

Project:	**BF Goodrich RI/FS**	Start Date:	**10-10-2011**
Project Number:	**07163.0054**	End Date:	**12-23-2011**
Location:	**Rialto, CA**	Total Depth (ft. bgs):	**770**
Client:	**EPA**	Surface Elevation (ft msl):	**1221.08**
Drilling Contractor:	**WDC**	Longitude:	**-177.3682953**
Drilling Method:	**Mud Rotary**	Latitude:	**34.1004989**
		Logged By:	**C.Marvin/T. Watchers**
		Review By:	**Pete Phillips**

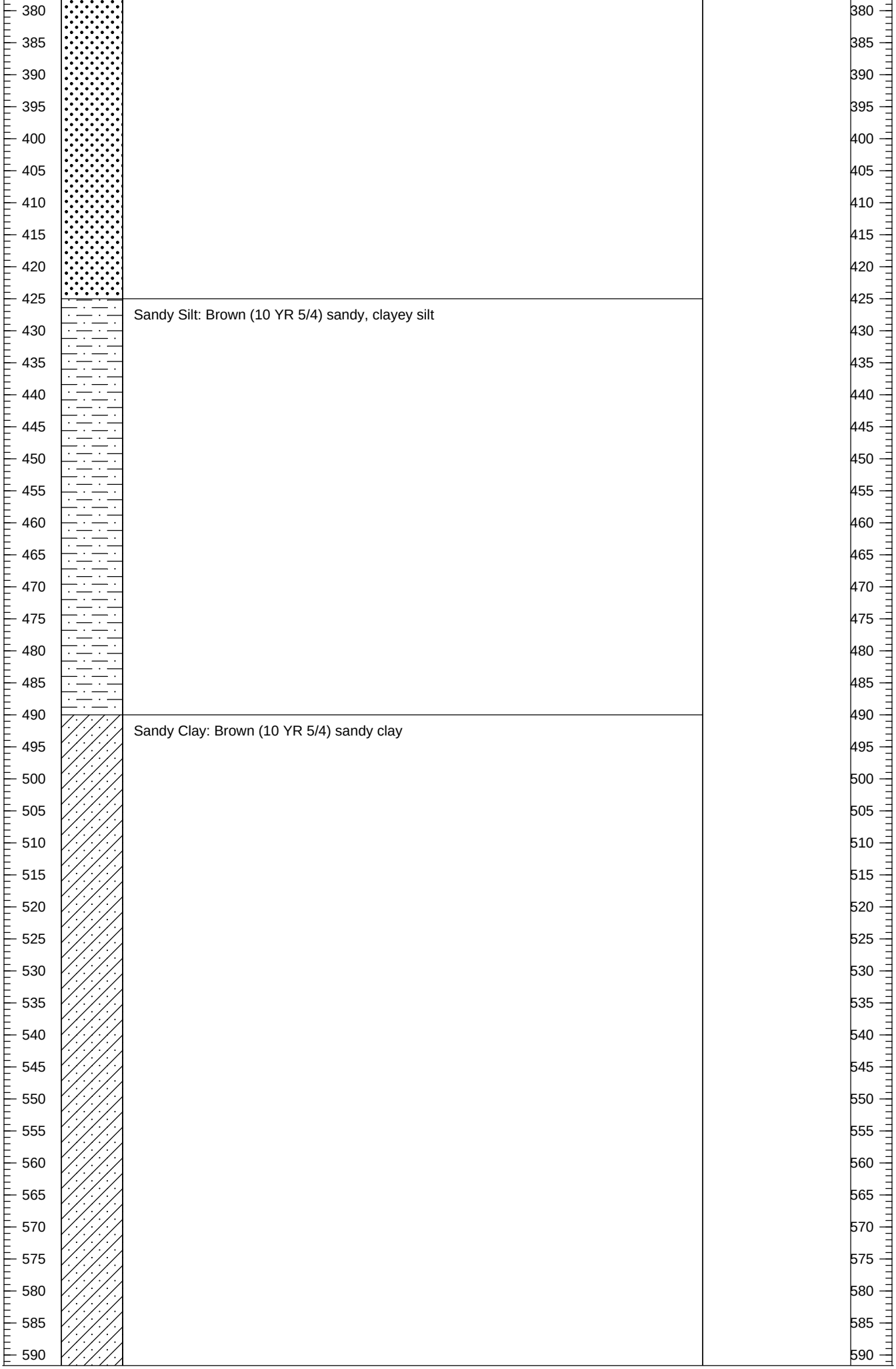
ITSI Gilbane

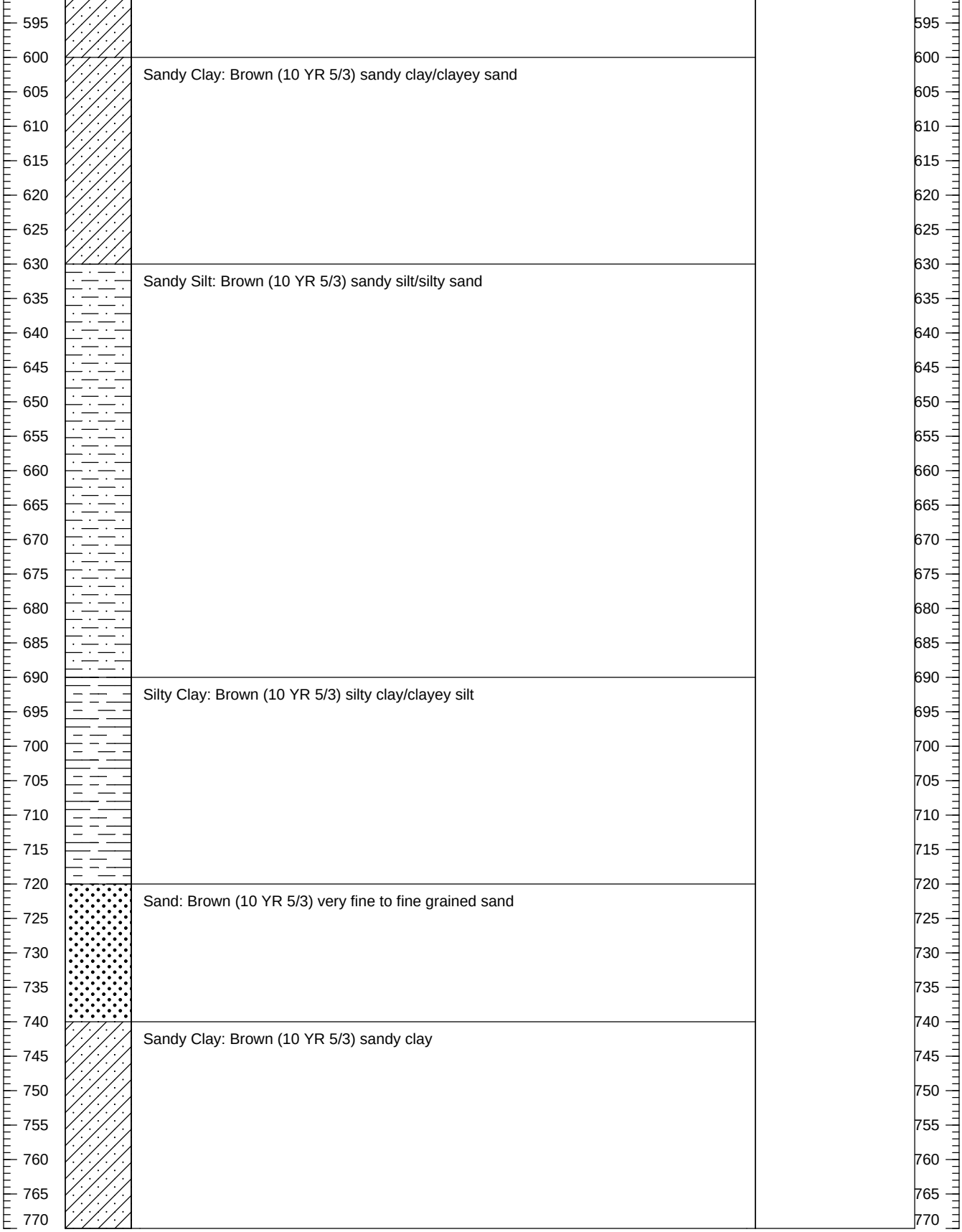
Boring ID:

EPA-MP8

Depth (feet)	Lithology	*LITHOLOGY DESCRIPTION*	*COMMENTS*
0–35		Silty Sand: Dark grayish brown (10 YR 4/2) silty, fine to coarse grained sand	
35–85		Silty Sand: Yellowish brown (10 YR 5/4) silty, coarse to medium grained sand	
85–165		Silty Sand: Yellowish brown (10 YR 5/4) silty, coarse to medium grained sand with trace gravel	

165–180	Silty Sand: Yellowish brown (10 YR 5/4) sandy silt
180–260	Silty Sand with Gravel: Yellowish brown (10 YR 5/4) silty, coarse to fine grained sand with gravel
260–280	Silty Clay: Brown (7.5 YR 5/4) silty clay
280–330	Silty Sand: Brown (7.5 YR 5/3) silty, fine grained sand
330–340	Silty Sand: Brown (10 YR 5/4) silty sand/sandy silt
340–350	Silty Sand: Light olive brown (2.5Y 5/3) silty sand/sandy silt
350–375	Sand: Brown (10 YR 5/3) fine grained sand


380
385
390
395
400
405
410
415
420
425
430
435
440
445
450
455
460
465
470
475
480
485
490
495
500
505
510
515
520
525
530
535
540
545
550
555
560
565
570
575
580
585
590
Sandy Silt: Brown (10 YR 5/4) sandy, clayey silt
Sandy Clay: Brown (10 YR 5/4) sandy clay


595
600
605
610
615
620
625
630
635
640
645
650
655
660
665
670
675
680
685
690
695
700
705
710
715
720
725
730
735
740
745
750
755
760
765
770
Sandy Clay: Brown (10 YR 5/3) sandy clay/clayey sand
Sandy Silt: Brown (10 YR 5/3) sandy silt/silty sand
Silty Clay: Brown (10 YR 5/3) silty clay/clayey silt
Sand: Brown (10 YR 5/3) very fine to fine grained sand
Sandy Clay: Brown (10 YR 5/3) sandy clay

Summary Casing Log

Job No: WB885
Well: EPA-MP8

Legend

(Qty) MP Components

(Library - WD Library 7/27/00)

(2) 020102 - MP38 Casing 3 (2F/0.6M)

(22) 020105 - MP38 Casing 2 (5F/1.5M)

(56) 020110 - MP38 Casing 1 (10F/3M)

(15) 0239 - MP38 Packer 82mm (5F/1.5M)

