

Results of Directional Survey

API number:	30-025-41389		
OGRID:		Operator:	COG OPERATING LLC
		Property:	CRAZY HORSE FEDERAL # 1H

surface	ULSTR:	D	18	T 19S	R 32E
				330 FNL	190 FWL

5306

BH Loc	ULSTR:	A	18	T 19S	R 32E
13695	MD	9219.9	TVD	493 FNL	332 FEL
					4974 FWL

Top Perf/OH	ULSTR:	D	18	T 19S	R 32E
9409	MD	9185.0	TVD	396 FNL	698 FWL

Bot Perf/OH	ULSTR:	A	18	T 19S	R 32E
13630	MD	9219.1	TVD	486 FNL	396 FEL
					4910 FWL

	MD	N/S	E/W	VD
	9377	-56.69	478.90	9176.76
TOP PERFS/OH	9409	-66.48	508.21	9185.03
	9409	-66.48	508.21	9185.03
	13623	-155.55	4712.64	9218.97
BOT PERFS/OH	13630	-156.28	4719.60	9219.06
	13695	-163.05	4784.24	9219.91

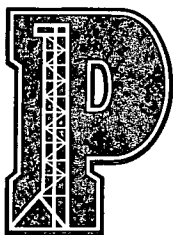
NEXT TO LAST	13623	-155.55	4712.64	9218.97
LAST READING	13695	-163.05	4784.24	9219.91
TD	13695	-163.05	4784.24	9219.91

Surface Location	330	FN	190	FW
Projected BHL	493	FN	4974	FW
Location of				
Top Perfs/OH	396	FN	698	FW
Bottom Perfs/OH	486	FN	4910	FW

SUMMARY of Subsurface Locations

Surface Location	D-18-19S-32E	330	FN	190	FW	Vert. Depth
Top Perfs/OH	D-18-19S-32E	396	FN	698	FW	9185.03
Bottom Perfs/OH	A-18-19S-32E	486	FN	4910	FW	9219.06
Projected TD	A-18-19S-32E	493	FN	4974	FW	9219.91

APR 21 2014



PATRIOT DRILLING, LLC

OPERATOR: COG Operating, LLC
WELL/LEASE: Crazy Horse Federal # 1 H
COUNTY: Lea Co., New Mexico
Sec. 18, T19S, R32E

HOBBS OCD

MAR 24 2014

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**STATE OF NEW MEXICO
DEVIATION REPORT**

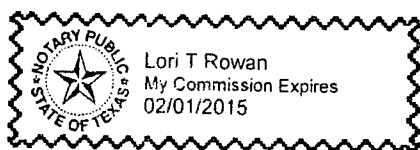
<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
385	1/4	4,146	1/4
900	1 1/2	4,650	1 1/4
1,020	1/2	4,989	2 1/4
1,334	3/4	5,303	2 1/4
1,595	1	5,636	1 3/4
2,200	2 1/2	5,930	1
2,414	2 1/2	6,728	3/4
2,509	2	7,260	2
2,798	1 1/4	7,829	1 3/4
3,053	1/2	7,606	1
3,282	1	8,185	1
3,746	3/4		

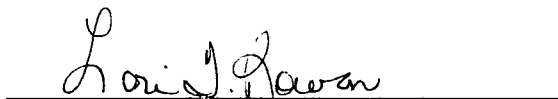
Patriot Drilling, LLC

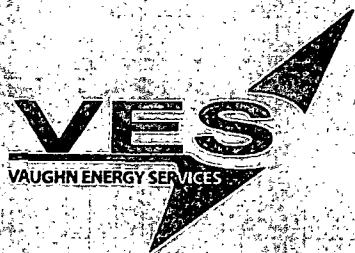

M. Leroy Peterson, Executive Vice-
President

The foregoing instrument was acknowledged before me on this 2nd day of
December, 2013 by M. Leroy Peterson, Executive Vice-President of Patriot Drilling,

My Commission Expires: 02/01/2015




Lori T. Rowan
Notary Public for Ector Co., Texas



A GYRO TECHNOLOGIES INC. COMPANY

P.O. Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

December 6, 2013

HOBBS OCD

MAR 24 2014

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Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: Crazy Horse Federal No. 001H

Please find enclosed a copy of the survey from 0.00' to 8550.00' ran on the above referenced well.

Sincerely,

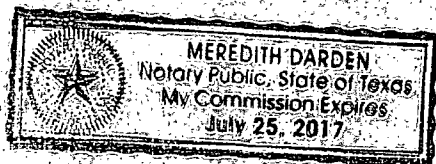

Keith Havelka
Operations

STATE OF TEXAS

COUNTY OF NUECES

§
§
§

This instrument was acknowledged before me on the 14th day of December
A.D., 2013, by Keith Havelka.




Meredith Darden
Notary Public, State of Texas



Company: COG Operating, LLC (Concho)
Lease/Well: Crazy Horse Federal/No. 001H
Location: S18 T19s R32e
Rig Name: Patriot #6
State/County: New Mexico/Lea
Latitude: 32.67, Longitude: -103.81
GRID North is 0.28 Degrees East of True North
VS-Azi: 0.00 Degrees

RKB : 17 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...se federal #1h gyro survey.ut

