



PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

15-42449

NM OIL CONSERVATION
ARTESIA DISTRICT

MAY 26 2015

RECEIVED

January 16, 2015

COG, LLC
One Concho Center
600 W. Illinois Ave.
Midland, TX 79701

RE: Patron 23 Federal 2H
322' FNL & 2085' FWL
Sec. 23, T25S, R29E
Eddy County, New Mexico

Dear Sir,

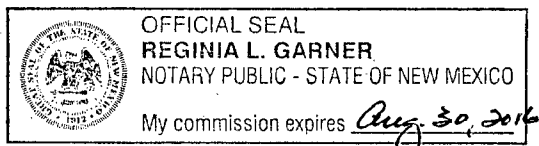
The attached is the Deviation Survey for the above captioned well.

Very truly yours,

Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 16th day of January, 2015.

Notary Public

Patron 23 Fed 2H

Date	Depth	Deviation	Direction	TVD	Horiz Disp
12/11/2014	114	0.50	0.00	0.00	0.00
12/11/2014	320	0.20	0.00	0.00	0.00
12/11/2014	512	0.50	0.00	0.00	0.00
12/14/2014	889	0.80	12.00	888.00	4.81
12/14/2014	1054	0.70	33.20	0.00	0.00
12/14/2014	1240	0.40	33.60	0.00	0.00
12/15/2014	1423	1.80	27.20	1422.00	11.42
12/16/2014	1606	3.20	28.40	0.00	0.00
12/16/2014	1698	5.00	99.70	0.00	0.00
12/16/2014	1877	1.90	135.00	0.00	0.00
12/17/2014	1970	0.50	179.00	0.00	0.00
12/17/2014	2124	1.40	27.30	2061.55	10.92
12/17/2014	2155	1.60	284.00	0.00	0.00
12/17/2014	2250	1.00	307.40	0.00	0.00
12/18/2014	2345	0.70	321.10	2344.00	12.94
12/18/2014	2440	0.90	1.00	0.00	0.00
12/18/2014	2535	1.10	15.70	0.00	0.00
12/18/2014	2619	2.70	41.80	0.00	0.00
12/18/2014	2723	2.00	57.60	2722.32	0.00
12/18/2014	2818	1.10	130.20	2817.30	0.00
12/18/2014	2912	1.30	158.70	2911.28	0.00
12/18/2014	3007	1.50	141.40	3006.25	0.00
12/23/2014	3250	1.50	0.00	0.00	0.00
12/29/2014	3307	0.90	0.00	0.00	0.00
12/29/2014	3400	0.70	0.00	0.00	0.00
12/29/2014	3495	0.50	0.00	0.00	0.00
12/29/2014	3621	0.50	0.00	0.00	0.00
12/29/2014	3746	0.70	0.00	0.00	0.00
12/29/2014	3872	0.20	0.00	0.00	0.00
12/29/2014	3997	0.50	0.00	0.00	0.00
12/29/2014	4124	0.50	0.00	0.00	0.00
12/29/2014	4250	0.50	0.00	0.00	0.00
12/29/2014	4376	0.30	0.00	0.00	0.00
12/29/2014	4502	0.30	0.00	0.00	0.00
12/29/2014	4628	0.20	0.00	0.00	0.00
12/29/2014	4787	0.40	0.00	0.00	0.00
12/29/2014	4942	0.50	0.00	0.00	0.00
12/29/2014	5101	0.70	0.00	0.00	0.00
12/30/2014	5575	0.70	0.00	0.00	0.00
12/30/2014	5731	1.00	0.00	0.00	0.00
12/30/2014	5826	1.20	0.00	0.00	0.00
12/30/2014	5921	1.10	0.00	0.00	0.00
12/30/2014	6015	1.10	0.00	0.00	0.00

Date	Depth	Deviation	Direction	TVD	Horiz Disp
12/30/2014	6110	1.00	0.00	0.00	0.00
12/30/2014	6298	1.20	0.00	0.00	0.00
12/30/2014	6393	1.00	0.00	0.00	0.00
12/30/2014	6580	0.80	0.00	0.00	0.00
12/30/2014	6770	0.80	0.00	0.00	0.00
12/30/2014	6864	0.90	0.00	0.00	0.00
12/31/2014	7056	1.20	0.00	0.00	0.00
1/1/2015	7250	3.60	228.30	7248.79	0.00
1/1/2015	7281	5.10	209.50	7279.00	0.00
1/1/2015	7313	6.90	191.50	7311.00	0.00
1/1/2015	7377	13.40	188.90	7374.45	47.30
1/1/2015	7408	16.20	190.60	7404.42	55.12
1/1/2015	7439	17.10	191.50	7434.00	63.86
1/2/2015	7503	19.40	184.20	7494.00	0.00
1/2/2015	7534	21.50	180.70	7523.00	0.00
1/2/2015	7566	24.10	176.40	7553.00	0.00
1/2/2015	7597	26.90	175.70	7581.00	0.00
1/2/2015	7629	30.20	176.90	7609.00	0.00
1/2/2015	7660	33.30	178.00	7635.89	151.74
1/2/2015	7692	36.50	176.80	7662.13	170.01
1/2/2015	7724	39.10	174.00	7687.42	189.53
1/4/2015	7787	45.70	170.30	7734.00	231.30
1/4/2015	7882	58.80	167.10	7792.25	0.00
1/4/2015	7913	63.60	166.00	7807.18	0.00
1/4/2015	7945	67.90	168.60	7820.32	0.00
1/4/2015	7977	73.20	171.00	1830.98	0.00
1/4/2015	8008	79.40	172.20	7838.31	0.00
1/5/2015	8108	88.70	179.50	7845.51	0.00
1/5/2015	8198	90.40	184.60	7845.91	0.00
1/5/2015	8419	88.40	183.80	7840.26	0.00
1/5/2015	8482	89.80	183.40	7841.20	0.00
1/5/2015	8514	91.10	183.00	7841.05	0.00
1/5/2015	8671	91.60	182.60	7834.00	0.00
1/6/2015	8955	90.40	183.00	7823.00	1363.00
1/6/2015	9050	90.60	182.40	7823.00	1458.00
1/6/2015	9144	89.40	181.40	7823.00	1552.00
1/6/2015	9238	90.10	181.40	7823.00	1646.00
1/6/2015	9427	89.50	182.20	7825.00	1835.00
1/6/2015	9616	90.00	131.10	7827.00	0.00
1/7/2015	9711	91.30	181.30	7826.10	0.00
1/9/2015	9903	93.10	179.70	7818.00	0.00
1/9/2015	10187	89.10	180.00	7816.75	0.00
1/9/2015	10282	88.90	179.70	7818.40	0.00
1/9/2015	10376	89.50	178.80	7819.72	0.00
1/9/2015	10470	90.80	179.00	7814.47	0.00