(1) 0203 - MP38 End Cap

(75) 0202 - MP38 Regular Coupling

(15) 0205 - MP38 Measurment Port

(5) 0224 - MP38 Pumping Port

(5) 0216 - Magnetic Location Collar

Geology

Backfill/Casing

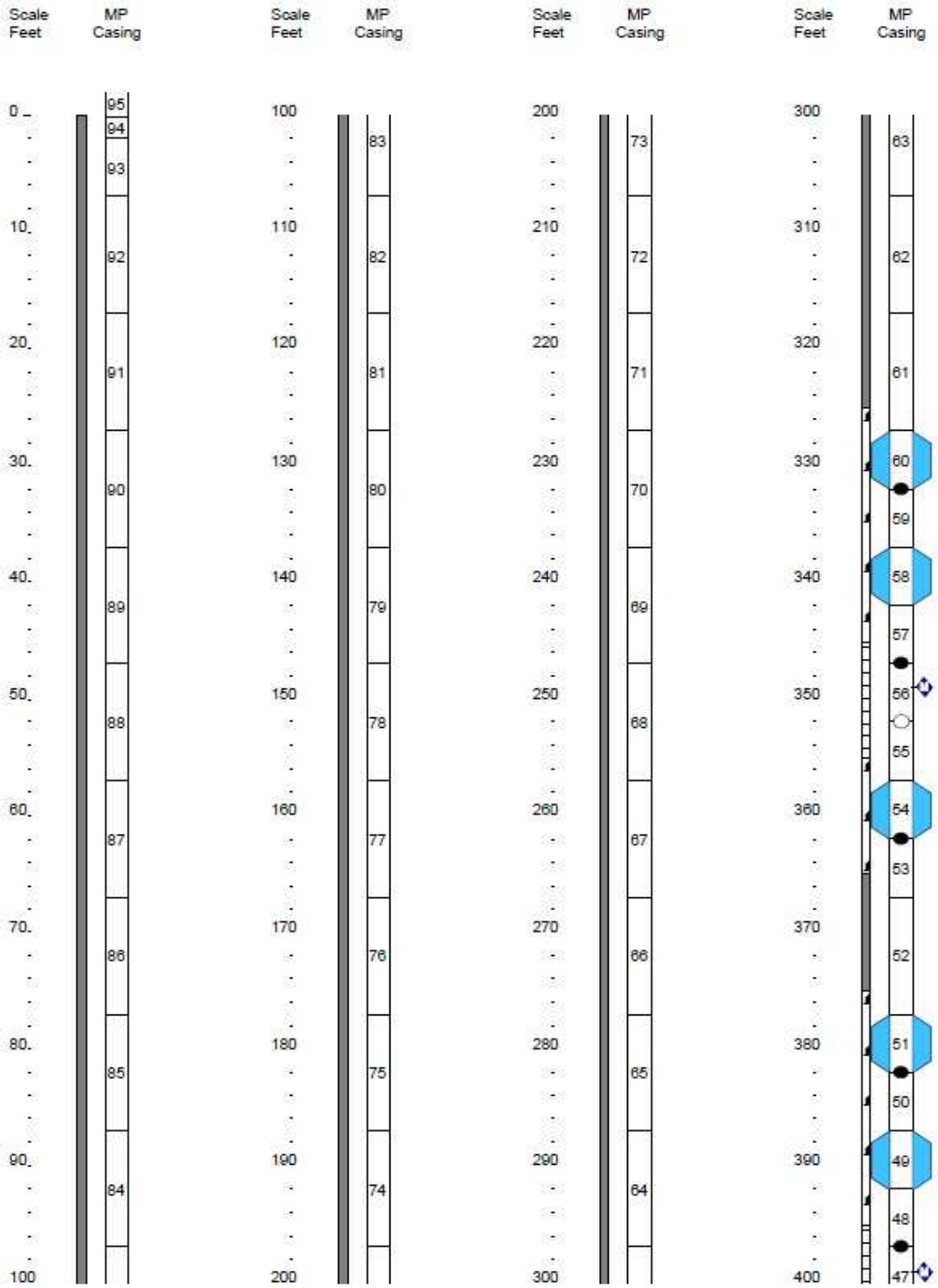
Mild Steel

Stainless Steel

Well Screen

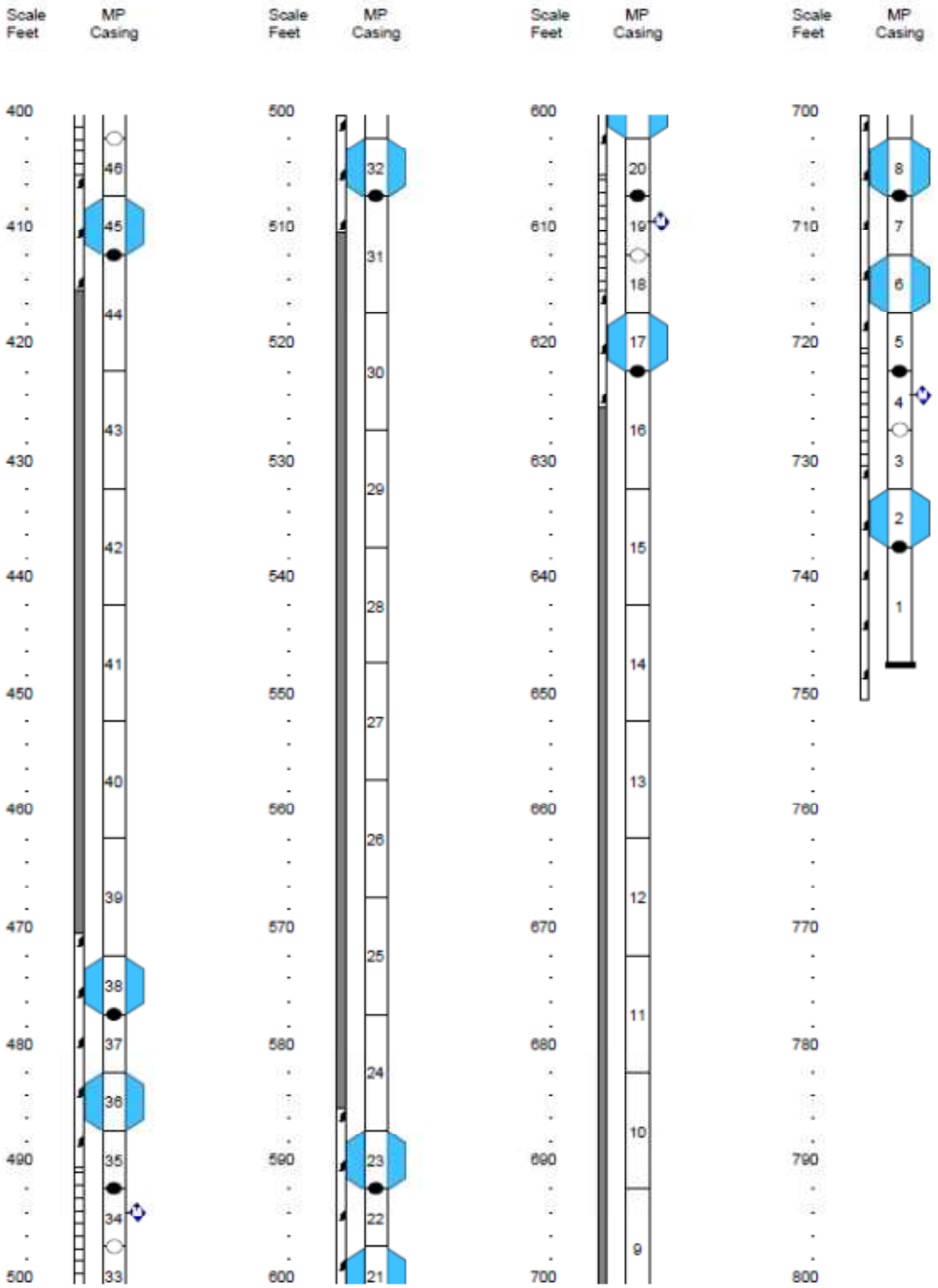
Summary Casing Log

Job No: WB885
Well: EPA-MP8



Summary Casing Log

Job No: WB885
Well: EPA-MP8



EPA-MW09A and 09B

PACIFIC SURVEYS

CALIPER
BOREHOLE VOLUMES

Job No.
16583

File No.

Company	WDC EXPLORATION & WELLS
Well	EPA-MW09A/B
Field	RIALTO
County	SAN BERNARDINO State CA

Location:

GPS: N 34o 07.930' W 117o 23.836'

Sec. Twp. Rge.

Other Services:

GR/LL3
ELOG
SONIC/VDL

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
Log Measured From	G.L. 0'		K.B.
Drilling Measured From	G.L.		D.F.
			G.L.

Date	06-01-2012		
Run Number	ONE		
Depth Driller	771'		
Depth Logger	772'		
Bottom Logged Interval	772'		
Top Log Interval	0'		
Casing Driller	14" @ 25'		
Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	22.0 @ 77F		
Rmf @ Meas. Temp	22.9 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEASURE		
Rm @ BHT	N/A		
Time Circulation Stopped	1000		
Time Logger on Bottom	1200		
Max. Recorded Temperature	N/A		
Equipment Number	PS-3		
Location	LA		
Recorded By	SCHUMACHER		
Witnessed By	C. MARVIN		

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Comments

Calibration Report

Database File: 16583.db
Dataset Pathname: CAL/CAL
Dataset Creation: Fri Jun 01 13:50:29 2012 by Log Open-Cased 090629

Temperature Calibration Report

Serial Number:	PS-3_Short			
Tool Model:	Short_GPH			
Performed:	Fri Nov 04 15:09:55 2011			
	Reference		Reading	
Low Reference:	4.00	degF	446.36	cps
High Reference:	8.00	degF	703.01	cps
Gain:	0.02			
Offset:	-2.96			
Delta Spacing	1			

XY Caliper Calibration Report

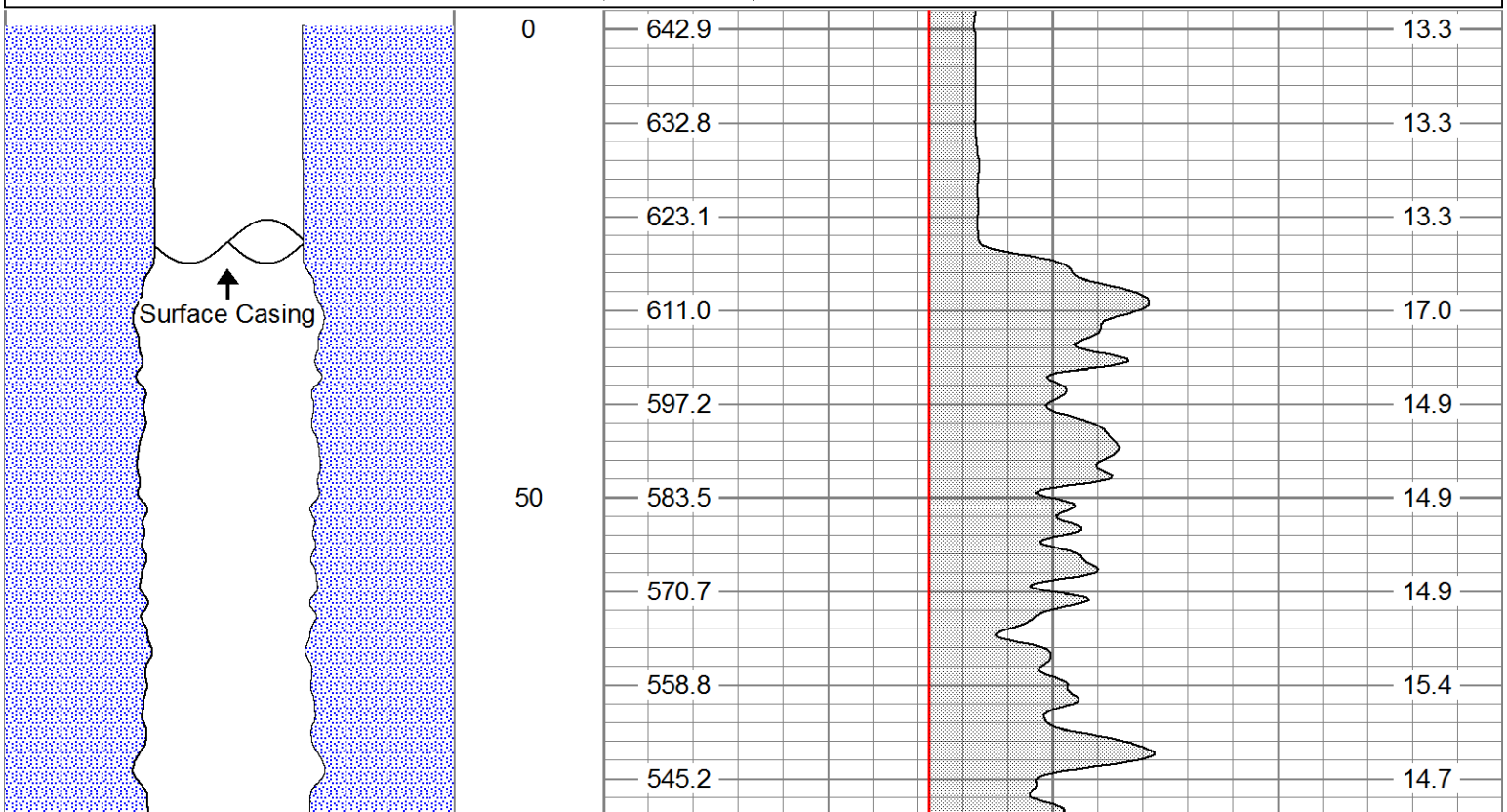
Serial Number/Model:	Short-Comprobe
Performed:	Wed Jul 06 14:17:30 2011