Minimum Curvature Method

Report Date/Time: 12/5/2013 / 13:31

Vaughn Energy Services

Gardendale, TX 79758

(432) 563-5444

Surveyor: Dustin Wedel

Crazy Horse Federal No. 001H / API 30-025-41389

HOBBS OCD

MAR 24 2014

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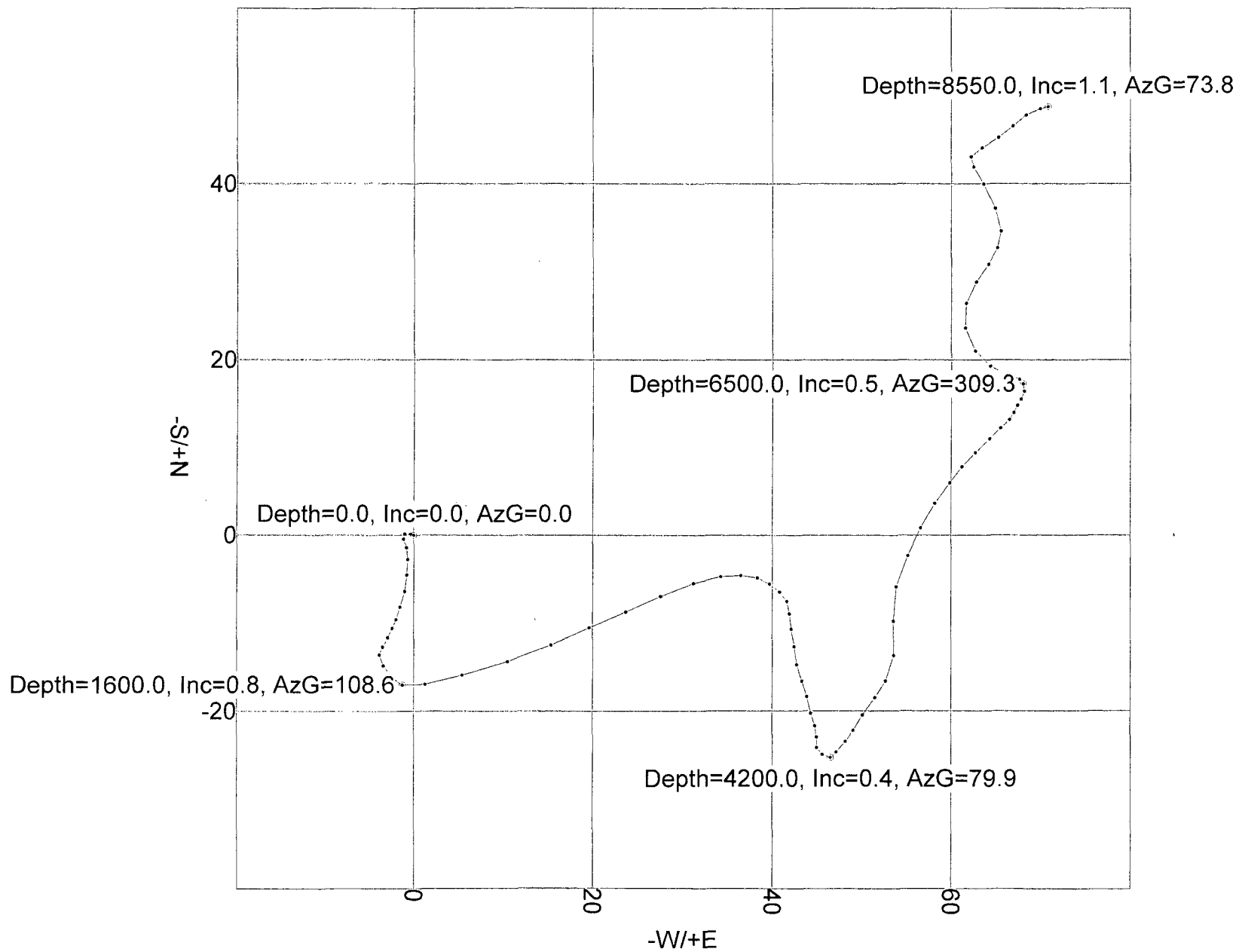
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.44	290.57	100.00	0.14	-0.36	0.39	290.57	0.44
200.00	0.33	241.05	200.00	0.13	-0.98	0.98	277.79	0.34
300.00	0.53	165.58	299.99	-0.45	-1.11	1.20	247.87	0.55
400.00	0.63	161.81	399.99	-1.42	-0.82	1.65	210.03	0.11
500.00	0.94	183.83	499.98	-2.77	-0.71	2.86	194.30	0.42
600.00	1.08	181.26	599.96	-4.52	-0.78	4.59	189.79	0.15
700.00	1.13	191.49	699.95	-6.43	-1.00	6.51	188.82	0.20
800.00	1.02	200.11	799.93	-8.23	-1.50	8.37	190.33	0.19
900.00	0.70	194.77	899.92	-9.66	-1.96	9.85	191.48	0.34
1000.00	0.59	218.69	999.91	-10.65	-2.44	10.92	192.91	0.28
1100.00	0.78	196.87	1099.90	-11.70	-2.96	12.07	194.20	0.32
1200.00	0.65	224.66	1199.90	-12.75	-3.56	13.24	195.59	0.36
1300.00	0.57	174.58	1299.89	-13.66	-3.91	14.21	195.98	0.52
1400.00	0.93	151.20	1399.88	-14.87	-3.47	15.27	193.14	0.47
1500.00	0.97	137.62	1499.87	-16.21	-2.51	16.40	188.79	0.23
1600.00	0.84	108.62	1599.86	-17.07	-1.24	17.11	184.16	0.47
1700.00	2.10	79.76	1699.82	-16.98	1.26	17.02	175.77	1.42
1800.00	2.81	73.14	1799.73	-15.94	5.41	16.83	161.26	0.77
1900.00	3.25	73.08	1899.59	-14.40	10.47	17.81	143.99	0.44

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
2000.00	2.75	64.29	1999.45	-12.53	15.35	19.81	129.24	0.68
2100.00	2.65	66.47	2099.34	-10.57	19.63	22.29	118.30	0.15
2200.00	2.45	65.61	2199.24	-8.77	23.69	25.26	110.31	0.20
2300.00	2.41	64.40	2299.15	-6.98	27.53	28.40	104.22	0.06
2400.00	2.14	71.55	2399.08	-5.48	31.19	31.67	99.96	0.39
2500.00	1.45	81.60	2499.03	-4.70	34.21	34.54	97.83	0.75
2600.00	1.14	93.16	2599.00	-4.57	36.46	36.75	97.15	0.40
2700.00	1.00	104.17	2698.98	-4.84	38.30	38.61	97.20	0.25
2800.00	0.86	133.84	2798.97	-5.58	39.69	40.08	98.00	0.49
2900.00	0.80	123.83	2898.96	-6.49	40.81	41.32	99.03	0.16
3000.00	0.83	160.43	2998.95	-7.55	41.63	42.31	100.28	0.51
3100.00	0.85	175.22	3098.94	-8.97	41.93	42.88	102.07	0.22
3200.00	1.16	171.34	3198.92	-10.71	42.14	43.48	104.26	0.32
3300.00	1.12	171.81	3298.91	-12.69	42.44	44.29	106.64	0.04
3400.00	1.26	171.17	3398.88	-14.75	42.75	45.22	109.03	0.14
3500.00	1.01	152.72	3498.86	-16.62	43.32	46.40	110.99	0.44
3600.00	1.12	170.13	3598.85	-18.37	43.89	47.58	112.71	0.34
3700.00	1.14	163.38	3698.83	-20.29	44.34	48.77	114.58	0.13
3800.00	0.58	161.05	3798.82	-21.72	44.79	49.78	115.87	0.56
3900.00	0.91	180.74	3898.81	-22.99	44.95	50.49	117.09	0.42
4000.00	0.46	173.30	3998.80	-24.19	44.98	51.08	118.27	0.46
4100.00	0.81	125.47	4098.79	-25.00	45.60	52.01	118.73	0.60
4200.00	0.40	79.87	4198.79	-25.35	46.52	52.98	118.59	0.60
4300.00	0.73	28.46	4298.78	-24.73	47.17	53.25	117.67	0.58
4400.00	1.11	45.92	4398.77	-23.49	48.16	53.59	116.00	0.46
4500.00	0.75	21.43	4498.76	-22.21	49.10	53.89	114.34	0.53
4600.00	1.61	35.69	4598.74	-20.47	50.15	54.17	112.20	0.90
4700.00	1.13	33.98	4698.71	-18.51	51.52	54.75	109.76	0.48
4800.00	1.44	30.98	4798.68	-16.62	52.72	55.27	107.50	0.32
4900.00	2.13	7.61	4898.64	-13.70	53.61	55.33	104.34	0.99
5000.00	2.36	353.15	4998.56	-9.82	53.61	54.50	100.38	0.61
5100.00	2.26	15.58	5098.48	-5.87	53.89	54.21	96.22	0.90
5200.00	2.06	23.47	5198.41	-2.32	55.14	55.19	92.41	0.36
5300.00	1.95	25.90	5298.35	0.85	56.60	56.60	89.14	0.14
5400.00	1.71	33.91	5398.30	3.62	58.17	58.28	86.44	0.35
5500.00	1.56	36.59	5498.26	5.95	59.82	60.11	84.32	0.17
5600.00	1.04	36.77	5598.23	7.77	61.17	61.66	82.76	0.52
5700.00	1.46	47.33	5698.21	9.36	62.65	63.35	81.50	0.47
5800.00	1.09	42.30	5798.18	10.93	64.23	65.15	80.34	0.39
5900.00	0.90	48.09	5898.17	12.15	65.45	66.57	79.48	0.22
6000.00	0.69	41.24	5998.16	13.13	66.43	67.71	78.82	0.23

