

Results of Directional Survey

API number:	30-025-41242		
OGRID:		Operator:	CIMAREX ENERGY CO.
		Property:	CASCADE 29 FEDERAL # 4H

surface	ULSTR:	A	29	T 25S	R 33E
				330 FNL	735 FEL

BH Loc	ULSTR:	P	29	T 25S	R 33E
14230 MD		9874.4	TVD	333 FSL	399 FEL

Top Perf/OH	ULSTR:	A	29	T 25S	R 33E
9950 MD		9814.9	TVD	695 FNL	680 FEL

Bot Perf/OH	ULSTR:	P	29	T 25S	R 33E
14117 MD		9873.9	TVD	445 FSL	410 FEL

	MD	N/S	E/W	VD
	9939.00	403440.26	772124.31	9810.30
TOP PERFS/OH	9950.00	403430.28	772124.65	9814.90
	9971.00	403411.22	772125.31	9823.68
	14063.00	399342.34	772427.31	9873.41
BOT PERFS/OH	14117.00	399288.56	772432.15	9873.91
	14157.00	399248.73	772435.73	9874.28

NEXT TO LAST	14157.00	399248.73	772435.73	9874.28
LAST READING	14230.00	399176.11	772443.16	9874.41
TD	14230.00	399176.11	772443.16	9874.41

Surface Location	403795.10	Northing	772070.00	Easting
	330	FN	735	FE
Projected BHL	399176.11	Northing	772443.16	Easting
Location of				
Top Perfs/OH	403430.28	Northing	772124.65	Easting
Bottom Perfs/OH	399288.56	Northing	772432.15	Easting

SUMMARY of Subsurface Locations

Surface Location	A-29-25S-33E	330	FN	735	FE	Vert. Depth
Top Perfs/OH	A-29-25S-33E	695	FN	680	FE	9814.90 NE
Bottom Perfs/OH	P-29-25S-33E	445	FS	410	FE	9873.91 SE
Projected TD	P-29-25S-33E	333	FS	399	FE	9874.41 SE

FEB 17 2015



Cimarex Cascade 29 Federal 4H XEM+MWD 0ft to 14230ft MD Survey

Geodetic Report

(Non-Def Survey)



Report Date: August 06, 2014 - 09:09 AM
Client: Cimarex
Field: NM Lea County (NAD 83)
Structure / Slot: Cimarex Cascade 29 Federal #4H / Cimarex Cascade 29 Federal #4H
Well: Cimarex Cascade 29 Federal #4H
Borehole: Original Borehole
UWI / API#: Cactus 101 / Unknown
Survey Name: Cimarex Cascade 29 Federal 4H XEM+MWD 0ft to 14230ft MD
Survey Date: July 12, 2014
Tort / AHD / DDI / ERD Ratio: 167.988 ° / 4747.207 ft / 6.060 / 0.481
Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
Location Lat / Long: N 32° 6' 28.51040", W 103° 35' 17.30879"
Location Grid N/E Y/X: N 403795.100 ftUS, E 772070.000 ftUS
CRS Grid Convergence Angle: 0.3961 °
Grid Scale Factor: 0.99997007
Version / Patch: 2.7.1043.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 175.290 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: RKB
TVD Reference Elevation: 3415.000 ft above MSL
Seabed / Ground Elevation: 3397.000 ft above MSL
Magnetic Declination: 7.363 °
Total Gravity Field Strength: 998.4334mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 48201.863 nT
Magnetic Dip Angle: 59.992 °
Declination Date: July 12, 2014
Magnetic Declination Model: BGGM 2014
North Reference: Grid North
Grid Convergence Used: 0.3961 °
Total Corr Mag North->Grid North: 6.9665 °
Local Coord Referenced To: Structure Reference Point