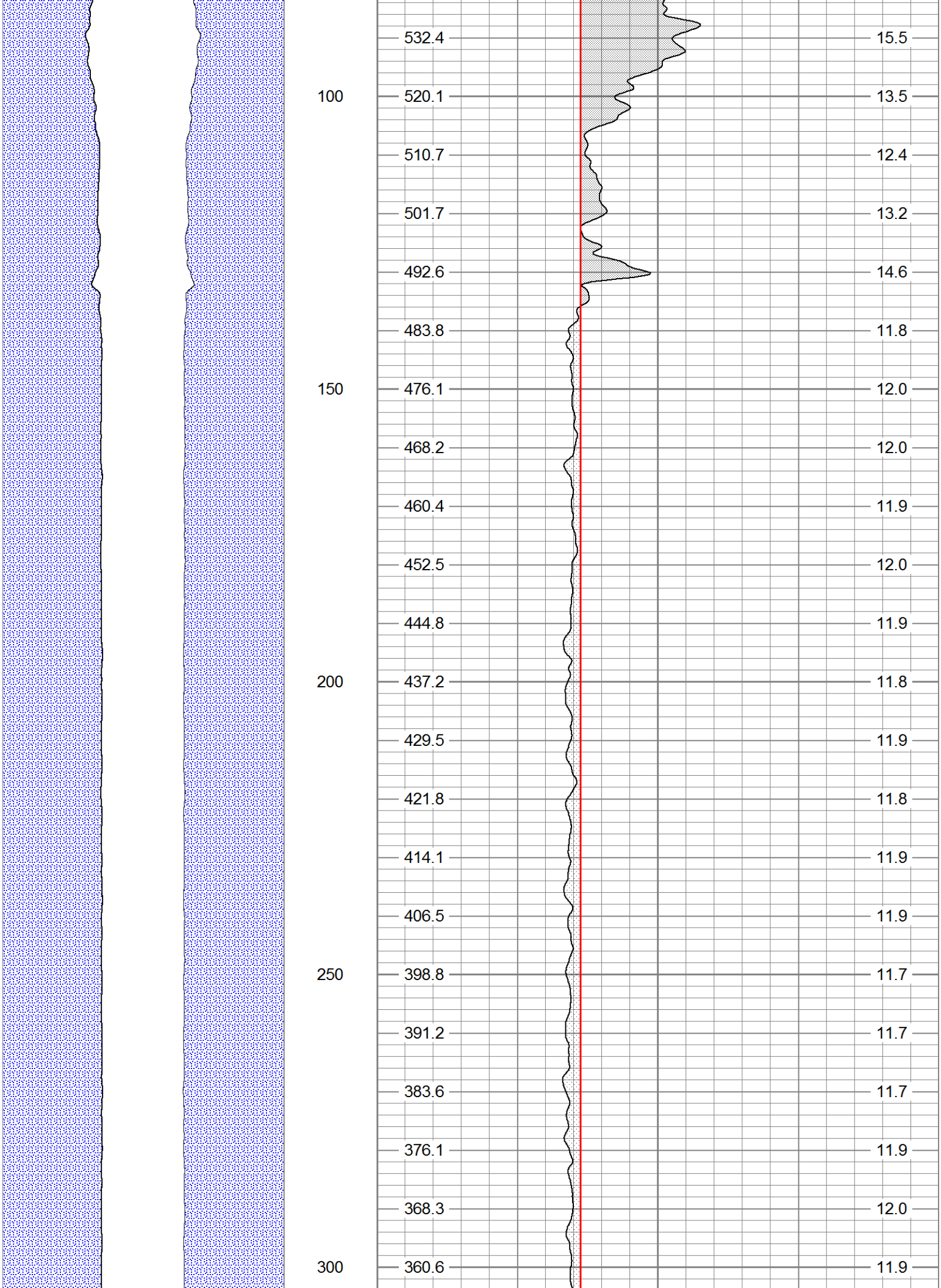
	Ring		X Caliper		Y Caliper	
1:	4	in	323.326	cps	323.326	cps
2:	8	in	446.363	cps	446.363	cps
3:	12	in	575.851	cps	575.851	cps
4:	16	in	703.014	cps	703.014	cps
5:	20	in	834.164	cps	834.164	cps
6:		in		cps		cps

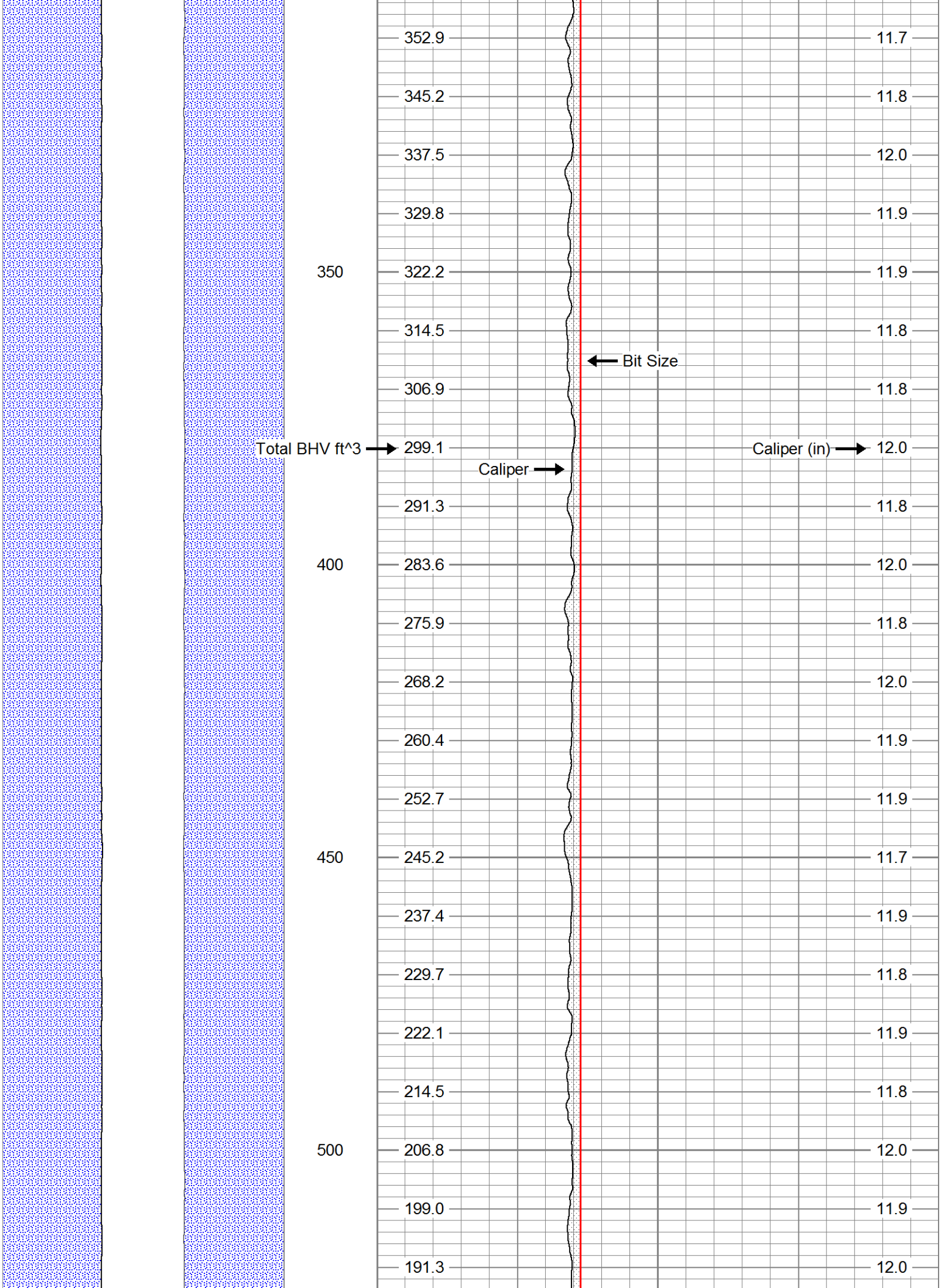
Database File:	16583.db
Dataset Pathname:	CAL/CAL
Presentation Format:	xyc_gph
Dataset Creation:	Fri Jun 01 13:50:29 2012 by Log Open-Cased 090629
Charted by:	Depth in Feet scaled 1:240

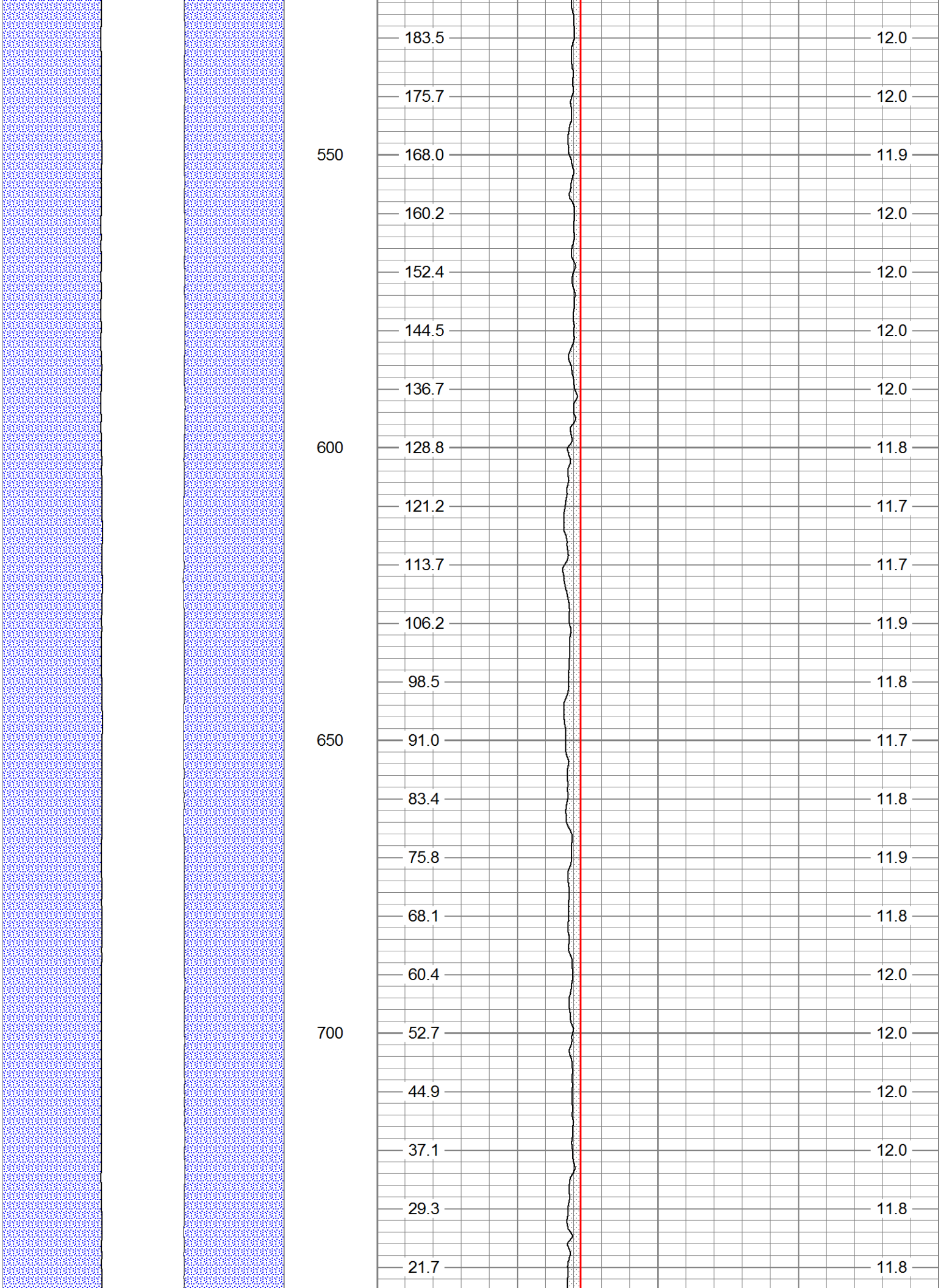
CSG SCHEDULE

Pipe(s) proportional to Hole Size




100
150
200
250
300
532.4
520.1
510.7
501.7
492.6
483.8
476.1
468.2
460.4
452.5
444.8
437.2
429.5
421.8
414.1
406.5
398.8
391.2
383.6
376.1
368.3
360.6
15.5
13.5
12.4
13.2
14.6
11.8
12.0
12.0
11.9
12.0
11.9
11.8
11.9
11.8
11.9
11.9
11.7
11.7
11.7
11.9
12.0
11.9


Total BHV ft^3
350
400
450
500
352.9
345.2
337.5
329.8
322.2
314.5
306.9
299.1
291.3
283.6
275.9
268.2
260.4
252.7
245.2
237.4
229.7
222.1
214.5
206.8
199.0
191.3
Bit Size
Caliper
Caliper (in)
11.7
11.8
12.0
11.9
11.9
11.8
11.8
12.0
11.8
12.0
11.8
12.0
11.9
11.9
11.7
11.9
11.8
11.9
11.8
12.0
11.9
12.0


550
600
650
700
183.5
175.7
168.0
160.2
152.4
144.5
136.7
128.8
121.2
113.7
106.2
98.5
91.0
83.4
75.8
68.1
60.4
52.7
44.9
37.1
29.3
21.7
12.0
12.0
11.9
12.0
12.0
12.0
12.0
11.8
11.7
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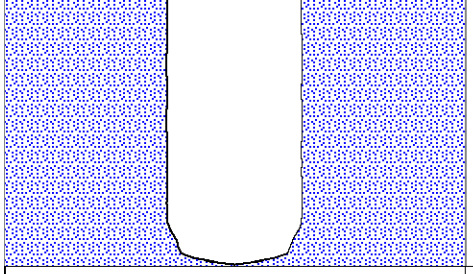
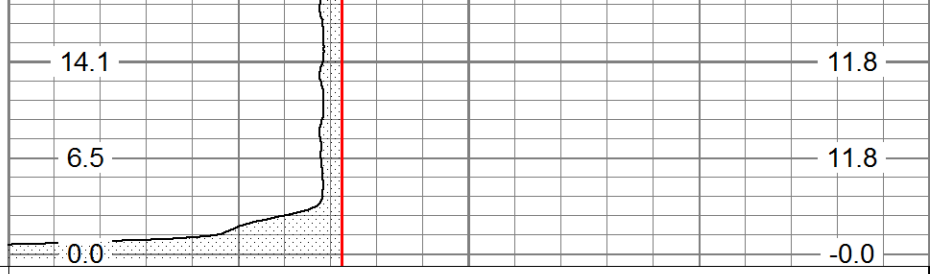
12.0
12.0
11.8
11.8



750



CSG SCHEDULE

Pipe(s) proportional to Hole Size

5	Caliper (in)	25
5	Bit Size (in)	25

Total BHV ft^3 (ft3)	Caliper (in)

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG 3
GAMMA-RAY

Job No.
16583

File No.