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
6100.00	0.47	15.95	6098.15	13.97	66.93	68.38	78.21	0.33
6200.00	0.55	32.94	6198.15	14.77	67.31	68.91	77.63	0.17
6300.00	0.41	29.65	6298.14	15.48	67.75	69.49	77.13	0.15
6400.00	0.71	16.52	6398.14	16.39	68.10	70.04	76.47	0.33
6500.00	0.46	309.29	6498.14	17.23	67.97	70.12	75.77	0.68
6600.00	0.32	339.42	6598.13	17.75	67.56	69.85	75.28	0.24
6700.00	0.90	282.39	6698.13	18.18	66.69	69.13	74.75	0.78
6800.00	0.50	293.35	6798.12	18.52	65.53	68.09	74.22	0.43
6900.00	1.16	303.98	6898.11	19.26	64.29	67.11	73.33	0.68
7000.00	1.62	326.09	6998.08	20.99	62.67	66.09	71.48	0.70
7100.00	1.67	346.63	7098.04	23.58	61.54	65.91	69.04	0.59
7200.00	1.67	16.23	7198.00	26.40	61.61	67.03	66.80	0.85
7300.00	1.39	35.22	7297.96	28.80	62.72	69.02	65.34	0.57
7400.00	1.39	33.88	7397.93	30.80	64.10	71.12	64.34	0.03
7500.00	1.08	21.95	7497.91	32.68	65.13	72.87	63.35	0.40
7600.00	1.19	1.00	7597.89	34.60	65.50	74.08	62.16	0.43
7700.00	1.94	337.31	7697.85	37.20	64.87	74.78	60.17	0.98
7800.00	1.59	331.54	7797.81	39.98	63.55	75.08	57.83	0.40
7900.00	0.97	326.23	7897.78	41.90	62.43	75.18	56.13	0.63
8000.00	0.60	27.42	7997.77	43.07	62.20	75.65	55.30	0.86
8100.00	1.30	61.09	8097.76	44.08	63.43	77.24	55.20	0.87
8200.00	1.17	52.09	8197.74	45.26	65.23	79.39	55.25	0.23
8300.00	1.22	50.44	8297.72	46.56	66.85	81.47	55.15	0.06
8400.00	1.01	49.61	8397.70	47.81	68.34	83.40	55.03	0.20
8500.00	1.04	80.68	8497.68	48.53	69.91	85.10	55.23	0.55
8550.00	1.06	73.82	8547.67	48.73	70.80	85.95	55.46	0.26



Vaughn Energy Services
Gardendale, TX 79758
(432) 563-5444
Surveyor: Dustin Wedel
Crazy Horse Federal No. 001H / API 30-025-41389



VES Survey Date: 11/23/2013



COG Crazy Horse Federal 1H Gyro + MWD 0ft to 13695ft MD Survey
Geodetic Report
 (Non-Def Survey)



Report Date: November 30, 2013 - 04:23 PM
 Client: COG
 Field: NM Lea County (NAD 27)
 Structure / Slot: COG Crazy Horse Federal #1H / COG Crazy Horse Federal #1H
 Well: Crazy Horse Federal #1H
 Borehole: Original Borehole
 UWI / API#: Unknown / Unknown
 Survey Name: COG Crazy Horse Federal 1H Gyro + MWD 0ft to 13695ft MD
 Survey Date: November 24, 2013
 Tort / AHD / DDI / ERD Ratio: 192.587 ° / 4914.581 ft / 6.148 / 0.533
 Coordinate Reference System: NAD27 New Mexico State Plane, Eastern Zone, US Feet
 Location Lat / Long: N 32° 40' 0.29373", W 103° 48' 47.29129"
 Location Grid N/E Y/X: N 606666.400 ftUS, E 660081.400 ftUS
 CRS Grid Convergence Angle: 0.2808 °
 Grid Scale Factor: 0.99993844

Survey / DLS Computation: Minimum Curvature / Lubinski
 Vertical Section Azimuth: 90.474 ° (Grid North)
 Vertical Section Origin: 0.000 ft, 0.000 ft
 TVD Reference Datum: RKB
 TVD Reference Elevation: 3622.100 ft above
 Seabed / Ground Elevation: 3604.100 ft above
 Magnetic Declination: 7.546 °
 Total Gravity Field Strength: 998.5045mgn (9.80665 Based)
 Total Magnetic Field Strength: 48593.841 nT
 Magnetic Dip Angle: 60.484 °
 Declination Date: November 24, 2013
 Magnetic Declination Model: BGGM 2013
 North Reference: Grid North
 Grid Convergence Used: 0.2808 °
 Total Corr Mag North->Grid North: 7.2654 °
 Local Coord Referenced To: Structure Reference Point