RECEIVED
FEB 10 2015
HOBBSOCD

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Closure Azimuth (°)	Closure (ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' '')	Longitude (E/W ° ' '')	TF (°)
SHL Cascade 29 Fed #4H	0.00	0.00	0.00	0.00	-3415.00	0.00	0.00	0.00	N/A	0.00	0.00	403795.10	772070.00	N 32 6 28.51	W 103 35 17.31	127.61M
	127.00	0.70	127.61	127.00	-3288.00	0.52	-0.47	0.61	0.55	127.61	0.78	403794.63	772070.61	N 32 6 28.51	W 103 35 17.30	48.33M
	158.00	0.48	48.33	158.00	-3257.00	0.57	-0.50	0.86	2.49	120.26	1.00	403794.60	772070.86	N 32 6 28.51	W 103 35 17.30	44.82M
	201.00	0.62	44.82	200.99	-3214.01	0.31	-0.22	1.16	0.33	100.64	1.18	403794.88	772071.16	N 32 6 28.51	W 103 35 17.30	34M
	232.00	0.62	34.00	231.99	-3183.01	0.07	0.04	1.37	0.38	88.33	1.37	403795.14	772071.37	N 32 6 28.51	W 103 35 17.29	43.32M
	290.00	0.62	43.32	289.99	-3125.01	-0.38	0.53	1.76	0.17	73.31	1.84	403795.63	772071.76	N 32 6 28.52	W 103 35 17.29	41.12M
	351.00	0.48	41.12	350.99	-3064.01	-0.78	0.96	2.16	0.23	65.99	2.36	403796.06	772072.16	N 32 6 28.52	W 103 35 17.28	48.02M
	408.00	0.70	48.02	407.98	-3007.02	-1.16	1.37	2.57	0.40	61.90	2.92	403796.47	772072.57	N 32 6 28.52	W 103 35 17.28	31.9M
	464.00	0.62	31.90	463.98	-2951.02	-1.61	1.86	2.99	0.36	58.10	3.52	403796.96	772072.99	N 32 6 28.53	W 103 35 17.27	30.93M
	521.00	0.40	30.93	520.98	-2894.02	-2.02	2.29	3.25	0.39	54.83	3.98	403797.39	772073.25	N 32 6 28.53	W 103 35 17.27	356.61M
	577.00	0.40	356.61	576.98	-2838.02	-2.37	2.66	3.34	0.42	51.53	4.27	403797.76	772073.34	N 32 6 28.54	W 103 35 17.27	11.81M
	637.00	0.62	11.81	636.97	-2778.03	-2.89	3.18	3.40	0.43	46.86	4.65	403798.28	772073.40	N 32 6 28.54	W 103 35 17.27	24.12M
	726.00	0.62	24.12	725.97	-2689.03	-3.78	4.09	3.69	0.15	42.05	5.51	403799.19	772073.69	N 32 6 28.55	W 103 35 17.27	12.03M
	820.00	0.79	12.03	819.96	-2595.04	-4.84	5.19	4.03	0.24	37.85	6.57	403800.29	772074.03	N 32 6 28.56	W 103 35 17.26	17.7M
	911.00	0.88	17.70	910.95	-2504.05	-6.09	6.47	4.38	0.13	34.08	7.81	403801.57	772074.38	N 32 6 28.57	W 103 35 17.26	21.39M
	963.00	0.62	21.39	962.95	-2452.05	-6.71	7.11	4.60	0.51	32.90	8.47	403802.21	772074.60	N 32 6 28.58	W 103 35 17.25	26.31M
	1070.00	0.79	26.31	1069.94	-2345.06	-7.86	8.31	5.14	0.17	31.73	9.77	403803.41	772075.14	N 32 6 28.59	W 103 35 17.25	27.41M
	1165.00	0.70	27.41	1164.93	-2250.07	-8.92	9.42	5.70	0.10	31.18	11.00	403804.51	772075.70	N 32 6 28.60	W 103 35 17.24	31.81M
	1260.00	0.62	31.81	1259.92	-2155.08	-9.82	10.37	6.23	0.10	31.02	12.10	403805.47	772076.23	N 32 6 28.61	W 103 35 17.24	9.61M
	1352.00	0.62	9.61	1351.92	-2063.08	-10.70	11.28	6.58	0.26	30.26	13.06	403806.38	772076.58	N 32 6 28.62	W 103 35 17.23	8.91M
	1447.00	0.70	8.91	1446.91	-1968.09	-11.76	12.36	6.76	0.08	28.66	14.09	403807.46	772076.76	N 32 6 28.63	W 103 35 17.23	23.81M
	1542.00	0.62	23.81	1541.91	-1873.09	-12.78	13.40	7.05	0.20	27.75	15.15	403808.50	772077.05	N 32 6 28.64	W 103 35 17.23	19.19M
	1636.00	0.40	19.19	1635.90	-1779.10	-13.53	14.18	7.37	0.24	27.45	15.98	403809.28	772077.37	N 32 6 28.65	W 103 35 17.22	22.8M
	1733.00	0.70	22.80	1732.90	-1682.10	-14.36	15.05	7.71	0.31	27.12	16.90	403810.15	772077.71	N 32 6 28.66	W 103 35 17.22	11.5M
	1827.00	0.70	11.50	1826.89	-1588.11	-15.42	16.14	8.04	0.15	26.50	18.03	403811.24	772078.04	N 32 6 28.67	W 103 35 17.21	18.62M
	1922.00	0.70	18.62	1921.88	-1493.12	-16.51	17.26	8.35	0.09	25.81	19.17	403812.36	772078.35	N 32 6 28.68	W 103 35 17.21	2.8M
	2017.00	0.70	2.80	2016.88	-1398.12	-17.62	18.39	8.56	0.20	24.96	20.28	403813.49	772078.56	N 32 6 28.69	W 103 35 17.21	19.11M
	2112.00	0.62	19.11	2111.87	-1303.13	-18.67	19.45	8.76	0.21	24.23	21.33	403814.55	772078.76	N 32 6 28.70	W 103 35 17.21	10.71M
	2207.00	0.79	10.71	2206.86	-1208.14	-19.77	20.58	9.05	0.21	23.73	22.48	403815.68	772079.05	N 32 6 28.71	W 103 35 17.20	8.12M
	2299.00	0.70	8.12	2298.86	-1116.14	-20.93	21.76	9.24	0.10	23.01	23.64	403816.86	772079.24	N 32 6 28.73	W 103 35 17.20	6.41M
	2398.00	0.70	6.41	2397.85	-1017.15	-22.11	22.96	9.40	0.02	22.26	24.81	403818.06	772079.40	N 32 6 28.74	W 103 35 17.20	14.49M
	2492.00	0.79	14.49	2491.84	-923.16	-23.29	24.16	9.62	0.15	21.72	26.00	403819.26	772079.62	N 32 6 28.75	W 103 35 17.19	6.71M
	2588.00	1.19	6.71	2587.83	-827.17	-24.89	25.79	9.90	0.44	21.01	27.62	403820.89	772079.80	N 32 6 28.76	W 103 35 17.19	12.43M
	2618.00	1.01	12.43	2617.82	-797.18	-25.45	26.36	10.00	0.70	20.77	28.19	403821.45	772080.00	N 32 6 28.77	W 103 35 17.19	10.71M
	2682.00	1.19	10.71	2681.81	-733.19	-26.63	27.56	10.24	0.29	20.39	29.40	403822.66	772080.24	N 32 6 28.78	W 103 35 17.19	254.01M
	2776.00	0.62	254.01	2775.80	-639.20	-27.47	28.38	9.93	1.67	19.29	30.07	403823.48	772079.93	N 32 6 28.79	W 103 35 17.19	280.32M

