COMPLETION REPORT FOR PRODUCTION WELL CHARLIE PALO VERDE NUCLEAR GENERATING STATION

Prepared for
Arizona Public Service Company

Prepared by
Clear Creek Associates, PLC

June 2008

CLEAR CREEK ASSOCIATES

COMPLETION REPORT FOR THE INSTALLATION OF PRODUCTION WELL CHARLIE PALO VERDE NUCLEAR GENERATING STATION

B(1-6)34AAB
ADWR Registration No. 55-214659
Wintersburg, Arizona

REGISTERED GEOLOGIST
CERTIFICATE NO.
22744
MARVIN
GLOTFELTY
Date Signed 6-4-08
ARIZONA, U.S.A.
Expires 12/31/08

Registered Professional Engineer (Environmental)
CERTIFICATE NO.
42803
WAYNE M.
FELLER
Date Signed 6-4-08
ARIZONA, U.S.A.
Expires 6/30/2011

Prepared By:

Clear Creek Associates, PLC
6155 E. Indian School Rd., Suite 200
Scottsdale, Arizona 85251

Prepared For:

Arizona Public Service Company
Mail Station 8376
P.O. Box 53999
Phoenix, AZ 85072

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REGISTERED GEOLOGIST CERTIFICATE NO. 22744 MARVIN GLOTFELTY Date Signed 6-4-08 ARIZONA, U.S.A.

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1.0 INTRODUCTION

This report was prepared to document the drilling, installation, development, and testing of a water supply well, herein referred to as Production Well Charlie, at the Palo Verde Nuclear Generating Station in Wintersburg, Arizona (Figure 1). This report was prepared by Clear Creek Associates for Arizona Public Service Company (APS).

The legal location of Production Well Charlie is the NW ¼ (10-acre) of the NE ¼ (40-acre) of the NE ¼ (160-acre) of Section 34, in Township 1 North, Range 6 West of the Gila and Salt River Baseline and Meridian [also designated as B(1-6)34aab]. The latitude and longitude coordinates for the location of Production Well Charlie was measured on October 1, 2007 using a handheld Garmin® eTrex™ Global Positioning System, which has a 12-channel receiver and a variable accuracy that averages between 15 and 25 feet. Based on these measurements, the coordinates for Production well Charlie are approximately N 33° 23' 29.3" W 112° 51' 16.8".

Hydrologic testing permit no. 59-214658 was obtained from the Arizona Department of Water Resources (ADWR) for the authority to drill for the well for testing purposes. The ADWR well registration number for Production Well Charlie is 55-214659. The permitting documentation and the Well Driller Report for Production Well Charlie is presented in Appendix A.

Drilling, installation, development, and testing operations for Production Well Charlie were conducted between October 1, 2007 and January 3, 2008. The well video and gyroscopic surveys were conducted on January 3, 2008. Photographs of these operations are presented in Appendix B. The details of the work performed during the drilling, installation, and testing of Production Well Charlie are presented in the following sections. The details of drilling and installation of the production well are described in Section 2.0. Results of the post-construction well testing are presented in Section 3.0, and a summary of this information is presented in Section 4.0. Our pumping recommendations for Production Well Charlie are presented in Section 5.0.

2.0 DRILLING AND INSTALLATION

Drilling, installation, development, and testing operations at Production Well Charlie were conducted from October 1, 2007 through January 3, 2008. A general discussion of borehole drilling and well installation techniques and methods is included in Appendix C. Copies of the daily driller reports are included in Appendix D. Specific drilling and well installation details are included below.

2.1 SURFACE CASING INSTALLATION

Zim Industries Inc. subcontracted Gil's Drilling to drill the surface borehole for the installation of the surface casing for Production Well Charlie. The surface casing installation was conducted between October 1, 2007 and October 2, 2007. A solid stem auger drill rig was used to drill the surface borehole to a depth of approximately 39 feet below land surface (bls) with a 54-inch diameter auger (Figure 2). The surface casing, consisting of 38-inch outside diameter (O.D.) low-carbon steel (0.375-inch wall thickness), was installed to the bottom of the borehole and sealed in place with approximately 10.5 cubic yards of 15-sack sand slurry cement. The borehole annulus was filled to approximately 3 feet bls.

2.2 INTERMEDIATE CASING

Drilling and installation of the intermediate casing at the Production Well Charlie began on October 13, 2007 and was completed on October 17, 2007. The purpose of the intermediate casing is to prevent any hydrologic communication between the upper perched aquifer and the lower regional aquifer of the area. Details of the drilling and installation of the intermediate casing are included below.

2.2.1 Intermediate Borehole Drilling

Between October 13 and October 14, 2007, Zim Industries Inc. drilled the pilot hole for the intermediate casing of Production Well Charlie using the reverse-rotary drilling technique. A Challenger 360 rotary drilling rig was used to perform all work associated with the drilling and

installation of the well. Drilling and well installation operations were performed on a 24-hour per day, 7-day per week basis. Clear Creek Associates personnel performed field observations and documentation of the key field operations.

The pilot hole for the intermediate casing was drilled using a 17½-inch button bit to a total depth of 240 feet bls. The average penetration rate from 40 feet to 240 feet was approximately 25.8 feet per hour, with the slowest rates occurring at the depths of 40 to 70 feet bls. Based on inclinometer measurements, the measured vertical drift of the Production Well Charlie pilot hole did not exceed 0.06 degrees. The penetration rate chart (geolograph) and lithologic log for Production Well Charlie pilot hole are presented in Appendix E.

2.2.2 Intermediate Borehole Geophysical Logging

Upon completion of the pilot hole drilling for the intermediate casing on October 14, 2007, Southwest Exploration Services, LLC conducted a down-hole geophysical logging suite including the following logs: caliper, natural gamma ray, electric (resistivity and spontaneous potential), guard and sonic. Clear Creek Associates considered information presented in the lithologic log and the geophysical logs to verify penetration into the Palo Verde Clay so that the intermediate casing could be set approximately 30 feet into this unit. For reference, a general description of geophysical log interpretation methods is presented in Appendix F. The logs for the intermediate casing pilot borehole were appended to the geophysical logs for the remaining pilot borehole to a total depth of 1,360 feet bls and are presented in Plate 1. The results of the composite log (for the entire combined pilot hole) are presented in Section 2.5. The complete geophysical logs for the entire borehole are summarized on Figure 3.

2.2.3 Intermediate Borehole Reaming

A stacked assembly (36-inch reamer bit above a 17½-inch lead bit) tri-cone button bit was used to ream the borehole to a depth of 240 feet bls (Figure 2). The Production Well Charlie pilot borehole for the intermediate casing was reamed to its final diameter of 36 inches from October

14 to October 15, 2007. Upon completion of reaming, Zim Industries Inc. began to install the intermediate casing.

2.2.4 Intermediate Casing Installation

The installation of the intermediate casing consists of 28-inch outside diameter ASTM Standard A139 Grade B low-carbon steel (LCS) casing with a 0.375-inch wall thickness. Before landing the intermediate casing, eight 4-inch diameter holes were cut into the casing in a staggering pattern just below ground surface in order to allow water to circulate from the flow line and into the well, to facilitate drilling of the lower borehole.. After the intermediate casing installation, sand slurry cement and a bentonite-clay seal was installed into the well annulus between the borehole and the casing through a tremie pipe.

The intermediate casing was installed from October 15 to October 16, 2007. The casing was set to a total depth of 240 feet bls. From October 16 to October 17, 2007, the sand slurry cement seals and the bentonite seal were placed into the borehole and casing annulus. Approximately 9 cubic yards of sand slurry cement, weighing about 17.3 lbs/gal, were installed from 203 to 240 feet bls. A 110-foot bentonite seal was installed above the sand slurry cement from 93 to 203 feet bls, and another 8 cubic yards of sand slurry cement, weighing about 17.2 lbs/gal, were installed from 30 to 93 feet (Figure 2). The remaining 30 feet to surface was filled on November 20, 2007 with extra cement used to fill the annulus between the well casing and the intermediate casing.

2.3 PILOT HOLE DRILLING

Between October 17 and October 25, 2007, Zim Industries Inc. drilled the pilot hole beneath the intermediate casing for Production Well Charlie using the reverse-rotary drilling technique with the same Challenger 360 rotary drilling rig. Drilling and well installation operations were performed on a 24-hour per day, 7-day per week basis. Clear Creek Associates personnel performed field observations and documentation of the key field operations.

The pilot hole was drilled using a 17½-inch diameter button bit from 240 to 1,102 feet bls and a 17-inch diameter button bit from 1,102 to 1,360 feet bls. The average penetration rate was 22.6 feet per hour from 240 feet to 446 feet bls and 8.2 feet per hour from 446 feet to 1,360 feet bls. Based on inclinometer measurements, the measured vertical drift of Production Well Charlie pilot hole did not exceed 0.3 degrees. The penetration rate chart and lithologic log for Production Well Charlie pilot hole are presented in Appendix E.

2.4 LITHOLOGIC LOGGING

Drilled cuttings from the Production Well Charlie pilot hole were collected from an above-ground sample collection device, which uses a baffle system to separate the drilled cuttings from drilling fluid. Cutting samples were collected at 10-foot intervals, with a representative sample from each interval preserved in specially designed plastic chip tray containers. Clear Creek Associates personnel prepared a lithologic log of the cuttings from the Production Well Charlie pilot hole. The cuttings were described based on grain size (using the Wentworth grade scale), sorting, degree of roundness, and composition. The lithologic log also includes the penetration rate for drilling intervals and field remarks relating to the drilling program. The lithologic log for Production Well Charlie is presented in Appendix E.

The sediment penetrated by the borehole for Production Well Charlie can be grouped into three general lithologic units. The general lithologic units reflect site-specific geologic materials observed in drilled cuttings from this location. A generalized stratigraphic column is presented on Figure 3. The geophysical logs were used to adjust unit boundaries, as the depths recorded on the lithologic log are not adjusted for bottoms-up time (the amount of time required for cuttings to travel from the bottom of the borehole to the surface where they are collected), which increases with borehole depth.

The following lithologic unit descriptions are referenced from the Lower Hassayampa Sub-Basin Hydrologic Study and Computer Model (Brown and Caldwell, 2006). No specific unit depths were available in the vicinity of Production Well Charlie. The Upper Alluvial Unit (UAU)

sediments were deposited in environments typical of channels, floodplains and alluvial fans in an open basin with a through-flowing stream system. The Middle Alluvial Unit (MAU) sediments were deposited in low energy environments in closed basins such as a playa lake or alluvial fan. The Lower Alluvial Unit (LAU) sediments were deposited in alluvial fan and fluvial environments from the surrounding up-lifted mountain blocks. Sediments were deposited in a closed, subsiding basin environment coincident with the normal faulting activity of the Basin and Range Disturbance (Corell and Corkhill, 1994). The following unit information is based on cuttings from Production Well Charlie and derived from the above descriptions.

Upper Alluvial Unit (0 to 60 feet): This lithologic unit is generally characterized as sand, gravel, cobbles and boulders with deposits of silt and clay. Nearly 100% sand was encountered from ground level to 60 feet bls followed by varying amounts of clay, silt and sand.

Middle Alluvial Unit (60 to 450 feet bls): This lithologic unit is characterized by clay and silt dominated material with some interbedded coarse-grained material.

Lower Alluvial Unit (450 to 1,360 feet bls): This lithologic unit is dominated by gravels and sands with varying amounts of fine-grained material throughout.

Six samples of soils within the proposed screen interval were retained for sieve analysis to aid in the sizing of filter pack material and screen slot size. The sieve analyses were conducted by Ninyo and Moore of Phoenix, Arizona. Results of the sieve analyses and grain size distribution curves are presented in Table 1 and material laboratory reports are included as Appendix G.

2.5 GEOPHYSICAL LOGGING

Upon completion of the pilot hole drilling, Southwest Exploration conducted a down-hole geophysical logging suite including the following logs: caliper, natural gamma ray, electric (resistivity and spontaneous potential), guard and sonic. Clear Creek Associates considered information presented in the lithologic log, the geophysical logs, and the water quality concerns to finalize the well design. For reference, a general description of geophysical log interpretation is

presented in Appendix F. The geophysical logging was conducted in the Production Well Charlie pilot hole on October 26, 2007. The logs for the Production Well Charlie borehole are presented in Plate 1 and summarized on Figure 3.

2.5.1 Caliper Log

Prior to installing the intermediate casing, a caliper log was conducted which showed a substantial "washing out" (enlargement) of the $17^1/_2$-inch diameter pilot borehole below the surface casing. The borehole diameter was 37.25 inches from the base of the surface casing down to about 68 feet. The pilot hole diameter for the intermediate casing remained consistent at about 18 inches between 68 feet and 240 feet. Following completion of the pilot borehole for the well, a second caliper log was completed from 240 feet to 1,360 feet bls. The pilot hole diameter beneath the intermediate casing was about 25 inches, and gradually decreased to 20 inches at 400 feet bls. From 400 feet to 1,100 feet bls, the diameter remained fairly constant at about 20 inches to about 18 inches between 1,100 feet and 1,360 feet bls.

2.5.2 Natural Gamma Ray Log

In general, the gamma counts increased with depth throughout the borehole. Gamma counts remained less than 30 API units from surface to 70 feet bls and in a range of of 45 to 75 API units from 70 feet to 470 feet bls. The API counts remained generally less than 30 from 470 feet to 700 feet bls, then between 30 and 45 API units between 700 and 940 feet bls. The API units were generally less than 30 from 940 feet to 1,115 feet bls and below 45 units from 1,115 to 1,190 feet bls. From 1,190 feet bls, the API counts gradually increased to 60 units at 1,300 feet and then increased to about 105 units in the interval from 1,300 to 1,360 feet.

2.5.3 Electric Log

The electric logs for the Production Well Charlie pilot borehole indicate predominantly fine grained clay and silt deposits from the bottom of the surface casing to about 390 feet. The long normal generally increased from 10 Ohms per meter (Ohms/m) at 390 feet bls to about 17 Ohm/m

at 470 feet bls. The long normal log fluctuated between 25 and 35 Ohm/m between 470 feet and 780 feet and then decreased to about 11 Ohms/m for the interval between 780 feet and 890 feet. The long normal fluctuated between 8 and 38 Ohms/m between 890 feet and 1,360 feet bls.

2.5.4 Guard Log

The guard log generally correlates with the trends in the normal electric logs throughout the borehole. The log indicates predominantly fine grained clay and silt deposits from the bottom of the surface casing to 450 feet. The logs indicate fine grained material with sparsely inter-bedded coarse materials from 450 feet to 780 feet bls, predominantly fine grained material from 780 feet to 890 feet bls, and fine grained material with more frequent inter-bedded coarse material from 890 feet to 1,360 feet bls.

2.5.5 Sonic Log

The sonic log was conducted only after the intermediate casing was installed. The results of the sonic log for the Production Well Charlie pilot hole generally correlate with the results of the electric logs and lithologic logs. The sonic log reflects predominantly fine grained material from the bottom of the intermediate casing to 450 feet and predominantly coarse-grained material from 450 feet to 1,360 feet bls.

2.6 PILOT HOLE REAMING

A stacked assembly (26-inch diameter reamer bit above a 17-inch diameter lead bit) of tri-cone button bits was used to ream the borehole from 240 to 570 feet bls (Figure 2). From 572 to 1,324 feet bls, a stacked assembly (24-inch diameter reamer bit above a 17-inch diameter lead bit) of tri-cone button bits was used. Upon completion of reaming, Southwest Exploration Services, LLC conducted a final caliper log in the reamed borehole prior to well installation. The final caliper log enabled Clear Creek Associates to identify washout zones and calculate specific borehole volumes and annular material placement requirements.

The Production Well Charlie pilot borehole was reamed in two diameters (26-inch and 24-inch) between October 29 and November 7, 2007. The final caliper log was conducted on November 8, 2007 after completing the entire borehole ream. The final caliper log for the reamed 26-inch diameter section of borehole between 240 and 570 feet bls indicates washed out areas as great as 39 inches between 240 feet to 320 feet and a reamed diameter of 27 to 30 inches between 320 and 570 feet bls. The final caliper log for the reamed 24-inch diameter section of borehole indicates it is also relatively within gauge from 570 feet to the bottom of the borehole with minor washouts greater than 28 inches in diameter from 650 to 655 feet bls, 960 to 965 feet bls, and 1,165 to 1,170 feet bls (Plate 1).

2.7 WELL INSTALLATION

The blank well casing for Production Well Charlie consists of 20-inch outside diameter ASTM Standard A139 Grade B LCS pipe with a 0.375-inch wall thickness from surface to 480 feet bls. From 480 to 485 feet bls, a LCS 0.375-inch walled reducer was installed to join the 20-inch upper blank casing with a 16-inch outside diameter ASTM Standard A139 Grade B LCS casing with a 0.312-inch wall thickness, which extends to a depth of 528 feet bls. A dissimilar metals connector joins the 16-inch LCS blank casing to 16-inch outside diameter stainless steel blank casing with a 0.312-inch wall thickness (Figure 2). The 16-inch stainless steel blank casing extends from a depth of 530 feet to 610 feet. The well screen consists of 16-inch (nominal) diameter stainless steel wire-wrap screen with a 0.050-inch size slot, 0.25-inch thick wire rods, and altitude of 0.300-inch from 610 feet to 1,290 feet. The casing included a stainless steel bottom end cap attached to a 20 foot section of blank 16-inch stainless steel casing. The well casing between the two intervals of well screen and above the bottom end plate consists of 16-inch outside diameter stainless steel blank pipe with a 0.312-inch wall thickness. The casing material test reports are included in Appendix H.

After well casing and screen installation, sand filter pack (6-12 mesh Tacna) was installed into the well annulus through a tremie pipe. A liquid sodium hypochlorite disinfectant was also introduced during installation of the filter pack material through the tremie pipe. The filter pack was installed

with intermittent swabbing to improve settling and compaction. A bentonite clay seal was installed above the filter pack, and a cement seal was installed above the bentonite seal. A well completion diagram for Production Well Charlie is presented on Figure 2. Well installation field forms including pipe tallies (documenting the lengths of the tubular equipment installed) and annular material records (documenting all materials installed) for the intermediate casing and well casing are presented in Appendix I.

The well casing and screen for the Production Well Charlie were installed from November 8 to November 9, 2007. The well casing was set to a total depth of 1,310 feet bls. The screened interval extends from 610 to 790 feet bls and from 870 to 1,290 feet bls. From November 9 to November 20, 2007, the filter pack, bentonite seal, and cement seal were placed into the well annulus. Approximately 58 cubic yards of filter pack sand were installed from 570 to 1,324 feet bls. A 455-foot bentonite seal was installed above the filter pack from 115 to 570 feet bls. Four cubic yards of sand slurry cement, weighing about 17.1 lbs/gal, were installed from 52 to 115 feet bls, and 6.5 cubic yards of neat cement, weighing about 14.4 lbs/gal, were installed from ground surface to 52 feet bls.

2.8 WELL DEVELOPMENT

Simultaneous swabbing and airlifting with a 20-foot long perforated double-flanged swabbing tool was used for the initial well development of Production Well Charlie. Further development was accomplished by pumping and surging with a Weber pump rig and test pump.

The screened interval in Production Well Charlie (600 feet total length) was developed from November 13 to November 16, 2007. The initial development period continued for about 81 hours of total swab and airlift time, for an average rate of approximately 8.1 minutes of development per linear foot of well screen. The discharge water near the end of swab and airlift development for each section of screen was essentially clear, with periods of brief turbidity after each swabbing event. Swabbing occurred from the top of the screen to the bottom of the screen

and again from the bottom to the top of the screen. By the end of development, the water was slightly cloudy and mostly free of sand or fines.

On December 10, 2007, a test pump installed by the Weber Group was used to further develop the well. Production Well Charlie was pumped for approximately 10.5 hours at progressively increasing pumping rates from about 500 to 1,500 gallons per minute (gpm) with intermittent surging (shutdown and restarted) at approximately 30-minute intervals. The discharge water was predominantly clear, with slight turbidity and some sand intermittently observed during the initial hour of development (Appendix J).

3.0 PUMPING TESTS

3.1 STEP-RATE PUMPING TEST

Clear Creek Associates conducted a 10-hour step-rate pumping test at Production Well Charlie on December 11, 2007, to evaluate the well's production capability and efficiency (specific capacity). The step-rate test was evaluated using the methodology outlined by Lewis Clark (*The Analysis and Planning of Step Drawdown Tests, Quarterly Journal of Engineering Geology*, 1977. Volume 10. pp 125-143). A regression analysis of the groundwater production rate versus the specific drawdown was used to obtain well-specific coefficients that provide prediction of water level drawdown. The water level drawdown values were then used to calculate the percentage of the total head loss that is attributable to laminar flow and the specific capacities at various pumping rates.

Production Well Charlie was pumped for five 2-hour intervals, at rates averaging approximately 591 gpm, 783 gpm, 1,008 gpm, 1,183 gpm, and 1,400 gpm (Figure 4). Flow rates were monitored using a totalizing flowmeter installed in the discharge pipe. The static water level was measured at 201.7 feet bls prior to starting the pump. The water-level drawdown values in the well at the end of pumping steps one through five were 53.5, 81.0, 114.1, 149.6, and 191.4 feet, respectively (Figure 5). Using the average pumping rates and observed drawdowns, the resultant specific capacity values ranged from approximately 7.3 to 11.2 gallons per minute per foot of drawdown (gpm/ft) at the end of each step. The step-rate pumping test field data are presented in Appendix K.

The following results were obtained for a flow rate of 1,500 gpm (Figure 5):

- The predicted total drawdown is approximately 215 feet.
- The head loss due to laminar flow is predicted to be 40.2 percent.
- The specific capacity is predicted to be approximately 7 gpm/ft.

3.2 CONSTANT RATE AQUIFER TEST

From December 15 to 17, 2007 Clear Creek Associates conducted a 48-hour constant rate aquifer test at Production Well Charlie to facilitate a determination of the local aquifer characteristics. The constant rate aquifer test for Production Well Charlie was conducted while the nearby Bravo Well was cyclically pumped to meet water supply demands for the plant. The Bravo Well is located approximately 330 feet to the north of Production Well Charlie. Based on operation records provided by the plant for the period of November 30, 2007 to December 29, 2007, the Bravo Well pump operated intermittently during November 30, December 13, December 15-18, December 20, December 22, and December 26-29. During the 48-hour aquifer test at Production Well Charlie, a total of 2,749,000 gallons were pumped from Well Bravo. Well Bravo actually operated for 1,816 of the 2,880 minutes during the 48-hour pumping test, or 63% of the time. The resulting average flow rate from Bravo Well during the test period was 954 gpm while the instantaneous pump rate for the Bravo Well was 1,514 gpm.

Pumping at Production Well Charlie began at 7:00 AM on December 15th at an average rate of 1,068 gpm throughout 48 hours of testing with the pump intake set 440 bls. Flow was measured in the same manner as with the step-discharge test. The static water level in the well was measured at 203.7 feet bls just prior to starting the pump. The pumping water level at the end of the constant-rate pumping test was 334.9 feet bls, corresponding to a drawdown of 131.2 feet and a specific capacity of about 8.1 gpm/foot of drawdown. After the pump was turned off, water-level recovery was monitored for approximately 100 minutes, until the water level had recovered to a depth of 208.7 feet bls, or approximately 96% of the initial static water level. The water level datasheets for Production Well Charlie are presented in Appendix K.

A Cooper-Jacob Plot is a semi-logarithmic plot of water-level drawdown versus time, and a Theis Recovery Plot is a semi-logarithmic plot showing residual water-level drawdown versus the ratio between total test time (t), and the time since the pump was turned off (t´). A Cooper-Jacob Plot of the constant-rate aquifer test data for the well is presented on Figure 6, and a Theis Recovery Plot of the water-level recovery data is provided on Figure 7.

The pumping of Well Bravo during the aquifer test interfered with the measured drawdown at Production Well Charlie as indicated by the fluctuations in drawdown observed on the Cooper-Jacob plot (Figure 6). Analysis of the Cooper-Jacob Plot indicates an aquifer transmissivity of approximately 122,588 gpd/ft for the screened interval of the aquifer penetrated by the well. The Theis Recovery Plot (Figure 7) suggests an aquifer transmissivity of approximately 93,984 gpd/ft. The Theis recovery plot also shows the pumping cycles for the Bravo Well during water level recovery measurements. The 'best fit' line for the Theis recovery plot was weighted towards the drawdown values recorded when Bravo Well was not pumping. Since the water-level recovery data are not affected by any perturbations from the pump equipment in the test well, the Theis Recovery Plot is generally considered more representative of the aquifer characteristics than the Cooper-Jacob Plot. However, since the pumping at Well Bravo influenced measured water levels during the pumping and non-pumping periods of the aquifer testing, the estimated transmissivity value may not be accurate, but could be used as a general estimate. Based on assumed equivalent water production across the entire screened interval, the effective hydraulic conductivity value (K) of the aquifer surrounding the well is approximately 156.6 gpd/ft^2 (20.9 ft/d) based on the Theis Recovery Plot, or 204.3 gpd/ft^2 (27.3 ft/d) based on the Cooper-Jacob Plot.

At the request of APS, Clear Creek Associates installed a pressure transducer in a monitoring well (ADWR Reg. No. 55-613122) to monitor water levels during aquifer testing at Production Well Charlie. The perforated interval for Well 55-613122 reportedly includes the aquifer that is screened at Production Well Charlie. The transducer was installed on December 7, 2007 and removed on January 15, 2008 and recorded water levels on a frequency of 30 minute intervals. Well 55-613122 is located approximately 4,450 feet to west-northwest of Production Well Charlie and 4,300 feet west-northwest of Well Bravo. A decline of about 0.6 feet was observed in the daily maximum water level at Well 55-613122 during the 48-hour aquifer test at Production Well Charlie. However, diurnal fluctuations were observed in water levels at Well 55-613122 during the monitoring period between about 0.5 and 2 feet (Figure 8). Furthermore, barometric pressure data plotted with the observation well data does not appear to influence water levels.

Therefore, Clear Creek Associates does not consider the data collected to be adequate for a reliable storativity estimate.

3.3 WATER QUALITY

The collection of water quality samples during the installation of Production Well Charlie was not included in our scope of work. APS personnel conducted new source sampling of the discharge water at the conclusion of the constant rate aquifer test on December 17, 2007, but those results are not included in this report.

3.4 WELL VIDEO

Welenco conducted a post-construction well video survey of Production Well Charlie on January 3, 2008. A well video survey log is presented in Appendix L. The video survey indicates that Production Well Charlie was constructed in good condition.

3.5 PLUMBNESS AND ALIGNMENT TEST

Welenco conducted a gyroscopic survey of Production Well Charlie on January 3, 2008 to document its plumbness and alignment. The survey results are provided in Appendix L. The results for Production Well Charlie show a maximum deviation of 4.18 horizontal feet with a true vertical depth from land surface to the bottom of casing at 1,307.37 feet. This equates to an average deviation of 0.32 horizontal feet per 100 feet of depth (4.18/1,307.37 = 0.0032 feet per foot or 0.32 feet per 100 feet). According to the AWWA Standard A100, an allowable deviation for a 16-inch well is 0.89 feet per 100 feet of depth, or a total deviation of 11.7 feet for Production Well Charlie. The results indicate compliance with that standard.

4.0 SUMMARY

Production Well Charlie was completed as telescoping 16-inch and 20-inch outside diameter production well within reamed borehole ranging from 28-inches to 25-inches as shown on Figure 2. The upper well casing for Production Well Charlie consists of 20-inch outside diameter A139 Grade B LCS pipe with a 0.375-inch wall thickness from surface to 480 feet bls. The well screen consists of 16-inch (nominal) diameter stainless steel wire-wrap screen with 0.050-inch horizontal slots with 0.25-inch thick wire rods from 610 feet to 790 feet and from 870 feet to 1,290 feet. The completed depth of the well is 1,310 feet bls. The well is equipped with a 20-foot bottom sump from 1,290 to 1,310 feet. The filter pack consists of 6-12 mesh Tacna and was selected to accommodate the well screen slot size and the formation characteristics. For the screened interval, filter pack sand was placed from the bottom of the reamed borehole to 570 feet bls, (40 feet above the top of the screen). A bentonite seal was then installed above the filter pack sand from 570 to 115 feet bls. Above the bentonite seal, a cement seal was placed up to surface.

After completing the well construction, Production Well Charlie was developed using the swab and airlift method for about 81 hours, followed by pumping and surging for an additional 10.5 hours with pumping rates up to 1,500 gpm.

Both step-discharge and constant rate aquifer tests were then performed after completing the well development. The results of the step-discharge test indicate:

- For a 1,500 gpm pumping rate, the specific capacity of the well is estimated to be 7 gpm/ft and the predicted pumping water level would be about 425 feet bls.

The constant rate aquifer test was performed at an average pumping rate of 1,068 gpm. The data were analyzed using the Cooper-Jacob and Theis Recovery methods. Based on the data, Production Well Charlie has a maximum transmissivity of about 122,588 gpd/ft.

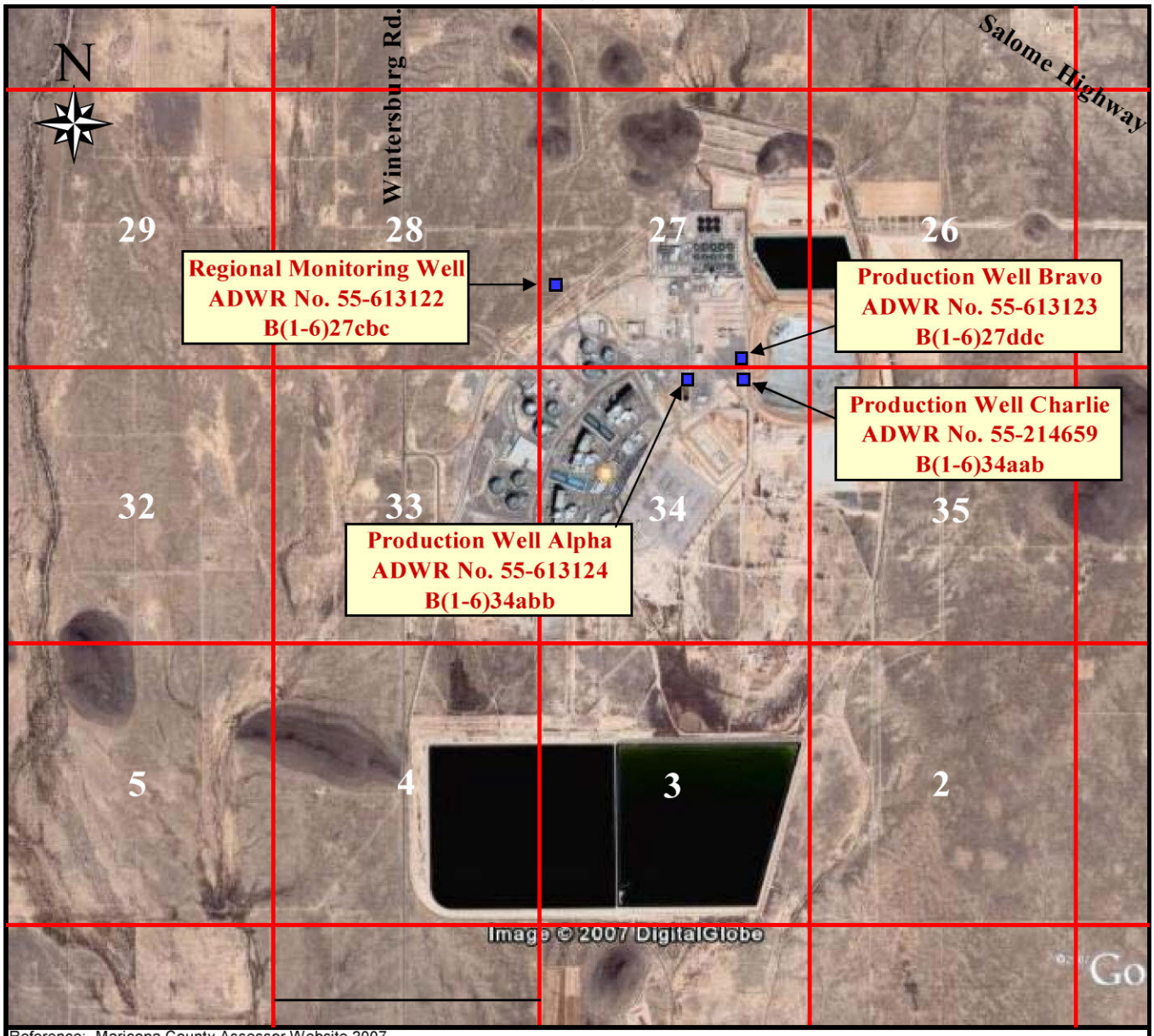
At the conclusion of the constant rate aquifer test, the production discharge water was sampled by APS personnel and analyzed for New Source Drinking Water constituents.

A final video survey of the well performed on January 3, 2008 indicates that the well was constructed in good condition with no notable flaws or deficiencies. The plumbness and alignment test was also performed on January 3, 2008. The results of this test indicate that Production Well Charlie has a maximum deviation of about 4.2 horizontal feet with a true vertical depth of 1,307 feet bls, which meets established standards.

5.0 RECOMMENDATIONS

Based on the data and analyses presented herein, Clear Creek Associates recommends that Production Well Charlie be equipped with a pump capable of producing maximum of 1,500 gpm if the intake is set within the 20-inch outside diameter blank well casing. Based on the step test results, the predicted total drawdown at a 1,500 gpm pumping rate is approximately 215 feet, resulting in a pumping water level of approximately 425 feet bls (based on a static water level depth of 210 feet). To provide an adequate net positive suction head to avoid damage to the pump impellers, the pumping water level should not be allowed to drop below approximately 40 feet above the pump intake. Therefore, the recommended pump equipment should be set at a minimum depth of 465 feet bls. If, in the future, the pump is set within the 16-inch well casing, the pumping water level should not be allowed to draw down below the annular seal at approximately 570 feet bls (Figure 2).

FIGURES



Reference: Maricopa County Assessor Website 2007

EXPLANATION

Section and section number

Approximate Scale

0 mi. 0.5 mi. 1 mi.

CLEAR CREEK ASSOCIATES

FIGURE 1
WELL LOCATION MAP
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona

M:\APS\Palo Verde Production Well\Report\Figures\Figure 1 – Location Map

ADWR Reg. No. 55-214659
B(1-6)34AAB
Installed during November 2007

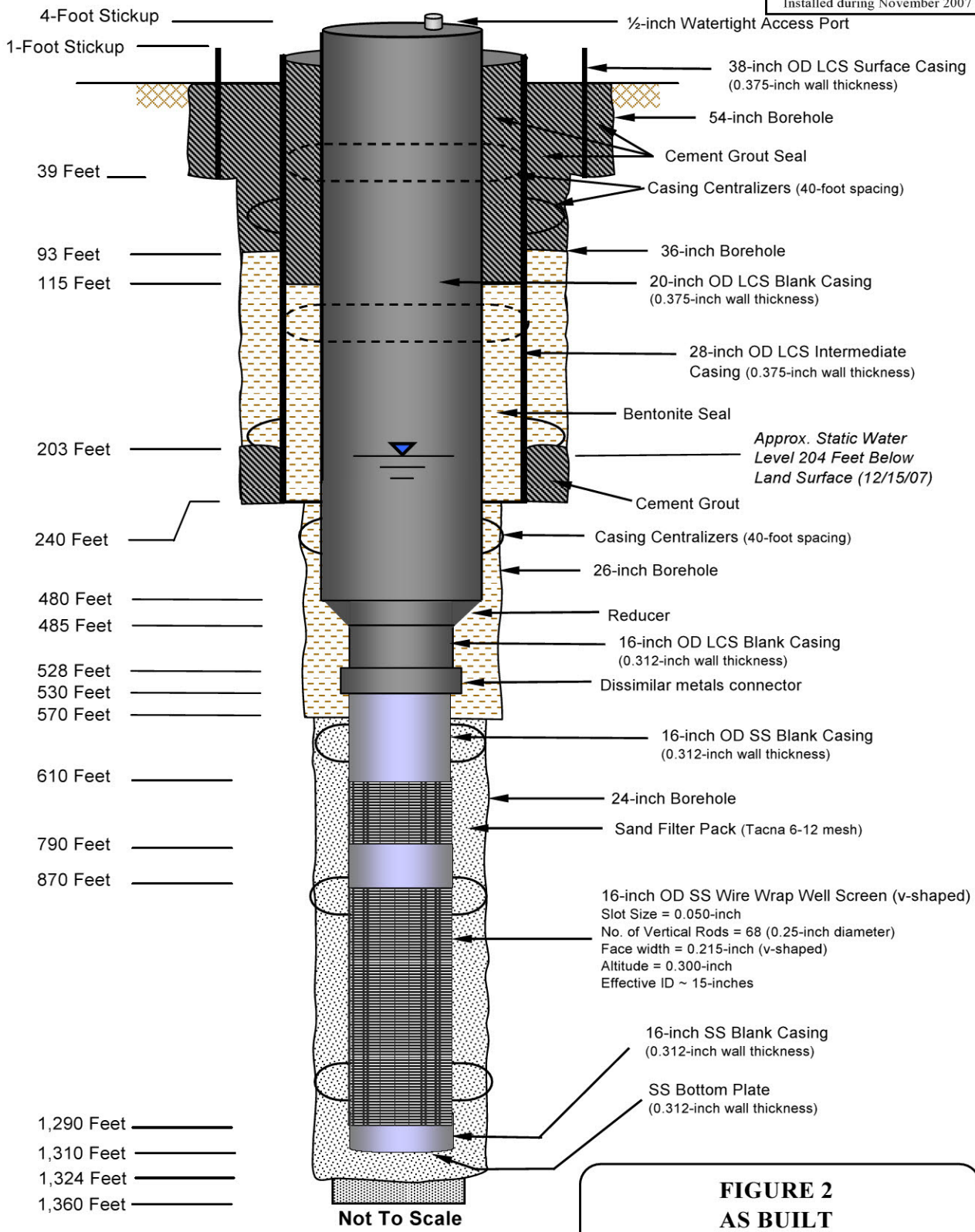
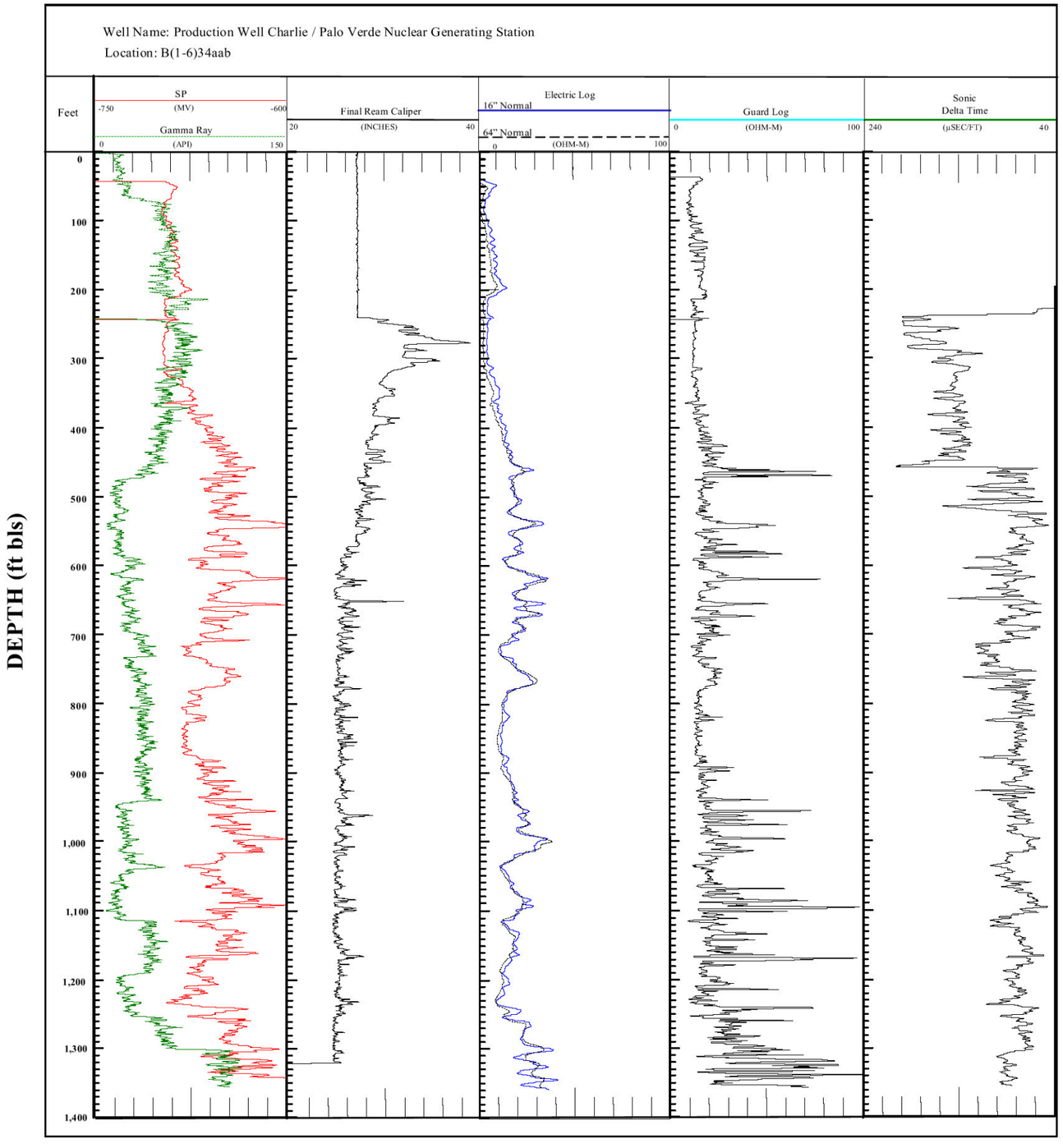


FIGURE 2
AS BUILT
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona

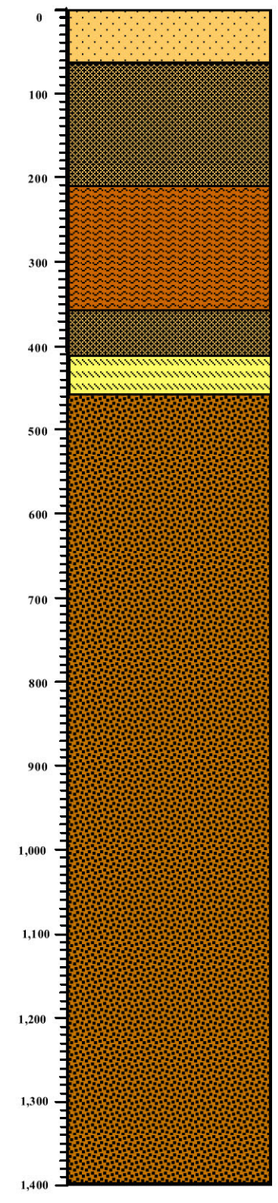
CLEAR CREEK ASSOCIATES

Notes:
LCS = low carbon steel
SS = stainless steel
All diameters are O.D. except the well screen, which is nominal.
Approximate top of Palo Verde Clay is 212 feet

GEOPHYSICAL LOGS



GEOLOGY



Geology generalized from lithologic log.

EXPLANATION

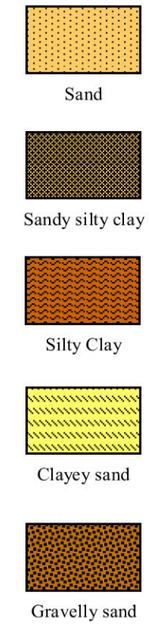
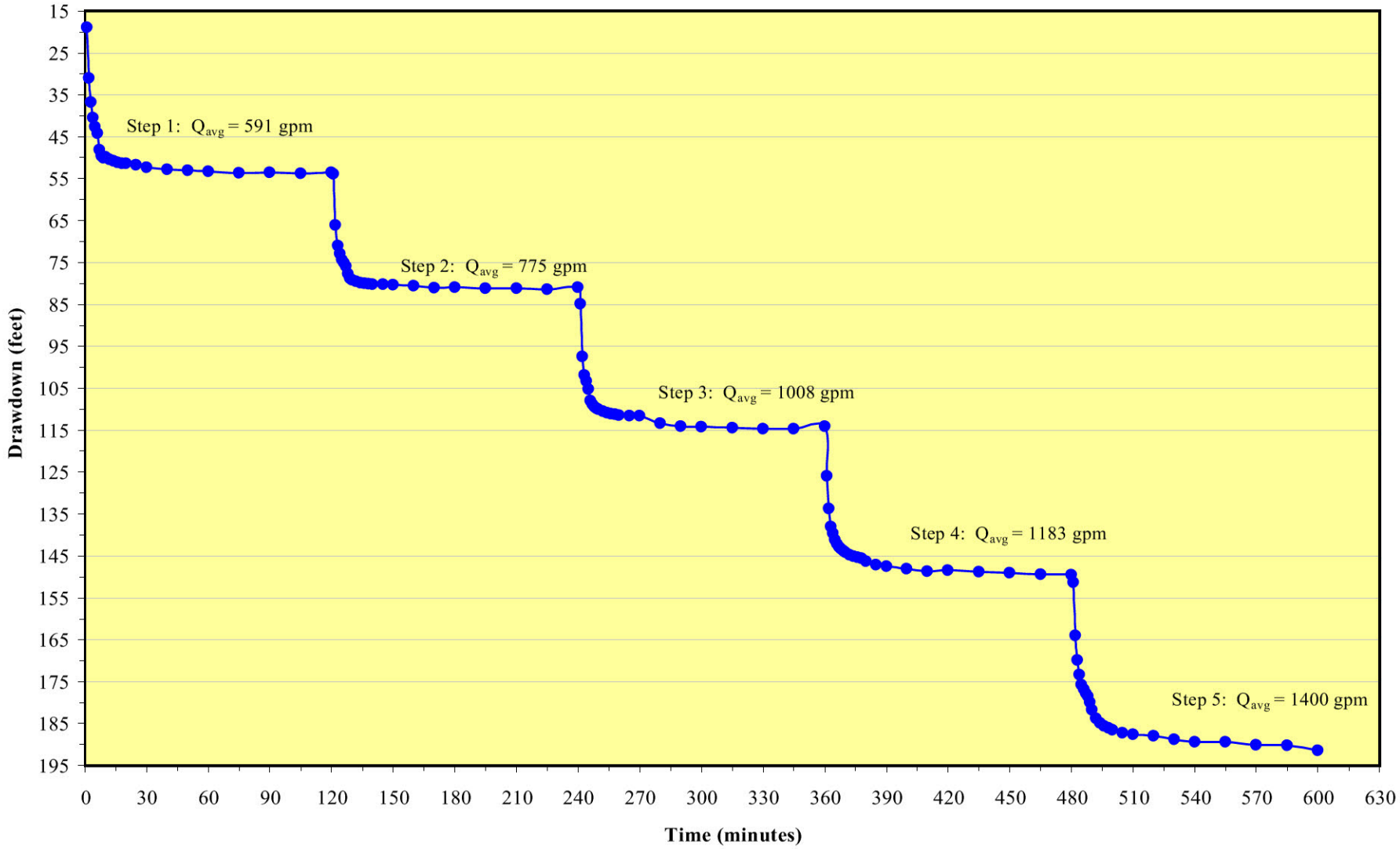


FIGURE 3
GENERALIZED GEOLOGIC AND GEOPHYSICAL DATA
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona



Test Performed 12/11/07

FIGURE 4
Step-Rate Pumping Test
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona

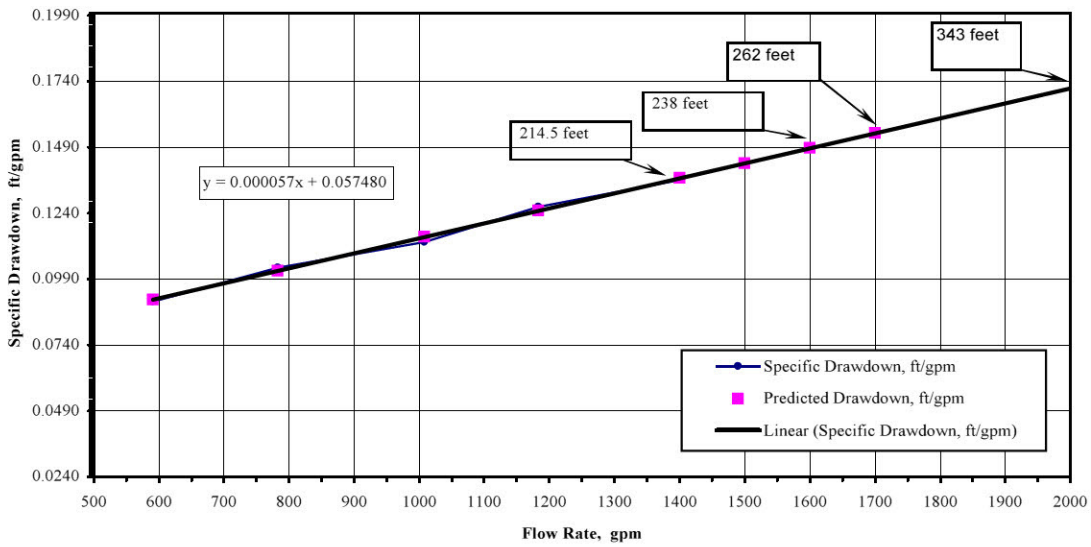
CLEAR CREEK ASSOCIATES

N:\APS Energy Services\APS\Palo Verde Production Well\Aquifer Test Data\PVNGS - 10 Hour STEP TEST

FIGURE 5
ANALYSIS OF STEP-DISCHARGE PUMPING TEST
Production Well Charlie
Palo Verde Nuclear Generating Station
December 11, 2007

Step	Average Flow Rate (Q) gpm	Drawdown (s) feet	Specific Drawdown (s/Q) feet/gpm
1	591	53.5	0.0906
2	783	81.0	0.1034
3	1008	114.1	0.1132
4	1183	149.6	0.1264
5	1400	191.4	0.1367
Predictions	1500	214.5	0.1430
	1600	237.9	0.1487
	1700	262.4	0.1544
	2000	343.0	0.1715

Specific Drawdown vs. Flow Rate



Equations:

Predicted Total Drawdown (s) = $BQ + CQ^2$

Predicted Aquifer Drawdown = BQ

Predicted Well Loss = CQ^2

$L_p = BQ/(BQ+CQ^2)$

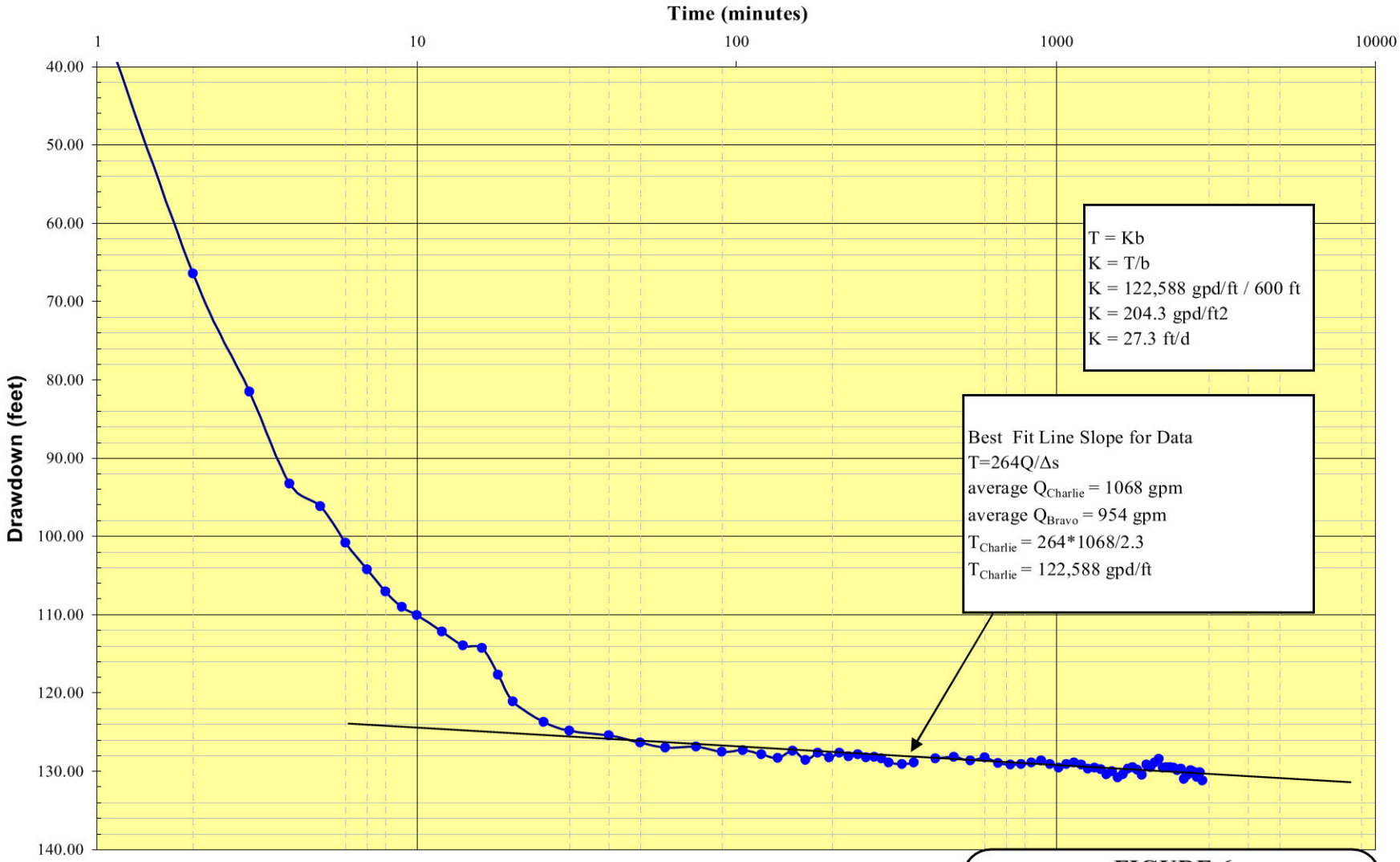
L_p = Percentage Head Loss Attributable to Laminar Flow, "Predicted Well Efficiency."