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MAR 24 2014
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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	TF (°)
SHL	0.00	0.00	0.00	0.00	-3622.10	0.00	0.00	0.00	0.00	0.00	N/A	606666.40	660081.40	N 32 40 0.29	W 103 48 47.29	290.57M
	100.00	0.44	290.57	100.00	-3522.10	-0.36	0.13	-0.36	0.38	290.57	0.44	606666.53	660081.04	N 32 40 0.30	W 103 48 47.30	241.05M
	200.00	0.33	241.05	200.00	-3422.10	-0.97	0.13	-0.97	0.98	277.65	0.34	606666.53	660080.43	N 32 40 0.30	W 103 48 47.30	165.58M
	300.00	0.53	165.58	299.99	-3322.11	-1.10	-0.46	-1.11	1.20	247.59	0.55	606665.94	660080.29	N 32 40 0.29	W 103 48 47.30	161.81M
	400.00	0.63	161.81	399.99	-3222.11	-0.81	-1.43	-0.82	1.65	209.91	0.11	606664.97	660080.58	N 32 40 0.28	W 103 48 47.30	183.83M
	500.00	0.94	183.83	499.98	-3122.12	-0.68	-2.77	-0.70	2.86	194.27	0.43	606663.63	660080.70	N 32 40 0.27	W 103 48 47.30	181.26M
	600.00	1.08	181.26	599.96	-3022.14	-0.74	-4.53	-0.78	4.60	189.77	0.15	606661.87	660080.62	N 32 40 0.25	W 103 48 47.30	191.49M
	700.00	1.13	191.49	699.95	-2922.15	-0.94	-6.44	-1.00	6.51	188.80	0.20	606659.96	660080.40	N 32 40 0.23	W 103 48 47.30	200.11M
	800.00	1.02	200.11	799.93	-2822.17	-1.43	-8.24	-1.50	8.37	190.31	0.20	606658.16	660079.90	N 32 40 0.21	W 103 48 47.31	194.77M
	900.00	0.70	194.77	899.92	-2722.18	-1.88	-9.67	-1.96	9.86	191.47	0.33	606656.74	660079.44	N 32 40 0.20	W 103 48 47.31	218.69M
	1000.00	0.59	218.69	999.91	-2622.19	-2.35	-10.66	-2.44	10.93	192.89	0.29	606655.74	660078.96	N 32 40 0.19	W 103 48 47.32	196.87M
	1100.00	0.78	196.87	1099.90	-2522.20	-2.86	-11.71	-2.96	12.08	194.17	0.32	606654.69	660078.44	N 32 40 0.18	W 103 48 47.33	224.66M
	1200.00	0.65	224.66	1199.90	-2422.20	-3.45	-12.77	-3.55	13.25	195.56	0.37	606653.63	660077.85	N 32 40 0.17	W 103 48 47.33	174.58M
	1300.00	0.57	174.58	1299.89	-2322.21	-3.79	-13.66	-3.91	14.21	195.95	0.52	606652.74	660077.49	N 32 40 0.16	W 103 48 47.34	151.2M
	1400.00	0.93	151.20	1399.88	-2222.22	-3.34	-14.87	-3.47	15.27	193.13	0.47	606651.53	660077.93	N 32 40 0.15	W 103 48 47.33	137.62M
	1500.00	0.97	137.62	1499.87	-2122.23	-2.37	-16.21	-2.51	16.40	188.79	0.23	606650.19	660078.89	N 32 40 0.13	W 103 48 47.32	108.62M
	1600.00	0.84	108.62	1599.86	-2022.24	-1.10	-17.07	-1.24	17.11	184.16	0.47	606649.33	660080.16	N 32 40 0.12	W 103 48 47.31	79.76M
	1700.00	2.10	79.76	1699.82	-1922.28	1.40	-16.98	1.26	17.02	175.77	1.42	606649.43	660082.66	N 32 40 0.13	W 103 48 47.28	73.14M
	1800.00	2.81	73.14	1799.73	-1822.37	5.54	-15.94	5.41	16.83	161.27	0.76	606650.46	660086.81	N 32 40 0.14	W 103 48 47.23	73.08M
	1900.00	3.25	73.08	1899.59	-1722.51	10.58	-14.40	10.46	17.80	144.00	0.44	606652.00	660091.86	N 32 40 0.15	W 103 48 47.17	64.29M
	2000.00	2.75	64.29	1999.45	-1622.65	15.44	-12.54	15.34	19.81	129.26	0.68	606653.86	660096.74	N 32 40 0.17	W 103 48 47.11	66.47M
	2100.00	2.65	66.47	2099.34	-1522.76	19.70	-10.57	19.62	22.29	118.32	0.14	606655.83	660101.02	N 32 40 0.19	W 103 48 47.06	65.81M
	2200.00	2.45	65.81	2199.24	-1422.86	23.76	-8.77	23.68	25.25	110.31	0.20	606657.63	660105.08	N 32 40 0.21	W 103 48 47.01	64.4M
	2300.00	2.41	64.40	2299.15	-1322.95	27.58	-6.98	27.53	28.40	104.22	0.07	606659.42	660108.92	N 32 40 0.22	W 103 48 46.97	71.55M
	2400.00	2.14	71.55	2399.08	-1223.02	31.24	-5.48	31.19	31.67	99.96	0.39	606660.92	660112.59	N 32 40 0.24	W 103 48 46.93	81.6M
	2500.00	1.45	81.60	2499.03	-1123.07	34.25	-4.70	34.22	34.54	97.82	0.76	606661.70	660115.61	N 32 40 0.25	W 103 48 46.89	93.16M
	2600.00	1.14	93.16	2599.00	-1023.10	36.50	-4.57	36.46	36.75	97.15	0.40	606661.83	660117.86	N 32 40 0.25	W 103 48 46.87	104.17M
	2700.00	1.00	104.17	2698.98	-923.12	38.34	-4.84	38.30	38.61	97.20	0.25	606661.56	660119.70	N 32 40 0.24	W 103 48 46.84	133.84M
	2800.00	0.86	133.84	2798.97	-823.13	39.73	-5.57	39.69	40.08	97.99	0.50	606660.83	660121.09	N 32 40 0.24	W 103 48 46.83	123.83M
	2900.00	0.80	123.83	2898.96	-723.14	40.86	-6.48	40.81	41.32	99.03	0.16	606659.92	660122.21	N 32 40 0.23	W 103 48 46.81	160.43M
	3000.00	0.83	160.43	2998.95	-623.15	41.69	-7.55	41.63	42.31	100.28	0.51	606658.85	660123.03	N 32 40 0.22	W 103 48 46.80	175.22M
	3100.00	0.85	175.22	3098.94	-523.16	42.01	-8.97	41.94	42.89	102.08	0.22	606657.43	660123.33	N 32 40 0.20	W 103 48 46.80	171.34M
	3200.00	1.16	171.34	3198.93	-423.17	42.24	-10.71	42.15	43.49	104.26	0.32	606655.69	660123.55	N 32 40 0.19	W 103 48 46.80	171.81M
	3300.00	1.12	171.81	3298.91	-323.19	42.55	-12.68	42.44	44.40	106.64	0.04	606653.72	660123.84	N 32 40 0.17	W 103 48 46.80	171.17M
	3400.00	1.26	171.17	3398.88	-223.22	42.87	-14.74	42.75	45.22	109.02	0.14	606651.66	660124.15	N 32 40 0.15	W 103 48 46.79	152.72M
	3500.00	1.01	152.72	3498.86	-123.24	43.46	-16.61	43.32	46.40	110.97	0.44	606649.79	660124.72	N 32 40 0.13	W 103 48 46.79	170.13M
	3600.00	1.12	170.13	3598.85	-23.25	44.04	-18.35	43.89	47.58	112.69	0.34	606648.05	660125.29	N 32 40 0.11	W 103 48 46.78	163.38M
	3700.00	1.14	163.38	3698.83	76.73	44.51	-20.27	44.35	48.76	114.56	0.13	606646.13	660125.74	N 32 40 0.09	W 103 48 46.77	161.05M
	3800.00	0.58	161.05	3798.82	176.72	44.97	-21.70	44.80	49.77	115.85	0.56	606644.70	660126.19	N 32 40 0.08	W 103 48 46.77	180.74M
	3900.00	0.91	180.74	3898.81	276.71	45.14	-22.97	44.95	50.48	117.07	0.41	606643.43	660126.35	N 32 40 0.06	W 103 48 46.77	173.3M
	4000.00	0.46	173.30	3998.80	376.70	45.18	-24.17	44.99	51.07	118.24	0.46	606642.24	660126.38	N 32 40 0.05	W 103 48 46.77	125.47M
	4100.00	0.81	125.47	4098.79	476.69	45.81	-24.97	45.61	52.00	118.70	0.61	606641.43	660127.01	N 32 40 0.04	W 103 48 46.76	79.87M
	4200.00	0.40	79.87	4198.79	576.69	46.74	-25.32	46.53	52.97	118.56	0.60	606641.08	660127.92	N 32 40 0.04	W 103 48 46.75	28.46M
	4300.00	0.73	28.46	4298.78	676.68	47.38	-24.70	47.17	53.25	117.64	0.57	606641.70	660128.57	N 32 40 0.05	W 103 48 46.74	45.92M

Comments
MD
Incl
Azim Grid
TVD
TVDS
VSEC
NS
EW
Closure
Closure
Azimuth
DLS
Northing
Easting
Latitude
Longitude
TF