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Closure Azimuth (°)	Closure (ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	TF (°)	
	2871.00	0.48	280.32	2870.80	-544.20	-27.47	28.31	9.05	0.30	17.73	29.72	403823.41	772079.05	N 32	6 28.79	W 103 35 17.20	267.93M
	2966.00	0.31	267.93	2965.79	-449.21	-27.58	28.37	8.40	0.20	16.49	29.59	403823.47	772078.40	N 32	6 28.79	W 103 35 17.21	322.99M
	3061.00	0.40	322.99	3060.79	-354.21	-27.88	28.63	7.94	0.36	15.51	29.71	403823.72	772077.94	N 32	6 28.79	W 103 35 17.21	331.03M
	3157.00	0.48	331.03	3156.79	-258.21	-28.53	29.25	7.55	0.11	14.47	30.20	403824.34	772077.55	N 32	6 28.80	W 103 35 17.22	352.52M
	3251.00	0.48	352.52	3250.79	-164.21	-29.28	29.98	7.31	0.19	13.70	30.86	403825.08	772077.31	N 32	6 28.81	W 103 35 17.22	350.81M
	3346.00	0.70	350.81	3345.78	-69.22	-30.25	30.95	7.16	0.23	13.03	31.77	403826.05	772077.16	N 32	6 28.82	W 103 35 17.22	13.13M
	3441.00	0.70	13.13	3440.78	25.78	-31.39	32.09	7.20	0.29	12.65	32.88	403827.18	772077.20	N 32	6 28.83	W 103 35 17.22	41.21M
	3537.00	0.70	41.21	3536.77	121.77	-32.35	33.10	7.72	0.35	13.13	33.99	403828.20	772077.72	N 32	6 28.84	W 103 35 17.22	23.59M
	3631.00	0.70	23.59	3630.76	215.76	-33.26	34.06	8.33	0.23	13.74	35.06	403829.15	772078.33	N 32	6 28.85	W 103 35 17.21	21.39M
	3726.00	0.70	21.39	3725.75	310.75	-34.29	35.13	8.77	0.03	14.02	36.21	403830.23	772078.77	N 32	6 28.86	W 103 35 17.20	27.41M
	3822.00	0.88	27.41	3821.75	406.75	-35.44	36.33	9.33	0.21	14.40	37.51	403831.43	772079.33	N 32	6 28.87	W 103 35 17.20	46.09M
	3916.00	0.79	46.09	3915.74	500.74	-36.46	37.42	10.12	0.30	15.14	38.76	403832.52	772080.12	N 32	6 28.88	W 103 35 17.19	36.99M
	4011.00	0.79	36.99	4010.73	595.73	-37.36	38.40	10.99	0.13	15.97	39.94	403833.49	772080.99	N 32	6 28.89	W 103 35 17.18	61.43M
	4121.00	0.62	61.43	4120.72	705.72	-38.17	39.29	11.97	0.31	16.94	41.07	403834.39	772081.97	N 32	6 28.90	W 103 35 17.17	91.7M
	4216.00	0.31	91.70	4215.72	800.72	-38.35	39.52	12.68	0.41	17.78	41.51	403834.62	772082.68	N 32	6 28.90	W 103 35 17.16	101.11M
	4309.00	0.70	101.11	4308.71	893.71	-38.17	39.41	13.49	0.43	18.89	41.65	403834.51	772083.49	N 32	6 28.90	W 103 35 17.15	127.92M
	4405.00	0.62	127.92	4404.71	989.71	-37.66	38.98	14.47	0.33	20.37	41.58	403834.07	772084.47	N 32	6 28.90	W 103 35 17.14	125.32M
	4499.00	1.10	125.32	4498.69	1083.69	-36.73	38.14	15.61	0.51	22.26	41.21	403833.24	772085.61	N 32	6 28.89	W 103 35 17.12	134.02M
	4594.00	1.49	134.02	4593.67	1178.67	-35.22	36.76	17.24	0.46	25.13	40.60	403831.85	772087.24	N 32	6 28.87	W 103 35 17.11	139.52M
	4697.00	1.80	139.52	4696.63	1271.63	-33.12	34.80	19.06	0.37	28.71	39.68	403829.90	772089.06	N 32	6 28.85	W 103 35 17.08	144.53M
	4783.00	1.58	144.53	4782.59	1367.59	-30.76	32.58	20.81	0.28	32.56	38.66	403827.68	772090.81	N 32	6 28.83	W 103 35 17.06	138.73M
	4835.00	1.49	138.73	4834.57	1419.57	-29.60	31.49	21.87	0.35	34.53	38.22	403826.59	772091.67	N 32	6 28.82	W 103 35 17.05	143.6M
	4981.00	1.10	143.60	4980.53	1565.53	-26.89	28.93	23.75	0.28	39.38	37.43	403824.03	772093.75	N 32	6 28.80	W 103 35 17.03	168.7M
	5075.00	1.41	168.70	5074.51	1659.51	-24.97	27.07	24.51	0.66	42.16	36.52	403822.17	772094.51	N 32	6 28.78	W 103 35 17.02	146.2M
	5170.00	1.49	146.20	5169.48	1754.48	-22.73	24.90	25.43	0.60	45.60	35.59	403820.00	772095.43	N 32	6 28.76	W 103 35 17.01	151.69M
	5263.00	1.49	151.69	5262.45	1847.45	-20.56	22.83	26.68	0.15	49.44	35.11	403817.93	772096.67	N 32	6 28.73	W 103 35 17.00	152.31M
	5357.00	1.41	152.31	5356.42	1941.42	-18.38	20.73	27.79	0.09	53.28	34.67	403815.83	772097.79	N 32	6 28.71	W 103 35 16.98	137.41M
	5454.00	1.32	137.41	5453.39	2038.39	-16.40	18.85	29.10	0.38	57.07	34.68	403813.95	772099.10	N 32	6 28.69	W 103 35 16.97	126.11M
	5547.00	1.19	126.11	5546.37	2131.37	-14.92	17.49	30.61	0.30	60.25	35.26	403812.59	772100.61	N 32	6 28.68	W 103 35 16.95	117.19M
	5642.00	1.19	117.19	5641.35	2226.35	-13.76	16.46	32.28	0.19	62.98	36.24	403811.56	772102.28	N 32	6 28.67	W 103 35 16.93	112.71M
	5737.00	1.19	112.71	5736.33	2321.33	-12.78	15.63	34.07	0.10	65.36	37.48	403810.73	772104.07	N 32	6 28.66	W 103 35 16.91	119.83M
	5833.00	1.19	119.83	5832.31	2417.31	-11.76	14.75	35.85	0.15	67.64	38.77	403809.85	772105.85	N 32	6 28.65	W 103 35 16.89	115.22M
	5928.00	1.10	115.22	5927.29	2512.29	-10.74	13.87	37.54	0.14	69.72	40.02	403808.97	772107.53	N 32	6 28.65	W 103 35 16.87	113.9M
	6024.00	1.32	113.90	6023.27	2608.27	-9.75	13.03	39.38	0.23	71.69	41.48	403808.13	772109.38	N 32	6 28.64	W 103 35 16.85	113.72M
	6119.00	1.32	113.72	6118.24	2703.24	-8.71	12.15	41.38	0.00	73.64	43.13	403807.25	772111.38	N 32	6 28.63	W 103 35 16.83	111.52M
	6214.00	1.19	111.52	6213.22	2798.22	-7.75	11.34	43.30	0.15	75.32	44.76	403806.44	772113.30	N 32	6 28.62	W 103 35 16.80	118.42M
	6308.00	1.32	118.42	6307.20	2892.20	-6.73	10.47	45.16	0.21	76.95	46.36	403805.57	772115.16	N 32	6 28.61	W 103 35 16.78	117.32M
	6403.00	1.10	117.32	6402.18	2987.18	-5.65	9.53	46.93	0.23	78.52	47.89	403804.63	772116.93	N 32	6 28.60	W 103 35 16.76	52.59M
	6496.00	0.31	52.59	6495.17	3080.17	-5.31	9.27	47.93	1.08	79.05	48.82	403804.37	772117.93	N 32	6 28.60	W 103 35 16.75	28.91M
	6591.00	0.31	28.91	6590.17	3175.17	-5.66	9.66	48.26	0.13	78.68	49.21	403804.76	772118.25	N 32	6 28.60	W 103 35 16.75	59.4M
	6686.00	0.31	59.40	6685.17	3270.17	-5.99	10.01	48.60	0.17	78.36	49.62	403805.11	772118.60	N 32	6 28.61	W 103 35 16.74	60.02M
	6781.00	0.40	60.02	6780.17	3365.17	-6.24	10.31	49.11	0.09	78.15	50.18	403805.41	772119.11	N 32	6 28.61	W 103 35 16.74	32.73M
	6875.00	0.31	32.73	6874.16	3459.16	-6.58	10.69	49.53	0.20	77.83	50.67	403805.79	772119.53	N 32	6 28.61	W 103 35 16.73	238.92M
	6969.00	0.22	238.92	6968.16	3553.16	-6.70	10.81	49.51	0.55	77.69	50.68	403805.91	772119.61	N 32	6 28.61	W 103 35 16.73	271.31M
	7063.00	0.31	271.31	7062.16	3647.16	-6.65	10.72	49.11	0.18	77.69	50.26	403805.82	772119.10	N 32	6 28.61	W 103 35 16.74	238.61M
	7158.00	0.22	238.61	7157.16	3742.16	-6.60	10.63	48.69	0.18	77.68	49.84	403805.73	772118.69	N 32	6 28.61	W 103 35 16.74	222.62M
	7253.00	0.31	222.62	7252.16	3837.16	-6.34	10.35	48.36	0.12	77.93	49.46	403805.45	772118.36	N 32	6 28.61	W 103 35 16.75	239.32M
	7346.00	0.22	239.32	7345.16	3930.16	-6.09	10.07	48.04	0.13	78.16	49.08	403805.17	772118.04	N 32	6 28.61	W 103 35 16.75	173.71M
	7442.00	0.22	173.71	7441.16	4026.16	-5.83	9.79	47.90	0.25	78.45	48.89	403804.89	772117.90	N 32	6 28.60	W 103 35 16.75	190.32M
	7541.00	0.22	190.32	7540.16	4125.16	-5.45	9.42	47.89	0.06	78.88	48.80	403804.52	772117.89	N 32	6 28.60	W 103 35 16.75	187.99M
	7636.00	0.48	187.99	7635.16	4220.16	-4.89	8.84	47.80	0.27	79.52	48.61	403803.94	772117.80	N 32	6 28.59	W 103 35 16.75	187.99M
	7731.00	0.48	187.99	7730.15	4315.15	-4.11	8.06	47.69	0.00	80.41	48.36	403803.15	772117.69	N 32	6 28.59	W 103 35 16.75	173.31M
	7825.00	0.62	173.31	7824.15	4409.15	-3.22	7.16	47.69	0.21	81.46	48.23	403802.26	772117.69	N 32	6 28.58	W 103 35 16.75	166.81M
	7919.00	0.79	166.81	7918.14	4503.14	-2.07	6.02	47.90	0.20	82.83	48.28	403801.12	772117.90	N 32	6 28.57	W 103 35 16.75	177.93M
	8014.00	0.70	177.93	8013.13	4598.13	-0.84	4.81	48.07	0.18	84.29	48.31	403799.91	772118.07	N 32	6 28.55	W 103 35 16.75	170.1M
	8110.00	0.79	170.10	8109.13	4694.13	0.40	3.57	48.21	0.14	85.77	48.34	403798.67	772118.20	N 32	6 28.54	W 103 35 16.75	156.83M
	8204.00	0.79	156.83	8203.12	4788.12	1.66	2.33	48.57	0.19	87.25	48.63	403797.43	772118.57	N 32	6 28.53	W 103 35 16.74	177.53M
	8299.00	1.10	177.53	8298.10	4883.10	3.19	0.82	48.87	0.48	89.04	48.88	403795.92	772118.87	N 32	6 28.52	W 103 35 16.74	180.45M
Crossing 330' HL	8340.00	1.19	180.45	8339.10	4924.10	4.01	0.00	48.88	0.27	90.00	48.88	403795.10	772118.88	N 32	6 28.51	W 103 35 16.74	183.59M
	8393.00	1.32	183.59	8392.08	4977.08	5.17	-1.16	48.84	0.27	91.36	48.85	403793.94	772118.84	N 32	6 28.50	W 103 35 16.74	187.81M
	8487.00	1.49	187.81	8486.06	5071.06	7.43	-3.45</										

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Closure Azimuth (°)	Closure (ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	TF (°)
	8677.00	1.80	189.53	8675.99	5260.99	12.36	-8.46	47.86	0.42	100.02	48.60	403786.64	772117.85	N 32 6 28.42	W 103 35 16.75	198.1M
	8867.00	2.02	198.10	8865.88	5450.88	18.34	-14.58	46.32	0.19	107.48	48.56	403780.52	772116.32	N 32 6 28.36	W 103 35 16.77	192.66M
	8944.00	1.75	192.66	8942.84	5527.84	20.71	-17.02	45.64	0.42	110.45	48.71	403778.08	772115.64	N 32 6 28.34	W 103 35 16.78	285.59M
	9037.00	0.26	285.59	9035.83	5620.83	21.99	-18.35	45.13	1.92	112.13	48.72	403776.75	772115.13	N 32 6 28.33	W 103 35 16.79	263.27M
	9131.00	0.15	263.27	9129.83	5714.83	21.92	-18.31	44.80	0.14	112.23	48.40	403776.79	772114.80	N 32 6 28.33	W 103 35 16.79	212.33M
	9226.00	0.76	212.33	9224.82	5809.82	22.43	-18.85	44.34	0.71	113.04	48.18	403776.25	772114.34	N 32 6 28.32	W 103 35 16.79	189.87M
	9257.00	2.68	189.87	9255.81	5840.81	23.30	-19.74	44.10	6.45	114.11	48.32	403775.36	772114.10	N 32 6 28.31	W 103 35 16.80	200.58M
	9276.00	2.43	200.58	9274.79	5859.79	24.09	-20.56	43.89	2.83	115.10	48.46	403774.54	772113.89	N 32 6 28.30	W 103 35 16.80	199.74M
	9307.00	3.50	199.74	9305.75	5890.75	25.55	-22.06	43.34	3.45	116.98	48.63	403773.04	772113.34	N 32 6 28.29	W 103 35 16.81	190.48M
	9339.00	6.31	190.48	9337.53	5922.53	28.13	-24.71	42.69	9.10	120.07	49.32	403770.39	772112.69	N 32 6 28.26	W 103 35 16.81	176.57M
	9370.00	9.66	176.57	9368.32	5953.32	32.38	-28.98	42.53	12.40	124.27	51.47	403766.12	772112.53	N 32 6 28.22	W 103 35 16.82	20.29R
	9402.00	13.56	170.53	9399.66	5984.66	38.80	-35.37	43.31	12.75	129.24	55.92	403759.73	772113.31	N 32 6 28.16	W 103 35 16.81	1.12R
	9434.00	17.60	170.79	9430.48	6015.48	47.37	-43.85	44.70	12.63	134.45	62.62	403751.25	772114.70	N 32 6 28.07	W 103 35 16.79	10.35R
	9465.00	19.75	171.95	9459.85	6044.85	57.27	-53.66	46.19	7.04	139.28	70.80	403741.44	772116.18	N 32 6 27.98	W 103 35 16.78	19.97R
	9497.00	21.34	173.53	9489.81	6074.81	68.49	-64.80	47.60	5.26	143.70	80.40	403730.30	772117.60	N 32 6 27.87	W 103 35 16.76	4.76L
	9526.00	23.76	173.03	9516.59	6101.59	79.60	-75.84	48.90	8.37	147.19	90.24	403719.26	772118.90	N 32 6 27.76	W 103 35 16.75	0.57R
	9558.00	26.92	173.10	9545.51	6130.51	93.29	-89.44	50.56	9.88	150.52	102.74	403705.67	772120.55	N 32 6 27.62	W 103 35 16.73	9.92R
	9590.00	30.24	174.25	9573.61	6158.61	108.59	-104.65	52.23	10.52	153.47	116.96	403690.45	772122.23	N 32 6 27.47	W 103 35 16.71	19.48R
	9621.00	34.03	176.63	9599.85	6184.85	125.07	-121.08	53.53	12.89	156.15	132.39	403674.02	772123.53	N 32 6 27.31	W 103 35 16.70	20.33R
	9653.00	37.43	178.69	9625.83	6210.83	143.73	-139.75	54.28	11.27	158.77	149.92	403655.35	772124.27	N 32 6 27.12	W 103 35 16.69	24.36R
	9685.00	39.94	180.45	9650.81	6235.81	163.68	-159.75	54.42	8.56	161.19	168.76	403635.36	772124.42	N 32 6 26.93	W 103 35 16.69	10.21R
	9716.00	41.83	180.96	9674.24	6259.24	183.88	-180.04	54.17	6.19	163.26	188.01	403615.07	772124.16	N 32 6 26.73	W 103 35 16.69	4.6R
	9750.00	43.63	181.17	9699.22	6284.22	206.83	-203.10	53.74	5.31	165.18	210.09	403592.01	772123.73	N 32 6 26.50	W 103 35 16.70	4.68R
	9781.00	47.03	181.55	9721.01	6306.01	228.75	-225.14	53.21	11.00	166.70	231.34	403569.97	772123.21	N 32 6 26.28	W 103 35 16.71	7.08L
	9813.00	51.04	180.91	9741.98	6326.98	252.78	-249.29	52.70	12.62	168.06	254.80	403545.82	772122.70	N 32 6 26.04	W 103 35 16.72	16.59L
	9845.00	54.12	179.78	9761.42	6346.42	278.09	-274.70	52.55	10.03	169.17	279.68	403520.41	772122.55	N 32 6 25.79	W 103 35 16.72	12.62L
	9876.00	56.93	179.03	9778.97	6363.97	303.58	-300.25	52.82	9.28	170.02	304.86	403494.86	772122.82	N 32 6 25.54	W 103 35 16.72	10.42L
	9908.00	60.09	178.36	9795.68	6380.68	330.81	-327.53	53.44	10.04	170.73	331.86	403467.58	772123.44	N 32 6 25.27	W 103 35 16.71	5.05L
	9939.00	63.64	178.01	9810.30	6395.30	358.11	-354.85	54.31	11.49	171.30	358.98	403440.26	772124.31	N 32 6 25.00	W 103 35 16.71	0.48R
	9971.00	66.91	178.04	9823.68	6408.68	387.14	-383.89	55.31	10.22	171.80	387.86	403411.22	772125.31	N 32 6 24.71	W 103 35 16.70	4.67L
	10003.00	68.39	177.91	9835.85	6420.85	416.70	-413.47	56.36	4.64	172.24	417.29	403381.64	772126.35	N 32 6 24.42	W 103 35 16.69	16.19R
	10034.00	69.78	178.34	9846.92	6431.92	445.62	-442.41	57.30	4.67	172.62	446.11	403352.70	772127.30	N 32 6 24.13	W 103 35 16.68	6.02L
	10065.00	73.88	177.89	9856.58	6441.58	475.03	-471.84	58.27	13.30	172.96	475.43	403323.27	772128.27	N 32 6 23.84	W 103 35 16.67	5.04L
	10096.00	77.54	177.56	9864.23	6449.23	505.04	-501.85	59.47	11.85	173.24	505.37	403293.26	772129.46	N 32 6 23.54	W 103 35 16.66	3.83L
	10128.00	80.49	177.36	9870.33	6455.33	536.43	-533.23	60.86	9.24	173.49	536.70	403261.88	772130.86	N 32 6 23.23	W 103 35 16.64	3.41L
	10159.00	84.17	177.14	9874.47	6459.47	567.13	-563.92	62.33	11.89	173.69	567.35	403231.20	772132.33	N 32 6 22.93	W 103 35 16.63	3.08L
	10191.00	87.14	176.98	9876.89	6461.89	599.02	-595.78	63.97	9.29	173.87	599.20	403199.34	772133.97	N 32 6 22.61	W 103 35 16.61	HS
	10223.00	89.07	176.98	9877.95	6462.95	630.99	-627.71	65.65	6.03	174.03	631.14	403167.41	772135.65	N 32 6 22.29	W 103 35 16.60	7.18R
	10254.00	90.34	177.14	9878.11	6463.11	661.97	-658.67	67.24	4.13	174.17	662.10	403136.45	772137.24	N 32 6 21.99	W 103 35 16.58	74.5L
	10272.00	90.62	176.13	9877.96	6462.96	679.96	-676.64	68.30	5.82	174.24	680.08	403118.48	772138.30	N 32 6 21.81	W 103 35 16.57	56.3L
	10367.00	91.20	175.26	9876.45	6461.45	774.95	-771.36	75.43	1.10	174.41	775.04	403023.76	772145.43	N 32 6 20.87	W 103 35 16.49	142.86R
	10462.00	90.17	176.04	9875.31	6460.31	869.94	-866.08	82.63	1.36	174.55	870.01	402929.05	772152.63	N 32 6 19.93	W 103 35 16.42	81.16R
	10557.00	90.24	176.49	9874.97	6459.97	964.92	-960.87	88.82	0.48	174.72	964.97	402834.26	772158.82	N 32 6 19.00	W 103 35 16.35	95.06L
	10652.00	90.17	175.70	9874.63	6459.63	1059.91	-1055.65	95.29	0.83	174.84	1059.95	402739.48	772165.29	N 32 6 18.06	W 103 35 16.29	140.28L
	10747.00	89.52	175.16	9874.89	6459.89	1154.91	-1150.35	102.86	0.89	174.89	1154.94	402644.79	772172.86	N 32 6 17.12	W 103 35 16.21	96.93L
	10842.00	89.35	173.76	9875.83	6460.83	1249.89	-1244.90	112.03	1.48	174.86	1249.93	402550.24	772182.03	N 32 6 16.18	W 103 35 16.11	60.9L
	10935.00	90.38	171.91	9876.05	6461.05	1342.80	-1337.17	123.63	2.28	174.72	1342.87	402457.98	772193.63	N 32 6 15.27	W 103 35 15.98	53.97L
	11030.00	90.62	171.58	9875.22	6460.22	1437.62	-1431.18	137.27	0.43	174.52	1437.75	402363.97	772207.27	N 32 6 14.34	W 103 35 15.83	83.05R
	11125.00	90.76	172.73	9874.07	6459.07	1532.47	-1525.28	150.24	1.22	174.37	1532.66	402269.87	772220.23	N 32 6 13.41	W 103 35 15.68	56.6R
	11220.00	91.34	173.61	9872.33	6457.33	1627.38	-1619.59	161.53	1.11	174.30	1627.63	402175.56	772231.53	N 32 6 12.47	W 103 35 15.56	178.96R
	11314.00	90.24	173.63	9871.04	6456.04	1721.33	-1713.00	171.98	1.17	174.27	1721.61	402082.16	772241.97	N 32 6 11.55	W 103 35 15.45	95.71L
	11409.00	90.17	172.93	9870.70	6455.70	1816.27	-1807.34	183.09	0.74	174.22	1816.59	401987.81	772253.09	N 32 6 10.61	W 103 35 15.33	103.09R
	11503.00	90.07	173.36	9870.50	6455.50	1910.21	-1900.67	194.31	0.47	174.16	1910.58	401894.49	772264.31	N 32 6 9.69	W 103 35 15.20	111.25R
	11598.00	89.86	173.90	9870.56	6455.56	2005.17	-1995.08	204.85	0.61	174.14	2005.57	401800.08	772274.85	N 32 6 8.75	W 103 35 15.09	74.05R
	11693.00	90.14	174.88	9870.56	6455.56	2100.16	-2089.63	214.14	1.07	174.15	2100.57	401705.54	772284.13	N 32 6 7.82	W 103 35 14.99	114.92R
	11788.00	89.55	176.15	9870.81	6455.81	2195.15	-2184.33	221.57	1.47	174.21	2195.54	401610.84	772291.56	N 32 6 6.88	W 103 35 14.91	60.99R
	11883.00	90.21	177.34	9871.01	6456.01	2290.12	-2279.18	226.96	1.43	174.31	2290.45	401515.99	772296.96	N 32 6 5.94	W 103 35 14.85	116.15R
	11978.00	89.66	178.46	9871.12	6456.12	2385.02	-2374.11	230.44	1.31	174.46	2385.27	401421.06	772300.44	N 32 6 5.00	W 103 35 14.82	107.36L
	12072.00	89.31	177.34	9871.97	6456.97	2478.92	-2468.04	233.89	1.25	174.59	2479.10	401327.13	772303.88	N 32 6 4.07	W 103 35 14.79	49.01L
	12167.00	90.04	176.50	9872.50	6457.50	2573.87	-2562.90	238.99	1.17	174.67	2574.02	401232.28	772308.98			