B = 0.057480

C = 0.000057

For a flow rate of 1000 gpm	**For a flow rate of 1500 gpm**
Predicted Aquifer Drawdown = 57.5 feet	**Predicted Aquifer Drawdown = 86.2 feet**
Predicted Well Loss = 57 feet	**Predicted Well Loss = 128.3 feet**
Predicted Total Drawdown = 114.5 feet	**Predicted Total Drawdown = 214.5 feet**
Predicted Well Efficiency at 1000 gpm Lp = 50.2%	**Predicted Well Efficiency at 1500 gpm Lp = 40.2%**
Specific Capacity = 8.74 gpm/foot of drawdown	**Specific Capacity = 6.99 gpm/foot of drawdown**

CLEAR CREEK ASSOCIATES



Test Date: December 15 - 17, 2007

FIGURE 6
COOPER-JACOB PLOT
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona

CLEAR CREEK ASSOCIATES

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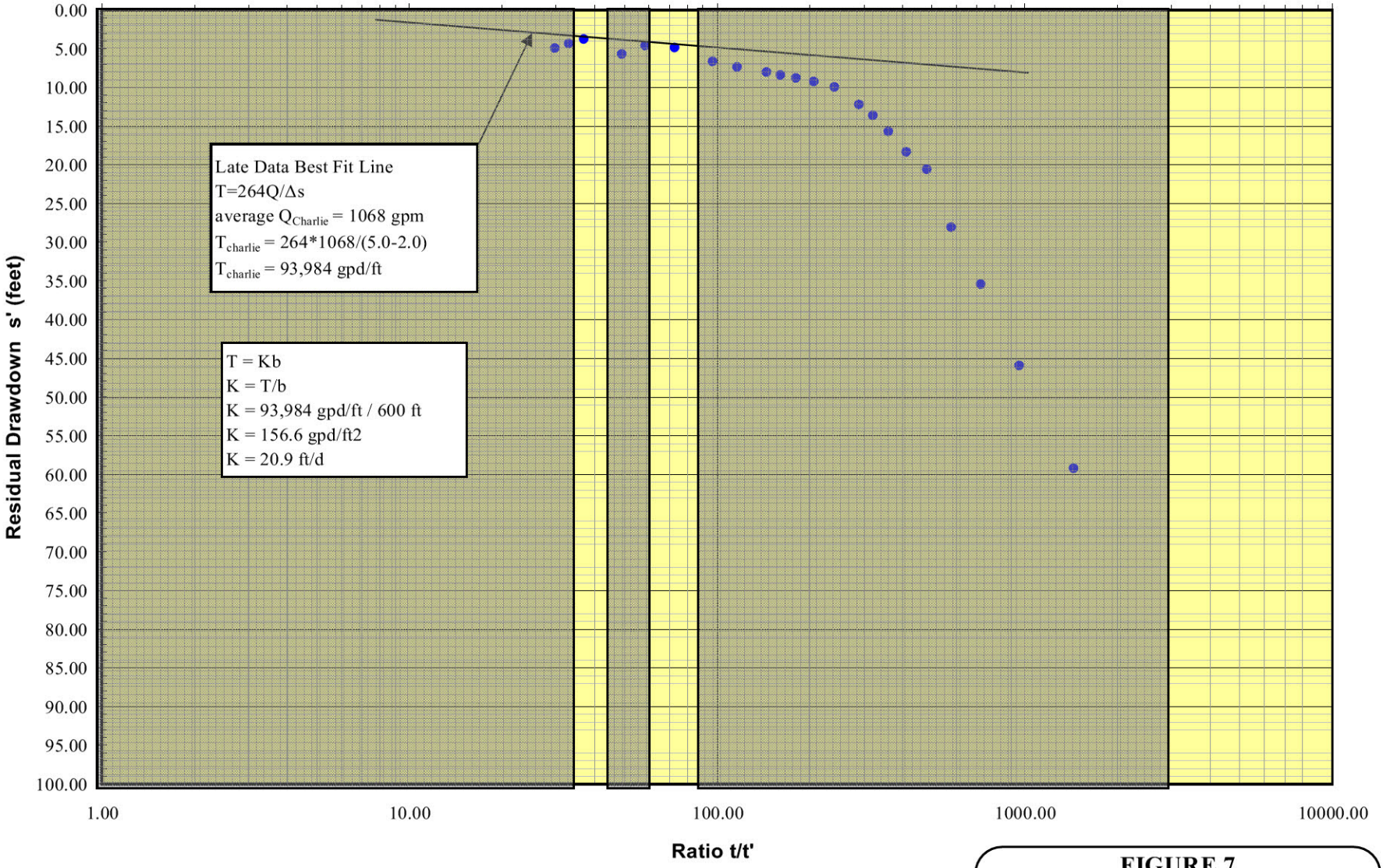

CLEAR CREEK ASSOCIATES

Test Date: December 15 - 17, 2007

Bravo Well Pumping at 1,500 gpm

FIGURE 7
THEIS RECOVERY PLOT
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona

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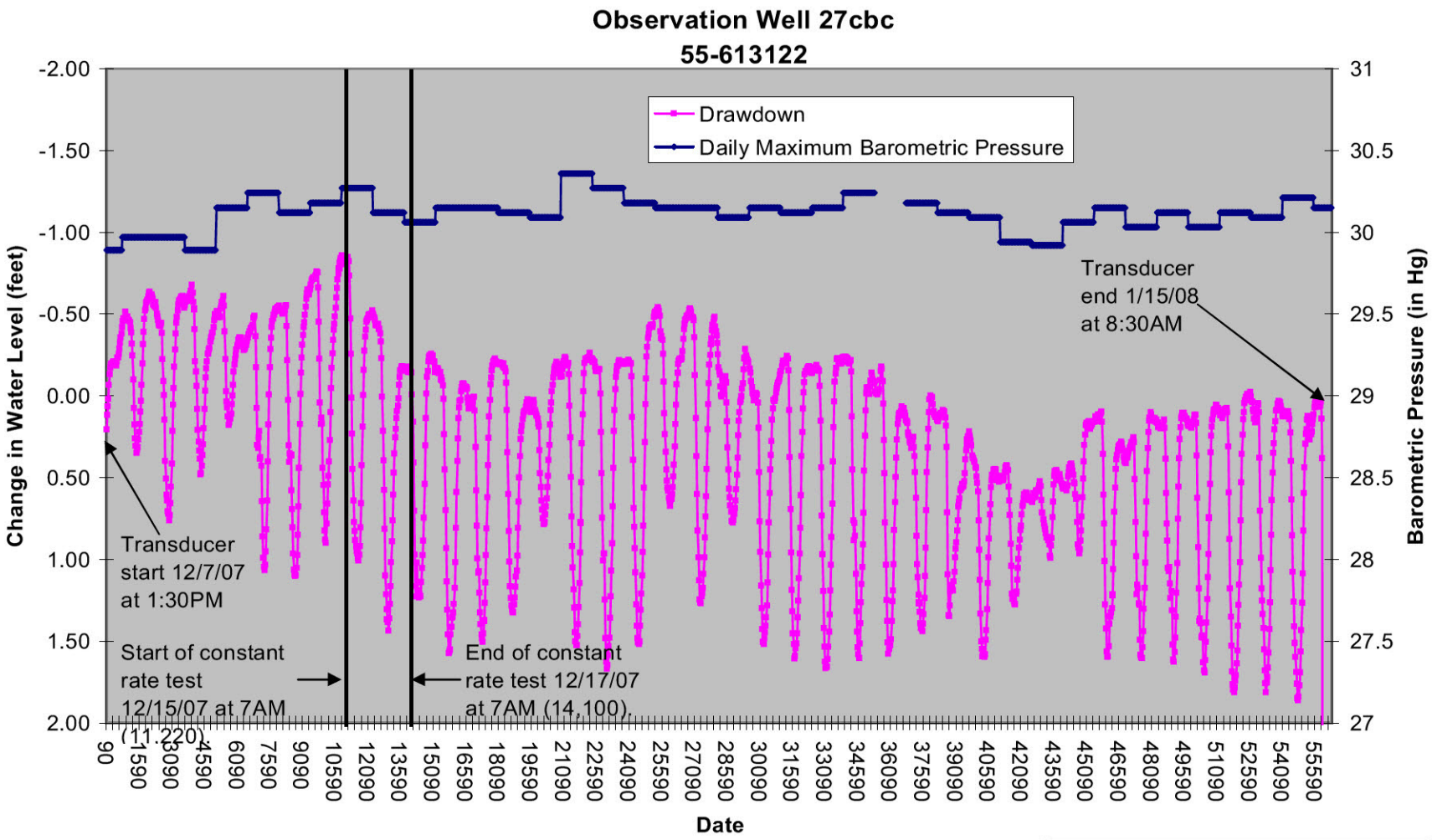
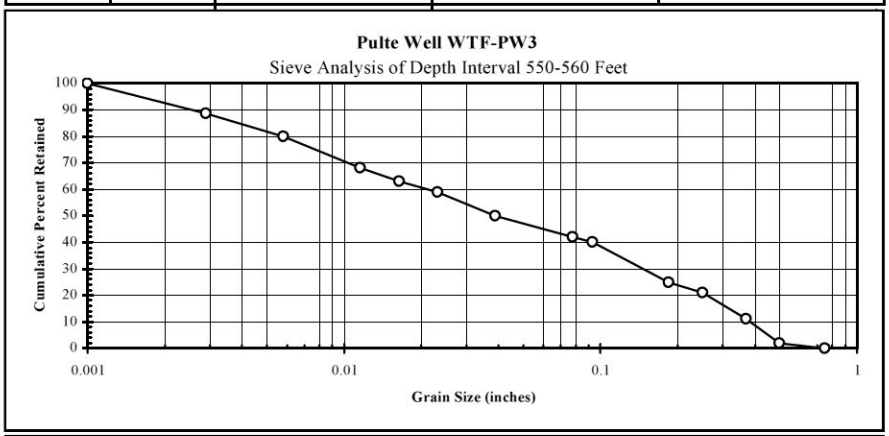


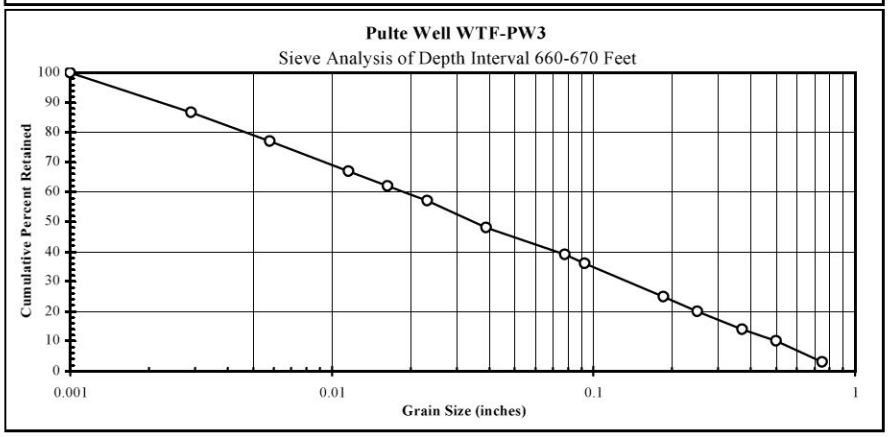
FIGURE 8
OBSERVATION WELL DATA
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona

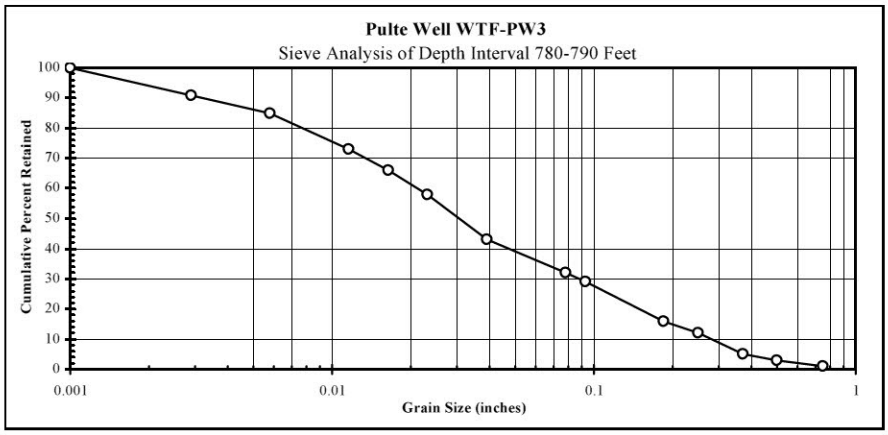
TABLES

TABLE 1
SIEVE ANALYSIS
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona

Sieve	Size (inches)	Depth: 550-560 Feet Cum. Percent Retained	Depth: 660-670 Feet Cum. Percent Retained	Depth: 780-790 Feet Cum. Percent Retained
Pan	0.001	100	100	100
200	0.0029	88.6	86.6	90.8
100	0.0058	80	77.0	85.0
50	0.0116	68	67.0	73.0
40	0.0164	63	62.0	66.0
30	0.0232	59	57.0	58.0
16	0.039	50	48.0	43.0
10	0.078	42	39.0	32.0
8	0.093	40.0	36.0	29.0
4	0.185	25.0	25.0	16.0
1/4"	0.250	21.0	20.0	12.0
3/8"	0.371	11.0	14.0	5.0
1/2"	0.50	2.0	10.0	3.0
3/4"	0.75	0.0	3.0	1.0



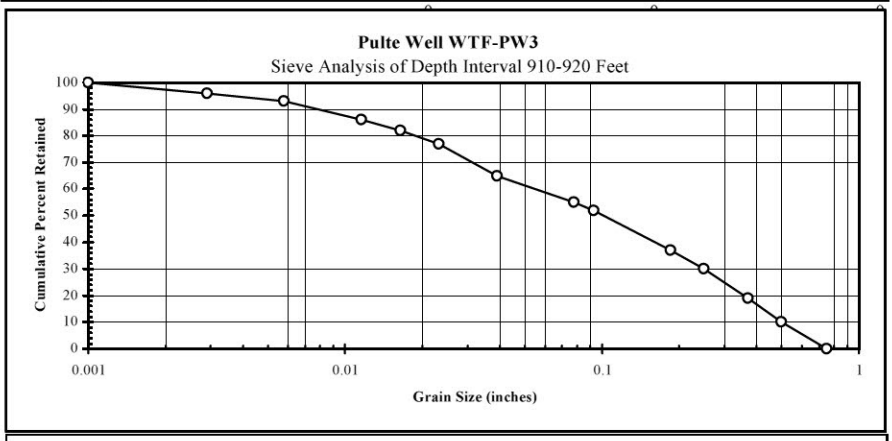


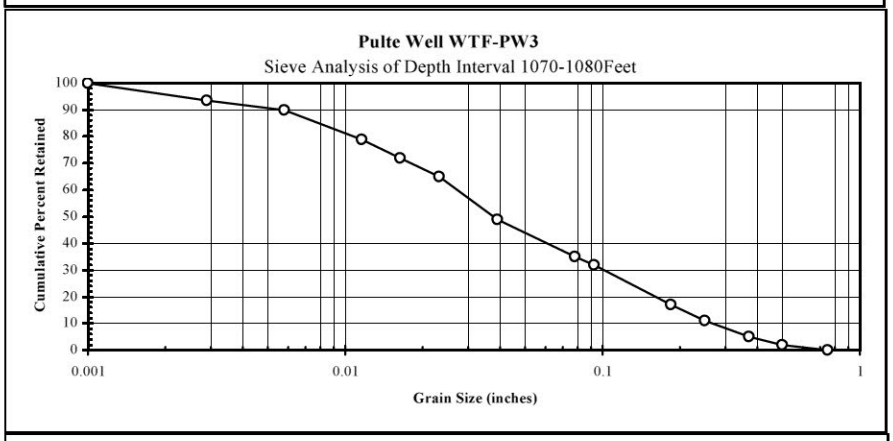


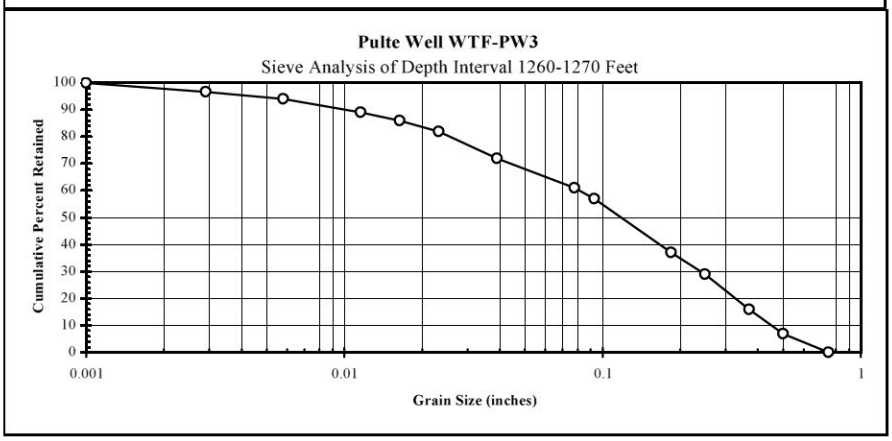
CLEAR CREEK ASSOCIATES

TABLE 1
SIEVE ANALYSIS
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona

Sieve	Size (inches)	Depth: 910-920 Feet Cum. Percent Retained	Depth: 1070-1080 Feet Cum. Percent Retained	Depth: 1260-1270 Feet Cum. Percent Retained
Pan	0.001	100	100	100
200	0.0029	95.8	93.5	96.7
100	0.0058	93.0	90.0	94.0
50	0.0116	86.0	79.0	89.0
40	0.0164	82.0	72.0	86.0
30	0.0232	77.0	65.0	82.0
16	0.039	65.0	49.0	72.0
10	0.078	55.0	35.0	61.0
8	0.093	52.0	32.0	57.0
4	0.185	37.0	17.0	37.0
1/4"	0.250	30.0	11.0	29.0
3/8"	0.371	19.0	5.0	16.0
1/2"	0.50	10.0	2.0	7.0
3/4"	0.75	0.0	0.0	0.0







CLEAR CREEK ASSOCIATES

APPENDIX A

PERMITTING DOCUMENTATION
AND
WELL DRILLER REPORT

current 9/26/07

ARIZONA DEPARTMENT OF WATER RESOURCES
WATER MANAGEMENT DIVISION

3550 North Central Avenue
Phoenix, Arizona 85012

R E I S S U E

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILL OPERATIONS

WELL REGISTRATION NO: 55-214659 **PERMIT NO.:** 59-214658

AUTHORIZED DRILLER: ZIM INDUSTRIES INC **LICENSE NO:** 185

AUTHORITY TO DRILL A NON-EXEMPT WELL(s) INSIDE THE PHOENIX ACTIVE MANAGEMENT AREA FOR HYDROLOGIC TESTING HAS BEEN GRANTED TO:

WELL OWNER: Arizona Public Service Company P.O. Box 53999/Mail Sta: 8376 Phoenix AZ 85072-3999

The well(s) is/are to be located in the:

NW ¼ of the NE ¼ of the NE ¼ Section 34 Township 1 North Range 6 West

No. of well(s) in this project: 1

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE 20TH DAY OF MARCH, 2008.

Sandra Fabritz Whitney

WATER MANAGEMENT DIVISION

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING

GREAT SEAL OF THE STATE OF ARIZONA
DITAT DEUS
1912

ARIZONA DEPARTMENT OF WATER RESOURCES
WATER MANAGEMENT DIVISION
3550 North Central Avenue, Phoenix, Arizona 85012
Telephone 602 771-8585
Fax 602 771-8688

Janet Napolitano
Governor

Herbert R. Guenther
Director

March 21, 2007

Arizona Public Service Company
Attn: John Boyer
MS 8376, PO Box 53999
Phoenix AZ 85072-3999

RE: Permit to Withdraw Groundwater for Hydrologic Testing No. 59-214658.0000
Well Registration No. 55-214659; File No. B(1-6)34ACC

Dear Permittee:

Your permit as referenced above is enclosed for your records. Please be aware that the approval of this hydrologic testing permit does not constitute a commitment by the Department for the granting of a right to withdraw groundwater or converting the test well into a water production well. A site inspection is not required at this time; however, if you apply in the future to convert the hydrologic testing well into a water production well, a site inspection will be required at that time. During that site inspection, the Department will verify the location of the well.

Pursuant to the provisions of A.R.S. § 45-604, any person withdrawing groundwater from a well is required to use a water measuring device to record rates of withdrawal in order to provide or allow the computation of an annual volume of pumpage from the well. The total volume of pumpage shall be reported on an annual report. The first annual reporting period shall be from the date of issuance of this permit until the end of the year 2007, or the expiration date of the permit, whichever comes first. Additionally, within sixty (60) days upon completion of the hydrologic testing, the permittee shall provide the results of the test data to the Arizona Department of Water Resources, to Sharon Ward, Water Management Division office for evaluation.

In the event the location of the proposed well changes, you must notify the Department of Water Resources of the change in writing. A drill card with the correct proposed well location must be in the possession of the driller before drilling may commence.

Under A.R.S. § 45-593, the person to whom a well is registered must notify the Department of a change in ownership, physical characteristics or any other data about the well in order to keep the well registration records current and accurate. For future changes, a Request to Change Well Information form is enclosed.

The Department has issued this hydrologic testing permit pursuant to A.R.S. § 45-519.01 of the Groundwater Code. The legal nature of the water withdrawn from your well may be the subject of court action in the future as part of a determination of surface water rights in your area. If there are court proceedings that could affect your well, you will be notified and be given the opportunity to participate.

The permit has been issued by this Department without a hearing. As such, it is an appealable agency action. You are entitled to appeal and your rights are described in the enclosed notice of right to appeal.

If you have any questions about the permit, please call me at 602-771-8614.

Sincerely,

Sharon Ward

Sharon Ward
Water Resource Specialist

Enclosure

cc: Don Hanson, Clear Creek Associates
File

ARIZONA DEPARTMENT OF WATER RESOURCES

PERMIT TO WITHDRAW GROUNDWATER FOR

HYDROLOGIC TESTING

PURSUANT TO A.R.S. § 45-519.01

PERMIT NO. 59-214658.0000

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

This is to certify that Application No. 59-214658.0000 meets the requirements of Title 45, Chapter 2, Article 7 for a Permit to Withdraw Groundwater for Hydrologic Testing. The Director hereby grants authority to the Permittee to construct and operate a well for hydrologic testing pursuant to A.R.S. § 45-519.01, subject to the following limitations and conditions:

Permit Limitations

Permittee:	Arizona Public Service Company Mail Station 8376 P.O. Box 53999 Phoenix Arizona 85072-3999
Active Management Area:	Phoenix
Sub-basin:	Hassayampa

PERMIT NO. 59-214658.0000

Authorized purpose of hydrologic testing:	Determine Aquifer Properties for Water Supply Well Siting and Design
Maximum Amount of Groundwater to be Withdrawn:	25 Acre-Feet Per Annum
Authorized Disposition of Groundwater:	Water Will Be Stored In Adjacent Reservoir And Used As Process Water For Plant Operation, Or Used For Dust Control During Construction Of An Additional Evaporation Pond.

Authorized Points of Withdrawal:

Authorized Well Registration Numbers:	File Numbers:	Depth of Well	Casing Diameter	Casing Material
55-214659	B(1-6)34ACC	1,300 Feet	16 Inches	Steel

Effective Date of Permit:	March 21, 2007
Expiration Date of Permit:	March 20, 2008

Permit Conditions

1. Within sixty (60) days upon completion of the hydrologic testing, the permittee shall provide the results of the test data to the Arizona Department of Water Resources for evaluation. Results shall be mailed to Sharon Ward, Water Management Support, Arizona Department of Water Resources, 3550 North Central, Phoenix, Arizona 85012.

2. This approval for test wells and pump test does not constitute a commitment by the Department for the granting of a right to withdraw groundwater or converting the test well into a production well.

3. The well drilled for this project shall be drilled in compliance with the Arizona Department of Water Resources minimum well construction standards, A.A.C. R12-15-811.

4. The permittee shall monitor withdrawals of groundwater and shall report the total amount of groundwater withdrawn on an Annual Water Withdrawal and Use Report. The first annual reporting period shall be from the date of issuance of this permit through December 31, 2007, or the expiration date of this permit, whichever comes first.

PERMIT NO. 59-214658.0000

5. The issuance of the permit does not waive any federal, state, county or local government ordinances, regulations or permits for which the facility may have to comply.

WITNESS my hand and seal of office this 21st day of March, 2007.

Sandra Fabritz-Whitney, Assistant Director

Arizona Department of Water Resources
Information Management Unit
P.O. Box 458 • Phoenix, Arizona 85001-0458
(602) 771-8627 • (800) 352-8488
www.azwater.gov

Well Driller Report and Well Log

THIS REPORT MUST BE FILED WITHIN **30 DAYS** OF COMPLETING THE WELL.

PLEASE PRINT CLEARLY USING BLACK OR BLUE INK.

FILE NUMBER

WELL REGISTRATION NUMBER **55 - 214659**

PERMIT NUMBER (IF ISSUED) **59-214658**

SECTION 1. DRILLING AUTHORIZATION

Drilling Firm

NAME: Zim Industries Inc.	DWR LICENSE NUMBER: 185
ADDRESS: 4545 E. Lincoln	TELEPHONE NUMBER: (559) 834-1551
CITY / STATE / ZIP: Fresno, California 93725	FAX: (559) 834-5156

SECTION 2. REGISTRY INFORMATION

Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL: Arizona Public Service Company

MAILING ADDRESS: Mail Station 8376 P.O. Box 53999

CITY / STATE / ZIP CODE: Phoenix, Arizona 85072

CONTACT PERSON NAME AND TITLE: Rich Bennett Senior Engineer

TELEPHONE NUMBER: (623) 393-3487 FAX: (623) 393-1688

WELL NAME (e.g., MW-1, PZ-3, Lot 25 Well, Smith Well, etc.): B(1-6)34AAB Charlie Well

Location of Well

WELL LOCATION ADDRESS (IF ANY):

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
1N	6W	34	NE ¼	NE ¼	NW ¼

LATITUDE			LONGITUDE		
33° Degrees	23' Minutes	29.5" N Seconds	112° Degrees	51' Minutes	16.9" W Seconds

METHOD OF LATITUDE/LONGITUDE (CHECK ONE): ☑ *GPS: Hand-Held ☐ USGS Quad Map ☐ Conventional Survey ☐ *GPS: Survey-Grade

LAND SURFACE ELEVATION AT WELL: 949 Feet Above Sea Level

METHOD OF ELEVATION (CHECK ONE): ☑ *GPS: Hand-Held ☐ USGS Quad Map ☐ Conventional Survey ☐ *GPS: Survey-Grade

*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE): ☐ NAD-83 ☑ Other (*please specify*): WGS 84

COUNTY: Maricopa

ASSESSOR'S PARCEL ID NUMBER: BOOK | MAP | PARCEL

SECTION 3. WELL CONSTRUCTION DETAILS

Drill Method

CHECK ALL THAT APPLY
- ☐ Air Rotary
- ☐ Bored or Augered
- ☐ Cable Tool
- ☐ Dual Rotary
- ☐ Mud Rotary
- ☑ Reverse Circulation
- ☐ Driven
- ☐ Jetted
- ☐ Air Percussion / Odex Tubing
- ☐ Other (*please specify*):

Modification did not require drilling.

Method of Well Development

CHECK ALL THAT APPLY
- ☑ Airlift
- ☐ Bail
- ☑ Surge Block
- ☑ Surge Pump
- ☐ Other (*please specify*):

Condition of Well

CHECK ONE
- ☑ Capped
- ☐ Pump Installed

Method of Sealing at Reduction Points

CHECK ONE
- ☐ None
- ☐ Packed
- ☐ Swedged
- ☑ Welded
- ☐ Other (*please specify*):

Construction Dates

DATE WELL CONSTRUCTION STARTED: 10-01-07

DATE WELL CONSTRUCTION COMPLETED: 11-16-07

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY: Robert J. Zimmer DATE: 12-17-07

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 214659

SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILT) (attach additional page if needed)

Depth

DEPTH OF BORING	DEPTH OF COMPLETED WELL
1360 Feet Below Land Surface	1310 Feet Below Land Surface

Water Level Information

STATIC WATER LEVEL	DATE MEASURED	TIME MEASURED	IF FLOWING WELL, METHOD OF FLOW REGULATION
202 Feet Below Land Surface	11-18-07	5:00 PM	☐ Valve ☐ Other:

Borehole			Installed Casing													
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE (T)				PERFORATION TYPE (T)						SLOT SIZE IF ANY (inches)
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	
0	39	46	+1	39	38	+			cond.							
39	240	36	+1	240	28	+			Inter.							
240	1360	17 1/2	+4	480	20					+						
240	572	26	480	485	20/16				Reducer							
572	1324	24	485	528	16				LCS	+						
			528	530	18				DMC							
			530	610	16				S.S.	+						
			610	790	16				S.S.		+					0.050
			790	870	16				S.S.	+						

Installed Annular Material

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (T)								FILTER PACK		
						BENTONITE						
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	SAND	GRAVEL	SIZE
2	115			+								
115	570						+					
570	1324								Tacna	+		6 x 12

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 214659

SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILT) (attach additional page if needed)

Depth

DEPTH OF BORING	DEPTH OF COMPLETED WELL
Feet Below Land Surface	Feet Below Land Surface

Water Level Information

STATIC WATER LEVEL	DATE MEASURED	TIME MEASURED	IF FLOWING WELL, METHOD OF FLOW REGULATION
Feet Below Land Surface			☐ Valve ☐ Other:

Borehole			Installed Casing													
DEPTH FROM SURFACE			DEPTH FROM SURFACE			MATERIAL TYPE (T)				PERFORATION TYPE (T)						
FROM (feet)	TO (feet)	BOREHOLE DIAMETER (inches)	FROM (feet)	TO (feet)	OUTER DIAMETER (inches)	STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED	IF OTHER TYPE, DESCRIBE	SLOT SIZE IF ANY (inches)
			870	1290	16				S.S.		+					0.050
			1290	1310	16				S.S.	+						

Installed Annular Material

DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE (T)								FILTER PACK		
						BENTONITE						
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	SAND	GRAVEL	SIZE

Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 214659

SECTION 5. GEOLOGIC LOG OF WELL

DEPTH FROM SURFACE FROM (feet)	TO (feet)	Description Describe material, grain size, color, etc.	Check (T) every interval where water was encountered (if known)
		Attached	

55-214659

Formation Log

0-50 Brown clay and fine sand and some gravel
50-80 Brown clay and fine sand
80-100 Brown clay with less fine sand
100-420 Brown clay
420-450 Brown clay some gravel and fine sand
450-470 Brown clay volcanic sand
470-560 Volcanic rocks and some brown clay
560-740 Volcanic rock and volcanic black sand
740-780 Volcanic rock and volcanic red sand
780-880 Volcanic rock with gray sand
880-920 Volcanic rock sand some gray clay
920-940 volcanic rock and gray sand
940-1040 Volcanic rock and red sand
1040-1300 Volcanic sand and grey rocks with some red clay
1300-1360 Volcanic sand and rocks all white

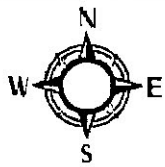
Well Driller Report and Well Log

WELL REGISTRATION NUMBER
55 - 214659

SECTION 6. WELL SITE PLAN

NAME OF WELL OWNER	COUNTY ASSESSOR'S PARCEL ID NUMBER		
	BOOK	MAP	PARCEL
Arizona Public Service Company			

- Please draw the following: (1) the boundaries of property on which the well was located; (2) the well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well.
- Please indicate the distance between the well location and any septic tank system or sewer system.



1" = _____ ft

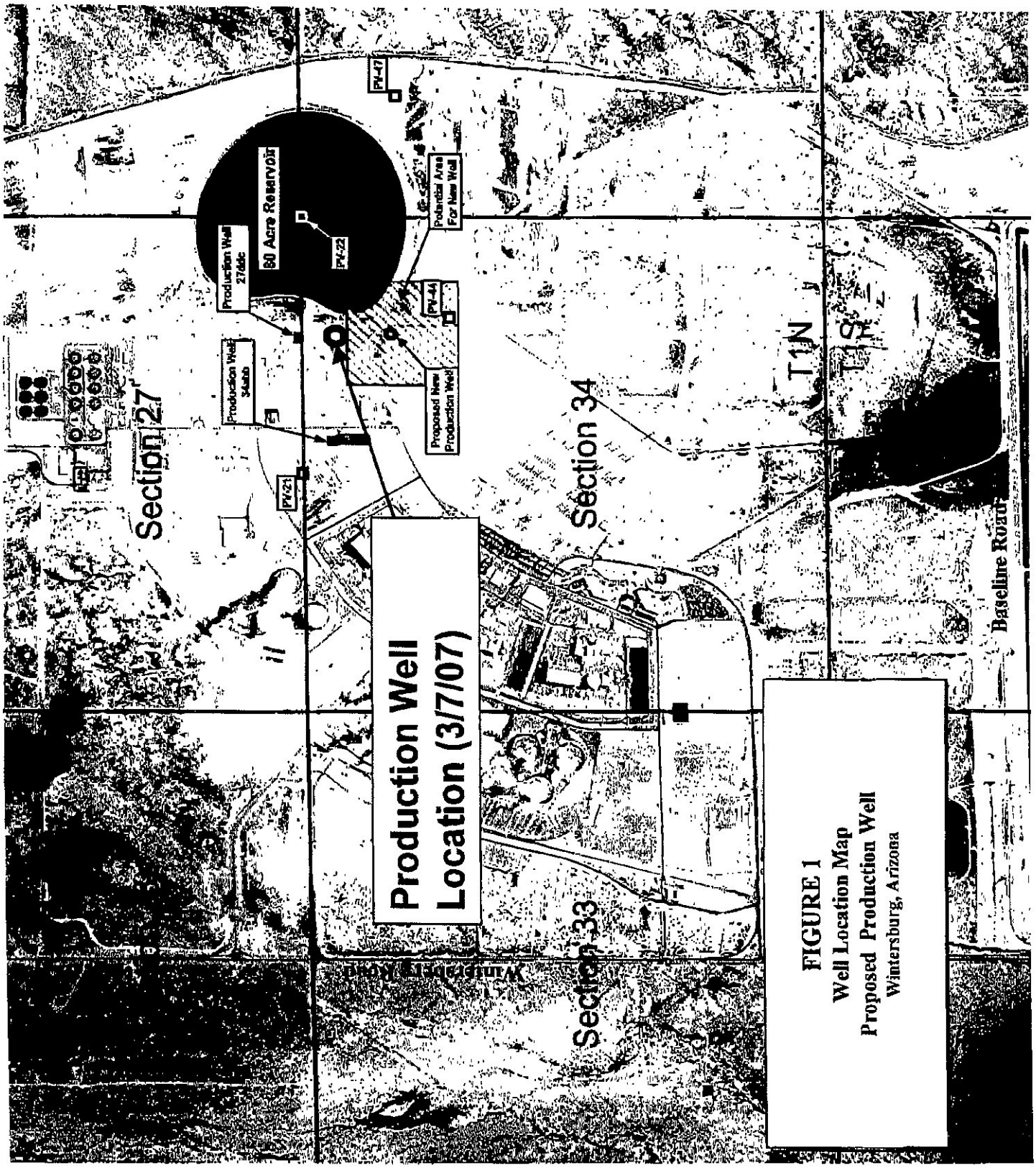


FIGURE 1
Well Location Map
Proposed Production Well
Wintersburg, Arizona

\Production\APS\Palo Verde Production Well\Location map.ppt

ARIZONA DEPARTMENT OF WATER RESOURCES
WATER MANAGEMENT DIVISION

3550 North Central Avenue
Phoenix, Arizona 85012

REISSUE

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILL OPERATIONS

WELL REGISTRATION NO: 55-214659 **PERMIT NO.:** 59-214658

AUTHORIZED DRILLER: ZIM INDUSTRIES INC **LICENSE NO:** 185

AUTHORITY TO DRILL A NON-EXEMPT WELL(s) INSIDE THE PHOENIX ACTIVE MANAGEMENT AREA FOR HYDROLOGIC TESTING HAS BEEN GRANTED TO:

WELL OWNER: Arizona Public Service Company P.O. Box 53999/Mail Sta: 8376 Phoenix AZ 85072-3999

The well(s) is/are to be located in the:

NW ¼ of the NE ¼ of the NE ¼ Section 34 Township 1 North Range 6 West

No. of well(s) in this project: 1

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE 20TH DAY OF MARCH, 2008.

WATER MANAGEMENT DIVISION

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING

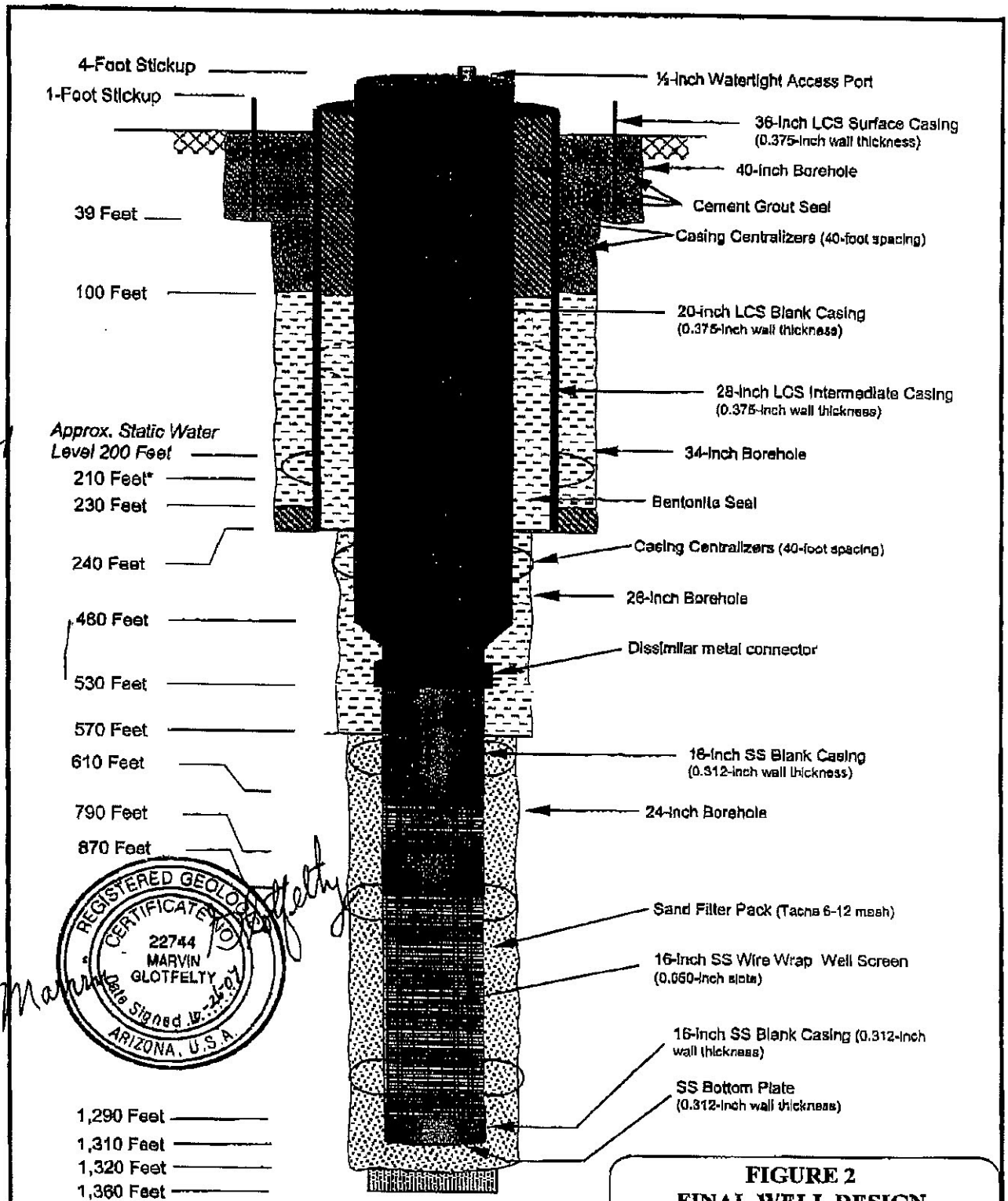


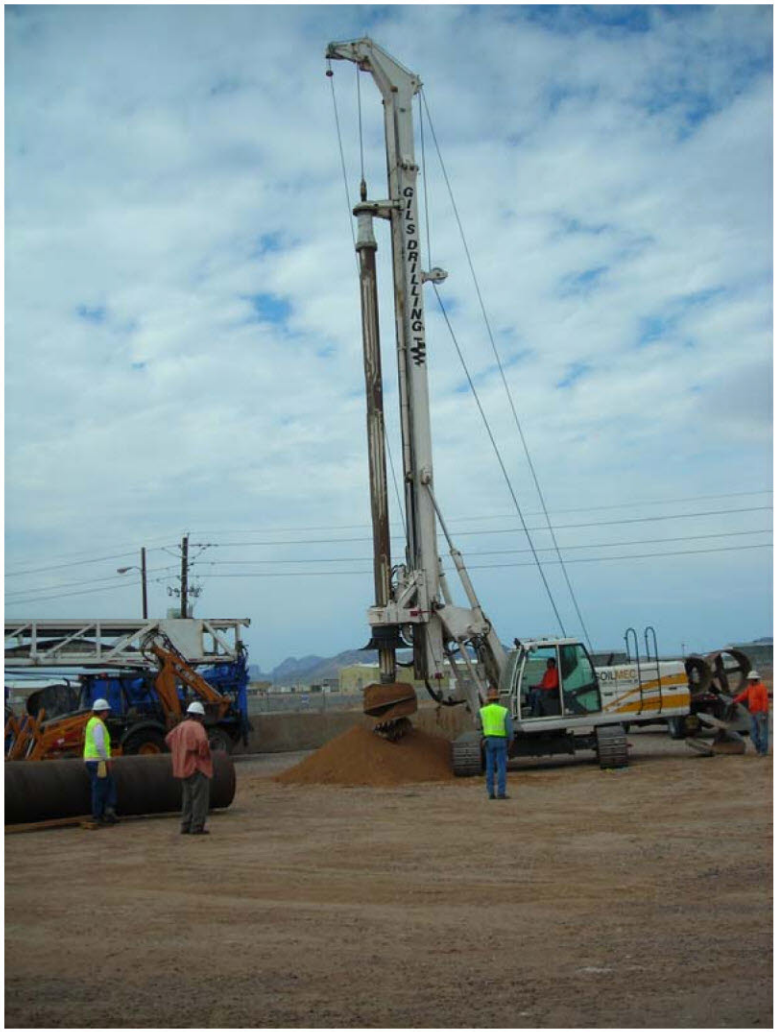
FIGURE 2
FINAL WELL DESIGN
Arizona Public Service Company
Palo Verde Nuclear Generating Station
B(1-6)34AAB

N:\APS\Palo Verde Production Well \ Tech Spec\Well Design \ Fig 2 - Well design 10-26-07.ppt October 26, 2007

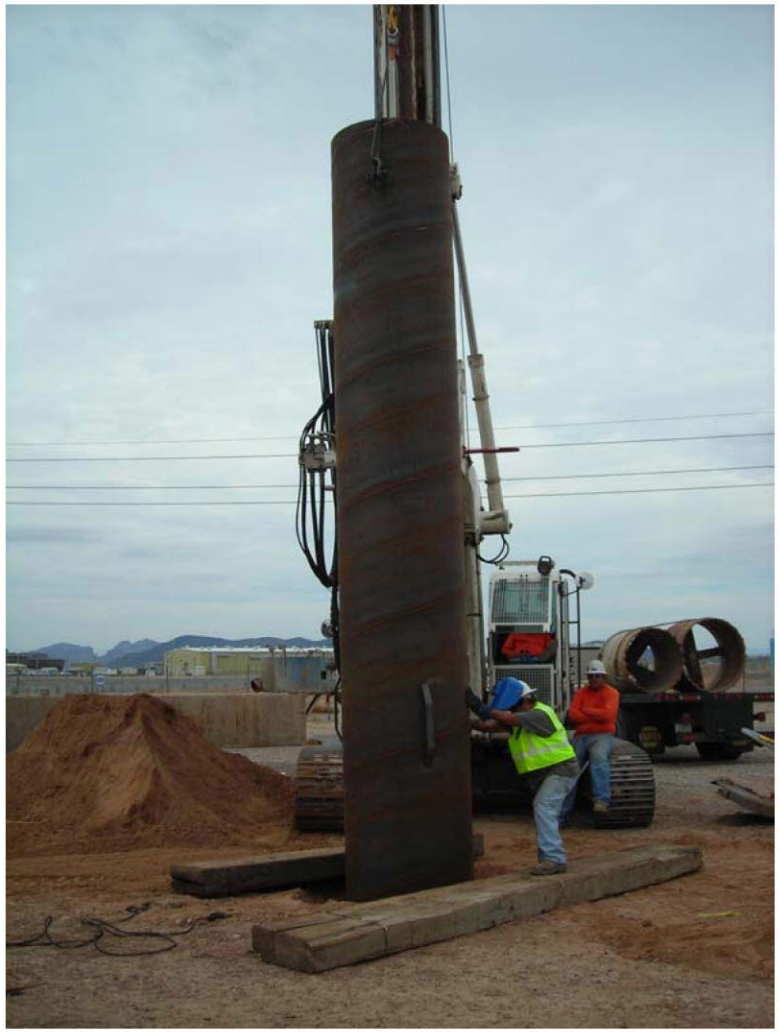
APPENDIX B

PHOTOGRAPHIC DOCUMENTATION

Appendix B – Photographic Documentation



Drilling pilot hole for surface casing installation.



Installing surface casing.

CLEAR CREEK ASSOCIATES

Connecting second 20-foot section of surface casing.

Welding second 20-foot section of surface casing.

Cementing surface casing in place.

Drilling pilot hole for intermediate casing.

Geophysical logging pilot hole for intermediate casing.

Lithologic sample collection area.

Installing intermediate casing.

Installing intermediate casing.

Installing intermediate casing.

Well casing (screen and blank).

Dissimilar metal connector on right.

Well screen.

Reducer.

Welding well casing sections.

Installation of annular filter pack.

Super sacks of filter pack.

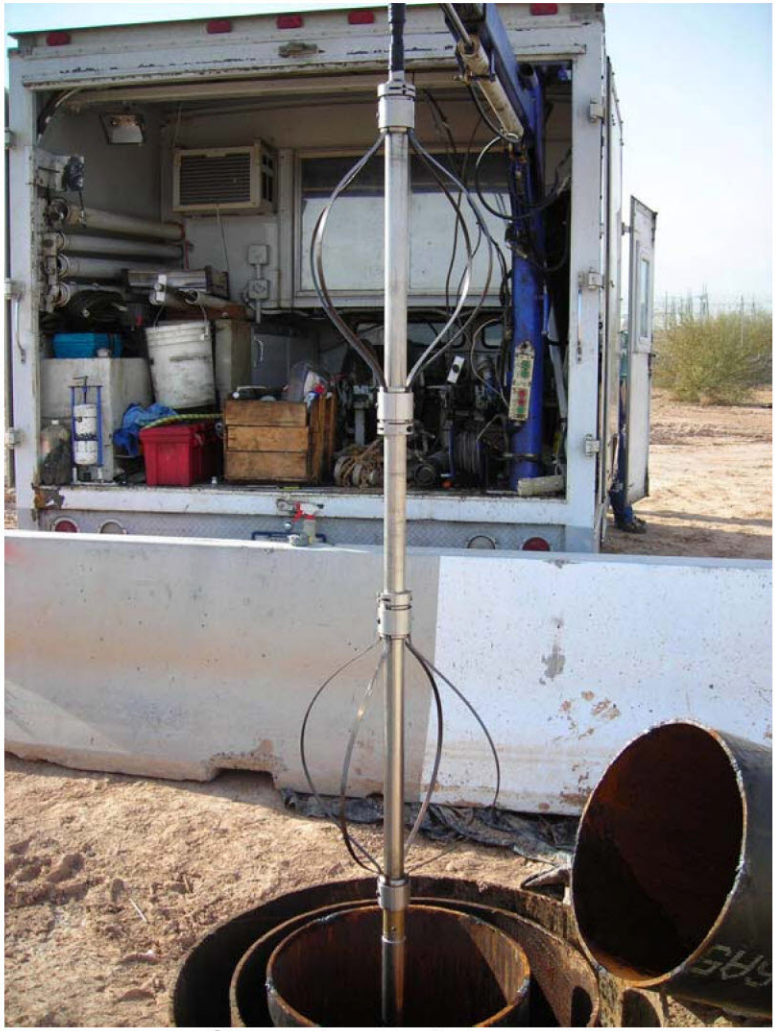
Installation of cement seal.

Discharge water during air-lift development.

Discharge water during air-lift development.

Test pump setup.

Discharge water during step-testing.



Gyroscopic survey instrument.

Downhole video camera.

APPENDIX C

WELL DRILLING
AND INSTALLATION METHODS

APPENDIX C

WELL DRILLING AND INSTALLATION METHODS

SURFACE CASING INSTALLATION

A bucket auger is typically used for the installation of surface casing for water production wells due to the large borehole diameter and relatively shallow depth. The surface casing is sealed in place with cement grout to stabilize the borehole and casing and to comply with the requirements of Arizona Administrative Code (A.A.C.) R12-15-811(B).

PILOT HOLE DRILLING AND LITHOLOGIC LOG

After installation of the surface casing, a pilot hole is drilled to the anticipated total depth of the well in order to accommodate geophysical well logging and the collection of depth-specific (zonal) groundwater samples before reaming the well to the final diameter. A detailed lithologic log of the drilled cuttings is prepared to document the subsurface geologic conditions. Representative samples from each interval are preserved in chip trays for archival purposes. If an exploratory boring analysis has already been performed at the well site, the well may be drilled to its final diameter in one pass and geophysical well logging and zonal groundwater sampling will not be performed.

GEOPHYSICAL WELL LOGGING

After completion of the pilot hole drilling, geophysical logging is conducted in the borehole. The geophysical logging suite typically includes: caliper, natural gamma-ray, electric (resistivity and spontaneous potential), laterolog 3 (guard), and sonic logs. Geophysical logs provide useful information relating to the subsurface that cannot be readily determined from drilled cuttings. After the geophysical logging of the borehole, depth-specific (zonal) groundwater samples can be collected, if groundwater quality at certain depths is unknown and/or of concern.

ZONAL SAMPLING METHOD

After the drilling and geophysical logging of the borehole, zonal (depth-specific) groundwater samples are collected at selected depths. The purpose of zonal groundwater sampling is to evaluate selected horizons of the aquifer that may contain elevated contaminant concentrations. The zonal groundwater samples are collected in such a manner as to be representative of a discrete interval of the borehole. This enables Clear Creek Associates to develop a final well design that will reduce the potential for poor quality groundwater being pumped from the completed well. The general method for collection of the zonal groundwater samples in pilot holes is:

1. The pilot borehole is filled with pea gravel to within 5 feet of the bottom of the interval to be sampled.
2. The portion of the borehole immediately beneath the interval to be sampled is sealed with approximately 5 feet of bentonite.
3. A minimum 5½-inch inside diameter steel eductor pipe is installed to the sample depth. The eductor pipe is capped at its base, and is perforated in the bottom 20 feet.
4. An envelope of clean pea gravel is then installed around the perforated portion of the eductor pipe, and the gravel envelope is capped with another 5-foot layer of bentonite. The bentonite annular seals and pea gravel filter pack surrounding the eductor pipe effectively constitute a temporary "well," which will receive groundwater only from a discrete interval of the borehole.
5. Groundwater is purged from the sample interval of the borehole by airlifting for approximately 12 hours to evacuate introduced water and drilling fluid from the borehole, so that a representative groundwater sample can be obtained.

After the sample collection, the eductor pipe is pulled up to the next sampling interval, and steps 1 through 5 are repeated.

PILOT HOLE REAMING

Larger-diameter wells are often drilled in two passes in order to maintain plumbness and alignment of the boring, and to accommodate pilot hole analyses. After the completion of

drilling and testing of the pilot hole, the pilot hole is reamed (hole diameter enlarged) prior to the installation of the well screen and casing. A caliper log, which provides a measurement of the borehole diameter, is typically conducted in the drilled borehole and enables Clear Creek Associates to calculate specific volumes of the annulus to be filled with filter pack and annular seal materials. Changes in the borehole diameter commonly occur due to formation washouts (enlarged hole diameter) or swelling of natural clays in the formation (decreased hole diameter).

WELL INSTALLATION METHOD

During the installation of the well casing, the drilling fluid level within the borehole is maintained full to the ground surface. The well casing is centered in the hole to the extent possible during installation, and casing centralizers are secured to the casing and screen at intervals of approximately 40 feet. The well casing and well screen are hung in suspension until the filter pack and cement grout seal are installed.

WELL DEVELOPMENT METHOD

After the installation of the well is complete, the well is developed to repair borehole damage, to remove drilling fluids, and to settle the filter pack in the well. Damage to the formation adjacent to the well typically occurs during drilling, as the sediment is pulverized and smeared across the face of the borehole. Well development is the process of removing fine-grained sediment from the borehole wall and filter pack to increase the porosity and permeability of the material surrounding the screened interval of the well. The well is developed by airlifting groundwater from the well, while simultaneously swabbing the screened interval with a 20-foot double-flanged perforated tool between two swab disks. The swabbing tool is reciprocated in the well screen, which breaks down the fine-grained smear on the borehole wall and surrounding formation. The fine-grained sediment is then pulled through the perforations between the swab disks and removed from the well by airlifting.

The screened interval of the well is developed from the bottom of the screen to the top, in approximately 20-foot intervals. During well development operations, Clear Creek Associates personnel periodically monitor the discharge water produced by airlifting for sand content, pH,

temperature, and electrical conductivity. Once the groundwater parameters have stabilized in the interval undergoing development and the discharged water is relatively free of sand, the swabbing tool is raised to the next 20-foot interval and the process is repeated. Any sand that accumulates at the bottom of the well during development is removed by airlifting after the initial swabbing and airlifting operations are completed.

After swabbing and airlifting operations are complete, well development is resumed using a temporary pump. The pump is initially operated at a low rate, as sand content is monitored. Once the sand content drops below approximately 5 milliliters per liter (ml/l), the pump is surged (briefly turned off to allow the backflow of water into the well) two or three times in succession in order to pull fines loose from the filter pack and formation surrounding the well borehole. The pumping rate is increased and the procedure is repeated until the pumping rate exceeds the maximum rate anticipated during well testing activities. Pumping and surging is performed for a total of approximately 12 hours. The pump is then shut down and the water level in the well is allowed to recover to its static level. Well testing and evaluation activities can then begin and normally consist of a step-rate pumping test, a constant rate aquifer test, and a water level recovery test.

APPENDIX D

DAILY DRILLER REPORTS

[redacted]

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

10/13/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
39'	55											

TOTAL FT. NIGHT TOUR 5:30 P.M. A.M. INJURED ON THIS TOUR

WT. OF STRING LBS. CREW SOC. SEC. NO. NAME HRS. INITIAL YES OR NO

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

R Thompson
J McGill
A Harris

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
5:30	9:00			Filled pits Worked on Compr
9:00				Dig Starter Hole 36"

BIT RECORD: BIT NO. / SIZE

MUD RECORD: TIME / WEIGHT / PRESSURE GRADIENT / VISC.-SEC. / PV/YP / GELS / WL-CC'S / SOILDS %

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
55	70'	36"										

TOTAL 15' 99' FT. DAY TOUR 7:00 A.M. P.M. INJURED ON THIS TOUR

WT. OF STRING LBS. CREW SOC. SEC. NO. NAME HRS. INITIAL YES OR NO

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

V. Lira
A. Lopez

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
11:00	12:00			SAFETY
12:00	2:15			Drilling 36" Hole 55'-70'
2:15				Rachase Hole & Trip out
				to take 36" Reamer out
				take 17½ out from Reamer
				Trip in with 17½"
	3:30			Level Rig & work on Lights
3:30	12:00			Drilling 17½" 70'-99'
				Rachase Hole GOOD

BIT RECORD: BIT NO. / SIZE

MUD RECORD: TIME / WEIGHT / PRESSURE GRADIENT / VISC.-SEC. / PV/YP / GELS / WL-CC'S / SOILDS %

14029

[redacted]

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

10/14/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo-Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
99	240'											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12:00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mike Sell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
144	1/16°			

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
330	600			Drlg 17½ Pilot
600	645			Coon 144' Survey 1/16°
645	1045			Drlg
1045				TD 240'

BIT RECORD			
BIT NO.	1		
SIZE	17½		

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
70'	100'											

TOTAL FT. DAY TOUR A.M. P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. Lira			
			P. Lopez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1130	1200			Safety meeting
1200	100			Finish trip out B.H.A.
100	330			Rig up & start Logging well
330				Rig up B.H.A. welded
				studs on 17½" Bit to 24"
				Reamer & Have to weld
				on stand pipe 90°
	915			Trip in with 36" Reamer
915	1200			Reaming 36" 70-100'
				1 X 5 GAL EZMUD

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14030

4045 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

10/19/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
108	229											

TOTAL FT. NIGHT TOUR 12:00 P.M. 12:00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		R Thompson			
		J Mikesell			
		N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	12:00			Finished Reaming 2'
12:00	2:30			changed Trailers Made
				Conn
2:30	3:00			Drlg 36"
3:00	3:30			unplugging Bit
3:30				Drlg 36"

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
229												

TOTAL FT. DAY TOUR 12:00 Pm A.M. 12:00 Am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		U. Lira			
		D. Lopez			
		D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	12:30			REAMING 17" to 36" 229'-233.90'
12:30	1:00			SAFETY MEETING & CONN
1:00	1:30			REAMING 36" 233.90 to 240'
1:30	4:30			CIRCULATE & CONDITION MUD
4:30				TRIP OUT B.H.A. TAKE
				17½" BIT APART FROM DA
				RIG UP RUN 228'
				SET ON TOP OF SURFACE CASING
				RIG UP START PICKING UP
				28" CASING

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14031

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

10/16/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD / REEL NO.
Palo Verde			

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thomason			
			J Mikatell			
			N Harris			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	7:30			Setting 28" Casing & landed
				240'
7:30	8:00			Getting Ready For Cement
8:00	8:15			Waiting For Cement
8:15	9:00			Cement
9:00	12:00			Cleaning up

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 12:00 A.M. 12:00 P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. Lira			
			D. Lopez			
			D. Ramirez			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00				Work on Gravel pump &
	2:00			Get Ready to Pump H/plug
2:00				Pumping Hole plug From
				203' up to 140'
	12:00			198' sks Hole plug

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14032

Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

10/17/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD / REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			T Mikesell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	6:30			Pumping Hole Plug 92'
6:30	10:00			Get Ready For Cement
10:00	10:45			Cementing
10:45	12:00			Cleaning up

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
203	212											

TOTAL FT. DAY TOUR 12:00 pm A.M. 12:00 am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. LIRA			
			D. Lopez			
			D. RAMIREZ			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00				SAFETY MEETING & CLEAN
				PICKED UP TOOLS & EQUIP
				HOSES & WENT TO YARD
				TO PICKED UP REAMERS
				WAIT TO CEMENT TO SET
				RIG UP B.H.A. WELDED
				STRAPS ON BIT REAMER
	10:30			TRIP IN 26" 24" + 17½ BIT
10:30	12:00			DRILLING 26" DRILLING
				CEMENT out 203-212

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14033

Ph. (559) 834-1551 Fax (559) 834-5156

10/18/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
212'	240											

TOTAL FT. NIGHT TOUR 12:00 P.M. 12:00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			T Mikesell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	12:00			Safety Meeting
12:00	8:00			Drlg 12½" Drlg out Cement
8:00	12:00			T.O.H

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
239'	325											

TOTAL FT. DAY TOUR 12:00 PM A.M. 12:00 AM P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. Lira			
			D. Lopez			
			D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
317	1/3°			

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00				Safety Meeting
				Clean & Trip in with
	2:00			17½" & Check Equip oil
2:00	4:30			Clean cement out of pit
4:30				Drilling 17½" pilot 239'-325'
				145' Air lines
				3 sks of S/Bicarbonate

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14034

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10/19/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
325	506											

TOTAL FT. NIGHT TOUR 12:00 P.M. 12:00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		R Thompson			
		J M. Kelsell			
		N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
446	1/8°			

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	5:15			Drlg 17½ Pilot
5:15	5:45			Comm 446' Survey 1/8°
5:45	12:00			Drlg 17½
				Loosing circulation at 487'

BIT RECORD		
BIT NO.	1	40'
SIZE	17½	

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
506	617											

TOTAL FT. DAY TOUR 12:00 P.M. 12:00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		V. Lira			
		P. Lopez			
		P. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
576	1/8°			

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	12:30			SAFETY meeting & work on table Drive Line
12:30	6:15			Drilling 17½" pilot 506-576'
6:15	7:00			Comm. Survey 1/8°
7:00	12:00			Drilling 17½" 576'-617'

BIT RECORD		
BIT NO.		
SIZE		

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14035

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10/20/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD / REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
617	689											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mikesell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200				Safety Meeting
				Drlg 17½ Pilot
				Still Losing Circulation

BIT RECORD		
BIT NO.	1	40'
SIZE	17½	Mill

MUD RECORD		
TIME	1100	
WEIGHT	88	
PRESSURE GRADIENT		
VISC.-SEC.	26	
PV/YP	/	/ /
GELS	/	/ /
WL-CC'S		
SOILDS %	8	

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
689	730											

TOTAL FT. DAY TOUR 12.00 pm A.M. 12.00 Am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. Lira			
			D. Lopez			
			D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200	230			SAFETY MEETING
				DRILLING 17½" 689-707'
230				Circulate trip out to
				CHANGE BIT & trip in
				WITH 17½" Button Bit
	900			Reclase Hole 661-707'
900	1200			DRILLING 17½" 707-730

BIT RECORD		
BIT NO.		
SIZE		

MUD RECORD		
TIME	100	1000
WEIGHT	8.3	8.3
PRESSURE GRADIENT		
VISC.-SEC.	26	26
PV/YP	/	/ /
GELS	/	/ /
WL-CC'S		
SOILDS %	0	0

14036

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10/21/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
230	801											

TOTAL	FT.	NIGHT TOUR 12.00	P.M. 12.00	A.M.	INJURED ON THIS TOUR

WT. OF STRING	LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
				R Thompson			
				T Mikesell			
				N Harris			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
	250	Gulls Eye			

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200	100			Dlg 17½ Pilot
100	200			Conn Survey Bullseye 750'

BIT RECORD			
BIT NO.	2	207	
SIZE	17½ Button		

MUD RECORD			
TIME	1200	600	1100
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
801	851											

TOTAL	FT.	DAY TOUR 1200 PM	A.M. 1200 AM	P.M.	INJURED ON THIS TOUR

WT. OF STRING	LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
				U. Lira			
				D. Lopez			
				P. Ramirez			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12	815			Drilling 17½" Pilot 801-837'
				Hard & Rough 15 min
815	830			Conn check oil
830				Drilling 17½" 837' - 851

BIT RECORD			
BIT NO.	2	207	
SIZE	17½ Button		

MUD RECORD			
TIME	1200	500	1000
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

14037

[redacted]

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10/22/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Kabuverde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
851	909											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mikesell			
			N Harris			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
	881	1/16°			

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	4.00			Drlg 17½ Pilot
4.00	6.00			Condi + Survey 1/16° 881'
6.00	12.00			Drlg 17½

BIT RECORD			
BIT NO.	1	707	
SIZE	17½ Rutton		
MUD RECORD			
TIME	12.00	6.00	11.00
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
909	977											

TOTAL FT. DAY TOUR 12.00 pm A.M. 12.00 Am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. Lira			
			D. Lopez			
			P. Ramirez			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	1.00			Drilling 17½" 909' - 924'
1.00	1.30			Work on swivel & conn.
				Check oil
1.30	9.00			Drilling 17½" 924' - 968'
9.00	9.15			Conn
9.15	12.00			Drilling 17½" 968' - 977'

BIT RECORD			
BIT NO.	1	707	
SIZE	17½ Buttn		
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14038

4540 E. Lincoln, Fresno, CA 93725
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10/23/07

FIELD OR/DIST.	COUNTY	STATE	WIRE LINE RECORD / REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
977	1073											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thomason			
			J Mikesell			
			M Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
1010	1/8°			

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	2.30			Drlg 17½ Pilot
2.30	3.45			Conn Survey ½° 1010'
3.45	12.00			Drlg 17½

BIT RECORD		
BIT NO.	1	707
SIZE	17½	Button

MUD RECORD			
TIME	12.00	6.00	11.00
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
1073	1102											

TOTAL FT. DAY TOUR 12.00 PM A.M. 12.00 AM P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. LIRA			
			P. LOPEZ			
			P. RAMIREZ			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
				SAFETY MEETING
12.00	3.30			Drilling 17½" 1073'-1095'
3.30	4.00			Conn & Check oil
4.00	5.00			Drilling 17½" 1095'-1102'
5.00	12.00			Change Bolts on Drive
				Line & Circulate &
				Trip out to change
				Bit & change Bit &
				Start trip in Hole

BIT RECORD		
BIT NO.		
SIZE		

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14039

[redacted]

4545 E. Lincoln, Fresno, CA 93725
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10/24/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD / REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
1102	1144				50/60	18K						

TOTAL ~~[illegible]~~ FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING 80K LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		R Thompson			
		J Mikesell			
		N Harris			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12@	6:45			T.I.H
6:45				Drlg 17"

BIT RECORD		
BIT NO.	2	1102'
SIZE	17"	Button

MUD RECORD			
TIME	7:30	10:00	
WEIGHT	8.3	8.3	
PRESSURE GRADIENT			
VISC.-SEC.	26	25	
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
1144	1219				40/50	10/15K						

TOTAL FT. DAY TOUR 12:00 PM A.M. 12:00 AM P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		N. LIRA			
		D. LOPEZ			
		D. RAMIREZ			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
	1180	1/16°			

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
				SAFETY MEETING
12:00	4:45			Drilling 17" Pilot 1144' - 1180'
4:45	5:15			CONN & SURVEY 1/16 check oil
5:15	12:00			Drilling 17" 1180' - 1219'

BIT RECORD		
BIT NO.	2	1102
SIZE	17"	Button

MUD RECORD			
TIME	12:00	5:00	10:00
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

14040

... E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

10/25/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
1219'	1310				40/50	18K						

TOTAL FT. NIGHT TOUR 12:00 P.M. 12:00 A.M. INJURED ON THIS TOUR

WT. OF STRING 90K LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R. Thompson			
			J. Mikesell			
			M. Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
1309	1/4°			

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	10:15			Drlg 17"
10:15	11:15			Conn + Survey 1/4° 1309'
11:15	12:00			Drlg 17"

BIT RECORD			
BIT NO.	2	1102	
SIZE	17"	Button	

MUD RECORD			
TIME	12:00	6:00	10:00
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	25	25	25
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	∅	∅	∅

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
1310'	1360	T.D.			35/50	10/15 K						

TOTAL FT. DAY TOUR 12:00 A.M. P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. Lira			
			D. Lopez			
			D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	7:00			DRILLING 17" Pilot 1310'-1352'
7:00	7:15			CONN.
7:15	9:00			DRILLING 17" 1352'-1360' T.D.
9:00	11:00			CLEAN PITS & CIRCULATE
11:00	12:00			START TRIP OUT OF HOLE

BIT RECORD			
BIT NO.	2	1102	
SIZE	17"	Button	

MUD RECORD			
TIME	12:00	6:00	9:00
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	∅	∅	∅

14041

resno, CA 93725
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10 26 07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mitsell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00		4.30		T.O.H
4.30	6.30			Waiting For Logger
6.30	7.00			Rigging up For logger
7.00				Logging Well

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 12.00 Pm A.M. 12.00 Am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. LIRA			
			D. LOPEZ			
			D. RAMIREZ			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	1.00			SAFETY MEETING
				FINISH LOGGING
				WORK ON RIG & COMP
				KEEP HOLE FULL OF WATER
				CHANGE OIL ON COMP
				CHANGE AIR FILTERS ON
				COMP & RIG
	1.00			SLIP DRL & SLIP T.L.

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14042

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10-29-07 07-137

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
PALO VERDE	MARICOPA	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR P.M. A.M. INJURED ON THIS TOUR

WT. OF STRING LBS. CREW SOC. SEC. NO. NAME HRS. INITIAL YES OR NO

DEVIATION RECORD: DEPTH | DEV. | DIR. | TVD | HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES

BIT RECORD: BIT NO. / SIZE

MUD RECORD: TIME / WEIGHT / PRESSURE GRADIENT / VISC.-SEC. / PV/YP / GELS / WL-CC'S / SOILDS %

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
240	288				40	3/5K						

TOTAL FT. DAY TOUR 1200 PM A.M. 1200 AM P.M. INJURED ON THIS TOUR

WT. OF STRING LBS. CREW SOC. SEC. NO. NAME HRS. INITIAL YES OR NO

DEVIATION RECORD: DEPTH | DEV. | DIR. | TVD | HORZ. DISP.

V. LIRA
D. LOPEZ
D. RAMIREZ

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200				SAFETY MEETING
				RIG UP B.H.A. & WELDED
				STRAPS ON 17" BIT to 26" REAMER
				TRIP IN TO 240' - ADD AIR LINE
				CHECK EQUIP.
	400			
400				REAMING 26"
				HELP DAVID to get DC TRAILER

BIT RECORD: BIT NO. 1 / 240 — SIZE 26" / 17 MILL TEETH

MUD RECORD: TIME 500 / 1000 — WEIGHT 88 / 88 — PRESSURE GRADIENT — VISC.-SEC. 26 / 26 — PV/YP — GELS — WL-CC'S — SOILDS % 0 / 0

14043

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10/30/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
283	441											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12:00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mikesell			
			A Harris			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	12:00			Reaming 26"

BIT RECORD		
BIT NO. 1	240	
SIZE 26"		

MUD RECORD			
TIME	12:00	6:00	11:00
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	25	25	25
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
441	509											

TOTAL FT. DAY TOUR 12:00 PM A.M. 12:00 AM P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. LIRA			
			D. LOPEZ			
			D. RAMIREZ			

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
				STARTED MORNING
12:00	1:30			REAMING 26" 441' - 451'
1:30	2:00			CONN. CHECK OIL
2:00	5:15			REAMING 26" 451' - 471'
5:15	6:00			WORK ON CONN
6:00	9:00			REAMING 26" 471' - 494'
9:00	9:15			CONN
9:15	12:00			REAMING 26" 494' - 509'
				REAMING ROUGH FORMAT

BIT RECORD		
BIT NO. 1	240	
SIZE 26"	17½"	

MUD RECORD			
TIME	12:00	5:00	10:30
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

14044

. 1551 Fax (559) 834-5156

10/31/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
509	572											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mitchell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	7.30			Reaming 26" 572'
7.30	8.00			Circulate
8.00	10.00			T.O. To D.C.

BIT RECORD		
BIT NO.		
SIZE		

MUD RECORD		
TIME	12.00	6.00
WEIGHT	8.3	8.3
PRESSURE GRADIENT		
VISC.-SEC.	25	25
PV/YP	/	/
GELS	/	/
WL-CC'S		
SOILDS %	0	0

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 1.00 A.M. 1.00 P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. Lira			
			D. Lopez			
			R. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	3.30			WAIT ON DC TRAILER &
				DC ELEVATORS
3.30				FINISH TRIP OUT
				TAKE BIT & REAMER APART
				RECEIVE LOAD OF CASING
				RIG UP B.H.A. START
	12.00			TRIP IN

BIT RECORD		
BIT NO.		
SIZE		

MUD RECORD		
TIME		
WEIGHT		
PRESSURE GRADIENT		
VISC.-SEC.		
PV/YP	/	/
GELS	/	/
WL-CC'S		
SOILDS %		

14045

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11/1/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
572'	657				30/35	5K						

TOTAL	FT.	NIGHT TOUR 12.00	P.M. 12.00	A.M.	INJURED ON THIS TOUR

WT. OF STRING 55K LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mikesell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
Rig 2:30				T.I.H + Air line
2:30	12 am			Reaming 24"

BIT RECORD			
BIT NO.	1	572'	
SIZE	24"		

MUD RECORD			
TIME		6.00	12.00
WEIGHT		8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	25	25	25
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %		2	2

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
657	701				30/40	3/5	K					

TOTAL	FT.	DAY TOUR 12.00	A.M. 12.00 Am	P.M.	INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. Lira			
			R. Lopez			
			D. Pamplec			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
				Safety meeting
12:00	1:30			Reaming 24" 657 - 665'
1:30	2:00			Conn check oil
2:00	3:15			Reaming 665' - 671'
3:15	6:30			Wait on oil for comp.
6:30	12:00			Reaming 24" 671 - 701

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

14046

Lincoln, Fresno, CA 937
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11 2 07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

SIZE	NO LINES	FT. SLIPPED
FT. CUT OFF	PRESENT LENGTH	
TON MI. OR TRIPS SINCE LAST CUT		
CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR.,D RM.,R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
708	801											

TOTAL FT. NIGHT TOUR 12.00 P.M. 1200 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J McKesell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	8.30			Reaming 24"
8.30	10.00			Emergency Shut Down
				Palo Verde
10.00				Drlg 24"

BIT RECORD			
BIT NO.	1	5 72	
SIZE	24"		

MUD RECORD			
TIME	1200	600	1200
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	25	25	25
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR.,D RM.,R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
801	852				20/30	30/5K						

TOTAL FT. DAY TOUR 1200 Pm A.M. 1200 Am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. Lira			
			R. Ramirez			
			R. Lopez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1450	930			REAMING 24" 801 — 840'.
				ROUGH & LEYERS
930	945			CONN. & CHECK oil
945	1200			REAMING 24' 840 - 852'

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME	200	600	1100
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

14047

[redacted]

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/3/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Pinal	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
852	900											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R. Thompson			
			J. Mikesell			
			N. Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200	3.00			Drlg 24"
3.00	845			Working on Compr Went To Yard To Get Part
845	915			Connn 883'
915				Reaming 24"

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME	12.00		11.00
WEIGHT	8.3		8.3
PRESSURE GRADIENT			
VISC.-SEC.	25		25
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0		0

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
900	992											

TOTAL FT. DAY TOUR 12.00 A.M. 12.00 P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. Lira			
			R. Lopez			
			R. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200	1230			Work on Comp.
1230	300			Reaming 24" 900' - 927'
300	315			Conn. & check oil
315	900			Reaming 24" 927' - 970'
900	915			Conn
915	1200			Reaming 24" 970' - 992'

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME	1200	500	1100
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	2	2	2

14048

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/4/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
992	1052											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mikesell			
			N Herrin			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200	1245			Reaming 24"
1245	330			Replacing 1/0 Kes to Drill line
330	530			Reaming 24"
530	745			unplugging Bit
745	830			Reaming
830	845			Tightening Bolts on Pilot Reaming
845	1200			Reaming 24"

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME	1200	600	11.00
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	25		25
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0		0

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM
1052	1141											

TOTAL FT. DAY TOUR 12.00 P.M. A.M. 12.00 A.M. P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. Lira			
			D. Lopez			
			D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200	1215			REAMING 24" 1052' - 1055'
1215	1245			CONN & WORK ON AIR LINE check oil
1245	500			REAMING 24" 1055 - 1098'
500	515			CONN
515	930			REAMING 24" 1098' - 1141'
930	945			CONN
945	930			REAMING 24" 1141' -

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME	100	600	1000
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

14049

Ph. (559) 834-1551 Fax (559) 834-5156

11/5/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

SIZE	NO LINES	FT. SLIPPED
FT. CUT OFF	PRESENT LENGTH	
TON MI. OR TRIPS SINCE LAST CUT		
CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
1144	1226											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J M K Bell			
			V Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12 00	12 00			Reaming 24"
				Unloading Gravel

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME	12 00	6 00	11 00
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	25	25	25
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
1226	1292											

TOTAL FT. DAY TOUR 12 00 PM A.M. 12 00 AM P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. Lira			
			D. Lopez			
			D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12 00	12 00			REAMING 24"
				WORK ON SAND & WORK ON
				LIGHT PLANT AT WENT OUT
				HOOK UP PALO VERDE LIGHTS
				PLANTS

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME	1 00	6 00	11 00
WEIGHT	8.3	8.3	8.3
PRESSURE GRADIENT			
VISC.-SEC.	26	26	26
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	0	0	0

14050

ZIM INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11 / 6 / 07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

SIZE	NO LINES	FT. SLIPPED

FT. CUT OFF	PRESENT LENGTH

TON MI. OR TRIPS SINCE LAST CUT

CUMLATIVE TON MI. OR TRIPS

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM
1292	1325											

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		R Thompson			
		J Mikesell			
		N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	5.45			Reaming 24"
5.45	8.00			Circulating
8.00	12.00			T.O.H up to 535

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME	12.00	6.00	
WEIGHT	8.3	8.7	
PRESSURE GRADIENT			
VISC.-SEC.	25	25	
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	~~8~~	~~8~~	

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 12.00 pm A.M. 12.00 Am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		V. Lira			
		P. Lopez			
		D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	12.00			Went to Davis Rig to
				Get car trailer & take
				ALL reamers and fold
				Back to yard
				Clean Dog House

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13851

ZIM INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11-7-07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
PALO VERDE	MARICOPA	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL	FT.	NIGHT TOUR	P.M.	A.M.	INJURED ON THIS TOUR
WT. OF STRING	LBS.	CREW	SOC. SEC. NO.	NAME	HRS. / INITIAL / YES OR NO

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL	FT.	DAY TOUR 12⁰⁰ P.M.	A.M. 12⁰⁰ AM	P.M.	INJURED ON THIS TOUR
WT. OF STRING	LBS.	CREW	SOC. SEC. NO.	NAME	HRS. / INITIAL / YES OR NO
				U. LIRA	
				P. LOPEZ	
				P. RAMIREZ	

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12⁰⁰				Get all joint of trimmie
				Ready & work on Back Hoe
				Get Ready & trip in to 1312'
	730			ADD Air Line & check equip
730	930			Circulate & clean pits
930	12⁰⁰			trip out

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13853

11/8/07

COUNTY	STATE	WIRE LINE RECORD REEL NO.
Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mikesell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	5:30			Finished T.O.H
5:30	6:00			Waiting on Casing
6:00	9:00			logging well + Unloading Casing
9:00	10:30			Get Ready For Trimmie pipe
10:30				Running IN Trimmie

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 12:00 pm A.M. 12:00 am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. LIRA			
			P. LOPEZ			
			P. RAMIREZ			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00				FINISH RUNNING TRIMMIE 1261'
				PIG UP TO RUN 16" CASING
	1:00			UNLOAD 13 DALETS OF Hole plug
1:00	12:00			RUNNING 16" CASING

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13854

ZIM INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/9/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

SIZE	NO LINES	FT. SLIPPED

FT. CUT OFF	PRESENT LENGTH

TON MI. OR TRIPS SINCE LAST CUT

CUMLATIVE TON MI. OR TRIPS

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12:00 P.M. 12:00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		R Thompson			
		T Mikell			
		J Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	12:00			Setting 16" + 20" Casing

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 12:00 PM A.M. 12:00 AM P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		V. Lira			
		R. Lopez			
		R. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	1:30			FINISH setting 16" + 20" CASING
1:30				LANDING CASING & CLEAN
				RIG & CUT CASING & GET
				TABLE BACK IN RIG & RIG
				UP to TRIP IN 5" & FIX
				SWAB to 15"
				TRIP IN 15" SWAB to 1283'
	12:00			Kelly & ADD AIR LINE

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13855

ZIM INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/10/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD	REEL NO.
Palo Verde	Maricopa	AZ		

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			K Thompson			
			J Mikesell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	6.00			Finished in Airline
				Circulating Hooking up
				Gravel pump pulled up
				Trimmin pipe Above Table
6.00				Gravel packing up to 1189'
				Swabbed up to 1190 to 1242'
				Gravel packing up to 1148
				12 Bags Gravel

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT	Fell 1192'		
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 12.00 pm A.M. 12.00 Am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. LIRA			
			P. LOPEZ			
			P. RAMIREZ			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00				GRAVEL PACK 1148'- 1111'
				GRAVEL PACK 1111'- 1020'
				SWABBING 1242'- 1033'
				GRAVEL PACK 1028'- 921'
				SWABBING 1033'- 930'
				GRAVEL PACK 926'- 763'
				SWABBING 930'- 870'
				PULL SWAB to 784'
				GRAVEL PACK 765'- 732'
				30 BAGS OF GRAVEL

BIT RECORD			
BIT NO.			
SIZE	Fell 1028'		
MUD RECORD			
TIME	Fell 926'		
WEIGHT			
PRESSURE GRADIENT	Fell 765'		
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13856

ZIM INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/11/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		R Thompson			
		J Mikesell			
		N Harris			

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12~~00~~	1200			Gravel packing up to 670'
				Swabbed From 788' up to 704'
				Gravel packing up to 573'
				Dry swabbing 60' to 1290'
				Dry swabbing up to 704'
				Trimmie pipe 5-38

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 1200 PM A.M. 1200 AM P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
		U. LIRA			
		D. LOPEZ			
		D. RAMIREZ			

TIME LOG FROM	TIME LOG TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200				FINISH DRY SWABBING 704'-690'
				GRAVEL AT 579' & GRAVEL
				PACK UP TO 570'
				GET READY TO SET SEAL
				DUMPING SEAL 570' UP TO
	1200			391' 480 SKS OF Hole PLUG
				TRIMMIE PIPE AT 313'
				CLEAN WORKING AREA
				480 SKS Hole PLUG
				SWAB AT 535'

BIT RECORD			
BIT NO.	690'		
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13857

ZIM INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11-12-07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R. Tomson			
			M. Harris			
			J. McSell			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00				Pumping in Hole Plug
				288 Rods

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	S.P.M.	PUMP NO. LINER SIZE	S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 1200 A.M. 1200 P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. Lira			
			D. Lopez			
			D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200				SAFETY MEETING
				KEEPS PUMPING HOLE PLUG
				PUMPING ALL 3/8" IN HOLE
				UP TO 236' & 204 SKS
				PULL TRIMMIE OUT
				PUMPING 3/4" FROM 236' -
				UP TO 132' 2'41 SKS
	1200			CLEAN UP

BIT RECORD			
BIT NO.			
SIZE	302'		

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13858

Z INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/13/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	Ariz.	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12 00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mikesell			
			N Harris			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

Start 1922 T.P.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200	245			unloaded Timmie off
				Trailer
245	330			Swabbing 610' 623'
330	500			Swabbing 623' 664'
500	645			working on Compr
645	800			Swabbing 664' 704'
800	845			Con w working on Compr
845	900			Swabbing 704' 746'
900	1200			working on Compr
				Went to Yard to get
				Another Compr

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	7	1.25	Avg

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 1200 A.M. 1200 P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. Lira			
			D. Lopez			
			D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.
	Comp. work OK			

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
1200	1230			WORK ON COMP & SAFETY (W)
1230				AIR LIFT SWAB 704' - 746'
				NOT WORKING STOP & WELDING
	300			PLATE ON TOP OF FLOW PIPE
300	400			AIR LIFT SWAB 746' - 788'
400	500			TRIP IN TO 867
500	600			AIR LIFT SWAB 870' - 910'
600	700			" " " 910' - 951'
700	800			" " " 951' - 993'
800	900			" " " 993' - 1035'
900	1000			" " " 1035 1075'
1000	1100			1075' - 1116
1100	1200			1116' - 1157

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %	9	Hrs	

13859

ZIM INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/14/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mikesell			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	1.00			Swabbing 1157' 1199
1.00	2.00			Swabbing 1199' 1244'
2.00	6.00			Swabbing 1244' 1285'
6.00	8.00			Swabbing 1285' 1290
8.00				Swabbing 1199' 1244'

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 12.00 pm A.M. 12.00 Am P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. LIRA			
			D. LOPEZ			
			D. RAMIREZ			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12.00	5.15			Air Lift Swab 1159'-1199'
5.15	9.15			Air Lift Swab 1116'-1157
9.15	12.00			Air Lift Swab 1075'-1116'

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13860

ZIM INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/15/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT

SIZE	NO LINES	FT. SLIPPED
FT. CUT OFF	PRESENT LENGTH	
TON MI. OR TRIPS SINCE LAST CUT		
CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL	FT.	NIGHT TOUR 12.00	P.M. 12.00	A.M.	INJURED ON THIS TOUR

WT. OF STRING	LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
				R Thompson			
				T Mikesell			
				N Thompson			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12	2:15			1075' 1116'
2:15	6:15			Swabbing 1025' 1075'
6:15	10:15			Swabbing 993' 1025'
10:15				Swabbing 951' 993'

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL	FT.	DAY TOUR 12:00 PM	A.M. 12:00 AM	P.M.	INJURED ON THIS TOUR

WT. OF STRING	LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
				U. LIRA			
				D. LOPEZ			
				D. RAMIREZ			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	3:00			AIR LIFT & SWAB 951'-993'
3:00	7:30			AIR LIFT & SWAB 910'-951'
7:30	12:00			AIR LIFT & SWAB 870'-910'
				PWL 220' 2"

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13861

ZIM INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/16/07

FIELD OR DIST.	COUNTY	STATE	WIRE LINE RECORD REEL NO.
Palo Verde	Maricopa	AZ	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12 AM P.M. 12:00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			R Thompson			
			J Mikesell			
			N Thompson			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	4:30			Swabbing 746' 788'
4:30	8:30			Swabbing 704' 746'
8:30	12:00			Swabbing 664' 704'

BIT RECORD			
BIT NO.			
SIZE			
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 12:00 PM A.M. 12:00 AM P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			U. Lira			
			D. Lopez			
			D. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	1:30			Air Lift & Swab 664'-704'
1:30	5:45			Air Lift & Swab 623'-664'
5:45	9:45			Air Lift & Swab 610'-623'
9:45	12:00			Pull Air Line out
				trip out swab
				TOP OF SEAL 118'

BIT RECORD			
BIT NO.			
SIZE	Pull 215' .41 9/CW		
MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13862

[illegible] INDUSTRIES, INC.

4545 E. Lincoln, Fresno, CA 93725
Ph. (559) 834-1551 Fax (559) 834-5156

11/17/07

FIELD OR DIST.	COUNTY	STATE	WIRELINE RECORD REEL NO.
Palo Verde	Maricopa	Az	

LAST CASING TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	RKB. TO CSG. HD.	SET AT	SIZE	NO LINES	FT. SLIPPED
								FT. CUT OFF	PRESENT LENGTH	
								TON MI. OR TRIPS SINCE LAST CUT		
								CUMLATIVE TON MI. OR TRIPS		

NIGHT TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. NIGHT TOUR 12.00 P.M. 12.00 A.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			L Thompson			
			J Mikell			
			N Thompson			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00	3:00			Finished T.I.H Cleaning Bottom

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

DAY TOUR

FOOTAGE FROM	FOOTAGE TO	DR..D RM..R CORE.C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM

TOTAL FT. DAY TOUR 12:00 PM A.M. 12:00 P.M. INJURED ON THIS TOUR

WT. OF STRING LBS.	CREW	SOC. SEC. NO.	NAME	HRS.	INITIAL	YES OR NO
			V. Lira			
			P. Lopez			
			P. Ramirez			

DEVIATION RECORD DEPTH	DEV.	DIR.	TVD	HORZ. DISP.

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATING IN SEQUENCE AND REMAKES
12:00				Clean Location &
				Clean In Side of 38" -
				28" Casing & Circulate
				On Bottom of Hole
				Secure Equip

BIT RECORD			
BIT NO.			
SIZE			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC.-SEC.			
PV/YP	/	/	/
GELS	/	/	/
WL-CC'S			
SOILDS %			

13863

United Metro Materials, Inc.
Dba Rinker Materials
701 N. 44th Street
PO Box 52140
Phoenix, AZ 85072-2140
(602) 220-5000 • (800) 535-2753
www.rinker.com

Rinker MATERIALS™

'07 OCT 2 AM 8:58

60794618

TO PLACE AN ORDER PLEASE CALL:

North Dispatch	South Dispatch	East Dispatch	West Dispatch	Central Dispatch	Aggregate and Asphalt Dispatch
(623) 582-1503	(800) 579-2044	(480) 362-1411	(623) 536-0174	(602) 262-1400	(602) 220-5530

Plant:	Begin Loading:	To Job:	Arrive Job:	Start Unload:	Finish Unload:	Leave Job:	Return Plant:
955/1955	943	1001	1036	1154			

Customer Code: 3084610
Customer Name: ZIM INDUSTRIES INC
Customer Job Number:
Order Code / Date: 6455 10/02/07

Project Code:
Project Name:
Project P.O. Number:
Order P.O. Number: PER BRAD

Ticket Date: 10/02/07
Delivery Address: 5801 S WINTERBERG RD
Map Page: 001
Map/Row/Column: PHXLX119

Delivery Instructions:
SOUTH ON WITERSBERG TO SALOME HWY, GO LEFT TO 367TH
THEN GO RIGHT AND FOLLOW TO WATER REC PLANT ** SS **

Dispatcher: srlemmon
Ticket Number: 95517550

Due On Job:	Slump:	Truck Number:	Driver Number:	Driver Name:	End Use:
10:30	8.00	10024101	195502	DOYLE, STEPHEN H	SLU UNASSIGNED

LOAD QUANTITY	CUMULATIVE QUANTITY	ORDERED QUANTITY	MATERIAL CODE	PRODUCTION DESCRIPTION	UOM	UNIT PRICE	AMOUNT
10.50	10.50	10.50	1332412	SLURRY 4000psi 15sk SAND	YD3		
10.50	10.50	1.00	1348825	SUMMERSET	D05		
1.00			1202749	ENVIRONMENTAL CHARGE			

☐ Cash ☐ Check ☐ Charge
Check # / Auth Code:
Signature of Driver Receiving Cash:
Cash Received:
Total COD Order Amount to Collect Without Standby Charges:

Comments:

WATER ADDED: _____ GAL YARDS IN DRUM: _____ WHEN ADDED.

_____ SIGNATURE

CURB LINE CROSSED AT OWNER'S/AGENT'S REQUEST:

_____ SIGNATURE

☐ LOAD WAS TESTED BY: _____

Notice: Our drivers will make every effort to place materials where the customer designates, but the Company assumes no responsibility for damages inside curb or property line. Customer agrees to the terms of sale and delivery and accepts concrete as is. Due to important factors which are out of our control after delivery, this Company will not accept any responsibility for the finished results. No credit for returned concrete. Buyers exceptions and claims shall be deemed waived unless made to us in writing within one business day after the receipt of materials.

SPECIAL TERMS: Any water added is at customers own risk. If water is added on job, concrete strength is no longer guaranteed. **WARNING:** Product may cause skin and/or eye irritation. **CAUTION:** Material may be hazardous to your safety and health. Please refer to the backside of this ticket for important safety handling information, and to the material safety data sheets for additional information.
RECEIVED BY:
X

INVOICE

PREV TRK: LOAD NUM: 1

United Metro Materials, Inc.
Dba Rinker Materials
701 N. 44th Street
PO Box 52140
Phoenix, AZ 85072-2140
(602) 220-5000 • (800) 535-2753
www.rinker.com

Rinker MATERIALS™

60794962

TO PLACE AN ORDER PLEASE CALL:

North Dispatch	South Dispatch	East Dispatch	West Dispatch	Central Dispatch	Aggregate and Asphalt Dispatch
(623) 582-1503	(800) 579-2044	(480) 362-1411	(623) 536-0174	(602) 262-1400	(602) 220-5530

Plant:	Begin Loading:	To Job:	Arrive Job:	Start Unload:	Finish Unload:	Leave Job:	Return Plant:
955/1955	0710	723	0808	0815	905		

Customer Code: 3084610
Customer Name: ZIM INDUSTRIES INC
Customer Job Number:
Order Code / Date: 6171 10/16/07
Project Code: 123904
Project Name: PALOVERDE
Project P.O. Number: 07137
Order P.O. Number: 07137
Ticket Date: 10/16/07
Delivery Address: 5801 S WINTERSBERG RD
Map Page: 001
Map/Row/Column: PHXLX119
Delivery Instructions: S OF I-10 ON WITERBERG EXIT TO SALOME HWY GO LEFT TO TO 367TH AVE ABD THEN GO RIGHT , FOLLOW TO WATER REC PLANT
Dispatcher: selemmon
Ticket Number: 95517886

Due On Job:	Slump:	Truck Number:	Driver Number:	Driver Name:	End Use:
08:00	9.00	10023840	195500	WARTHEN, WILLIAM P	FLL BED/FILL

LOAD QUANTITY	CUMULATIVE QUANTITY	ORDERED QUANTITY	MATERIAL CODE	PRODUCTION DESCRIPTION	UOM	UNIT PRICE	AMOUNT
9.00	9.00	9.00	1332412	SLURRY 4000psi 15sk SAND	YD3		
1.00			1202749	ENVIRONMENTAL CHARGE			

☐ Cash ☐ Check ☐ Charge — Check # / Auth Code:
Signature of Driver Receiving Cash:
Cash Received:
Total COD Order Amount to Collect Without Standby Charges:

Comments:

WATER ADDED: 40 GAL YARDS IN DRUM: 9.00 WHEN ADDED.

SIGNATURE

CURB LINE CROSSED AT OWNER'S/AGENT'S REQUEST:

SIGNATURE

☐ LOAD WAS TESTED BY:

Notice: Our drivers will make every effort to place materials where the customer designates, but the Company assumes no responsibility for damages inside curb or property line. Customer agrees to the terms of sale and delivery and accepts concrete as is. Due to important factors which are out of our control after delivery, this Company will not accept any responsibility for the finished results. No credit for returned concrete. Buyers exceptions and claims shall be deemed waived unless made to us in writing within one business day after the receipt of materials.

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RECEIVED BY:
X

INVOICE

PREV TRK: 9216-882-209

LOAD NUM: 1

United Metro Materials, Inc.
Dba Rinker Materials
701 N. 44th Street
PO Box 52140
Phoenix, AZ 85072-2140
(602) 220-5000 (800) 535-2753
www.rinker.com

Rinker MATERIALS™

'07 OCT 17 AM 9:02

60794994

TO PLACE AN ORDER PLEASE CALL:

North Dispatch	South Dispatch	East Dispatch	West Dispatch	Central Dispatch	Aggregate and Asphalt Dispatch
(623) 582-1503	(800) 579-2044	(480) 362-1411	(623) 536-0174	(602) 262-1400	(602) 220-5530

Plant:	Begin Loading:	To Job:	Arrive Job:	Start Unload:	Finish Unload:	Leave Job:	Return Plant:
955/1955	9:07	9:19	9:53	10:00	10:44		

Customer Code: 3084610
Customer Name: ZIM INDUSTRIES INC
Customer Job Number:
Order Code / Date: 6626 10/17/07
Project Code: 123304
Project Name: PALOVERDE
Project P.O. Number: 07137
Order P.O. Number: 07137
Ticket Date: 10/17/07
Delivery Address: 5801 S WINTERSBERG RD
Map Page: 001
Map/Row/Column: PHXLX119
Delivery Instructions: S OF I-10 ON WITERBERG EXIT TO SALOME HWY GO LEFT TO TO 367TH AVE ABD THEN GO RIGHT , FOLLOW TO WATER REC PLANT
Dispatcher: smlennon
Ticket Number: 95517918

Due On Job:	Slump:	Truck Number:	Driver Number:	Driver Name:	End Use:
09:50	9.00	10019633	195505	MEREDITH, JAMIE	FLL BED/FILL

LOAD QUANTITY	CUMULATIVE QUANTITY	ORDERED QUANTITY	MATERIAL CODE	PRODUCTION DESCRIPTION	UOM	UNIT PRICE	AMOUNT
8.00	8.00	8.00	1332412	SLURRY 4000psi 15sk SAND	YD3		
1.00			1202749	ENVIRONMENTAL CHARGE			

☐ Cash ☐ Check ☐ Charge — Check # / Auth Code:
Signature of Driver Receiving Cash:
Cash Received:
Total COD Order Amount to Collect Without Standby Charges:

Comments:

WATER ADDED: Ø GAL YARDS IN DRUM: _____ WHEN ADDED.

SIGNATURE

CURB LINE CROSSED AT OWNER'S/AGENT'S REQUEST:

SIGNATURE

☐ LOAD WAS TESTED BY: _____

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PO Box 52140
Phoenix, AZ 85072-2140
(602) 220-5000 • (800) 535-2753
www.rinker.com

Rinker MATERIALS™

60796822

TO PLACE AN ORDER PLEASE CALL:

North Dispatch	South Dispatch	East Dispatch	West Dispatch	Central Dispatch	Aggregate and Asphalt Dispatch
(623) 582-1503	(800) 579-2044	(480) 362-1411	(623) 536-0174	(602) 262-1400	(602) 220-5530

Plant:	Begin Loading:	To Job:	Arrive Job:	Start Unload:	Finish Unload:	Leave Job:	Return Plant:
955/1955	900	911	956	1002	1023		

Customer Code: 3084610
Customer Name: ZIM INDUSTRIES INC
Customer Job Number:
Order Code / Date: 6045 11/19/07

Project Code: 123904
Project Name: PALOVERDE
Project P.O. Number: 07137
Order P.O. Number: 07137

Ticket Date: 11/19/07
Delivery Address: 5801 S WINTERSBERG RD
Map Page: 001
Map/Row/Column: PHXLX119

Delivery Instructions:
S OF I-10 ON WITERBERG EXIT TO SALOME HWY GO LEFT TO
TO 367TH AVE ABD THEN GO RIGHT , FOLLOW TO WATER REC PLANT

Dispatcher: srlennon
Ticket Number: 95518731

Due On Job:	Slump:	Truck Number:	Driver Number:	Driver Name:	End Use:
10:00	9.00	10024128	195519	STRICKLAND JR, LONN	SLU FOUNDATION

LOAD QUANTITY	CUMULATIVE QUANTITY	ORDERED QUANTITY	MATERIAL CODE	PRODUCTION DESCRIPTION	UOM	UNIT PRICE	AMOUNT
4.00	4.00	4.00	1332412	SLURRY 4000psi 15sk SAND	YD3		
1.00			1202749	ENVIRONMENTAL CHARGE			
1.00			1359314	MINIMUM LOAD CHARGE			

☐ Cash ☐ Check ☐ Charge
Check # / Auth Code:
Signature of Driver Receiving Cash:
Cash Received:
Total COD Order Amount to Collect Without Standby Charges:

Comments:

WATER ADDED: _____ GAL YARDS IN DRUM: _____ WHEN ADDED.

SIGNATURE

CURB LINE CROSSED AT OWNER'S/AGENT'S REQUEST:

SIGNATURE

☐ LOAD WAS TESTED BY: _____

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PO Box 52140
Phoenix, AZ 85072-2140
(602) 220-5000 • (800) 535-2753
www.rinker.com

Rinker MATERIALS™

'07 NOV 20 AM 9:02

60796867

TO PLACE AN ORDER PLEASE CALL:

North Dispatch	South Dispatch	East Dispatch	West Dispatch	Central Dispatch	Aggregate and Asphalt Dispatch
(623) 582-1503	(800) 579-2044	(480) 362-1411	(623) 536-0174	(602) 262-1400	(602) 220-5530

Plant:	Begin Loading:	To Job:	Arrive Job:	Start Unload:	Finish Unload:	Leave Job:	Return Plant:
955/1955	0902	0916	0952	0958	1100		

Customer Code: 3064610
Customer Name: ZIM INDUSTRIES INC
Customer Job Number:
Order Code / Date: 6033 11/20/07
Project Code: 12390A
Project Name: PALOVERDE
Project P.O. Number: 07137
Order P.O. Number: 07137
Ticket Date: 11/20/07
Delivery Address: 5801 S WINTERSBERG RD
Map Page: 001
Map/Row/Column: PHXLX119
Delivery Instructions:
S OF I-10 ON WITERBERG EXIT TO SALOME HWY GO LEFT TO
TO 367TH AVE ABD THEN GO RIGHT , FOLLOW TO WATER REC PLANT
Dispatcher: srlemmon
Ticket Number: 95518776

Due On Job:	Slump:	Truck Number:	Driver Number:	Driver Name:	End Use:
10:00	0.00	10019638	195512	LOCKRIDGE, CHRIS L	SLU UNASSIGNED

LOAD QUANTITY	CUMULATIVE QUANTITY	ORDERED QUANTITY	MATERIAL CODE	PRODUCTION DESCRIPTION	UOM	UNIT PRICE	AMOUNT
6.50	6.50	6.50	1333055	SLURRY 21.14sk CEMENT/ASH/WT	YD3		
1.00			1202749	ENVIRONMENTAL CHARGE			

☐ Cash ☐ Check ☐ Charge — Check # / Auth Code:
Signature of Driver Receiving Cash:
Cash Received:
Total COD Order Amount to Collect Without Standby Charges:

Comments:

WATER ADDED: Ø GAL YARDS IN DRUM: _____ WHEN ADDED.

SIGNATURE

CURB LINE CROSSED AT OWNER'S/AGENT'S REQUEST:

SIGNATURE

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INVOICE

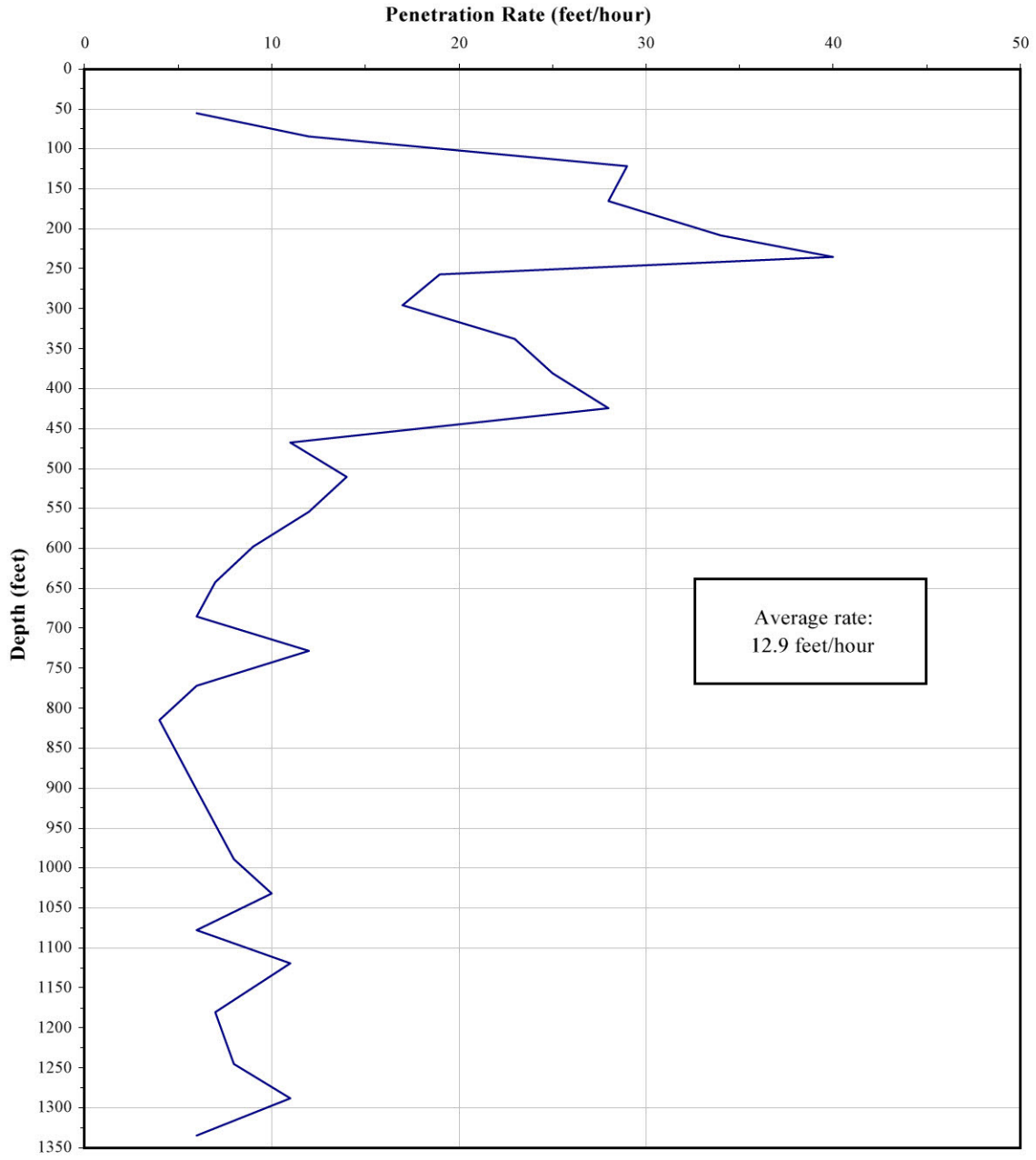
PREV TRK:

LOAD NUM: 1

APPENDIX E

PENETRATION RATE GRAPH AND LITHOLOGIC LOG

Penetration Rate
Production Well Charlie
Palo Verde Nuclear Generating Station
Wintersburg, Arizona



CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Project/Client Name: Charlie Well PVNGS	Location (Cadastral): B(1-6)34aab	Elevation (ft amsl)	Project No.: 040070
Drilling Co.: Zim	Location (NAD 83 GPS Latitude Longitude): N33°23'29.3" W112°51'16.8"	Date Started: 10-14-07	Date Finished: 10-26-07
Lithology Described By: GQ	Drilling Equipment: Challenger 360 / Drilling Method: Reverse circulation	ADWR Well Registration No.: 55-214659	
Total Depth: 1360' bls	Drilling Fluid: Water	* Indicates (based on visual estimates of volume):	
Bit Diameter: 17" and 17½" Button Bit	Conductor Casing (type; diameter; depth): LCS, 37¾" OD, 39' bls	■ Relative % fines (F < 0.06mm)	
Comments		□ Relative % sand (S > 0.06 < 2mm)	
* Clasification System:	**Modified Wentworth (AGI)**	▨ Relative % gravel (G > 2mm)	

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Surface Casing	0, 10, 20, 30			SAA = Same as above
Sand w/gravel: 100% sand, trace gravel. Sand ranges from c-f, predom f, SA-SR, int comp. Gravel ranges from 2-15mm, predom 3mm, SA, int comp. V.poorly sorted MIRXN	40	6		
SAA: except sand A-SR; gravel ranges from 4-20mm, predom 4, SA-SR, F and M	50, 60			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Sandy clay w/gravel: 80% clay, 20% sand, trace gravel. Clay color 7.5YR 4/4 Brown, soft, mod plast, mod stick. Sand from c-vf, predom fine, A-Rnd, FD. Gravel from 3-20mm, predom 5mm, VA-SA, FD. MIRxN. Poorly sorted	60	6		
Sandy silty clay w/gravel: 70% clay, 20% silt, 10% sand, trace gravel. Clay color 7.5YR 5/4 Brown, soft, mod plast, low stick. Sand from vc-vf, predom med, VA-SR, FD. Gravel from 2-25mm, predom 3mm, A-SR, MD. MORxN. Poorly sorted.	70			Conn @ 70'
SAA: except low plast. Sand VA-Rnd. Gravel from 2-22 mm	80	12		
SAA: except sand VA-SR. Gravel from 3-13mm, predom 4mm, FD.	90			
SAA: except gravel 3-20mm.	100			Conn @ 99'
SAA: except clay mod soft. Gravel from 2-12 mm, predom 3mm, SA-SR	110	29		
SAA: except gravel up to 10mm	120			
SAA	130			
	140			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Sandy silty clay: 70% clay, 20% silt, 10% sand. Clay color 7.5YR 5/4 Brown, mod firm, mod plast, low stick. Sand VC-vf, predom fine, R-SR, FD. MORXN. Poorly sorted	140	29		Deviation survey @ 144' = 1/16° Conn @ 144'
SAA	150			
SAA	160	28		
SAA: except sand c-vf	170			
SAA	180			
SAA	190			Conn @ 187'
SAA	200	34		
SAA	210			
	220			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Sandy silty clay: 70% clay, 20% silt, 10% sand. Clay color 7.5YR 5/4 Brown, mod firm, mod plast, low stick. Sand is vc-vf, predom fine, A-SR, FD. MORXN. Mod sorted	220	34		
SAA	230	40		Conn @ 230'
SAA: except 10% silt, 20% sand, trace gravel. Clay mod soft. Sand A-Rnd, MD. Gravel up to 10mm, predom 2mm, VA-SA, MD	240			Deviation survey @ 240' = 0°
SAA: except 80% clay, 10% silt, 10% sand. Clay high plast, mod stick. Sand is vf-med. Gravel up to 20mm	250	19		
SAA: except sand vf-c; gravel up to 15mm.	260			
SAA: except sand vf-vc. Gravel up to 20mm.	270			Conn @ 274'
SAA: except gravel up to 15mm.	280	17		
SAA: except sand is vf-vc. No gravels. Well sorted	290			
	300			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Sandy silty clay : 80% clay, 10% silt, 10% sand. Clay color 7.5 YR 5/4 Brown, mod soft, high plast, mod stick. Sand is vf-vc, predom fine, A-Rnd, MD. MORXN. Well sorted.	300			
		17		
Silty clay : 90% clay, 10% silt, trace sand. Clay color 7.5 YR 5/4 Brown, soft, high plast, mod stick. Sand is vf-med, predom vf, A-Rnd, MD. MORXN. V. well sorted.	310			Deviation survey @ 317' = 1/8° Conn @ 317'
SAA	320			
SAA: except clay is v. soft, low plast, mod stick	330			
		23		
Sandy silty clay : 80% clay, 10% silt, 10% sand. Clay color is 7.5 YR 5/4 Brown, mod soft, mod plast, mod stick Sand is vf-vc, predom vf, VA-SR, MD. MORXN. Well sorted	340			
SAA: except 70% clay, 20% sand, 10% silt. Clay high plast. Sand predom med.	350			
SAA: sand predom coarse	360			Conn @ 359'
		25		
SAA: except clay is soft	370			
	380			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Sandy silty clay: 60% clay, 10% silt, 30% sand. Clay color is 7.5YR 5/4 Brown, soft, high plast, mod stick. Sand is vf-vc, predom coarse, VA-SR, MD. MORXN. Well sorted.	380			
SAA	390	25		
SAA: except clay v.soft, mod plast, low stick.	400			Conn @ 403'
SAA: except 50% clay, 10% silt, 40% sand.	410			
Clayey sand: 70% sand, 25% clay, 5% silt. Sand is f-vc, predom coarse, A-Rnd, MD. Clay color is 7.5YR 5/4 Brown, v. soft, low plast, no stick. MORXN well sorted.	420	28		
SAA	430			
SAA: except 80% sand, 20% clay. Sand VA-Rnd.	440			Deviation survey @ 446' = 1/8° Conn @ 446'
SAA	450	11		
	460			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly clayey sand: 80% sand, 10% clay, 10% gravel. Sand is f-vc, predom coarse, VA-Rnd, MD. Clay is 7.5YR 5/4 Brown, v. soft, low plast, low stick. Gravel up to 8mm, predom 2mm, VA-SR, MD. MORXN. Well sorted.	460			
Gravelly sand: 80% sand, 20% gravel, trace clay. Sand is f-vc, predom coarse, VA-Rnd, MD. Gravel up to 25mm, predom 5mm, VA-SR, MD. MORXN. Well sorted.	470	11		
SAA: except gravels up to 20mm.	480			
SAA:	490			Conn @ 489'
SAA: except sand vf-vc, A-Rnd. Gravels up to 35mm, predom 6m, SA-SR; Clay mod soft, mod plast, low stick. MIRXN	500	14		
SAA: except sand SA-SR. Gravels up to 15mm, A-SR	510			
SAA: except sand A-Rnd. Gravels up to 20mm, predom 5mm, VA-SR. No clay.	520			
SAA: except sand A-SR.	530	12		Conn @ 532'
	540			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly sand: 80% sand, 20% gravel. Sand is vf-vc, predom fine, A-Rnd, MD. Gravels up to 20 mm, predom 6mm, SA-SR, MD. MIRXN. Well sorted.	540			
SAA: except gravels A-SA	550			
SAA: except sand SA-Rnd. Gravels predom 4mm, VA-Rnd.	560	12		
SAA: except sand A-SR. Gravels VA-SA.	570			Deviation survey @ 576' = 1/8° Conn @ 576'
SAA: except sand 70%, 30% gravel. Sand is med. Gravels up to 32mm, predom 8mm, SA.	580			
SAA: except 80% sand, 20% gravel. Sand predom vf. Gravels up to 20mm, predom 4mm, VA-SA.	590	9		
SAA: except sand is med, A-Rnd. Gravels up to 28mm, predom 5mm, A-SR	600			
SAA: gravels up to 22mm.	610			
	620			Conn @ 620'

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PUNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly sand: 80% sand, 20% gravel. Sand is vf-vc, predom med, SA-SR, MD. Gravels up to 20mm, predom 5mm, SA-Rnd, MD. MIRXN. Well sorted.	620			Conn @ 620'
SAA: except trace clay, color 7.5YR 5/4 (Brown), soft, low plast, no stick. Sand is A-Rnd. Gravels up to 15 mm, VA-SR.	630			
SAA: except sand is predom coarse. Gravels up to 30mm, predom 6mm.	640	7		
SAA: except gravels up to 20mm, VA-SA.	650			
SAA: except sand A-SR.	660			Conn @ 664'
SAA: except gravels up to 25mm, predom 7mm, A-SA	670			
SAA: except gravels up to 10mm, predom 5mm, VA-SA.	680	6		
SAA: except sand is SA-SR. Gravels up to 27mm, A-SA.	690			
	700			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly sand: 80% sand, 20% gravel. Sand is vf-vc, predom coarse, A-SR, MD. Gravels up to 20mm, predom 5mm, A-SA, MD. MIRXN. Well sorted	700	6		
				Conn @ 707'
SAA: except trace clay, color 10YR 5/4 Yellowish brown, soft, mod plast, low stick. Sand predom med. Gravels predom 6mm, A-SR.	710			
SAA: gravels predom 4mm.	720			
		12		
SAA: except sand is VA-SR. Gravels up to 28mm, VA-SA.	730			
SAA: except sand is A-Rnd. Gravels up to 25mm, predom 7mm.	740			
				Deviation survey @ 750' = 0°
SAA: except gravels up to 18mm, predom 4mm, A-SA.	750			Conn @ 750'
SAA: except gravels up to 20mm, predom 6mm, VA-SR. Clay color is 5YR 4/4 Reddish brown.	760	6		
SAA: except sand is A-SR. Gravels up to 15mm, VA-SA.	770			
	780			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly sand: 80% sand, 20% gravel. Sand is vf-vc, predom coarse, A-SR, MD. Gravels up to 13mm, predom 6mm, VA-SA, MD. MIRxN. Well sorted.	780	6		
SAA: except sand A-Rnd. Gravels up to 30mm, predom 5 mm.	790			Conn @ 793'
SAA: except sand is A-SR. Gravels predom 7mm.	800	4		
SAA: except sand VA-SR. Gravels up to 32mm, predom 7mm, VA-A	810			
SAA: except gravels up to 30, predom 10mm, VA-SA	820			
SAA: except sand VA-Rnd. Gravels up to 40mm.	830			Conn @ 837'
SAA: except sand A-SR. Gravels up to 20mm, predom 8mm, VA-A	840	6		
SAA: except trace clay, 5 yR 4/3 Reddish brown, v. soft, no plast, no stick. Sand A-Rnd. Gravels up to 30mm, predom 10mm, VA-SA. No rxn.	850			
	860			

CLEAR CREEK ASSOCIATES

Project No. 040070

Charlie Well
Well/Boring PVNGS
Page 12 of 18

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly Sand: 80% sand, 20% gravels, trace clay. Sand is vf-vc, predom coarse, VA-Rnd, MD. Gravels up to 40mm, predom 10mm, VA-SA, MD Clay 5YR 4/3 Reddish brown, v. soft, no plast, no stick. No rxn. Well sorted.	860			
SAA: except sand is A-Rnd, Gravels up to 24mm, predom 8mm. Clay 7.5YR 5/2 Brown, soft, low plast, no stick.	870	6		
SAA: except sand VA-Rnd. Gravels up to 30mm, predom 10mm. Clay 5YR 4/3 Reddish brown, v. soft, no plast, no stick.	880	X		Deviation survey @ 881' = 1/16° Conn @ 881'
SAA: except gravels up to 20mm, Clay 7.5YR 5/4 Brown.	890			
SAA: except No clay. Gravels up to 30mm, predom 8mm.	900	6		
SAA: except gravels up to 40mm, predom 6mm.	910			
SAA: except gravels up to 24mm, predom 10mm, VA-SR	920	X		Conn @ 924'
SAA: except gravels predom 8mm, VA-SA.	930	6		
	940			

CLEAR CREEK ASSOCIATES

Project No. D40070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Silty gravelly Sand: 80% sand, 10% gravel, 10% silt. Sand is vf-vc, predom med, VA-Rnd, MD. Gravels up to 18mm, predom 7mm, VA-SA, MD. Silt is 5YR 3/4 Dark Reddish Brown. No rxn. Well sorted.	940			
SAA: except gravels predom 9mm. Trace clay, 5YR 3/4 Dark Reddish Brown, soft, mod plast, low stick.	950	6		
SAA: except gravels up to 20mm.	960			
SAA: except gravels predom 8mm. No clay	970	X		Conn @ 968'
SAA: except gravels up to 24mm	980	8		
SAA: except gravels up to 22mm	990			
SAA: except gravels up to 20mm. MIRXN	1000			
SAA: except gravels up to 28mm.	1010	X		Deviation survey @1010' = 1/3° Conn @ 1010'
	1020	10		

CLEAR CREEK ASSOCIATES

Project No. 040070

Charlie Well
Well/Boring PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly Silty Sand: 80% sand, 10% gravels, 10% silt. Sand is vf-vc, predom med, VA-Rnd, MD. Gravels up to 25 mm, predom 7mm, VA-SA, MD. Silt is 5 YR 3/4 Dark Reddish Brown. MIRXN. Well sorted	1020			
SAA: except gravels up to 30mm, predom 6mm.	1030			
		10		
SAA: except gravels up to 20mm, predom 9mm, VA-SR. Trace clay, 7.5 YR 5/4 Brown, soft, mod plast, low stick.	1040			
SAA: except sand VA-SR. Gravels up to 23mm, predom 8mm, VA-SA	1050			Conn @ 1054'
Gravelly sand: 90% sand, 10% gravel, trace silt and clay. Sand is vf-vc, predom med, VA-SR, MD. Gravels up to 20mm, predom 9mm, VA-SA, MD. Silt and clay 5 YR 3/4 Dark Reddish Brown, soft, mod plast, low stick. MIRXN. Well sorted.	1060			
SAA: except sand VA-Rnd. Gravels up to 30mm, predom 5mm.	1070			
		6		
SAA: except no silt or clay. Gravels up to 26mm, predom 8mm, VA-A.	1080			
SAA: except 80% sand, 20% gravel. Gravels up to 25mm, predom 9mm.	1090			Conn @ 1095'
		6		
	1100			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly sand: 80% sand, 20% gravels. Sand is vf-vc, predom med, VA-Rnd, MD. Gravels up to 20mm, predom 9mm, VA-A, MD. MIRXN. Well sorted.	1100	6		Tripout @ 1102' and change bit from 17½" Button to 17" Button bit.
Gravelly sand w/fines: 80% sand, 10% gravel, 5% silt, 5% clay. Sand vf-vc, predom med, VA-Rnd, MD. Gravels up to 27mm, predom 7mm, VA-A, MD. Silt and clay 5YR 3/4 Dark Reddish Brown, soft, mod plast, low stick. MIRXN. Well sorted.	1110	11		
SAA: except sand VA-SR. Gravels up to 18mm, predom 9mm. Clay mod soft, low plast, low stick.	1120			
SAA: (Gravelly sand) except no fines. 70% sand, 30% gravel. Sand is f-vc, predom coarse. Gravels up to 27mm.	1130			
SAA: except gravels up to 32mm, predom 8mm. 60% sand, 40% gravel. Mod sorted	1140			Conn @ 1137'
SAA: except gravels up to 25mm, predom 9mm.	1150	7		
SAA: except 70% sand, 30% gravel. Gravels up to 24mm, predom 7mm. Well sorted	1160			
SAA: except 60% sand, 40% gravel. Gravels up to 20mm, predom 8mm. Mod sorted	1170			
	1180			Deviation survey @ 1180' = ½° Conn @ 1180'

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PVNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly sand: 70% sand, 30% gravel. Sand is f-vc, predom coarse, VA-Rnd, MD. Gravels up to 28 mm, predom 7mm, VA-A, MD. MIRXN. Well sorted.	1180			
SAA: except trace clay, 5YR 3/4 Dark Reddish Brown, soft, mod plast, low stick. Sand VA-SR. Gravels up to 23 mm, predom 9mm.	1190			
SAA: except no clay. Sand is VA-Rnd. Gravels up to 29mm, predom 8mm, VA-SA.	1200	7		
SAA: except trace clay, 5YR 3/4 Dark Reddish Brown, soft, mod plast, low stick. Sand VA-SR. Gravels up to 25mm	1210			
SAA: except 80% sand, 20% gravel. Gravels up to 20 mm, predom 7mm, VA-SR. Well sorted.	1220			Conn @ 1223'
SAA: except clay mod firm. Gravels up to 23 mm, predom 6mm, VA-SA.	1230			
SAA: except 60% sand, 40% gravel. Gravels up to 40mm, predom 10mm. Clay is soft. Mod sorted	1240	8		
SAA: except gravels up to 18mm.	1250			
	1260			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PUNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly sand: 60% sand, 40% gravel. Sand is f-vc, predom coarse, VA-SR, MD. Gravels up to 25mm, predom 8mm, VA-A. MIRXN. Mod sorted	1260	8		
				Conn @ 1267'
SAA: except 70% sand, 30% gravel. Gravels up to 38mm, predom 10mm. Trace clay, 5YR 3/4 Dark Reddish Brown, soft, mod plast, low stick. Well sorted	1270			
SAA: except no clay. Gravels up to 38mm.	1280	11		
SAA: except sand is VA-SA. Gravels up to 42mm. No rxn.	1290			
SAA: except gravels up to 30mm, predom 9mm. MIRXN. Presence of fine-grained sandstone.	1300			
				Deviation survey @ 1309' = 1/4°
SAA: except 60% sand, 40% gravels. Sand is predom VC, VA-Rnd. Gravels predom 10mm, VA-SR. Mod sorted.	1310			Conn @ 1309'
SAA: except gravels up to 34mm, predom 7mm. Presence of fine-grained sandstone in a 50/50 ratio w/mafics for both gravels and sand.	1320	6		
SAA: except sand is A-Rnd. Gravels up to 35mm, predom 8mm, VA-SA. 70% sand, 30% gravels. well sorted.	1330			
	1340			

CLEAR CREEK ASSOCIATES

Project No. 040070

Well/Boring Charlie Well PJNGS

Description	Depth (feet)	Drill Rate (feet/hour)	* F S G (%)	Remarks
Gravelly sand: 70% sand, 30% gravel. Sand is f-vc, predom vc, VA-Rnd, MD. Gravels up to 30mm, predom 10mm, VA-SA, MD. MiRxN. Well sorted. Presence of fine-grained sandstone in a 50/50 ratio w/mafics for both gravels and sand.	1340	↑ 6		
SAA: except gravels up to 50mm.	1350	↑ 6		Conn @ 1352'
	1360	↓		TD @ 1360' on 10-25-07 @ 20:40

CLEAR CREEK ASSOCIATES

APPENDIX F

GEOPHYSICAL LOG INTERPRETATION

APPENDIX F

GEOPHYSICAL LOG INTERPRETATION

Geophysical logs are helpful to characterize subsurface hydrogeologic conditions that cannot be readily determined from drilled cuttings. Geophysical logs can be correlated with the lithologic log of a boring to provide a confirmation of the local stratigraphy. They also provide greater resolution of subtle geologic conditions (such as thin stratigraphic units, or gradational changes in grain size) that may not be discernable in the lithologic log. Some of the more common geophysical logs are briefly described below.

ELECTRIC LOG

The electric log consists of a spontaneous potential (SP) log, a short-normal (16-inch) resistivity log, and a long-normal (64-inch) resistivity log, which are recorded simultaneously. The SP log measures naturally occurring electrical signals and is used mainly for lithologic correlations or for differentiating non-permeable strata in a clay-sand sequence. The short-normal and long-normal resistivity logs are measured as the reciprocal of a formation's electrical conductivity. The increase or decrease of a formation's resistivity is partially controlled by its porosity. Because groundwater is an electrical conductor, its presence in the interconnected pores reduces the overall formation resistivity. Typically, silt and clay units will have lower resistivity values in comparison to sand and gravel units. The short-normal resistivity log measures the resistivity of the formation near the borehole, while the long-normal resistivity log measures the resistivity at a greater distance from the borehole. In more permeable sand or gravel zones, the long-normal and short-normal logs will exhibit a horizontal separation, as the resistivity of the borehole wall (wall cake) differs from the resistivity of the undisturbed formation. The long-normal and short-normal logs will measure similar resistivities in non-permeable clay zones, although the two logs may also be similar in extremely permeable zones where drilling fluid invasion into the formation has been extensive.

CALIPER LOG

The caliper log provides a measurement of the borehole diameter. Changes in the borehole diameter commonly occur from formation washouts (enlarged hole diameter), buildup of the drilling mud-wall cake across permeable strata (decreased hole diameter), or swelling of natural clays in the formation (decreased hole diameter). The caliper log is used in conjunction with other logs to differentiate hole diameter effects from actual lithologic changes.

SONIC LOG

The sonic log (also called the "acoustic log") measures the average velocity of a sound wave passing through the formation. The velocity of the sound wave changes as it passes through water and through varying formation materials. The sonic log is useful for estimating relative formation density, evaluating fracture patterns in bedrock aquifers, and estimating the location of the regional static water level and any perched water tables. This log is also useful for characterizing the integrity and quality of cement grout annular seals outside the casings of existing wells.

The sonic wave travel time (Δt) is measured in microseconds per foot (µsec/ft); therefore, an increase in Δt equates to a decrease in travel speed. In unconsolidated alluvial sediment, lower Δt values (increased travel speeds) indicate a somewhat rigid or compacted condition that may correlate with coarse-grained or cemented sediments. The Δt values in crystalline rock formations are of a much lower magnitude (increased travel speed) than in unconsolidated sediments. The porous or fractured intervals within a crystalline rock aquifer are generally reflected as higher Δt values (decreased travel speeds) on the sonic log, where the lack of rigid crystalline rock retards the speed of the sound wave.

GAMMA-RAY LOG

The gamma-ray log measures the naturally occurring gamma emissions from the decay of unstable elements in the formation surrounding the borehole. One of the most significant and the

most abundant radioactive elements is potassium 40. As potassium 40 decays, it emits electromagnetic radiation, which the gamma-ray probe detects and records. The greater the counting rate, the higher the amount of potassium 40 in the formation. All potassium-bearing minerals such as feldspar, biotite, and several clay minerals contain potassium 40. Consequently, an increase in clay content in the strata typically results in a high response of the gamma-ray probe and inversely, a decrease in clay content results in a low response. However, in many portions of Arizona, arkosic (feldspar-rich, poorly weathered) sand formations are present, which also have high gamma-ray emissions. Therefore the gamma-ray log must be used in conjunction with the other logs.

LATERAL (GUARD) LOG

The lateral log (also called 'guard log') operates in a similar manner as the long-normal and short-normal resistivity logs to detect the formation's electrical resistance. However, the normal logs are more limited in their ability to assess more than a few inches into the strata adjacent to the borehole. The lateral logging tool is capable of detecting formation properties at much greater distances from the borehole, and it is also able to resolve thin sedimentary units that are not detected by conventional electric logs. Therefore, the lateral log provides a more detailed resolution of thin sedimentary strata (in unconsolidated alluvium) or fractures (in crystalline bedrock) than its electric log counterpart.

APPENDIX G

SIEVE ANALYSIS LABORATORY REPORTS
(including filter pack material)

MECHANICAL SIEVE ANALYSIS

SIEVE SIZE		PERCENT PASSING	SPECIFICATION
US STD	METRIC		
4	100		
3.5	89		
3	75		
2.5	63.5		
2	50		
1.5	37.5		
1.25	31.25		
1	25		
3/4	19	100	
1/2	12.5	98	
3/8	9.5	89	
1/4	6.4	79	
#4	4.75	75	
#8	2.36	60	
#10	2.00	58	
#16	1.18	50	
#30	.6	41	
#40	.425	37	
#50	.3	32	
#100	.15	20	
#200	.075	11.4	

PERFORMED IN ACCORDANCE WITH ASTM C 136

ATTERBERG LIMITS

LL	PL	PI (%)
-	-	-

PERFORMED IN GENERAL ACCORDANCE WITH ASTM C 4318-05

SAMPLE LOCATION	DEPTH (ft)	SOIL DESCRIPTION
PALO VERDE	550-560	SAND WITH GRAVEL

Ninyo & Moore		MECHANICAL SIEVE ANALYSIS	LAB NO.
PROJECT NO.	DATE TESTED	PALO VERDE CLEAR CREEK ASSOCIATES	1
129999	10/26/07		

MECHANICAL SIEVE ANALYSIS

SIEVE SIZE		PERCENT PASSING	SPECIFICATION
US STD	METRIC		
4	100		
3.5	89		
3	75		
2.5	63.5		
2	50		
1.5	37.5		
1.25	31.25		
1	25	100	
3/4	19	97	
1/2	12.5	90	
3/8	9.5	86	
1/4	6.4	80	
#4	4.75	75	
#8	2.36	64	
#10	2.00	61	
#16	1.18	52	
#30	.6	43	
#40	.425	38	
#50	.3	33	
#100	.15	23	
#200	.075	13.4	

PERFORMED IN ACCORDANCE WITH ASTM C 136

ATTERBERG LIMITS

LL	PL	PI (%)
-	-	-

PERFORMED IN GENERAL ACCORDANCE WITH ASTM C 4318-05

SAMPLE LOCATION	DEPTH (ft)	SOIL DESCRIPTION
PALO VERDE	660-670	SAND WITH GRAVEL

Ninyo & Moore		MECHANICAL SIEVE ANALYSIS	LAB NO.
PROJECT NO.	DATE TESTED	PALO VERDE CLEAR CREEK ASSOCIATES	2
129999	10/26/07		

MECHANICAL SIEVE ANALYSIS

SIEVE SIZE		PERCENT PASSING	SPECIFICATION
US STD	METRIC		
4	100		
3.5	89		
3	75		
2.5	63.5		
2	50		
1.5	37.5		
1.25	31.25		
1	25	100	
3/4	19	99	
1/2	12.5	97	
3/8	9.5	95	
1/4	6.4	88	
#4	4.75	84	
#8	2.36	71	
#10	2.00	68	
#16	1.18	57	
#30	.6	42	
#40	.425	34	
#50	.3	27	
#100	.15	15	
#200	.075	9.2	

PERFORMED IN ACCORDANCE WITH ASTM C 136

ATTERBERG LIMITS

LL	PL	PI (%)
-	-	-

PERFORMED IN GENERAL ACCORDANCE WITH ASTM C 4318-05

SAMPLE LOCATION	DEPTH (ft)	SOIL DESCRIPTION
PALO VERDE	780-790	SAND WITH GRAVEL

Ninyo & Moore		MECHANICAL SIEVE ANALYSIS	LAB NO.
PROJECT NO.	DATE TESTED	PALO VERDE CLEAR CREEK ASSOCIATES	3
129999	10/26/07		

MECHANICAL SIEVE ANALYSIS

SIEVE SIZE		PERCENT PASSING	SPECIFICATION
US STD	METRIC		
4	100		
3.5	89		
3	75		
2.5	63.5		
2	50		
1.5	37.5		
1.25	31.25		
1	25		
3/4	19	100	
1/2	12.5	90	
3/8	9.5	81	
1/4	6.4	70	
#4	4.75	63	
#8	2.36	48	
#10	2.00	45	
#16	1.18	35	
#30	.6	23	
#40	.425	18	
#50	.3	14	
#100	.15	7	
#200	.075	4.2	

PERFORMED IN ACCORDANCE WITH ASTM C 136

ATTERBERG LIMITS

LL	PL	PI (%)
-	-	-

PERFORMED IN GENERAL ACCORDANCE WITH ASTM C 4318-05

SAMPLE LOCATION	DEPTH (ft)	SOIL DESCRIPTION
PALO VERDE	910-920	SAND WITH GRAVEL

Ninyo & Moore		MECHANICAL SIEVE ANALYSIS	LAB NO.
PROJECT NO.	DATE TESTED	PALO VERDE CLEAR CREEK ASSOCIATES	4
129999	10/26/07		

MECHANICAL SIEVE ANALYSIS

SIEVE SIZE		PERCENT PASSING	SPECIFICATION
US STD	METRIC		
4	100		
3.5	89		
3	75		
2.5	63.5		
2	50		
1.5	37.5		
1.25	31.25		
1	25		
3/4	19	100	
1/2	12.5	98	
3/8	9.5	95	
1/4	6.4	89	
#4	4.75	83	
#8	2.36	68	
#10	2.00	65	
#16	1.18	51	
#30	.6	35	
#40	.425	28	
#50	.3	21	
#100	.15	10	
#200	.075	6.5	

PERFORMED IN ACCORDANCE WITH ASTM C 136

ATTERBERG LIMITS

LL	PL	PI (%)
-	-	-

PERFORMED IN GENERAL ACCORDANCE WITH ASTM C 4318-05

SAMPLE LOCATION	DEPTH (ft)	SOIL DESCRIPTION
PALO VERDE	1070-1080	SAND WITH GRAVEL

Ninyo & Moore		MECHANICAL SIEVE ANALYSIS	LAB NO.
PROJECT NO.	DATE TESTED	PALO VERDE CLEAR CREEK ASSOCIATES	5
129999	10/26/07		

MECHANICAL SIEVE ANALYSIS

SIEVE SIZE		PERCENT PASSING	SPECIFICATION
US STD	METRIC		
4	100		
3.5	89		
3	75		
2.5	63.5		
2	50		
1.5	37.5		
1.25	31.25		
1	25		
3/4	19	100	
1/2	12.5	93	
3/8	9.5	84	
1/4	6.4	71	
#4	4.75	63	
#8	2.36	43	
#10	2.00	39	
#16	1.18	28	
#30	.6	18	
#40	.425	14	
#50	.3	11	
#100	.15	6	
#200	.075	3.3	

PERFORMED IN ACCORDANCE WITH ASTM C 136

ATTERBERG LIMITS

LL	PL	PI (%)
-	-	-

PERFORMED IN GENERAL ACCORDANCE WITH ASTM C 4318-05

SAMPLE LOCATION	DEPTH (ft)	SOIL DESCRIPTION
PALO VERDE	1260-1270	SAND WITH GRAVEL

Ninyo & Moore		MECHANICAL SIEVE ANALYSIS	LAB NO.
PROJECT NO.	DATE TESTED	PALO VERDE CLEAR CREEK ASSOCIATES	6
129999	10/26/07		

Palo Verde
Charlie Well
Filter Pack.

TACNA SAND & GRAVEL

SIEVE ANALYSIS TEST RESULTS

PROJECT: ZIM INDUSTRIES
LOCATION:
MATERIAL: 6 X 12
SAMPLED BY: DAVE BURAU
TESTED BY: DAVE BURAU

DATE: 10/29/07
SAMPLE NO.:
SAMPLED FROM: STOCK

FRACTION EQUIVALENTS	US STANDARD	OPENING INCHES	PERCENT WEIGHT	PERCENT RETAINED	PERCENT PASSED	SPECS		
3/4"	3/4"	0.750						
1/2"	1/2"	0.500						
3/8"	3/8"	0.375						
5/16"	5/16"	0.312						
1/4"	1/4"	0.250						
3/16"	#4	0.187	TRACE					
1/8"	#6	0.132	41.3	41.3	58.7			
3/32"	#8	0.0937	44.3	85.6	14.4			
	#10	0.0787	6.5	92.1	7.9			
	#12	0.0661	3.3	95.4	4.6			
	#14	0.0555						
	#16	0.0469	2.7	98.1	1.9			
	#18	0.0394						
	#20	0.0331						
	#30	0.00234						
	#40	0.0165						
	#50	0.0117						
	#60	0.0098						
	#70	0.0083						
	#100	0.0059						
	#200	0.0029						
	PAN		1.9	100.0				
TOTAL								

SUBMITTED BY: _____

APPENDIX H

CASING MATERIAL TEST REPORTS

California Steel Industries
14000 San Bernardino Ave.
Fontana, California 92335

38"
Surface casing

CERTIFIED TEST REPORT

CUSTOMER ORDER	MO. NUMBER	SHIPPING DATE	CAR NUMBER	TALLY NUMBER
11290-00	01-8416-03	09/27/07	9d28080 m	HS 250692245 1/

BILL TO	SHIP TO
ROSCOE MOSS MANUFACTURING CO. SUBS OF ROSCOE MOSS COMPANY BOX 31064/LINCOLN HEIGHTS STA LOS ANGELES CA 90031	ROSCOE MOSS MANUFACTURING CO. SUBS OF ROSCOE MOSS COMPANY 4360 WORTH ST. LOS ANGELES CA 90063

TEST REPORTS TO SHOW WEIGHTS. FRT COLLECT, F/B TO CHARGE TO. MARK ALL DOCUMENTS PART # 01-33-365-1.

END USE: SPIRAL WELD PIPE 38"OD x .375

PROD: H.R. SHEET PROCESSED COIL (SE) - PRIME

SPEC: PQ-50 KSI MIN YIELD

T/R: 1 INSPECTION: MILL

DESCRIPTION	COILS, PIECES OR BUNDLES	HEAT NUMBER
.3650 x 33.5000 x COIL MIN SE	1	M82889
TOTAL WEIGHT: 15,390 LBS		

I CERTIFY THE FOLLOWING TEST INFORMATION TO BE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

Sr. Chemist – Laboratory Services

MECHANICAL PROPERTIES / CHEMICAL ANALYSIS 11:04:02 09/27/07 CC

HEAT OR LOT NUMBER	SLAB NUMBER	LOC	YIELD KSI	TENSILE STRENGTH KSI	% ELONGATION 8"	% ELONGATION 2"	BEND TEST	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al	V	Cb	Ti	As	N	Sn
M82889		B	59.5	71.5	31			07	1.14	011	003	243	02	01	01	00	040	001	021	003	000	002	001
		B	58.5	73.0	30																		

Material is RoHS compliant

California Steel Industries
14000 San Bernardino Ave.
Fontana, California 92335

28" Intermediate Casing

CERTIFIED TEST REPORT

CUSTOMER ORDER	MO. NUMBER	SHIPPING DATE	CAR NUMBER	TALLY NUMBER
11290-00	01-8416-03	09/27/07	9d28080 m	HS 250692245 1/

BILL TO	SHIP TO
ROSCOE MOSS MANUFACTURING CO. SUBS OF ROSCOE MOSS COMPANY BOX 31064/LINCOLN HEIGHTS STA LOS ANGELES CA 90031	ROSCOE MOSS MANUFACTURING CO. SUBS OF ROSCOE MOSS COMPANY 4360 WORTH ST. LOS ANGELES CA 90063

TEST REPORTS TO SHOW WEIGHTS. FRT COLLECT, F/B TO CHARGE TO. MARK ALL DOCUMENTS PART # 01-33-365-1.

END USE: SPIRAL WELD PIPE 28"OD x .375

PROD: H.R. SHEET PROCESSED COIL (SE) - PRIME

SPEC: PQ-50 KSI MIN YIELD

T/R 1 INSPECTION MILL

DESCRIPTION	COILS, PIECES OR BUNDLES	HEAT NUMBER
.3650 x 33.5000 x COIL MIN SE	1	M82889
TOTAL WEIGHT: 15,390 LBS		

I CERTIFY THE FOLLOWING TEST INFORMATION TO BE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

Sr. Chemist – Laboratory Services

MECHANICAL PROPERTIES / CHEMICAL ANALYSIS 11:04:02 09/27/07 CC

HEAT OR LOT NUMBER	SLAB NUMBER	LOC	YIELD KSI	TENSILE STRENGTH KSI	% ELONGATION 8"	% ELONGATION 2"	BEND TEST	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al	V	Cb	Ti	As	N	Sn
M82889		B	59.5	71.5	31			07	1.14	011	003	243	02	01	01	00	040	001	021	003	000	002	001
		B	58.5	73.0	30																		

Material is RoHS compliant

16"OD X 5/16" NC BLK

California Steel Industries
14000 San Bernardino Ave.
Fontana, California 92335

CERTIFIED TEST REPORT

CUSTOMER ORDER	SO. NUMBER	SHIPPING DATE	CAR NUMBER	TALLY NUMBER
11271-00	01-7574-06	10/15/07	9d94786 a	HS 250694900 1/

BILL TO: ROSCOE MOSS MANUFACTURING CO.
SUBS OF ROSCOE MOSS COMPANY
BOX 31064/LINCOLN HEIGHTS STA.
LOS ANGELES CA 90031

SHIP TO: WAL
WAL
WAL
WAL CA

TEST REPORTS TO SHOW WEIGHTS. FRT COLLECT, F/B TO CHARGE TO. MARK ALL DOCUMENTS PART #01-24-312-2.

END USE: SPIRAL WELD PIPE

PROD: H.R. SHEET PROCESSED COIL (SE) - PRIME

SPEC: PQ-SUITABLE TO MEET ASTM-A-139-96-GR.B-MIN.20CU-FULLY KILLED-FINE GRAIN PRACTICE

T/R 1 INSPECTION MILL

DESCRIPTION	COILS, PIECES OR BUNDLES	HEAT NUMBER
.3030 x 24.0000 x COIL MIN SE	2	T44595
TOTAL WEIGHT: 41,520 LBS		

I CERTIFY THE FOLLOWING TEST INFORMATION TO BE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

Sr. Chemist – Laboratory Services

08:41:12 10/15/07 CC

HEAT OR LOT NUMBER	BLOW NUMBER	LOC	YIELD KSI	TENSILE STRENGTH KSI	% ELONGATION 8"	% ELONGATION 2"	BEND TEST	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al	V	Cb	Ti	As	N	Sn
T44595		BT	43.8	67.6		41		16	.81	025	006	184	25	09	03	00	038	002	001	001	000	002	002
		BT	44.8	67.0		42																	

Material is RoHS compliant

10007/10 001 DLANE

SS Blank

METALLURGICAL TEST REPORT

NAS
6870 HIGHWAY 42 EAST

NORTH AMERICAN STAINLESS
6870 HIGHWAY 42 EAST
GHENT, KY 41045

Certificate: 30358 2

Customer: 005437 001

Mail To:
ROSCOE MOSS COMPANY
4360 NORTH ST.
LOS ANGELES, CA 90063

Ship To:
ROSCOE MOSS COMPANY
4360 NORTH ST.
LOS ANGELES, CA 90063

Date: 9/05/2007 Page: 1

Steel: 304L

Finish: BRAP

Your Order: 11291

NAS Order: IN 0028598 02

Corrosion: ASTM A262/02aE;180Bmd-GX

PRODUCT DESCRIPTION:

STAINLESS STEEL COIL, HOT ROLLED, ANNEALED AND PICKLED.
ASTMA240/06b,480/06b,666/03,ASMESA240/04-A05,480/04-A05,SA666/04
QQS766D-A X MS PERM,AMS5513H X MAX,MIL40438,AMS,X CHRM MEAS
ASTM A479 (Chem & Mech only) ASTM/ASME SA312 (chem only)
ASTM A276 (Chem & Mech only)

REMARKS:

Mat'l Free of Mercury Contamination. No weld repairs.
MM 10204 3.1; QQS766F Cond A; RoHS Compliant
* Melted & Manufactured in the USA

Product Id	Coil #	Thickness	Width	Weight	Length	Mark	Pieces	Commodity Code
022NK9 A	022NK9 A	.3118	48.0000	12,160 COIL		3	1	

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa)

Heat	CM	C	CR	CU	MN	MO	N	NI	P	S	SI
2NK9	US	.020	18.226	.414	1.746	.304	.079	8.171	.030	.001	.281

MECHANICAL PROPERTIES

Product Id#	Coil #	Id Loc	Id Dir	UTS KSI	.2% YS KSI	ELONG %-2"	Hard RB	Tail Hard
022NK9 A	022NK9 A	F	T	90.71	51.05	50.28	86.50	90.50

NAS hereby certifies that the analysis on this certification is correct and the material meets the specifications stated.

QC ENGINEER ERIC HESS 9/12/2007

.250 ROD

NORTH AMERICAN STAINLESS INSPECTION CERTIFICATE

North American Stainless
6870 Highway 42 East
Ghent, Kentucky 41045-9615
Telephone: (502) 347-6000
FAX: (502) 347-6001

Email: customerservice@northamericanstainless.com

2007 / 28590	DATE 10/11/2007
PACKING LIST # 2007 /87448	NUMBER 1
GRADE NAS-143 P.O.# :11305 AISI (304L/304)	Item Code:

CUSTOMER
ROSCOE MOSS COMPANY

TOLERANCE

PRODUCT
Wire rod, hot rolled, annealed, pickled.

ORDER NUMBER	MARK#/ FROD ID	HEAT NUM	WEIGHT
[illegible]	WAB8565	2WA3	4846
[illegible]	WAB8566	2WA3	[illegible]
[illegible]	WAB8563	2WA3	[illegible]
[illegible]	WAB8570	2WA3	4844

REQUIREMENTS
AISI [illegible]

LENGTH ft
SIZE .3122 Inches

MECHANICAL PROPERTIES

HEAT NUM	[illegible]	YS	2% RA	ELONG A % L4d	HARD NESS HB	RESIL IENCE J	[illegible]
2WA3	87[illegible]	[illegible]	80	68	136		[illegible]
Required Values	65 100	[illegible]					[illegible]

SURFACE AND DIMENSION CONTROL
Without Objections

INTERGRANULAR CORROSION
ASTM A262-02a
PRACTICE E-
Acceptable

CHEMICAL COMPOSITION %
CM(Country of Melt) ES(Spain) US(United States)

CM	HEAT	C	P	S	Si	Mn	Cr	Ni	Mo	Ti	N	Cu	Co	Al
US	2WA3	.0208	.0261	.0246	.3017	1.4072	18.1040	8.6329	.0597	.0041	.0920	.1666	.1641	.0023
REQUIRED VALUES		.0300	.0450	.0300	1.0000	2.0000	18.0000 20.0000	8.0000 12.0000			.1000			

STEELMAKING PROCESS
EAF+AOD+CC

OBSERVATIONS/SPECIFICATIONS
UNS S30400, UNS S30403, AISI 304

Product complies w/ requirements of EU directive2002.95.EC.RoHS.Material Free from Mercury contamination.
No weld repair. NAS certifies the analysis on certification is correct & the material meets specs stated.

QUALITY INSPECTOR
Eric Hess
Quality Control Representative

0.2B WIRE

NORTH AMERICAN STAINLESS INSPECTION CERTIFICATE

WIRE

North American Stainless
6870 Highway 42 East
Ghent, Kentucky 41045-9615
Telephone: (502) 347-6000
FAX: (502) 347-6001

Email: customerservice@northamericanstainless.com

2007 / 33555	DATE 12/12/2007
PACKING LIST # 2007 /90667	NUMBER 1
GRADE NAS-143 P.O.# :11305 AISI (304L/304)	Item Code:

CUSTOMER
ROSCOE MOSS COMPANY

TOLERANCE

PRODUCT
Wire rod, hot rolled, annealed, pickled.

ORDER NUMBER	MARKS / PROD ID	HEAT NUM	WEIGHT
LN38833	33034/WA93146	3DX3	4850
	33035/WA93147	3DX3	4900

REQUIREMENTS
AISI

LENGTH ft
SIZE .2500 inches

SURFACE AND DIMENSION CONTROL
Without Objections

MECHANICAL PROPERTIES

HEAT NUM	Rm UTS KSI	Rp 0.2 YS KSI	Rp 1.0 YS KSI	Z% RA	ELONG A % L4d	HARD NESS HB	RESIL IENCE J	A% %L_d
3DX3	88	40		80	61	131		5
Required Values	65 100							000000

INTERGRANULAR CORROSION
ASTM A262-02a
PRACTICE E-
Acceptable

CHEMICAL COMPOSITION % CM(Country of Melt) ES(Spain) US(United States)

CM	HEAT	C	P	S	Si	Mn	Cr	Ni	Mo	Ti	N	Cu	Co	Al
US	3DX3	.0225	.0304	.0294	.3774	1.4350	18.2399	8.7653	.3190	.0049	.0596	.3180	.1731	.0019
REQUIRED VALUES		.0300	.0050	.0300	1.0000	2.0000	18.0000 20.0000	8.0000 12.0000			.1000			

STEELMAKING PROCESS
EAF+AOD+CC

OBSERVATIONS/SPECIFICATIONS

UNS S30400, UNS S30403, AISI 304

Product complies w/ requirements of EU directive2002.95.EC.RoHS.Material Free from Mercury contamination.
No weld repair. NAS certifies the analysis on certification is correct & the material meets specs stated.

QUALITY INSPECTOR
Eric Hess
Quality Control Representative

NAS hereby certifies that the analysis on this certification is correct and the material meets the specifications stated.

APPENDIX I

WELL INSTALLATION FIELD FORMS

CLEAR CREEK ASSOCIATES

PIPE TALLY

Project Name.: Charlie Well PVNGS	Project No.: 040070
Well No.: 55-214659	Date: 10-15-07
Location: B(1-6)34aab	Pipe Talley for: tremie for intermediate casing
Total Depth: 240 ftbls	Geologist: GQ

Type of Connections: ☐ Welded ☐ T+C ☑ Flush Thread ☐ Other

Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type	Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type
1	✓	28.70	28.70	Tremie					
2	✓	28.00	56.70	↓					
3	✓	29.60	86.30	↓					
4	✓	32.30	118.60	↓					
5	✓	29.90	148.50	↓					
6	✓	30.10	178.60	↓					
7	✓	31.00	209.60	↓					
8	✓	31.44	241.04	↓					

SUMMARY OF TALLY

Total length of casing/screen tallied (ft.):

Length of casing cut off after landing (ft.): 3 ft

Bottom of Casing (feet below land surface): 238.04

Screened Interval(s) (ft.bls):

Total feet of blank casing in hole (ft.):

Notes:

CLEAR CREEK ASSOCIATES

PIPE TALLY

Project Name.: Charlie Well PVNGS	Project No.: 040070
Well No.: 55-214659	Date: 10-15-07
Location: B(1-6)34aab	Pipe Talley for: 28" Intermediate well Casing
Total Depth: 240 ft bls	Geologist: GQ

Type of Connections: ☑ Welded ☐ T+C ☐ Flush Thread ☐ Other

Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type	Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type
1	✓	40.03	40.03	LCS Intermediate					
2	✓	40.05	80.08	↓					
3	✓	40.08	120.16						
4	✓	40.03	160.19						
5	✓	40.04	200.23						
6	✓	40.06	240.29						
7	✓	40.05	280.34						

SUMMARY OF TALLY

Total length of casing/screen tallied (ft.): 280.34

Length of casing cut off after landing (ft.): 35.68; 4.37 ft of stickup

Bottom of Casing (feet below land surface): 240.29

Screened Interval(s) (ft.bls): N/A

Total feet of blank casing in hole (ft.): 240.29

Notes:

CLEAR CREEK ASSOCIATES

Well Casing
PIPE TALLY

Project Name.: Charlie Wall PVNGS	Project No.: 040070
Well No.: 55-214659	Date: 11-8-07
Location: B(1-6)34aab	Pipe Talley for: 16" SS / 20" LCS casing
Total Depth: 1324	Geologist: RG, MAC, GQ

Type of Connections: ☒ Welded ☐ T+C ☐ Flush Thread ☐ Other

Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type	Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type
1	✓	19.78	19.78	SS casing w/ well cap	36	✓	2.10	781.01	Dissimilar metals connection
2	✓	19.97	39.75	SS wire wrap 16"	37	✓	40.02	821.03	LCS Blank casing 16"
3	✓	19.98	59.73	"	38	✓	3.01	824.04	"
4	✓	19.98	79.71	"	39	✓	5.08	829.12	Reduction
5	✓	19.97	99.68	"	40	✓	42.03	871.15	LCS Blank casing 20"
6	✓	19.95	119.63	"	41	✓	42.02	913.17	"
7	✓	19.96	139.59	"	42	✓	42.01	955.18	"
8	✓	19.97	159.56	"	43	✓	42.02	997.20	"
9	✓	19.97	179.53	"	44	✓	42.02	1,039.22	"
10	✓	19.97	199.50	"	45	✓	42.01	1,081.23	"
11	✓	19.97	219.47	"	46	✓	42.02	1,123.25	"
12	✓	19.96	239.43	"	47	✓	42.02	1,165.27	"
13	✓	19.97	259.40	"	48	✓	42.02	1,207.29	"
14	✓	19.97	279.37	"	49	✓	42.04	1,249.33	"
15	✓	19.97	299.34	"	50	✓	42.03	1,291.36	"
16	✓	19.97	319.31	"	51	✓	42.03	1,333.39	"
17	✓	19.97	339.28	"					
18	✓	19.96	359.24	"					
19	✓	19.97	379.21	"					
20	✓	19.97	399.18	"					
21	✓	19.97	419.15	"					
22	✓	19.98	439.13	"					
23	✓	40.04	479.17	SS Blank casing					
24	✓	40.03	519.20	SS Blank casing					
25	✓	19.98	539.18	SS wire wrap 16"					
26	✓	19.99	559.17	"					
27	✓	19.97	579.14	"					
28	✓	19.95	599.09	"					
29	✓	19.97	619.06	"					
30	✓	19.98	639.04	"					
31	✓	19.98	659.02	"					
32	✓	19.96	678.98	"					
33	✓	19.96	698.94	"					
34	✓	39.96	738.90	SS Blank casing					
35	✓	40.01	778.91	SS Blank casing					

SUMMARY OF TALLY

Total length of casing/screen tallied (ft.): 1333.39

Length of casing cut off after landing (ft.): 19.00'

Bottom of Casing (feet below land surface): 1310 (4.39' stickup)

Screened Interval(s) (ft.bls): 610-790 870-1290

Total feet of blank casing in hole (ft.): ~~1150.78~~ RG 710.00 ~~715.30~~ GQ

Notes:

535.48
615.45

CLEAR CREEK ASSOCIATES

Tremie

PIPE TALLY

Project Name.: Charlie Well PVNGS	Project No.: 040070
Well No.: 55-214659	Date: 11-8-07
Location: B(1-6)34aab	Pipe Talley for: Tremie pipe
Total Depth: 1324	Geologist: GQ

Type of Connections: ☐ Welded ☐ T+C ☒ Flush Thread ☐ Other

Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type	Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type
0	X	2.00	2.00	Mule shoe	35	X	32.20	1111.22	Tremie
1	X	30.67	32.67	Tremie	36	X	29.60	1140.82	↓
2	X	30.05	62.72	↓	37	X	28.00	1168.82	↓
3	X	32.41	95.13	↓	38	X	31.00	1199.82	↓
4	X	30.74	125.87	↓	39	X	31.50	1231.32	↓
5	X	29.89	155.76	↓	40	X	29.90	1261.22	✓
6	X	32.54	188.30	↓					
7	X	34.05	222.35	↓					
8	X	31.15	253.50	↓					
9	X	31.23	284.73	↓					
10	X	28.89	313.62	↓					
11	X	31.90	345.52	↓					
12	X	32.56	378.08	↓					
13	X	32.73	410.81	↓					
14	X	31.97	442.78	↓					
15	X	32.22	475.00	↓					
16	X	33.34	508.34	↓					
17	X	31.30	539.64	↓					
18	X	32.59	572.23	↓					
19	X	30.75	602.98	↓					
20	X	32.80	635.78	↓					
21	X	30.97	666.75	↓					
22	X	32.18	698.93	↓					
23	X	30.39	729.32	↓					
24	X	33.74	763.06	↓					
25	X	31.76	794.82	↓					
26	X	30.40	825.22	↓					
27	X	30.10	855.32	↓					
28	X	33.90	889.22	↓					
29	X	32.10	921.32	↓					
30	X	31.15	952.47	↓					
31	X	30.40	982.87	↓					
32	X	31.40	1014.27	↓					
33	X	32.55	1046.82	↓					
34	X	32.20	1079.02	✓					

SUMMARY OF TALLY

Total length of casing/screen tallied (ft.): _____

Length of casing cut off after landing (ft.): _____

Bottom of Casing (feet below land surface): _____

Screened Interval(s) (ft.bls): _____

Total feet of blank casing in hole (ft.): _____

Notes:

CLEAR CREEK ASSOCIATES

Swab tool

PIPE TALLY

Project Name.: Charlie Well PVNGS	Project No.: 040070
Well No.: 55-214659	Date: 11-10-07
Location: B(1-6)34aab	Pipe Talley for: Swab tool for dry swabbing
Total Depth: 1324	Geologist: RG, MAC, GQ

Type of Connections: ☐ Welded ☐ T+C ☒ Flush Thread ☐ Other

Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type	Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type
1	✓	26.32	26.32	Swab tool					
2	✓	39.15	65.47	5" pipe					
3	✓	39.17	104.64						
4	✓	39.35	143.99						
5	✓	39.64	183.63						
6	✓	41.10	224.73						
7	✓	39.90	264.63						
8	✓	40.75	305.38						
9	✓	39.70	345.08						
10	✓	39.15	384.23						
11	✓	39.70	423.93						
12	✓	40.15	464.08						
13	✓	39.90	503.98						
14	✓	41.85	545.83						
15	✓	38.10	583.93						
16	✓X	40.75	624.68						
17	✓X	39.44	664.12						
18	✓X	42.35	706.47						
19	✓XX	41.60	748.07						
20	XX	39.80	787.87						
21	XX	39.70	827.57						
22	XX	43.41	870.98						
23	XX	40.04	911.02						
24	XX	42.68	953.70						
25	XX	42.10	995.80						
26	XX	39.83	1035.63						
27	XX	41.35	1076.98						
28	XX	40.70	1117.68						
29	XX	42.00	1159.68						
30	XX	44.75	1204.43						
31	XX	40.70	1245.13						
32	XX	29.40	1274.53						
	XX	40.00	1314.53	Kelly					

SUMMARY OF TALLY

Total length of casing/screen tallied (ft.): _____

Length of casing cut off after landing (ft.): _____

Bottom of Casing (feet below land surface): _____

Screened Interval(s) (ft.bls): _____

Total feet of blank casing in hole (ft.): _____

Notes:

CLEAR CREEK ASSOCIATES

Swab tool

PIPE TALLY

Project Name.: Charlie Well PVNGS	Project No.: 040070
Well No.: 55-214659	Date: 11-13-07
Location: B(1-6)34 aab	Pipe Talley for: Swab tool for swab & airlift
Total Depth: 1310' bls	Geologist: BQ

Type of Connections: ☐ Welded ☐ T+C ☒ Flush Thread ☐ Other

Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type	Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type
	✓	40.00	40.00	Kelly					
	✓	26.32	66.32	Swab tool					
1	✓	39.15	105.47	5" pipe					
2	✓	39.17	144.64						
3	✓	39.35	183.99						
4	✓	39.64	223.63						
5	✓	41.10	264.73						
6	✓	39.90	304.63						
7	✓	40.75	345.38						
8	✓	39.70	385.08						
9	✓	39.15	424.23						
10	✓	39.70	463.93						
11	✓	40.15	504.08						
12	✓	39.90	543.98						
13	✓	41.85	585.83						
14	✓	38.10	623.93						
15	✓	40.75	664.68						
16	✓	39.44	704.12						
17	X	42.35	746.47						
18	X	41.60	788.07						
19	X	39.80	827.87						
20	X	39.70	867.57						
21	X	43.41	910.98						
22	X	40.04	951.02						
23	X	42.68	993.70						
24	X	42.10	1035.80						
25	X	39.83	1075.63						
26	X	41.35	1116.98						
27	X	40.70	1157.68						
28	X	42.00	1199.68						
29	X	44.75	1244.43						
30	X	40.70	1285.13						
31	X	29.40	1314.53	✓					

SUMMARY OF TALLY

Total length of casing/screen tallied (ft.): _____

Length of casing cut off after landing (ft.): _____

Bottom of Casing (feet below land surface): _____

Screened Interval(s) (ft.bls): _____

Total feet of blank casing in hole (ft.): _____

Notes:

Intermediate Casing.

ESTIMATED ANNULAR MATERIAL RECORD

Project Name: Charlie Well PVNGS

Project No.: 050011 Date: 10/16/07 - 10/17/07

Well No.: 55-219659 Geologist: GQ

ANNULAR VOLUME CALCULATIONS

Total Depth of Borehole (ft) [T]: 240

Length of Interval to be filled (ft) [L]: 240

Borehole Diameter (in.) [D]: 36

Total Cased Depth (ft): 240

Casing Diameter (in.) [d]: 28

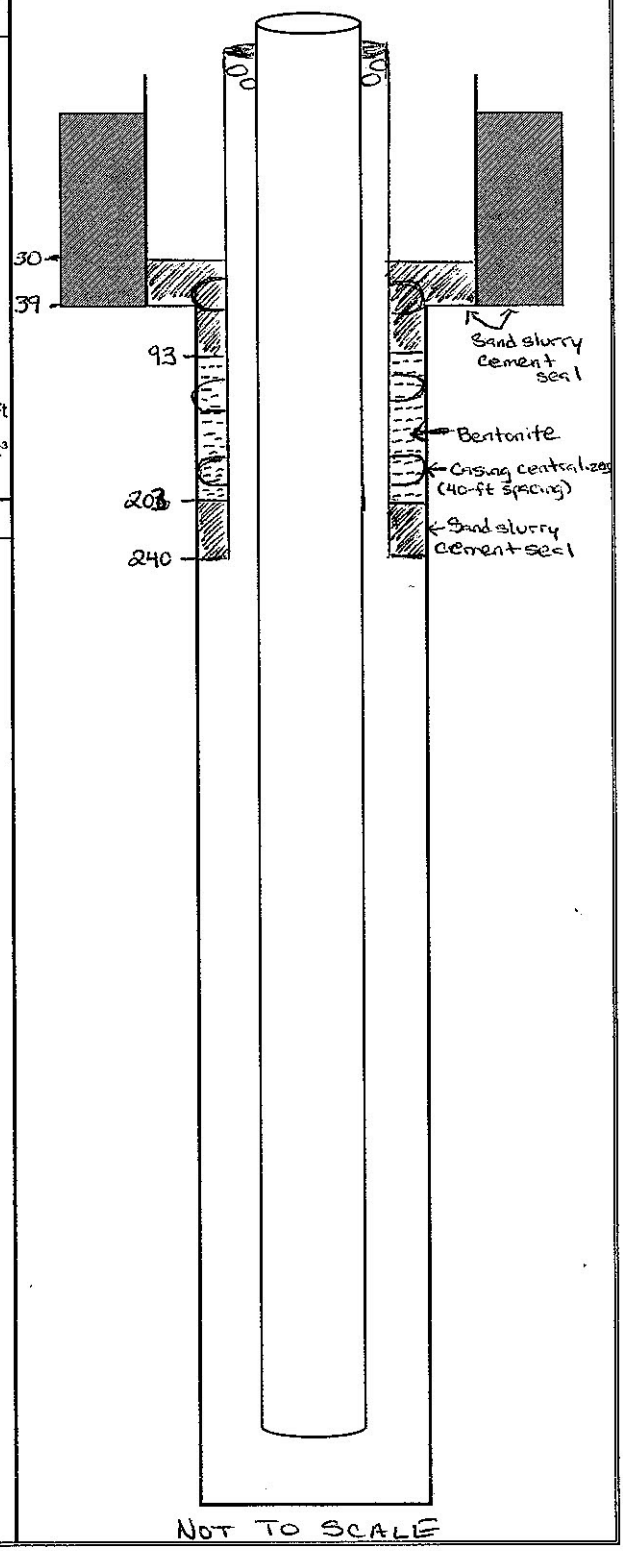
Rat Hole Volume (ft^3) [R]: N/A

Annular Volume [A]: (D^2-d^2) 0.005454 = 2.79 Ft^3/Lin. Ft

Expected Calculated Volume = (AxL)+R= 669.6 Ft^3

NOTES:

Annular materials volume calculations for intermediate casing.



CLEAR CREEK ASSOCIATES

ESTIMATED ANNULAR MATERIAL RECORD (Continued)

Project Name: Charlie Well PVNGS
Project Number: 050011
Well Number: 55-214659
Date: 10/16/07
Geologist: GQ, MAC

EQUATIONS

2,700 lbs. Silica Sand=1 cubic yard=27 cubic ft
Pea gravel: 1yd^3 = ~2700 lbs.
Bentonite bag = .69ft^3/bag (hydrated)
[1] Volume of bag (Ft^3) = bag weight/100
[2] Calculated depth=previous calculated depth - (v/A)

No.	✓	Weight installed (lbs.)	Volume installed (v) (ft^3)	Total Vol. installed (ft^3)	Calculated Depth[2] (ft bls)	Tagged Depth (ft bls)	Type of Annular Material	Type/Size of Container	Measurement Method	Comments
	✓	31,449	243	243	153	203	Sand slurry cement	Cement truck	Delivery ticket	wt of cement: 17.3lbs/gal
198	✓	9,900	158.4	401.4	146	140	3/8" Holeplug	50lbs/bag	wt on bag	
164	✓	8,200	131.13	532.53	93	93	"	"	"	
	✓	27,793	216	748.53	16	30	Sand slurry cement	Cement truck	Delivery ticket	wt of cement: 17.2lbs/gal
										D of surface casing = 38"

Notes:

ESTIMATED ANNULAR MATERIAL RECORD

Well Casing.

Project Name: Charlie Well PVNGS

Project No.: 040070 Date: 11-10-07

Well No.: 55-214659 Geologist: GQ, RG, MAC

ANNULAR VOLUME CALCULATIONS

Total Depth of Borehole (ft) [T]: 1,324

Length of Interval to be filled (ft) [L]: 1,324

Borehole Diameter (in.) [D]: 25" and 28"

Total Cased Depth (ft): 1,310

Casing Diameter (in.) [d]: 16" and 20"

Rat Hole Volume (ft^3) [R]: 47.72

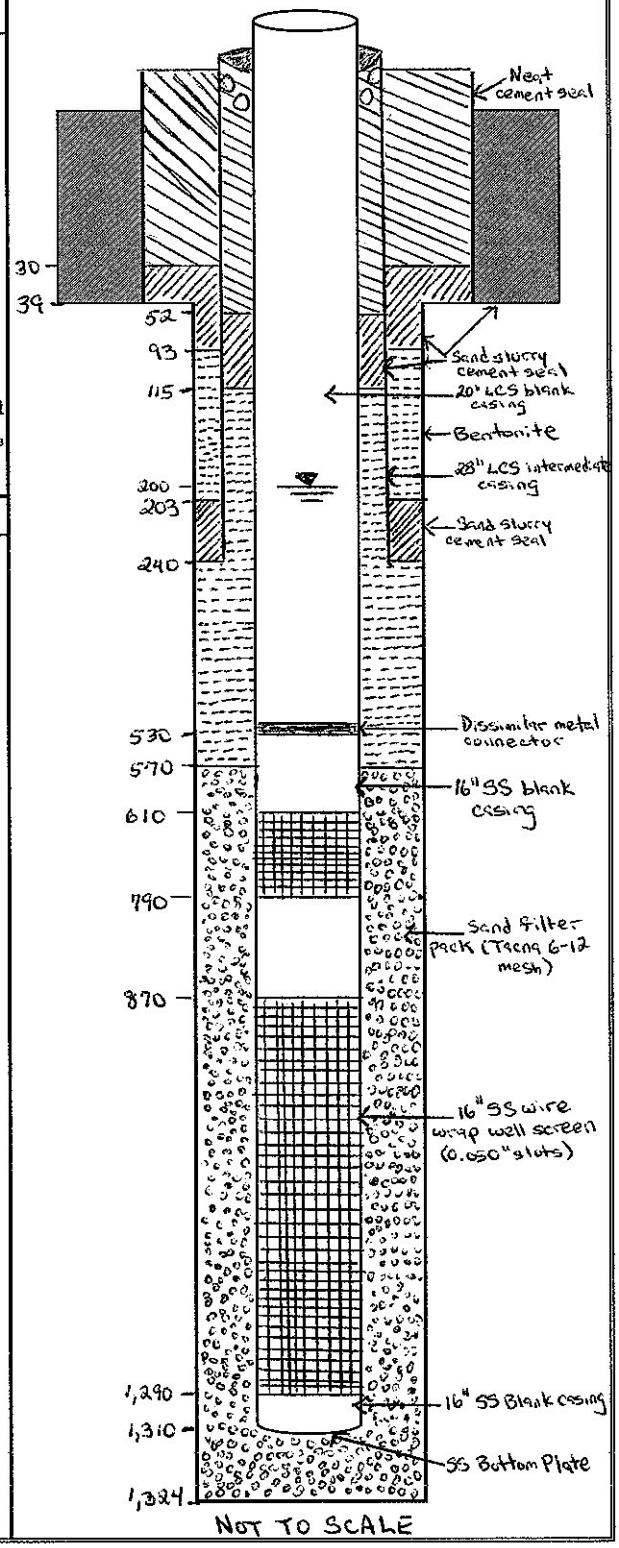
Annular Volume [A]: (D^2-d^2) 0.005454 = for 16" casing 2.01 / for 20" casing 2.10 Ft^3/Lin. Ft

Expected Calculated Volume = (AxL)+R= for 25" borehole diameter 1,535.12 / for 28" borehole diameter 1,197 Ft^3

Total V=2732.12 ft^3

NOTES:

Annular Volume of rat hole = 3.41 ft^3/Lin ft.



CLEAR CREEK ASSOCIATES

ESTIMATED ANNULAR MATERIAL RECORD (Continued)

Project Name: Charlie Well PVNGS
Project Number: 040070
Well Number: 55-214659
Date: 11-10-07
Geologist: GQ

EQUATIONS

2,700 lbs. Silica Sand=1 cubic yard=27 cubic ft
Pea gravel: 1yd^3 = ~2700 lbs.
Bentonite bag = .69ft^3/bag (hydrated)
[1] Volume of bag (Ft^3) = bag weight/100
[2] Calculated depth=previous calculated depth - (v/A)

No.	✓	Weight installed (lbs.)	Volume installed (v) (ft^3)	Total Vol. installed (ft^3)	Calculated Depth[2] (ft bls)	Tagged Depth (ft bls)	Type of Annular Material	Type/Size of Container	Measurement Method	Comments
1	✓	2997	29.97	29.97	1317	—	Tacna 6-12 mesh	Supersack	wt on bag	
2	✓	2995	29.95	59.92	1308	1314	"	"	"	
3	✓	2998	29.98	89.90	1299	—	"	"	"	
4	✓	2994	29.94	119.84	1284	1281	"	"	"	
5	✓	2996	29.96	149.80	1266	1253	"	"	"	
6	✓	2992	29.92	179.72	1248	1245	"	"	"	
7	✓	2995	29.95	209.67	1230	—	"	"	"	
8	✓	3003	30.03	239.70	1215	1216	"	"	"	
9	✓	2996	29.96	269.66	1201	—	"	"	"	
10	✓	2996	29.96	299.62	1194	1193	"	"	"	9.5 bags in, tagged after swabbing
11	✓	3001	30.01	329.63	1170	1170	"	"	"	
12	✓	2992	29.92	359.55	1155	1156	"	"	"	
13	✓	2994	29.94	389.49	1141	—	"	"	"	
14	✓	3002	30.02	419.51	1126	~~1117~~ 1126	"	"	"	
15	✓	2992	29.92	449.43	1111	1117	"	"	"	
16	✓	2998	29.98	479.41	1102	—	"	"	"	
17	✓	3001	30.01	509.42	1087	1091	"	"	"	Tagged depth 16.5 bags
18	✓	2998	29.98	539.40	1068	1059	"	"	"	
19	✓	2998	29.98	569.38	1044	1041	"	"	"	
20	✓	2995	29.95	599.33	1026	1029	"	"	"	

Notes: Rat Hole (D) = 3.41

ESTIMATED ANNULAR MATERIAL RECORD (Continued)

Project Name: Charlie Well PVNGS
Project Number: 040070
Well Number: 55-214659
Date: 11/10/07
Geologist: RG

EQUATIONS

2,700 lbs. Silica Sand=1 cubic yard=27 cubic ft
Pea gravel: 1yd^3 = ~2700 lbs.
Bentonite bag = .69ft^3/bag (hydrated)
[1] Volume of bag (Ft^3) = bag weight/100
[2] Calculated depth=previous calculated depth - (v/A)

No.	✓	Weight installed (lbs.)	Volume installed (v) (ft³)	Total Vol. installed (ft³)	Calculated Depth[2] (ft bls)	Tagged Depth (ft bls)	Type of Annular Material	Type/Size of Container	Measurement Method	Comments
21	✓	2993	29.93	629.26	1014	—	Tacna 6-12 mesh	supersack	wt on bag	
22	✓	3001	30.01	659.27	999	1007	"	"	"	
23	✓	2991	29.91	689.18	992	993	"	"	"	
24	✓	2999	29.99	719.17	978	983	"	"	"	
25	✓	2996	29.96	749.13	968	—	"	"	"	
26	✓	3008	30.08	779.21	953	953	"	"	"	
27	✓	2998	29.98	809.13	938	~~934~~ RG	"	"	"	Tagged w/some of bag 28
28	✓	2999	29.98	839.11	923	922	"	"	"	Tagged 926 after swabbing
29	✓	3000	30.00	869.11	RG ~~907~~ 911	—	"	"	"	
30	✓	3000	30.00	899.11	896	899	"	"	"	
31	✓	3001	30.01	929.12	884	882	"	"	"	
32	✓	3000	30.00	959.12	867	870	"	"	"	
33	✓	2997	29.97	989.09	855	855	"	"	"	
34	✓	2997	29.97	1019.06	840	843	"	"	"	
35	✓	3000	30.00	1049.06	828	825	"	"	"	Tagged 832 w/some of bag 35 left
36	✓	3004	30.04	1079.10	810	803	"	"	"	
37	✓	2999	29.99	1109.09	788	785	"	"	"	
38	✓	2997	29.97	1139.06	770	780	"	"	"	
39	✓	2999	29.99	1169.05	765	773	"	"	"	
40	✓	2995	29.95	1199.00	758	763	"	"	"	Pull 3 tremie

Notes: 1020 before swab (time 1300) 1028 after swab (time 1510)

ESTIMATED ANNULAR MATERIAL RECORD (Continued)

Project Name: Charlie Well PVNGS
Project Number: 040070
Well Number: 55-214659
Date: 11/10/07
Geologist: GW, RG, MSC

EQUATIONS

2,700 lbs. Silica Sand=1 cubic yard=27 cubic ft
Pea gravel: 1yd^3 = ~2700 lbs.
Bentonite bag = .69ft^3/bag (hydrated)
[1] Volume of bag (Ft^3) = bag weight/100
[2] Calculated depth=previous calculated depth - (v/A)

No.	✓	Weight installed (lbs.)	Volume installed (v) (ft^3)	Total Vol. installed (ft^3)	Calculated Depth[2] (ft bls)	Tagged Depth (ft bls)	Type of Annular Material	Type/Size of Container	Measurement Method	Comments
41	✓	3000	30.00	1,229.00	748	750	Tacoma 6-12 mesh	super sack	wt. on bag	
42	✓	2996	29.96	1,258.96	735	732	"	"	"	
43	✓	3005	30.05	1,289.01	717	—	"	"	"	
44	✓	2995	29.95	1,318.96	702	696	"	"	"	
45	✓	2996	29.98	1,348.92	681	681	"	"	"	
46	✓	2999	29.99	1,378.91	666	673	"	"	"	hvd fr 670 before swab.
47	✓	2999	29.99	1,408.90	658	—	"	"	"	
48	✓	2997	29.97	1,438.87	643	—	"	"	"	
49	✓	3002	30.02	1,468.89	628	637*	"	"	"	
50	✓	3001	30.01	1,498.90	613	617	"	"	"	
51	✓	3000	30.00	1,528.90	602	602	"	"	"	
52	✓	3000	30.00	1,558.90	587	579**	"	"	"	Tagged after swabbing
53	✓	3006	30.06	1568.96	564	570	"	"	"	
54	✓	2400	Rd 38.4	1607.36	551	—	3/8" hole plug	50 lb bag		1 pallet
55	✓	2400	38.4	1645.76	533	535	"	"	"	1 pallet
56	✓	2400	38.4	1684.16	516	518	"	"	"	1 pallet
57	✓	2400	38.4	1722.56	499	—	"	"	"	1 pallet
58	✓	2400	38.4	1760.96	481	—	"	"	"	"
59	✓	2400	38.4	1799.36	463	466	"	"	"	"
60	✓	2400	38.4	1837.76	447	—	"	"	"	"

Notes:
*Supersack had not been completely pumped down hole yet.
** Tag counter may be off by ~4ft. Actual depth may be deeper.

ESTIMATED ANNULAR MATERIAL RECORD (Continued)

Project Name: Charlie Well PVNGS
Project Number: 040070
Well Number: 55-214659
Date: 11/11/07
Geologist: RG, MAC, GQ

EQUATIONS

2,700 lbs. Silica Sand=1 cubic yard=27 cubic ft Pea gravel: 1yd^3 = ~2700 lbs. Bentonite bag = .69ft^3/bag (hydrated)

[1] Volume of bag (Ft^3) = bag weight/100 [2] Calculated depth=previous calculated depth - (v/A)

No.	✓	Weight installed (lbs.)	Volume installed (v) (ft³)	Total Vol. installed (ft³)	Calculated Depth[2] (ft bls)	Tagged Depth (ft bls)	Type of Annular Material	Type/Size of Container	Measurement Method	Comments
61	✓	2400	38.4	1,876.16	429	—	3/8" hole plug	50 lb bag		1 pallet (48 bags (50 lbs))
62	✓	2400	38.4	1,914.56	410	410	"	"		"
63	✓	2400	38.4	1,952.96	392	391	"	"		"
64	✓	2400	38.4	1,991.36	373	—	"	"		"
65	✓	2400	38.4	2,029.76	355	360	"	"		"
66	✓	2400	38.4	2,068.16	342	344	"	"		"
67	✓	2400	38.4	2,106.56	326	329	"	"		"
68	✓	2400	38.4	2,144.96	311	314	"	"		"
69	✓	2400	38.4	2,183.36	296	302	"	"		"
70	✓	2400	38.4	2,221.76	284	—	"	"		"
71	✓	2400	38.4	2260.16	265	279	"	"		" look at geo logs.
72	✓	2400	38.4	2298.56	260	265	"	"		Tagged in ½ of #73
73	✓	2400	38.4	2336.96	255	257	"	"		1 pallet 3/8 hole plug
74	✓	2400	38.4	2375.36	238	243	"	"		"
75	✓	600	9.6	2384.96	238	236	"	"		10 bags 3/8 hole plug
76	✓	2400	38.4	2423.36	217	—	3/4" hole plug	"		
77	✓	2400	38.4	2461.76	199	208	"	"		Tagged at ½ pallet
78	✓	2400	38.4	2500.16	181	188	"	"		Tagged at ½ pallet
79	✓	2400	38.4	2538.56	162	167	"	"		Tagged at ½ pallet
* 80	✓	2400	38.4	2576.96	144	132	"	"		

Notes:

ESTIMATED ANNULAR MATERIAL RECORD (Continued)

Project Name: Charlie Well PVNGS
Project Number: 040070
Well Number: 55-214659
Date: 11-19-07
Geologist: GQ

EQUATIONS

2,700 lbs. Silica Sand=1 cubic yard=27 cubic ft
Pea gravel: 1yd^3 = ~2700 lbs.
Bentonite bag = .69ft^3/bag (hydrated)
[1] Volume of bag (Ft^3) = bag weight/100
[2] Calculated depth=previous calculated depth - (v/A)

No.	✓	Weight installed (lbs.)	Volume installed (v) (ft^3)	Total Vol. installed (ft^3)	Calculated Depth[2] (ft bls)	Tagged Depth (ft bls)	Type of Annular Material	Type/Size of Container	Measurement Method	Comments
81	✓	2400	38.4	2615.36	114	115	3/8" Holeplug	50 lb bag		
	✓	13,816	108	2723.36	64	52	Sand slurry cement	Cement truck	Delivery ticket	wt: 17.1 lbs/gal
	✓	18,906	175.5	2898.86	-31.57	Ø	Neat cement	Cement truck	Delivery ticket	wt: 14.4 lbs/gal

Notes:

APPENDIX J

WELL DEVELOPMENT FIELD FORMS

CLEAR CREEK ASSOCIATES

SWAB AND AIR-LIFT DEVELOPMENT FIELD DATA LOG

Started 11/13/07 @

Project Name: Charlie Well PVNGS	Project No.: 040070
Well No.: 55-214659	Date: 11-13-07
Location: B(1-6)34aab	Geologist: GQ
Total Depth of Well (ft bls): 1310	Measuring Point (M. P.): discharge baffle
Screen Interval (ft bls): 610-790, 870-1290	Distance from ground level to M. P.: ~7 ft.

Time	Depth Interval (ft)	Color	Odor	Sand Content (ml/l)	pH	Sp. Cond. (mS/cm)	Temp. (°F)	Comments TDS (ppt)	
0745	664-704	Brown	none	0.5	9.05	2.07	80.9	0.88	Kelly down
0755	664-704	Brown	none	0.3	9.08	1.35	80.9	0.69	Kelly down
0740	1285-1290	cloudy	none	trace	8.46	0.86	77.0	0.93	1/2 Kelly
0835	1199-1244	Brown	none	0.3	8.73	1.42	82.3	0.72	Kelly down Swab
0840	1199-1244	cloudy	none	trace	8.67	1.36	84.1	0.68	Kelly down
0848	1199-1244	cloudy	none	none	8.65	1.37	83.8	0.68	1/2 Kelly
0855	1199-1244	cloudy	none	none	8.66	1.36	84.4	0.68	1/2 Kelly Swab
0904	1199-1244	slightly cloudy	none	none	8.65	1.35	84.3	0.68	Kelly up
0910	1199-1244	cloudy	none	trace	8.64	1.37	84.3	0.68	Kelly up Swab
0920	1199-1244	slightly cloudy	none	trace	8.64	1.34	84.2	0.67	Kelly down
0927	1199-1244	cloudy	none	trace	8.66	1.36	84.1	0.68	Kelly down Swab
0939	1199-1244	Brown	none	0.4	8.68	1.38	84.6	0.69	1/2 Kelly
0945	1199-1244	cloudy	none	0.1	8.64	1.37	85.6	0.68	1/2 Kelly Swab
0958	1199-1244	slightly cloudy	none	trace	8.64	1.35	84.6	0.68	3/4 Kelly
1005	1199-1244	slightly cloudy	none	none	8.66	1.36	84.7	0.68	3/4 Kelly Swab
1014	1199-1244	Brown	none	0.1	8.66	1.36	85.1	0.68	Kelly down
1022	1199-1244	cloudy	none	trace	8.64	1.36	85.6	0.68	Kelly down Swab
1030	1199-1244	cloudy	none	trace	8.64	1.36	84.9	0.68	1/2 Kelly
1037	1199-1244	cloudy	none	trace	8.66	1.35	85.4	0.67	1/2 Kelly Swab
0805	993-1035	very cloudy	none	trace	8.64	1.75	83.9	0.86	1/2 Kelly
0810	993-1035	very cloudy	none	trace	8.69	1.49	83.9	0.74	1/2 Kelly
0817	993-1035	cloudy	none	trace	8.66	1.43	83.1	0.71	1/2 Kelly
0825	993-1035	cloudy	none	none	8.65	1.41	83.1	0.71	1/2 Kelly Swab
0835	993-1035	very light brown	none	0.1	8.63	1.41	82.5	0.71	Kelly down
0843	993-1035	cloudy	none	trace	8.62	1.41	82.9	0.70	Kelly down Swab
0859	993-1035	cloudy	none	trace	8.63	1.40	81.8	0.70	Kelly up
0906	993-1035	slightly cloudy	none	trace	8.65	1.40	82.0	0.70	Kelly up
0913	993-1035	slightly cloudy	none	trace	8.64	1.40	82.2	0.70	Kelly up

Additional Comments:

CLEAR CREEK ASSOCIATES

SWAB AND AIR-LIFT DEVELOPMENT FIELD DATA LOG

Project Name: Charlie Well PVNGS	Project No.: 040070
Well No.: 55-214659	Date: 11-15-07
Location: B(1-6)34 aab	Geologist: GQ
Total Depth of Well (ft bls): 1310	Measuring Point (M. P.): discharge baffle
Screen Interval (ft bls): 610-790, 870-1290	Distance from ground level to M. P.: ~7 ft

Time	Depth Interval (ft)	Color	Odor	Sand Content (ml/l)	pH	Sp. Cond. (µs/cm)	Temp. (°F)	Comments TDS (ppt)
0925	993-1035	very slightly cloudy	none	none	8.64	1.39	82.2	0.69 Kelly up Swab
0940	993-1035	light brown	none	0.1	8.63	1.40	82.7	0.70 Kelly down
0948	993-1035	slightly cloudy	none	trace	8.62	1.40	83.3	0.70 Kelly down
0957	993-1035	very slightly cloudy	none	none	8.62	1.38	82.1	0.69 Kelly down
1040	951-993	very light brown	none	0.1	8.63	1.39	82.9	0.69 Kelly down
1048	951-993	cloudy	none	trace	8.63	1.42	84.8	0.71 Kelly down
1057	951-993	cloudy	none	trace	8.61	1.41	85.0	0.70 Kelly down Swab
1109	951-993	very light brown	none	0.1	8.63	1.41	84.6	0.70 1/4 Kelly
1117	951-993	cloudy	none	trace	8.62	1.40	85.0	0.70 1/4 Kelly
1125	951-993	cloudy	none	trace	8.64	1.41	85.0	0.70 1/4 Kelly
0742	704-746	very slightly cloudy	none	none	8.44	1.64	82.5	0.83 Kelly down Swab
0758	704-746	cloudy	none	trace	8.67	1.41	81.8	0.71 1/2 Kelly
0805	704-746	cloudy	none	none	8.61	1.41	82.5	0.71 1/2 Kelly Swab
0814	704-746	cloudy	none	0.1	8.59	1.46	82.7	0.73 1/4 Kelly Swab
0826	704-746	cloudy	none	trace	8.62	1.36	81.9	0.68 3/4 Kelly
0857	664-704	Brown	none	0.4	8.59	1.43	83.6	0.72 Kelly down Swab
0908	664-704	Brown	none	0.5	8.60	1.42	83.8	0.71 1/4 Kelly "
0916	664-704	cloudy	none	trace	8.59	1.45	84.8	0.72 1/4 Kelly Swab
0924	664-704	cloudy	none	trace	8.58	1.42	84.9	0.71 1/2 Kelly
0930	664-704	cloudy	none	trace	8.61	1.42	84.8	0.71 1/2 Kelly Swab
0938	664-704	light brown	none	0.3	8.63	1.43	86.4	0.71 1/2 Kelly
0945	664-704	cloudy	none	trace	8.59	1.44	85.2	0.72 1/2 Kelly Swab
0954	664-704	light brown	none	0.1	8.64	1.36	85.1	0.68 3/4 Kelly
1002	664-704	cloudy	none	trace	8.59	1.42	85.4	0.71 3/4 Kelly
1010	664-704	slightly cloudy	none	trace	8.61	1.45	85.4	0.72 3/4 Kelly Swab
1019	664-704	cloudy	none	trace	8.57	1.48	86.1	0.74 1/4 Kelly
1027	664-704	cloudy	none	trace	8.63	1.44	85.2	0.72 1/4 Kelly Swab
1039	664-704	cloudy	none	trace	8.60	1.43	85.4	0.71 1/2 Kelly "

Additional Comments:

CLEAR CREEK ASSOCIATES

SWAB AND AIR-LIFT DEVELOPMENT FIELD DATA LOG

Project Name: Charlie Well PVNGS	Project No.: 040070
Well No.: 55-614659	Date: 11-16-07
Location: B(1-6)34aab	Geologist: GQ
Total Depth of Well (ft bls): 1310	Measuring Point (M. P.): discharge baffle
Screen Interval (ft bls): 610-790, 870-1290	Distance from ground level to M. P.: ~7 ft.

Time	Depth Interval (ft)	Color	Odor	Sand Content (ml/l)	pH	Sp. Cond. (mS (µS/cm))	Temp. (°F)	Comments TDS (ppt)
1045	664-704	slightly cloudy	none	none	8.60	1.43	85.4	0.72 1/2 Kelly Swab
1052	664-704	cloudy	none	trace	8.62	1.41	85.0	0.70 1/2 Kelly
1100	664-704	slightly cloudy	none	none	8.61	1.41	85.2	0.70 1/2 Kelly Swab
1110	664-704	cloudy	none	trace	8.62	1.41	84.9	0.70 1/2 Kelly
1117	664-704	slightly cloudy	none	none	8.61	1.43	85.4	0.72 1/2 Kelly

Additional Comments:

PUMP AND SURGE DEVELOPMENT
FIELD DATA LOG

Project Name: PVNGS Charlie Well	Project No.: 040070
Well No.: 55-214659	Date: 12-10-07
Location: B(1-6)34 99b	Geologist: GQ
Total Depth of Well (ft bls): 1310	Measuring Point (M.P.): top of sounding tube
Pump Type/Setting (ft bls): turbine / 440' bls	Distance from ground level to M. P.: ~2 ft
Static Water Level (ft bls): 204' - 2' = 202 ft bls	Screen Interval (ft bls): 610-790, 870-1290
How Q Measured: flowmeter, totalizer, manometer 10" pipe 8" orifice	

Time	Totalizer Reading	Discharge (gpm)	Pumping Water Level (ft)	Drawdown (ft)	Specific Capacity (gpm/ft)	Specific Conductivity (~~µS/cm~~ mS)	pH	Temp. (°F)	TDS (~~ppm~~ ppt)	Sand Content (ml/l)	Comments
0656	~~25~~ 542055 259477 511183	—	204	—	—	—	—	—	—	—	40428 gf
0722	25548/511192	501.7	522.60	18.6	26.97	1.68	9.23	74.0	0.33	trace	
0730	—	—	—	—	—	—	—	—	—	—	Surge (x3)
0734	—	—	—	—	—	—	—	—	—	—	Pump on @ 530 gpm
0748	259498/511204	520.8	226.05	22.05	23.62	1.41	8.37	80.8	0.70	trace	
0759	259509/511209	518.3	226.01	22.01	23.55	1.42	8.15	82.3	0.71	trace	
0800	—	—	—	—	—	—	—	—	—	—	Surge(x3)
0804	—	—	—	—	—	—	—	—	—	—	Pump on @ 520gpm
0812	259510/511214	533.2	225.69	21.69	24.58	1.42	8.45	83.5	0.71	trace	
0825	259516/511221	500.8	225.81	21.81	22.96	1.41	8.36	82.0	0.71	None	
0830	—	—	—	—	—	—	—	—	—	—	Surge (x3)
0834	—	—	—	—	—	—	—	—	—	—	Pump on @ 520 gpm
0844	259523/511229	517	225.89	21.89	23.62	1.40	8.26	81.4	0.70	None	
0855	259529/511235	529.8	225.90	21.90	24.19	1.45	8.28	84.1	0.73	trace	
0900	—	—	—	—	—	—	—	—	—	—	Surge(x3)
0904	—	—	—	—	—	—	—	—	—	—	Pump on @ 700gpm.
0914	259538/511244	703	243.35	39.35	17.87	1.46	8.26	83.3	0.73	trace	
0925	259546/511252	705	244.70	40.70	17.32	1.43	8.27	85.2	0.71	trace	
0931	—	—	—	—	—	—	—	—	—	—	Surge (x3)
0935	—	—	—	—	—	—	—	—	—	—	Pump on @ 700gpm
0945	259557/511262	682	262.65	58.65	11.63	1.46	8.26	85.0	0.73	trace	

Additional Comments:

PUMP AND SURGE DEVELOPMENT
FIELD DATA LOG

Project Name: PVNGS Charlie Well	Project No.: 040070
Well No.: 55-214659	Date: 12-10-07
Location: B(1-6)34aab	Geologist: GQ
Total Depth of Well (ft bls): 1310	Measuring Point (M.P.): top of sounding tube
Pump Type/Setting (ft bls): turbine / 440' bls	Distance from ground level to M. P.: ~2 ft
Static Water Level (ft bls): 204' - 2' = 202' bls	Screen Interval (ft bls): 610-790, 870-1290
How Q Measured: flowmeter, totalizer manometer 10" pipe 8" orifice	

Time	Totalizer Reading	Discharge (gpm)	Pumping Water Level (ft)	Drawdown (ft)	Specific Capacity (gpm/ft)	Specific Conductivity (µS/cm)	pH	Temp. (°F)	TDS (ppm) ppt	Sand Content (ml/l)	Comments
0958	259567/511272	672	262.88	58.88	11.41	1.45	8.23	84.3	0.72	trace	Surge (x3)
1013	259573/511278	649	260.08	56.08	11.57	—	—	—	—	—	
1025	259581/511287	686	269.42	65.42	10.49	1.46	8.21	83.6	0.73	trace	
1030	—	—	—	—	—	—	—	—	—	—	Surge (x3)
1034	—	—	—	—	—	—	—	—	—	—	Pump on @ 700 gpm
1045	259593/511299	722	269.90	65.90	10.96	1.42	8.16	82.0	0.71	trace	Nitrate: 2
1057	259601/511307	700	270.64	66.64	10.50	1.41	8.16	82.1	0.71	None	
1100	—	—	—	—	—	—	—	—	—	—	Surge (x3)
1106	—	—	—	—	—	—	—	—	—	—	Pump on @ 1000 gpm
1116	259615/511321	885	317.00	113.00	7.83	1.43	8.27	81.8	0.71	None	Increasing to 1000 gpm
1127	259626/511332	1009	321.25	117.25	8.61	1.45	8.25	84.3	0.72	trace	
1130	—	—	—	—	—	—	—	—	—	—	Surge (x3)
1134	—	—	—	—	—	—	—	—	—	—	Pump on @ 1000 gpm
1145	259641/511346	996	320.18	116.18	8.57	1.45	8.26	84.2	0.72	trace	Manometer: 7.5" 825 gpm
1157	259652/511358	992	324.02	120.02	8.27	1.44	8.26	84.0	0.72	trace	
1200	—	—	—	—	—	—	—	—	—	—	Surge (x3)
1204	—	—	—	—	—	—	—	—	—	—	Pump on @ 1000 gpm
1215	259667/511373	996	319.40	115.40	8.63	—	—	—	—	—	
1226	259678/511384	993	321.75	117.75	8.43	1.46	8.23	83.8	0.72	trace	
1230	—	—	—	—	—	—	—	—	—	—	Surge (x3)
1234	—	—	—	—	—	—	—	—	—	—	Pump on @ 1000 gpm

Additional Comments:

PUMP AND SURGE DEVELOPMENT
FIELD DATA LOG

Project Name: PVNGS Charlie Well	Project No.: 040070
Well No.: 55-214659	Date: 12-10-07
Location: B(1-6)34aab	Geologist: GQ
Total Depth of Well (ft bls): 1310	Measuring Point (M.P.): top of sounding tube
Pump Type/Setting (ft bls): turbine /440' bls	Distance from ground level to M. P.: ~2 ft.
Static Water Level (ft bls): 204' - 2' = 202' bls	Screen Interval (ft bls): 610 - 790, 870-1290
How Q Measured: flowmeter, totalizer, manometer 10" pipe 8" orifice	

Time	Totalizer Reading	Discharge (gpm)	Pumping Water Level (ft)	Drawdown (ft)	Specific Capacity (gpm/ft)	Specific Conductivity (mS/cm)	pH	Temp. (°F)	TDS (~~ppm~~ ppt)	Sand Content (ml/l)	Comments
1247	259695/511401	1001	321.73	117.73	8.50	1.45	8.22	84.0	0.73	trace	
1257	259705/511411	1003	322.64	118.64	8.45	1.45	8.21	83.8	0.72	trace	
1300	—	—	—	—	—	—	—	—	—	—	Surge (x3)
1304	—	—	—	—	—	—	—	—	—	—	Pump on @ 1200 gpm
1315	259721/511427	1193	354.23	150.23	7.94	1.45	8.21	83.5	0.72	trace	Manometer: 10.5" 976 gpm
1328	259737/511443	1196	357.00	153.00	7.82	1.45	8.22	83.6	0.72	trace	Nitrate: 2
1330	—	—	—	—	—	—	—	—	—	~~trace~~	Surge (x3)
1334	—	—	—	—	—	—	—	—	—	—	Pump on @ 1200 gpm
1345	259753/511459	1203	353.50	149.50	8.05	1.45	8.21	83.8	0.72	0.1	Manometer: 14" 1127 gpm.
1358	259768/511474	1201	355.74			1.51	8.26	84.4	0.75	0.1	
1400	—	—	—	—	—	—	—	—	—	—	Surge (x3)
1404	—	—	—	—	—	—	—	—	—	—	Pump on @ 1200 gpm
1415	259781/511490	1204	353.95	149.95	8.03	1.44	8.21	83.4	0.72	0.1	Manometer: 16.5" 1224 gpm
1428	259800/511506	1203	356.78	152.78	7.87	1.44	8.24	83.4	0.72	trace	
1430	—	—	—	—	—	—	—	—	—	—	Surge (x3) Rossum: 26 ppm
1434	—	—	—	—	—	—	—	—	—	—	Pump on @ 1500 gpm
1445	259819/511524	1502	404.05	200.05	7.51	1.45	8.21	80.4	0.72	0.1	Manometer: 25.5" 1522 gpm
1458	259838/511544	1491	410.37	206.37	7.22	1.44	8.24	81.3	0.73	0.1	
1500	—	—	—	—	—	—	—	—	—	—	Surge (x3)
1504	—	—	—	—	—	—	—	—	—	—	Pump on @ 1400 gpm
1515	259856/511562	1387	384.60	180.60	7.68	1.46	8.22	82.8	0.73	trace	

Additional Comments:

PUMP AND SURGE DEVELOPMENT
FIELD DATA LOG

Project Name: PVNGS Charlie Well	Project No.: 040070
Well No.: 55-214659	Date: 12-10-07
Location: B(1-6)34aab	Geologist: GQ
Total Depth of Well (ft bls): 1310	Measuring Point (M.P.): top of sounding tube
Pump Type/Setting (ft bls): Turbine / 440' bls	Distance from ground level to M. P.: ~2 ft
Static Water Level (ft bls): 204' - 2' = 202' bls	Screen Interval (ft bls): 610-790, 870-1290
How Q Measured: flowmeter, totalizer, manometer 10" pipe 8" orifice	

Time	Totalizer Reading	Discharge (gpm)	Pumping Water Level (ft)	Drawdown (ft)	Specific Capacity (gpm/ft)	Specific Conductivity (~~µS~~ mS/cm)	pH	Temp. (°F)	TDS (~~ppm~~ ppt)	Sand Content (ml/l)	Comments
1528	259874/511580	1386	393.88	189.88	7.30	1.46	8.22	83.2	0.73	trace	
1530	—	—	—	—	—	—	—	—	—	—	Surge (x3) Rossum= 12.5 ppm
1534	—	—	—	—	—	—	—	—	—	—	Pump on @ 1400 gpm
1545	259893/511599	1426	389.30	185.30	7.70	1.46	8.11	82.4	0.72	trace	Manometer: 22.5" 1429 gpm
1558	259911/511617	1414	393.37	189.37	7.47	1.46	8.13	81.4	0.73	trace	
1600	—	—	—	—	—	—	—	—	—	—	Surge (x3) Rossum= 7.2 ppm
1604	—	—	—	—	—	—	—	—	—	—	Pump on @ 1400 gpm.
1617	259933/511639	1420	390.04	186.04	7.63	—	—	—	—	—	
1628	259949/511655	1416	393.08	189.08	7.49	1.47	8.13	82.4	0.73	trace	
1630	—	—	—	—	—	—	—	—	—	—	Surge (x3) Rossum= 4.2 ppm
1634	—	—	—	—	—	—	—	—	—	—	Pump on @ 1400 gpm.
1642	259964/511669	1437	386.50	182.5	7.87	1.44	8.16	81.7	0.72	trace	
1645	—	—	—	—	—	—	—	—	—	—	Surge (x3) Rossum= 5.2 ppm
1649	—	—	—	—	—	—	—	—	—	—	Pump on @ 1400 gpm.
1658	259981/511687	1406	383.44	179.44	7.84	1.46	8.19	82.1	0.73	trace	
1700	—	—	—	—	—	—	—	—	—	—	Surge (x3) Rossum= 5.2 ppm
1704	—	—	—	—	—	—	—	—	—	—	Pump on @ 1400 gpm
1715	260009/511706	1399	381.76	177.76	7.87	1.47	8.19	81.2	0.73	trace	
1728	260018/511724	1373	387.05	183.05	7.50	1.43	8.08	81.7	0.72	none	Rossum = 3.6 ppm
1730	—	—	—	—	—	—	—	—	—	—	Pump shut off

Additional Comments:

APPENDIX K

PUMPING TEST DATA

STEP	AVG Q
1	591
2	783
3	1008
4	1183
5	~~1391~~ 1400

10-HR STEP

AQUIFER TEST DATA

Project: PVNGS Charlie Well	Project No.: 040070		Static Water Level: 203.65' - 2' (stickup) = 201.65' bls
Well Location: B(1-6) 34aab	Well No.: 55-214659		Measuring Point: top of sounding tube
Well Diameter: 16", 20"	Measured By: GQ		Elevation Measuring Point:
Pump Setting: 440' bls	Pump On: Date 12-11-07	Time: 0500	Available Drawdown: 238.35'
Screen Interval(s): 610-790, 870-1290	Pump Off: Date 12-11-07	Time: 1500	Distance From Pumping Well: N/A
How Q Measured: flowmeter, totalizer, manometer	Duration of Aquifer Test: 10 hours		Initial Totalizer Reading: 22542629 / 2600 21 / 511727 | 40603 gf

Time of Measurement	Time Since Pumping Started (t) (minutes)	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-201.65)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x1000)	Remarks
0501	1	222.60	2.0	220.60	18.95	544	28.71	260022 511728	
0502	2	234.63		232.63	30.98	630	20.34	260023 511728	
0503	3	240.47		238.47	36.82	588	15.97	260023 511729	
0504	4	244.10		242.10	40.45	580	14.34	260024 511729	
0505	5	246.33		244.33	42.68	575	13.47	260024 511730	
0506	6	247.80		245.80	44.15	618	14.00	260025 511731	Increased GPM's
0507	7	251.77		249.77	48.12	611	12.70	260026 511731	
0508	8	253.19		251.19	49.54	625	12.62	260026 511732	
0509	9	253.66		251.66	50.01	605	12.08	260027 511732	
0510	10	253.46		251.46	49.81	606	12.17	260027 511733	
0512	12	254.10		252.10	50.45	602	11.93	260029 511734	
0514	14	254.48		252.48	50.83	593	11.67	260030 511735	
0516	16	254.78		252.78	51.13	604	11.81	260031 511736	
0518	18	255.00		253.00	51.35	593	11.55	260032 511738	
0520	20	255.03		253.03	51.38	605	11.78	260033 511739	
0525	25	255.36		253.36	51.71	591	11.43	260036 511742	
0530	30	255.98		253.98	52.33	593	11.33	260039 511745	

AQUIFER TEST DATA

Project No. 040070
Date 12-11-07

Time of Measurement	Time Since Pumping Started (t) (minutes)	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-201.65)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x1000)	Remarks
0540	40	256.50	2.0	254.50	52.85	588	11.13	260045 511751	
0550	50	256.65		254.65	53.00	586	11.06	260051 511757	
0600	60	256.93		254.93	53.28	605	11.36	260057 511763	
0615	75	257.30		255.30	53.65	583	10.87	260066 511772	
0630	90	257.15		255.15	53.50	586	10.95	260075 511781	
0645	105	257.38		255.38	53.73	588	10.94	260084 511789	
0700	120	257.19		255.19	53.54	599	11.19	260092 511798	End of Step 1
0701	121	257.60		255.60	53.95	755	13.99	260093 511799	Begin Step 2
0702	122	269.81		267.81	66.16	764	11.55	260094 511799	
0703	123	274.64		272.64	70.99	804	11.33	260095 511800	
0704	124	276.60		274.60	72.95	797	10.93	260095 511801	
0705	125	277.97		275.97	74.32	787	10.59	260096 511802	
0706	126	278.78		276.78	75.13	790	10.52	260097 511803	
0707	127	279.55		277.55	75.90	783	10.32	260097 511803	
0708	128	281.37		279.37	77.72	798	10.27	260098 511804	
0709	129	282.46		280.46	78.81	792	10.05	260099 511805	
0710	130	282.77		280.77	79.12	793	10.07	260100 511805	
0712	132	283.14		281.14	79.49	799	10.05	260102 511807	
0714	134	283.48		281.48	79.83	786	9.85	260103 511809	
0716	136	283.60		281.60	79.95	800	10.01	260105 511810	
0718	138	283.79		281.79	80.14	799	9.97	260106 511812	
0720	140	283.86		281.86	80.21	798	9.95	260108 511814	
0725	145	283.86	↓	281.86	80.21	792	9.87	260112 511817	

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CLEAR CREEK ASSOCIATES

AQUIFER TEST DATA

Project No. 040070
Date 12-11-07

Time of Measurement	Time Since Pumping Started (t) (minutes)	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-201.65)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x1000)	Remarks
0730	150	284.00	2.0	282.00	80.35	780	9.71	260116 511822	
0740	160	284.28		282.28	80.63	785	9.74	260124 511830	
0750	170	284.70		282.70	81.05	786	9.70	260132 511837	
0800	180	284.64		282.64	80.99	789	9.74	260139 511845	
0815	195	284.88		282.88	81.23	780	9.60	260151 511857	
0830	210	284.80		282.80	81.15	789	9.72	260163 511869	
0845	225	285.03		283.03	81.38	782	9.61	260175 511881	
0900	240	284.60		282.60	80.95	784	9.68	260186 511891	End Step 2 783
0901	241	288.60		286.60	84.95	1112	13.09	260187 511893	Begin Step 3
0902	242	301.15		299.15	97.50	1038	10.65	260188 511894	
0903	243	305.49		303.49	101.84	996	9.78	260189 511895	
0904	244	307.00		305.00	103.35	986	9.54	260190 511896	
0905	245	308.88		306.88	105.23	1003	9.53	260191 511897	
0906	246	311.65		309.65	108.00	1015	9.40	260192 511898	
0907	247	312.46		310.46	108.81	1001	9.20	260193 511899	
0908	248	313.08		311.08	109.43	1006	9.19	260194 511900	
0909	249	313.49		311.49	109.84	990	9.01	260195 511901	
0910	250	313.69		311.69	110.04	997	9.06	260196 511902	
0912	252	314.10		312.10	110.45	995	9.01	260198 511904	
0914	254	314.57		312.57	110.92	995	8.97	260200 511906	
0916	256	314.70		312.70	111.05	994	8.95	260202 511908	
0918	258	314.89		312.89	111.24	990	8.90	260204 511910	
0920	260	315.06	↓	313.06	111.41	987	8.86	260206 511912	

CLEAR CREEK ASSOCIATES

AQUIFER TEST DATA

Project No. 040070
Date 12-11-07

Time of Measurement	Time Since Pumping Started (t) (minutes)	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-201.65)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x1000)	Remarks
0925	265	315.28	2.0	313.28	111.63	982	8.80	260211 511917	
0930	270	315.20		313.20	111.55	984	8.82	260216 511922	Increasing GPM's
0940	280	317.05		315.05	113.40	998	8.80	260226 511932	Manometer: 10.5" 976 gpm
0950	290	317.70		315.70	114.05	1007	8.83	260236 511942	
1000	300	317.92		315.92	114.27	1002	8.77	260246 511952	pH: 8.20 TDS: 0.84 ppt Stand. Cond: 1.69 mS/cm T: 83.5°F Cont: None
1015	315	318.10		316.10	114.45	1001	8.75	260261 511966	
1030	330	318.30		316.30	114.65	981	8.56	260276 511982	pH: 8.22 TDS: 0.75 ppt Stand Cond: 1.51 mS/cm T: 82.5°F Cont: None
1045	345	318.30		316.30	114.65	986	8.60	260291 511997	Manometer: 11" 999 gpm
1100	360	317.71		315.71	114.06	985	8.64	260306 512012	End Step 3 1000
1101	361	329.55		327.55	125.90	1228	9.75	260307 512013	Begin Step 4
1102	362	337.32		335.32	133.67	1231	9.21	260308 512014	
1103	363	341.72		339.72	138.07	1197	8.67	260309 512015	
1104	364	343.20		341.20	139.55	1218	8.73	260310 512016	
1105	365	344.81		342.81	141.16	1190	8.43	260311 512017	
1106	366	345.70		343.70	142.05	1187	8.36	260313 512018	
1107	367	346.49		344.49	142.84	1201	8.41	260314 512020	
1108	368	346.99		344.99	143.34	1202	8.39	260315 512021	
1109	369	347.40		345.40	143.75	1207	8.40	260316 512022	
1110	370	347.73		345.73	144.08	1193	8.28	260317 512023	
1112	372	348.35		346.35	144.70	1185	8.19	260320 512025	Manometer: 16" 1205 gpm
1114	374	348.78		346.78	145.13	1191	8.21	260323 512028	
1116	376	349.04		347.04	145.39	1189	8.18	260324 512030	
1118	378	349.17	✓	347.17	145.52	1189	8.17	260327 512033	

CLEAR CREEK ASSOCIATES

AQUIFER TEST DATA

Project No. 040070
Date 12-11-07

Time of Measurement	Time Since Pumping Started (t) (minutes)	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-201.65)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x1000)	Remarks
1120	380	349.98	2.0	347.98	146.33	1197	8.18	260330 512035	
1125	385	350.79		348.79	147.14	1200	8.16	260336 512041	
1130	390	351.10		349.10	147.45	1198	8.12	260341 512047	
1140	400	351.68		349.68	148.03	1201	8.11	260353 512058	
1150	410	352.31		350.31	148.66	1203	8.09	260365 512071	
1200	420	352.10		350.10	148.45	1206	8.12	260378 512083	pH: 8.18 TDS: 0.74 ppt Cond: 1.48 mS/cm T: 81.8°F Sand: None
1215	435	352.50		350.50	148.85	1185	7.96	260395 512100	
1230	450	352.68		350.68	149.03	1187	7.96	260413 512119	Manometer: 16" 1205 gpm
1245	465	353.05		351.05	149.40	1202	8.05	260432 512137	
1300	480	353.23		351.23	149.58	1195	7.99	260448 512154	End Step 4 1183
1301	481	355.00		353.00	151.35	1344	8.88	260450 512156	Begin Step 5
1302	482	367.70		365.70	164.05	1405	8.56	260451 512157	
1303	483	373.54		371.54	169.89	1400	8.24	260453 512158	
1304	484	376.97		374.97	173.32	1410	8.14	260454 512159	
1305	485	379.40		377.40	175.75	1400	7.97	260455 512161	
1306	486	380.48		378.48	176.83	1398	7.91	260457 512162	
1307	487	381.42		379.42	177.77	1386	7.80	260458 512164	
1308	488	382.09		380.09	178.44	1376	7.71	260460 512165	
1309	489	383.53		381.53	179.88	1400	7.78	260461 512167	
1310	490	385.34		383.34	181.69	1413	7.78	260462 512168	
1312	492	387.35		385.35	183.70	1414	7.70	260465 512171	Manometer: 22.5" 1429 gpm
1314	494	388.45		386.45	184.80	1389	7.52	260468 512174	
1316	496	389.15		387.15	185.50	1406	7.58	260471 512176	

CLEAR CREEK ASSOCIATES

AQUIFER TEST DATA

Project No. 040070
Date 12-11-07

Time of Measurement	Time Since Pumping Started (t) (minutes)	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-201.65)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x1000)	Remarks
1318	498	389.72	2.0	387.72	186.07	1404	7.55	260474 512180	
1320	500	390.10		388.10	186.45	1400	7.51	260476 512182	
1325	505	390.90		388.90	187.25	1400	7.48	260484 512190	
1330	510	391.28		389.28	187.63	1398	7.45	260491 512196	
1340	520	391.57		389.57	187.92	1393	7.41	260504 512210	
1350	530	392.45		390.45	188.80	1391	7.37	260518 512224	pH: 3.13 TDS: 0.73 ppt Cond: 1.46 mS/cm T: 80.9°F Nit: 2 Sand: none
1400	540	392.98		390.98	189.33	1390	7.34	260532 512238	
1415	555	393.05		391.05	189.40	1401	7.40	260553 512259	Manometer: 22" 1413gpm
1430	570	393.70		391.70	190.05	1383	7.28	260575 512280	
1445	585	393.90		391.90	190.25	1405	7.39	260595 512301	
1500	600	395.02		393.02	191.37	1400	7.32	260615 512322	End Step 5

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CLEAR CREEK ASSOCIATES

48-hour Constant Rate Test

AQUIFER TEST DATA

Project: Palo Verde Production Well Charlie	Project No.: 040070		Static Water Level: 205.72'
Well Location: B(1-6)34aab	Well No.: 55-214659		Measuring Point: Top of casing/sounding tube
Well Diameter: 16", 20"	Measured By: LNP		Elevation Measuring Point: 2'
Pump Setting: 440'	Pump On: Date 12/15/07	Time: 0700	Available Drawdown: 206.28
Screen Interval(s): 610-790, 870-1290	Pump Off: Date	Time:	Distance From Pumping Well: N/A
How Q Measured: Digital flow meter	Duration of Aquifer Test: 48 hr		Initial Totalizer Reading: 22543226

Time of Measurement	Time Since Pumping Started (t) (minutes)	Recovery Time (t') (minutes)	t/t'	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-203.72)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x1000)	Remarks
0701	1	N/A	N/A	238	2	236.0	32.28	~1100	30.98	—	Initial totalizer = 22543226
0702	2			272.15	2	270.15	66.43	~1100	15.05	—	
0703	3			287.26	2	285.26	81.54	~1100	12.26	—	
0704	4			298.98	2	296.98	93.26	~1100	10.72	—	Calculated gpm = 1000
0705	5			301.92	2	299.92	96.20	~1100	10.40	—	
0706	6			306.57	2	304.57	100.85	~1100	9.92	—	
0707	7			309.97	2	307.97	104.25	~1100	9.59	—	
0708	8			312.78	2	310.78	107.06	~1100	9.34	—	
0709	9			314.76	2	312.76	109.04	~1100	9.17	—	
0710	10			315.82	2	313.82	110.10	~1000	9.08	22543236	
0712	12			317.90	2	315.90	112.18	~1080	9.81	22543239	
0714	14			319.10	2	317.10	113.38	~1080	9.70	22543241	
0716	16			320.03	2	318.03	114.31	~1075	9.62	22543243	Calculated gpm = 1100
0718	18			323.42	2	321.42	117.70	~1115	9.35	22543246	
0720	20			326.84	2	324.84	121.12	~1110	9.08	22543247	
0725	25			329.47	2	327.47	123.75	~1110	8.89	22543254	
0730	30			330.56	2	328.56	124.84	~1115	8.81	22543259	

CLEAR CREEK ASSOCIATES

48-hour Constant Rate Test

AQUIFER TEST DATA

Project No. 040070

Date 12/15/07

Time of Measurement	Time Since Pumping Started (t) (minutes)	Recovery Time (t') (minutes)	t/t'	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-203.72)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x1000)	Remarks
0740	40	N/A	N/A	331.18	2	329.18	125.46	~1100	8.77	22543270	
0750	50			332.10	2	330.10	126.38	~1100	8.70	22543281	
0800	60			332.72	2	330.72	127.0	~1100	8.66	22543292	
0815	75			332.62	2	330.62	126.90	~1100	8.67	22543309	
0830	90			333.23	2	331.23	127.51	~1100	8.63	22543325	
0845	105			333.06	2	331.06	127.34	~1100	8.64	22543342	
0900	120			333.56	2	331.56	127.84	~1100	8.61	22543358	
0915	135			334.03	2	332.03	128.31	~1100	8.57	22543374	
0930	150			333.15	2	331.15	127.43	~1100	8.63	22543391	
0945	165			334.28	2	332.28	128.56	~1100	8.56	22543407	
1000	180			333.40	2	331.40	127.68	~1100	8.62	22543423	
1015	195			333.98	2	331.98	128.26	~1100	8.58	22543439	
1030	210			333.36	2	331.36	127.64	~1100	8.62	22543456	
1045	225			333.82	2	331.82	128.10	~1100	8.59	22543471	
1100	240			333.58	2	331.58	127.86	~1100	8.60	22543488	
1115	255			333.99	2	331.99	128.27	~1100	8.58	22543504	
1130	270			333.90	2	331.90	128.18	~1100	8.58	22543520	
1145	285			334.08	2	332.08	128.36	~1100	8.57	22543536	
1200	300			334.60	2	332.60	128.88	~1100	8.54	22543553	
1230	330			334.80	2	332.80	129.08	~1100	8.52	22543585	
1300	360			334.60	2	332.60	128.88	~1100	8.54	22543618	
1330	390			—	—	—	—	—	—	—	
1400	420	STATIC WATER LEVEL 205.72		334.11	2	332.11	128.39	1081	8.55	22545684	Begin pump operator readings

- 2' Correction

CLEAR CREEK ASSOCIATES

48-hour Constant Rate Test

AQUIFER TEST DATA

Project No. 040070

Date 12/15-12/16/07

Time of Measure-ment	Time Since Pumping Started (t) (minutes)	Recovery Time (t') (minutes)	t/t'	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-203.72)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x/000)	Remarks
1500	480	N/A	N/A	333.90	2	331.90	128.18	1085	8.46	22543748	
1600	540			334.40	2	332.40	128.68	1070	8.31	22543811	
1700	600			334.00	2	332.00	128.28	1076	8.38	22543877	
1800	660			334.72	2	332.72	129.0	1083	8.39	22543942	
1900	720			334.90	2	332.90	129.18	1053	8.15	22544005	
2000	780			334.80	2	332.80	129.08	1077	8.34	22544069	
2100	840			334.60	2	332.60	128.88	1088	9.44	22544133	
2200	900			334.40	2	332.40	128.68	1069	8.30	22544198	
2300	960			334.80	2	332.80	129.08	1079	8.35	22544262	
12/15/07 2400	1020			335.30	2	333.30	129.58	1070	8.25	22544326	
12/16/07 0100	1080			334.80	2	332.80	129.08	1076	8.33	22544390	
0200	1140			334.60	2	332.60	128.88	1086	8.42	22544455	
0300	1200			334.90	2	332.90	129.18	1058	8.19	22544519	
0400	1260			335.40	2	333.40	129.68	1069	8.24	22544583	
0500	1320			335.30	2	333.30	129.58	1076	8.30	22544647	
0600	1380			335.50	2	333.50	129.78	1065	8.20	22544711	
0700	1440			336.13	2	334.13	130.38	1080	8.28	22544777	
0800	1500			335.74	2	333.74	129.98	1070	8.23	22544852	
0900	1560			336.55	2	334.55	130.78	1078	8.18	22544905	
1000	1620			336.12	2	334.12	130.40	1060	8.12	22544968	
1100	1680			335.45	2	333.45	129.73	1064	8.20	22545031	End pump operator readings
1200	1740			335.19	2	333.19	129.47	~1065	8.23	22545096	Begin LNP readings
1300	1800			335.57	2	333.57	129.85	~1070	8.24	22545159	

CLEAR CREEK ASSOCIATES

48-hour Constant Rate Test

AQUIFER TEST DATA

Project No. 040070

Date 12/16/07

Time of Measure-ment	Time Since Pumping Started (t) (minutes)	Recovery Time (t') (minutes)	t/t'	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet) (-203.72)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons) (x1000)	Remarks
1400	1860	N/A	N/A	336.19	2	334.19	130.47	~1080	8.28	22545224	
1500	1920			334.90	2	332.90	129.18	~1060	8.21	22545288	
1600	1980			335.25	2	333.25	129.53	~1052	8.12	22545287	
1700	2040			334.60	2	332.60	128.88	~1058	8.20	22545415	
1800	2100			334.90	2	332.90	128.45	~1062	8.26	22545475	
1900	2160			335.30	2	333.30	129.58	1052	8.11	22545540	
2000	2220			335.20	2	333.20	129.48	1048	8.09	22545603	
2100	2280			335.20	2	333.20	129.48	1063	8.20	22545667	
2200	2340			335.30	2	333.30	129.58	1053	8.12	22545731	
2300	2400			335.60	2	333.60	129.88	1068	8.22	22545794	
12/16 2400	2460			335.40	2	333.40	129.68	1069	8.24	22545858	
12/17 0100	2520			336.70	2	334.70	130.98	1074	8.19	22545921	
0200	2580			336.20	2	334.20	130.48	1060	8.12	22545985	
0300	2640			335.60	2	333.60	129.88	1054	8.11	22546049	
0400	2700			335.80	2	333.80	130.08	1058	8.13	22546112	
0500	2760			336.50	2	334.50	130.78	1063	8.12	22546176	
0600	2820			335.90	2	333.90	130.18	1070	8.21	22546239	
0700	2880			336.94	2	334.94	131.22	1051	8.38	22546302	

212.28 210.28 129.66

CLEAR CREEK ASSOCIATES

AQUIFER TEST DATA

Project No. 041 2070
Date 12/18/07

12/17

Time of Measure-ment	Time Since Pumping Started (t) (minutes)	Recovery Time (t') (minutes)	t/t'	Sounder Reading (feet)	Correction (feet)	Water Level (feet)	Drawdown (feet)	Discharge (gpm)	Specific Capacity (gpm/ft)	Totalizer Reading (gallons)	Remarks
0701		1			2.0						
0702		2		264.95		262.95	59.23				
0703		3		251.70		249.70	45.98				
0704		4		241.15		239.15	35.43				
0705		5		233.80		231.80	28.08				
0706		6		226.33		224.33	20.61				
0707		7		224.10		222.10	18.38				
0708		8		221.42		219.42	15.70				
0709		9		219.41		217.41	13.69				
0710		10		217.94		215.94	12.22				
0712		12		215.72		213.72	10.00				
0714		14		215.22		213.22	9.30				
0716		16		214.55		212.55	8.83				
0718		18		214.19		212.19	8.47				
0720		20		213.78		211.78	8.06				
0725		25		213.13		211.13	7.41				
0730		30		212.43		210.43	6.71				
0740		40		210.62		208.62	4.90				
0750		50		210.35		208.35	4.63				
0800		60		211.45		209.45	5.73				
~~0820~~	0820	~~80~~		209.50		207.50	3.78				
~~0830~~	0830	90		210.10		208.10	4.38				
~~0840~~	0840	100		210.68		208.68	4.96				

CLEAR CREEK ASSOCIATES

APPENDIX L

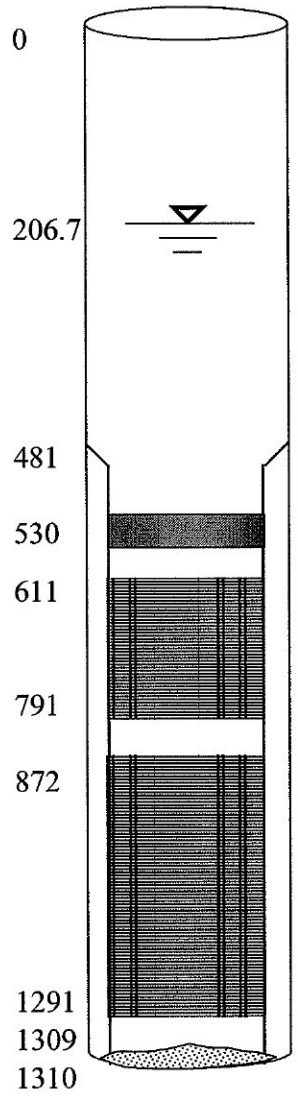
WELL VIDEO SURVEY LOG
AND
PLUMBNESS AND ALIGNMENT SURVEY

VIDEO SURVEY LOG

Well Name: Charlie Well		**Video Survey Co.** Welenco	
Well Owner: PVNGS		**Video Date** 1/3/08	
Well Location: B(1-6)34aab		**Color**	
Video Reviewed By: MAC		**Side Scan Available? Yes**	
Original Depth 1,310 feet	**Current Depth** 1,309 feet	**Casing Diameter(s)** 20"- 0 to 480 ft 16"- 480 to 1,310 ft	**Perforation Type(s)** Stainless Steel Wire Wrap	**Static Water Level** 206.7 feet bls

Depth	Description/Comment
0	Ground Level.
206.7	SWL, Film on top. Water is cloudy, large amount of floating debris
271	Side View, water clear enough to see casing wall.
481	Transition from 20" to 16" casing. Not easy to see.
489	Side View, weld looks good.
530	Dissimilar Metals Connector, welds look good.
571	Side View, weld looks good.
611	Top of upper screened portion (SS Wire Wrap). Water is clearer in screen, still a large amount of floating debris.
675	Side View, screen has a small amount of rust-colored build-up.
750	Side View, small amount of build-up.
791	Bottom of upper screened portion.
872	Top of lower screened portion.
951	Side View, small amount of rust-colored build-up on screen. Weld looks good.
1050	Side View, small amount of build-up. Weld looks good.
1200	Side View, small amount of build-up, water still clear.
1280	Piece of debris caught in screen.
1291	Bottom of lower screened portion.
1309	Bottom fill, Side View of bottom fill debris.

Generalized Well Graphic



NOT TO SCALE

General Comments:

Camera zeroed at ground level.

CLEAR CREEK ASSOCIATES

Drift-Pac™

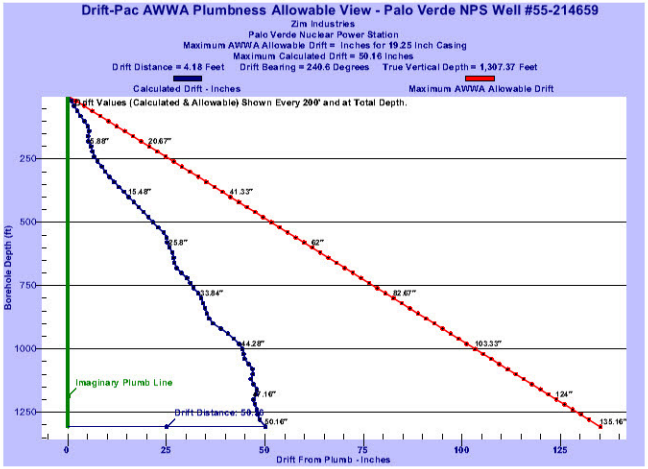
Wellbore DRIFT Interpretation Package

PREPARED ESPECIALLY FOR

Zim Industries and Palo Verde Nuclear Power Station

Palo Verde NPS Well #55-214659

January 3, 2008



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Drift-Pac

New Solutions in Borehole Geophysics

Wellbore Drift Interpretation

welenco
(800) 445-9914

Company: Zim Industries **County:** Maricopa **State:** Arizona
Well Number: Palo Verde NPS Well #55-21 **Well Owner:** Palo Verde Nuclear Power Station **Survey Date:** January 3, 2008 **Magnetic Declination:** Not Used
Field: Palo Verde **Operator:** Mitch Tullis **Casing Size:** 19.25"
Van No.: L-18 **Job Ticket:** 8619 **Welenco Office:** SVG **Witness:**
Location: Panama Ln.
Remarks: Reduction at 481' to 15.5" ID **Tool Type:** Gyroscopic **Tool No.:** 1
Methodology: Balanced Tangential **Lat.:** 33° 23' 29.3" **Long.:** 112° 51' 14.3" **Sec:** 34 **Twp:** 1N **Rge:** 6W **Meridian:** Gila and Salt River

Measured Data			Drift Computations				Rectangular Computations			
Depth, Feet	Inclination, Degrees From Vertical	Azimuth, Degrees, True	Course Deviation, Feet	True Vertical Depth, Feet	Drift Distance, Feet	Drift Bearing, Degrees, True	Latitude, Feet	Departure, Feet	Total Latitude, Feet	Total Departure, Feet
0'	0.30°	219°	0.00'	00.00'	0.00' (.00")	00.00°	.00'	0.00'	.00'	0.00'
20'	0.18°	172°	0.08'	19.99'	0.08' (.96")	201.70°	-.07'	-0.03'	-.07'	-0.03'
40'	0.15°	181°	0.06'	39.98'	0.13' (1.56")	191.00°	-.06'	0.00'	-.13'	-0.03'
60'	0.22°	196°	0.06'	59.97'	0.20' (2.40")	190.60°	-.06'	-0.01'	-.19'	-0.04'
80'	0.23°	201°	0.08'	79.96'	0.27' (3.24")	192.90°	-.07'	-0.03'	-.27'	-0.06'
100'	0.31°	238°	0.09'	99.96'	0.35' (4.20")	200.10°	-.07'	-0.06'	-.33'	-0.12'
120'	0.23°	262°	0.09'	119.95'	0.42' (5.04")	209.40°	-.03'	-0.09'	-.37'	-0.21'
140'	0.20°	122°	0.03'	139.94'	0.45' (5.40")	209.10°	-.02'	-0.01'	-.39'	-0.22'
160'	0.17°	068°	0.06'	159.93'	0.43' (5.16")	201.90°	-.01'	0.06'	-.40'	-0.16'
180'	0.19°	213°	0.02'	179.92'	0.44' (5.28")	200.00°	-.02'	0.01'	-.41'	-0.15'
200'	0.19°	257°	0.06'	199.91'	0.49' (5.88")	204.10°	-.04'	-0.05'	-.45'	-0.20'
220'	0.28°	288°	0.08'	219.90'	0.52' (6.24")	212.40°	.01'	-0.08'	-.44'	-0.28'
240'	0.32°	289°	0.10'	239.89'	0.56' (6.72")	222.90°	.03'	-0.10'	-.41'	-0.38'
260'	0.34°	265°	0.11'	259.88'	0.63' (7.56")	231.20°	.01'	-0.11'	-.40'	-0.49'
280'	0.25°	267°	0.10'	279.87'	0.72' (8.64")	235.90°	-.01'	-0.10'	-.40'	-0.59'
300'	0.27°	277°	0.09'	299.86'	0.79' (9.48")	239.80°	.00'	-0.09'	-.40'	-0.68'
320'	0.30°	262°	0.10'	319.85'	0.88' (10.56")	242.90°	.00'	-0.10'	-.40'	-0.78'
340'	0.28°	258°	0.10'	339.84'	0.98' (11.76")	244.60°	-.02'	-0.10'	-.42'	-0.88'
360'	0.32°	250°	0.10'	359.83'	1.08' (12.96")	245.50°	-.03'	-0.10'	-.45'	-0.98'
380'	0.29°	258°	0.11'	379.82'	1.19' (14.28")	246.30°	-.03'	-0.10'	-.48'	-1.09'
400'	0.34°	243°	0.11'	399.81'	1.29' (15.48")	246.60°	-.04'	-0.10'	-.51'	-1.19'
420'	0.25°	246°	0.10'	419.80'	1.40' (16.80")	246.40°	-.05'	-0.09'	-.56'	-1.28'
440'	0.36°	225°	0.10'	439.79'	1.50' (18.00")	245.50°	-.06'	-0.08'	-.62'	-1.36'
460'	0.25°	246°	0.10'	459.78'	1.60' (19.20")	244.70°	-.06'	-0.08'	-.68'	-1.45'
480'	0.34°	219°	0.10'	479.77'	1.70' (20.40")	243.90°	-.06'	-0.08'	-.75'	-1.53'
500'	0.30°	222°	0.11'	499.76'	1.80' (21.60")	242.50°	-.09'	-0.07'	-.83'	-1.60'
520'	0.41°	205°	0.12'	519.75'	1.91' (22.92")	240.60°	-.10'	-0.07'	-.94'	-1.66'

 TVD: 1,307.37' **Final Drift Distance:** 4.18' (50.16") **Final Drift Bearing:** 240.60°

Note: Magnetic Declination is not used because it is not a factor in the calculation of well drift or alignment. Magnetic Declination is only important if attempting to hit a target or miss another well and then it is included in the calculations.

Drift-Pac

New Solutions in Borehole Geophysics

Wellbore Drift Interpretation

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(800) 445-9914

Company: Zim Industries **County:** Maricopa **State:** Arizona
Well Number: Palo Verde NPS Well #55-21 **Well Owner:** Palo Verde Nuclear Power Station **Survey Date:** January 3, 2008 **Magnetic Declination:** Not Used
Field: Palo Verde **Operator:** Mitch Tullis **Casing Size:** 19.25"
Van No.: L-18 **Job Ticket:** 8619 **Welenco Office:** SVG **Witness:**
Location: Panama Ln.
Remarks: Reduction at 481' to 15.5" ID **Tool Type:** Gyroscopic **Tool No.:** 1
Methodology: Balanced Tangential **Lat.:** 33° 23' 29.3" **Long.:** 112° 51' 14.3" **Sec:** 34 **Twp:** 1N **Rge:** 6W **Meridian:** Gila and Salt River

Measured Data			Drift Computations				Rectangular Computations			
Depth, Feet	Inclination, Degrees From Vertical	Azimuth, Degrees, True	Course Deviation, Feet	True Vertical Depth, Feet	Drift Distance, Feet	Drift Bearing, Degrees, True	Latitude, Feet	Departure, Feet	Total Latitude, Feet	Total Departure, Feet
540'	0.47°	195°	0.15'	539.74'	2.03' (24.36")	237.80°	-.14'	-0.05'	-1.08'	-1.71'
560'	0.32°	147°	0.13'	559.73'	2.09' (25.08")	234.70°	-.13'	0.01'	-1.21'	-1.70'
580'	0.20°	159°	0.09'	579.72'	2.10' (25.20")	232.30°	-.08'	0.04'	-1.29'	-1.66'
600'	0.24°	203°	0.07'	599.71'	2.15' (25.80")	230.80°	-.07'	0.00'	-1.36'	-1.67'
620'	0.17°	205°	0.07'	619.70'	2.21' (26.52")	230.00°	-.07'	-0.03'	-1.42'	-1.69'
640'	0.03°	179°	0.03'	639.69'	2.24' (26.88")	229.60°	-.03'	-0.01'	-1.45'	-1.71'
660'	0.08°	189°	0.02'	659.68'	2.25' (27.00")	229.20°	-.02'	0.00'	-1.47'	-1.71'
680'	0.21°	240°	0.05'	679.67'	2.30' (27.60")	229.20°	-.03'	-0.03'	-1.50'	-1.74'
700'	0.39°	218°	0.10'	699.66'	2.40' (28.80")	229.00°	-.07'	-0.07'	-1.58'	-1.82'
720'	0.31°	193°	0.12'	719.65'	2.52' (30.24")	228.00°	-.11'	-0.05'	-1.68'	-1.87'
740'	0.27°	182°	0.10'	739.64'	2.59' (31.08")	226.60°	-.10'	-0.01'	-1.78'	-1.88'
760'	0.27°	189°	0.09'	759.63'	2.66' (31.92")	225.30°	-.09'	-0.01'	-1.88'	-1.89'
780'	0.32°	213°	0.10'	779.62'	2.76' (33.12")	224.40°	-.09'	-0.04'	-1.97'	-1.93'
800'	0.29°	147°	0.09'	799.61'	2.82' (33.84")	223.20°	-.09'	0.00'	-2.06'	-1.93'
820'	0.13°	212°	0.06'	819.60'	2.86' (34.32")	222.10°	-.06'	0.02'	-2.12'	-1.92'
840'	0.12°	205°	0.04'	839.59'	2.90' (34.80")	221.90°	-.04'	-0.02'	-2.16'	-1.94'
860'	0.13°	225°	0.04'	859.58'	2.94' (35.28")	221.80°	-.04'	-0.03'	-2.19'	-1.96'
880'	0.13°	226°	0.05'	879.57'	2.99' (35.88")	221.90°	-.03'	-0.03'	-2.23'	-2.00'
900'	0.33°	206°	0.08'	899.56'	3.07' (36.84")	221.60°	-.07'	-0.04'	-2.29'	-2.04'
920'	0.71°	241°	0.17'	919.55'	3.24' (38.88")	222.10°	-.11'	-0.13'	-2.41'	-2.17'
940'	0.20°	233°	0.16'	939.54'	3.39' (40.68")	222.90°	-.08'	-0.14'	-2.49'	-2.31'
960'	0.57°	258°	0.13'	959.53'	3.51' (42.12")	223.90°	-.04'	-0.13'	-2.53'	-2.43'
980'	0.41°	290°	0.16'	979.52'	3.62' (43.44")	225.80°	.01'	-0.17'	-2.52'	-2.60'
1,000'	0.47°	289°	0.15'	999.52'	3.69' (44.28")	228.00°	.05'	-0.15'	-2.47'	-2.74'
1,020'	0.68°	328°	0.19'	1,019.51'	3.72' (44.64")	230.90°	.13'	-0.14'	-2.34'	-2.88'
1,040'	0.75°	309°	0.25'	1,039.50'	3.74' (44.88")	234.70°	.18'	-0.17'	-2.16'	-3.05'
1,060'	0.61°	296°	0.24'	1,059.49'	3.83' (45.96")	238.00°	.13'	-0.20'	-2.03'	-3.25'

 TVD: 1,307.37' **Final Drift Distance:** 4.18' (50.16") **Final Drift Bearing:** 240.60°

Note: Magnetic Declination is not used because it is not a factor in the calculation of well drift or alignment. Magnetic Declination is only important if attempting to hit a target or miss another well and then it is included in the calculations.

Drift-Pac

New Solutions in Borehole Geophysics

Wellbore Drift Interpretation

welenco
(800) 445-9914

Company: Zim Industries **County:** Maricopa **State:** Arizona
Well Number: Palo Verde NPS Well #55-21 **Well Owner:** Palo Verde Nuclear Power Station **Survey Date:** January 3, 2008 **Magnetic Declination:** Not Used
Field: Palo Verde **Operator:** Mitch Tullis **Casing Size:** 19.25"
Van No.: L-18 **Job Ticket:** 8619 **Welenco Office:** SVG **Witness:**
Location: Panama Ln.
Remarks: Reduction at 481' to 15.5" ID **Tool Type:** Gyroscopic **Tool No.:** 1
Methodology: Balanced Tangential **Lat.:** 33° 23' 29.3" **Long.:** 112° 51' 14.3" **Sec:** 34 **Twp:** 1N **Rge:** 6W **Meridian:** Gila and Salt River

Measured Data			Drift Computations				Rectangular Computations			
Depth, Feet	Inclination, Degrees From Vertical	Azimuth, Degrees, True	Course Deviation, Feet	True Vertical Depth, Feet	Drift Distance, Feet	Drift Bearing, Degrees, True	Latitude, Feet	Departure, Feet	Total Latitude, Feet	Total Departure, Feet
1,080'	0.21°	186°	0.10'	1,079.48'	3.91' (46.92")	238.90°	.01'	-0.10'	-2.02'	-3.35'
1,100'	0.14°	043°	0.02'	1,099.47'	3.91' (46.92")	238.50°	-.02'	0.01'	-2.04'	-3.33'
1,120'	0.55°	339°	0.11'	1,119.46'	3.87' (46.44")	240.00°	.11'	-0.02'	-1.93'	-3.35'
1,140'	0.66°	290°	0.19'	1,139.45'	3.93' (47.16")	242.70°	.13'	-0.14'	-1.80'	-3.49'
1,160'	0.18°	129°	0.09'	1,159.44'	4.00' (48.00")	243.50°	.02'	-0.08'	-1.78'	-3.58'
1,180'	0.06°	112°	0.04'	1,179.43'	3.98' (47.76")	243.00°	-.02'	0.03'	-1.81'	-3.54'
1,200'	0.35°	116°	0.07'	1,199.42'	3.93' (47.16")	242.20°	-.03'	0.06'	-1.84'	-3.48'
1,220'	0.39°	270°	0.03'	1,219.41'	3.96' (47.52")	241.90°	-.03'	-0.01'	-1.87'	-3.49'
1,240'	0.21°	119°	0.04'	1,239.40'	4.00' (48.00")	241.90°	-.02'	-0.04'	-1.88'	-3.53'
1,260'	0.23°	194°	0.06'	1,259.39'	4.01' (48.12")	241.00°	-.06'	0.02'	-1.94'	-3.51'
1,280'	0.16°	240°	0.06'	1,279.38'	4.06' (48.72")	240.60°	-.05'	-0.03'	-1.99'	-3.54'
1,308'	0.33°	238°	0.12'	1,307.37'	4.18' (50.16")	240.60°	-.06'	-0.10'	-2.06'	-3.64'

Page No. 3 **TVD:** 1,307.37' **Final Drift Distance:** 4.18' (50.16") **Final Drift Bearing:** 240.60°

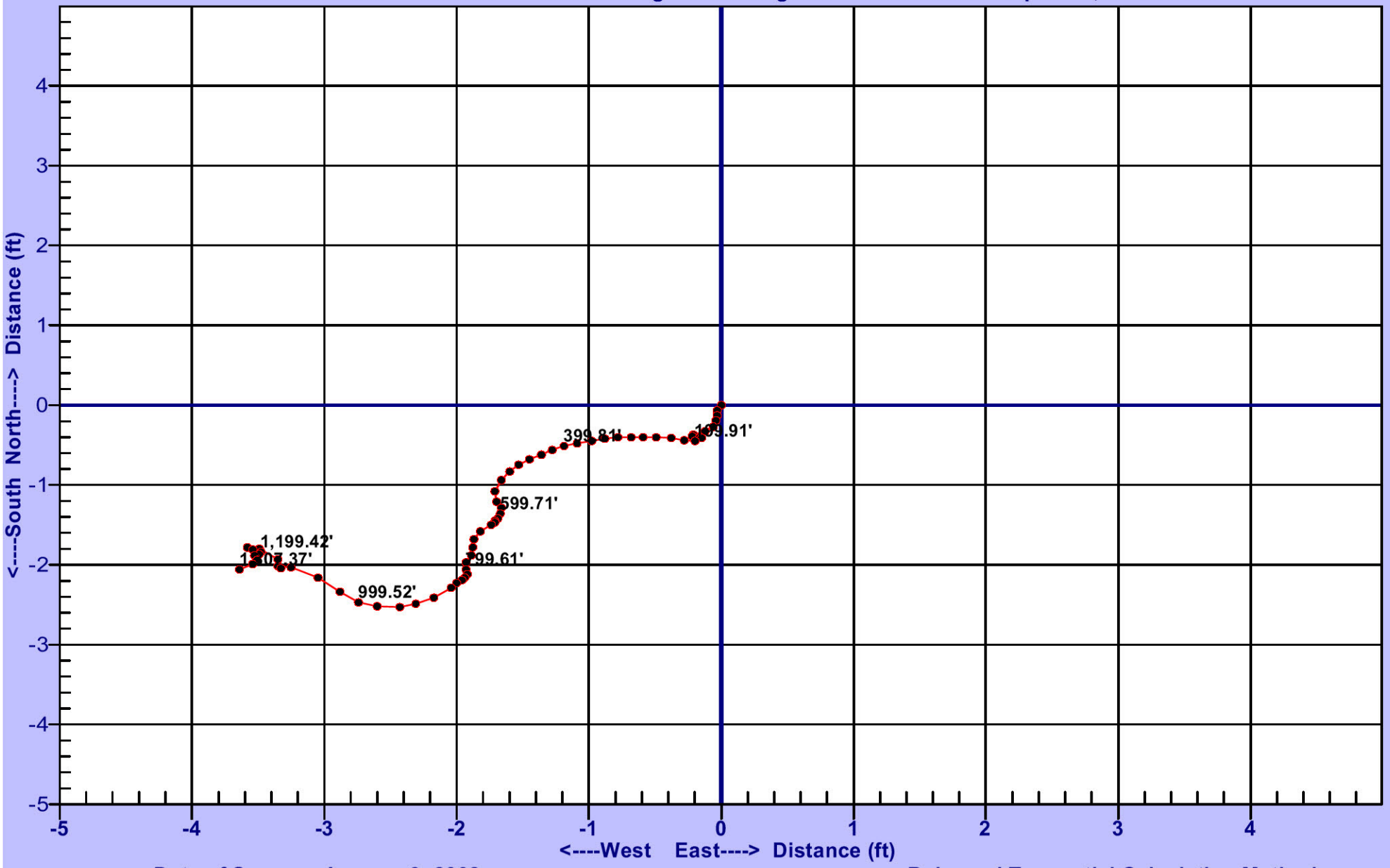
Note: Magnetic Declination is not used because it is not a factor in the calculation of well drift or alignment. Magnetic Declination is only important if attempting to hit a target or miss another well and then it is included in the calculations.

Drift-Pac Plan View - Palo Verde NPS Well #55-214659

Zim Industries

Palo Verde Nuclear Power Station

Drift Distance = 4.18 Feet Drift Bearing = 240.6 Degrees True Vertical Depth = 1,307.37 Feet



Date of Survey: January 3, 2008 **Balanced Tangential Calculation Method**

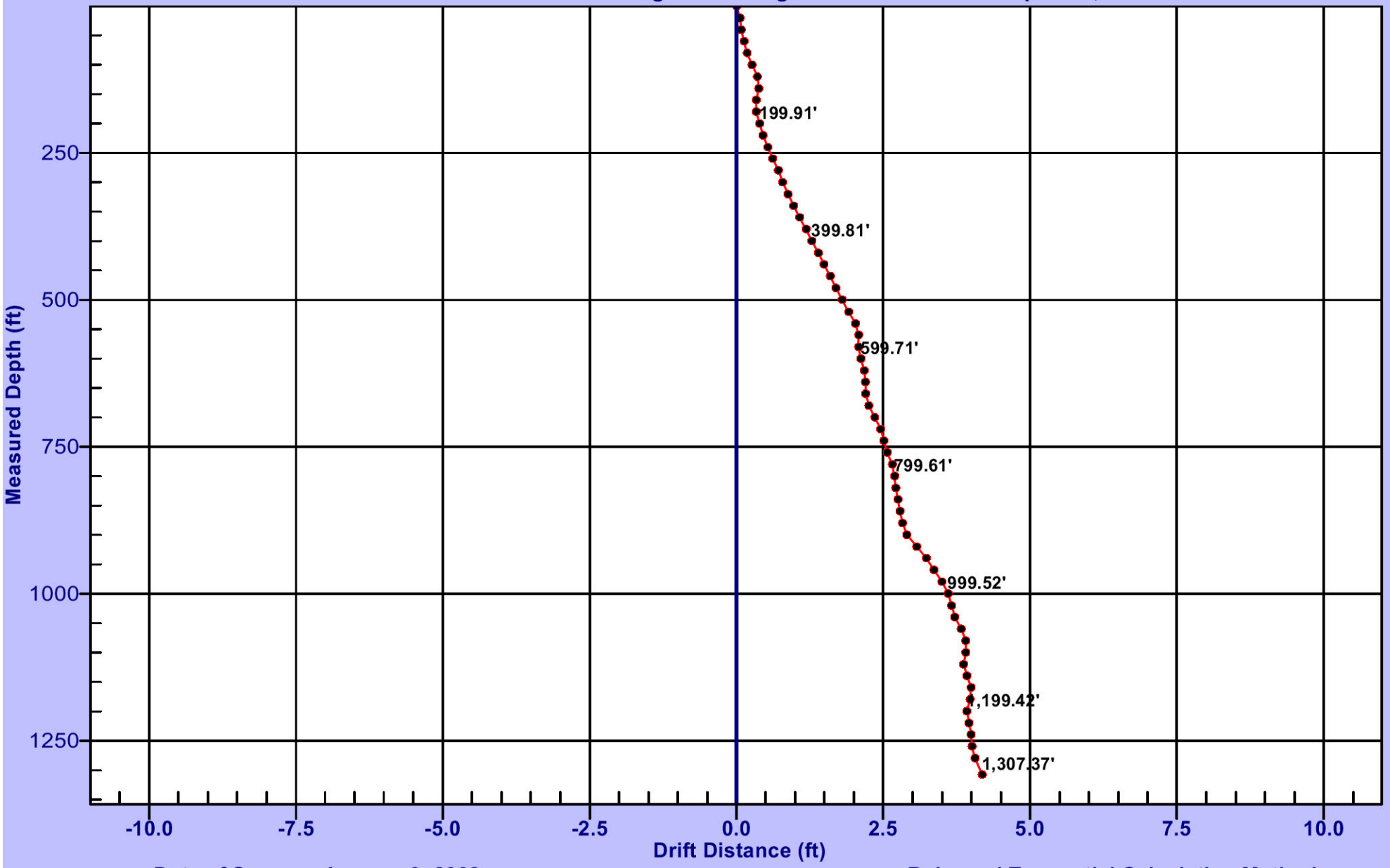
Copyright by Welenco, Inc. (800) 445-9914

Drift-Pac Plane of Drift View - Palo Verde NPS Well #55-214659

Zim Industries

Palo Verde Nuclear Power Station

Drift Distance = 4.18 Feet Drift Bearing = 240.6 Degrees True Vertical Depth = 1,307.37 Feet



Date of Survey: January 3, 2008

Balanced Tangential Calculation Method

Copyright by Welenco, Inc. (800) 445-9914

Drift-Pac AWWA Plumbness Allowable View - Palo Verde NPS Well #55-214659

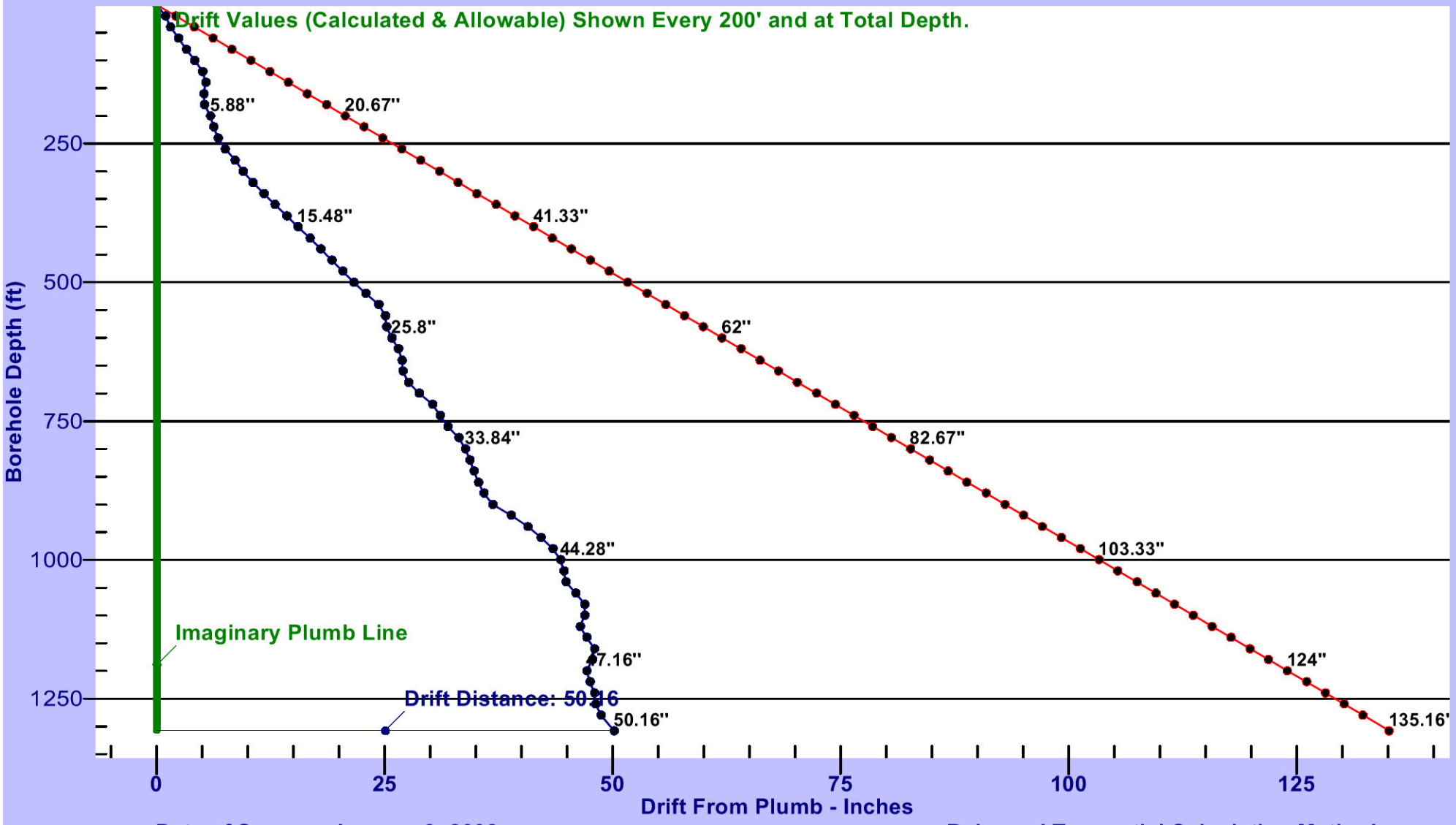
Zim Industries

Palo Verde Nuclear Power Station

Maximum AWWA Allowable Drift = Inches for 19.25 Inch Casing

Maximum Calculated Drift = 50.16 Inches

Drift Distance = 4.18 Feet Drift Bearing = 240.6 Degrees True Vertical Depth = 1,307.37 Feet



Date of Survey: January 3, 2008

Balanced Tangential Calculation Method

Copyright by Welenco, Inc. (800) 445-9914

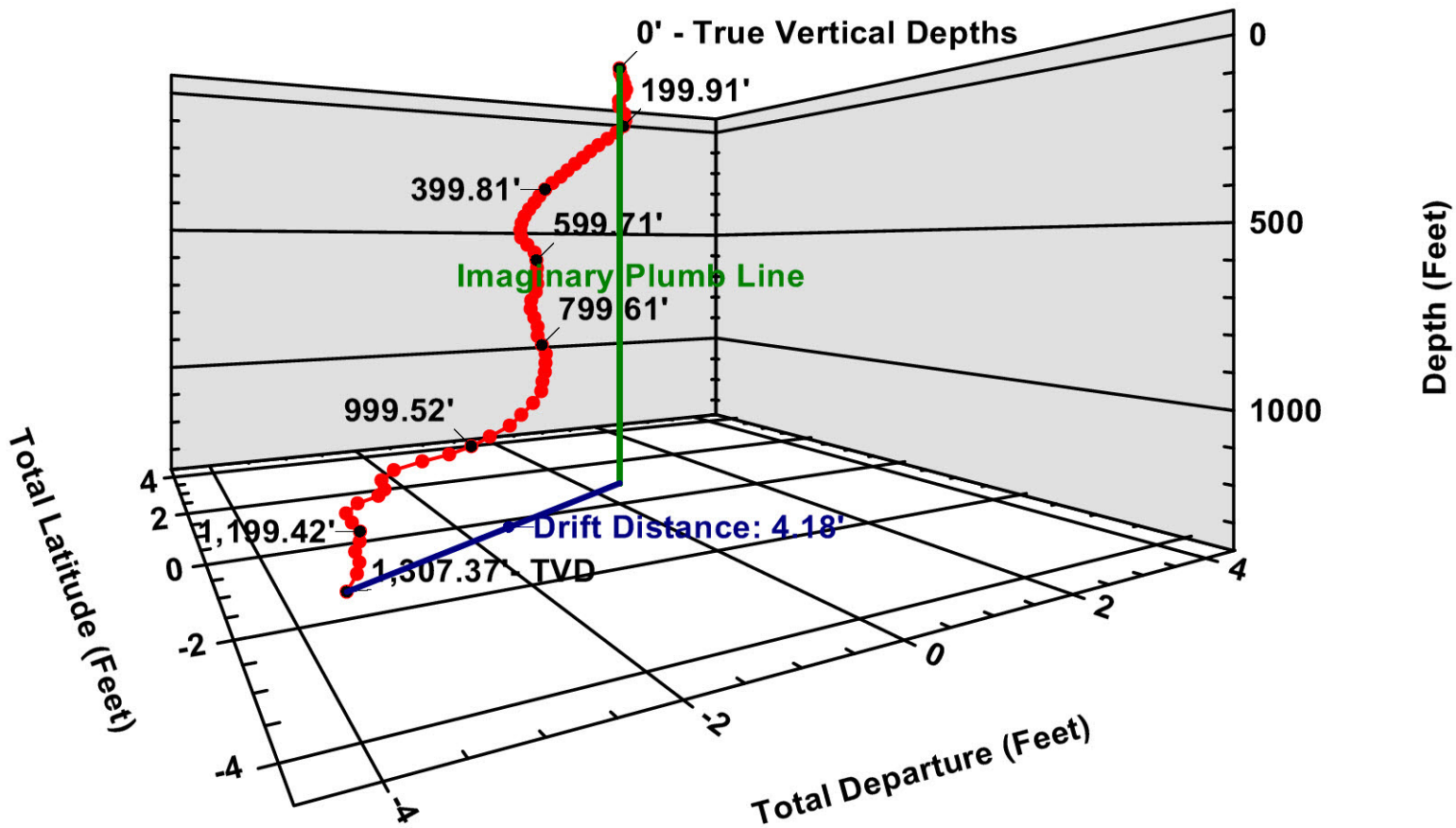
Drift-Pac 3-D Projection View - Palo Verde NPS Well #55-214659

Zim Industries

Palo Verde Nuclear Power Station

Drift Distance = 4.18 Feet **Drift Bearing = 240.6 Degrees** **True Vertical Depth = 1,307.37 Feet**

151.0



Date of Survey: January 3, 2008 **Balanced Tangential Calculation Method**

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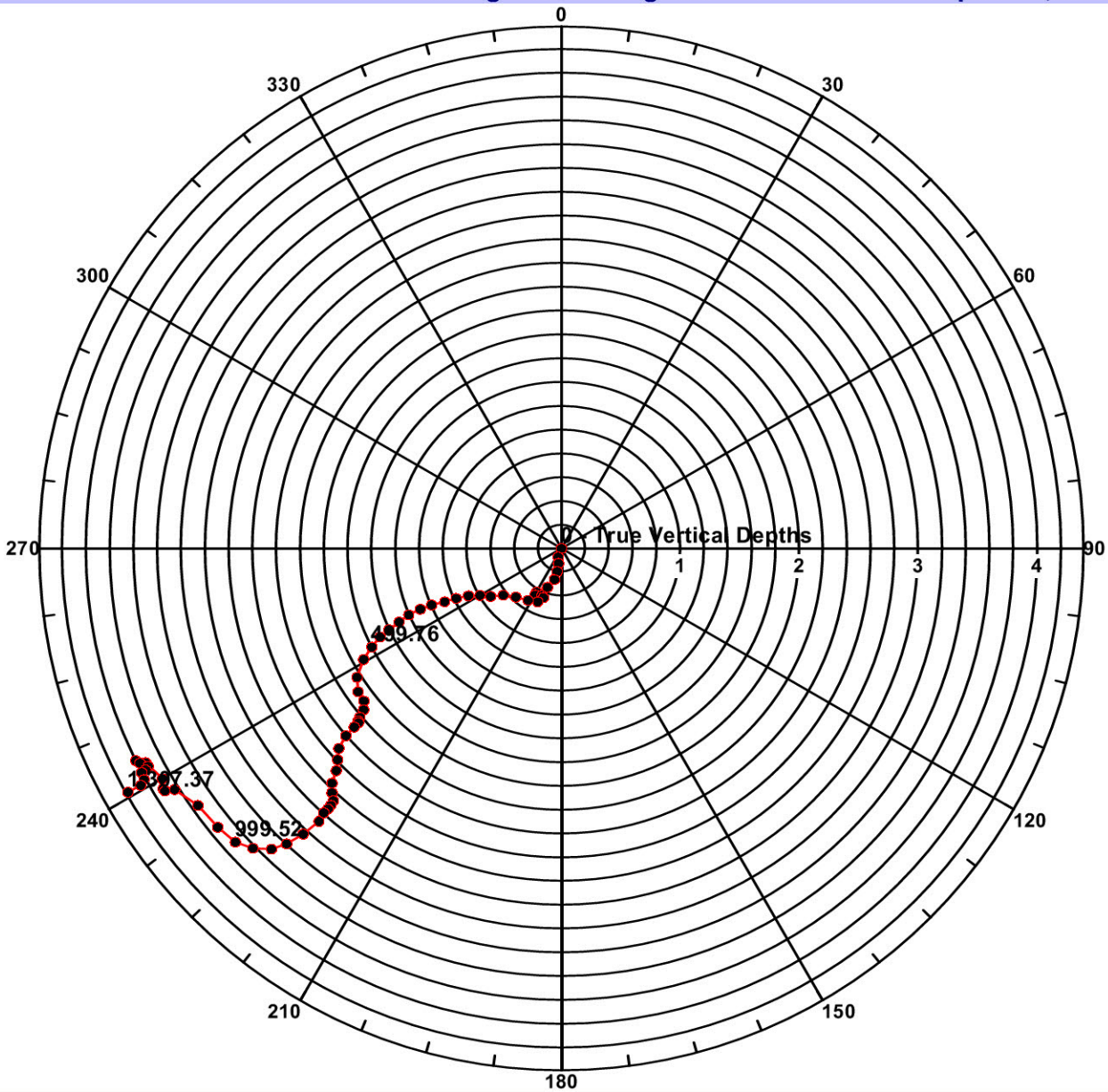
Drift-Pac Polar View - Palo Verde NPS Well #55-214659

Zim Industries

Palo Verde Nuclear Power Station

Drift Distance = 4.18 Feet Drift Bearing = 240.6 Degrees True Vertical Depth = 1,307.37 Feet



Date of Survey: January 3, 2008 **Balanced Tangential Calculation Method**

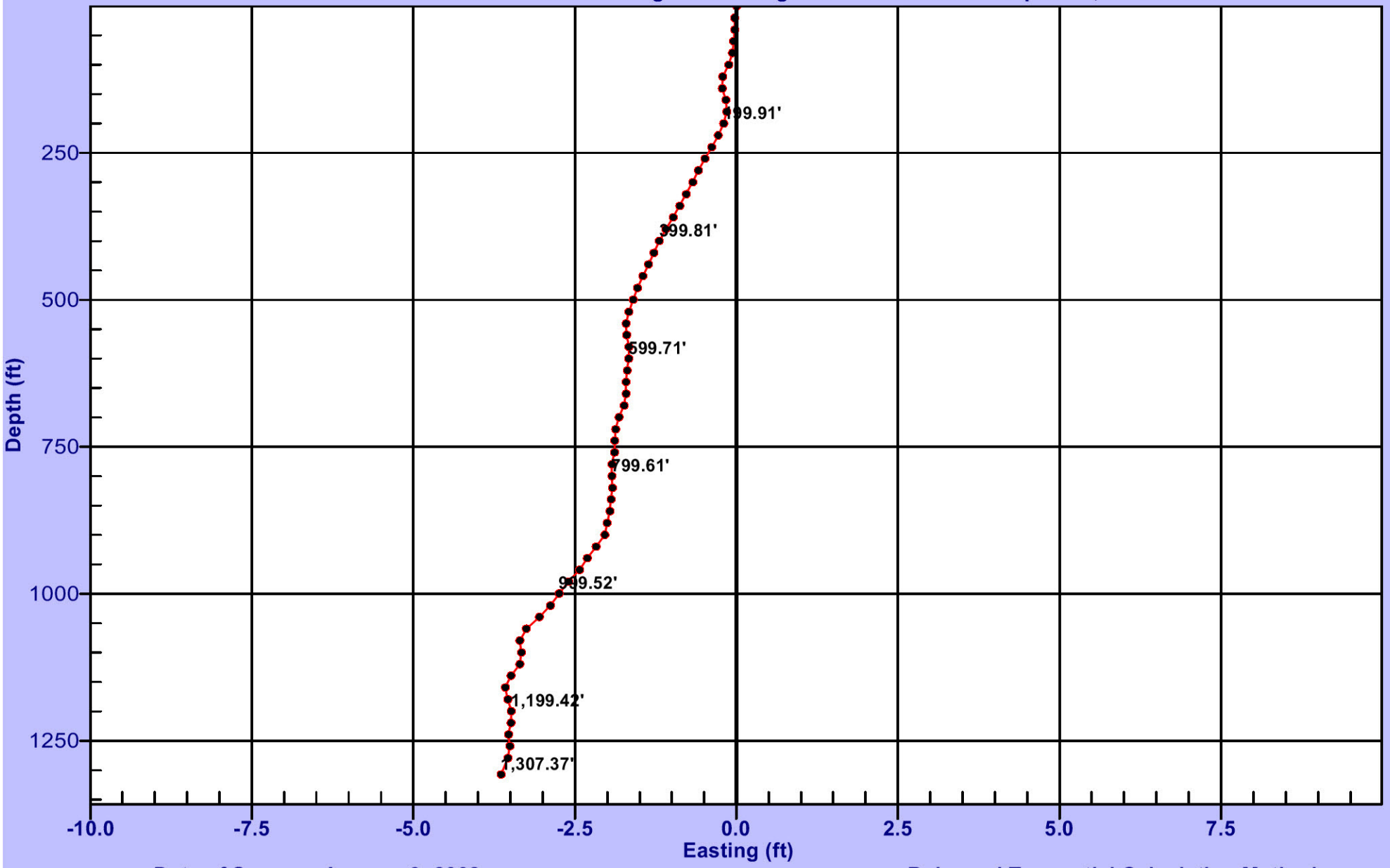
Copyright by Welenco, Inc. (800) 445-9914

Drift-Pac Easting Rectangular View - Palo Verde NPS Well #55-214659

Zim Industries

Palo Verde Nuclear Power Station

Drift Distance = 4.18 Feet Drift Bearing = 240.6 Degrees True Vertical Depth = 1,307.37 Feet



Date of Survey: January 3, 2008

Balanced Tangential Calculation Method

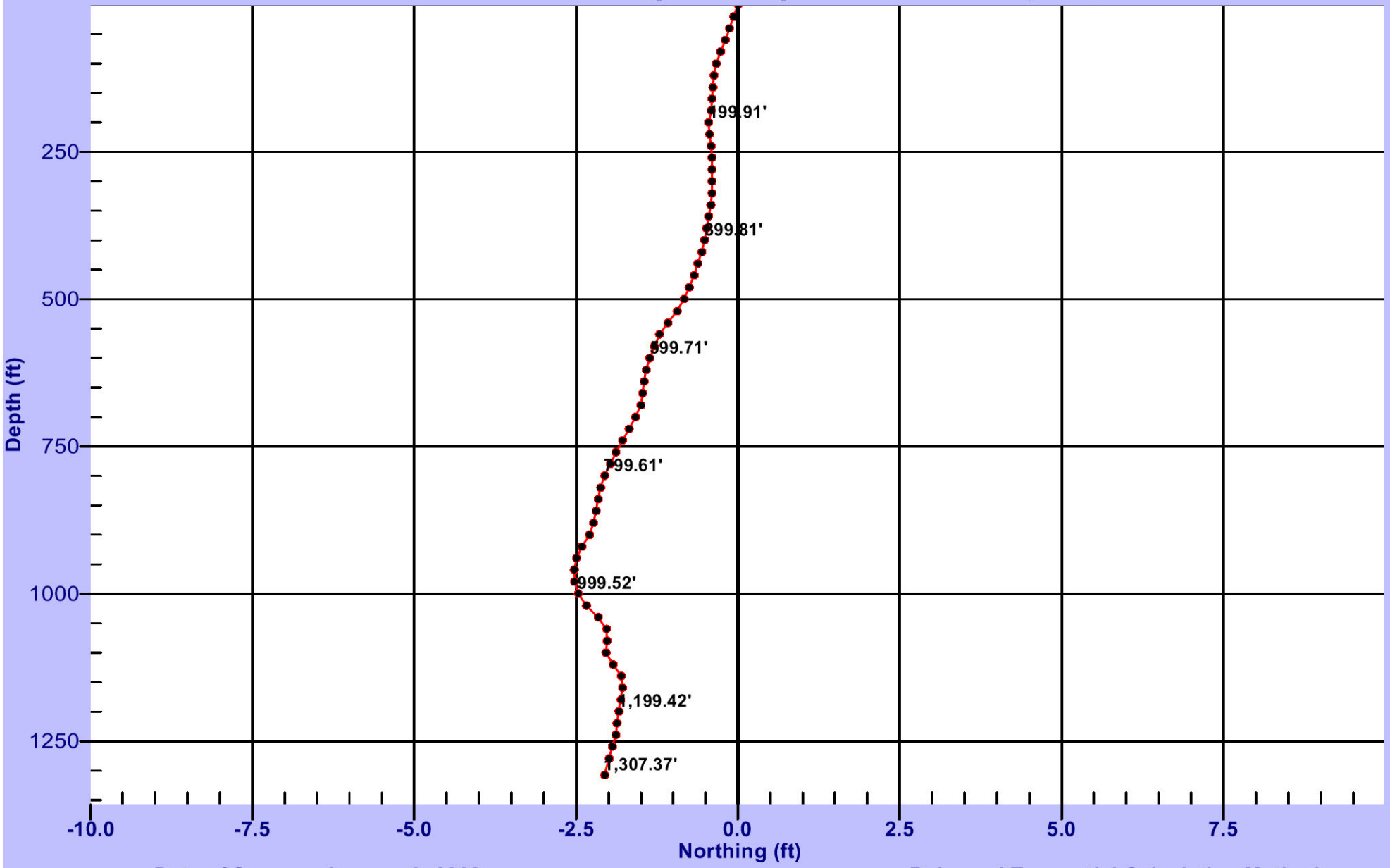
Copyright by Welenco, Inc. (800) 445-9914

Drift-Pac Northing Rectangular View - Palo Verde NPS Well #55-214659

Zim Industries

Palo Verde Nuclear Power Station

Drift Distance = 4.18 Feet Drift Bearing = 240.6 Degrees True Vertical Depth = 1,307.37 Feet



Date of Survey: January 3, 2008

Balanced Tangential Calculation Method

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DRIFT-PAC METHODOLOGY

Balanced Tangential Method

The Balanced Tangential Method uses the inclination and direction angles at the upper and lower ends of the course length in a manner so as to balance the two sets of measured angles over a course length. From a theoretical standpoint, this method combines the trigonometric functions to provide the average balanced inclination and direction angles, which are used in standard computational procedures. Other common names for this method are Vector Averaging, Acceleration, and Trapezoidal.

$$\Delta \text{North} = [\Delta MD/2] \times [\sin(I_1) \times \cos(A_1) + \sin(I_2) \times \cos(A_2)]$$

$$\Delta \text{East} = [\Delta MD/2] \times [\sin(I_1) \times \sin(A_1) + \sin(I_2) \times \sin(A_2)]$$

$$\Delta \text{Vertical} = [\Delta MD/2] \times [\cos(I_2) + \cos(I_1)]$$

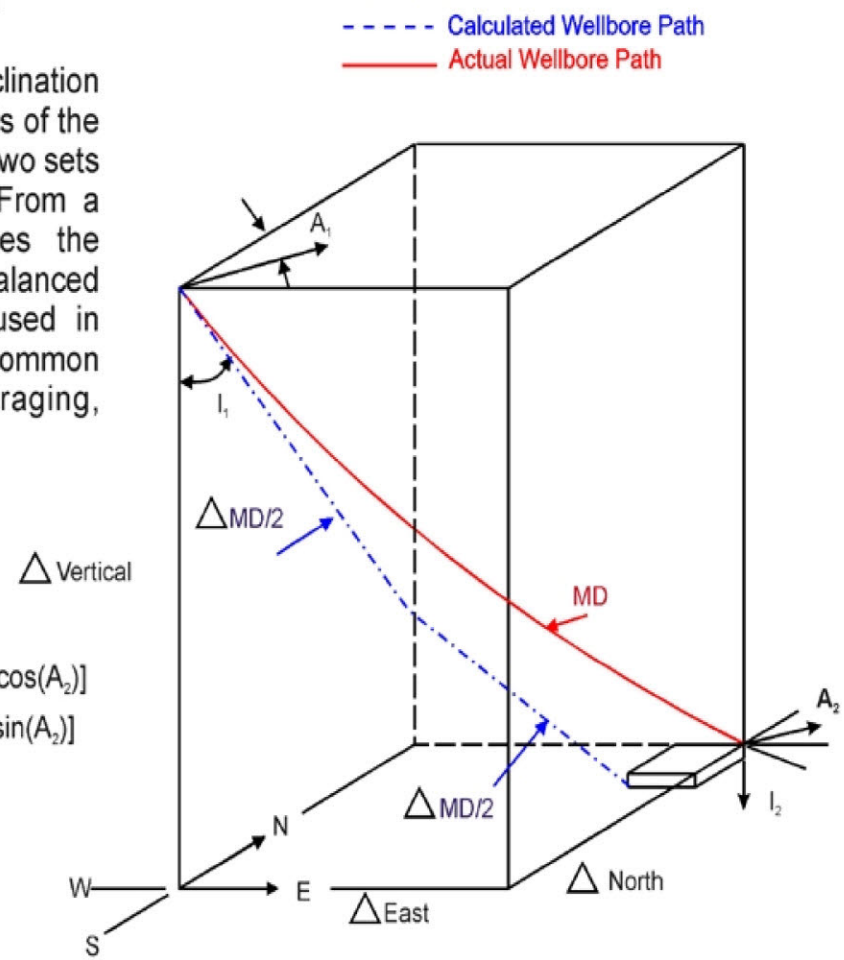


PLATE 1

GEOPHYSICAL LOGS

Southwest Exploration Services, LLC

borehole geophysics & video services

COMPANY	CLEAR CREEK ASSOCIATES
WELL ID	PALO VERDE DEEP WELL CHARLIE
FIELD	PVNGS
COUNTY	MARICOPA STATE ARIZONA

TYPE OF LOGS: E-LOGS-GAMMA
MORE: GUARD RESISTIVITY

OTHER SERVICES
CALIPER
SONIC

LOCATION
B(1-6)34aab

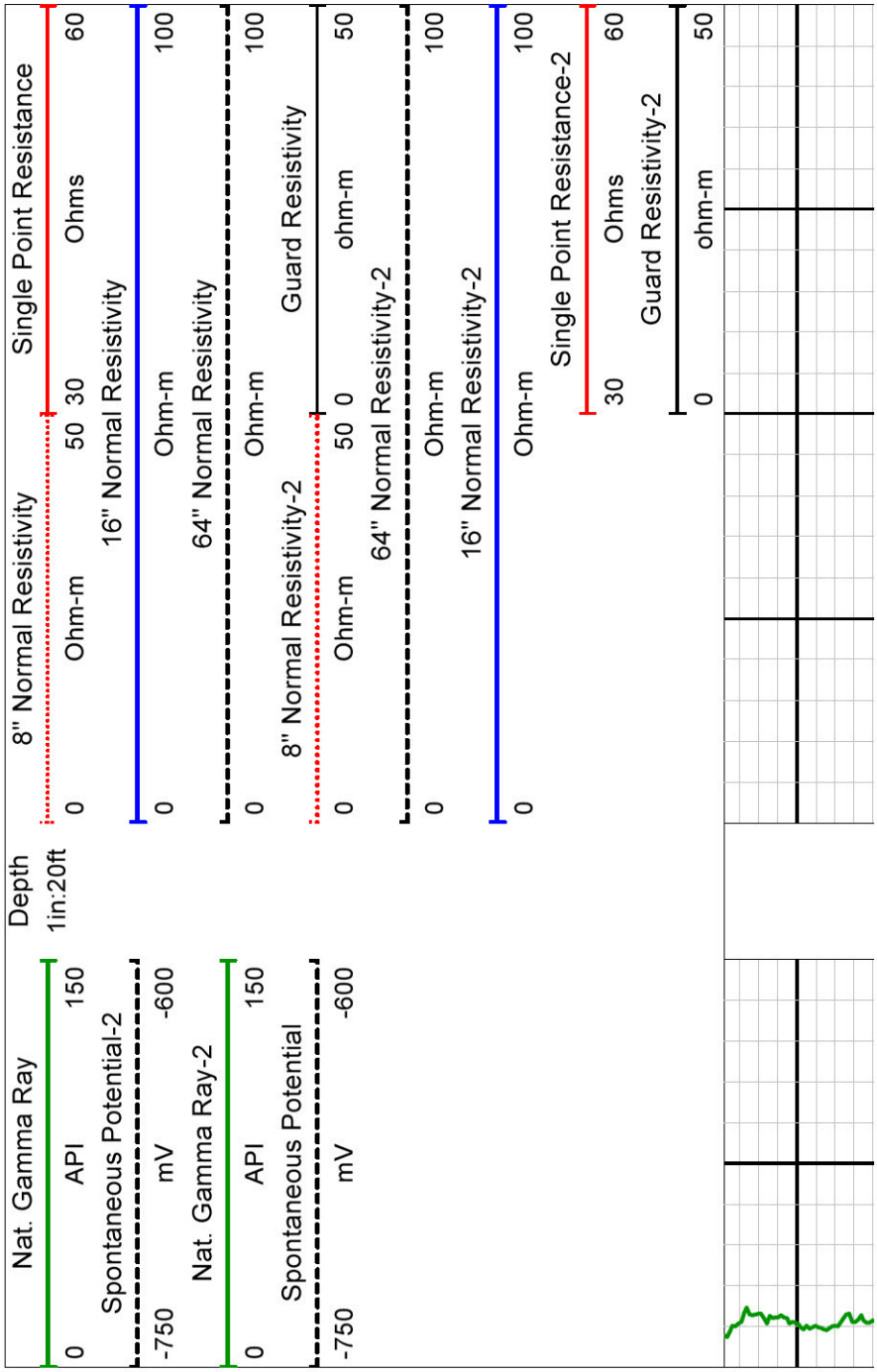
SEC 34 TWP 1N RGE 6W

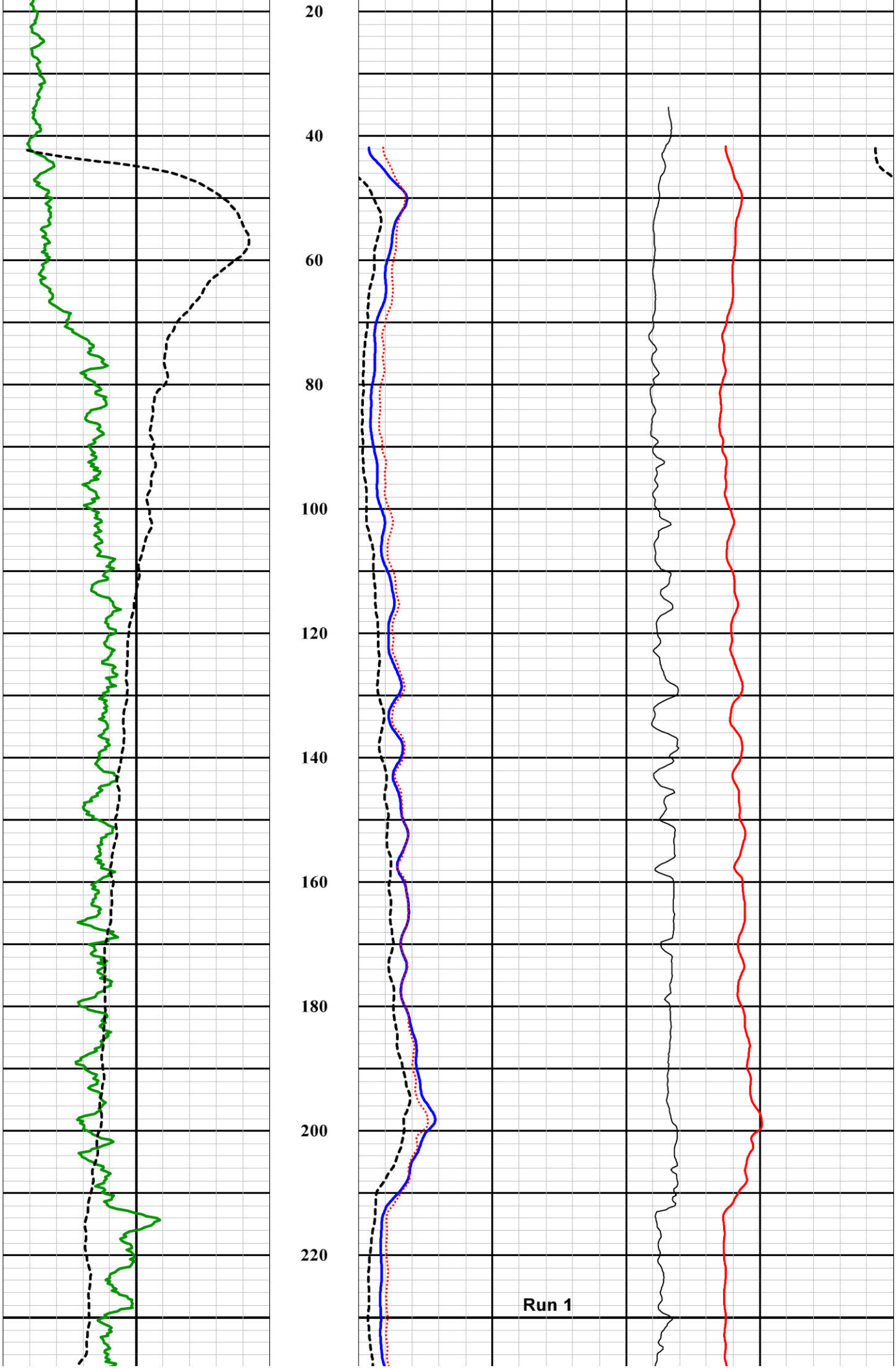
PERMANENT DATUM		ELEVATION	K.B.
LOG MEAS. FROM	GROUND LEVEL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM			G.L.

DATE	10-14-07, 10-26-07	TYPE FLUID IN HOLE	FRESH MUD
RUN No	1,2	SALINITY	
TYPE LOG	E-LOGS-GAMMA-GUARD	DENSITY	
DEPTH-DRILLER	240 FT, 1360 FT	LEVEL	FULL
DEPTH-LOGGER	240 FT, 1360 FT	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	240 FT, 1360 FT	IMAGE ORIENTED TO:	N/A
TOP LOGGED INTERVAL	10 FT, 240 FT	SAMPLE INTERVAL	.2 FT
DRILLER / RIG#	ZIM	LOGGING TRUCK	TRUCK # 400
RECORDED BY / Logging Eng.	K. MITCHELL, E. TURNER	TOOL STRING/SN	POLYPROBE/2GDA
WITNESSED BY	GINA - CLR CREEK	LOG TIME:ON SITE/OFF SITE	

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	40"	SURFACE	40 FT	36"		SURFACE	40 FT
2	17.5"	40 FT	240 FT	28"		SURFACE	240 FT
3	17.5"	240 FT	TD				

COMMENTS:

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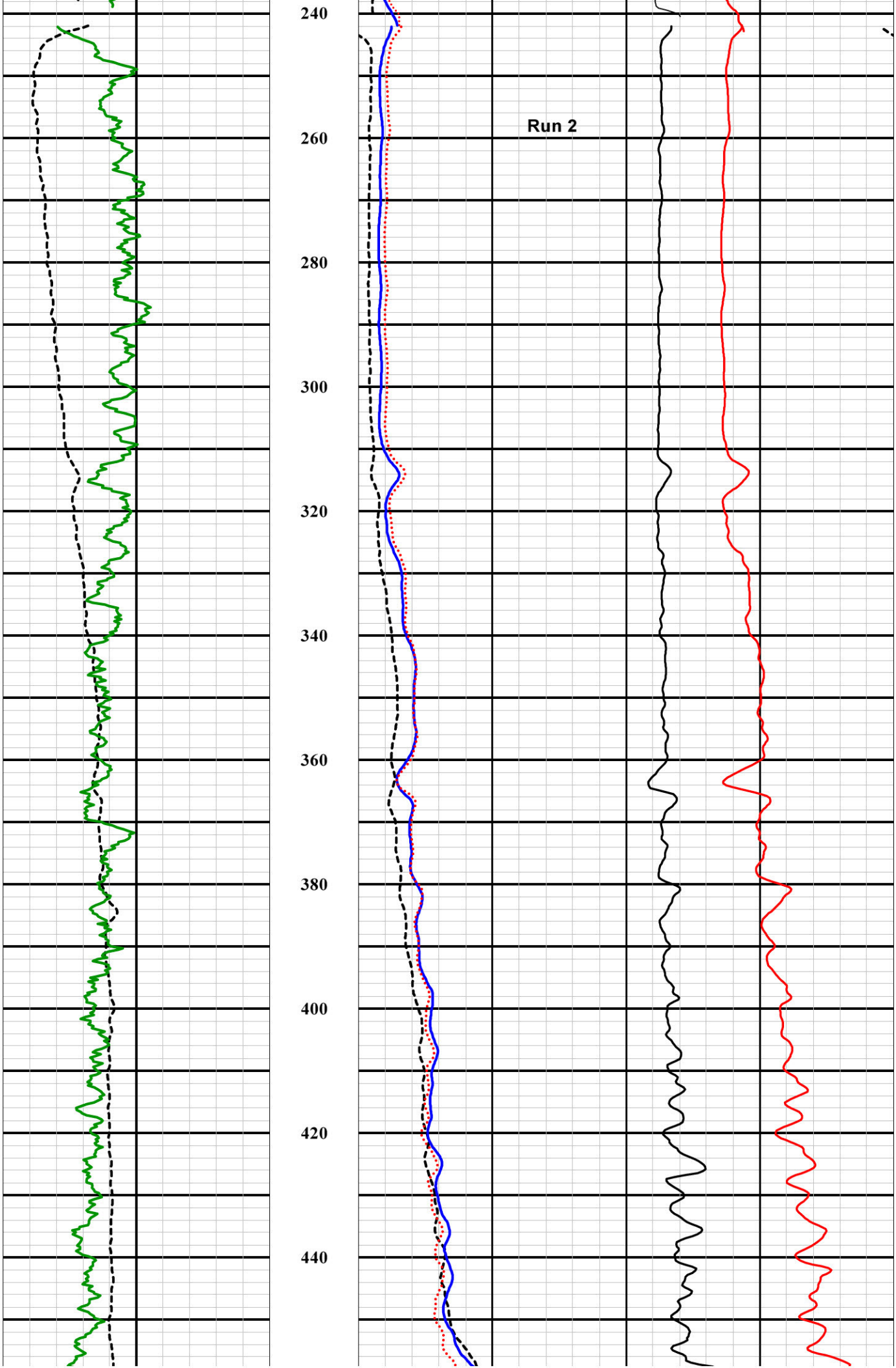
80
100
120
140
160
180
200
220
Run 1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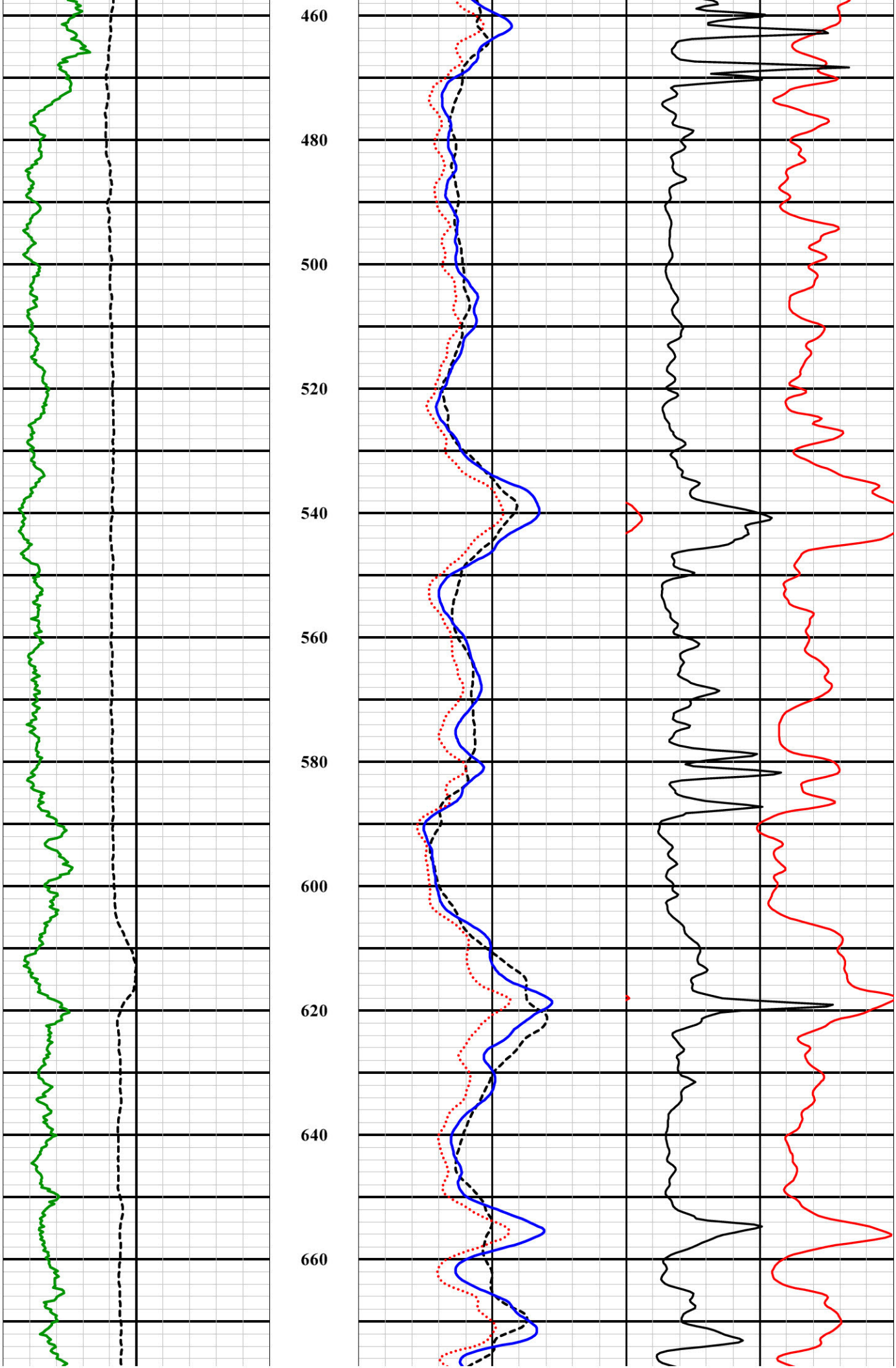
420
440
Run 2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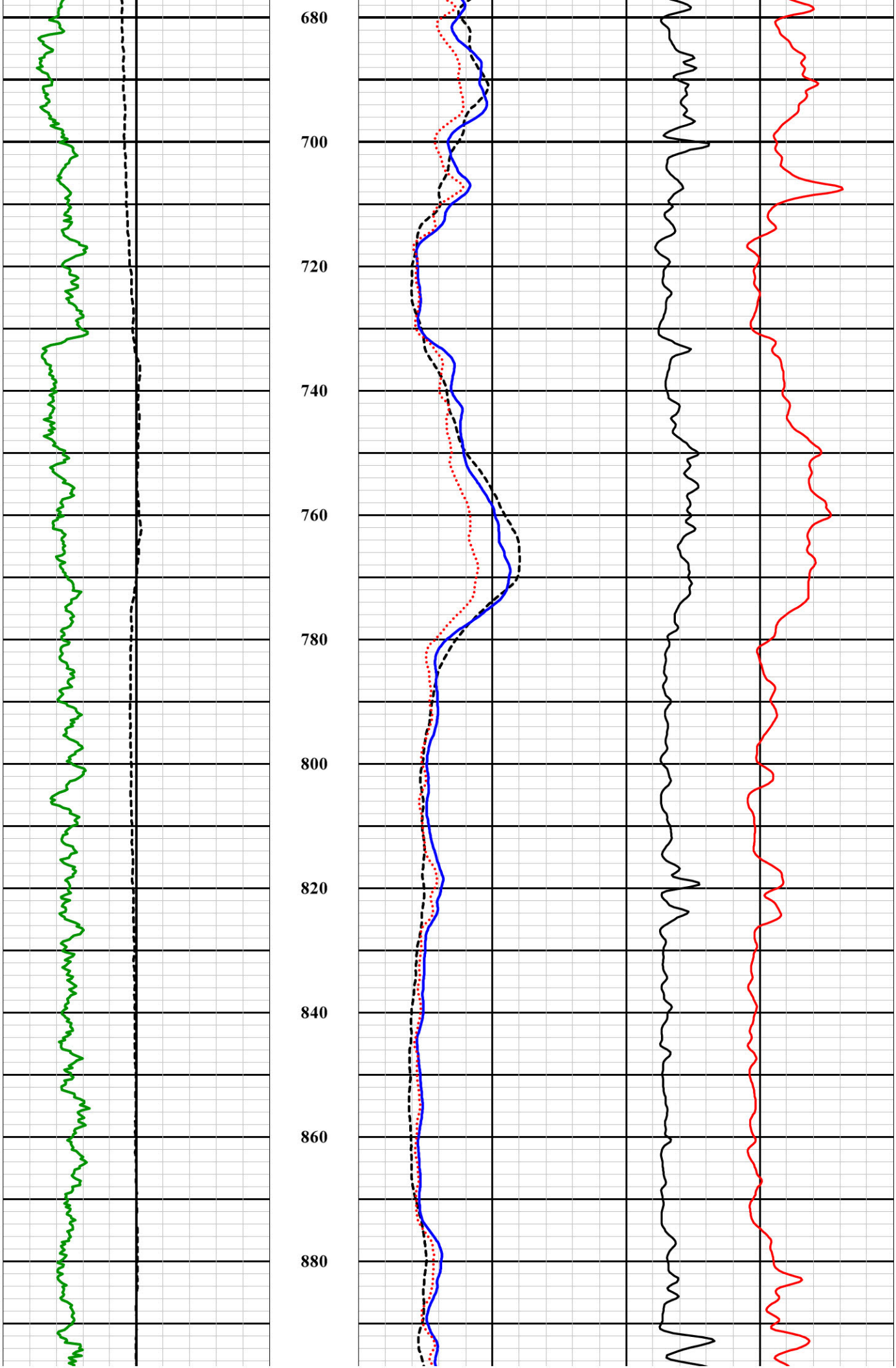
600
620
640
660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720
740
760
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800
820
840
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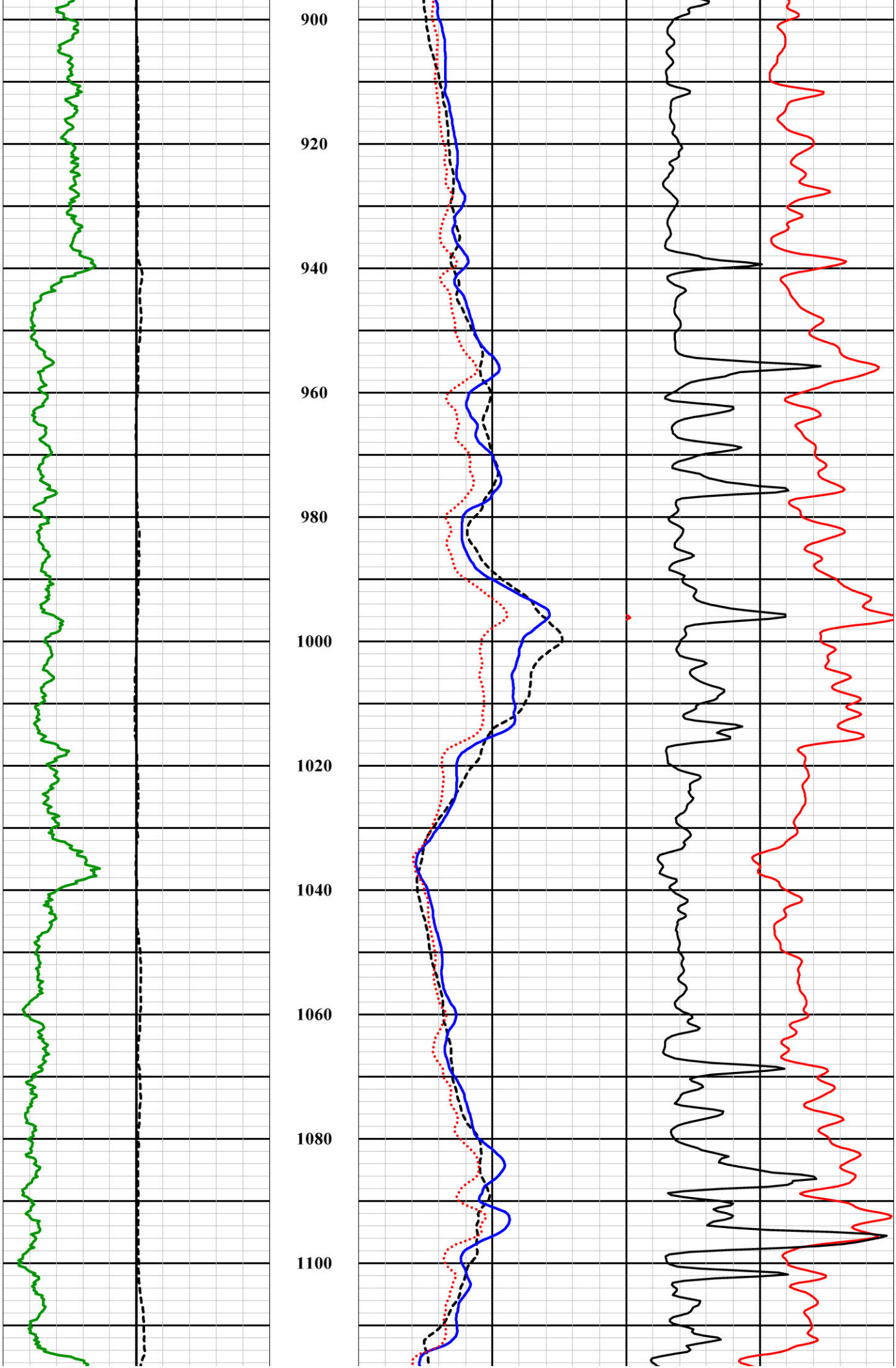
880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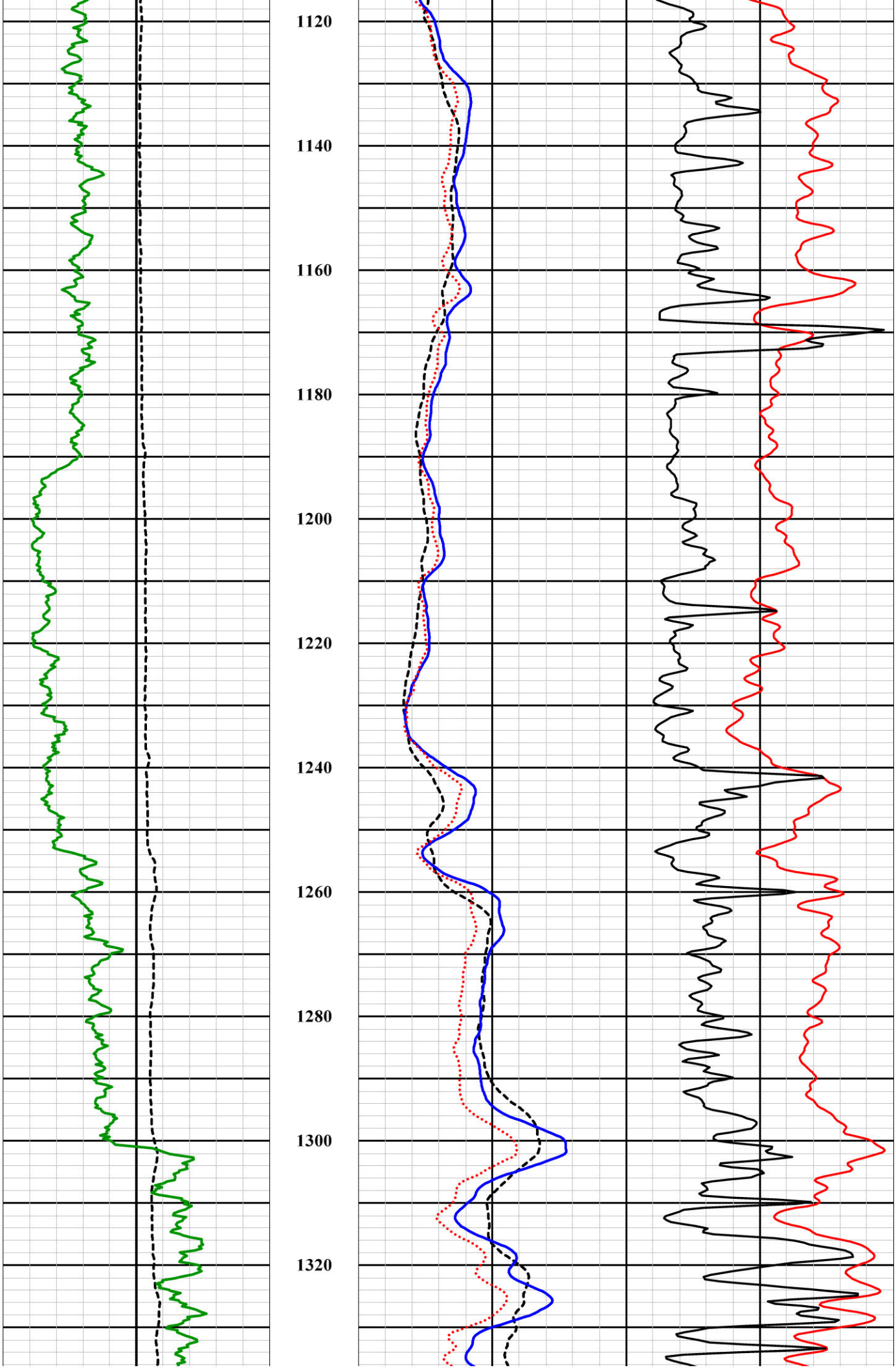
920
940
960
980
1000
1020
1040
1060
1080
1100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1160
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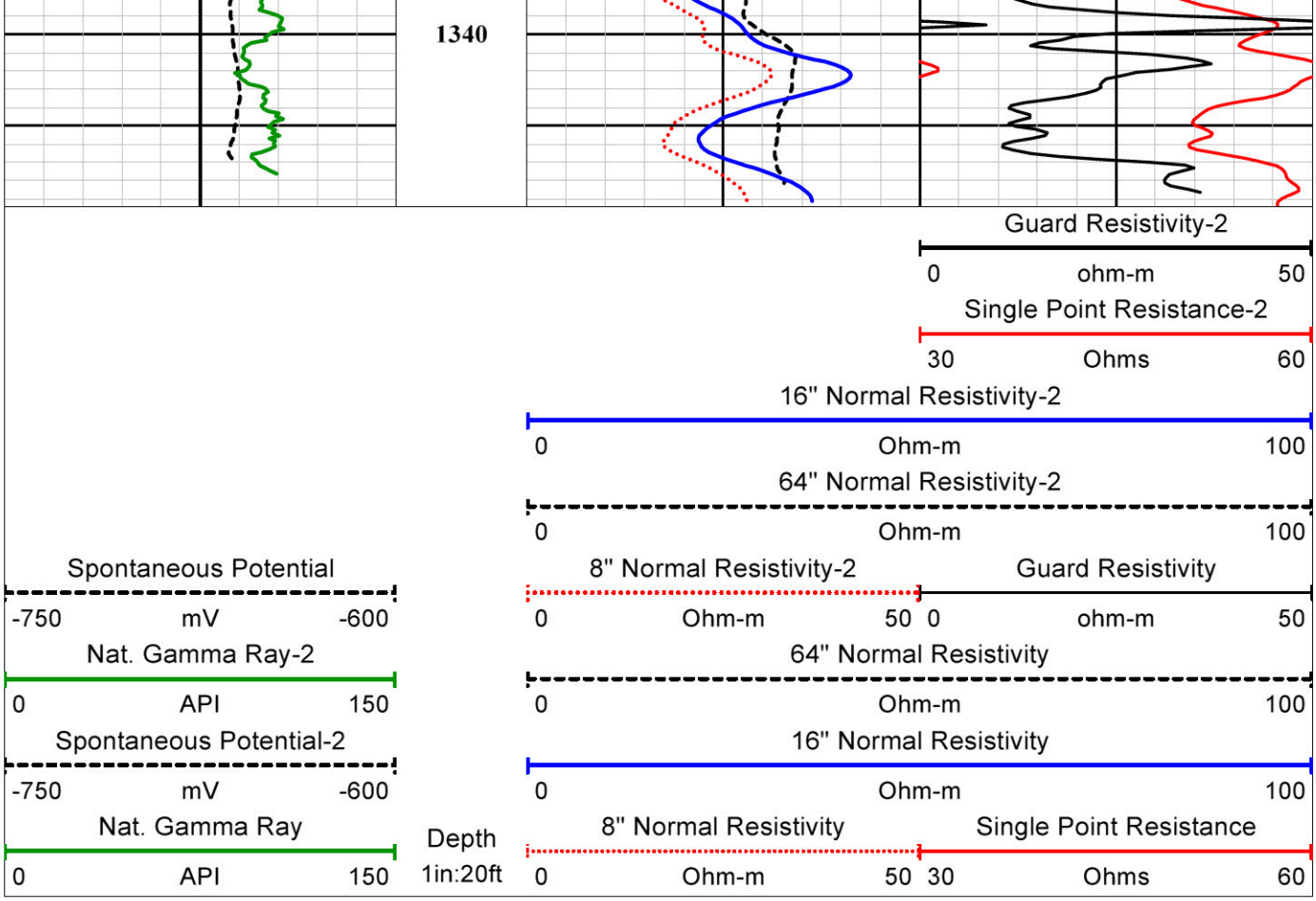
1200
1220
1240
1260
1280
1300
1320


1340
Guard Resistivity-2
0 ohm-m 50
Single Point Resistance-2
30 Ohms 60
16" Normal Resistivity-2
0 Ohm-m 100
64" Normal Resistivity-2
0 Ohm-m 100
Spontaneous Potential
-750 mV -600
8" Normal Resistivity-2
0 Ohm-m 50
Guard Resistivity
0 ohm-m 50
Nat. Gamma Ray-2
0 API 150
64" Normal Resistivity
0 Ohm-m 100
Spontaneous Potential-2
-750 mV -600
16" Normal Resistivity
0 Ohm-m 100
Nat. Gamma Ray
0 API 150
Depth
1in:20ft
8" Normal Resistivity
0 Ohm-m 50
Single Point Resistance
30 Ohms 60

Southwest Exploration Services, LLC

borehole geophysics & video services

COMPANY	CLEAR CREEK ASSOCIATES
WELL ID	PALO VERDE DEEP WELL CHARLIE
FIELD	PVNGS
COUNTY	MARICOPA STATE ARIZONA

TYPE OF LOGS: 60mm SONIC

MORE: 3-ARM CALIPER

OTHER SERVICES
ELOGS
GUARD RES.

LOCATION
B(1-6)34aab

SEC 34 TWP 1N RGE 6W

PERMANENT DATUM ELEVATION K.B.

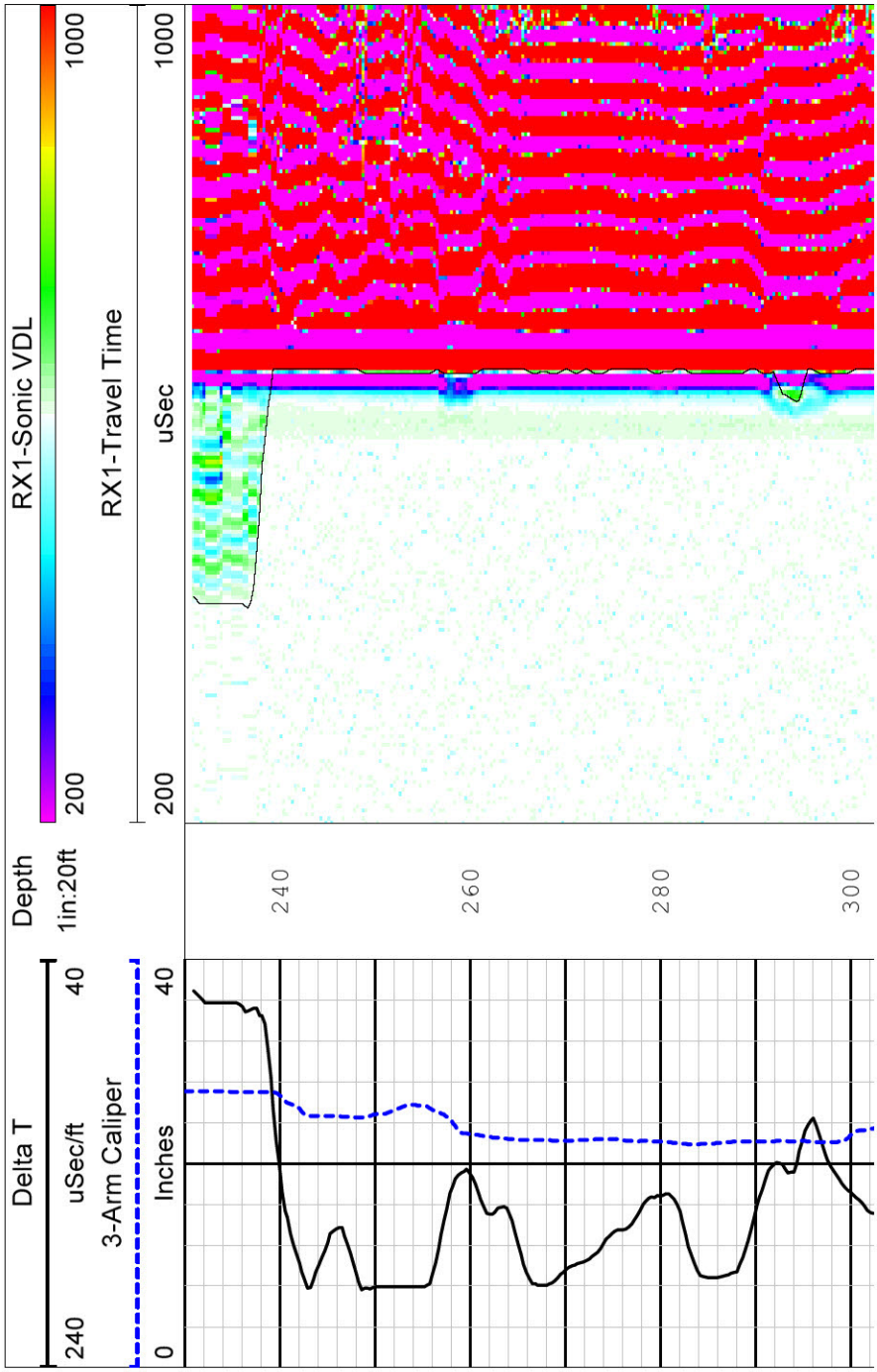
LOG MEAS. FROM GROUND LEVEL ABOVE PERM. DATUM D.F.

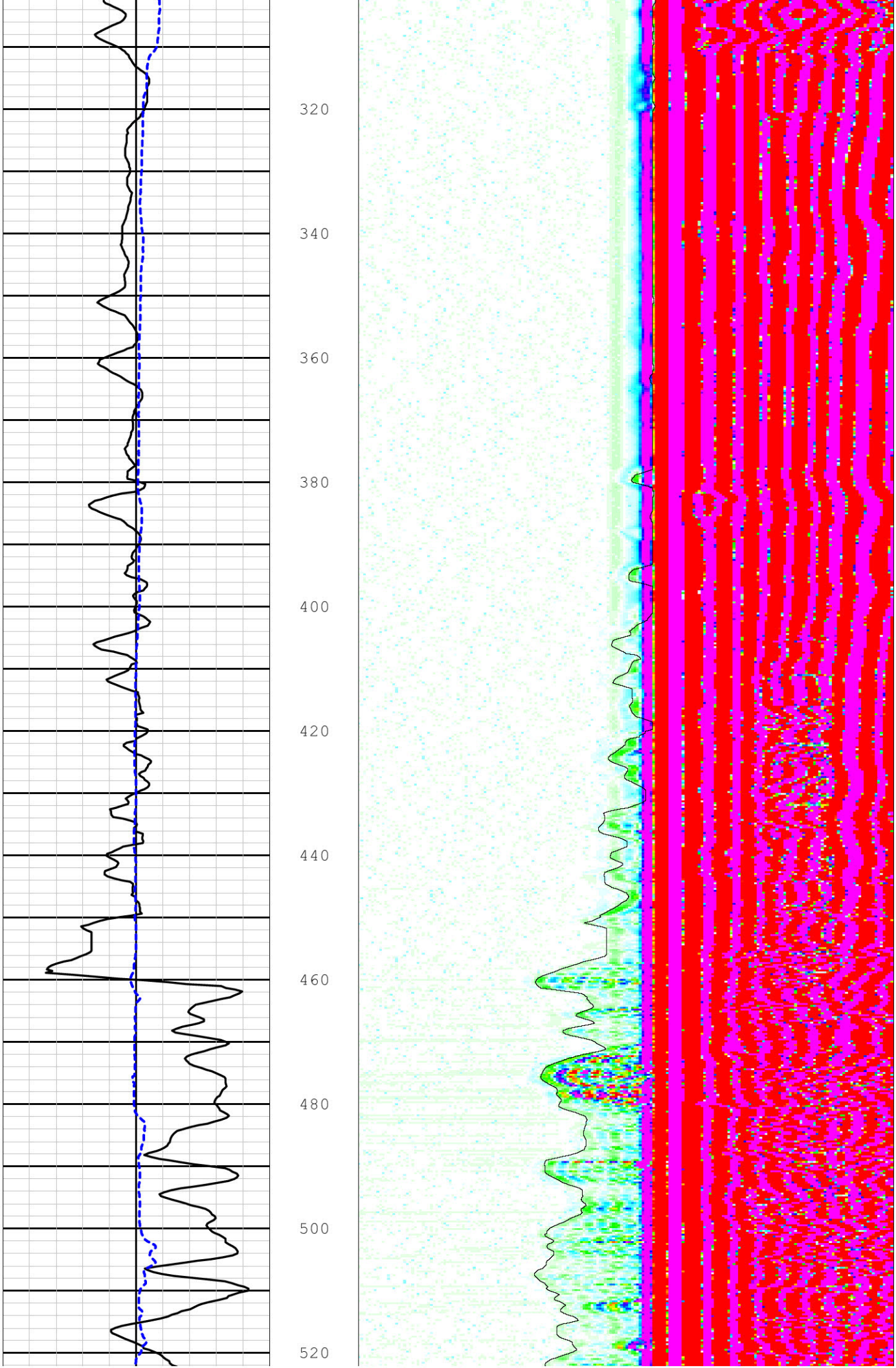
DRILLING MEAS. FROM G.L.

DATE	10-26-07	TYPE FLUID IN HOLE	FRESH MUD
RUN No	2	SALINITY	
TYPE LOG	SONIC-CALIPER	DENSITY	
DEPTH-DRILLER	1360 FT	LEVEL	FULL
DEPTH-LOGGER	1360 FT	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	1360 FT	IMAGE ORIENTED TO:	N/A
TOP LOGGED INTERVAL	240 FT	SAMPLE INTERVAL	.2 FT
DRILLER / RIG#	ZIM	LOGGING TRUCK	TRUCK # 400
RECORDED BY / Logging Eng.	E. TURNER	TOOL STRING/SN	MSI FWS60/2PCA
WITNESSED BY	GINA - CLR CREEK	LOG TIME:ON SITE/OFF SITE	

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	40"	SURFACE	40 FT	36"		SURFACE	40 FT
2	17.5"	40 FT	240 FT	28"		SURFACE	240 FT
3	17.5"	240 FT	TD				

COMMENTS:

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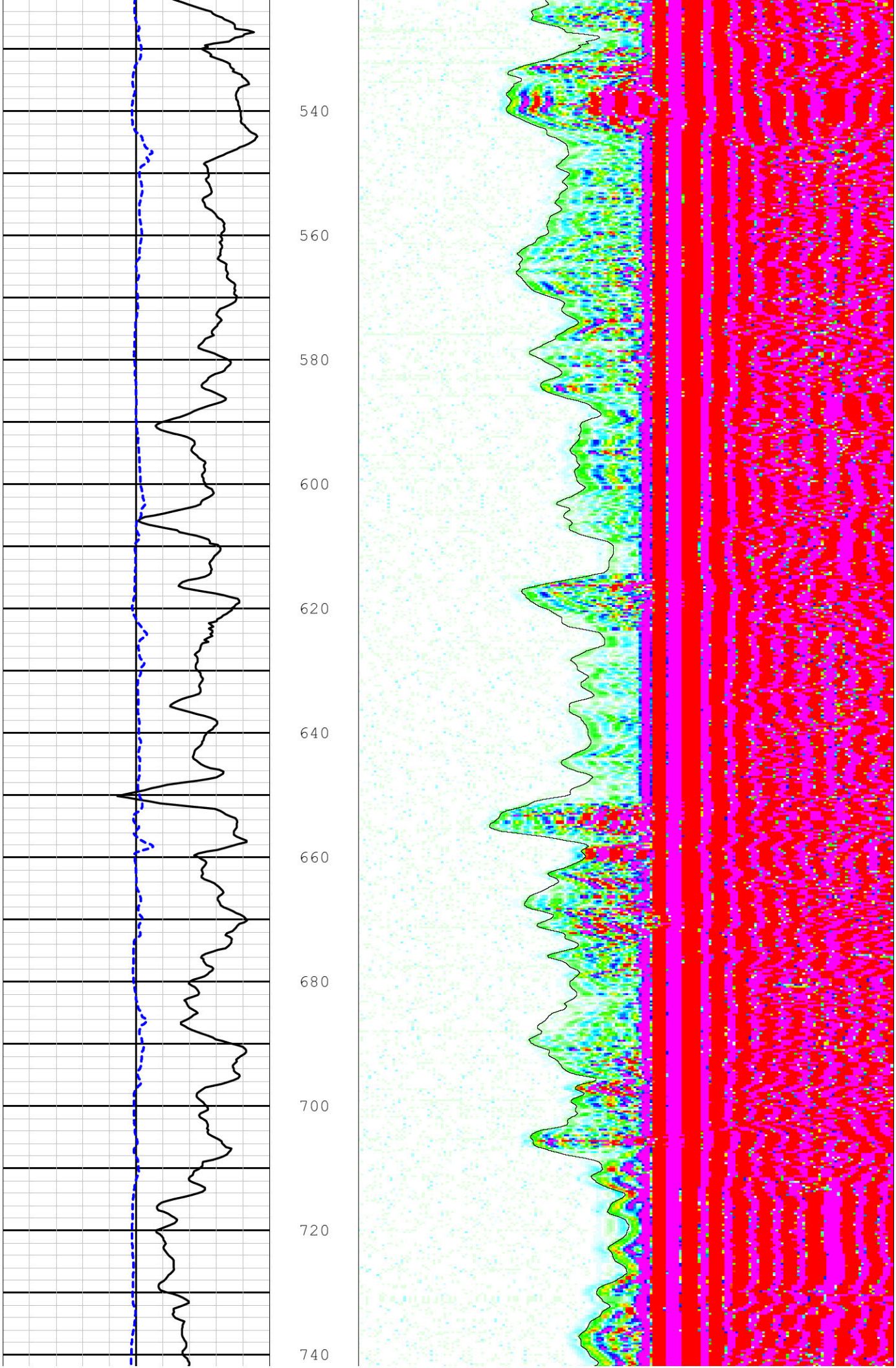
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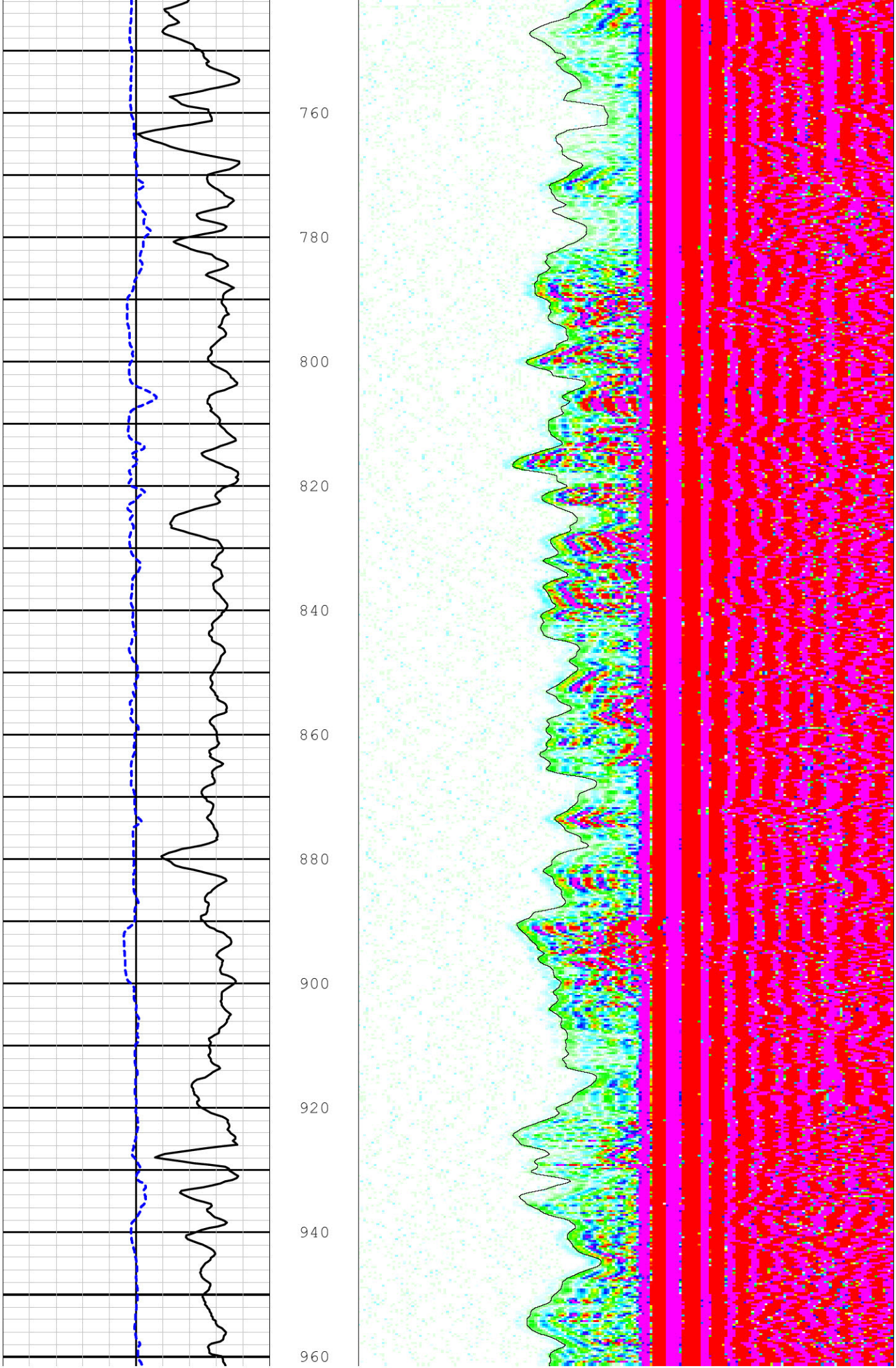
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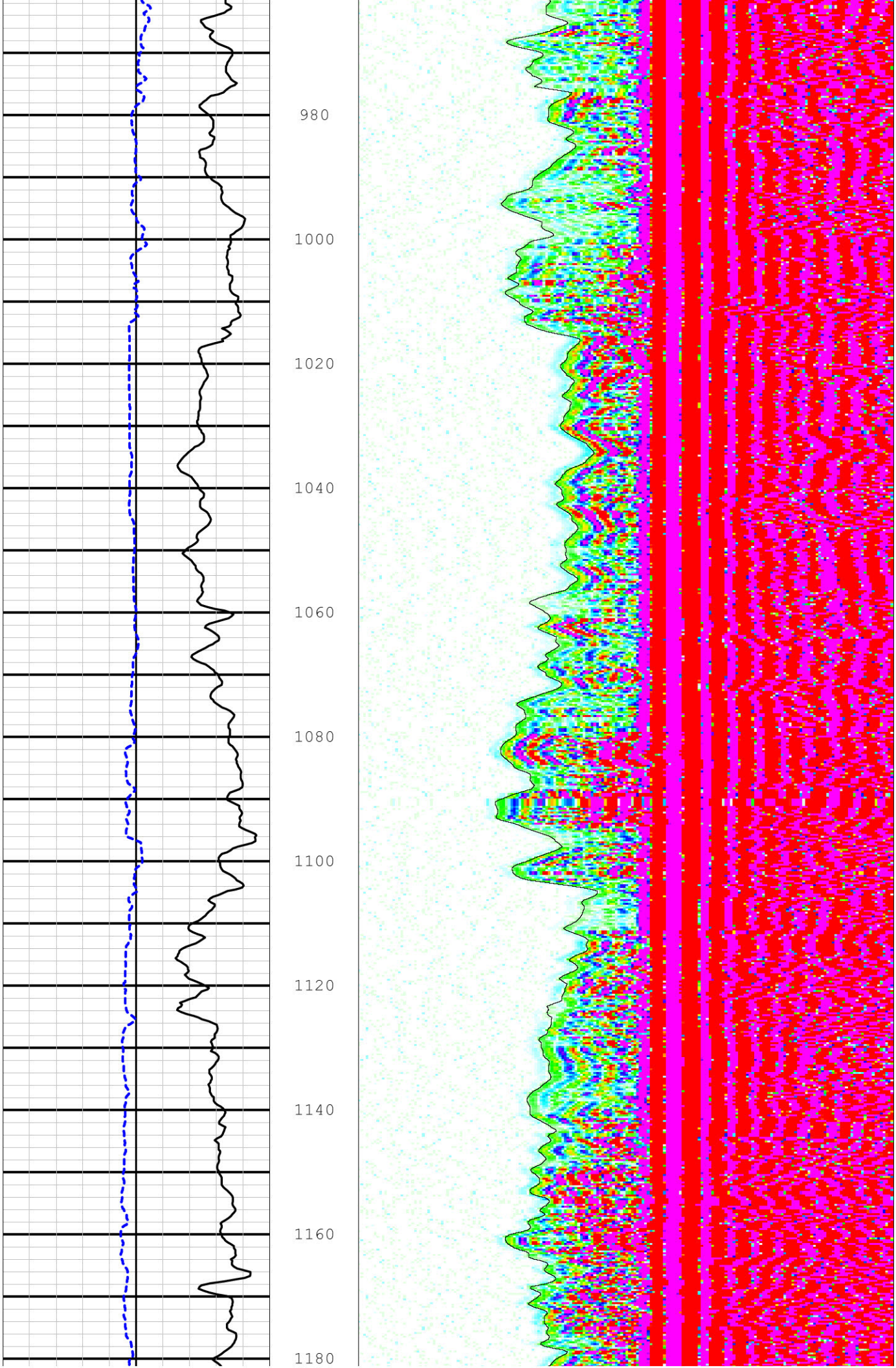
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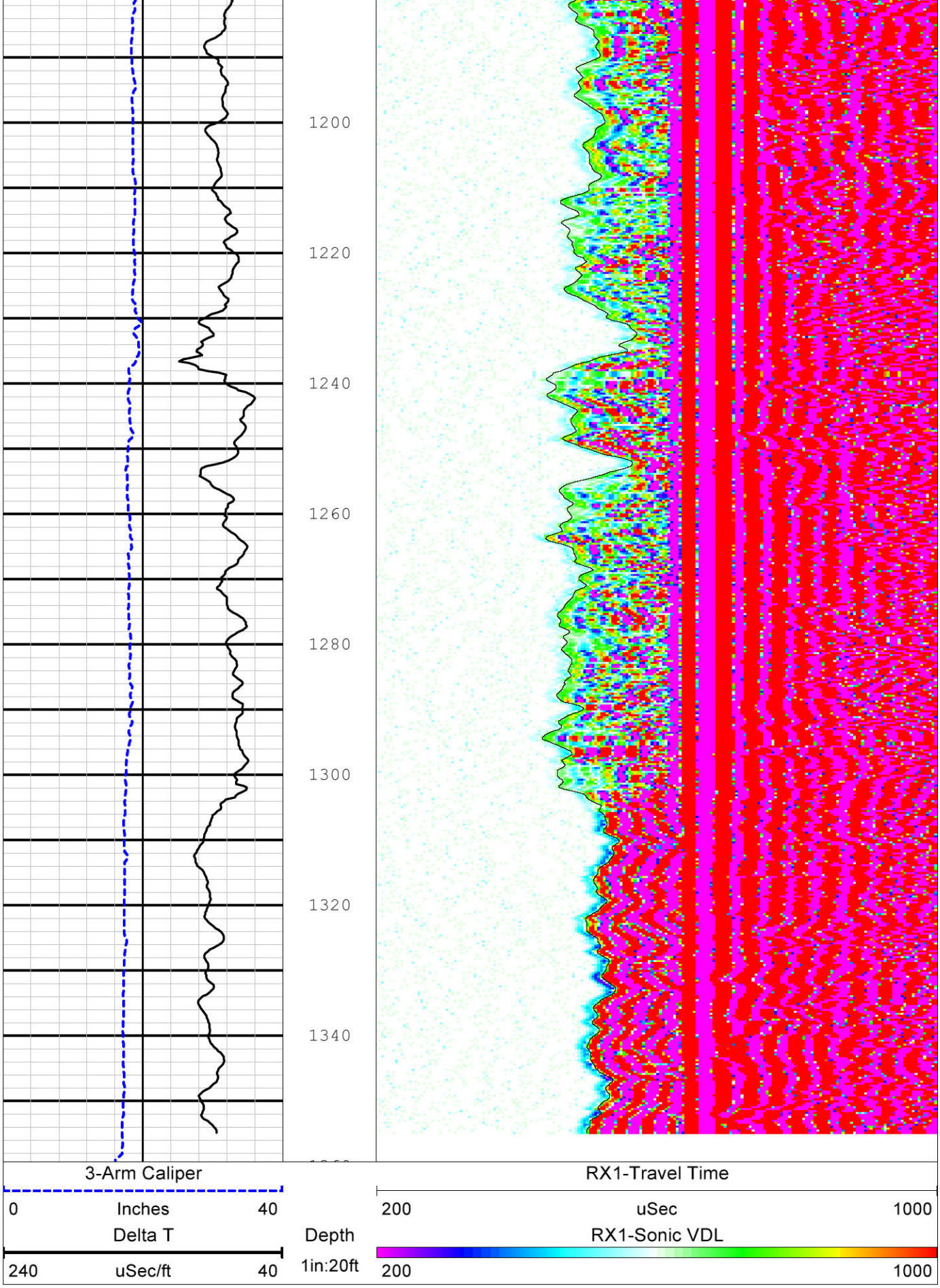
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1240
1260
1280
1300
1320
1340
3-Arm Caliper
0
Inches
40
Delta T
240
uSec/ft
40
Depth
1in:20ft
RX1-Travel Time
200
uSec
1000
RX1-Sonic VDL
200
1000

Southwest Exploration Services, LLC

borehole geophysics & video services

COMPANY	CLEAR CREEK ASSOCIATES
WELL ID	PALO VERDE DEEP WELL CHARLIE
FIELD	PVNGS
COUNTY	MARICOPA STATE ARIZONA

TYPE OF LOGS: CALIPER W/ VOLUME
MORE: BASED ON 2 CASINGS

OTHER SERVICES
NONE

LOCATION
B(1-6)34aab

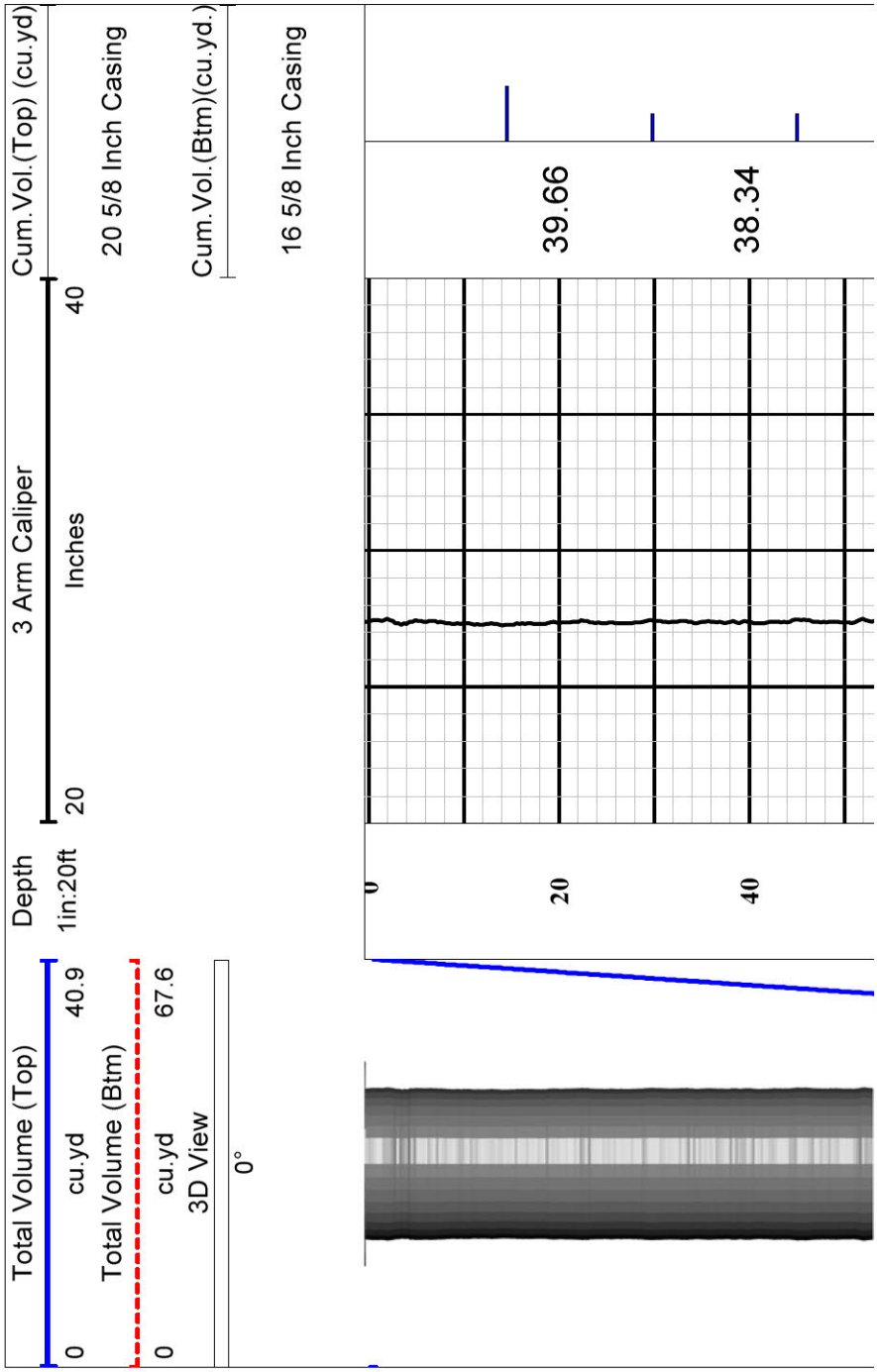
SEC 34 TWP 1N RGE 6W

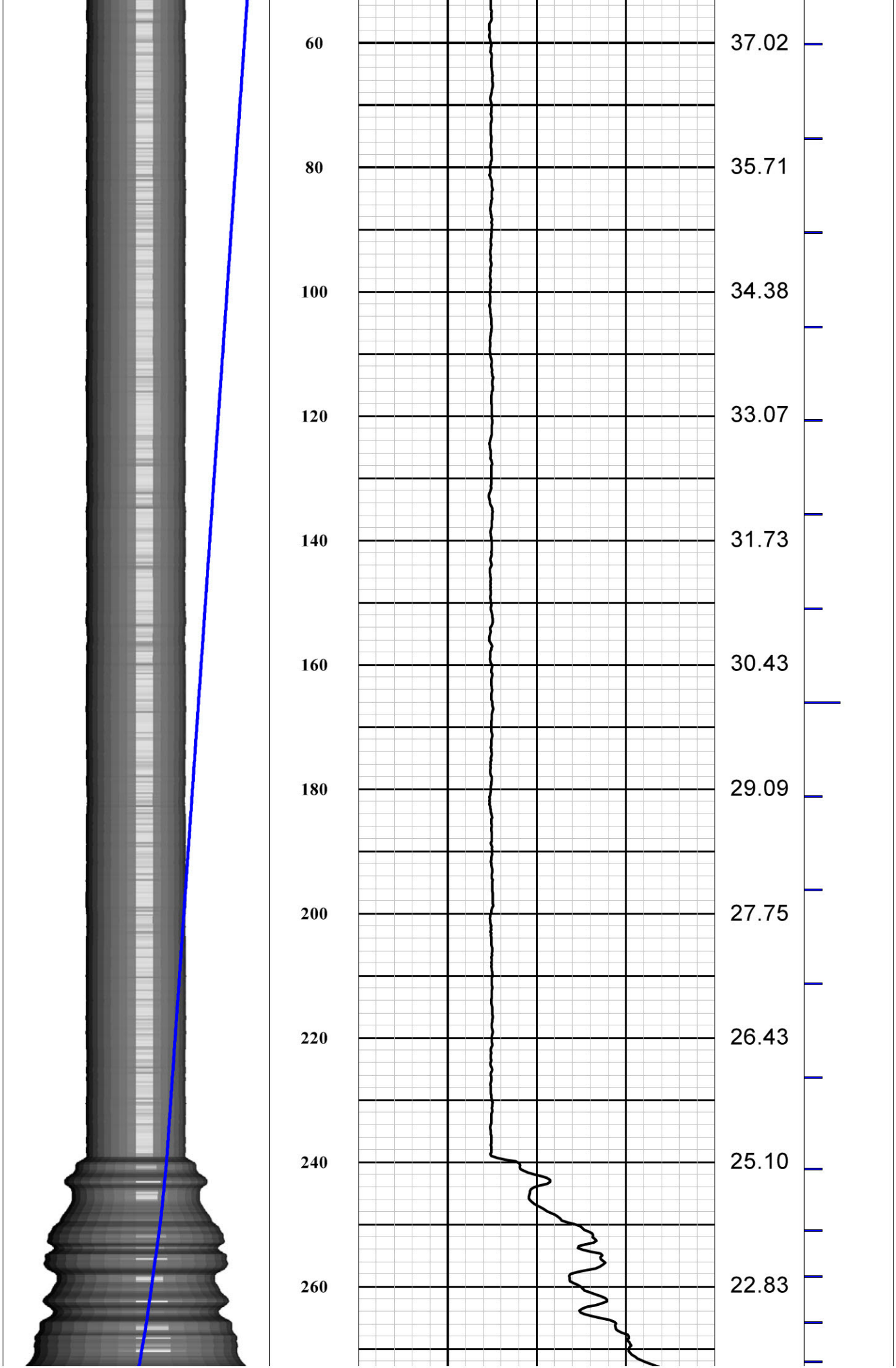
PERMANENT DATUM		ELEVATION	K.B.
LOG MEAS. FROM	GROUND LEVEL	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM			G.L.

DATE	11-8-07	TYPE FLUID IN HOLE	FRESH MUD
RUN No	1	SALINITY	
TYPE LOG	CALIPER	DENSITY	
DEPTH-DRILLER	1325 FT	LEVEL	FULL
DEPTH-LOGGER	1324 FT	MAX. REC. TEMP.	N/A
BTM LOGGED INTERVAL	1324 FT	IMAGE ORIENTED TO:	N/A
TOP LOGGED INTERVAL	SURFACE	SAMPLE INTERVAL	0.2 FT
DRILLER / RIG#	ZIM	LOGGING TRUCK	TRUCK #107
RECORDED BY / Logging Eng.	D. JACOVITCH	TOOL STRING/SN	COMPROBE 2 1/8"
WITNESSED BY	ZIM-BRAD	LOG TIME:ON SITE/OFF SITE	0600 0915

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	?	SURFACE	240 FT	28"		SURFACE	240 FT
2	26"	240 FT	572 FT				
3	24"	572 FT	TOTAL DEPTH				

COMMENTS: TWO STAGE COMPLETION WITH 20 INCH AND 16 INCH CASING SIZES.

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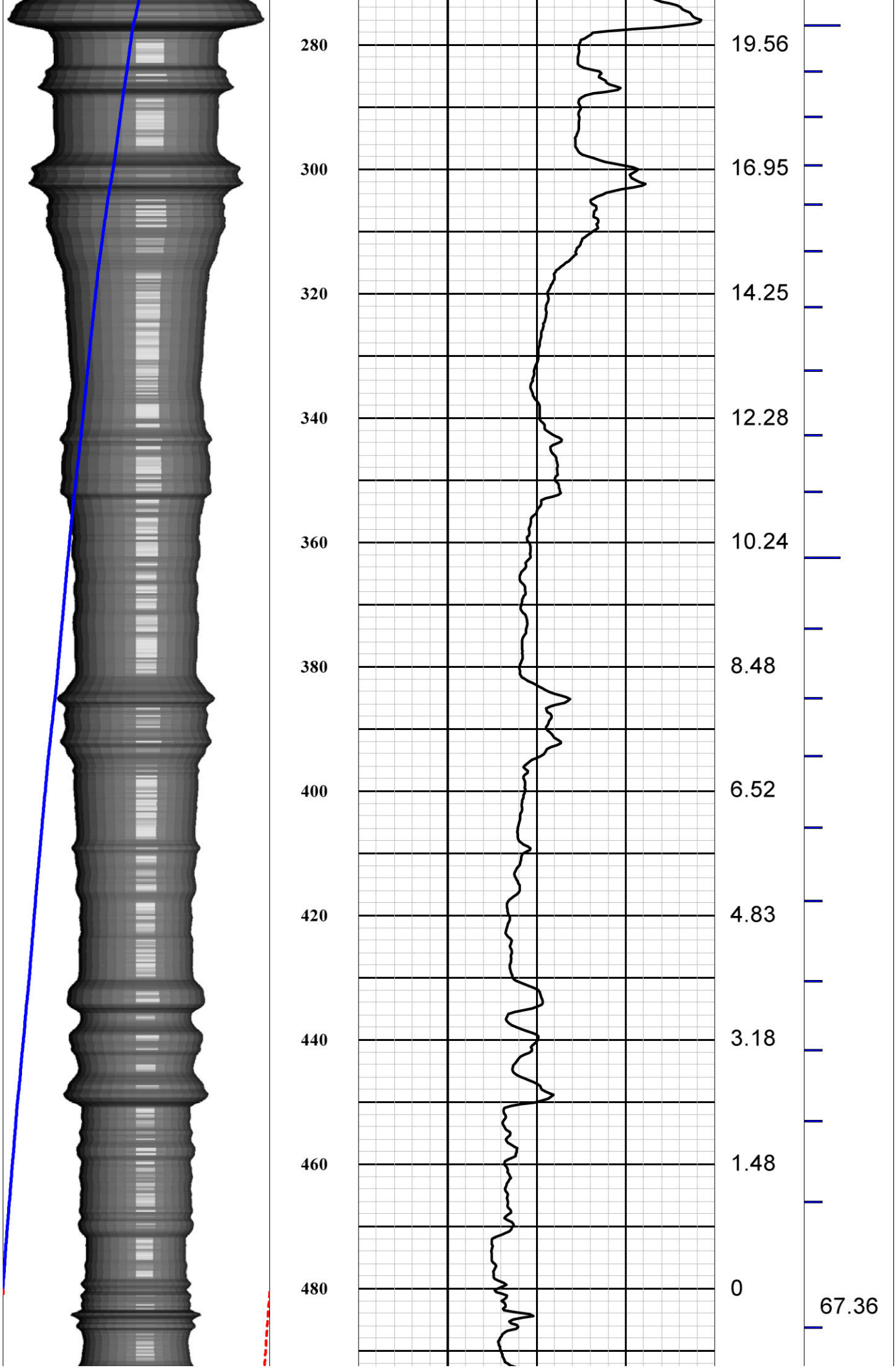
25.10
22.83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14.25
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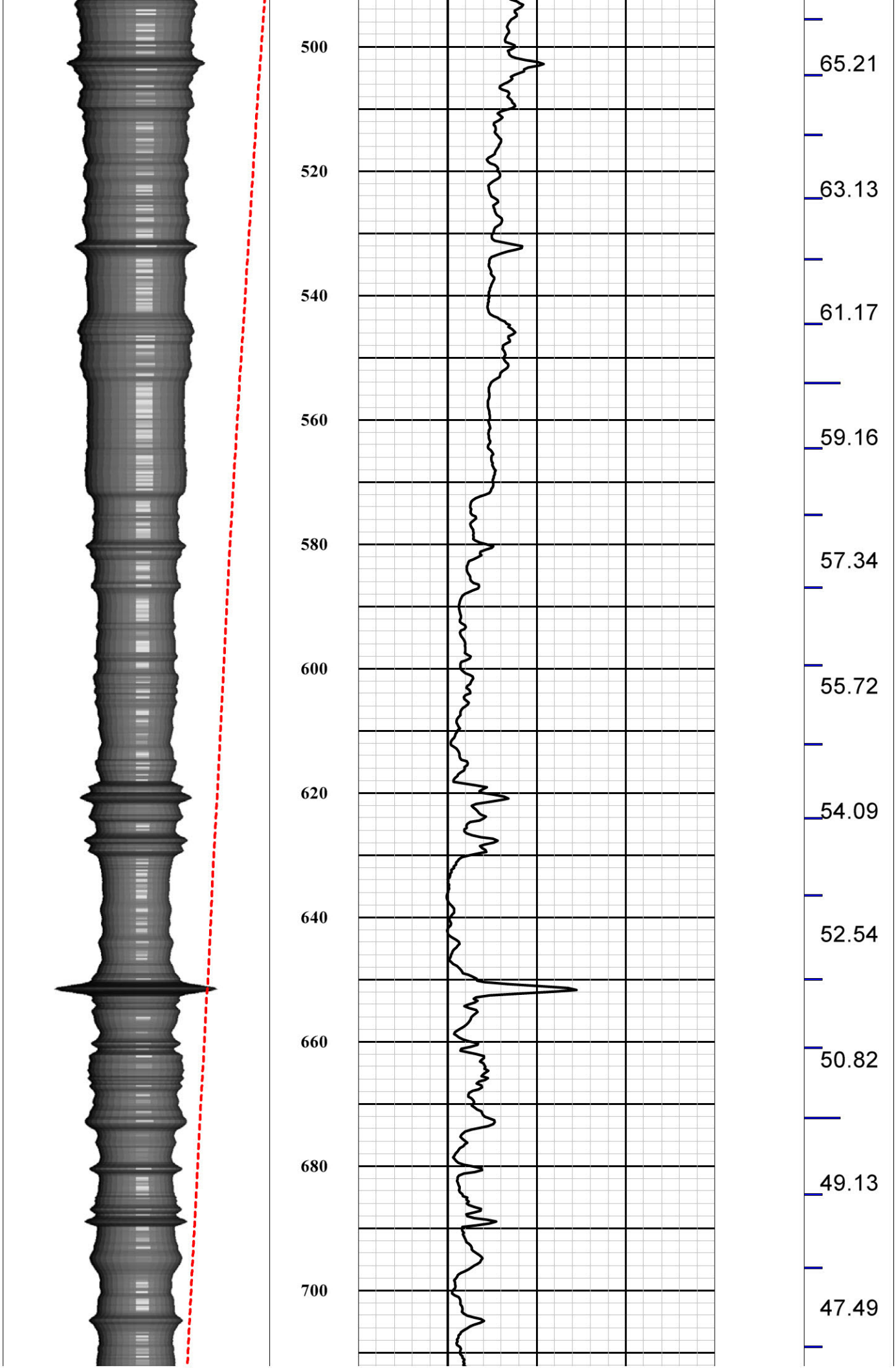
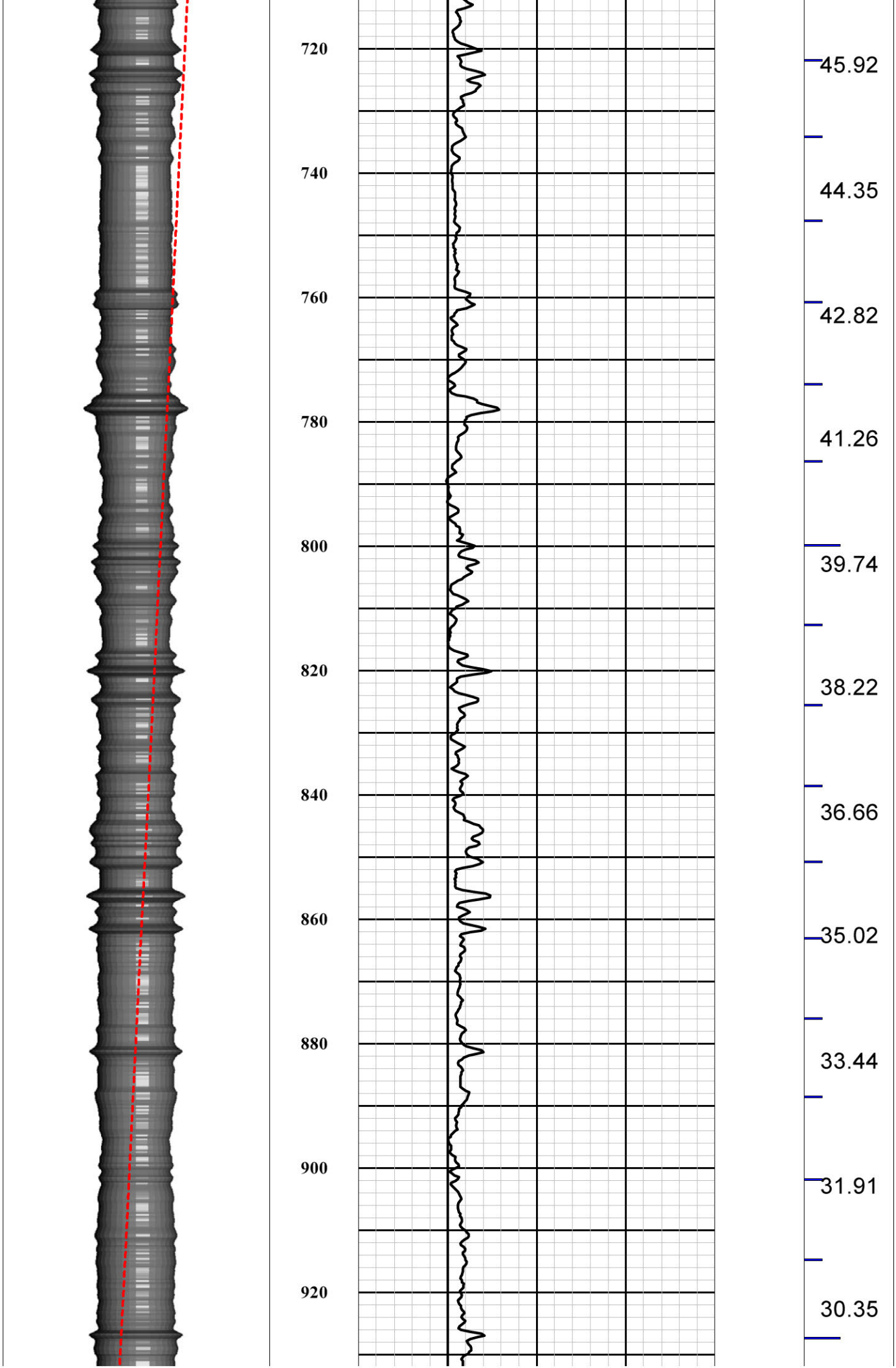
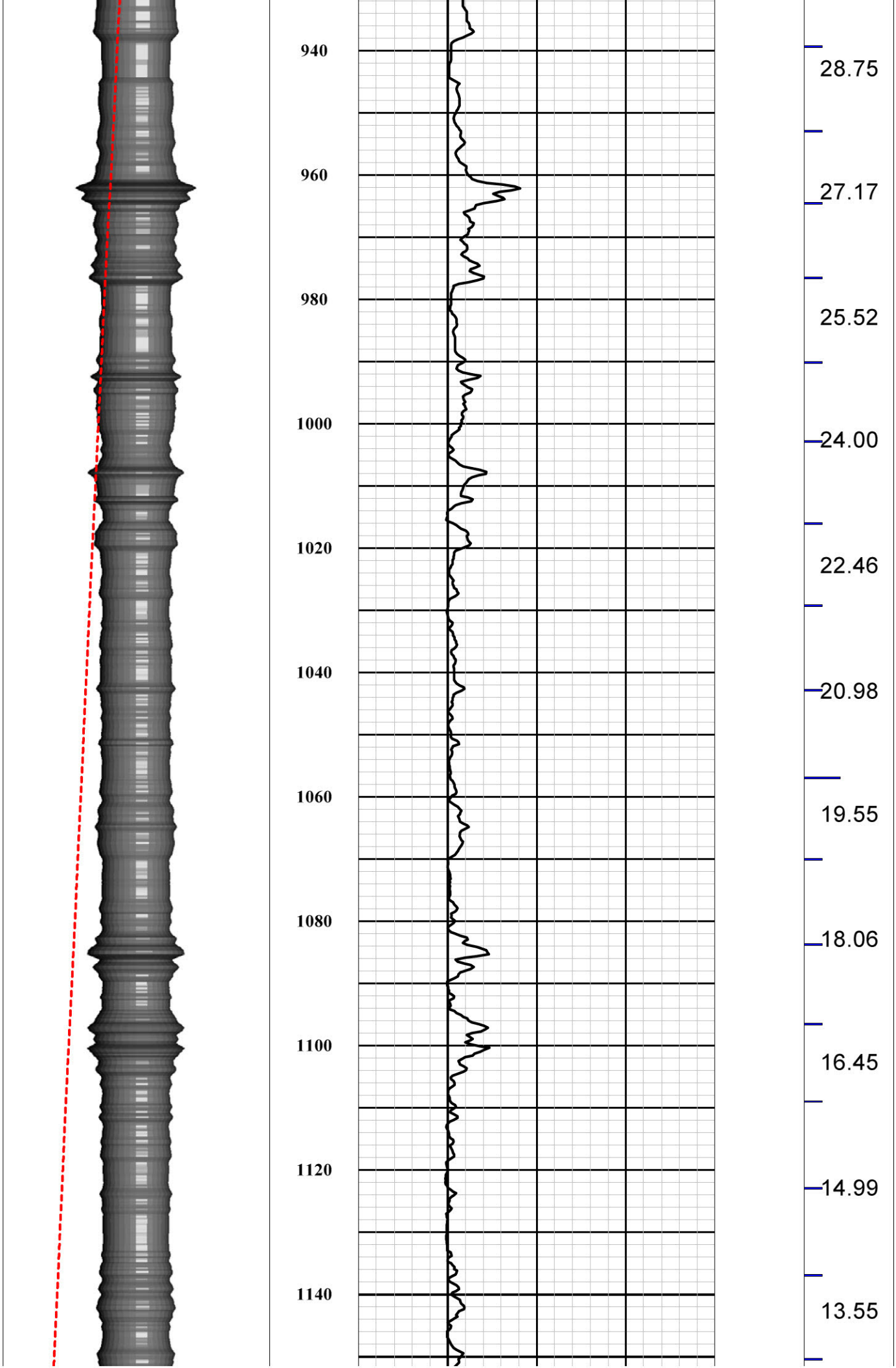
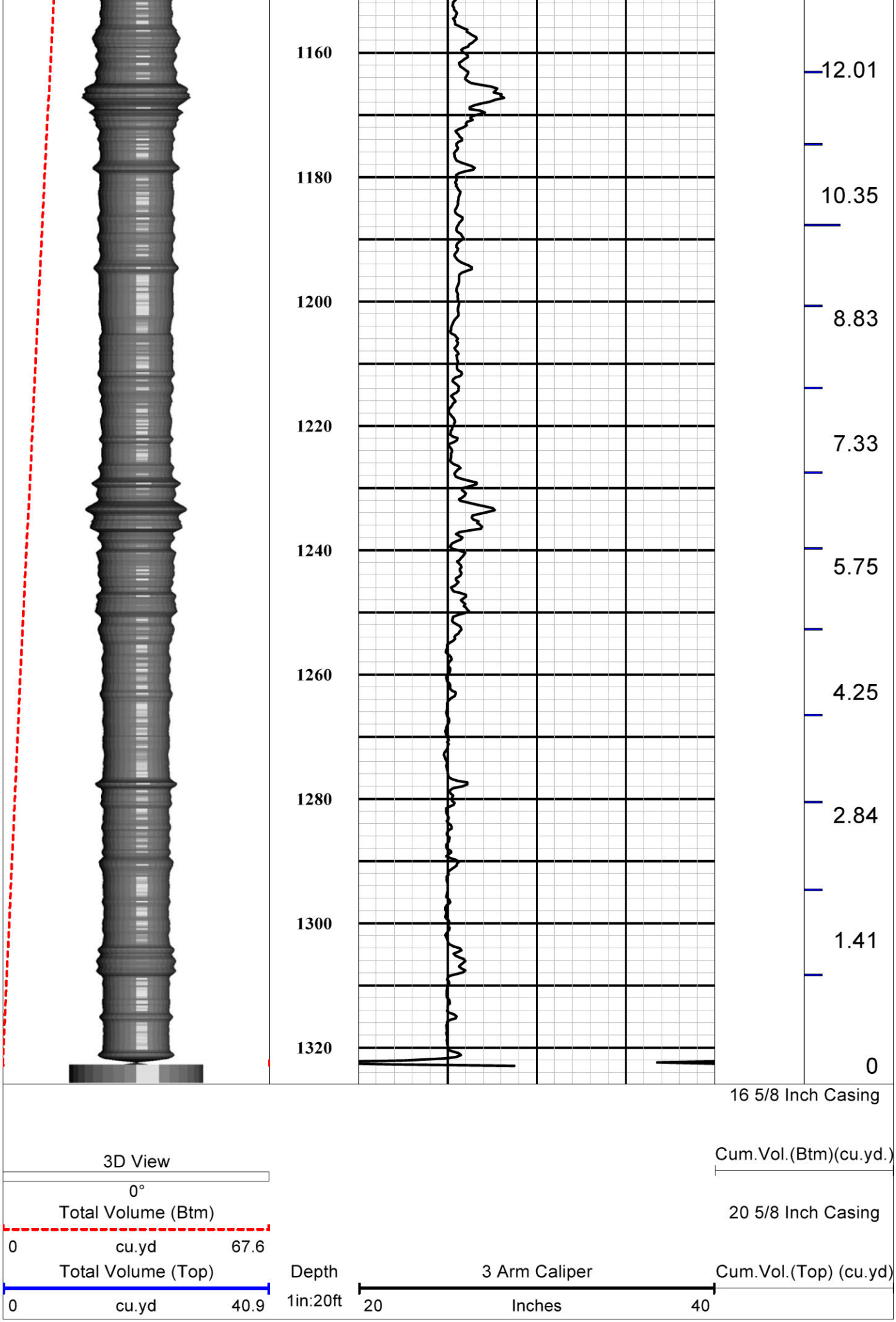
6.52
4.83
3.18
1.48
0
67.36


500
520
540
560
580
600
620
640
660
680
700
65.21
63.13
61.17
59.16
57.34
55.72
54.09
52.54
50.82
49.13
47.49


720
740
760
780
800
820
840
860
880
900
920
45.92
44.35
42.82
41.26
39.74
38.22
36.66
35.02
33.44
31.91
30.35


940
960
980
1000
1020
1040
1060
1080
1100
1120
1140
28.75
27.17
25.52
24.00
22.46
20.98
19.55
18.06
16.45
14.99
13.55


1160
1180
1200
1220
1240
1260
1280
1300
1320
12.01
10.35
8.83
7.33
5.75
4.25
2.84
1.41
0
16 5/8 Inch Casing
Cum.Vol.(Btm)(cu.yd.)
3D View
0°
Total Volume (Btm)
0
cu.yd
67.6
20 5/8 Inch Casing
Total Volume (Top)
0
cu.yd
40.9
Depth
1in:20ft
3 Arm Caliper
20
Inches
40
Cum.Vol.(Top) (cu.yd)