Company	WDC EXPLORATION & WELLS
Well	EPA-MW09A/B
Field	RIALTO
County	SAN BERNARDINO State CA

Location:

GPS: N 34o 07.930' W 117o 23.836'

Sec. Twp. Rge.

Other Services:

GR/LL3
SONIC/VDL
CALIPER

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
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Drilling Measured From	G.L.		D.F.
			G.L.

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Depth Logger	772'		
Bottom Logged Interval	772'		
Top Log Interval	0'		
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Casing Logger	25'		
Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	22.0 @ 77F		
Rmf @ Meas. Temp	22.9 @ 77F		
Rmc @ Meas. Temp	N/A		
Source of Rmf / Rmc	MEASURE		
Rm @ BHT	N/A		
Time Circulation Stopped	1000		
Time Logger on Bottom	1200		
Max. Recorded Temperature	N/A		
Equipment Number	PS-3		
Location	LA		
Recorded By	SCHUMACHER		
Witnessed By	C. MARVIN		

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Comments

Calibration Report

Database File: 16583.db
Dataset Pathname: ELOG
Dataset Creation: Fri Jun 01 12:19:31 2012 by Log Open-Cased 090629

ELOG Calibration Report

Serial:	D4
Model:	DTQ
Shop Calibration Performed:	Fri Sep 02 15:34:18 2011
Before Survey Verification Performed:	Sun Sep 09 13:17:43 2007
After Survey Verification Performed:	Sun Sep 09 13:17:48 2007

Shop Calibration

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	9.321	100.380		10.200	102.200	Ohm-m	1.010	0.782
Long	8.948	97.855		10.200	102.200	Ohm-m	1.035	-17.100
IEE	88.740	5882.980	counts	0.097	6.438	A		
VSN	104.920	6618.800	counts	2.001	126.246	V		
VLN	77.120	1684.980	counts	1.471	32.139	V		

Before Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	40.249	101.201		40.505	101.206	Ohm-m	0.996	0.422
Long	142.638	102.842		102.858	102.858	Ohm-m	1.024	-2.408
IEE	212.960	7070.960	counts	0.233	7.738	A		
VSN	96.300	8039.720	counts	1.837	153.348	V		
VLN	85.320	2042.520	counts	1.627	38.959	V		

After Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	40.270	101.200		40.249	101.201	Ohm-m	1.000	-0.035
Long	142.491	102.843		102.842	102.842	Ohm-m	1.004	-0.383
IEE	213.380	7077.580	counts	0.234	7.746	A		
VSN	96.540	8047.160	counts	1.841	153.490	V		
VLN	85.400	2044.440	counts	1.629	38.995	V		

After Survey Verification compared to Before Survey Calibration

	Zero			Cal		
	Before	After		Before	After	
Short	40.505	40.249	Ohm-m	101.206	101.201	Ohm-m
Long	143.592	142.638	Ohm-m	102.858	102.842	Ohm-m

Gamma Ray Calibration Report

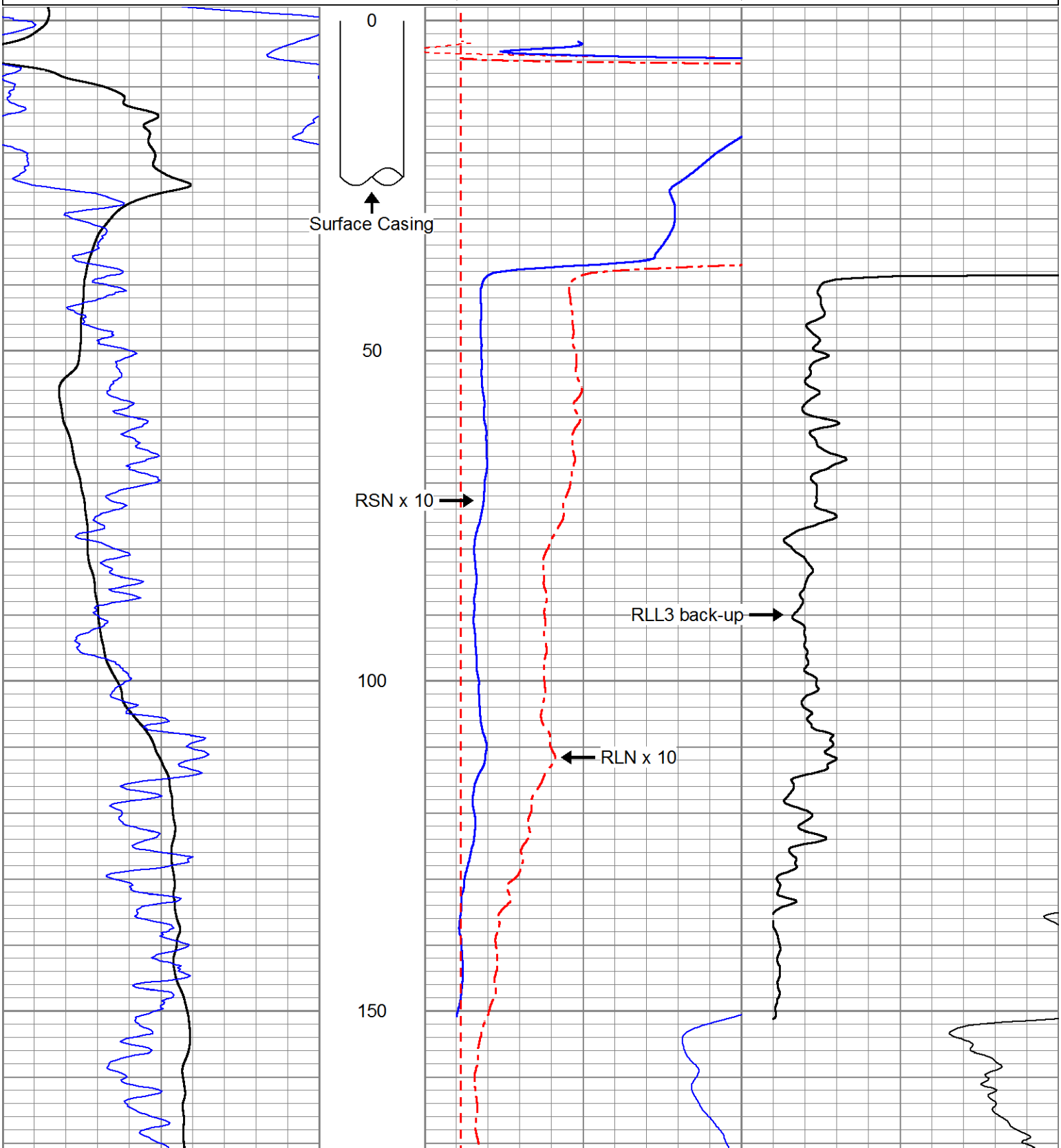
Serial Number:	D4	
Tool Model:	ELOG	
Performed:	Tue Jul 15 15:58:21 2008	
Calibrator Value:	162.0	GAPI
Background Reading:	198.6	cps
Calibrator Reading:	742.0	cps
Sensitivity:	0.2982	GAPI/cps

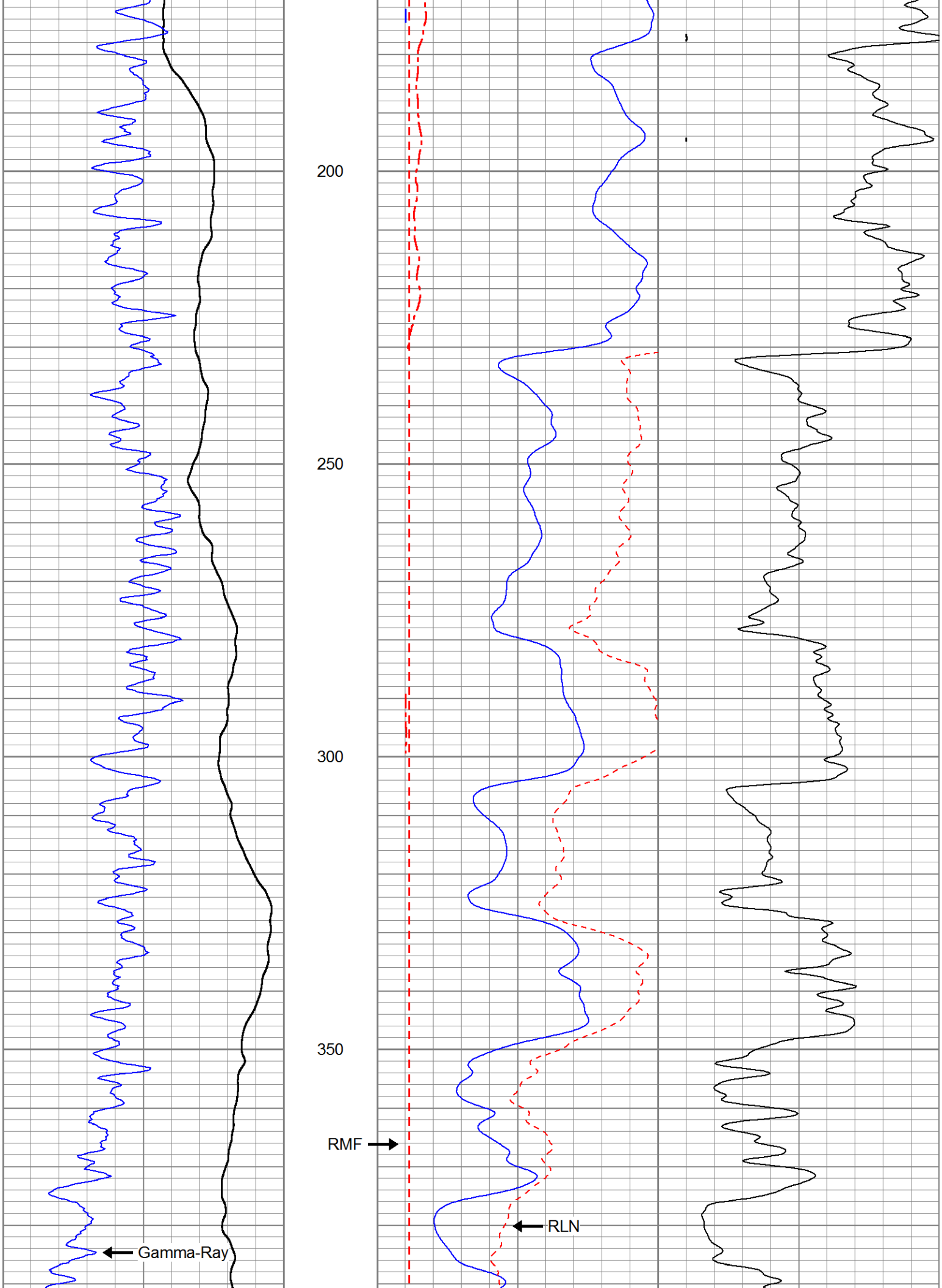
Database File: 16583.db
Dataset Pathname: ELOG
Presentation Format: elog
Dataset Creation: Fri Jun 01 12:19:31 2012 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