4400.00	1.11	45.92	4398.77	776.67	48.37	-23.47	48.17	53.59	115.97	0.47	660129.57	N	32	40	0.06	W	103	48	46.73	21.43M
4500.00	0.75	21.43	4498.76	876.66	49.29	-22.19	49.11	53.89	114.31	0.53	606444.22	N	32	40	0.07	W	103	48	46.72	35.69M
4600.00	1.61	35.69	4598.74	976.64	50.34	-20.43	50.17	54.17	112.16	0.90	606445.97	N	32	40	0.09	W	103	48	46.71	33.98M
4700.00	1.13	33.98	4698.71	1076.61	51.69	-18.48	51.54	54.75	109.72	0.48	606447.92	N	32	40	0.11	W	103	48	46.69	30.88M
4800.00	2.13	30.88	4798.68	1276.58	52.87	-16.58	52.74	55.34	104.29	0.99	606449.82	N	32	40	0.13	W	103	48	46.66	7.81M
4900.00	2.36	25.33	4898.56	1376.46	53.71	-13.66	53.63	54.51	100.33	0.61	606455.62	N	32	40	0.19	W	103	48	46.66	15.58M
5000.00	2.06	23.47	4998.48	1476.38	53.66	-5.83	53.91	54.23	96.17	0.90	606660.57	N	32	40	0.23	W	103	48	46.66	23.47M
5100.00	1.58	15.76	5098.48	1576.31	55.16	-2.28	55.16	55.21	92.37	0.36	606664.12	N	32	40	0.27	W	103	48	46.65	25.9M
5200.00	1.95	25.90	5298.35	1676.25	56.61	0.89	56.62	56.63	89.09	0.14	606667.29	N	32	40	0.30	W	103	48	46.63	33.91M
5300.00	1.71	33.91	5398.30	1776.20	58.16	3.66	58.19	58.31	86.40	0.35	606670.06	N	32	40	0.33	W	103	48	46.61	36.59M
5400.00	1.54	36.59	5498.26	1876.16	59.79	5.88	59.84	60.14	84.28	0.17	606672.39	N	32	40	0.35	W	103	48	46.59	36.77M
5500.00	1.04	36.77	5598.23	1976.13	61.13	7.81	61.19	61.69	82.72	0.52	606674.21	N	32	40	0.37	W	103	48	46.58	47.33M
5600.00	1.46	47.33	5698.21	2076.11	62.59	9.41	62.67	63.37	81.47	0.48	606675.80	N	32	40	0.38	W	103	48	46.56	42.3M
5700.00	1.09	42.30	5798.18	2176.08	64.16	10.97	64.25	65.18	80.31	0.39	606677.37	N	32	40	0.40	W	103	48	46.54	48.09M
5800.00	0.90	48.09	5898.17	2276.07	65.37	12.20	65.47	66.60	79.44	0.21	606678.60	N	32	40	0.41	W	103	48	46.52	41.24M
5900.00	0.69	41.24	5998.16	2376.06	66.34	13.18	66.46	67.75	78.78	0.23	606679.58	N	32	40	0.42	W	103	48	46.51	15.95M
6000.00	0.69	41.24	6098.15	2476.05	66.85	14.02	66.96	68.42	78.17	0.33	606680.42	N	32	40	0.44	W	103	48	46.51	32.94M
6100.00	0.55	32.94	6198.15	2576.05	67.21	14.82	67.34	68.95	77.59	0.17	606681.22	N	32	40	0.44	W	103	48	46.50	29.65M
6200.00	0.41	29.65	6298.14	2676.04	67.65	15.54	67.78	69.53	77.09	0.14	606681.93	N	32	40	0.44	W	103	48	46.50	16.52M
6300.00	0.71	16.52	6398.14	2776.04	67.99	16.44	68.13	70.16	75.73	0.32	606682.84	N	32	40	0.45	W	103	48	46.49	309.29M
6400.00	0.46	309.29	6498.13	2876.03	67.85	17.29	68.00	70.16	75.73	0.68	606683.69	N	32	40	0.46	W	103	48	46.49	339.42M
6500.00	0.32	339.42	6598.13	2976.03	67.44	17.80	67.59	69.89	75.24	0.24	606684.20	N	32	40	0.47	W	103	48	46.50	282.39M
6600.00	0.90	282.39	6698.13	3076.02	68.57	18.28	68.72	69.17	74.71	0.77	606684.63	N	32	40	0.47	W	103	48	46.51	293.35M
6700.00	0.50	282.35	6798.12	3176.02	69.40	18.58	69.55	69.13	74.18	0.42	606684.95	N	32	40	0.47	W	103	48	46.52	303.98M
6800.00	0.50	293.35	6898.11	3276.01	64.15	19.31	64.31	67.15	73.28	0.67	606685.71	N	32	40	0.48	W	103	48	46.54	326.09M
6900.00	1.16	303.98	6898.11	3376.01	64.15	19.31	64.31	67.15	73.28	0.67	606685.71	N	32	40	0.48	W	103	48	46.54	326.09M
7000.00	1.62	326.09	6998.08	3475.98	62.51	21.05	62.69	66.13	71.44	0.70	606687.45	N	32	40	0.50	W	103	48	46.56	346.63M
7100.00	1.67	346.63	7098.04	3575.94	61.36	23.64	61.56	66.94	68.99	0.59	606690.04	N	32	40	0.52	W	103	48	46.57	16.23M
7200.00	1.67	346.63	7198.00	3675.90	61.41	26.48	61.63	67.07	69.05	0.85	606692.86	N	32	40	0.55	W	103	48	46.57	35.22M
7300.00	1.39	35.22	7297.96	3775.86	62.50	28.85	62.74	69.05	69.30	0.58	606695.25	N	32	40	0.58	W	103	48	46.56	33.88M