Date	Depth	Deviation	Direction	TVD	Horiz Disp
1/9/2015	10565	88.30	179.40	7820.22	0.00
1/9/2015	10659	88.90	179.00	7822.51	0.00
1/9/2015	10847	90.70	178.80	7823.51	0.00
1/9/2015	11037	88.20	180.60	7824.00	3444.00
1/9/2015	11226	88.90	180.90	7829.00	3633.00
1/10/2015	11415	89.00	180.60	7832.00	0.00
1/10/2015	11699	91.90	181.10	7831.00	0.00
1/10/2015	11794	90.90	181.20	7829.44	0.00
1/10/2015	11887	92.20	180.90	7826.92	4293.87
1/10/2015	11982	90.60	181.90	7824.60	4388.84
1/10/2015	12170	89.10	181.70	7426.83	4577.79



January 13, 2015

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

Attn: Kanicia Castillo

RE: Patron 23 Federal No 002H

Please find enclosed a copy of the survey from 0.00' to 7134.00' ran on the above referenced well.

If I can be of any further service, please do not hesitate to call me at 800-606-4976.

Sincerely,

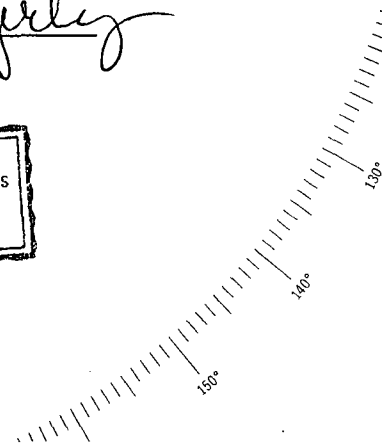
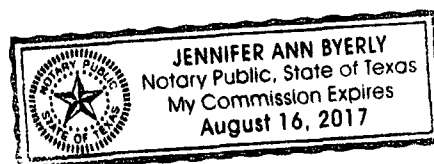
A handwritten signature in black ink, appearing to read "KH", followed by a horizontal line.

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 13 day of January A.D., 2015, by Keith Havelka.

A handwritten signature in black ink, appearing to read "Jennifer Ann Byerly", written over a horizontal line.
Jennifer Ann Byerly
Notary Public, State of Texas



Company: COG Operating
Lease/Well: Patron 23 Federal/No 002H



Rig Name: Silveroak 7
State/County: New Mexico/Eddy
Latitude: 31.12, Longitude: -103.96
GRID North is 0.19 Degrees East of True North
VS-Azi: 0.00 Degrees



ARM OIL CONSERVATION
ARTESIA DISTRICT
MAY 26 2015
RECEIVED

Depth Reference : RKB = 18 Ft

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ... 23 federal 2h_gyro survey.ut
Minimum Curvature Method
Report Date/Time: 1/13/2015 / 15:06

VES Survey International
West Texas
(432) 563-5444
Surveyor: Gene Heiss
Patron 23 Federal No 002H / API 30-015-42449

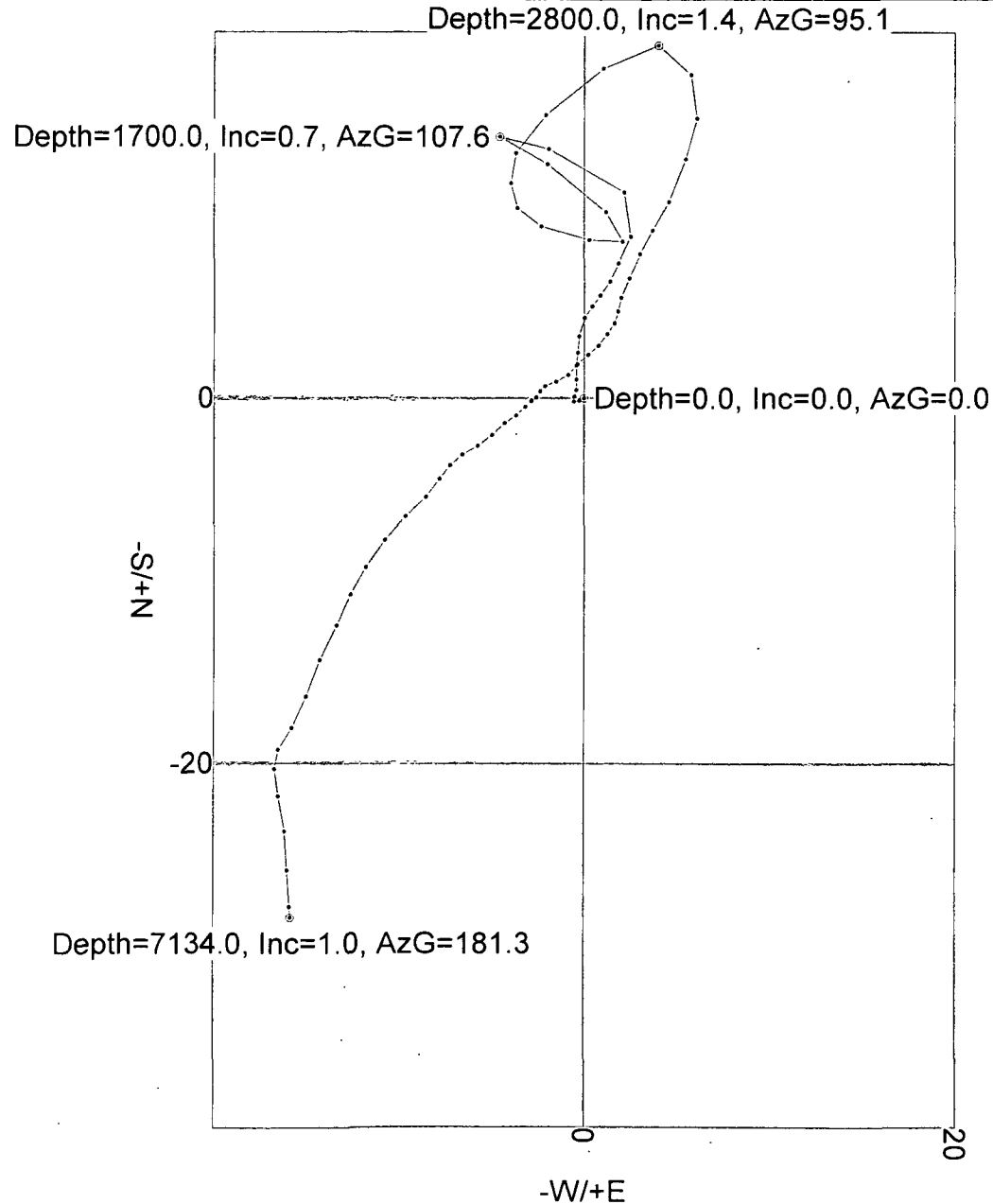
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.34	239.95	100.00	-0.15	-0.25	-0.15	0.29	239.95	0.34
200.00	0.14	346.41	200.00	-0.18	-0.54	-0.18	0.57	251.59	0.40
300.00	0.18	19.56	300.00	0.09	-0.51	0.09	0.52	279.83	0.10
400.00	0.25	11.31	400.00	0.46	-0.41	0.46	0.62	317.70	0.07
500.00	0.40	355.73	500.00	1.02	-0.40	1.02	1.10	338.70	0.17
600.00	0.49	2.72	599.99	1.80	-0.40	1.80	1.84	347.35	0.11
700.00	0.30	9.36	699.99	2.48	-0.34	2.48	2.51	352.19	0.20
800.00	0.74	3.71	799.99	3.38	-0.26	3.38	3.39	355.65	0.44
900.00	0.50	34.38	899.98	4.38	0.03	4.38	4.38	0.41	0.40
1000.00	0.36	31.90	999.98	5.01	0.44	5.01	5.03	5.05	0.14
1100.00	0.48	38.44	1099.98	5.60	0.87	5.60	5.67	8.80	0.13
1200.00	0.59	31.81	1199.97	6.36	1.40	6.36	6.51	12.38	0.12
1300.00	0.66	18.50	1299.96	7.35	1.85	7.35	7.58	14.14	0.16
1400.00	1.20	29.19	1399.95	8.81	2.54	8.81	9.17	16.11	0.56
1500.00	2.01	329.88	1499.92	11.24	2.17	11.24	11.45	10.94	1.74
1600.00	3.79	284.73	1599.80	13.60	-1.91	13.60	13.74	352.03	2.77
1700.00	0.67	107.59	1699.73	14.27	-4.55	14.27	14.98	342.32	4.46
1800.00	2.77	122.81	1799.68	12.79	-1.97	12.79	12.94	351.26	2.13

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	1.99	139.72	1899.60	10.15	1.18	10.15	10.22	6.66	1.04
2000.00	0.41	216.34	1999.58	8.54	2.10	8.54	8.79	13.80	1.94
2100.00	1.87	283.32	2099.56	8.63	0.30	8.63	8.64	1.97	1.75
2200.00	1.22	289.95	2199.52	9.37	-2.30	9.37	9.65	346.23	0.67
2300.00	0.80	336.05	2299.50	10.38	-3.58	10.38	10.98	340.94	0.88
2400.00	0.82	354.85	2399.50	11.72	-3.93	11.72	12.37	341.46	0.26
2500.00	1.13	18.78	2499.48	13.37	-3.68	13.37	13.87	344.62	0.51
2600.00	1.99	48.34	2599.44	15.46	-2.06	15.46	15.60	352.41	1.15
2700.00	2.60	52.25	2699.36	18.01	1.03	18.01	18.04	3.28	0.63
2800.00	1.38	95.12	2799.31	19.29	4.02	19.29	19.70	11.78	1.85
2900.00	1.84	158.85	2899.27	17.68	5.80	17.68	18.61	18.16	1.75
3000.00	1.07	195.83	2999.24	15.28	6.12	15.28	16.47	21.84	1.18
3100.00	1.59	195.02	3099.22	13.05	5.51	13.05	14.17	22.90	0.52
3200.00	1.30	208.37	3199.18	10.71	4.61	10.71	11.67	23.30	0.44
3300.00	0.78	212.23	3299.17	9.14	3.71	9.14	9.86	22.10	0.52
3400.00	0.86	203.50	3399.16	7.88	3.05	7.88	8.44	21.16	0.14
3500.00	0.80	205.30	3499.15	6.56	2.45	6.56	7.00	20.49	0.06
3600.00	0.52	197.95	3599.14	5.49	2.01	5.49	5.85	20.11	0.30
3700.00	0.37	186.03	3699.14	4.74	1.84	4.74	5.08	21.20	0.17
3800.00	0.42	204.86	3799.13	4.08	1.65	4.08	4.40	21.99	0.14
3900.00	0.41	222.98	3899.13	3.49	1.25	3.49	3.70	19.71	0.13
4000.00	0.48	212.10	3999.13	2.87	0.78	2.87	2.97	15.22	0.11
4100.00	0.42	247.74	4099.13	2.37	0.21	2.37	2.38	5.16	0.28
4200.00	0.52	212.19	4199.12	1.85	-0.37	1.85	1.88	348.69	0.30
4300.00	0.36	229.74	4299.12	1.26	-0.85	1.26	1.52	326.12	0.21
4400.00	0.51	249.02	4399.12	0.90	-1.50	0.90	1.75	301.10	0.21
4500.00	0.23	243.05	4499.11	0.65	-2.09	0.65	2.19	287.33	0.27
4600.00	0.22	202.92	4599.11	0.39	-2.35	0.39	2.38	279.33	0.16
4700.00	0.27	218.16	4699.11	0.03	-2.56	0.03	2.56	270.65	0.08
4800.00	0.15	263.42	4799.11	-0.17	-2.83	-0.17	2.84	266.62	0.19
4900.00	0.41	214.02	4899.11	-0.48	-3.16	-0.48	3.20	261.35	0.34
5000.00	0.38	238.69	4999.11	-0.95	-3.65	-0.95	3.77	255.35	0.17
5100.00	0.47	233.89	5099.11	-1.37	-4.27	-1.37	4.48	252.20	0.09
5200.00	0.62	220.47	5199.10	-2.02	-4.95	-2.02	5.34	247.78	0.19
5300.00	0.54	245.72	5299.10	-2.63	-5.73	-2.63	6.30	245.38	0.26
5400.00	0.55	234.16	5399.09	-3.10	-6.55	-3.10	7.25	244.66	0.11
5500.00	0.45	222.27	5499.09	-3.68	-7.21	-3.68	8.09	242.97	0.15
5600.00	0.61	213.43	5599.08	-4.42	-7.77	-4.42	8.94	240.39	0.18
5700.00	0.80	219.26	5699.08	-5.40	-8.50	-5.40	10.07	237.59	0.20

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5800.00	0.96	230.40	5799.06	-6.47	-9.59	-6.47	11.57	235.99	0.24
5900.00	1.03	212.37	5899.05	-7.77	-10.72	-7.77	13.23	234.07	0.32
6000.00	1.05	216.01	5999.03	-9.27	-11.73	-9.27	14.95	231.71	0.07
6100.00	0.95	201.17	6099.02	-10.77	-12.57	-10.77	16.56	229.40	0.27
6200.00	1.15	205.64	6199.00	-12.45	-13.30	-12.45	18.22	226.89	0.22
6300.00	1.27	205.63	6298.98	-14.36	-14.22	-14.36	20.21	224.72	0.11
6400.00	1.17	194.89	6398.96	-16.34	-14.96	-16.34	22.15	222.47	0.25
6500.00	1.02	214.19	6498.94	-18.06	-15.72	-18.06	23.94	221.04	0.39
6600.00	0.61	207.00	6598.93	-19.27	-16.46	-19.27	25.34	220.51	0.42
6700.00	0.67	175.99	6698.92	-20.32	-16.66	-20.32	26.28	219.35	0.35
6800.00	1.07	169.08	6798.91	-21.81	-16.44	-21.81	27.32	217.01	0.41
6900.00	1.16	171.18	6898.89	-23.73	-16.11	-23.73	28.68	214.17	0.10
7000.00	1.31	180.59	6998.87	-25.87	-15.97	-25.87	30.40	211.69	0.25
7100.00	1.01	170.60	7098.85	-27.87	-15.84	-27.87	32.06	209.60	0.36
7134.00	0.99	181.26	7132.84	-28.46	-15.79	-28.46	32.55	209.02	0.55



VES Survey International
West Texas
(432) 563-5444
Surveyor: Gene Heiss
Patron 23 Federal No 002H / API 30-015-42449



VES Survey Date: 12/30/2014

COG Operating, LLC.

Eddy County, N.M.

Section 23 T25-S R29-E, Patron 23 Federal #2H

Patron 23 Federal #2H

Original Hole

Design: Original Hole

Survey Report - Geographic

12 January, 2015

Stryker Directional

Survey Report - Geographic

Company:	COG Operating, LLC.	Local Co-ordinate Reference:	Well Patron 23 Federal #2H
Project:	Eddy County, N.M.	TVD Reference:	GL 3112.6+18 @ 3130.6usft (Silver Oak 7)
Site:	Section 23 T25-S R29-E, Patron 23 Federal #2H	MD Reference:	GL 3112.6+18 @ 3130.6usft (Silver Oak 7)
Well:	Patron 23 Federal #2H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Stryker_EDM

Project	Eddy County, N.M.		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Ground Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Section 23 T25-S R29-E, Patron 23 Federal #2H		
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Site Position:		Northing:	408,219.90 usft	Latitude:	32° 7' 18.308 N
From:	Map	Easting:	616,658.20 usft	Longitude:	103° 57' 23.445 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.20 °

Well	Patron 23 Federal #2H				
Well Position	+N/-S	0.0 usft	Northing:	408,219.90 usft	Latitude: 32° 7' 18.308 N
	+E/-W	0.0 usft	Easting:	616,658.20 usft	Longitude: 103° 57' 23.445 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level: 3,112.6 usft

Wellbore	Original Hole				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/3/2014	7.33	59.94	48,169

Design	Original Hole				
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Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	181.50

Survey Program		Date 1/12/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	7,134.0	MWD Survey #1 (Original Hole)	MWD	MWD - Standard	
7,187.0	12,216.0	Actual MWD Survey (Original Hole)	MWD	MWD - Standard	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.0	0.00	0.00	0.0	0.0	0.0	408,219.90	616,658.20	32° 7' 18.308 N	103° 57' 23.445 W
100.0	0.34	239.95	100.0	-0.1	-0.3	408,219.75	616,657.95	32° 7' 18.306 N	103° 57' 23.448 W
200.0	0.14	346.41	200.0	-0.2	-0.5	408,219.72	616,657.66	32° 7' 18.306 N	103° 57' 23.451 W
300.0	0.18	19.56	300.0	0.1	-0.5	408,219.99	616,657.69	32° 7' 18.309 N	103° 57' 23.451 W
400.0	0.25	11.31	400.0	0.5	-0.4	408,220.35	616,657.78	32° 7' 18.312 N	103° 57' 23.450 W
500.0	0.40	355.73	500.0	1.0	-0.4	408,220.91	616,657.80	32° 7' 18.318 N	103° 57' 23.450 W
600.0	0.49	2.72	600.0	1.8	-0.4	408,221.69	616,657.79	32° 7' 18.326 N	103° 57' 23.450 W
700.0	0.30	9.36	700.0	2.5	-0.3	408,222.37	616,657.85	32° 7' 18.332 N	103° 57' 23.449 W
800.0	0.74	3.71	800.0	3.4	-0.3	408,223.27	616,657.94	32° 7' 18.341 N	103° 57' 23.448 W
900.0	0.50	34.38	900.0	4.4	0.0	408,224.28	616,658.23	32° 7' 18.351 N	103° 57' 23.445 W
1,000.0	0.36	31.90	1,000.0	5.0	0.4	408,224.91	616,658.64	32° 7' 18.357 N	103° 57' 23.440 W

Stryker Directional Survey Report - Geographic

Company:	COG Operating, LLC.	Local Co-ordinate Reference:	Well Patron 23 Federal #2H
Project:	Eddy County, N.M.	TVD Reference:	GL 3112.6+18 @ 3130.6usft (Silver Oak 7)
Site:	Section 23 T25-S R29-E, Patron 23 Federal #2H	MD Reference:	GL 3112.6+18 @ 3130.6usft (Silver Oak 7)
Well:	Patron 23 Federal #2H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Stryker_EDM

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,100.0	0.48	38.44	1,100.0	5.6	0.9	408,225.50	616,659.07	32° 7' 18.363 N	103° 57' 23.435 W
1,200.0	0.59	31.81	1,200.0	6.4	1.4	408,226.27	616,659.60	32° 7' 18.371 N	103° 57' 23.429 W
1,300.0	0.66	18.50	1,300.0	7.4	1.8	408,227.25	616,660.05	32° 7' 18.381 N	103° 57' 23.423 W
1,400.0	1.20	29.19	1,400.0	8.8	2.5	408,228.71	616,660.75	32° 7' 18.395 N	103° 57' 23.415 W
1,500.0	2.01	329.88	1,499.9	11.2	2.2	408,231.14	616,660.38	32° 7' 18.419 N	103° 57' 23.419 W
1,600.0	3.79	284.73	1,599.8	13.6	-1.9	408,233.50	616,656.30	32° 7' 18.443 N	103° 57' 23.467 W
1,700.0	0.67	107.59	1,699.7	14.3	-4.5	408,234.16	616,653.66	32° 7' 18.449 N	103° 57' 23.497 W
1,800.0	2.77	122.81	1,799.7	12.8	-2.0	408,232.68	616,656.25	32° 7' 18.434 N	103° 57' 23.467 W
1,900.0	1.99	139.72	1,899.6	10.1	1.2	408,230.04	616,659.40	32° 7' 18.408 N	103° 57' 23.431 W
2,000.0	0.41	216.34	1,999.6	8.5	2.1	408,228.43	616,660.31	32° 7' 18.392 N	103° 57' 23.420 W
2,100.0	1.87	283.32	2,099.6	8.6	0.3	408,228.52	616,658.51	32° 7' 18.393 N	103° 57' 23.441 W
2,200.0	1.22	289.95	2,199.5	9.4	-2.3	408,229.26	616,655.92	32° 7' 18.401 N	103° 57' 23.471 W
2,300.0	0.80	336.05	2,299.5	10.4	-3.6	408,230.26	616,654.64	32° 7' 18.411 N	103° 57' 23.486 W
2,400.0	0.82	354.85	2,399.5	11.7	-3.9	408,231.61	616,654.29	32° 7' 18.424 N	103° 57' 23.490 W
2,500.0	1.13	18.78	2,499.5	13.4	-3.7	408,233.26	616,654.54	32° 7' 18.440 N	103° 57' 23.487 W
2,600.0	1.99	48.34	2,599.4	15.4	-2.0	408,235.34	616,656.16	32° 7' 18.461 N	103° 57' 23.468 W
2,700.0	2.60	52.25	2,699.4	18.0	1.0	408,237.89	616,659.25	32° 7' 18.486 N	103° 57' 23.432 W
2,800.0	1.38	95.12	2,799.3	19.3	4.0	408,239.17	616,662.24	32° 7' 18.498 N	103° 57' 23.397 W
2,900.0	1.84	158.85	2,899.3	17.7	5.8	408,237.56	616,664.02	32° 7' 18.482 N	103° 57' 23.377 W
3,000.0	1.07	195.83	2,999.2	15.3	6.1	408,235.17	616,664.35	32° 7' 18.459 N	103° 57' 23.373 W
3,100.0	1.59	195.02	3,099.2	13.0	5.5	408,232.93	616,663.73	32° 7' 18.437 N	103° 57' 23.380 W
3,200.0	1.30	208.37	3,199.2	10.7	4.6	408,230.59	616,662.83	32° 7' 18.414 N	103° 57' 23.391 W
3,300.0	0.78	212.23	3,299.2	9.1	3.7	408,229.02	616,661.93	32° 7' 18.398 N	103° 57' 23.401 W
3,400.0	0.86	203.50	3,399.2	7.9	3.1	408,227.75	616,661.27	32° 7' 18.386 N	103° 57' 23.409 W
3,500.0	0.80	205.30	3,499.1	6.5	2.5	408,226.43	616,660.67	32° 7' 18.372 N	103° 57' 23.416 W
3,600.0	0.52	197.95	3,599.1	5.5	2.0	408,225.37	616,660.23	32° 7' 18.362 N	103° 57' 23.421 W
3,700.0	0.37	186.03	3,699.1	4.7	1.9	408,224.62	616,660.06	32° 7' 18.355 N	103° 57' 23.423 W
3,800.0	0.42	204.86	3,799.1	4.1	1.7	408,223.96	616,659.87	32° 7' 18.348 N	103° 57' 23.426 W
3,900.0	0.41	222.98	3,899.1	3.5	1.3	408,223.37	616,659.47	32° 7' 18.342 N	103° 57' 23.430 W
4,000.0	0.48	212.10	3,999.1	2.9	0.8	408,222.75	616,659.01	32° 7' 18.336 N	103° 57' 23.436 W
4,100.0	0.42	247.74	4,099.1	2.4	0.2	408,222.26	616,658.44	32° 7' 18.331 N	103° 57' 23.442 W
4,200.0	0.52	212.19	4,199.1	1.8	-0.3	408,221.74	616,657.86	32° 7' 18.326 N	103° 57' 23.449 W
4,300.0	0.36	229.74	4,299.1	1.3	-0.8	408,221.15	616,657.38	32° 7' 18.320 N	103° 57' 23.455 W
4,400.0	0.51	249.02	4,399.1	0.9	-1.5	408,220.79	616,656.73	32° 7' 18.317 N	103° 57' 23.462 W
4,500.0	0.23	243.05	4,499.1	0.6	-2.1	408,220.54	616,656.13	32° 7' 18.314 N	103° 57' 23.469 W
4,600.0	0.22	202.92	4,599.1	0.4	-2.3	408,220.27	616,655.88	32° 7' 18.312 N	103° 57' 23.472 W
4,700.0	0.27	218.16	4,699.1	0.0	-2.5	408,219.91	616,655.66	32° 7' 18.308 N	103° 57' 23.475 W
4,800.0	0.15	263.42	4,799.1	-0.2	-2.8	408,219.71	616,655.38	32° 7' 18.306 N	103° 57' 23.478 W
4,900.0	0.41	214.02	4,899.1	-0.5	-3.2	408,219.39	616,655.05	32° 7' 18.303 N	103° 57' 23.482 W
5,000.0	0.38	238.69	4,999.1	-1.0	-3.6	408,218.93	616,654.57	32° 7' 18.298 N	103° 57' 23.487 W
5,100.0	0.47	233.89	5,099.1	-1.4	-4.2	408,218.51	616,653.95	32° 7' 18.294 N	103° 57' 23.495 W
5,200.0	0.62	220.47	5,199.1	-2.0	-4.9	408,217.86	616,653.27	32° 7' 18.288 N	103° 57' 23.503 W
5,300.0	0.54	245.72	5,299.1	-2.6	-5.7	408,217.25	616,652.49	32° 7' 18.282 N	103° 57' 23.512 W
5,400.0	0.55	234.16	5,399.1	-3.1	-6.5	408,216.78	616,651.67	32° 7' 18.277 N	103° 57' 23.521 W
5,500.0	0.45	222.27	5,499.1	-3.7	-7.2	408,216.21	616,651.02	32° 7' 18.272 N	103° 57' 23.529 W
5,600.0	0.61	213.43	5,599.1	-4.4	-7.7	408,215.47	616,650.46	32° 7' 18.264 N	103° 57' 23.535 W
5,700.0	0.80	219.26	5,699.1	-5.4	-8.5	408,214.49	616,649.73	32° 7' 18.255 N	103° 57' 23.544 W
5,800.0	0.96	230.40	5,799.1	-6.5	-9.6	408,213.41	616,648.64	32° 7' 18.244 N	103° 57' 23.557 W
5,900.0	1.03	212.37	5,899.1	-7.8	-10.7	408,212.12	616,647.51	32° 7' 18.231 N	103° 57' 23.570 W
6,000.0	1.05	216.01	5,999.0	-9.3	-11.7	408,210.62	616,646.49	32° 7' 18.216 N	103° 57' 23.582 W
6,100.0	0.95	201.17	6,099.0	-10.8	-12.5	408,209.11	616,645.66	32° 7' 18.202 N	103° 57' 23.591 W
6,200.0	1.15	205.64	6,199.0	-12.5	-13.3	408,207.43	616,644.92	32° 7' 18.185 N	103° 57' 23.600 W
6,300.0	1.27	205.63	6,299.0	-14.4	-14.2	408,205.52	616,644.01	32° 7' 18.166 N	103° 57' 23.611 W
6,400.0	1.17	194.89	6,399.0	-16.4	-14.9	408,203.54	616,643.27	32° 7' 18.146 N	103° 57' 23.619 W
6,500.0	1.02	214.19	6,498.9	-18.1	-15.7	408,201.81	616,642.50	32° 7' 18.129 N	103° 57' 23.628 W

Stryker Directional

Survey Report - Geographic

Company:	COG Operating, LLC.	Local Co-ordinate Reference:	Well Patron 23 Federal #2H
Project:	Eddy County, N.M.	TVD Reference:	GL 3112.6+18 @ 3130.6usft (Silver Oak 7)
Site:	Section 23 T25-S R29-E, Patron 23 Federal #2H	MD Reference:	GL 3112.6+18 @ 3130.6usft (Silver Oak 7)
Well:	Patron 23 Federal #2H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Stryker_EDM

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,600.0	0.61	207.00	6,598.9	-19.3	-16.4	408,200.60	616,641.76	32° 7' 18.118 N	103° 57' 23.637 W
6,700.0	0.67	175.99	6,698.9	-20.4	-16.6	408,199.55	616,641.56	32° 7' 18.107 N	103° 57' 23.639 W
6,800.0	1.07	169.08	6,798.9	-21.9	-16.4	408,198.05	616,641.78	32° 7' 18.092 N	103° 57' 23.637 W
6,900.0	1.16	171.18	6,898.9	-23.8	-16.1	408,196.13	616,642.11	32° 7' 18.073 N	103° 57' 23.633 W
7,000.0	1.31	180.59	6,998.9	-25.9	-15.9	408,193.99	616,642.25	32° 7' 18.052 N	103° 57' 23.632 W
7,100.0	1.01	170.60	7,098.8	-27.9	-15.8	408,191.97	616,642.39	32° 7' 18.032 N	103° 57' 23.630 W
7,134.0	0.99	181.26	7,132.8	-28.5	-15.8	408,191.38	616,642.43	32° 7' 18.026 N	103° 57' 23.630 W
7134° VES Gyro Survey									
7,187.0	1.10	230.40	7,185.8	-29.3	-16.2	408,190.60	616,642.03	32° 7' 18.019 N	103° 57' 23.634 W
7,218.0	1.50	229.40	7,216.8	-29.8	-16.7	408,190.15	616,641.49	32° 7' 18.014 N	103° 57' 23.641 W
7,250.0	3.60	228.30	7,248.8	-30.7	-17.8	408,189.21	616,640.42	32° 7' 18.005 N	103° 57' 23.653 W
7,282.0	5.10	209.50	7,280.7	-32.6	-19.2	408,187.30	616,638.97	32° 7' 17.986 N	103° 57' 23.670 W
7,313.0	6.90	191.50	7,311.5	-35.6	-20.3	408,184.28	616,637.92	32° 7' 17.956 N	103° 57' 23.682 W
7,345.0	10.60	190.50	7,343.2	-40.4	-21.2	408,179.50	616,637.00	32° 7' 17.909 N	103° 57' 23.693 W
7,377.0	13.40	188.90	7,374.5	-47.0	-22.3	408,172.94	616,635.89	32° 7' 17.844 N	103° 57' 23.706 W
7,408.0	16.20	190.60	7,404.4	-54.8	-23.7	408,165.14	616,634.54	32° 7' 17.767 N	103° 57' 23.722 W
7,439.0	17.10	191.50	7,434.1	-63.5	-25.4	408,156.42	616,632.84	32° 7' 17.681 N	103° 57' 23.743 W
7,471.0	18.20	187.70	7,464.6	-73.0	-27.0	408,146.86	616,631.23	32° 7' 17.586 N	103° 57' 23.762 W
7,503.0	19.40	184.20	7,494.9	-83.3	-28.0	408,136.60	616,630.17	32° 7' 17.485 N	103° 57' 23.774 W
7,534.0	21.50	180.70	7,524.0	-94.1	-28.5	408,125.79	616,629.72	32° 7' 17.378 N	103° 57' 23.780 W
7,566.0	24.10	176.40	7,553.5	-106.5	-28.1	408,113.40	616,630.06	32° 7' 17.255 N	103° 57' 23.777 W
7,597.0	26.90	175.70	7,581.4	-119.8	-27.2	408,100.09	616,630.98	32° 7' 17.123 N	103° 57' 23.766 W
7,629.0	30.20	176.90	7,609.5	-135.1	-26.2	408,084.83	616,631.96	32° 7' 16.972 N	103° 57' 23.756 W
7,660.0	33.30	178.00	7,635.9	-151.4	-25.5	408,068.54	616,632.68	32° 7' 16.811 N	103° 57' 23.748 W
7,692.0	36.50	176.80	7,662.1	-169.7	-24.7	408,050.25	616,633.52	32° 7' 16.630 N	103° 57' 23.739 W
7,724.0	39.10	174.00	7,687.4	-189.2	-23.1	408,030.71	616,635.11	32° 7' 16.436 N	103° 57' 23.721 W
7,756.0	42.10	171.60	7,711.7	-209.8	-20.5	408,010.05	616,637.73	32° 7' 16.232 N	103° 57' 23.692 W