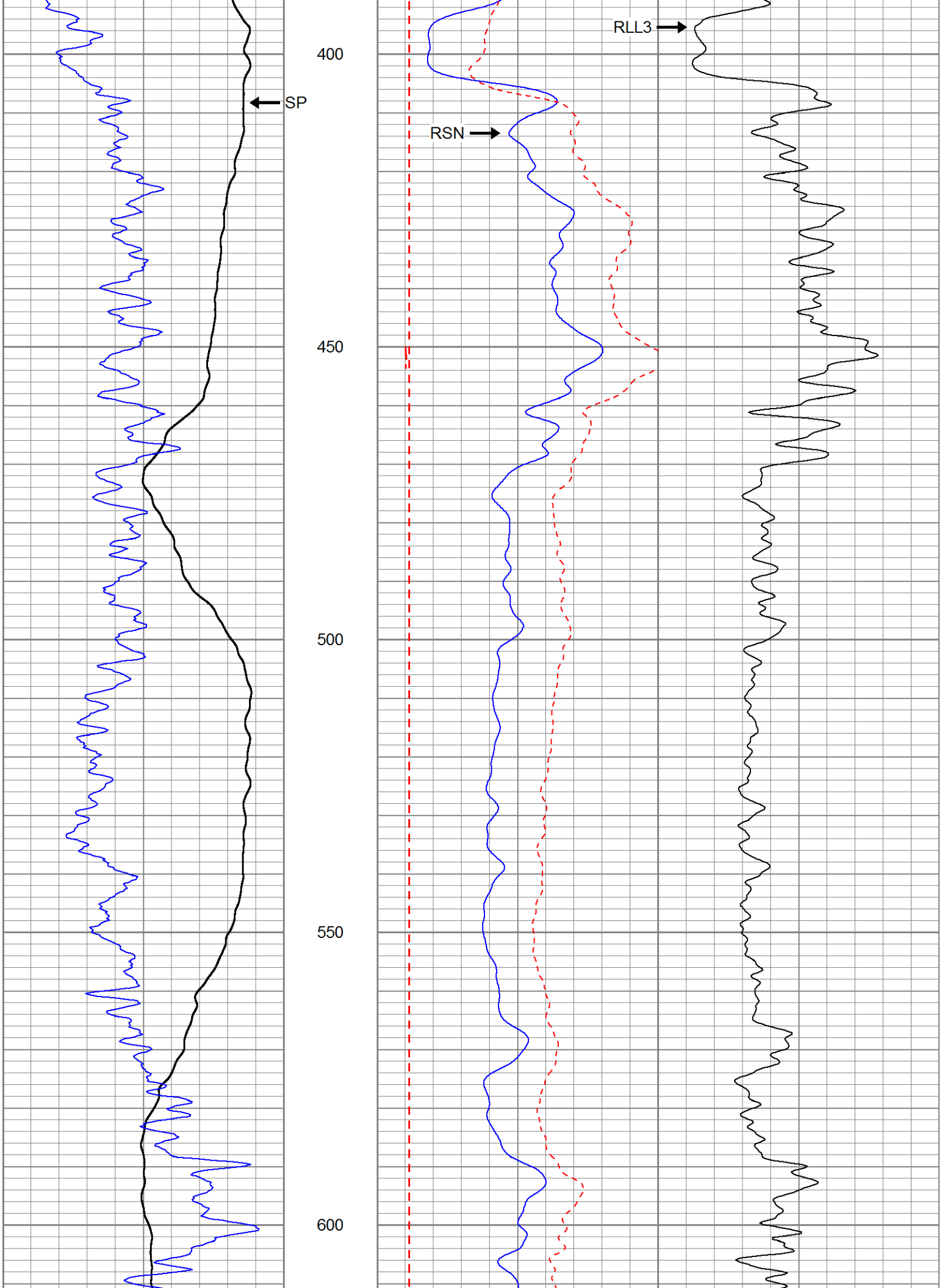
-100	SP (mV)	150
50	Gamma-Ray (GAPI)	100

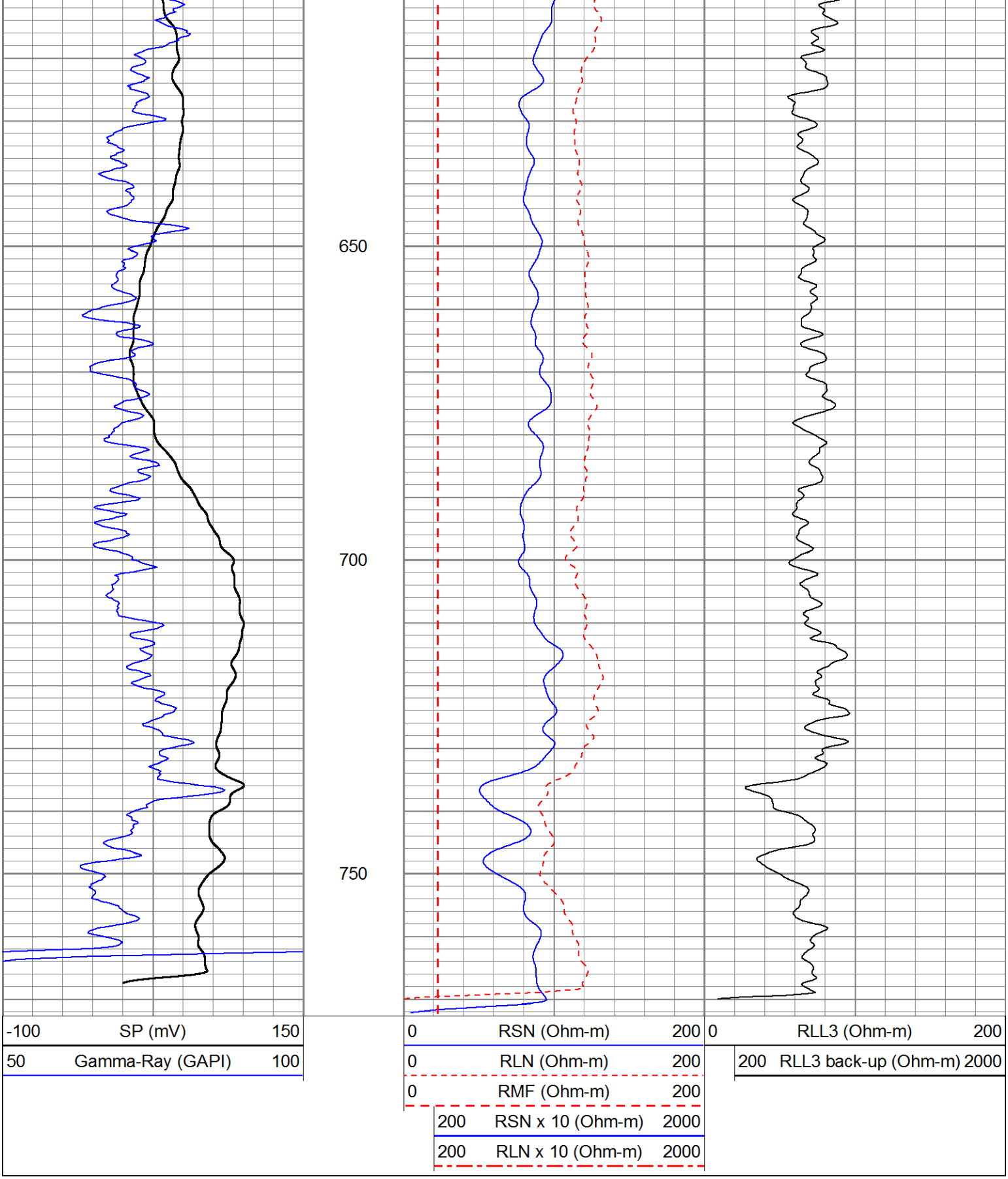
0	RSN (Ohm-m)	200
0	RLN (Ohm-m)	200
0	RMF (Ohm-m)	200
200	RSN x 10 (Ohm-m)	2000
200	RLN x 10 (Ohm-m)	2000

0	RLL3 (Ohm-m)	200
200	RLL3 back-up (Ohm-m)	2000




200
250
300
350
RMF
RLN
Gamma-Ray


400
450
500
550
600
SP
RSN
RLL3


650
700
750
-100 SP (mV) 150
50 Gamma-Ray (GAPI) 100
0 RSN (Ohm-m) 200
0 RLN (Ohm-m) 200
0 RMF (Ohm-m) 200
200 RSN x 10 (Ohm-m) 2000
200 RLN x 10 (Ohm-m) 2000
0 RLL3 (Ohm-m) 200
200 RLL3 back-up (Ohm-m) 2000

PACIFIC SURVEYS

ELECTRIC LOG
LATEROLOG 3
GAMMA-RAY

Job No.
16583

File No.

Company	WDC EXPLORATION & WELLS
Well	EPA-MW09A/B
Field	RIALTO
County	SAN BERNARDINO State CA

Location:

GPS: N 34o 07.930' W 117o 23.836'

Sec. Twp. Rge.

Other Services:

GR/LL3
SONIC/VDL
CALIPER

Permanent Datum	G.L.	Elevation above perm. datum	Elevation
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Drilling Measured From	G.L.		D.F.
			G.L.

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Top Log Interval	0'		
Casing Driller	14" @ 25'		
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Bit Size	12.25"		
Type Fluid in Hole	BENTONITE		
Density / Viscosity	N/A		
pH / Fluid Loss	N/A		
Source of Sample	PIT		
Rm @ Meas. Temp	22.0 @ 77F		
Rmf @ Meas. Temp	22.9 @ 77F		
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Source of Rmf / Rmc	MEASURE		
Rm @ BHT	N/A		
Time Circulation Stopped	1000		
Time Logger on Bottom	1200		
Max. Recorded Temperature	N/A		
Equipment Number	PS-3		
Location	LA		
Recorded By	SCHUMACHER		
Witnessed By	C. MARVIN		

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Comments

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Dataset Creation: Fri Jun 01 12:19:31 2012 by Log Open-Cased 090629

ELOG Calibration Report

Serial:	D4
Model:	DTQ
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Before Survey Verification Performed:	Sun Sep 09 13:17:43 2007
After Survey Verification Performed:	Sun Sep 09 13:17:48 2007

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IEE	88.740	5882.980	counts	0.097	6.438	A		
VSN	104.920	6618.800	counts	2.001	126.246	V		
VLN	77.120	1684.980	counts	1.471	32.139	V		

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	Zero	Cal		Zero	Cal		Gain	Offset
Short	40.249	101.201		40.505	101.206	Ohm-m	0.996	0.422
Long	142.638	102.842		102.858	102.858	Ohm-m	1.024	-2.408
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VSN	96.300	8039.720	counts	1.837	153.348	V		
VLN	85.320	2042.520	counts	1.627	38.959	V		

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Long	142.491	102.843		102.842	102.842	Ohm-m	1.004	-0.383
IEE	213.380	7077.580	counts	0.234	7.746	A		
VSN	96.540	8047.160	counts	1.841	153.490	V		
VLN	85.400	2044.440	counts	1.629	38.995	V		

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	Zero			Cal		
	Before	After		Before	After	
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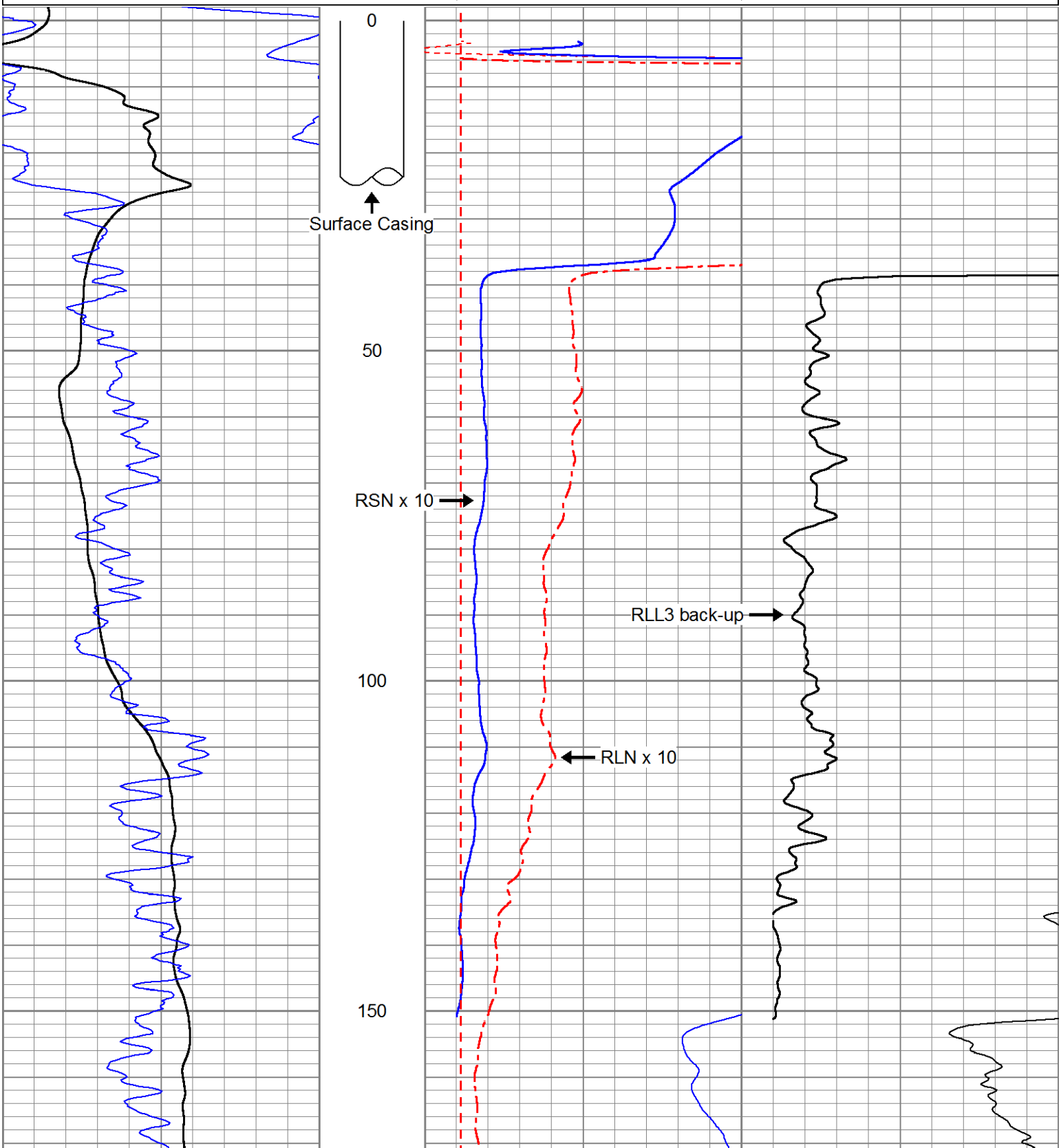
Calibrator Reading:	742.0	cps
Sensitivity:	0.2982	GAPI/cps