7400.00	1.39	33.88	7397.93	3875.83	63.86	30.85	64.11	71.15	64.30	0.03	606697.25	N	32	40	0.60	W	103	48	46.54	21.95M
7500.00	1.08	21.95	7497.91	3975.81	64.87	32.73	65.14	72.90	63.32	0.40	606699.13	N	32	40	0.61	W	103	48	46.53	337.31M
7600.00	1.19	337.31	7597.89	4075.75	65.22	34.64	65.51	74.11	62.13	0.43	606701.04	N	32	40	0.63	W	103	48	46.52	337.31M
7700.00	1.94	337.31	7697.85	4175.71	64.57	37.24	64.88	74.81	60.14	0.98	606703.64	N	32	40	0.66	W	103	48	46.53	331.54M
7800.00	0.97	331.54	7797.81	4275.68	63.23	40.02	63.56	75.21	57.80	0.39	606706.42	N	32	40	0.69	W	103	48	46.55	326.23M
7900.00	0.97	326.23	7897.78	4375.67	61.84	43.12	62.20	75.68	55.27	0.86	606709.51	N	32	40	0.72	W	103	48	46.56	61.09M
8000.00	0.60	27.42	7997.77	4475.65	61.84	43.12	62.20	75.68	55.27	0.86	606709.51	N	32	40	0.72	W	103	48	46.56	61.09M
8100.00	1.30	61.09	8097.76	4575.66	63.07	44.13	63.44	77.27	55.18	0.87	606710.53	N	32	40	0.73	W	103	48	46.55	52.09M
8200.00	1.17	52.09	8197.74	4675.64	64.86	45.30	65.23	79.42	55.22	0.23	606711.70	N	32	40	0.74	W	103	48	46.53	50.44M
8300.00	1.22	50.44	8297.72	4775.62	66.47	46.61	66.86	81.50	55.12	0.06	606713.01	N	32	40	0.75	W	103	48	46.51	49.61M
8400.00	1.01	49.61	8397.70	4875.60	67.95	47.86	68.35	83.44	55.00	0.21	606714.26	N	32	40	0.76	W	103	48	46.49	80.68M
8500.00	1.04	80.68	8497.68	4975.58	69.51	48.58	69.92	85.14	55.21	0.55	606714.97	N	32	40	0.77	W	103	48	46.47	73.22M
8600.00	1.06	73.82	8547.67	5075.57	70.41	49.78	70.81	85.99	55.44	0.25	606715.18	N	32	40	0.77	W	103	48	46.46	73.22M
8700.00	1.41	73.82	8647.65	5175.55	72.60	49.48	73.01	88.20	55.87	0.33	606715.86	N	32	40	0.78	W	103	48	46.43	74.91M
8800.00	1.58	73.81	8747.64	5275.54	73.99	49.72	73.81	90.45	56.50	0.61	606716.32	N	32	40	0.78	W	103	48	46.41	85.72M
8900.00	4.48	85.72	8847.59	5375.52	75.01	49.92	75.43	90.45	56.50	0.49	606716.32	N	32	40	0.78	W	103	48	46.41	89.68M
9000.00	4.58	85.72	8947.58	5475.51	77.8	50.03	79.19	93.67	57.72	14.38	606716.43	N	32	40	0.78	W	103	48	46.36	14.42M
9100.00	14.25	95.04	9047.53	5575.50	82.23	49.80	85.64	99.02	59.87	16.55	606716.10	N	32	40	0.78	W	103	48	46.29	7.11M
9200.00	18.38	96.67	9147.43	5675.49	93.89	48.70	94.30	106.18	62.64	13.40	606716.19	N	32	40	0.77	W	103	48	46.19	1.18M
9300.00	21.19	96.51	9247.44	5775.48	104.66	47.55	105.06	115.32	65.65	8.78	606713.95	N	32	40	0.76	W	103	48	46.06	9.62M
9400.00	24.53	97.87	9347.43	5875.47	117.00	45.99	117.39	126.08	68.61	10.57	606712.39	N	32	40	0.74	W	103	48	45.92	16.63M
9500.00	28.84	100.22	9447.42	5975.46	131.76	43.74	131.12	138.22	71.55	14.42	606710.14	N	32	40	0.72	W	103	48	45.76	10.29M
9600.00	36.59	102.87	9547.41	6075.45	146.89	40.39	147.23	152.67	74.66	13.72	606706.78	N	32	40	0.69	W	103	48	45.77	1.07M
9700.00	39.66	103.94	9647.40	6175.44	164.69	36.14	165.00	168.91	77.64	11.16	606702.54	N	32	40	0.64	W	103	48	45.36	3.01M
9800.00	43.18	104.30	9747.39	6275.43	183.30	31.52	183.56	186.25	80.26	9.94	606697.92	N	32	40	0.60	W	103	48	44.14	6.17M
9900.00	58.48	105.40	9847.38	6375.42	203.49	26.34	204.09	205.78	82.65	11.01	606692.74	N	32	40	0.54	W	103	48	44.90	90M
10000.00	58.74	105.94	9947.37	6475.41	225.90	20.85	226.08	227.04	84.73	12.13	606687.25	N	32	40	0.49	W	103	48	44.65	4.79M
10100.00	51.53	103.73	10047.36	6575.40	248.79	15.38	248.92	249.40	86.47	14.53	606681.77	N	32	40	0.43	W	103	48	44.38	6.21M
10200.00	55.05	103.71	10147.34	6675.39	268.31	10.70	268.41	269.53	89.16	14.16	606677.10	N	32	40	0.39	W	103	48	44.15	15.19M
10300.00	58.48	104.80	10247.33	6775.38	293.53	8.91	293.66	294.43	91.66	11.45	606670.71	N	32	40	0.32	W	103	48	43.86	75.34M
10400.00	58.74	105.94	10347.32	6875.37	3															

