



January 12, 2017

WILM OIL CONSERVATION
ARTESIA DISTRICT
MAY 01 2017

RECEIVED

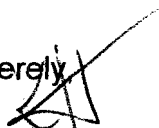
Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: **Switchback State No. 021H**

Please find enclosed a copy of the survey from 0' to 8600' ran on the above referenced well.

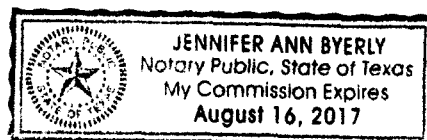
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 12 day of January, A.D., 2016, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: COG Operating
Lease/Well: Switchback State No.021H

Rig Name: Patriot 2
State/County: New Mexico/Eddy
VS-Azi: 87.84 Degrees
Latitude: 32.22530, Longitude: -104.17049
Grid North = True North -0.09 degs (NAD 27)
Grid Correction Applied = -0.09 degs

Depth Reference : RKB = 20 Foot

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey-de_01.ut
Minimum Curvature Method
Report Date/Time: 1/12/2017 / 09:09

VES Survey International
Midland Tx
(432) 563-5444

Surveyor: Gene Heiss

Switchback State No. 021H / API 30-015-43967

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	0.19	15.55	100.00	0.16	0.04	0.05	0.16	15.55	0.19
200.00	0.73	93.47	200.00	0.28	0.72	0.73	0.77	69.09	0.71
300.00	0.84	73.52	299.99	0.44	2.05	2.07	2.10	77.80	0.29
400.00	1.57	75.56	399.96	0.99	4.08	4.12	4.20	76.32	0.74
500.00	1.35	67.99	499.93	1.78	6.51	6.57	6.75	74.71	0.29
600.00	0.64	77.53	599.92	2.34	8.15	8.23	8.48	73.96	0.73
700.00	0.72	47.32	699.91	2.89	9.15	9.25	9.59	72.49	0.36
800.00	1.04	34.62	799.90	4.06	10.12	10.27	10.91	68.15	0.38
900.00	1.07	34.73	899.88	5.58	11.18	11.38	12.49	63.48	0.03
1000.00	1.34	41.81	999.86	7.22	12.49	12.75	14.42	59.97	0.30
1100.00	1.48	58.63	1099.83	8.76	14.37	14.69	16.83	58.63	0.44
1200.00	0.52	31.89	1199.81	9.82	15.71	16.07	18.53	58.01	1.05
1300.00	0.42	39.57	1299.81	10.48	16.18	16.57	19.28	57.07	0.11
1400.00	0.44	75.96	1399.81	10.86	16.79	17.19	20.00	57.11	0.27
1500.00	1.01	80.11	1499.80	11.10	18.03	18.44	21.18	58.38	0.58
1600.00	1.79	90.95	1599.77	11.23	20.46	20.87	23.34	61.24	0.82

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
1700.00	0.65	124.99	1699.74	10.88	22.49	22.88	24.98	64.18	1.31
1800.00	1.08	134.07	1799.73	9.90	23.63	23.98	25.62	67.27	0.46
1900.00	1.79	105.64	1899.70	8.82	25.81	26.12	27.27	71.13	0.98
2000.00	1.11	165.63	1999.67	7.46	27.55	27.81	28.54	74.85	1.56
2100.00	1.33	122.34	2099.65	5.90	28.77	28.97	29.37	78.41	0.92
2200.00	1.15	120.21	2199.63	4.77	30.61	30.77	30.98	81.14	0.19
2300.00	1.48	124.06	2299.60	3.55	32.55	32.66	32.74	83.78	0.34
2400.00	1.22	131.79	2399.58	2.11	34.42	34.47	34.48	86.49	0.32
2500.00	1.47	120.51	2499.55	0.75	36.31	36.32	36.32	88.81	0.36
2600.00	1.52	118.10	2599.52	-0.52	38.58	38.54	38.59	90.77	0.08
2700.00	1.72	121.00	2699.48	-1.92	41.04	40.94	41.08	92.68	0.22
2800.00	1.70	123.71	2799.43	-3.51	43.56	43.39	43.70	94.61	0.08
2900.00	1.67	131.46	2899.39	-5.30	45.88	45.65	46.19	96.59	0.23
3000.00	1.57	136.77	2999.35	-7.27	47.92	47.61	48.46	98.62	0.18
3100.00	1.45	141.14	3099.31	-9.25	49.65	49.26	50.50	100.55	0.17
3200.00	1.43	138.21	3199.28	-11.17	51.27	50.82	52.48	102.29	0.08
3300.00	1.09	142.72	3299.26	-12.85	52.68	52.16	54.23	103.71	0.36
3400.00	1.02	150.96	3399.24	-14.39	53.69	53.11	55.59	105.00	0.17
3500.00	1.05	156.49	3499.22	-16.01	54.49	53.85	56.80	106.38	0.10
3600.00	0.95	151.04	3599.21	-17.58	55.26	54.56	57.99	107.65	0.14
3700.00	0.65	169.62	3699.20	-18.87	55.77	55.02	58.87	108.70	0.39
3800.00	0.99	178.59	3799.19	-20.30	55.89	55.09	59.46	109.96	0.36
3900.00	1.04	165.95	3899.17	-22.04	56.13	55.26	60.31	111.44	0.23
4000.00	0.97	166.58	3999.16	-23.75	56.55	55.61	61.33	112.78	0.07
4100.00	0.98	166.38	4099.14	-25.40	56.95	55.95	62.35	114.04	0.01
4200.00	1.03	170.81	4199.13	-27.11	57.29	56.23	63.38	115.33	0.10
4300.00	1.11	174.42	4299.11	-28.97	57.53	56.40	64.41	116.73	0.10
4400.00	1.15	187.53	4399.09	-30.92	57.49	56.28	65.28	118.27	0.26
4500.00	1.07	195.33	4499.07	-32.81	57.11	55.84	65.87	119.88	0.17
4600.00	0.95	207.10	4599.06	-34.45	56.49	55.15	66.17	121.38	0.24
4700.00	1.04	207.79	4699.04	-36.00	55.68	54.29	66.31	122.88	0.09
4800.00	0.83	201.39	4799.03	-37.48	55.00	53.54	66.55	124.27	0.24
4900.00	0.77	207.39	4899.02	-38.74	54.43	52.93	66.81	125.44	0.10
5000.00	0.70	200.33	4999.01	-39.91	53.90	52.36	67.07	126.52	0.11
5100.00	0.51	178.22	5099.00	-40.93	53.70	52.12	67.52	127.31	0.30
5200.00	0.36	196.22	5199.00	-41.68	53.63	52.02	67.92	127.85	0.20
5300.00	0.23	187.10	5299.00	-42.18	53.52	51.89	68.14	128.24	0.14
5400.00	0.73	182.24	5399.00	-43.02	53.47	51.81	68.62	128.82	0.51
5500.00	0.68	177.80	5498.99	-44.25	53.46	51.76	69.40	129.61	0.08