7,787.0	45.70	170.30	7,734.1	-231.1	-17.1	407,988.83	616,641.12	32° 7' 16.022 N	103° 57' 23.653 W
7,819.0	49.80	169.50	7,755.6	-254.4	-12.9	407,965.52	616,645.27	32° 7' 15.791 N	103° 57' 23.606 W
7,850.0	54.30	168.70	7,774.6	-278.4	-8.3	407,941.52	616,649.90	32° 7' 15.553 N	103° 57' 23.553 W
7,882.0	58.80	167.10	7,792.3	-304.5	-2.7	407,915.42	616,655.51	32° 7' 15.295 N	103° 57' 23.489 W
7,913.0	63.60	166.00	7,807.2	-330.9	3.6	407,889.01	616,661.83	32° 7' 15.033 N	103° 57' 23.416 W
7,945.0	67.90	168.60	7,820.3	-359.3	10.0	407,860.56	616,668.23	32° 7' 14.751 N	103° 57' 23.343 W
7,977.0	73.20	171.00	7,831.0	-389.0	15.4	407,830.87	616,673.56	32° 7' 14.457 N	103° 57' 23.282 W
8,008.0	79.40	172.20	7,838.3	-418.8	19.7	407,801.09	616,677.95	32° 7' 14.163 N	103° 57' 23.232 W
8,041.0	84.70	174.10	7,842.9	-451.2	23.6	407,768.66	616,681.85	32° 7' 13.841 N	103° 57' 23.189 W
8,073.0	88.50	177.10	7,844.8	-483.1	26.1	407,736.82	616,684.29	32° 7' 13.526 N	103° 57' 23.161 W
8,103.0	88.70	179.50	7,845.5	-513.1	27.0	407,706.84	616,685.18	32° 7' 13.230 N	103° 57' 23.152 W
8,134.0	89.45	182.40	7,846.0	-544.0	26.5	407,675.85	616,684.67	32° 7' 12.923 N	103° 57' 23.159 W
8,166.0	90.20	184.50	7,846.1	-576.0	24.5	407,643.91	616,682.74	32° 7' 12.607 N	103° 57' 23.183 W
8,198.0	90.40	184.60	7,845.9	-607.9	22.0	407,612.01	616,680.21	32° 7' 12.291 N	103° 57' 23.214 W
8,230.0	90.60	183.80	7,845.7	-639.8	19.7	407,580.10	616,677.86	32° 7' 11.976 N	103° 57' 23.242 W
8,261.0	93.10	183.40	7,844.7	-670.7	17.7	407,549.18	616,675.92	32° 7' 11.670 N	103° 57' 23.266 W
8,293.0	95.20	183.40	7,842.3	-702.6	15.8	407,517.32	616,674.02	32° 7' 11.354 N	103° 57' 23.290 W
8,325.0	93.60	183.20	7,839.9	-734.4	14.0	407,485.47	616,672.19	32° 7' 11.039 N	103° 57' 23.312 W
8,356.0	89.70	184.10	7,839.0	-765.3	12.0	407,454.55	616,670.22	32° 7' 10.733 N	103° 57' 23.337 W
8,388.0	88.60	184.60	7,839.5	-797.3	9.6	407,422.65	616,667.79	32° 7' 10.418 N	103° 57' 23.366 W
8,419.0	88.40	183.80	7,840.3	-828.2	7.3	407,391.74	616,665.52	32° 7' 10.112 N	103° 57' 23.394 W
8,451.0	89.10	184.00	7,841.0	-860.1	5.1	407,359.82	616,663.34	32° 7' 9.796 N	103° 57' 23.420 W
8,482.0	89.80	183.40	7,841.3	-891.0	3.1	407,328.89	616,661.34	32° 7' 9.490 N	103° 57' 23.445 W
8,514.0	91.10	183.00	7,841.0	-923.0	1.4	407,296.94	616,659.56	32° 7' 9.174 N	103° 57' 23.467 W
8,545.0	91.90	182.50	7,840.2	-953.9	-0.1	407,265.99	616,658.07	32° 7' 8.868 N	103° 57' 23.485 W
8,577.0	93.10	183.80	7,838.8	-985.8	-1.9	407,234.07	616,656.31	32° 7' 8.552 N	103° 57' 23.507 W
8,671.0	91.60	182.60	7,835.0	-1,079.6	-7.1	407,140.30	616,651.07	32° 7' 7.624 N	103° 57' 23.572 W
8,766.0	92.20	182.60	7,831.8	-1,174.4	-11.4	407,045.45	616,646.76	32° 7' 6.686 N	103° 57' 23.626 W

Stryker Directional

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Project:	Eddy County, N.M.	TVD Reference:	GL 3112.6+18 @ 3130.6usft (Silver Oak 7)
Site:	Section 23 T25-S R29-E, Patron 23 Federal #2H	MD Reference:	GL 3112.6+18 @ 3130.6usft (Silver Oak 7)
Well:	Patron 23 Federal #2H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Stryker_EDM

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
8,861.0	93.50	182.80	7,827.1	-1,269.2	-15.9	406,950.67	616,642.30	32° 7' 5.748 N	103° 57' 23.682 W	
8,955.0	90.40	183.00	7,823.9	-1,363.0	-20.7	406,856.86	616,637.54	32° 7' 4.820 N	103° 57' 23.741 W	
9,050.0	90.60	182.40	7,823.1	-1,457.9	-25.1	406,761.97	616,633.07	32° 7' 3.881 N	103° 57' 23.797 W	
9,144.0	89.40	181.40	7,823.1	-1,551.9	-28.3	406,668.02	616,629.95	32° 7' 2.951 N	103° 57' 23.837 W	
9,238.0	90.10	181.40	7,823.5	-1,645.8	-30.5	406,574.05	616,627.65	32° 7' 2.021 N	103° 57' 23.867 W	
9,332.0	89.00	181.20	7,824.2	-1,739.8	-32.7	406,480.08	616,625.52	32° 7' 1.091 N	103° 57' 23.896 W	
9,427.0	89.50	182.20	7,825.5	-1,834.8	-35.5	406,385.13	616,622.70	32° 7' 0.152 N	103° 57' 23.932 W	
9,521.0	89.20	183.30	7,826.5	-1,928.6	-40.0	406,291.25	616,618.19	32° 6' 59.223 N	103° 57' 23.989 W	
9,616.0	90.00	181.10	7,827.2	-2,023.6	-43.7	406,196.33	616,614.55	32° 6' 58.283 N	103° 57' 24.035 W	
9,711.0	91.30	181.30	7,826.1	-2,118.5	-45.6	406,101.36	616,612.56	32° 6' 57.344 N	103° 57' 24.062 W	
9,806.0	93.00	182.40	7,822.6	-2,213.4	-48.7	406,006.48	616,609.49	32° 6' 56.405 N	103° 57' 24.101 W	
9,903.0	93.10	179.70	7,817.4	-2,310.3	-50.5	405,909.64	616,607.72	32° 6' 55.447 N	103° 57' 24.126 W	
9,997.0	90.90	179.50	7,814.1	-2,404.2	-49.8	405,815.71	616,608.38	32° 6' 54.517 N	103° 57' 24.122 W	
10,092.0	88.40	179.20	7,814.7	-2,499.2	-48.8	405,720.72	616,609.45	32° 6' 53.577 N	103° 57' 24.114 W	
10,187.0	89.10	180.00	7,816.8	-2,594.1	-48.1	405,625.75	616,610.12	32° 6' 52.637 N	103° 57' 24.110 W	
10,282.0	88.90	179.70	7,818.4	-2,689.1	-47.8	405,530.76	616,610.36	32° 6' 51.697 N	103° 57' 24.111 W	
10,376.0	89.50	178.80	7,819.7	-2,783.1	-46.6	405,436.78	616,611.60	32° 6' 50.767 N	103° 57' 24.100 W	
10,470.0	90.80	179.00	7,819.5	-2,877.1	-44.8	405,342.80	616,613.40	32° 6' 49.837 N	103° 57' 24.083 W	
10,565.0	88.30	179.40	7,820.2	-2,972.1	-43.5	405,247.82	616,614.73	32° 6' 48.897 N	103° 57' 24.071 W	
10,659.0	88.90	179.00	7,822.5	-3,066.0	-42.2	405,153.86	616,616.04	32° 6' 47.967 N	103° 57' 24.060 W	
10,754.0	89.60	178.50	7,823.8	-3,161.0	-40.1	405,058.89	616,618.11	32° 6' 47.027 N	103° 57' 24.040 W	
10,847.0	90.70	178.80	7,823.5	-3,254.0	-37.9	404,965.92	616,620.30	32° 6' 46.107 N	103° 57' 24.018 W	
10,942.0	90.00	180.00	7,822.9	-3,349.0	-36.9	404,870.93	616,621.30	32° 6' 45.167 N	103° 57' 24.010 W	
11,037.0	88.20	180.60	7,824.4	-3,444.0	-37.4	404,775.95	616,620.80	32° 6' 44.227 N	103° 57' 24.020 W	
11,131.0	88.60	180.80	7,827.1	-3,537.9	-38.6	404,681.99	616,619.65	32° 6' 43.297 N	103° 57' 24.037 W	
11,226.0	88.90	180.90	7,829.1	-3,632.9	-40.0	404,587.02	616,618.24	32° 6' 42.357 N	103° 57' 24.057 W	
11,320.0	89.30	181.20	7,830.6	-3,726.8	-41.7	404,493.05	616,616.52	32° 6' 41.427 N	103° 57' 24.081 W	
11,415.0	89.00	180.60	7,832.0	-3,821.8	-43.2	404,398.07	616,615.03	32° 6' 40.487 N	103° 57' 24.102 W	
11,510.0	89.10	182.20	7,833.6	-3,916.8	-45.5	404,303.12	616,612.71	32° 6' 39.548 N	103° 57' 24.133 W	
11,604.0	90.60	181.70	7,833.8	-4,010.7	-48.7	404,209.18	616,609.51	32° 6' 38.618 N	103° 57' 24.174 W	
11,699.0	91.90	181.10	7,831.8	-4,105.7	-51.0	404,114.23	616,607.19	32° 6' 37.679 N	103° 57' 24.205 W	
11,794.0	90.90	181.20	7,829.5	-4,200.6	-52.9	404,019.28	616,605.28	32° 6' 36.739 N	103° 57' 24.231 W	
11,887.0	92.20	180.90	7,826.9	-4,293.6	-54.6	403,926.33	616,603.58	32° 6' 35.819 N	103° 57' 24.255 W	
11,982.0	90.60	181.90	7,824.6	-4,388.5	-56.9	403,831.39	616,601.26	32° 6' 34.880 N	103° 57' 24.286 W	
12,076.0	88.80	182.00	7,825.1	-4,482.4	-60.1	403,737.45	616,598.06	32° 6' 33.950 N	103° 57' 24.327 W	
12,170.0	89.10	181.70	7,826.8	-4,576.4	-63.2	403,643.52	616,595.03	32° 6' 33.021 N	103° 57' 24.366 W	
12,216.0	89.10	181.70	7,827.6	-4,622.4	-64.5	403,597.54	616,593.66	32° 6' 32.566 N	103° 57' 24.383 W	

12216' MD Projected to Bit

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
7,134.0	7,132.8	-28.5	-15.8	7134' VES Gyro Survey	
12,216.0	7,827.6	-4,622.4	-64.5	12216' MD Projected to Bit	