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	TF (°)
	9409.00	77.21	108.43	9185.03	5562.93	508.75	-66.48	508.21	512.54	97.45	13.75	606599.92	660589.58	N 32 39 59.61	W 103 48 41.35	5.85L
	9441.00	81.95	107.94	9190.82	5568.72	538.72	-76.30	538.11	543.49	98.07	14.89	606590.11	660619.47	N 32 39 59.51	W 103 48 41.00	21L
	9472.00	86.35	106.25	9193.98	5571.88	568.26	-85.36	567.57	573.96	98.55	15.19	606581.05	660648.94	N 32 39 59.42	W 103 48 40.66	34.15L
	9504.00	90.04	103.75	9194.98	5572.88	599.21	-93.63	598.46	605.74	98.89	13.93	606572.77	660679.82	N 32 39 59.34	W 103 48 40.30	58.52L
	9536.00	92.15	100.30	9194.37	5572.27	630.55	-100.30	629.75	637.68	99.05	12.64	606566.11	660711.11	N 32 39 59.27	W 103 48 39.93	96.5L
	9567.00	91.80	97.25	9193.30	5571.20	661.21	-105.02	660.36	668.66	99.04	9.90	606561.38	660741.72	N 32 39 59.22	W 103 48 39.57	90L
	9599.00	91.80	94.79	9192.30	5570.20	693.04	-108.38	692.17	700.60	98.90	7.68	606558.03	660773.52	N 32 39 59.19	W 103 48 39.20	108.96L
	9631.00	90.84	92.00	9191.56	5569.46	724.99	-110.27	724.10	732.45	98.66	9.22	606556.13	660805.45	N 32 39 59.17	W 103 48 38.83	75.87L
	9726.00	91.28	90.25	9189.80	5567.70	819.96	-112.14	819.06	826.70	97.80	1.90	606554.27	660900.41	N 32 39 59.14	W 103 48 37.72	140.3R
	9821.00	90.75	90.69	9188.12	5566.02	914.94	-112.92	914.04	920.99	97.04	0.73	606553.49	660995.38	N 32 39 59.13	W 103 48 36.61	150.95R
	9916.00	90.48	90.84	9187.10	5565.00	1009.94	-114.19	1009.03	1015.47	96.46	0.33	606552.22	661090.36	N 32 39 59.11	W 103 48 35.49	83.65L
	10011.00	90.66	89.22	9186.15	5564.05	1104.93	-114.24	1104.02	1109.91	95.91	1.72	606552.17	661185.35	N 32 39 59.11	W 103 48 34.38	157.36L
	10105.00	88.55	88.34	9186.80	5564.70	1198.88	-112.23	1197.99	1203.24	95.35	2.43	606554.17	661279.31	N 32 39 59.12	W 103 48 33.28	10.01R
	10200.00	88.72	88.37	9189.07	5566.97	1293.79	-109.51	1292.92	1297.55	94.84	0.18	606556.90	661374.24	N 32 39 59.15	W 103 48 32.17	136.75L
	10295.00	88.55	88.21	9191.33	5569.23	1388.69	-106.67	1387.85	1391.95	94.40	0.25	606559.73	661469.17	N 32 39 59.17	W 103 48 31.06	132R
	10390.00	88.46	88.31	9193.81	5571.71	1483.59	-103.79	1482.78	1486.41	94.00	0.14	606562.62	661564.08	N 32 39 59.19	W 103 48 29.95	65.86R
	10485.00	88.72	88.89	9196.15	5574.05	1578.51	-101.47	1577.72	1580.98	93.68	0.67	606564.94	661659.02	N 32 39 59.21	W 103 48 28.84	53.13R
	10580.00	88.81	89.01	9198.19	5576.09	1673.45	-99.73	1672.68	1675.65	93.41	0.16	606566.68	661753.98	N 32 39 59.23	W 103 48 27.73	59.03R
	10675.00	88.99	89.31	9200.02	5577.92	1768.41	-98.34	1767.65	1770.39	93.18	0.37	606568.07	661848.94	N 32 39 59.23	W 103 48 26.62	31.61L
	10770.00	89.25	89.15	9201.48	5579.38	1863.37	-97.06	1862.63	1865.16	92.98	0.32	606569.35	661943.92	N 32 39 59.24	W 103 48 25.51	90L
	10865.00	89.25	88.99	9202.72	5580.62	1958.34	-95.52	1957.61	1959.94	92.79	0.17	606570.89	662038.89	N 32 39 59.25	W 103 48 24.40	11.31L
	10960.00	89.60	88.92	9203.67	5581.57	2053.30	-93.79	2052.59	2054.73	92.62	0.38	606572.62	662133.86	N 32 39 59.27	W 103 48 23.29	31.12L
	11055.00	90.13	88.60	9203.90	5581.80	2148.26	-91.73	2147.57	2149.53	92.45	0.65	606574.68	662228.83	N 32 39 59.28	W 103 48 22.18	4.61L
	11150.00	90.75	88.55	9203.17	5581.07	2243.20	-89.37	2242.54	2244.32	92.28	0.65	606577.04	662323.79	N 32 39 59.30	W 103 48 21.06	7.92L
	11245.00	91.54	88.44	9201.27	5579.17	2338.12	-86.87	2337.48	2339.10	92.13	0.84	606579.53	662418.74	N 32 39 59.32	W 103 48 19.95	168.48R
	11340.00	89.43	88.87	9200.46	5578.36	2433.07	-84.64	2432.45	2433.92	91.99	2.27	606581.76	662513.70	N 32 39 59.34	W 103 48 18.84	160.37R
	11435.00	89.72	89.72	9203.38	5581.28	2527.99	-83.47	2527.39	2528.77	91.89	2.66	606582.93	662608.63	N 32 39 59.34	W 103 48 17.73	177.55R
	11530.00	86.35	89.75	9208.85	5586.75	2622.83	-83.04	2622.23	2623.55	91.81	0.74	606583.37	662703.46	N 32 39 59.34	W 103 48 16.62	51.07R
	11625.00	87.23	90.84	9214.17	5592.07	2717.68	-83.53	2717.08	2718.36	91.76	1.47	606582.88	662798.31	N 32 39 59.33	W 103 48 15.51	178.92L
	11751.00	86.70	90.83	9220.84	5598.74	2843.50	-85.36	2842.89	2844.17	91.72	0.42	606581.05	662924.11	N 32 39 59.31	W 103 48 14.04	22.45R
	11846.00	90.31	92.32	9223.32	5601.22	2938.43	-87.97	2937.80	2939.12	91.72	4.11	606578.44	663019.01	N 32 39 59.28	W 103 48 12.93	51.83R
	11941.00	91.19	93.44	9222.08	5599.98	3033.33	-92.74	3032.67	3034.09	91.75	1.50	606573.66	663113.88	N 32 39 59.23	W 103 48 11.82	74.43L
	12036.00	91.71	91.57	9219.67	5597.57	3128.24	-96.89	3127.54	3129.05	91.77	2.04	606569.51	663208.75	N 32 39 59.18	W 103 48 10.71	159.88L
	12163.00	89.69	90.83	9218.12	5596.02	3255.21	-99.55	3254.50	3256.02	91.75	1.69	606566.85	663335.69	N 32 39 59.15	W 103 48 9.23	0.36R
	12289.00	91.28	90.84	9217.05	5594.95	3381.20	-101.39	3380.48	3382.00	91.72	1.26	606565.02	663461.66	N 32 39 59.12	W 103 48 7.75	163.9L
	12384.00	90.31	90.56	9215.74	5593.64	3476.19	-102.55	3475.46	3476.97	91.69	1.06	606563.86	663556.64	N 32 39 59.11	W 103 48 6.64	3.56L
	12479.00	92.24	90.44	9213.62	5591.52	3571.16	-103.38	3570.43	3571.93	91.66	2.04	606563.03	663651.60	N 32 39 59.10	W 103 48 5.53	172.6L
	12606.00	89.08	90.03	9212.16	5590.06	3698.14	-103.90	3697.40	3698.86	91.61	2.51	606562.51	663778.57	N 32 39 59.08	W 103 48 4.05	58.45R
	12669.00	89.43	90.60	9212.98	5590.88	3761.13	-104.24	3760.40	3761.84	91.59	1.06	606562.16	663841.56	N 32 39 59.08	W 103 48 3.31	169.49R
	12764.00	88.46	90.78	9214.73	5592.63	3856.11	-105.39	3855.37	3856.81	91.57	1.04	606561.02	663936.53	N 32 39 59.06	W 103 48 2.20	30.65R
	12859.00	90.57	92.03	9215.53	5593.43	3951.09	-107.72	3950.33	3951.80	91.56	2.58	606558.69	664031.48	N 32 39 59.03	W 103 48 1.09	155.92R
	12954.00	89.16	92.66	9215.76	5593.66	4046.04	-111.60	4045.25	4046.79	91.58	1.63	606554.80	664126.39	N 32 39 58.99	W 103 47 59.98	0.5L
	13049.00	90.31	92.65	9216.19	5594.09	4140.96	-116.00	4140.15	4141.77	91.60	1.21	606550.40	664221.28	N 32 39 58.94	W 103 47 58.87	173.13R
	13176.00	88.90	92.82	9217.07	5594.97	4267.86	-122.06	4266.99	4268.74	91.64	1.12	606544.34	664348.12	N 32 39 58.88	W 103 47 57.39	16.8R
	13271.00	89.43	92.98	9218.45	5596.35	4362.76	-126.87	4361.86	4363.71	91.67	0.58	606539.54	664442.99	N 32 39 58.82	W 103 47 56.28	38.38R
	13366.00	90.92	94.16	9218.16	5596.06	4457.62	-132.79	4456.67	4458.65	91.71	2.00	606533.62	664537.79	N 32 39 58.76	W 103 47 55.17	148.81R
	13460.00	89.78	94.85	9217.59	5595.49	4551.38	-140.17	4550.38	4552.54	91.76	1.42	606526.24	664631.49	N 32 39 58.68	W 103 47 54.07	115.13R
	13623.00	89.25	95.98	9218.97	5596.87	4713.77	-155.55	4712.64	4715.21	91.89	0.77	606510.86	664793.74	N 32 39 58.52	W 103 47 52.18	HS
	13695.00	89.25	95.98	9219.91	5597.81	4785.43	-163.05	4784.24	4787.02	91.95	0.00	606503.36	664865.34	N 32 39 58.44	W 103 47 51.34	