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
5600.00	0.97	167.06	5598.98	-45.66	53.68	51.92	70.47	130.39	0.33
5700.00	1.22	178.70	5698.96	-47.55	53.89	52.06	71.87	131.43	0.34
5800.00	1.58	178.63	5798.93	-50.00	53.95	52.02	73.56	132.83	0.36
5900.00	2.10	168.66	5898.88	-53.18	54.34	52.30	76.03	134.38	0.61
6000.00	1.40	190.12	5998.83	-56.18	54.49	52.33	78.26	135.87	0.95
6100.00	1.15	201.52	6098.81	-58.32	53.90	51.67	79.41	137.25	0.35
6200.00	1.00	218.92	6198.79	-59.93	52.99	50.69	79.99	138.52	0.36
6300.00	1.26	165.70	6298.77	-61.67	52.71	50.35	81.13	139.48	1.04
6400.00	1.16	173.26	6398.75	-63.74	53.10	50.66	82.96	140.20	0.18
6500.00	1.69	178.65	6498.72	-66.22	53.25	50.72	84.98	141.19	0.54
6600.00	1.95	181.31	6598.67	-69.39	53.25	50.60	87.47	142.50	0.27
6700.00	2.31	198.56	6698.60	-73.00	52.57	49.78	89.96	144.24	0.73
6800.00	1.95	199.19	6798.53	-76.52	51.37	48.44	92.16	146.13	0.36
6900.00	1.92	205.26	6898.47	-79.65	50.09	47.05	94.09	147.83	0.21
7000.00	2.61	211.67	6998.40	-83.10	48.18	45.01	96.06	149.90	0.73
7100.00	2.70	200.07	7098.29	-87.25	46.17	42.85	98.72	152.11	0.54
7200.00	1.87	193.15	7198.21	-91.06	44.99	41.53	101.57	153.70	0.88
7300.00	1.52	191.34	7298.17	-93.95	44.36	40.79	103.89	154.72	0.35
7400.00	1.22	192.90	7398.14	-96.28	43.86	40.20	105.80	155.51	0.31
7500.00	1.05	197.85	7498.12	-98.19	43.35	39.62	107.33	156.18	0.20
7600.00	0.72	229.50	7598.11	-99.46	42.59	38.81	108.20	156.82	0.57
7700.00	0.87	261.98	7698.10	-99.98	41.36	37.57	108.20	157.52	0.46
7800.00	0.88	268.91	7798.09	-100.10	39.85	36.05	107.74	158.29	0.11
7900.00	0.27	292.10	7898.08	-100.02	38.86	35.06	107.31	158.77	0.64
8000.00	0.46	333.96	7998.08	-99.57	38.47	34.69	106.74	158.88	0.32
8100.00	0.92	15.24	8098.07	-98.43	38.50	34.76	105.69	158.64	0.65
8200.00	0.87	43.65	8198.06	-97.10	39.24	35.55	104.73	158.00	0.44
8300.00	1.44	92.53	8298.04	-96.60	41.02	37.35	104.95	156.99	1.09
8400.00	2.59	106.06	8397.98	-97.28	44.45	40.75	106.96	155.45	1.23
8500.00	2.43	123.93	8497.88	-99.09	48.38	44.61	110.27	153.98	0.79
8600.00	2.36	132.16	8597.80	-101.66	51.66	47.80	114.03	153.06	0.35



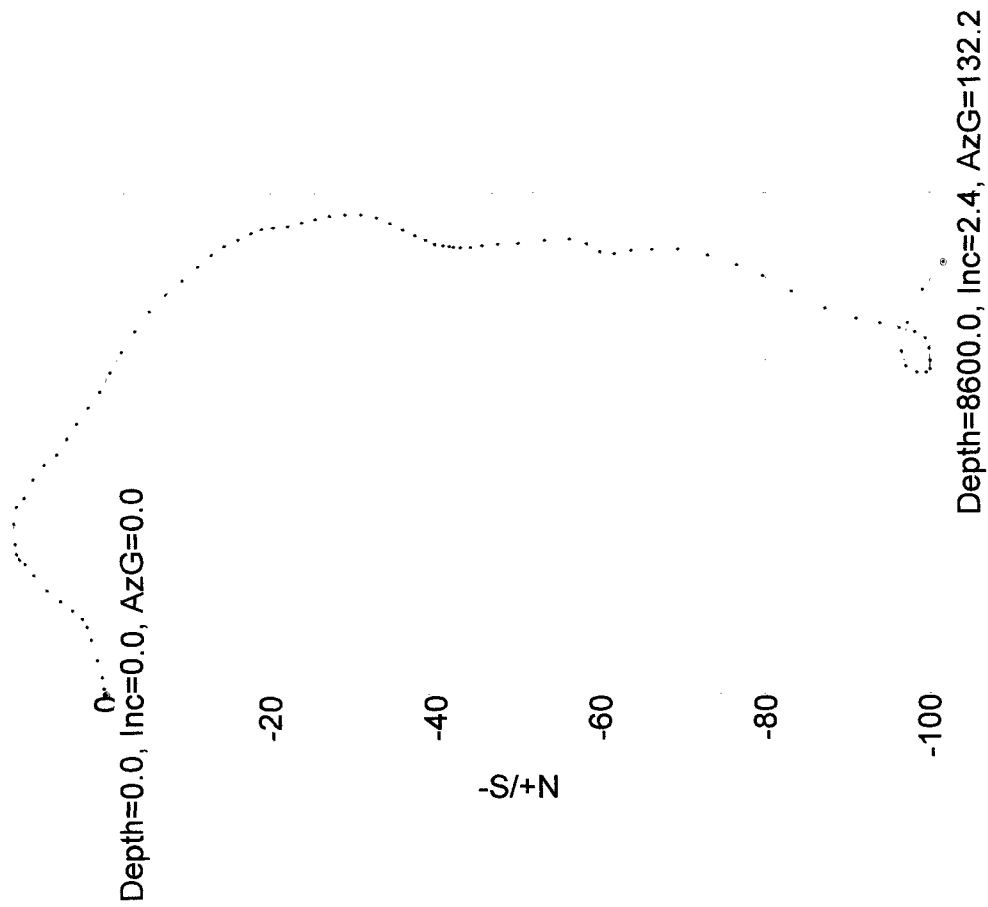
VES Survey International

Midland Tx

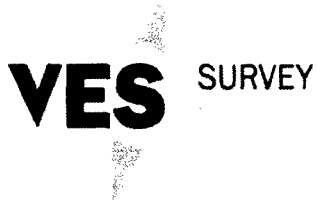
(432) 563-5444

Surveyor: Gene Heiss

Switchback State No. 021H / API 30-015-43967

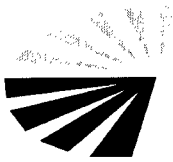


-W/+E
VES Survey Date: 1/3/2017



I Gene Heiss certify that I am employed by VES Survey International. That I did on the day(s) of 01/03/16 through 01/03/16 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 8,600.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating for the Switchback State Well # 21H API # 30-015-43967 in Eddy County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by VES Survey International.

Gene Heiss
Service Technician
VES Survey International



COG OPERATING

COG Operating L L C

Eddy County, NM (NAD 27 NME)

Sec. 10, T 24 S. , R 27 E

Switchback State 21H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

16 January, 2017





Integrity Directional Services, LLC

Survey Report - Geographic



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 10, T 24 S. , R 27 E
Well: Switchback State 21H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Switchback State 21H
TVD Reference: KB=20' @ 3189.80ft (Patriot 2)
MD Reference: KB=20' @ 3189.80ft (Patriot 2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Project	Eddy County, NM (NAD 27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Sec. 10, T 24 S. , R 27 E		
Site Position:		Northing:	445,721.7200 usft
From:	Map	Easting:	550,355.6600 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32° 13' 31.084 N
		Longitude:	104° 10' 13.777 W
		Grid Convergence:	0.09 °

Well	Switchback State 21H		
Well Position	+N/-S	0.00 ft	Northing: 445,721.7200 usft
	+E/-W	0.00 ft	Easting: 550,355.6600 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32° 13' 31.084 N
		Longitude:	104° 10' 13.777 W
		Ground Level:	3,169.80 ft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2015	9/23/2016	7.31
			Dip Angle (°)
			59.98
			Field Strength (nT)
			47,951

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)
	0.00	0.00	0.00
			Direction (°)
			87.84

Survey Program	Date 1/16/2017		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name
100.00	8,600.00	VES Gyros (Wellbore #1)	VESSI_GYROFLEX
8,666.00	14,511.00	IDS MWD Surveys (Wellbore #1)	MWD
			Description
			VESSI Gyroflex Gyro
			MWD - Standard

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	445,721.7200	550,355.6600	32° 13' 31.084 N	104° 10' 13.777 W
100.00	0.19	15.55	100.00	0.16	0.04	445,721.8797	550,355.7045	32° 13' 31.086 N	104° 10' 13.776 W
200.00	0.73	93.47	200.00	0.28	0.72	445,722.0009	550,356.3848	32° 13' 31.087 N	104° 10' 13.769 W
300.00	0.84	73.52	299.99	0.45	2.06	445,722.1703	550,357.7235	32° 13' 31.089 N	104° 10' 13.753 W
400.00	1.57	75.56	399.96	1.00	4.09	445,722.7198	550,359.7531	32° 13' 31.094 N	104° 10' 13.729 W
500.00	1.35	67.99	499.93	1.78	6.51	445,723.5029	550,362.1719	32° 13' 31.102 N	104° 10' 13.701 W
600.00	0.64	77.53	599.92	2.35	8.15	445,724.0650	550,363.8093	32° 13' 31.107 N	104° 10' 13.682 W
700.00	0.72	47.32	699.91	2.89	9.16	445,724.6115	550,364.8165	32° 13' 31.113 N	104° 10' 13.670 W
800.00	1.04	34.62	799.90	4.06	10.13	445,725.7843	550,365.7940	32° 13' 31.124 N	104° 10' 13.659 W
900.00	1.07	34.73	899.88	5.58	11.18	445,727.2984	550,366.8416	32° 13' 31.139 N	104° 10' 13.647 W
1,000.00	1.34	41.81	999.86	7.22	12.49	445,728.9373	550,368.1530	32° 13' 31.156 N	104° 10' 13.631 W



Integrity Directional Services, LLC

Survey Report - Geographic



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 10, T 24 S., R 27 E
Well: Switchback State 21H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Switchback State 21H
TVD Reference: KB=20' @ 3189.80ft (Patriot 2)
MD Reference: KB=20' @ 3189.80ft (Patriot 2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,100.00	1.48	58.63	1,099.83	8.76	14.38	445,730.4811	550,370.0351	32° 13' 31.171 N	104° 10' 13.609 W
1,200.00	0.52	31.89	1,199.81	9.82	15.72	445,731.5387	550,371.3775	32° 13' 31.181 N	104° 10' 13.594 W
1,300.00	0.42	39.57	1,299.81	10.49	16.19	445,732.2065	550,371.8507	32° 13' 31.188 N	104° 10' 13.588 W
1,400.00	0.44	75.96	1,399.81	10.86	16.80	445,732.5822	550,372.4567	32° 13' 31.192 N	104° 10' 13.581 W
1,500.00	1.01	80.11	1,499.80	11.11	18.04	445,732.8267	550,373.6975	32° 13' 31.194 N	104° 10' 13.567 W
1,600.00	1.79	90.95	1,599.77	11.23	20.47	445,732.9522	550,376.1273	32° 13' 31.195 N	104° 10' 13.538 W
1,700.00	0.65	124.99	1,699.75	10.88	22.49	445,732.6010	550,378.1537	32° 13' 31.192 N	104° 10' 13.515 W
1,800.00	1.08	134.07	1,799.73	9.90	23.64	445,731.6203	550,379.2956	32° 13' 31.182 N	104° 10' 13.502 W
1,900.00	1.79	105.64	1,899.70	8.82	25.82	445,730.5437	550,381.4767	32° 13' 31.171 N	104° 10' 13.476 W
2,000.00	1.11	165.63	1,999.68	7.46	27.56	445,729.1843	550,383.2212	32° 13' 31.158 N	104° 10' 13.456 W
2,100.00	1.33	122.34	2,099.65	5.91	28.78	445,727.6251	550,384.4421	32° 13' 31.142 N	104° 10' 13.442 W
2,200.00	1.15	120.21	2,199.63	4.78	30.63	445,726.4994	550,386.2899	32° 13' 31.131 N	104° 10' 13.420 W
2,300.00	1.48	124.06	2,299.60	3.55	32.57	445,725.2712	550,388.2269	32° 13' 31.119 N	104° 10' 13.398 W
2,400.00	1.22	131.79	2,399.58	2.12	34.43	445,723.8385	550,390.0905	32° 13' 31.105 N	104° 10' 13.376 W
2,500.00	1.47	120.51	2,499.55	0.76	36.33	445,722.4778	550,391.9894	32° 13' 31.091 N	104° 10' 13.354 W
2,600.00	1.52	118.10	2,599.52	-0.52	38.60	445,721.2019	550,394.2644	32° 13' 31.079 N	104° 10' 13.328 W
2,700.00	1.72	121.00	2,699.48	-1.92	41.06	445,719.8043	550,396.7207	32° 13' 31.065 N	104° 10' 13.299 W
2,800.00	1.70	123.71	2,799.43	-3.51	43.58	445,718.2081	550,399.2410	32° 13' 31.049 N	104° 10' 13.270 W
2,900.00	1.67	131.46	2,899.39	-5.30	45.91	445,716.4201	550,401.5670	32° 13' 31.031 N	104° 10' 13.243 W
3,000.00	1.57	136.77	2,999.35	-7.26	47.94	445,714.4572	550,403.5973	32° 13' 31.012 N	104° 10' 13.219 W
3,100.00	1.45	141.14	3,099.31	-9.25	49.67	445,712.4739	550,405.3294	32° 13' 30.992 N	104° 10' 13.199 W
3,200.00	1.43	138.21	3,199.28	-11.16	51.29	445,710.5584	550,406.9547	32° 13' 30.973 N	104° 10' 13.180 W
3,300.00	1.09	142.72	3,299.26	-12.85	52.70	445,708.8712	550,408.3624	32° 13' 30.956 N	104° 10' 13.164 W
3,400.00	1.02	150.96	3,399.24	-14.38	53.71	445,707.3362	550,409.3706	32° 13' 30.941 N	104° 10' 13.152 W
3,500.00	1.05	156.49	3,499.22	-16.00	54.51	445,705.7179	550,410.1681	32° 13' 30.925 N	104° 10' 13.143 W
3,600.00	0.95	151.04	3,599.21	-17.57	55.28	445,704.1523	550,410.9350	32° 13' 30.910 N	104° 10' 13.134 W