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Closure Azimuth (°)	Closure (ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	TF (°)
	12452.00	89.86	177.51	9872.47	6457.47	2858.74	-2847.52	253.80	0.38	174.91	2858.80	400947.68	772323.79	N 32 6 0.32	W 103 35 14.59	72.9R
	12546.00	89.90	177.64	9872.67	6457.67	2952.66	-2941.43	257.78	0.14	174.99	2952.71	400853.76	772327.77	N 32 5 59.39	W 103 35 14.55	51.2L
	12641.00	90.31	177.13	9872.49	6457.49	3047.60	-3036.33	262.11	0.69	175.07	3047.62	400758.87	772332.10	N 32 5 58.45	W 103 35 14.51	94.37R
	12736.00	90.17	178.96	9872.10	6457.10	3142.49	-3131.27	265.35	1.93	175.16	3142.49	400663.93	772335.34	N 32 5 57.51	W 103 35 14.48	77.28R
	12831.00	90.86	182.02	9871.24	6456.24	3237.08	-3226.25	264.54	3.30	175.31	3237.08	400568.95	772334.53	N 32 5 56.57	W 103 35 14.49	153.89R
	12924.00	90.35	182.27	9870.26	6455.26	3329.41	-3319.18	261.06	0.61	175.50	3329.43	400476.02	772331.05	N 32 5 55.65	W 103 35 14.54	101.94L
	13018.00	89.80	179.67	9870.14	6455.14	3422.94	-3413.16	259.47	2.83	175.65	3423.01	400382.05	772329.46	N 32 5 54.72	W 103 35 14.57	87.69L
	13113.00	89.90	177.20	9870.39	6455.39	3517.79	-3508.12	262.06	2.60	175.73	3517.89	400287.10	772332.05	N 32 5 53.78	W 103 35 14.54	83.4L
	13208.00	90.07	175.73	9870.41	6455.41	3612.77	-3602.93	267.92	1.56	175.75	3612.88	400192.28	772337.91	N 32 5 52.84	W 103 35 14.48	89.23L
	13303.00	90.10	173.49	9870.27	6455.27	3707.75	-3697.51	276.84	2.36	175.72	3707.86	400097.71	772346.83	N 32 5 51.90	W 103 35 14.39	73.74L
	13398.00	90.24	173.01	9869.99	6454.99	3802.69	-3791.85	288.01	0.53	175.66	3802.77	400003.37	772358.00	N 32 5 50.97	W 103 35 14.27	125.69L
	13493.00	89.73	172.30	9870.01	6455.01	3897.59	-3886.07	300.15	0.92	175.58	3897.64	399909.16	772370.14	N 32 5 50.04	W 103 35 14.13	99.25L
	13588.00	89.66	171.87	9870.52	6455.52	3992.44	-3980.16	313.24	0.46	175.50	3992.47	399815.07	772383.23	N 32 5 49.10	W 103 35 13.99	72.57R
	13683.00	89.93	172.73	9870.86	6455.86	4087.31	-4074.30	325.96	0.95	175.43	4087.32	399720.93	772395.95	N 32 5 48.17	W 103 35 13.85	116.4R
	13778.00	89.24	174.12	9871.55	6456.55	4182.25	-4168.67	336.84	1.63	175.38	4182.26	399626.56	772406.83	N 32 5 47.24	W 103 35 13.73	76.82R
	13872.00	89.69	176.04	9872.42	6457.42	4276.24	-4262.32	344.90	2.10	175.37	4276.25	399532.92	772414.89	N 32 5 46.31	W 103 35 13.64	63.76R
	13968.00	90.04	176.75	9872.65	6457.65	4372.23	-4358.13	350.94	0.82	175.40	4372.23	399437.11	772420.93	N 32 5 45.36	W 103 35 13.58	129.81L
	14063.00	89.04	175.55	9873.41	6458.41	4467.21	-4452.91	357.32	1.64	175.41	4467.22	399342.34	772427.31	N 32 5 44.42	W 103 35 13.51	58.26L
Final Surev	14157.00	89.90	174.16	9874.28	6459.28	4561.20	-4546.52	365.75	1.74	175.40	4561.21	399248.73	772435.73	N 32 5 43.50	W 103 35 13.42	HS
Proj to TD	14230.00	89.90	174.16	9874.41	6459.41	4634.18	-4619.14	373.17	0.00	175.38	4634.19	399176.11	772443.16	N 32 5 42.78	W 103 35 13.34	

Survey Type: Non-Def Survey

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma
Survey Program:

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	1	0.000	18.000	Act Stns	30.000	30.000	SLB_MWD-POOR-Depth Only	Original Borehole / Cimarex Cascade 29 Federal 4H
	1	18.000	8867.000	Act Stns	30.000	30.000	SLB_MWD-POOR	Original Borehole / Cimarex Cascade 29 Federal 4H
	1	8867.000	14147.000	Act Stns	30.000	30.000	SLB_MWD-STD	Original Borehole / Cimarex Cascade 29 Federal 4H
	1	14147.000	14230.000	Act Stns	30.000	30.000	SLB_BLIND+TREND	Original Borehole / Cimarex Cascade 29 Federal 4H



Cactus 101

Cimarex

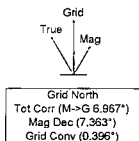
FINAL Pva



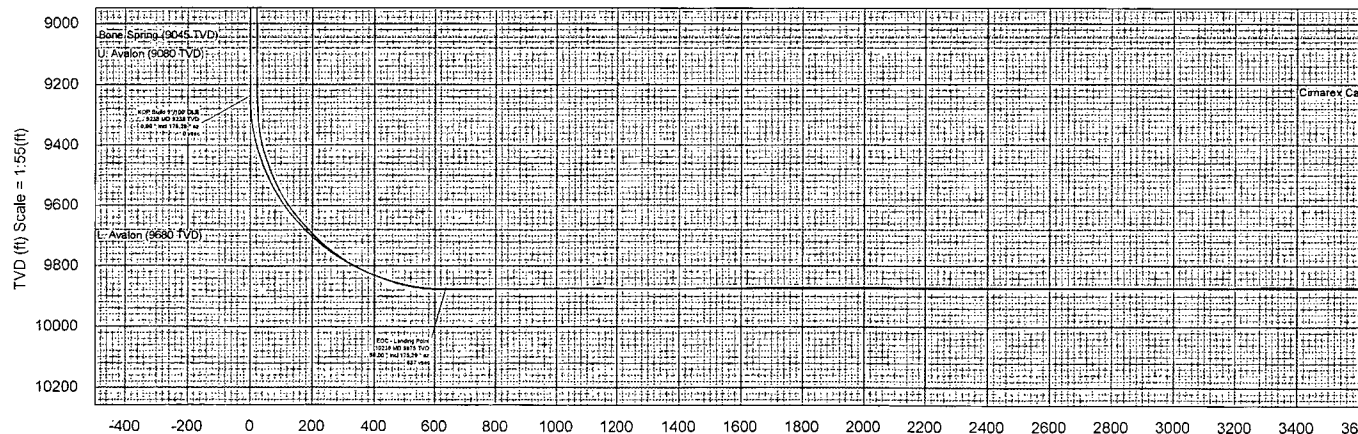
Borehole:	Well:	Field:	Structure:
Original Borehole	Cascade 29 Federal 4H	Lea County, NM	Cactus 101
Gravity & Magnetic Parameters			
Model: BGGM 2014	Dip: 59.992°	Date: 12-Jul-2014	Surface Location: NAD83 New Mexico State Plane, Eastern Zone, US Feet
MagDec: 7.363°	FS: 48201.863nT	Gravity FS: 988.433mgn (9.80665 Based)	Lat: N 32 6 28.51 Northing: 403785.110US Grid Conv: 0.3951°
Miscellaneous			
Slot: Cimarex Cascade 29 Federal 4H TVD Ref: RKB(3415R above MSL)			
Plan: XEM-MWD Dr to 14230ft MD			

Critical Points

Comments	Survey MD	Inc.	Azim	TVD	SSTVD	VS	NS	EW	Longitude	Latitude	Easting	Northing	DLS	Tool Face
SHL	0.00	0.00	175.29	0.00	3415.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	175.29	
Rustler	995.00	0.00	175.29	995.00	2420.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
Salt	1140.00	0.00	175.29	1140.00	2275.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
Castille	3380.00	0.00	175.29	3380.00	35.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
Base Last Salt	4670.00	0.00	175.29	4670.00	1255.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
Lamar	4900.00	0.00	175.29	4900.00	1485.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
Bell Canyon	4945.00	0.00	175.29	4945.00	1530.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
Cherry Canyon	6190.00	0.00	175.29	6190.00	2775.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
Brushy Canyon	7485.00	0.00	175.29	7485.00	4070.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
Bone Spring	9045.00	0.00	175.29	9045.00	5630.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
U. Avalon	9080.00	0.00	175.29	9080.00	5665.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
KOP Build 9"/100" DLS	9238.38	0.00	175.29	9238.38	5823.38	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	0.00
L. Avalon	9726.42	43.92	175.29	9680.00	6265.00	178.08	-177.48	14.62	W 103 35 17.153	N 32 6 26.753	772084.62	403617.62	9.00	175.29
EOC - Landing Point	10238.38	90.00	175.29	9875.00	6460.00	636.62	-634.47	52.28	W 103 35 16.752	N 32 6 22.229	772122.27	403160.65	9.00	0.00
PBHL	14239.31	90.00	175.29	9875.00	6460.00	4637.55	-4621.88	380.81	W 103 35 13.254	N 32 5 42.750	772450.80	399173.36	0.00	



Comments	Survey MD	Inc.	Azim	TVD	SSTVD	VS	NS	EW	Longitude	Latitude	Easting	Northing	DLS	Tool Face
Bone Spring (9045 TVD)	9045.00	0.00	175.29	9045.00	5630.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
U. Avalon (9080 TVD)	9080.00	0.00	175.29	9080.00	5665.00	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	175.29
KOP Build 9"/100" DLS	9238.38	0.00	175.29	9238.38	5823.38	0.00	0.00	0.00	W 103 35 17.309	N 32 6 28.510	772070.00	403795.10	0.00	0.00
L. Avalon (9680 TVD)	9680.00	43.92	175.29	9680.00	6265.00	178.08	-177.48	14.62	W 103 35 17.153	N 32 6 26.753	772084.62	403617.62	9.00	175.29
EOC - Landing Point	9875.00	90.00	175.29	9875.00	6460.00	636.62	-634.47	52.28	W 103 35 16.752	N 32 6 22.229	772122.27	403160.65	9.00	0.00
PBHL	9875.00	90.00	175.29	9875.00	6460.00	4637.55	-4621.88	380.81	W 103 35 13.254	N 32 5 42.750	772450.80	399173.36	0.00	



Vertical Section (ft) Azim = 175.29° Scale = 1:55(ft) Origin = 0N/S, 0E/W