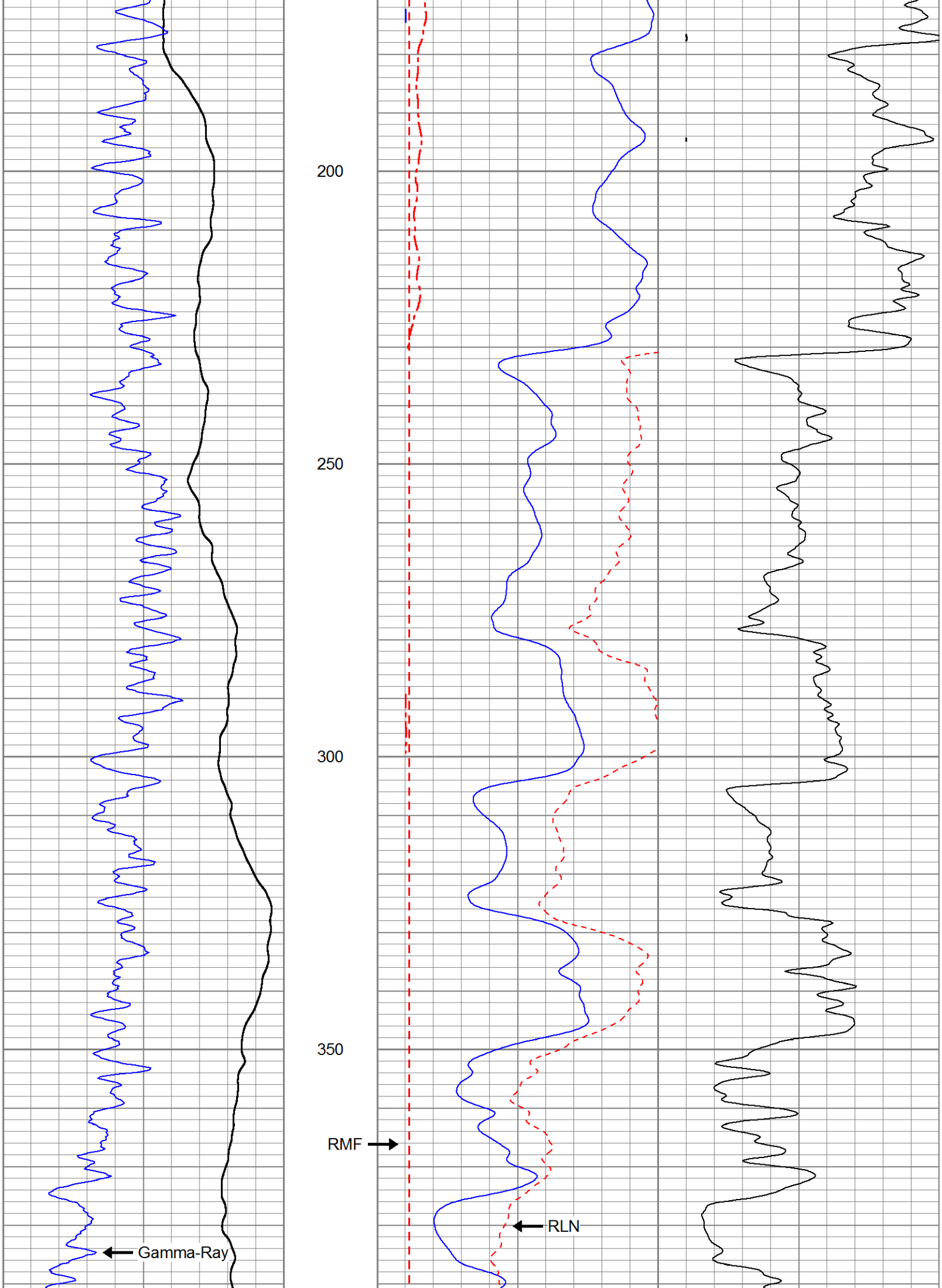
Database File: 16583.db
Dataset Pathname: ELOG
Presentation Format: elog
Dataset Creation: Fri Jun 01 12:19:31 2012 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

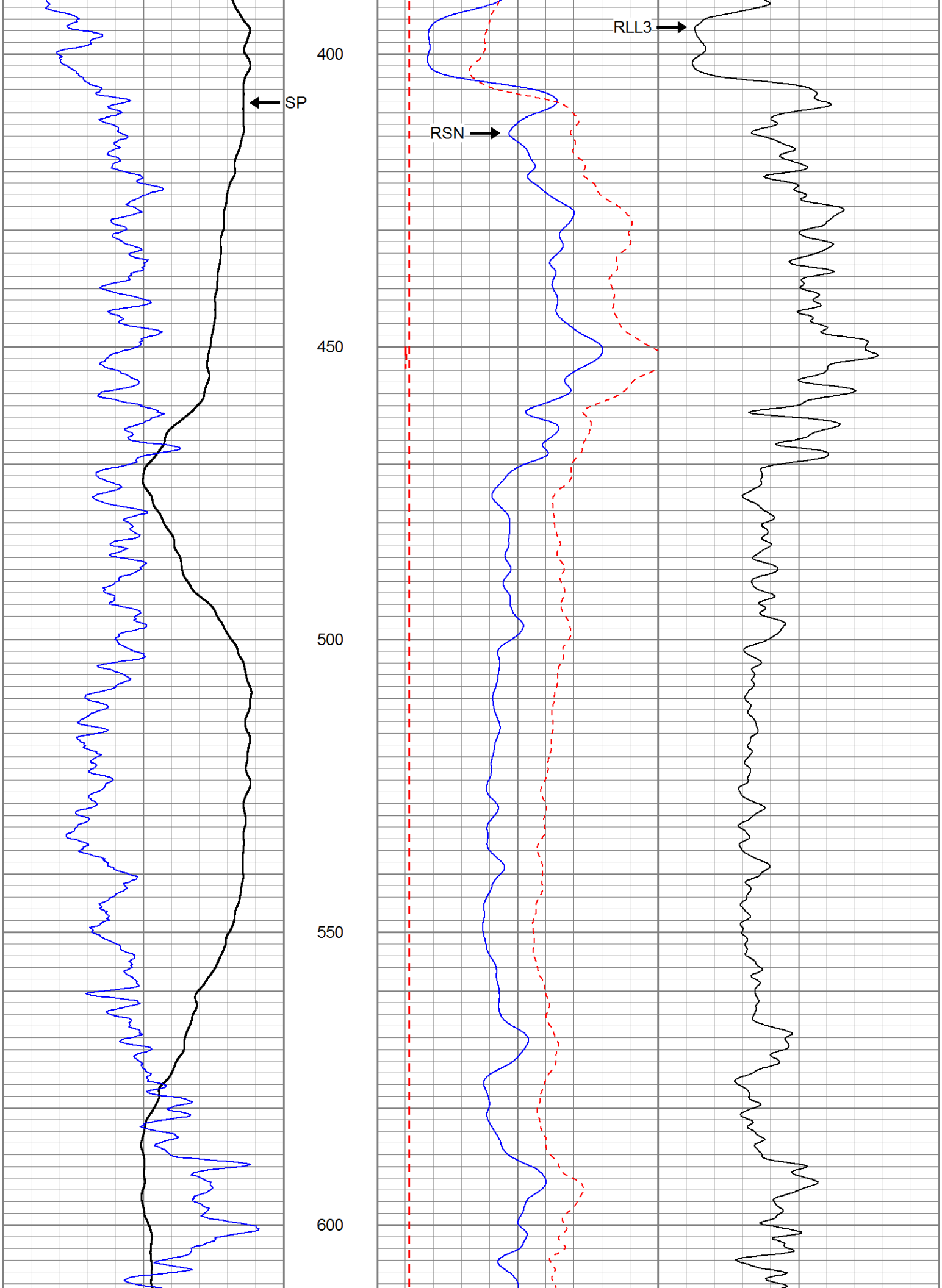
-100	SP (mV)	150
50	Gamma-Ray (GAPI)	100

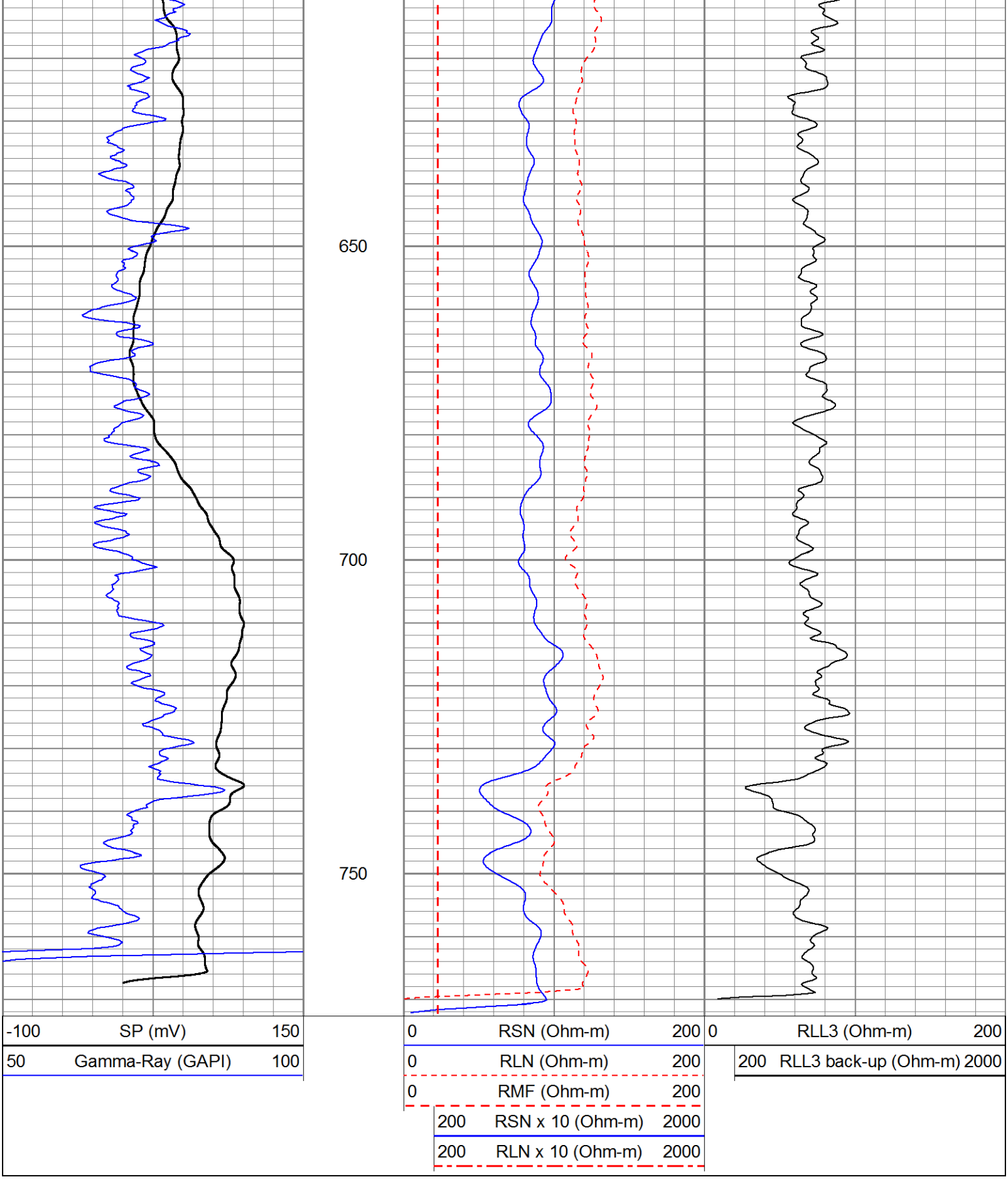
0	RSN (Ohm-m)	200
0	RLN (Ohm-m)	200
0	RMF (Ohm-m)	200
200	RSN x 10 (Ohm-m)	2000
200	RLN x 10 (Ohm-m)	2000

0	RLL3 (Ohm-m)	200
200	RLL3 back-up (Ohm-m)	2000




200
250
300
350
RMF
RLN
Gamma-Ray


400
450
500
550
600
SP
RSN
RLL3


650
700
750
-100 SP (mV) 150
50 Gamma-Ray (GAPI) 100
0 RSN (Ohm-m) 200
0 RLN (Ohm-m) 200
0 RMF (Ohm-m) 200
200 RSN x 10 (Ohm-m) 2000
200 RLN x 10 (Ohm-m) 2000
0 RLL3 (Ohm-m) 200
200 RLL3 back-up (Ohm-m) 2000

PACIFIC SURVEYS

SONIC VELOCITY VARIABLE DENSITY

Job No.
16583

File No.

Company WDC EXPLORATION & WELLS
Well EPA-MW09A/B
Field RIALTO
County SAN BERNARDINO State CA

Location:

GPS: N 34o 07.930' W 117o 23.836'

Sec. Twp. Rge.

Other Services:

GR/LL3
ELOG
CALIPER

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Equipment Number	PS-3		
Location	LA		
Recorded By	SCHUMACHER		
Witnessed By	C. MARVIN		

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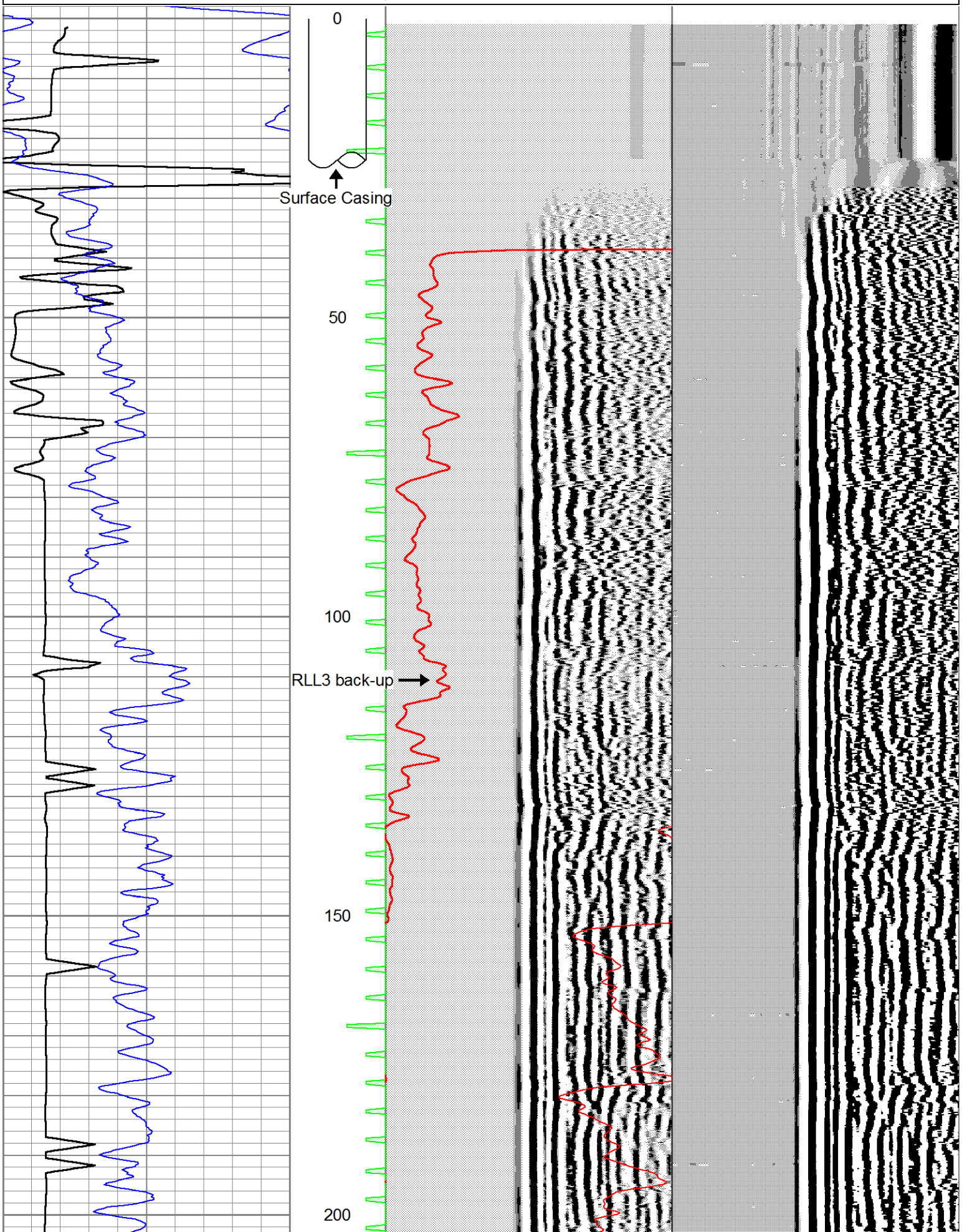
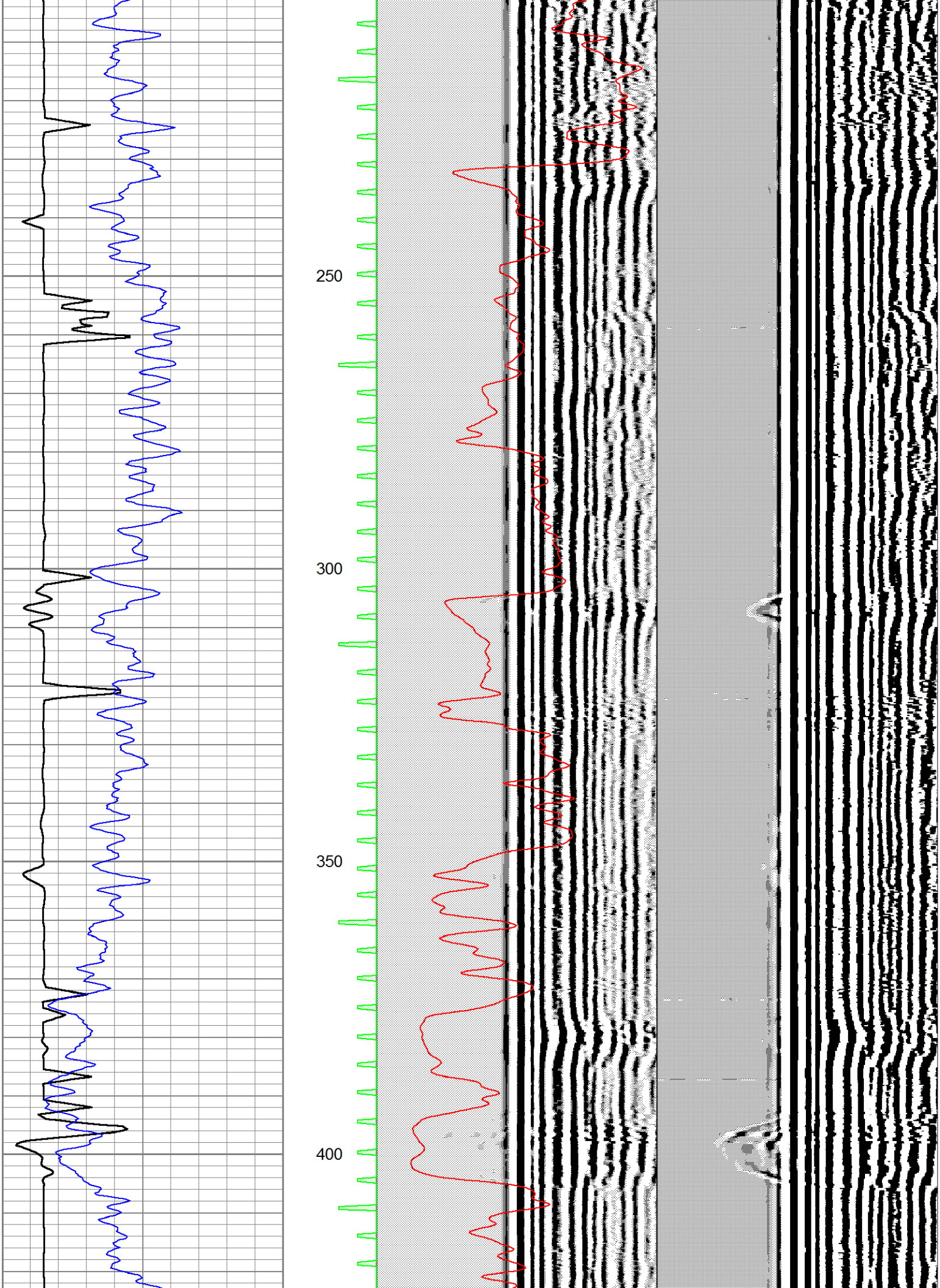
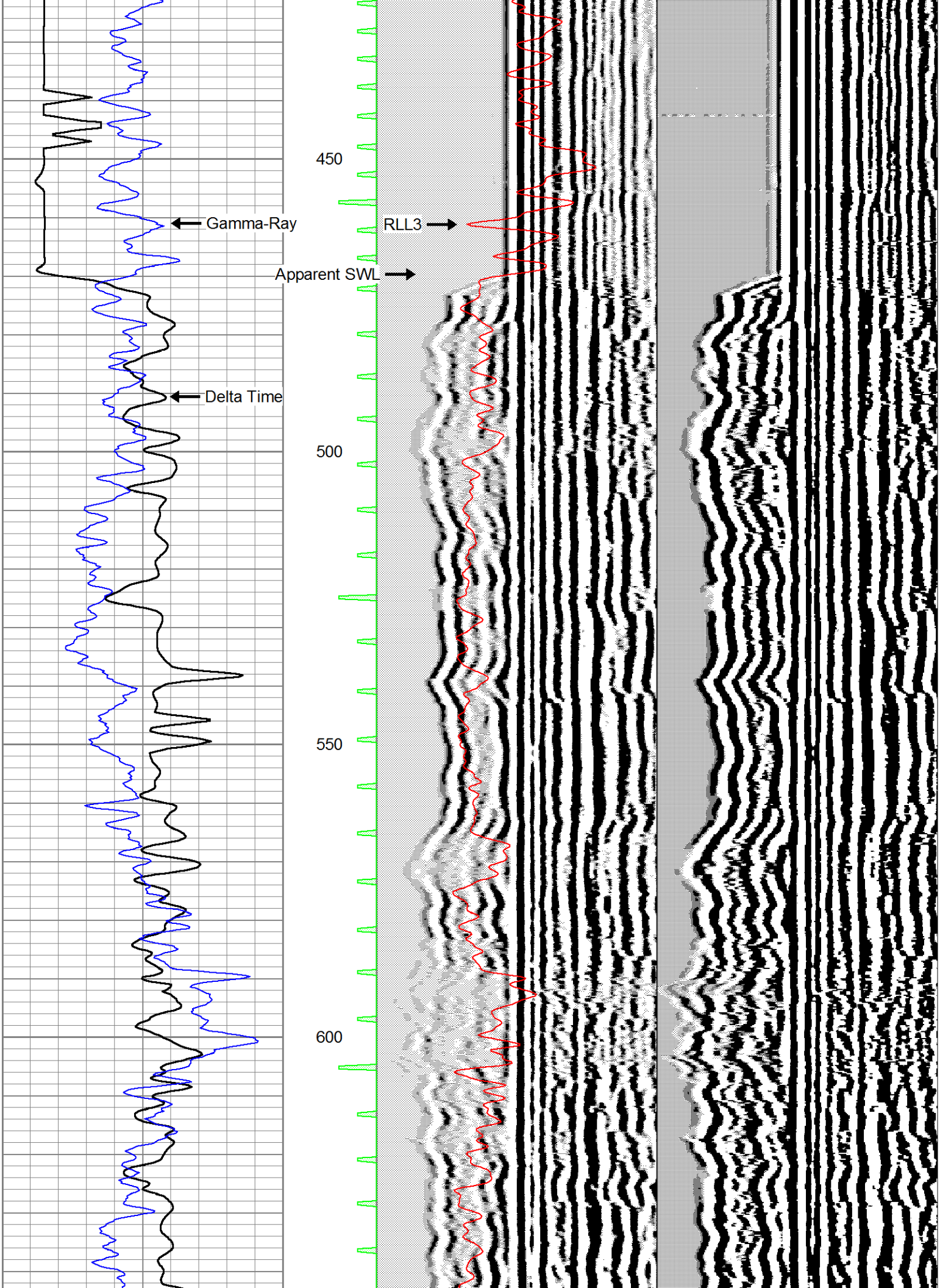
Comments

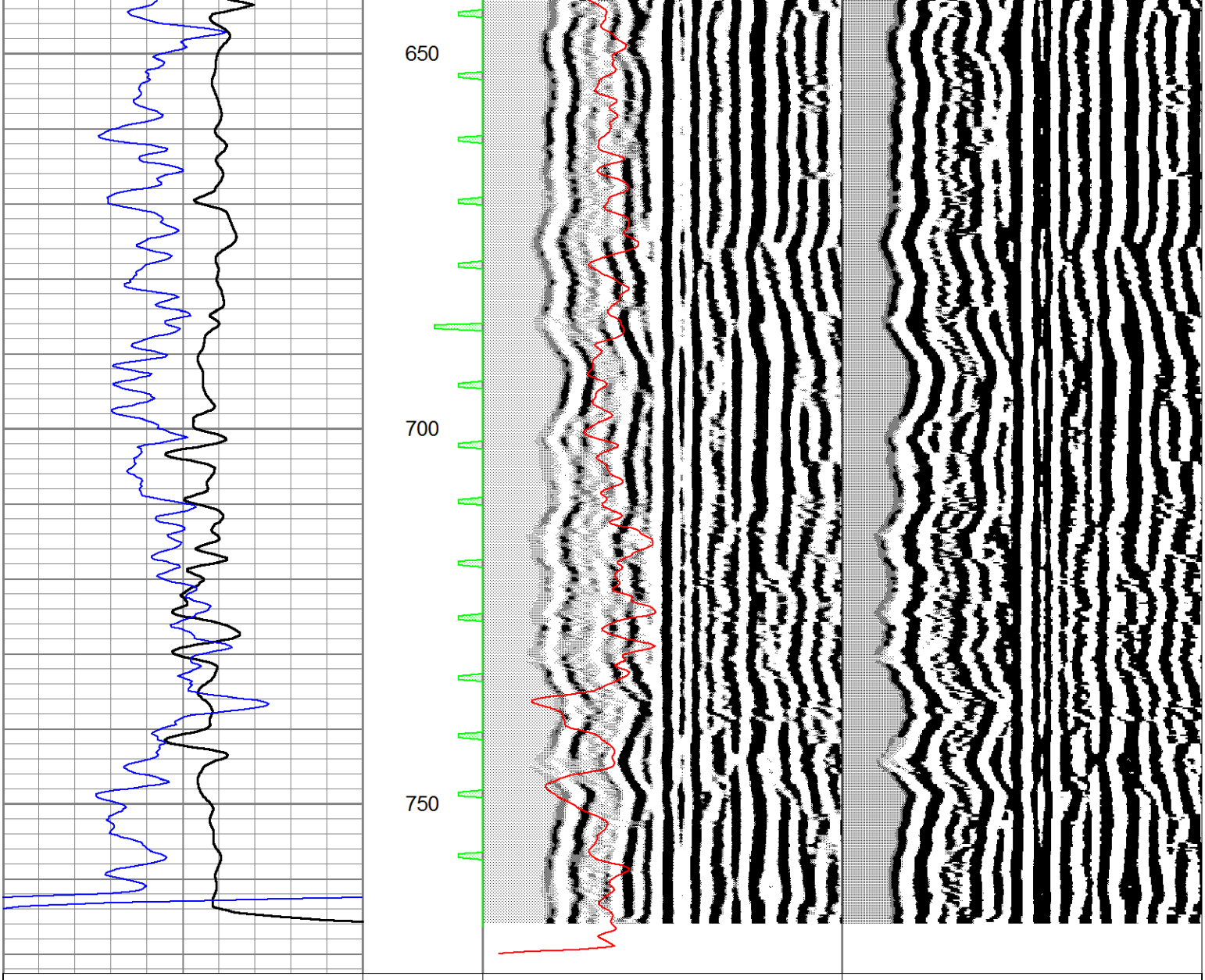
Database File: 16583.db
Dataset Pathname: SNC
Presentation Format: slt
Dataset Creation: Fri Jun 01 14:33:55 2012 by Log Open-Cased 090629
Charted by: Depth in Feet scaled 1:240

240	Delta Time (usec/ft)	40	ITT	600	Variable Density 5 ft	1600	600	Variable Density 5 ft	1600
50	Gamma-Ray (GAPI)	100	5 (msec) 0	0	RLL3 (Ohm-m)	200			
				200	RLL3 back-up (Ohm-m)	2000			




250
300
350
400


Gamma-Ray
Delta Time
RLL3
Apparent SWL
450
500
550
600


650
700
750
240 Delta Time (usec/ft) 40
50 Gamma-Ray (GAPI) 100
ITT
5 (msec) 0
600 Variable Density 5 ft 1600
0 RLL3 (Ohm-m) 200
200 RLL3 back-up (Ohm-m) 2000
600 Variable Density 5 ft 1600

Project:	**BF Goodrich RI/FS**	Start Date:	**05-14-2012**
Project Number:	**07163.0054**	End Date:	**06-15-2012**
Location:	**Rialto, CA**	Total Depth (ft. bgs):	**772**
Client:	**EPA**	Surface Elevation (ft msl):	**1449.03**
Drilling Contractor:	**WDC**	Longitude:	**-117.3971753**
Drilling Method:	**Mud Rotary**	Latitude:	**34.1322476**
		Logged By:	**Chad Marvin**
		Review By:	**Pete Phillips**

ITSI Gilbane

Boring ID:

EPA-MW9A and 9B

Depth (feet)	Lithology	*LITHOLOGY DESCRIPTION*	*COMMENTS*
0–5		Sand with Gravel: Light olive brown (2.5 YR 5/3) silty medium to coarse grained sand with gravel	
5–15		Sand with Gravel: Brown (10 YR 4/3) coarse grained sand with gravel	
15–45		Sand with Gravel: Dark gray brown (10 YR 4/2) fine to coarse grained sand with gravel	
45–65		Gravel with Sand: Gray (10 YR 5/1) gravel with sand	
65–85		Sand with Gravel: Gray (10 YR 5/1) coarse grained sand with gravel	
85–95		Sand with Gravel: Gray (10 YR 6/1) medium to coarse grained sand with gravel	
95–140		Sand with Gravel: Grayish-brown (10 YR 5/2) fine to coarse grained sand with gravel	
140–150		Sand with Gravel: Brown (10 YR 5/3) coarse grained sand with gravel	
150–165		Silty Sand: Brown (10 YR 5/3) silty, fine grained sand	

165–180	Silty Sand: Pale brown (10 YR 6/3) silty, fine grained sand
185–220	Silty Sand: Dark yellow bronwn (10 YR 4/4) silty, fine to medium grained sand
225–240	Silty Sand: Yellow brown (10 YR 5/4) silty, fine to medium grained sand
245–265	Sand: Yellow brown (10 YR 5/4) fine to medium grained sand with trace silt
270–295	Sandy Silt: Light yellowish brown (2.5 YR 5/3) sandy silt
300–315	Silty Sand: Light yellowish brown (2.5 YR 5/3) silty, medium grained sand
320–335	Silty Sand: Yellow brown (10 YR 5/6) silty, fine grained sand
340–350	Sand: Yellow brown (10 YR 5/6) fine grained sand with trace silt
355–375	Silty Sand: Yellow brown (10 YR 5/4) silty, fine to coarse grained sand

380 385 390 395 400 405 410 415 420 425

Silty Sand: Brown (10 YR 5/3) silty, fine to medium grained sand

430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555

Sand: Yellow brown (10 YR 5/4) fine to medium grained sand

560 565 570 575

Silty Sand: Yellow brown (10 YR 5/3) silty, fine to coarse grained sand

580 585 590

595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770

Sand: Brown (10YR 5/3) fine to medium grained sand

Sand: Yellow brown (10 YR 5/4) fine to medium grained sand

Sand: Brown (10 YR 4/3) coarse grained sand

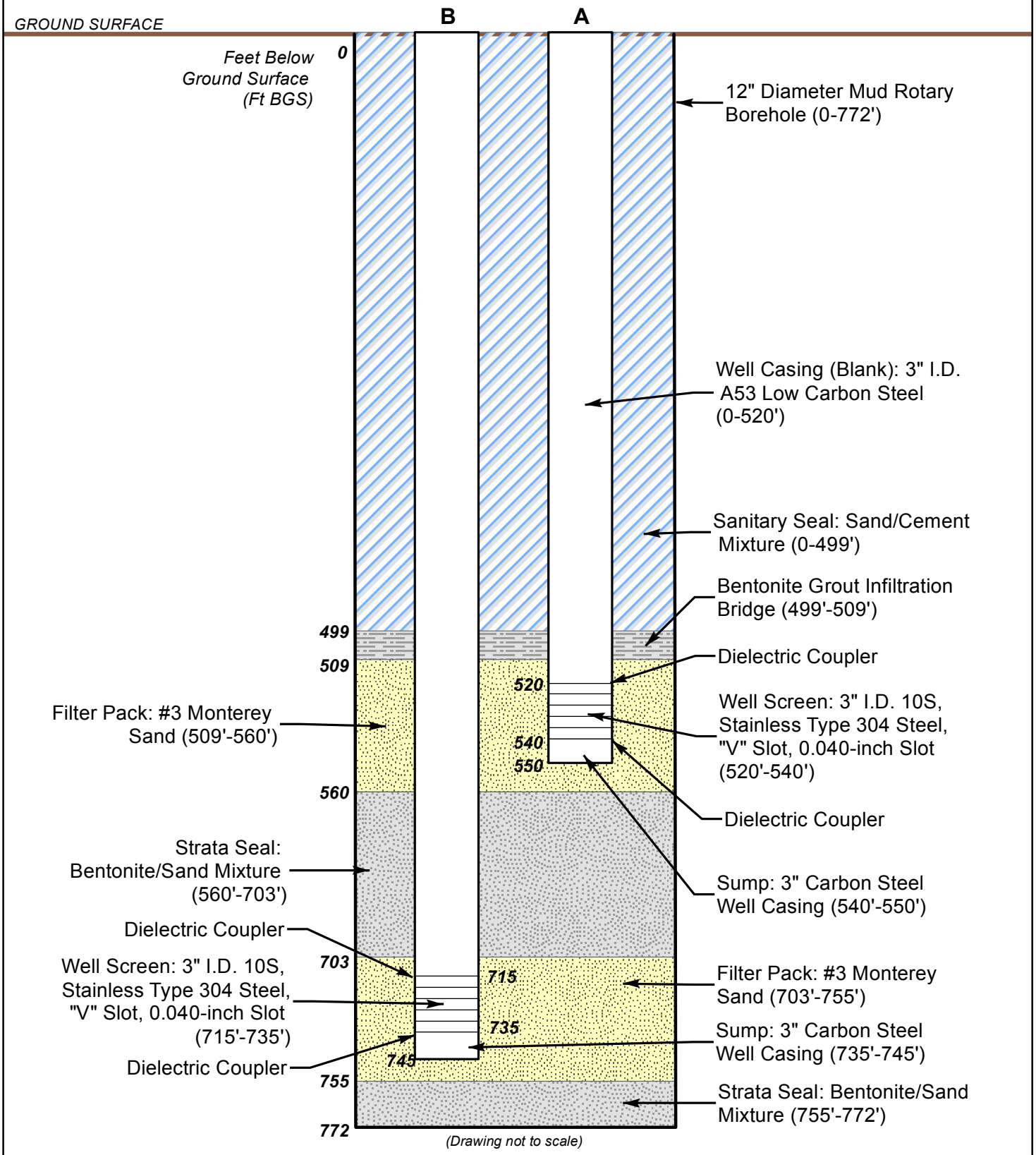
Sand with Silt: Yellow brown (10 YR 5/4) fine grained sand with silt

Sand: Brown (10 YR 5/3) fine to coarse grained sand

Silty Sand: Yellow brown (10 YR 5/4) silty, fine to coarse grained sand

Silty Sand: Light olive brown (2.5 YR 4/3) silty, fine to medium grained sand

EPA-MW9A and 9B



NOTES:
1) I.D. = INSIDE DIAMETER
2) CENTRALIZERS ATTACHED TO WELL CASING AT 40-FOOT INTERVALS

ITSI Gilbane

BF GOODRICH RI/FS
MONITORING WELL INSTALLATION AND SITE GROUNDWATER SAMPLING

EPA-MW9A AND 9B WELL CONSTRUCTION DETAILS

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APPENDIX B

Well Location and Elevation Survey Data

BF Goodrich Superfund Site, San Bernardino County, California
Survey Data for EPA-MP7, EPA-MP8 and EPA-MW9A and 9B

WELL	NORTH	EAST	LATITUDE (DD)	LONGITUDE (DD)	TOR ELEVATION	FS ELEVATION	TOC ELEVATION	RISER_HT
EPA-MP7	1862440.40	6757521.40	34.1083424	-117.3529891	1227.47	1227.52	1226.61	-0.91
EPA-MP8	1859556.61	6752906.10	34.1004989	-117.3682953	1221.09	1221.08	1219.97	-1.11
EPA-MW09A	1871056.62	6744093.92	34.1322476	-117.3971753	1449.15	1449.03	1448.73	-0.30
EPA-MW09B	1871056.62	6744093.92	34.1322476	-117.3971753	1449.15	1449.03	1448.63	-0.40

Professional's Name:

Armando D. Dupont

Professional's License Type:

Professional Land Surveyor

Professional's License Number:

7780

NOTE:

RISER_HT - RISER HEIGHT

RISER HEIGHT: THE MEASURED DISTANCE FROM GROUND SURFACE TO TOP OF WELL CASING

DD: DECIMAL DEGREES

TOR: TOP OF RIM

TOC: TOP OF CASING

FS: FINISHED SURFACE

BENCHMARK:

THE ELEVATIONS SHOWN HEREON ARE BASED UPON THE C.S.R.C. C.O.R.S. DATA POINT "GHRP"

ELEVATION = 2170.56 FEET (NAVD 88)

COORDINATES:

THE COORDINATES SHOWN HEREON ARE BASED UPON THE STATE PLANE COORDINATE SYSTEM (NAD 83),

CALIFORNIA ZONE 5, BASED UPON STATIC GPS OBSERVATION, HOLDING THE C.S.R.C. C.O.R.S. DATA POINT "GHRP"