Survey Type: Non-Def Survey

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

Description	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	0.000	18.000				SLB_NSG+MSHOT-Depth Only	Original Borehole / COG Crazy Hose Federal 1H Gyro + MWD 0ft to 13695ft MD
	18.000	8550.000				SLB_NSG+MSHOT	Original Borehole / COG Crazy Hose Federal 1H Gyro + MWD
	8550.000	13623.000				SLB_MWD-STD	Original Borehole / COG Crazy Hose Federal 1H Gyro + MWD
	13623.000	13695.000				SLB_BLIND+TREND	Original Borehole / COG Crazy Hose Federal 1H Gyro + MWD



Patriot 6

COG

FINAL Pva



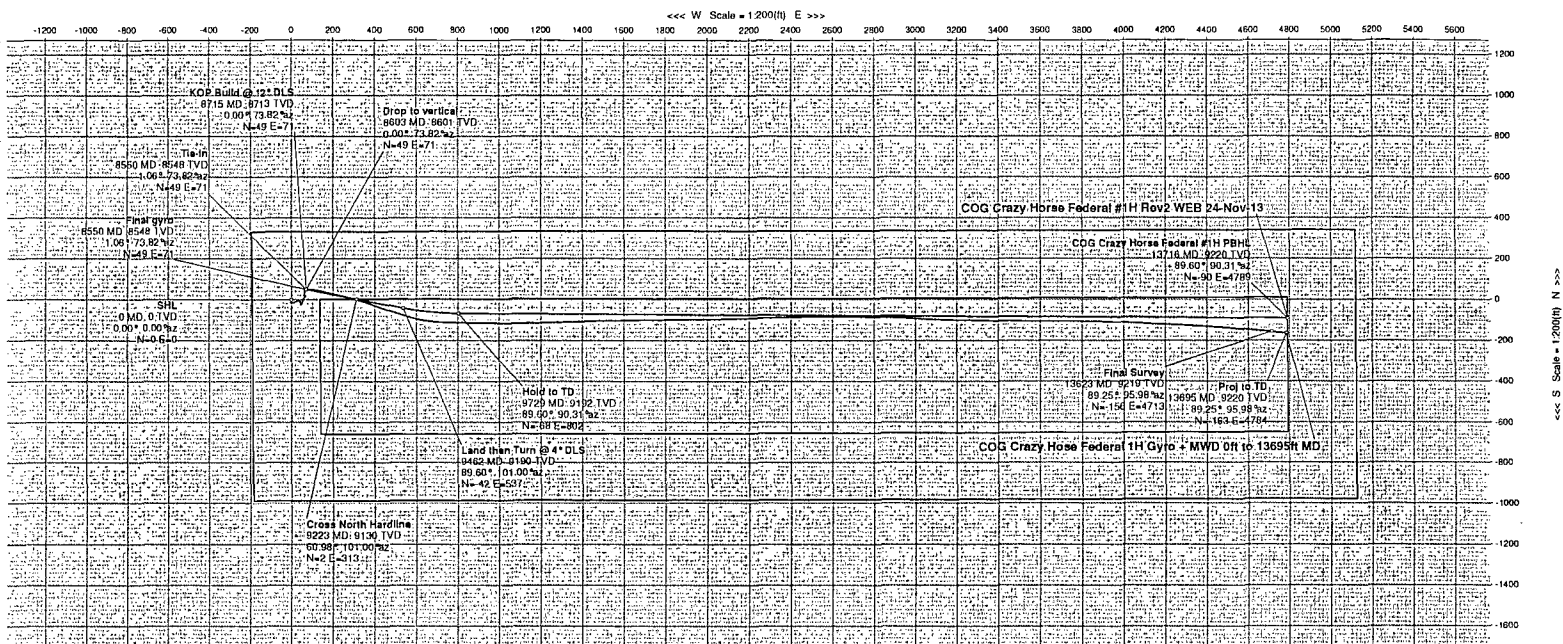
WELL			FIELD			STRUCTURE		
Crazy Horse Federal #1H			Lea County, NM (NAD 27)			Patriot 6		
Magnetic Parameters	Mag Dec:	60.484°	Date:	November 24, 2013	Surface Location	NAD27 New Mexico State Plane, Eastern Zone, 11° East	Miscellaneous	
Model:	BGM 2011	Mag Inc:	7.546°	PN:	48191.807	Lat: N 32.48 0.294 Long: W 103.48 41.291	Site: Crazy Horse Federal #1H Plan: Rev 2 WEB 24-Nov-13	TVD Ref: RKB13622 (ft above J) Strip Date: November 24, 2013
					Northings	666666.40 8115	Grid Conv: 0.281°	
					Eastings	666081.40 8115	Scale Fact: 0.9999844	

Legend

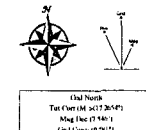
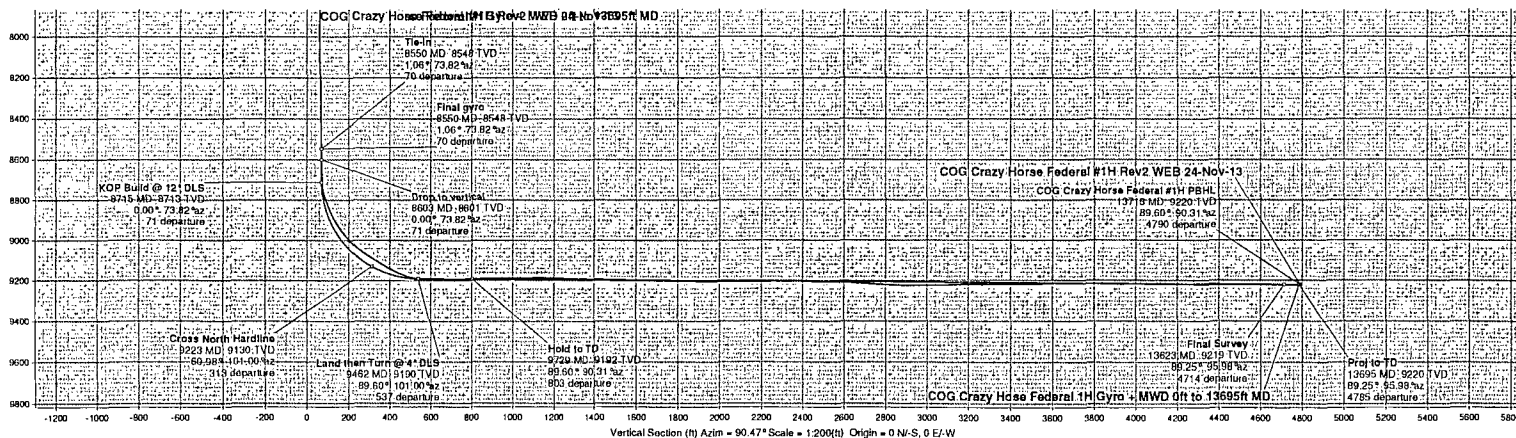
- COG Crazy Horse Federal #1H PBHL
- COG Crazy Horse Federal #1H PBHL
- COG Crazy Horse Federal #1H PBHL

COG Crazy Horse Federal #1H Gyro - MWD Off to 13695H MD

COG Crazy Horse Federal #1H Rev2 WEB 24-Nov-13



TVD Scale = 1200(ft)



Drawn By: MS/eller
Date Created: November 25, 2013 08:17:10 AM
Checked By:
Checked Date:
Approved By:
Approved Date: