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25063
TODD
KEAY
Date Signed 14 SEP 2012
ARIZONA U.S.A.
Expires 06/30/2014

TECHNICAL MEMORANDUM

DATE: **September 14, 2012** **Project 605.124**

TO: **Greg Ghidotti and Heather Gluski**
RESOLUTION COPPER MINING LLC

FROM: **Janis Blainer-Fleming and Bill Victor**
MONTGOMERY & ASSOCIATES

SUBJECT: **RESULTS OF DRILLING, CONSTRUCTION, AND DEVELOPMENT OF GROUNDWATER PRODUCTION WELL RESPW-01, RESOLUTION COPPER MINING, PINAL COUNTY, ARIZONA**

In accordance with a request from Mr. Greg Ghidotti, Resolution Copper Mining LLC (RCM), Montgomery & Associates (M&A) has prepared this Draft Technical Memorandum to summarize results of drilling, construction, and development of groundwater production well RESPW-01. The well was installed to intersect mine workings on the 4400 Mine Level adjacent to Shaft No. 8 of the Magma Mine in order to dewater that level and overlying levels.

SUMMARY

A summary of drilling, construction, and development operations and results is provided below:

1. Groundwater production well RESPW-01 is located on land owned by RCM, in Township 1 South, Range 12 East, in the SW ¼ of the NE ¼ of the NE ¼ of Section 35 [(D-1-12) 35aac2] at the West Plant site near Shaft No. 8.
2. Well RESPW-01 was drilled and constructed during the period February 9, 2011 through February 25, 2012.
3. Total drilled depth is 1,222.9 meters (4,012 feet) below land surface (bls).

4. Drill cuttings at RESPW-01 were not logged because cuttings were logged at nearby hydrologic test well DHRES-10. Geologic units encountered at test well DHRES-10 include Mississippian Escabrosa Limestone (Me), Devonian Martin Formation (Dm), Cambrian Bolsa Quartzite (Cb), younger Precambrian diabase (pCdiab), and Apache Group units, including the Dripping Spring Quartzite (pCds) and Pioneer Shale (pCp).
5. Three intervals of conductor casing were installed in the upper borehole above the production interval of the well: 32-inch diameter low carbon steel casing was installed from land surface to 36.7 meters (120 feet) bls, 28-inch diameter low carbon steel casing was installed from land surface to 195.4 meters (641 feet) bls, 16-inch diameter low carbon steel casing was installed from land surface to 912.6 meters (2,994 feet) bls, and 16-inch diameter stainless steel casing was installed from 913.2 to 1,187.5 meters (2,996 to 3,896 feet) bls. A dielectric coupler was installed between the 16-inch diameter low carbon steel and stainless steel casing in the interval from 912.6 to 913.2 meters (2,994 to 2,996 feet) bls.
6. The well was completed in the 4400 Level of the Magma Mine underground workings; 12-3/4-inch diameter perforated stainless steel casing was installed from 1,182.6 to 1,222.9 meters (3,880 to 4,012 feet) bls.
7. Non-pumping water level was 961.3 meters (3,154 feet) bls on February 28, 2012.
8. Following installation of production casing, 22.5 hours of airlifting was conducted to develop the well.

INTRODUCTION

Production well RESPW-01 was drilled and constructed during the period February 9, 2011 through February 25, 2012. The well was installed to intersect mine workings on the 4400 Mine Level adjacent to Shaft No. 8 of the Magma Mine in order to dewater that level and overlying levels. Well RESPW-01 is located on land owned by RCM at the West Plant site in Township 1 South, Range 12 East, in the SW ¼ of the NE ¼ of the NE ¼ of Section 35 [(D-1-12)35aac2], near hydrologic test well DHRES-10 [(D-1-12) 35aac1]. The location is shown on **Figure 1**. A schematic diagram summarizing well construction details is shown on **Figure 2**. Also shown on **Figure 2** are the geologic units encountered during drilling at nearby well DHRES-10 and groundwater level following well construction. A schematic diagram showing a simplified sequence of borehole drilling events is shown on **Figure 3**.

The presence of fractured rocks, faults, non-horizontal bedding, and underground mine workings in the subsurface at well RESPW-01 presented significant challenges during drilling, resulting in numerous occurrences of lost circulation, unstable borehole conditions, and deviation of the borehole.

DRILLING OPERATIONS AND METHODS

Production well RESPW-01 was drilled and constructed by Boart Longyear Drilling Services (Boart Longyear) of Salt Lake City, Utah, using a Lang LM-300 (Rig LK25) top-head drive rotary drill rig. Directional drilling services were provided by Scientific Drilling International of Houston, Texas, under subcontract to Boart Longyear. Well RESPW-01 was drilled in accordance with technical specifications prepared by M&A, who provided drilling review and advice on an as-needed basis. RCM personnel coordinated drilling contractor activities and purchase of well construction materials. Daily drilling reports were prepared by Boart Longyear personnel and were submitted to RCM for review. Well RESPW-01 was drilled and constructed in several stages using a variety of drilling methods discussed below.

Drilling of the Surface and Intermediate Boreholes

The surface borehole was drilled to a depth of 6.1 meters (20 feet) bls using the conventional mud rotary method and a 48-inch diameter tricone bit. A 42-inch outside diameter (OD) blank low-carbon steel surface casing was set and cemented from land surface to a depth of 6.1 meters (20 feet) bls. A borehole was then drilled to a depth of 36.7 meters (120 feet) bls using the reverse circulation mud rotary method and a 38-inch diameter tricone bit. A 32-inch OD blank low-carbon steel conductor casing was installed from land surface to a depth of 36.7 meters (120 feet) bls to prevent loss of circulation in the upper part of the borehole.

For the borehole interval below the uppermost (32-inch) conductor casing, the well was drilled in several stages. For these stages, a pilot borehole was advanced using a 12-1/4-inch diameter tricone bit followed by reaming to the final borehole diameter for the interval. Conventional mud rotary, flooded reverse rotary, and/or directional drilling methods were used to maintain borehole stability and to build the desired deflection to reach the drilling target at the 4400 Mine Level.

Following installation of the uppermost (32-inch) conductor casing, drilling resumed using the conventional mud rotary method and a 12-1/4-inch diameter tricone bit. Directional drilling commenced at a depth of 137.2 meters (450 feet) bls to build the required borehole deflection to intercept the underground mine workings. Lost circulation occurred at about 333 and 341 meters (1,092.6 and 1,118.8 feet) bls, but was controlled using lost circulation materials (LCM). Lost circulation occurred again at a depth of about 803 meters (2,635 feet) bls, and numerous attempts to stabilize and re-drill the borehole were unsuccessful. The borehole was reamed to a depth of 195.4 meters (641 feet) bls using a 31-inch diameter tricone bit, and a second conductor casing (28-inch OD blank low-carbon steel) was installed from land surface to total depth of this part of the borehole **(Figure 2)**.

Following installation of the second conductor casing, the borehole was reamed to a depth of approximately 253 meters (830 feet) bls using a 22-inch diameter tricone bit. Due to a number of problems encountered upon re-entry of the pilot borehole, a new branch of the pilot borehole (RESPW-01A) was drilled by deviation off the original pilot borehole using directional drilling from about 253 to 1,027 meters (830 to 3,370 feet) bls **(Figure 3)**. Numerous problems with the borehole interval below 900 meters (2.950 feet) bls made it necessary to cement back the lower part of the borehole to about 940 meters (3,083 feet) bls and drill a second deviated pilot borehole (RESPW-01B) **(Figure 3)**. The pilot borehole for RESPW-01B was drilled from about 940 to 1,195 meters (3,083 to 3,920 feet) bls. The borehole was reamed to 22-inch diameter from about 253 to 1,195 meters (830 to 3,920 feet) bls, and then the last conductor casing was installed (16-inch OD blank low-carbon steel and stainless steel with dielectric coupling). While reaming the borehole, some tooling was lost in the borehole at a depth of about 490 meters (1,607 feet) bls **(Figure 3)**. Numerous attempts to retrieve the tooling were unsuccessful and the tooling was left in the borehole and bypassed during subsequent reaming operations.

Drilling of the Production Borehole

Following installation of the last conductor casing, a pilot borehole for the production interval of the well was advanced using directional and conventional drilling methods to a total depth of 1,222.9 meters (4,012 feet) bls. During drilling of this interval, the 4400 Mine Level was intercepted with the ceiling at a depth of 1,217.9 meters (3,996 feet) bls, and the floor at 1,222.9 meters (4,012 feet) bls. The production interval was then reamed using a 14-3/4-inch diameter rotary bit, and 12-3/4-inch OD perforated stainless steel casing was installed in the production interval of the borehole.

BOREHOLE GEOPHYSICAL LOGGING

Borehole video and borehole deviation gyroscopic surveys were conducted periodically during drilling of the pilot and final boreholes for well RESPW-01 to view lost circulation zones and stuck tooling and to determine orientation of the borehole. Southwest Exploration Services, LLC of Gilbert, Arizona conducted a final gyroscopic deviation survey in the conductor casing to a depth of 1,218.6 meters bls on February 14, 2012. The report for this survey is provided in **Appendix A**. Results of gyroscopic logging indicate that the bottom of the cased conductor borehole is located 1.15 meters (3.77 feet) off center from the top of the casing at land surface, with a drift bearing of 231.2 degrees; true vertical depth for the survey was 1,217.9 meters (3,995.86 feet) bls. Maximum deviation of the cased conductor borehole in this interval was surveyed to be 3.24 meters (10.63 feet) at a depth of about 287 meters (942 feet) bls, with a drift bearing of 177.7 degrees. A complete record of logs obtained during drilling of RESPW-01 is on file at RCM.

GEOLOGY

Drill cuttings samples were not collected or logged at RESPW-01. The lithologic log shown on **Figure 2** is based on drill cuttings samples and borehole geophysical logs from hydrologic test well DHRES-10, drilled September to November 2010 and was used as the proxy for well RESPW-01. Geologic contacts shown on **Figure 2** are referenced to land surface at DHRES-10; adjustments were not made for differences in land surface elevation between DHRES-10 and RESPW-01. Geologic contacts at well DHRES-10 were picked based on analysis of drill cuttings samples, and confirmed using borehole geophysical logs. **Table 1** is a summary of geologic units encountered at well DHRES-10.

TABLE 1. SUMMARY OF GEOLOGIC UNITS DRILLED AT HYDROLOGIC TEST WELL DHRES-10

DEPTH INTERVAL (meters bls)	GEOLOGIC FORMATION
0 – 9.1	Fill
9.1 – 70.1	Escabrosa Limestone (Me)
70.1 – 84.1	Martin Limestone (Dm)
84.1 – 114.9	Bolsa Quartzite (Cb)
114.9 – 420.6 459.9 – 544.4 548.3 – 731.5 749.5 – 752.9 929.9 – 1,024.1 1,036.3 – 1,161.2	Diabase sills (pCdiab)
420.6 – 459.9 544.4 – 548.3 731.5 – 746.8	Upper Dripping Spring Quartzite (pCdsu)
746.8 – 749.5 752.9 – 834.8	Lower Dripping Spring Quartzite (pCdsl)
834.8 – 929.9 1,024.1 – 1,036.3	Pioneer Shale (pCp)
1,161.2 – 1,222.9	Unknown – Lost Circulation

WELL CONSTRUCTION

Production well RESPW-01 was constructed in five stages. Surface casing was installed from land surface to a depth of 6.1 meters (20 feet) bls, three intervals of conductor casing were installed from land surface to a depth of 1,187.5 meters (3,896 feet) bls, and production casing was installed from 1,182.6 to 1,222.9 meters (3,880 to 4,012 feet) bls. All blank low carbon steel conductor casing conforms to the requirements of ASTM Specification A139B. All blank stainless steel conductor casing and blank and perforated stainless steel production casing liner are Type 316L, and conform to the requirements of ASTM Specification A778. All conductor casing is 0.375-inch wall thickness. All production casing is 0.3125-inch wall thickness. All conductor and production casing was butt-welded. Details for each cased interval are discussed in the following section.

Casing Installation

Construction at well RESPW-01 began with installation of surface casing; after drilling of the 48-inch diameter surface borehole, 6.1 meters (20 feet) of 42-inch OD blank low carbon steel casing was installed and cemented in place. Following drilling of the 38-inch diameter conductor borehole, 32-inch OD blank low carbon steel casing was installed, centralized, and cemented in place in the interval from land surface to 36.7 meters (120 feet) bls (**Figure 2**).

Following installation of conductor casing and drilling of the pilot borehole to a depth of 809.2 meters (2,655 feet) bls, numerous problems with lost circulation, borehole stability, and borehole orientation necessitated installation of an additional conductor casing. The borehole was reamed to a depth of 195.4 meters (641 feet) bls, and 28-inch OD blank low carbon steel casing was installed from land surface to 195.4 meters (641 feet) bls; the casing was stabilized in the borehole using bentonite in the depth interval from 152.4 to 195.4 meters (500 to 641 feet) bls (**Figure 2**).

After the second conductor casing was installed, the pilot borehole was advanced to a depth of 1,194.8 meters (3,920 feet) bls and then reamed to 22-inch diameter. During drilling and reaming of this section, two deviated boreholes were drilled to bypass problematic sections of the borehole where circulation was problematic and lost tools could not be recovered (**Figure 3**). Following reaming of the borehole, 16-inch OD blank steel conductor casing was installed from land surface to a depth of 1,187.5 meters (3,896 feet) bls. Low carbon steel casing was installed in the depth interval from land surface to 912.6 meters (2,994 feet) bls, and stainless steel casing was installed in the depth interval from 913.2 to 1,187.5 meters (2,996 to 3,896 feet) bls; a bullnose was attached to the bottom joint of casing. A dielectric coupler joining the low carbon steel and stainless steel casing was installed in the depth interval from 912.6 to 913.2 meters (2,994 to 2,996 feet) bls (**Figure 2**). The proposed well design called for installation of annular materials; a cement basket was installed above the dielectric coupler so that the proposed annular gravel pack would not be lost into a zone of persistent lost circulation beginning at about 975 meters (3,200 feet) bls.

The initial plan was to install cement in the annular space outside the 16-inch casing using a tremie pipe. Due to the number and severity of doglegs in the borehole, there was concern that the tremie pipe would be crushed or lost in the borehole, and a decision was made to pressure-grout the zone from 975 to 1,036 meters (3,200 to 3,400 feet) bls instead, using a grout shoe installed with the casing string. As the casing passed through the numerous doglegs in the borehole, it became more difficult to pullback and release the slips with increasing depth of installation. At a depth of 966.8 meters (3,172 feet) bls, the draw works were unable to pull the casing back the 6 inches needed to release the slips. Installation of the 16-inch casing proceeded from this depth by landing the casing using welded-on tabs, and then lowering the drilling table by retracting the jacklegs. The remainder of the casing was run by landing the casing with welded-on tabs at each joint, installing the next, and then removing the welded-on tabs to install the section. The 16-inch casing is suspended at the wellhead by 1-inch thick x 4-inch wide x 8-inch long steel tabs that are welded onto the casing; the welded-on tabs rest on a 4-inch thick x 36-inch square steel plate that rests on the 28-inch diameter casing.

Following casing installation, an attempt was made to pressure-grout the 16-inch casing in place. After an apparent cement cure time of about two days, it was discovered that the grout shoe had failed and instead of the cement moving into the annulus of the well, it filled the 16-inch casing from 840 to 1,187.5 meters (2,776 to 3,896 feet) bls. The cement was removed by drilling using a 14-3/4-inch diameter tricone bit.

Following drilling through the bullnose at the bottom of the 16-inch casing, and drilling and reaming of the production interval of the borehole, the production interval for well RESPW-01 was constructed using 12-3/4-inch OD perforated stainless steel casing. A continuous perforated interval was installed in the depth interval from 1,182.6 to 1,222.9 meters (3,880 to 4,012 feet) bls. Perforations are 0.25-inch wide by 2.5-inch long machine-cut slots, 18 slots per round, 4 rounds per foot staggered (72 slots per foot). The production casing was installed in compression (not suspended) inside the 16-inch casing using a proprietary back-off tool assembly manufactured by Boart Longyear. A schematic diagram of the back-off tool assembly is given in **Appendix B**. Top of the 12-3/4-inch casing is at 1,182.6 meters (3,880 feet) bls (**Figure 2**).

Annular materials were not installed in the production interval of the well. A schematic diagram of well construction is shown on **Figure 2**. Following well development (discussed in the next section), several unsuccessful attempts were made to install cement in the annular space outside the 16-inch casing. Because annular cement could not be installed, the 16-inch casing was perforated at depths of 228.6, 423.7, 667.5, and 880.8 meters (751; 1,390; 2,190; and 2,890 feet) bls to provide weep holes to prevent any potential for the casing to collapse if fluids were to build up in the annular space. Perforations were made using a downhole perforator. Eight perforations were made at each depth noted above.

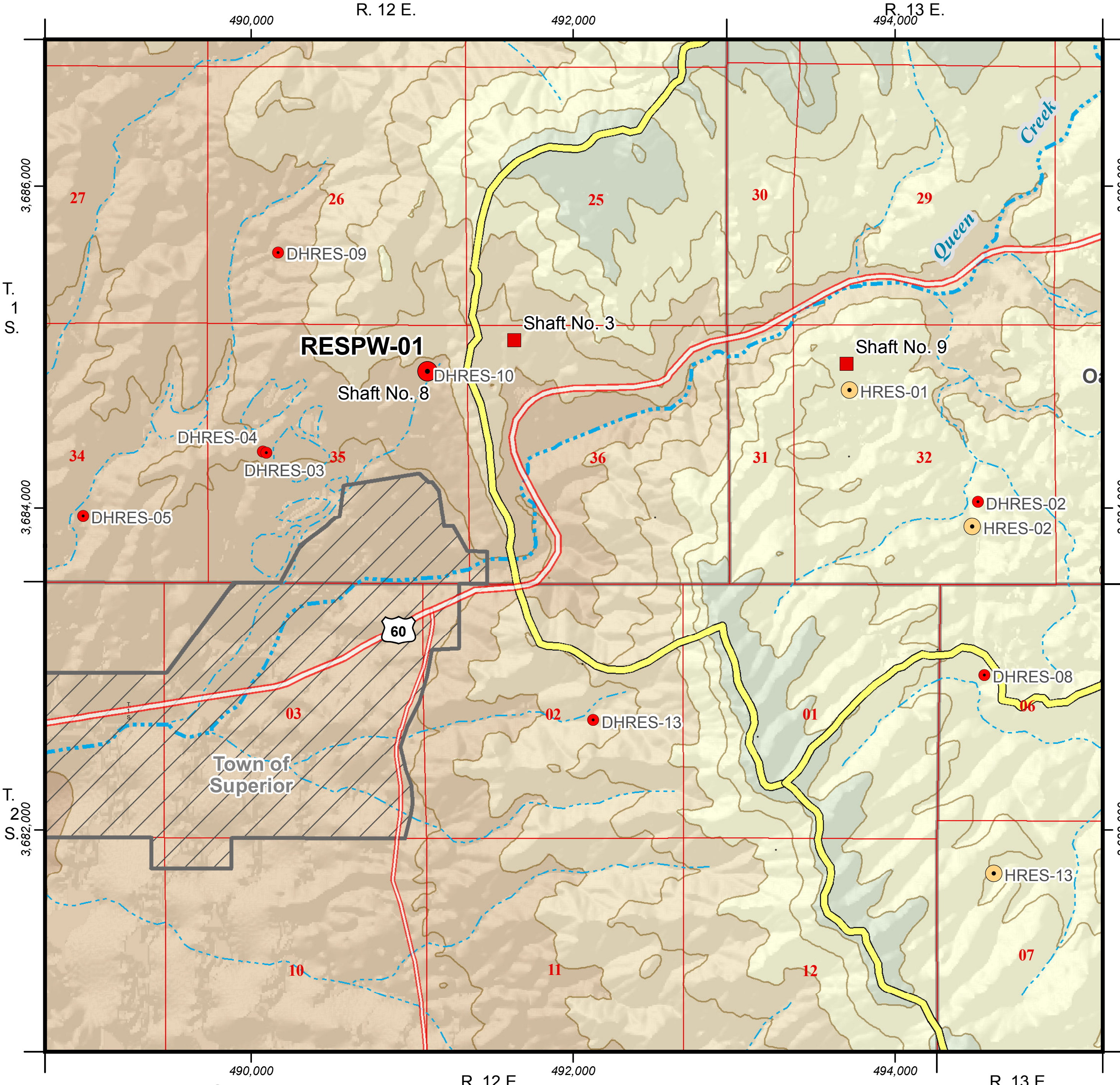
At the time of report preparation, the permanent surface completion for well RESPW-01 was in the design stage. Horizontal coordinates for the center of the well and elevation of top of the 16-inch casing were surveyed by Civiltec Engineering, Inc. of Phoenix, Arizona, on May 24, 2012. Survey data are provided in **Table 2**.

TABLE 2. PRELIMINARY SURVEY COORDINATES FOR PRODUCTION WELL RESPW-01	
Easting (meters)	491093.592
Northing (meters)	3684850.035
Elevation Top of 16-inch casing (meters amsl)	963.981
Elevation Land Surface (meters amsl)	962

Datum: UTM Zone 12N (NAD27)-NGVD29
amsl = above mean sea level

WELL DEVELOPMENT

Production well RESPW-01 was developed by airlift pumping within the perforated interval for approximately 22.5 hours. Airlift development proceeded by lowering the airline (open drill pipe) in eight successive 6-meter increments with pumping surges of about 3 hours duration. Airlift rate, specific electrical conductance, airline pressure, water temperature, and water pH were measured periodically during development. The perforated interval for well RESPW-01 is from 1,182.6 to 1,222.9 meters (3,880 to 4,012 feet) bls. Airlifting was conducted on February 17 and 18, 2012. The discharge rate ranged from 3.8 to 7.6 liters per second (L/s); average rate was 6.3 L/s. Specific electrical conductance of pumped water ranged from 3,000 to 3,880 microSiemens per centimeter (µS/cm); average was 3,520 µS/cm. Temperature of pumped water ranged from 20 to 34 degrees Celsius (^{o}C); average was about 30^{o}C. The pH of pumped water ranged from 6.20 to 6.76; average was 6.60. With the exception of water temperature which showed an increasing trend with depth, water quality parameters were relatively stable and showed no trend over the development period.



EXPLANATION

Groundwater Monitoring Sites

- Deep Groundwater System Production Well
- Apache Leap Tuff Aquifer Monitor Well
- Deep Groundwater System Monitor Well
- Shaft

Elevation Range
(meters above mean sea level)

- 1,600 - 1,800
- 1,400 - 1,600
- 1,200 - 1,400
- 1,000 - 1,200
- 800 - 1,000
- 600 - 800

N

0 1,000 2,000 3,000
Feet

Resolution Copper Mining

WELL LOCATIONS

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Water Resource Consultants

2012

FIGURE 1

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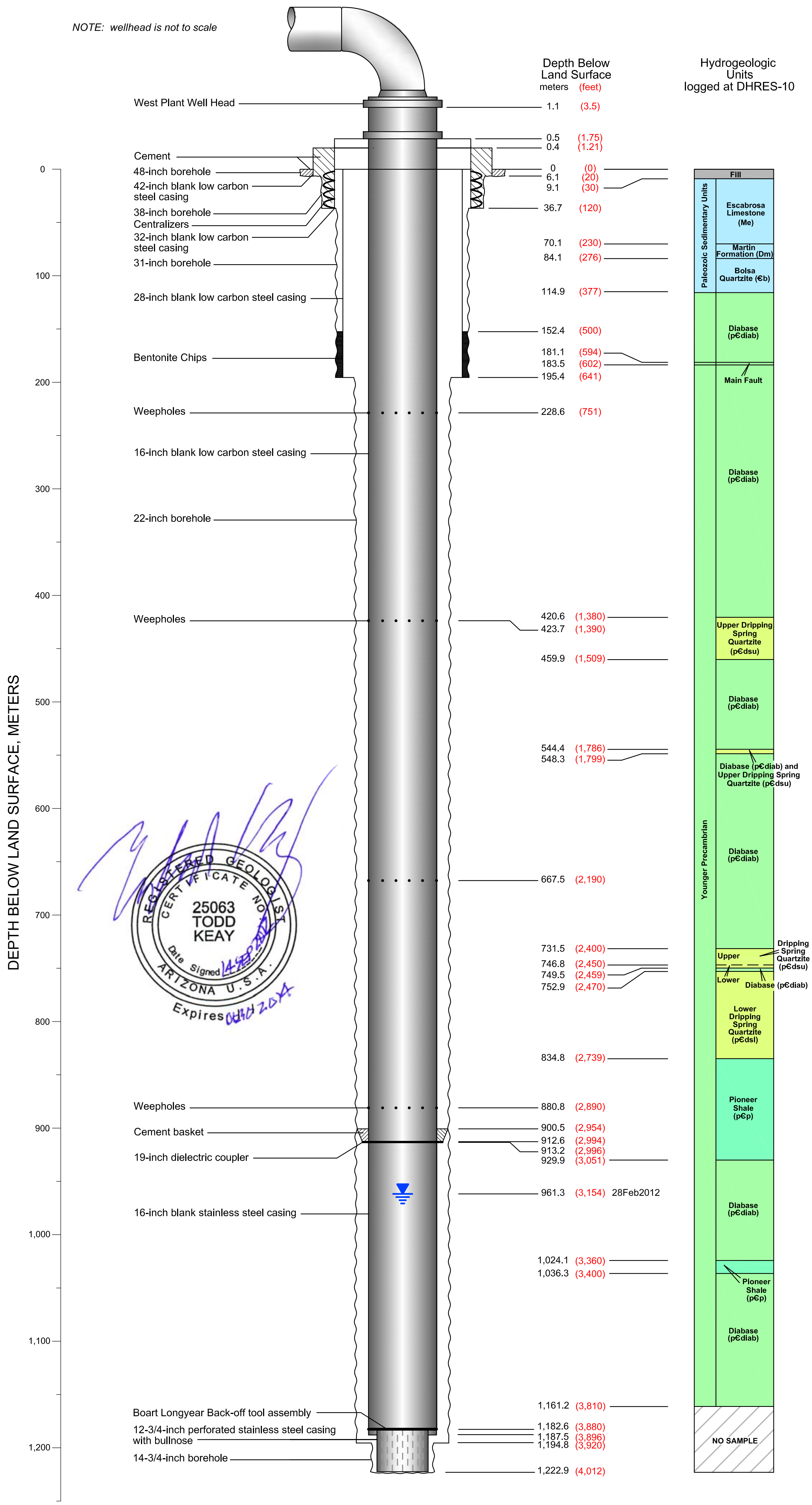

CADASTRAL: (D-1-12)35aac2	ADWR NO: 55-912941
NORTHING: 3684850.035	EASTING: 491093.592
LAND SURFACE ELEVATION: 962*	

DATUM: UTM 12N NAD27, Meters
VERTICAL: NGVD29, Meters

Non-pumping Water Level

* (from RCM staff)

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RESPW-01
SCHEMATIC DIAGRAM OF PRODUCTION WELL CONSTRUCTION

Version: September 14, 2012

FIGURE 2

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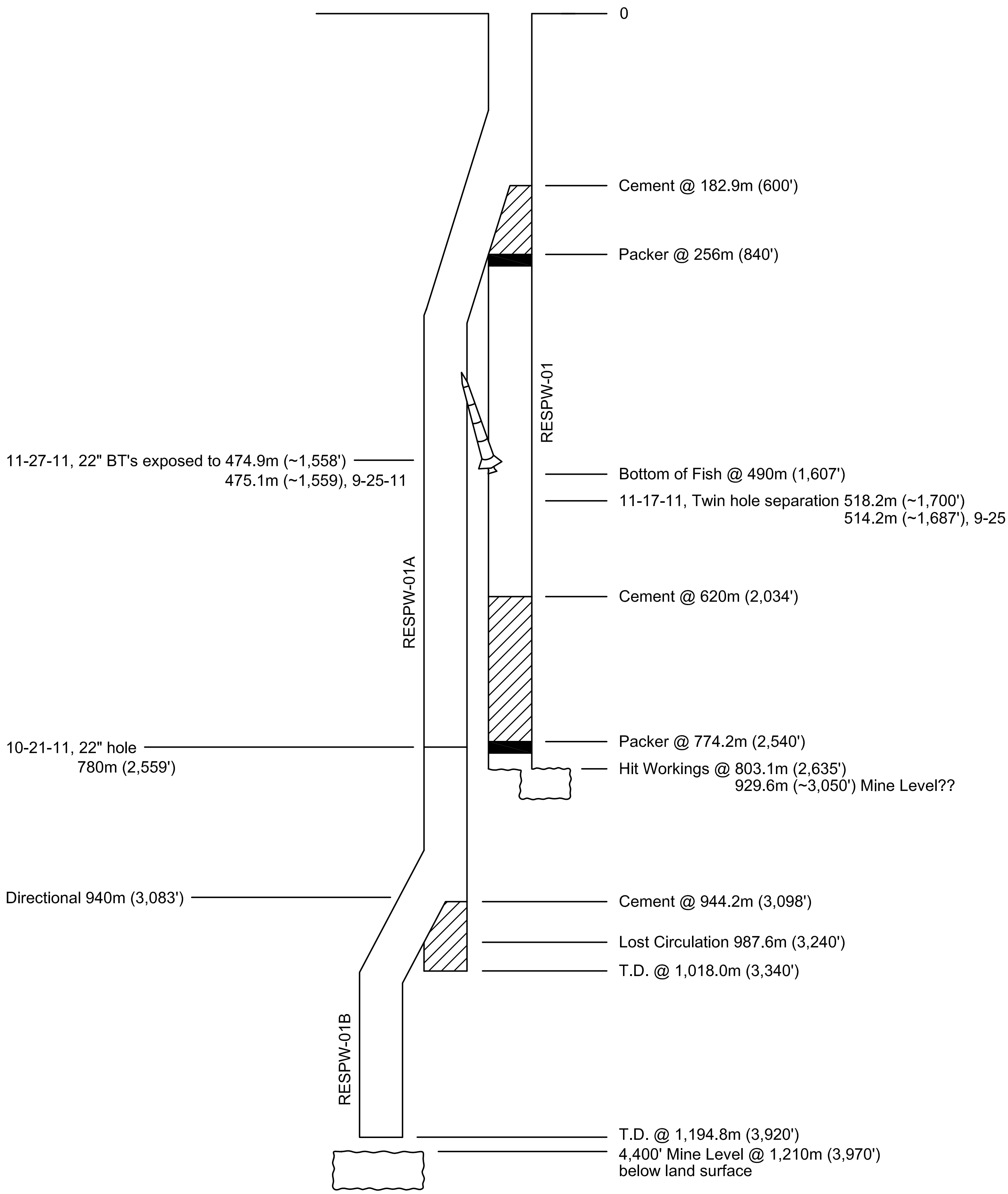


FIGURE 3. SCHEMATIC DIAGRAM OF THREE BOREHOLES AT RESPW-01, RESOLUTION COPPER MINING

Drift Report

Wellbore DRIFT Interpretation

PREPARED ESPECIALLY FOR

RESOLUTION and RESOLUTION

RES-PW1

Tuesday - February 14, 2012

Southwest Exploration Services, LLC
borehole geophysics & video services

Southwest Exploration Services, LLC
(480) 926-4558

WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC
(480) 926-4558

Company: RESOLUTION **Well Owner:** RESOLUTION

County: GILA **State:** Arizona **Country:** United States

Well Number: RES-PW1 **Survey Date:** Tuesday - February 14, 2012 **Magnetic Declination:** Declination Correction Not Used

Field: RESOLUTION **Drift Calculation Methodology:** Radius of Curvature Method

Location:

Remarks: DEPTH LOGGED = 3998 FT

Witness: **Vehicle No.:** 600 **Invoice No.:** **Operator:** D. JACOVITCH **Well Depth:** 3998 Feet **Casing size:** 14 Inches

Tool: Gyro **Lat.:** **Long.:** **Sec.:** **Twp.:** **Rge.:**

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BGR., degrees
0	0.00	000.00	0.00						
20	0.31	137.86	19.99	0.015	0.039	1.00	16.34	0.04' (.48")	068.90
40	0.48	171.77	39.98	-0.108	0.097	0.41	5.10	0.15' (1.80")	138.10
60	0.50	181.50	59.97	-0.279	0.107	0.96	1.48	0.30' (3.60")	159.00
80	0.61	184.02	79.96	-0.472	0.098	0.84	0.39	0.48' (5.76")	168.30
100	0.52	187.63	99.96	-0.668	0.078	0.42	0.55	0.67' (8.04")	173.30
120	0.56	192.21	119.95	-0.854	0.046	0.13	0.70	0.85' (10.20")	176.90
140	0.53	194.87	139.94	-1.039	0.001	0.43	0.41	1.04' (12.48")	179.90
160	0.58	203.06	159.93	-1.222	-0.062	0.83	1.25	1.22' (14.64")	182.90
180	0.71	204.45	179.92	-1.428	-0.153	0.95	0.21	1.44' (17.28")	186.10
200	0.69	207.88	199.91	-1.647	-0.261	0.37	0.52	1.67' (20.04")	189.00
220	0.78	203.58	219.90	-1.878	-0.372	1.00	0.66	1.91' (22.92")	191.20
240	0.84	200.02	239.89	-2.140	-0.477	1.00	0.54	2.19' (26.28")	192.60
260	0.70	198.68	259.88	-2.394	-0.566	0.34	0.21	2.46' (29.52")	193.30
280	0.71	196.83	279.87	-2.628	-0.641	0.93	0.28	2.71' (32.52")	193.70
300	0.71	199.95	299.86	-2.863	-0.719	0.78	0.48	2.95' (35.40")	194.10
320	0.67	204.46	319.85	-3.086	-0.810	0.53	0.69	3.19' (38.28")	194.70
340	0.76	207.56	339.84	-3.310	-0.919	0.00	0.47	3.44' (41.28")	195.50

 True Vertical Depth: 3995.86' **Final Drift Distance:** 3.77' (45.24") **Final Drift Bearing:** 231.20°

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.

WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

RES-PW1

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BRG., degrees
360	0.76°	209.79°	359.83	-3.543	-1.046	0.56	0.34	3.69' (44.28")	196.50
380	0.81°	211.21°	379.82	-3.779	-1.185	0.73	0.22	3.96' (47.52")	197.40
400	0.70°	213.13°	399.81	-4.002	-1.325	0.88	0.29	4.22' (50.64")	198.30
420	0.86°	211.05°	419.80	-4.233	-1.470	0.20	0.32	4.48' (53.76")	199.10
440	0.77°	210.20°	439.79	-4.478	-1.615	0.97	0.13	4.76' (57.12")	199.80
460	0.91°	208.49°	459.78	-4.734	-1.759	0.96	0.26	5.05' (60.60")	200.40
480	0.84°	207.55°	479.77	-5.004	-1.902	0.12	0.14	5.35' (64.20")	200.80
500	0.80°	206.26°	499.76	-5.259	-2.032	0.81	0.20	5.64' (67.68")	201.10
520	0.87°	204.70°	519.75	-5.522	-2.157	0.59	0.24	5.93' (71.16")	201.30
540	0.84°	199.86°	539.74	-5.798	-2.270	0.73	0.74	6.23' (74.76")	201.40
560	0.70°	193.25°	559.73	-6.055	-2.347	0.28	1.01	6.49' (77.88")	201.20
580	0.73°	182.69°	579.72	-6.302	-2.382	0.77	1.61	6.74' (80.88")	200.70
600	0.77°	168.88°	599.71	-6.562	-2.363	0.49	2.10	6.97' (83.64")	199.80
620	0.86°	159.06°	619.70	-6.835	-2.285	0.69	1.50	7.21' (86.52")	198.50
640	0.90°	152.47°	639.69	-7.115	-2.159	0.13	1.01	7.44' (89.28")	196.90
660	0.85°	145.28°	659.68	-7.376	-2.001	0.83	1.10	7.64' (91.68")	195.20
680	0.93°	142.56°	679.67	-7.627	-1.818	0.80	0.42	7.84' (94.08")	193.40
700	0.86°	143.08°	699.66	-7.876	-1.629	0.25	0.08	8.04' (96.48")	191.70
720	0.89°	141.67°	719.65	-8.118	-1.443	0.54	0.22	8.25' (99.00")	190.10
740	0.80°	144.01°	739.64	-8.353	-1.265	0.24	0.36	8.45' (101.40")	188.60
760	0.88°	145.98°	759.63	-8.593	-1.097	0.94	0.30	8.66' (103.92")	187.30
780	0.99°	148.01°	779.62	-8.867	-0.919	0.65	0.31	8.91' (106.92")	185.90
800	1.06°	147.46°	799.61	-9.170	-0.728	0.97	0.08	9.20' (110.40")	184.50
820	1.11°	145.25°	819.60	-9.485	-0.518	0.06	0.34	9.50' (114.00")	183.10
840	1.10°	141.54°	839.59	-9.795	-0.288	0.29	0.57	9.80' (117.60")	181.70
860	1.00°	138.80°	859.58	-10.076	-0.053	0.57	0.42	10.08' (120.96")	180.30
880	0.82°	137.14°	879.57	-10.312	0.160	0.47	0.26	10.31' (123.72")	179.10
900	0.67°	137.04°	899.56	-10.502	0.337	0.42	0.03	10.51' (126.12")	178.20
920	0.16°	122.95°	919.55	-10.595	0.448	0.69	2.15	10.60' (127.20")	177.60
940	0.18°	344.80°	939.54	-10.612	0.425	0.04	16.35	10.62' (127.44")	177.70
960	0.77°	329.74°	959.53	-10.460	0.361	0.30	2.30	10.47' (125.64")	178.00
980	1.20°	329.02°	979.52	-10.164	0.186	0.98	0.13	10.17' (122.04")	179.00
1,000	1.40°	328.23°	999.51	-9.777	-0.050	0.96	0.12	9.78' (117.36")	180.30

True Vertical Depth: 3995.86' **Final Drift Distance: 3.77' (45.24")** **Final Drift Bearing: 231.20°**

WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

RES-PW1

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BRG., degrees
1,020	1.52°	328.45°	1,019.50	-9.343	-0.317	0.95	0.04	9.35' (112.20")	181.90
1,040	1.51°	329.48°	1,039.49	-8.890	-0.590	0.51	0.16	8.91' (106.92")	183.80
1,060	1.52°	330.98°	1,059.48	-8.431	-0.853	0.30	0.23	8.47' (101.64")	185.80
1,080	1.70°	332.02°	1,079.47	-7.937	-1.121	0.94	0.16	8.02' (96.24")	188.00
1,100	1.89°	333.32°	1,099.46	-7.380	-1.409	0.15	0.20	7.51' (90.12")	190.80
1,120	1.70°	334.60°	1,119.45	-6.817	-1.684	0.21	0.20	7.02' (84.24")	193.90
1,140	1.63°	345.33°	1,139.44	-6.272	-1.883	0.99	1.64	6.55' (78.60")	196.70
1,160	1.59°	356.35°	1,159.43	-5.718	-1.972	0.59	1.68	6.05' (72.60")	199.00
1,180	1.68°	000.81°	1,179.42	-5.725	-1.972	0.83	0.68	6.06' (72.72")	199.00
1,200	1.43°	008.28°	1,199.41	-5.184	-1.929	0.61	1.14	5.53' (66.36")	200.40
1,220	1.27°	020.67°	1,219.40	-4.729	-1.811	0.92	1.89	5.06' (60.72")	201.00
1,240	1.24°	039.31°	1,239.39	-4.351	-1.593	0.49	2.83	4.63' (55.56")	200.10
1,260	1.30°	047.95°	1,259.38	-4.030	-1.287	0.96	1.32	4.23' (50.76")	197.70
1,280	1.18°	052.70°	1,279.37	-3.754	-0.954	0.87	0.73	3.87' (46.44")	194.30
1,300	1.26°	051.33°	1,299.36	-3.492	-0.618	0.91	0.21	3.55' (42.60")	190.00
1,320	1.16°	056.25°	1,319.35	-3.243	-0.277	0.80	0.75	3.25' (39.00")	184.90
1,340	1.27°	060.53°	1,339.34	-3.021	0.084	0.84	0.65	3.02' (36.24")	178.40
1,360	1.20°	063.05°	1,359.33	-2.817	0.464	0.79	0.39	2.86' (34.32")	170.70
1,380	1.19°	054.27°	1,379.32	-2.600	0.820	0.99	1.34	2.73' (32.76")	162.50
1,400	1.20°	028.99°	1,399.31	-2.291	1.095	0.97	3.83	2.54' (30.48")	154.50
1,420	1.29°	014.38°	1,419.30	-1.888	1.255	0.18	2.23	2.27' (27.24")	146.40
1,440	1.31°	005.08°	1,439.29	-1.441	1.332	0.30	1.42	1.96' (23.52")	137.30
1,460	1.40°	357.46°	1,459.28	-1.451	1.332	0.35	1.16	1.97' (23.64")	137.50
1,480	1.23°	356.46°	1,479.27	-0.993	1.308	0.83	0.15	1.64' (19.68")	127.20
1,500	1.19°	352.85°	1,499.26	-0.573	1.269	0.93	0.55	1.39' (16.68")	114.30
1,520	0.21°	333.74°	1,519.25	-0.340	1.199	0.24	2.91	1.25' (15.00")	105.80
1,540	0.12°	188.72°	1,539.24	-0.347	1.156	0.96	16.70	1.21' (14.52")	106.70
1,560	0.47°	163.05°	1,559.23	-0.449	1.163	0.93	3.89	1.25' (15.00")	111.10
1,580	0.61°	160.40°	1,579.22	-0.628	1.222	0.03	0.41	1.37' (16.44")	117.20
1,600	0.62°	165.29°	1,599.21	-0.833	1.285	0.67	0.75	1.53' (18.36")	122.90
1,620	0.79°	170.45°	1,619.20	-1.074	1.337	0.34	0.79	1.71' (20.52")	128.80
1,640	0.74°	168.59°	1,639.19	-1.337	1.386	0.92	0.28	1.93' (23.16")	134.00
1,660	0.41°	143.37°	1,659.18	-1.519	1.467	0.64	3.82	2.11' (25.32")	136.00

True Vertical Depth: 3995.86' **Final Drift Distance:** 3.77' (45.24") **Final Drift Bearing:** 231.20°

WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

RES-PW1

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BRG., degrees
1,680	0.51°	061.04°	1,679.17	-1.550	1.611	0.98	11.52	2.24' (26.88")	133.90
1,700	0.90°	031.98°	1,699.16	-1.382	1.788	0.04	4.39	2.26' (27.12")	127.70
1,720	0.92°	024.59°	1,719.15	-1.102	1.938	0.14	1.13	2.23' (26.76")	119.60
1,740	0.96°	026.59°	1,739.14	-0.806	2.080	0.73	0.31	2.23' (26.76")	111.20
1,760	1.08°	030.20°	1,759.13	-0.493	2.249	0.22	0.55	2.30' (27.60")	102.40
1,780	1.21°	027.59°	1,779.12	-0.143	2.442	0.12	0.40	2.45' (29.40")	093.40
1,800	1.19°	021.87°	1,799.11	0.237	2.617	0.90	0.87	2.63' (31.56")	084.80
1,820	0.75°	001.58°	1,819.10	0.567	2.685	0.37	3.08	2.74' (32.88")	078.10
1,840	0.57°	320.37°	1,839.09	0.539	2.695	0.70	6.16	2.75' (33.00")	078.70
1,860	0.76°	277.75°	1,859.08	0.649	2.497	0.74	6.36	2.58' (30.96")	075.40
1,880	1.22°	244.57°	1,879.07	0.597	2.160	0.96	5.00	2.24' (26.88")	074.60
1,900	1.54°	233.90°	1,899.06	0.351	1.747	0.58	1.63	1.78' (21.36")	078.60
1,920	1.61°	232.23°	1,919.05	0.021	1.308	0.94	0.26	1.31' (15.72")	089.10
1,940	1.76°	232.96°	1,939.04	-0.336	0.841	0.86	0.11	0.91' (10.92")	111.80
1,960	1.88°	230.69°	1,959.02	-0.729	0.342	0.88	0.35	0.80' (9.60")	154.90
1,980	1.95°	228.70°	1,979.00	-1.161	-0.168	0.91	0.30	1.17' (14.04")	188.20
2,000	1.84°	227.76°	1,998.98	-1.602	-0.661	0.98	0.14	1.73' (20.76")	202.40
2,020	1.58°	223.68°	2,018.97	-2.019	-1.088	0.46	0.62	2.29' (27.48")	208.30
2,040	0.83°	219.83°	2,038.96	-2.333	-1.368	0.94	0.60	2.70' (32.40")	210.40
2,060	0.22°	222.12°	2,058.95	-2.471	-1.488	0.72	0.36	2.88' (34.56")	211.10
2,080	0.04°	218.00°	2,078.94	-2.506	-1.517	0.68	0.63	2.93' (35.16")	211.20
2,100	0.27°	090.01°	2,098.93	-2.545	-1.498	0.30	15.73	2.95' (35.40")	210.50
2,120	0.45°	078.76°	2,118.92	-2.533	-1.373	0.84	1.72	2.88' (34.56")	208.50
2,140	0.53°	067.85°	2,138.91	-2.484	-1.209	0.29	1.66	2.76' (33.12")	206.00
2,160	0.55°	059.27°	2,158.90	-2.400	-1.040	0.43	1.31	2.62' (31.44")	203.40
2,180	0.48°	062.25°	2,178.89	-2.312	-0.883	0.51	0.46	2.48' (29.76")	200.90
2,200	0.44°	073.03°	2,198.88	-2.251	-0.735	0.45	1.64	2.37' (28.44")	198.10
2,220	0.53°	082.36°	2,218.87	-2.215	-0.570	0.33	1.42	2.29' (27.48")	194.40
2,240	0.49°	086.32°	2,238.86	-2.197	-0.393	0.81	0.60	2.23' (26.76")	190.10
2,260	0.35°	100.64°	2,258.85	-2.206	-0.247	0.22	2.18	2.22' (26.64")	186.40
2,280	0.29°	129.23°	2,278.84	-2.253	-0.147	0.60	4.32	2.26' (27.12")	183.70
2,300	0.45°	136.96°	2,298.83	-2.341	-0.053	0.80	1.18	2.34' (28.08")	181.30
2,320	0.49°	138.09°	2,318.82	-2.462	0.058	0.98	0.17	2.46' (29.52")	178.70

True Vertical Depth: 3995.86' **Final Drift Distance: 3.77' (45.24")** **Final Drift Bearing: 231.20°**

WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

RES-PW1

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BRG., degrees
2,340	0.39°	131.00°	2,338.81	-2.570	0.167	0.61	1.08	2.58' (30.96")	176.30
2,360	0.30°	126.00°	2,358.80	-2.645	0.261	0.93	0.76	2.66' (31.92")	174.40
2,380	0.08°	019.96°	2,378.79	-2.628	0.316	0.87	13.98	2.65' (31.80")	173.20
2,400	0.18°	347.13°	2,398.78	-2.632	0.316	0.88	4.95	2.65' (31.80")	173.20
2,420	0.40°	332.04°	2,418.77	-2.537	0.281	0.87	2.30	2.55' (30.60")	173.70
2,440	0.50°	342.40°	2,438.76	-2.392	0.220	0.93	1.58	2.40' (28.80")	174.70
2,460	0.68°	350.25°	2,458.75	-2.192	0.171	0.60	1.20	2.20' (26.40")	175.50
2,480	0.95°	350.07°	2,478.74	-1.912	0.122	0.98	0.05	1.92' (23.04")	176.30
2,500	0.94°	348.80°	2,498.73	-1.588	0.062	0.79	0.19	1.59' (19.08")	177.80
2,520	0.93°	344.52°	2,518.72	-1.271	-0.013	0.62	0.65	1.27' (15.24")	180.60
2,540	1.03°	349.15°	2,538.71	-0.938	-0.091	0.24	0.71	0.94' (11.28")	185.50
2,560	1.05°	354.85°	2,558.70	-0.579	-0.142	0.82	0.87	0.60' (7.20")	193.70
2,580	1.12°	001.59°	2,578.69	-0.586	-0.142	0.30	1.03	0.60' (7.20")	193.60
2,600	1.21°	001.81°	2,598.68	-0.180	-0.130	0.42	0.04	0.22' (2.64")	215.90
2,620	1.08°	355.29°	2,618.67	-0.187	-0.130	0.55	1.00	0.23' (2.76")	214.70
2,640	1.06°	359.22°	2,638.66	0.186	-0.148	0.39	0.60	0.24' (2.88")	321.50
2,660	1.06°	004.10°	2,658.65	0.181	-0.148	0.24	0.75	0.23' (2.76")	320.70
2,680	1.06°	006.58°	2,678.64	0.549	-0.114	0.87	0.38	0.56' (6.72")	348.30
2,700	1.02°	000.63°	2,698.63	0.911	-0.091	0.36	0.91	0.92' (11.04")	354.30
2,720	0.71°	342.27°	2,718.62	0.895	-0.089	0.73	2.79	0.90' (10.80")	354.30
2,740	0.70°	304.89°	2,738.61	1.090	-0.233	0.67	5.61	1.11' (13.32")	348.00
2,760	0.84°	279.70°	2,758.60	1.191	-0.480	0.91	3.82	1.28' (15.36")	338.10
2,780	0.97°	276.12°	2,778.59	1.234	-0.793	0.39	0.55	1.47' (17.64")	327.30
2,800	1.26°	276.63°	2,798.58	1.277	-1.180	1.00	0.09	1.74' (20.88")	317.30
2,820	1.52°	273.40°	2,818.57	1.319	-1.663	0.98	0.49	2.12' (25.44")	308.40
2,840	1.57°	270.77°	2,838.56	1.339	-2.202	0.68	0.40	2.58' (30.96")	301.30
2,860	1.66°	266.79°	2,858.55	1.327	-2.765	0.99	0.61	3.07' (36.84")	295.60
2,880	1.72°	269.00°	2,878.54	1.305	-3.354	1.00	0.34	3.60' (43.20")	291.30
2,900	1.55°	271.66°	2,898.53	1.308	-3.925	0.23	0.41	4.14' (49.68")	288.40
2,920	0.92°	277.76°	2,918.52	1.343	-4.354	0.79	0.94	4.56' (54.72")	287.10
2,940	0.30°	281.12°	2,938.51	1.378	-4.564	0.44	0.52	4.77' (57.24")	286.80
2,960	0.09°	282.34°	2,958.50	1.392	-4.631	0.91	0.19	4.84' (58.08")	286.70
2,980	0.13°	038.06°	2,978.49	1.378	-4.626	0.69	14.82	4.83' (57.96")	286.60

 True Vertical Depth: 3995.86' **Final Drift Distance:** 3.77' (45.24") **Final Drift Bearing:** 231.20°

WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

RES-PW1

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BRG., degrees
3,000	0.20°	020.36°	2,998.48	1.428	-4.598	1.00	2.69	4.81' (57.72")	287.30
3,020	0.24°	022.25°	3,018.47	1.500	-4.570	0.26	0.29	4.81' (57.72")	288.20
3,040	0.26°	064.81°	3,038.46	1.562	-4.511	0.16	6.35	4.77' (57.24")	289.10
3,060	0.42°	075.15°	3,058.45	1.603	-4.400	0.93	1.58	4.68' (56.16")	290.00
3,080	0.37°	072.93°	3,078.44	1.641	-4.267	0.24	0.34	4.57' (54.84")	291.00
3,100	0.46°	068.48°	3,098.43	1.689	-4.130	0.42	0.68	4.46' (53.52")	292.20
3,120	0.25°	060.90°	3,118.42	1.742	-4.018	0.98	1.16	4.38' (52.56")	293.40
3,140	0.26°	074.69°	3,138.41	1.776	-3.936	0.89	2.10	4.32' (51.84")	294.30
3,160	0.81°	056.31°	3,158.40	1.853	-3.767	1.00	2.80	4.20' (50.40")	296.20
3,180	1.06°	357.39°	3,178.39	1.798	-3.795	0.05	8.61	4.20' (50.40")	295.40
3,200	1.96°	346.51°	3,198.38	2.319	-3.869	0.33	1.67	4.51' (54.12")	300.90
3,220	1.83°	351.96°	3,218.36	2.968	-3.992	0.49	0.83	4.98' (59.76")	306.60
3,240	2.14°	356.53°	3,238.34	3.657	-4.061	0.53	0.70	5.47' (65.64")	312.00
3,260	1.85°	350.27°	3,258.32	4.348	-4.141	0.47	0.96	6.00' (72.00")	316.40
3,280	1.32°	356.10°	3,278.31	4.897	-4.207	0.61	0.89	6.46' (77.52")	319.30
3,300	0.98°	345.08°	3,298.30	5.292	-4.273	0.29	1.68	6.80' (81.60")	321.10
3,320	0.29°	127.49°	3,318.29	5.231	-4.365	0.09	16.57	6.81' (81.72")	320.20
3,340	0.70°	082.24°	3,338.28	5.188	-4.202	0.95	6.73	6.68' (80.16")	321.00
3,360	0.76°	093.37°	3,358.27	5.198	-3.948	0.57	1.70	6.53' (78.36")	322.80
3,380	1.11°	076.17°	3,378.26	5.228	-3.624	0.89	2.62	6.36' (76.32")	325.30
3,400	0.91°	075.65°	3,398.25	5.314	-3.282	0.40	0.09	6.25' (75.00")	328.30
3,420	1.38°	075.48°	3,418.24	5.414	-2.895	0.70	0.08	6.14' (73.68")	331.90
3,440	0.82°	075.00°	3,438.23	5.512	-2.524	0.01	0.11	6.06' (72.72")	335.40
3,460	1.17°	080.55°	3,458.22	5.586	-2.185	0.94	0.85	6.00' (72.00")	338.60
3,480	1.67°	070.53°	3,478.21	5.710	-1.706	0.96	1.53	5.96' (71.52")	343.40
3,500	1.14°	084.63°	3,498.20	5.815	-1.228	0.21	2.15	5.94' (71.28")	348.10
3,520	1.30°	083.23°	3,518.19	5.860	-0.805	0.91	0.22	5.92' (71.04")	352.20
3,540	1.20°	077.57°	3,538.18	5.933	-0.375	0.80	0.86	5.94' (71.28")	356.40
3,560	0.99°	091.05°	3,558.17	5.971	0.004	0.42	2.05	5.97' (71.64")	000.00
3,580	1.49°	091.23°	3,578.16	5.962	0.437	0.21	0.08	5.98' (71.76")	004.20
3,600	1.28°	083.93°	3,598.15	5.982	0.920	0.29	1.11	6.05' (72.60")	008.70
3,620	1.72°	090.26°	3,618.14	6.009	1.443	0.93	0.97	6.18' (74.16")	013.50
3,640	1.33°	085.52°	3,638.13	6.029	1.975	1.00	0.73	6.34' (76.08")	018.10

 True Vertical Depth: 3995.86' **Final Drift Distance: 3.77' (45.24")** **Final Drift Bearing: 231.20°**

WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

RES-PW1

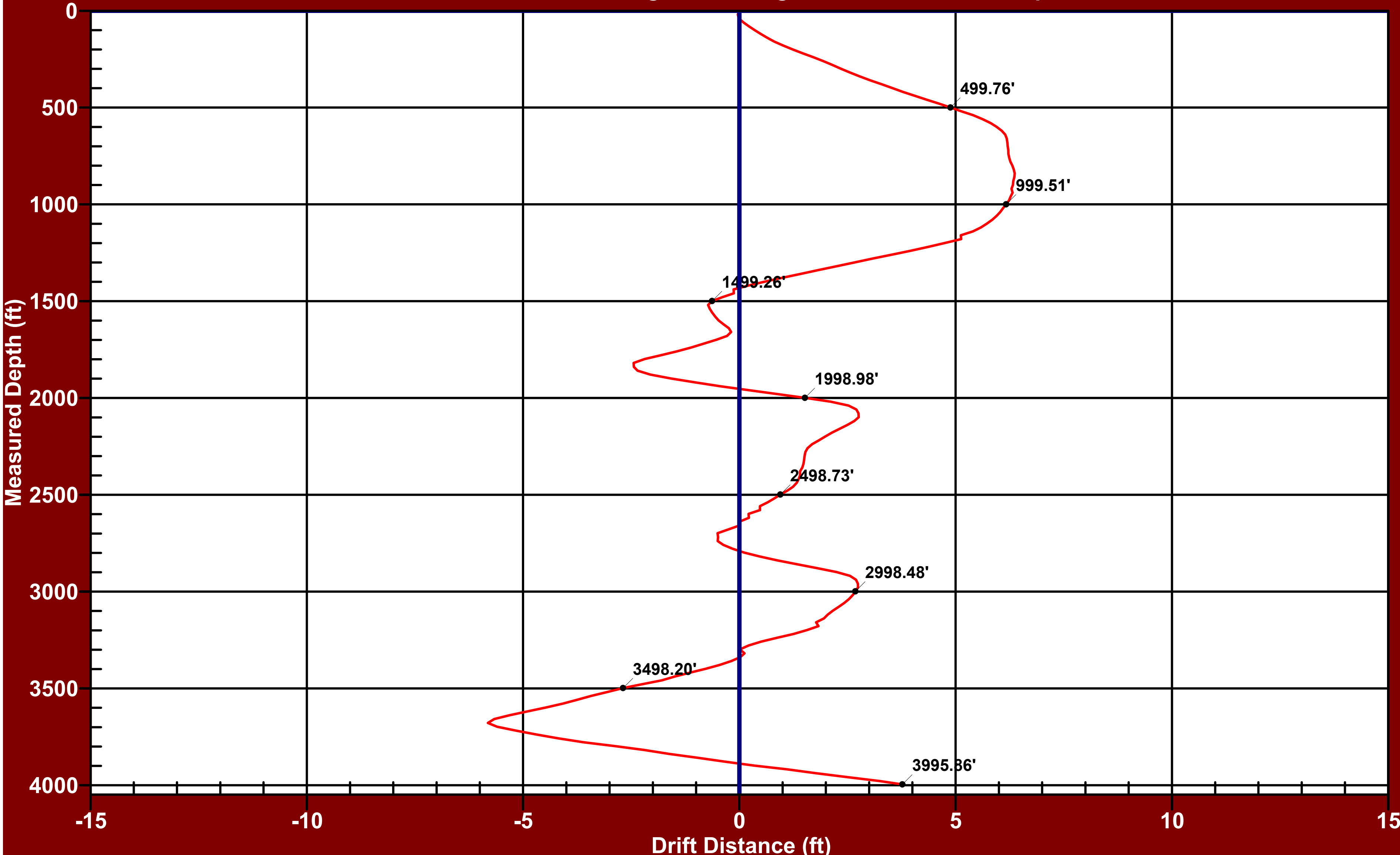
MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BRG., degrees
3,660	1.16°	089.55°	3,658.12	6.048	2.409	0.68	0.62	6.51' (78.12")	021.70
3,680	1.10°	146.50°	3,678.11	5.870	2.743	0.93	8.35	6.48' (77.76")	025.00
3,700	1.52°	194.02°	3,698.10	5.432	2.818	0.90	7.05	6.12' (73.44")	027.40
3,720	1.39°	210.20°	3,718.09	4.963	2.627	0.81	2.46	5.62' (67.44")	027.90
3,740	1.51°	211.81°	3,738.08	4.529	2.366	0.96	0.25	5.11' (61.32")	027.60
3,760	1.48°	216.24°	3,758.07	4.097	2.074	1.00	0.68	4.59' (55.08")	026.90
3,780	2.07°	209.74°	3,778.06	3.578	1.737	0.25	1.00	3.98' (47.76")	025.90
3,800	2.35°	219.94°	3,798.04	2.946	1.297	0.71	1.56	3.22' (38.64")	023.80
3,820	1.60°	210.37°	3,818.02	2.383	0.901	0.07	1.46	2.55' (30.60")	020.70
3,840	1.78°	220.75°	3,838.01	1.904	0.558	0.99	1.58	1.98' (23.76")	016.30
3,860	2.04°	219.26°	3,857.99	1.393	0.129	0.99	0.23	1.40' (16.80")	005.30
3,880	1.72°	213.45°	3,877.97	0.865	-0.260	0.64	0.89	0.90' (10.80")	343.30
3,900	2.26°	220.97°	3,897.95	0.312	-0.680	0.99	1.15	0.75' (9.00")	294.70
3,920	2.22°	218.68°	3,917.93	-0.288	-1.181	1.00	0.35	1.22' (14.64")	256.30
3,940	1.80°	215.62°	3,937.91	-0.847	-1.605	0.23	0.47	1.81' (21.72")	242.20
3,960	2.31°	223.38°	3,957.89	-1.400	-2.061	0.80	1.19	2.49' (29.88")	235.80
3,980	1.99°	226.90°	3,977.87	-1.929	-2.593	0.47	0.54	3.23' (38.76")	233.30
3,998	1.54°	209.84°	3,995.86	-2.362	-2.936	0.91	2.89	3.77' (45.24")	231.20

Page No. 7 **True Vertical Depth: 3995.86'** **Final Drift Distance: 3.77' (45.24")** **Final Drift Bearing: 231.20°**

PLANE OF DRIFT VIEW - RES-PW1

RESOLUTION
RESOLUTION

Drift Distance = 3.77 Feet Drift Bearing = 231.2 Degrees True Vertical Depth = 3995.86 Feet



Date of Survey: Tuesday - February 14, 2012

Radius of Curvature Calculation Method

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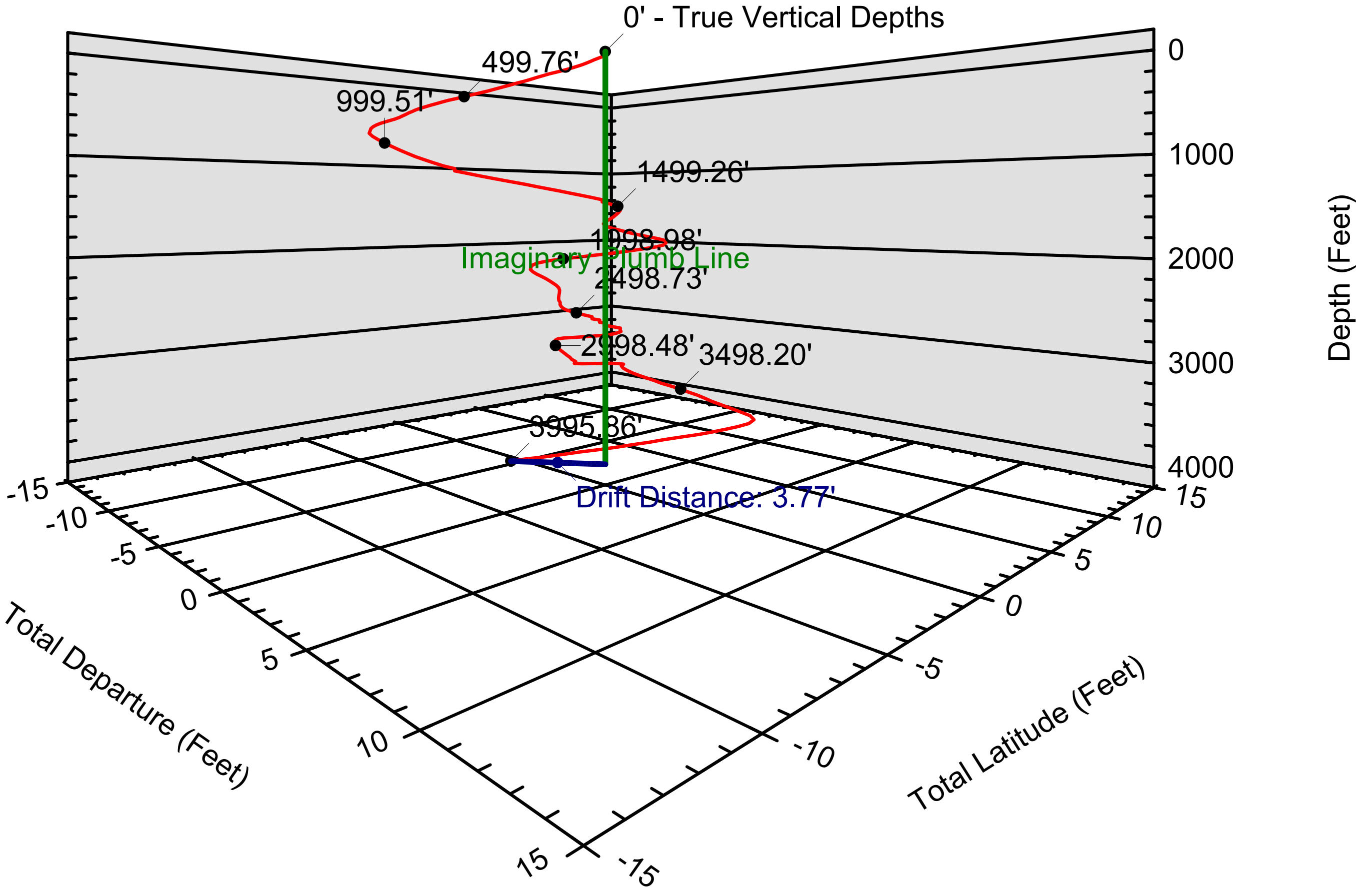
3D PROJECTION VIEW - RES-PW1

RESOLUTION
RESOLUTION

Drift Distance = 3.77 Feet **Drift Bearing = 231.2 Degrees** **True Vertical Depth = 3995.86 Feet**

226.0



Date of Survey: Tuesday - February 14, 2012 **Radius of Curvature Calculation Method**

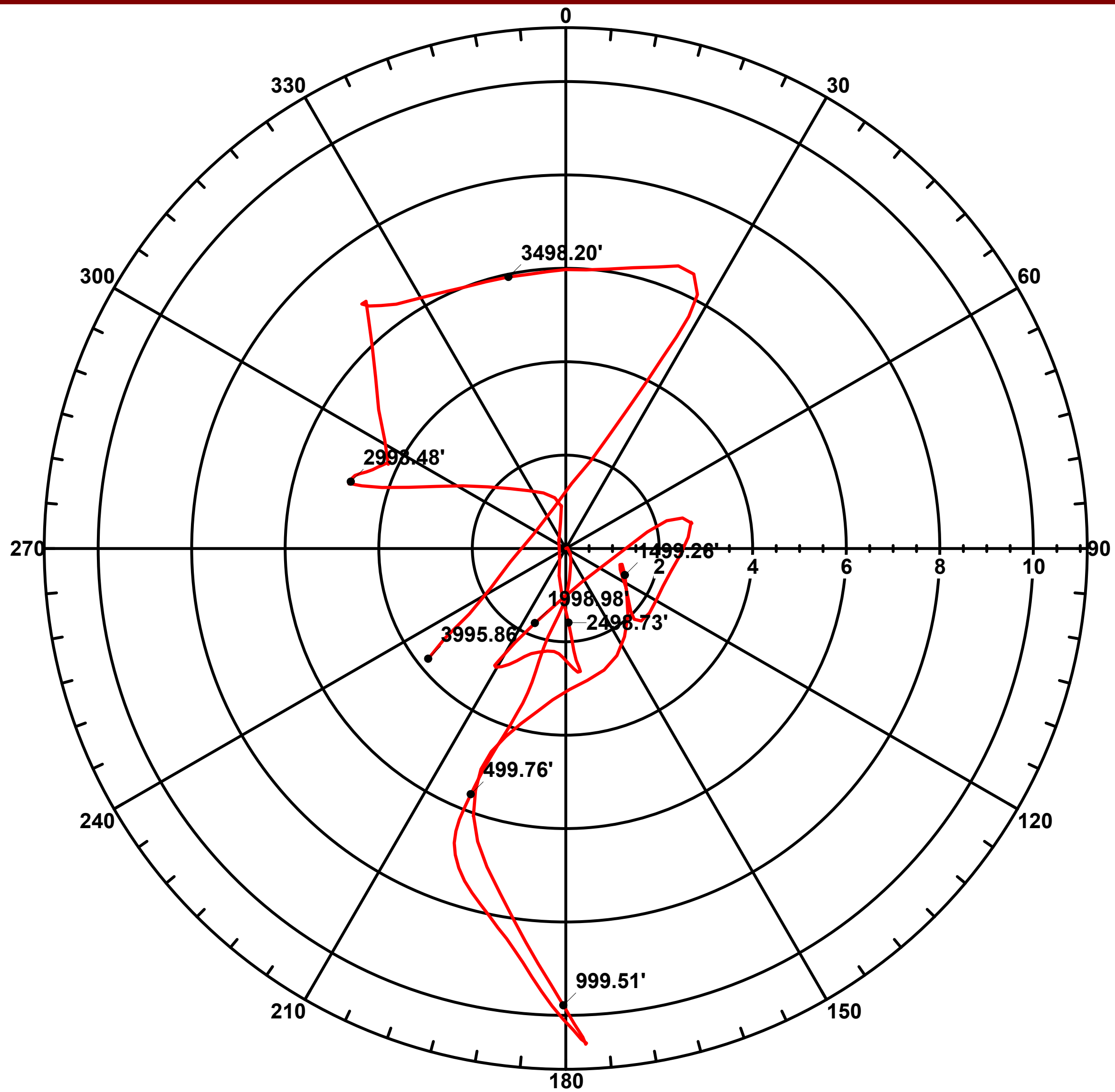
Southwest Exploration Services, LLC (480) 926-4558

POLAR VIEW - RES-PW1

RESOLUTION

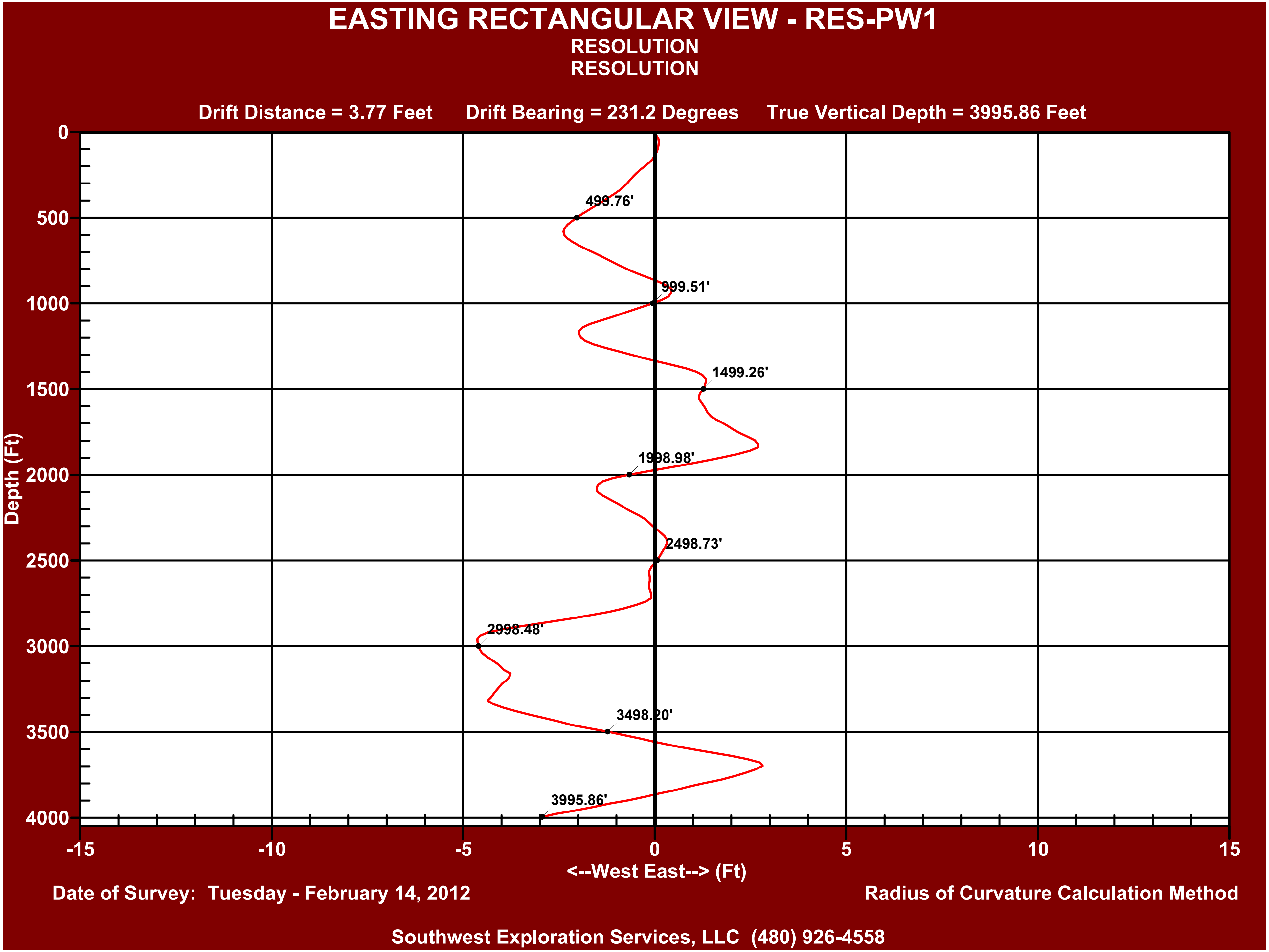
RESOLUTION

Drift Distance = 3.77 Feet   Drift Bearing = 231.2 Degrees   True Vertical Depth = 3995.86 Feet

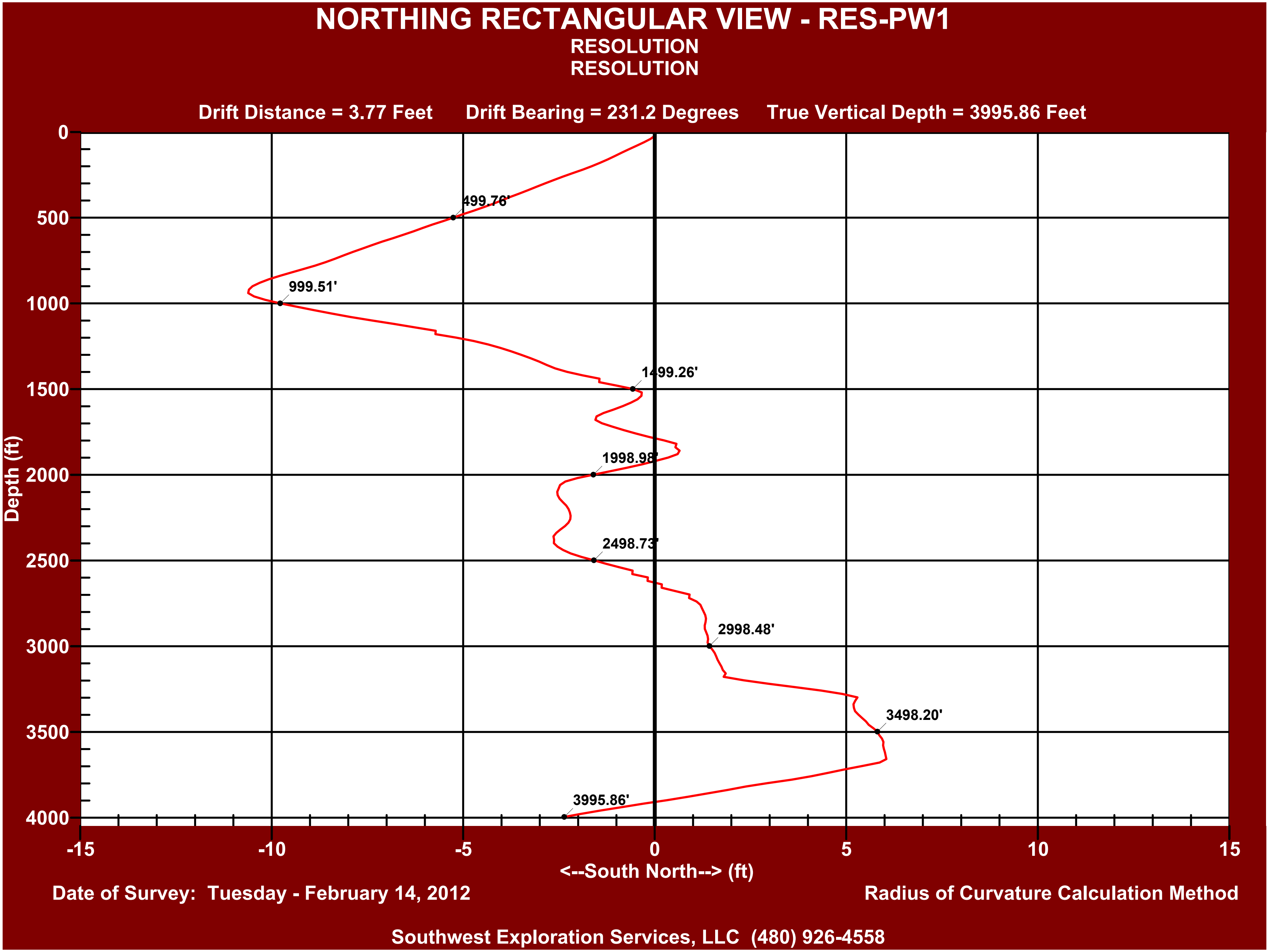


Date of Survey: Tuesday - February 14, 2012   Radius of Curvature Calculation Method

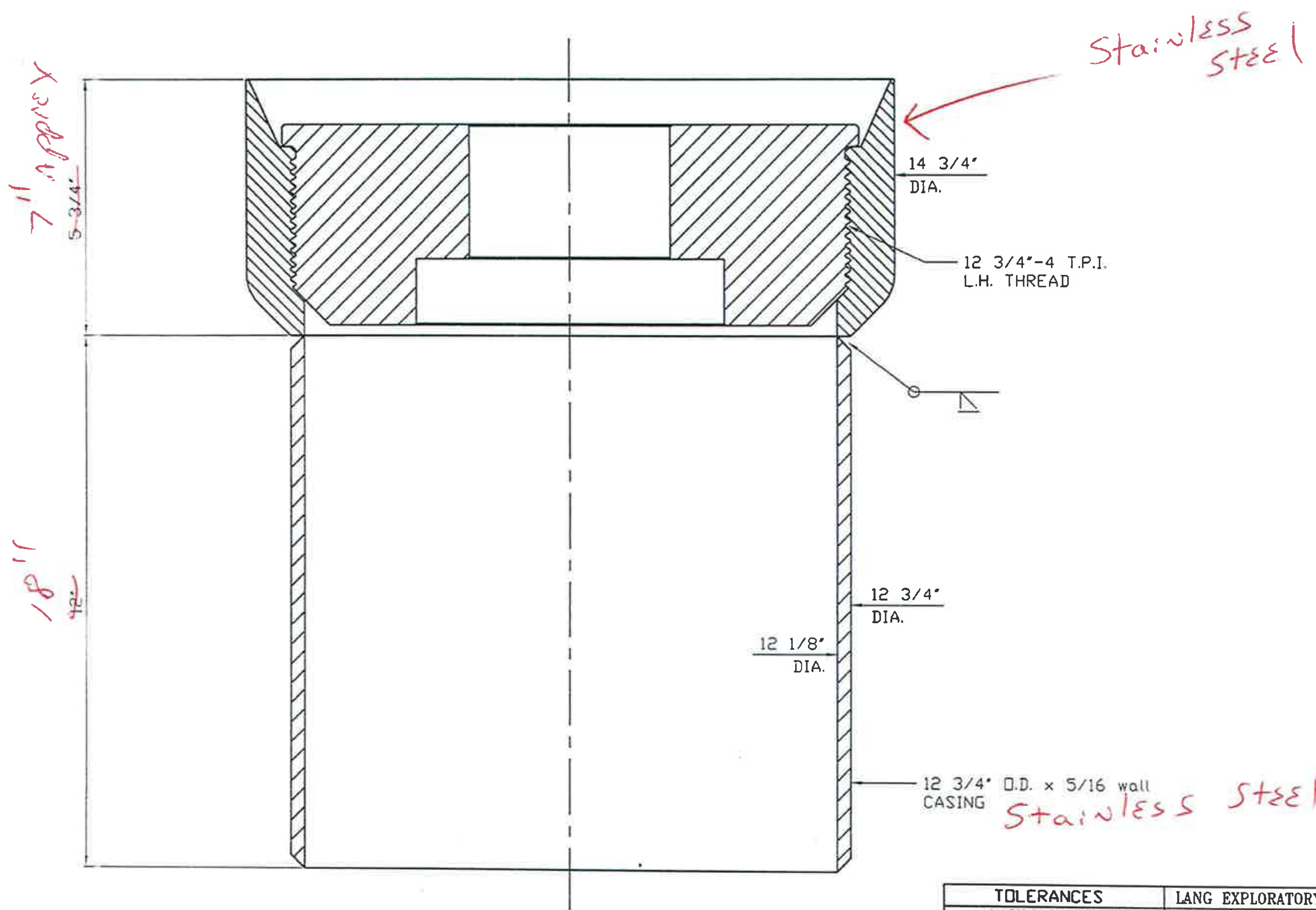
Southwest Exploration Services, LLC (480) 926-4558



EASTING RECTANGULAR VIEW - RES-PW1
RESOLUTION
RESOLUTION
Drift Distance = 3.77 Feet
Drift Bearing = 231.2 Degrees
True Vertical Depth = 3995.86 Feet
Depth (Ft)
0
500
1000
1500
2000
2500
3000
3500
4000
499.76'
999.51'
1499.26'
1998.98'
2498.73'
2998.48'
3498.20'
3995.86'
-15
-10
-5
0
5
10
15
<--West East--> (Ft)
Date of Survey: Tuesday - February 14, 2012
Radius of Curvature Calculation Method
Southwest Exploration Services, LLC (480) 926-4558



NORTHING RECTANGULAR VIEW - RES-PW1
RESOLUTION
RESOLUTION
Drift Distance = 3.77 Feet
Drift Bearing = 231.2 Degrees
True Vertical Depth = 3995.86 Feet
Depth (ft)
0
500
1000
1500
2000
2500
3000
3500
4000
499.76'
999.51'
1499.26'
1998.98'
2498.73'
2998.48'
3498.20'
3995.86'
-15
-10
-5
0
5
10
15
<--South North--> (ft)
Date of Survey: Tuesday - February 14, 2012
Radius of Curvature Calculation Method
Southwest Exploration Services, LLC (480) 926-4558



TOLERANCES	LANG EXPLORATORY DRILLING		
(UNLESS OTHERWISE NOTED)	SCALE: 1=1 / DATE: 7-06	APPROV. BY:	DRWN BY: JEFF
.X = ± .030 FRACTION = ± 1/16" .XX = ± .010 ANGLES = ± 1/2" .XXX = ± .005	12 3/4" INTO 16" CASING BACK-OFF TOOL ASSEMBLY		
ROUND ALL SHARP EDGES .005 RAD. MIN. SURFACE FINISHES TO BE 125/ RMS UNLESS NOTED			DRAWING NO. 1275CFAPA