3,700.00	0.65	169.62	3,699.20	-18.85	55.78	445,702.8691	550,411.4386	32° 13' 30.897 N	104° 10' 13.128 W
3,800.00	0.99	178.59	3,799.19	-20.27	55.90	445,701.4475	550,411.5621	32° 13' 30.883 N	104° 10' 13.127 W
3,900.00	1.04	165.95	3,899.17	-22.02	56.14	445,699.7035	550,411.8036	32° 13' 30.866 N	104° 10' 13.124 W
4,000.00	0.97	166.58	3,999.16	-23.72	56.56	445,697.9998	550,412.2204	32° 13' 30.849 N	104° 10' 13.119 W
4,100.00	0.98	166.38	4,099.14	-25.37	56.96	445,696.3453	550,412.6182	32° 13' 30.832 N	104° 10' 13.114 W
4,200.00	1.03	170.81	4,199.13	-27.09	57.30	445,694.6270	550,412.9631	32° 13' 30.815 N	104° 10' 13.110 W
4,300.00	1.11	174.42	4,299.11	-28.94	57.54	445,692.7757	550,413.2009	32° 13' 30.797 N	104° 10' 13.108 W
4,400.00	1.15	187.53	4,399.09	-30.90	57.50	445,690.8168	550,413.1636	32° 13' 30.778 N	104° 10' 13.108 W
4,500.00	1.07	195.33	4,499.07	-32.80	57.13	445,688.9215	550,412.7852	32° 13' 30.759 N	104° 10' 13.113 W
4,600.00	0.95	207.10	4,599.06	-34.44	56.50	445,687.2831	550,412.1607	32° 13' 30.743 N	104° 10' 13.120 W
4,700.00	1.04	207.79	4,699.04	-35.98	55.70	445,685.7422	550,411.3599	32° 13' 30.727 N	104° 10' 13.129 W
4,800.00	0.83	201.39	4,799.03	-37.46	55.01	445,684.2650	550,410.6727	32° 13' 30.713 N	104° 10' 13.137 W
4,900.00	0.77	207.39	4,899.02	-38.73	54.44	445,682.9940	550,410.0994	32° 13' 30.700 N	104° 10' 13.144 W
5,000.00	0.70	200.33	4,999.01	-39.90	53.92	445,681.8246	550,409.5781	32° 13' 30.689 N	104° 10' 13.150 W
5,100.00	0.51	178.22	5,099.01	-40.91	53.72	445,680.8070	550,409.3797	32° 13' 30.679 N	104° 10' 13.152 W
5,200.00	0.36	196.22	5,199.00	-41.66	53.65	445,680.0605	550,409.3057	32° 13' 30.671 N	104° 10' 13.153 W
5,300.00	0.23	187.10	5,299.00	-42.16	53.53	445,679.5596	550,409.1932	32° 13' 30.666 N	104° 10' 13.154 W
5,400.00	0.73	182.24	5,399.00	-43.00	53.48	445,678.7239	550,409.1435	32° 13' 30.658 N	104° 10' 13.155 W
5,500.00	0.68	177.80	5,498.99	-44.23	53.48	445,677.4944	550,409.1413	32° 13' 30.646 N	104° 10' 13.155 W
5,600.00	0.97	167.06	5,598.98	-45.64	53.69	445,676.0765	550,409.3537	32° 13' 30.632 N	104° 10' 13.153 W
5,700.00	1.22	178.70	5,698.96	-47.53	53.91	445,674.1873	550,409.5674	32° 13' 30.613 N	104° 10' 13.150 W
5,800.00	1.58	178.63	5,798.93	-49.98	53.96	445,671.7447	550,409.6245	32° 13' 30.589 N	104° 10' 13.150 W
5,900.00	2.10	168.66	5,898.88	-53.15	54.36	445,668.5701	550,410.0177	32° 13' 30.558 N	104° 10' 13.145 W
6,000.00	1.40	190.12	5,998.83	-56.15	54.50	445,665.5710	550,410.1633	32° 13' 30.528 N	104° 10' 13.143 W
6,100.00	1.15	201.52	6,098.81	-58.29	53.92	445,663.4348	550,409.5806	32° 13' 30.507 N	104° 10' 13.150 W
6,200.00	1.00	218.92	6,198.79	-59.90	53.00	445,661.8224	550,408.6642	32° 13' 30.491 N	104° 10' 13.161 W
6,300.00	1.26	165.70	6,298.77	-61.64	52.73	445,660.0780	550,408.3876	32° 13' 30.473 N	104° 10' 13.164 W
6,400.00	1.16	173.26	6,398.75	-63.71	53.12	445,658.0074	550,408.7780	32° 13' 30.453 N	104° 10' 13.160 W
6,500.00	1.69	178.65	6,498.72	-66.19	53.27	445,655.5279	550,408.9315	32° 13' 30.428 N	104° 10' 13.158 W



Integrity Directional Services, LLC

Survey Report - Geographic



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 10, T 24 S., R 27 E
Well: Switchback State 21H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Switchback State 21H
TVD Reference: KB=20' @ 3189.80ft (Patriot 2)
MD Reference: KB=20' @ 3189.80ft (Patriot 2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,600.00	1.95	181.31	6,598.67	-69.37	53.27	445,652.3528	550,408.9273	32° 13' 30.397 N	104° 10' 13.158 W
6,700.00	2.31	198.56	6,698.60	-72.98	52.59	445,648.7414	550,408.2470	32° 13' 30.361 N	104° 10' 13.166 W
6,800.00	1.95	199.19	6,798.53	-76.50	51.39	445,645.2241	550,407.0463	32° 13' 30.327 N	104° 10' 13.180 W
6,900.00	1.92	205.26	6,898.48	-79.62	50.11	445,642.1022	550,405.7722	32° 13' 30.296 N	104° 10' 13.195 W
7,000.00	2.61	211.67	6,998.40	-83.07	48.20	445,638.6493	550,403.8619	32° 13' 30.261 N	104° 10' 13.217 W
7,100.00	2.70	200.07	7,098.29	-87.22	46.20	445,634.4992	550,401.8582	32° 13' 30.220 N	104° 10' 13.241 W
7,200.00	1.87	193.15	7,198.21	-91.02	45.02	445,630.6980	550,400.6787	32° 13' 30.183 N	104° 10' 13.254 W
7,300.00	1.52	191.34	7,298.17	-93.91	44.39	445,627.8088	550,400.0467	32° 13' 30.154 N	104° 10' 13.262 W
7,400.00	1.22	192.90	7,398.14	-96.25	43.89	445,625.4707	550,399.5483	32° 13' 30.131 N	104° 10' 13.268 W
7,500.00	1.05	197.85	7,498.12	-98.16	43.37	445,623.5609	550,399.0297	32° 13' 30.112 N	104° 10' 13.274 W
7,600.00	0.72	229.50	7,598.11	-99.44	42.61	445,622.2807	550,398.2711	32° 13' 30.100 N	104° 10' 13.283 W
7,700.00	0.87	261.98	7,698.10	-99.95	41.38	445,621.7667	550,397.0416	32° 13' 30.095 N	104° 10' 13.297 W
7,800.00	0.88	268.91	7,798.09	-100.07	39.86	445,621.6462	550,395.5220	32° 13' 30.093 N	104° 10' 13.315 W
7,900.00	0.27	292.10	7,898.08	-100.00	38.88	445,621.7202	550,394.5360	32° 13' 30.094 N	104° 10' 13.326 W
8,000.00	0.46	333.96	7,998.08	-99.55	38.48	445,622.1695	550,394.1414	32° 13' 30.099 N	104° 10' 13.331 W
8,100.00	0.92	15.24	8,098.07	-98.42	38.52	445,623.3048	550,394.1762	32° 13' 30.110 N	104° 10' 13.330 W
8,200.00	0.87	43.65	8,198.06	-97.09	39.25	445,624.6287	550,394.9113	32° 13' 30.123 N	104° 10' 13.322 W
8,300.00	1.44	92.53	8,298.04	-96.60	41.03	445,625.1226	550,396.6907	32° 13' 30.128 N	104° 10' 13.301 W
8,400.00	2.59	106.06	8,397.98	-97.28	44.46	445,624.4420	550,400.1173	32° 13' 30.121 N	104° 10' 13.261 W
8,500.00	2.43	123.93	8,497.88	-99.09	48.39	445,622.6337	550,404.0476	32° 13' 30.103 N	104° 10' 13.215 W
8,600.00	2.36	132.16	8,597.80	-101.65	51.67	445,620.0684	550,407.3328	32° 13' 30.078 N	104° 10' 13.177 W
8,666.00	2.51	130.25	8,663.74	-103.50	53.78	445,618.2225	550,409.4431	32° 13' 30.059 N	104° 10' 13.153 W
First IDS MWD Survey									
8,697.00	2.35	124.12	8,694.71	-104.29	54.83	445,617.4275	550,410.4873	32° 13' 30.051 N	104° 10' 13.141 W
8,728.00	4.68	104.28	8,725.65	-104.96	56.58	445,616.7589	550,412.2393	32° 13' 30.045 N	104° 10' 13.120 W
8,760.00	9.21	93.31	8,757.41	-105.43	60.40	445,616.2888	550,416.0632	32° 13' 30.040 N	104° 10' 13.076 W
8,791.00	12.94	85.34	8,787.83	-105.29	66.34	445,616.4276	550,422.0017	32° 13' 30.041 N	104° 10' 13.006 W
8,822.00	15.81	83.43	8,817.85	-104.53	74.00	445,617.1929	550,429.6580	32° 13' 30.049 N	104° 10' 12.917 W
8,854.00	18.15	85.58	8,848.46	-103.64	83.30	445,618.0759	550,438.9592	32° 13' 30.057 N	104° 10' 12.809 W
8,885.00	22.05	85.63	8,877.56	-102.83	93.92	445,618.8917	550,449.5793	32° 13' 30.065 N	104° 10' 12.685 W
8,917.00	24.91	84.52	8,906.91	-101.73	106.62	445,619.9932	550,462.2795	32° 13' 30.076 N	104° 10' 12.538 W
8,948.00	27.55	87.49	8,934.72	-100.79	120.28	445,620.9308	550,475.9433	32° 13' 30.085 N	104° 10' 12.378 W
8,980.00	31.18	87.10	8,962.60	-100.05	135.96	445,621.6743	550,491.6149	32° 13' 30.092 N	104° 10' 12.196 W
9,011.00	34.23	83.63	8,988.69	-98.67	152.64	445,623.0481	550,508.3000	32° 13' 30.106 N	104° 10' 12.002 W
9,043.00	38.62	82.00	9,014.43	-96.28	171.48	445,625.4377	550,527.1435	32° 13' 30.129 N	104° 10' 11.782 W
9,074.00	42.39	80.49	9,038.00	-93.21	191.38	445,628.5118	550,547.0374	32° 13' 30.159 N	104° 10' 11.551 W
9,106.00	45.92	79.37	9,060.95	-89.30	213.32	445,632.4155	550,568.9799	32° 13' 30.197 N	104° 10' 11.295 W
9,137.00	49.21	78.18	9,081.87	-84.85	235.76	445,636.8746	550,591.4164	32° 13' 30.241 N	104° 10' 11.034 W
9,169.00	51.88	77.46	9,102.20	-79.63	259.91	445,642.0899	550,615.5651	32° 13' 30.292 N	104° 10' 10.753 W
9,200.00	55.25	77.09	9,120.61	-74.14	284.23	445,647.5845	550,639.8889	32° 13' 30.346 N	104° 10' 10.469 W
9,232.00	58.99	77.51	9,137.98	-68.23	310.44	445,653.4895	550,666.1010	32° 13' 30.404 N	104° 10' 10.164 W
9,263.00	61.32	78.54	9,153.40	-62.65	336.74	445,659.0652	550,692.4027	32° 13' 30.459 N	104° 10' 9.858 W
9,295.00	62.81	79.94	9,168.39	-57.38	364.52	445,664.3407	550,720.1756	32° 13' 30.511 N	104° 10' 9.534 W
9,326.00	64.81	81.72	9,182.08	-52.95	391.98	445,668.7696	550,747.6351	32° 13' 30.554 N	104° 10' 9.215 W
9,358.00	66.08	80.90	9,195.37	-48.55	420.75	445,673.1681	550,776.4058	32° 13' 30.597 N	104° 10' 8.880 W
9,389.00	67.57	81.49	9,207.57	-44.19	448.91	445,677.5295	550,804.5676	32° 13' 30.640 N	104° 10' 8.552 W
9,421.00	71.99	80.99	9,218.63	-39.62	478.58	445,682.1033	550,834.2374	32° 13' 30.685 N	104° 10' 8.206 W
9,452.00	77.25	80.85	9,226.85	-34.90	508.08	445,686.8191	550,863.7422	32° 13' 30.731 N	104° 10' 7.863 W
9,484.00	81.89	80.02	9,232.64	-29.67	539.11	445,692.0487	550,894.7668	32° 13' 30.783 N	104° 10' 7.501 W
9,514.00	86.17	79.35	9,235.76	-24.33	568.46	445,697.3908	550,924.1147	32° 13' 30.835 N	104° 10' 7.160 W
9,547.00	87.60	79.17	9,237.55	-18.19	600.83	445,703.5312	550,956.4878	32° 13' 30.895 N	104° 10' 6.783 W
9,667.00	89.62	77.86	9,240.47	5.70	718.38	445,727.4163	551,074.0414	32° 13' 31.130 N	104° 10' 5.414 W
9,762.00	88.39	78.28	9,242.12	25.33	811.31	445,747.0510	551,166.9733	32° 13' 31.323 N	104° 10' 4.332 W
9,857.00	88.08	81.18	9,245.04	42.26	904.74	445,763.9786	551,260.3966	32° 13' 31.489 N	104° 10' 3.244 W
9,951.00	87.30	83.87	9,248.83	54.48	997.85	445,776.1968	551,353.5125	32° 13' 31.608 N	104° 10' 2.159 W



Integrity Directional Services, LLC

Survey Report - Geographic



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 10, T 24 S., R 27 E
Well: Switchback State 21H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Switchback State 21H
TVD Reference: KB=20' @ 3189.80ft (Patriot 2)
MD Reference: KB=20' @ 3189.80ft (Patriot 2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,046.00	88.22	85.00	9,252.54	63.68	1,092.33	445,785.4018	551,447.9897	32° 13' 31.698 N	104° 10' 1.059 W
10,140.00	88.11	85.77	9,255.55	71.24	1,185.98	445,792.9611	551,541.6360	32° 13' 31.771 N	104° 9' 59.969 W
10,235.00	88.98	86.95	9,257.97	77.27	1,280.75	445,798.9901	551,636.4111	32° 13' 31.830 N	104° 9' 58.866 W
10,329.00	89.54	88.07	9,259.18	81.35	1,374.66	445,803.0734	551,730.3124	32° 13' 31.869 N	104° 9' 57.772 W
10,424.00	89.62	87.83	9,259.88	84.75	1,469.59	445,806.4716	551,825.2488	32° 13' 31.901 N	104° 9' 56.667 W
10,518.00	89.48	88.47	9,260.62	87.79	1,563.54	445,809.5061	551,919.1962	32° 13' 31.929 N	104° 9' 55.573 W
10,613.00	89.15	87.87	9,261.75	90.82	1,658.48	445,812.5396	552,014.1402	32° 13' 31.958 N	104° 9' 54.468 W
10,707.00	88.89	89.21	9,263.36	93.21	1,752.44	445,814.9343	552,108.0935	32° 13' 31.980 N	104° 9' 53.374 W
10,802.00	88.19	88.32	9,265.78	95.26	1,847.38	445,816.9810	552,203.0389	32° 13' 31.999 N	104° 9' 52.269 W
10,897.00	87.74	89.67	9,269.15	96.93	1,942.31	445,818.6463	552,297.9617	32° 13' 32.014 N	104° 9' 51.164 W
10,991.00	87.27	89.60	9,273.25	97.52	2,036.21	445,819.2445	552,391.8702	32° 13' 32.018 N	104° 9' 50.070 W
11,086.00	86.85	88.88	9,278.12	98.78	2,131.08	445,820.5029	552,486.7358	32° 13' 32.029 N	104° 9' 48.966 W
11,181.00	87.21	88.46	9,283.04	100.99	2,225.93	445,822.7050	552,581.5821	32° 13' 32.050 N	104° 9' 47.862 W
11,276.00	88.81	88.65	9,286.34	103.38	2,320.84	445,825.0990	552,676.4913	32° 13' 32.072 N	104° 9' 46.757 W
11,370.00	90.01	89.17	9,287.31	105.17	2,414.81	445,826.8870	552,770.4670	32° 13' 32.088 N	104° 9' 45.663 W
11,465.00	90.01	89.40	9,287.29	106.35	2,509.80	445,828.0725	552,865.4594	32° 13' 32.098 N	104° 9' 44.557 W
11,560.00	90.32	88.24	9,287.02	108.31	2,604.78	445,830.0288	552,960.4369	32° 13' 32.116 N	104° 9' 43.451 W
11,655.00	90.43	87.51	9,286.39	111.83	2,699.71	445,833.5512	553,055.3687	32° 13' 32.149 N	104° 9' 42.346 W
11,750.00	90.55	87.59	9,285.58	115.89	2,794.62	445,837.6121	553,150.2782	32° 13' 32.188 N	104° 9' 41.241 W
11,844.00	88.84	87.91	9,286.08	119.58	2,888.55	445,841.3023	553,244.2006	32° 13' 32.223 N	104° 9' 40.147 W
11,939.00	88.53	87.14	9,288.26	123.68	2,983.43	445,845.4036	553,339.0860	32° 13' 32.262 N	104° 9' 39.043 W
12,034.00	87.94	86.98	9,291.19	128.55	3,078.26	445,850.2738	553,433.9153	32° 13' 32.309 N	104° 9' 37.939 W
12,129.00	88.16	86.30	9,294.42	134.12	3,173.04	445,855.8385	553,528.6962	32° 13' 32.363 N	104° 9' 36.835 W
12,224.00	87.77	84.66	9,297.80	141.60	3,267.68	445,863.3200	553,623.3375	32° 13' 32.435 N	104° 9' 35.733 W
12,319.00	87.04	84.52	9,302.10	150.55	3,362.16	445,872.2675	553,717.8165	32° 13' 32.522 N	104° 9' 34.633 W
12,414.00	85.47	83.82	9,308.30	160.18	3,456.47	445,881.8958	553,812.1196	32° 13' 32.616 N	104° 9' 33.535 W
12,509.00	82.40	83.90	9,318.34	170.28	3,550.38	445,891.9989	553,906.0345	32° 13' 32.714 N	104° 9' 32.442 W
12,604.00	84.40	86.58	9,329.26	178.10	3,644.41	445,899.8244	554,000.0660	32° 13' 32.790 N	104° 9' 31.347 W
12,698.00	85.42	88.43	9,337.60	182.18	3,737.95	445,903.8988	554,093.6011	32° 13' 32.829 N	104° 9' 30.258 W
12,792.00	88.78	94.29	9,342.36	179.95	3,831.75	445,901.6648	554,187.3994	32° 13' 32.805 N	104° 9' 29.166 W
12,887.00	91.33	93.35	9,342.27	173.62	3,926.53	445,895.3363	554,282.1792	32° 13' 32.741 N	104° 9' 28.063 W
12,982.00	92.51	91.21	9,339.08	169.84	4,021.39	445,891.5587	554,377.0433	32° 13' 32.702 N	104° 9' 26.958 W
13,076.00	92.99	91.59	9,334.57	167.55	4,115.25	445,889.2648	554,470.9064	32° 13' 32.678 N	104° 9' 25.866 W
13,171.00	93.35	89.74	9,329.32	166.44	4,210.10	445,888.1637	554,565.7501	32° 13' 32.666 N	104° 9' 24.762 W
13,266.00	92.20	90.52	9,324.72	166.23	4,304.98	445,887.9481	554,660.6360	32° 13' 32.662 N	104° 9' 23.657 W
13,361.00	90.01	89.25	9,322.89	166.42	4,399.96	445,888.1391	554,755.6102	32° 13' 32.662 N	104° 9' 22.551 W
13,456.00	89.79	89.27	9,323.05	167.65	4,494.95	445,889.3661	554,850.6019	32° 13' 32.673 N	104° 9' 21.445 W
13,550.00	88.33	87.60	9,324.60	170.21	4,588.90	445,891.9325	554,944.5481	32° 13' 32.697 N	104° 9' 20.352 W
13,645.00	88.42	87.62	9,327.29	174.17	4,683.78	445,895.8925	555,039.4271	32° 13' 32.734 N	104° 9' 19.247 W
13,740.00	88.11	87.73	9,330.17	178.03	4,778.65	445,899.7447	555,134.3051	32° 13' 32.771 N	104° 9' 18.142 W
13,834.00	86.06	86.97	9,334.95	182.36	4,872.43	445,904.0843	555,228.0772	32° 13' 32.812 N	104° 9' 17.051 W
13,930.00	87.83	88.58	9,340.06	186.09	4,968.21	445,907.8047	555,323.8614	32° 13' 32.848 N	104° 9' 15.936 W
14,025.00	88.87	88.60	9,342.80	188.42	5,063.14	445,910.1413	555,418.7917	32° 13' 32.869 N	104° 9' 14.830 W
14,120.00	89.12	87.30	9,344.46	191.82	5,158.06	445,913.5391	555,513.7140	32° 13' 32.901 N	104° 9' 13.725 W
14,215.00	90.04	88.60	9,345.16	195.22	5,253.00	445,916.9371	555,608.6474	32° 13' 32.933 N	104° 9' 12.620 W
14,310.00	90.01	88.97	9,345.12	197.23	5,347.98	445,918.9515	555,703.6257	32° 13' 32.952 N	104° 9' 11.514 W
14,404.00	89.81	89.34	9,345.27	198.62	5,441.97	445,920.3377	555,797.6150	32° 13' 32.964 N	104° 9' 10.420 W
14,451.00	89.76	89.79	9,345.44	198.97	5,488.96	445,920.6946	555,844.6131	32° 13' 32.967 N	104° 9' 9.873 W

Final IDS MWD Survey

14,511.00	89.76	89.79	9,345.69	199.19	5,548.96	445,920.9145	555,904.6120	32° 13' 32.968 N	104° 9' 9.174 W
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Projection to TD



Integrity Directional Services, LLC

Survey Report - Geographic



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 10, T 24 S., R 27 E
Well: Switchback State 21H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Switchback State 21H
TVD Reference: KB=20' @ 3189.80ft (Patriot 2)
MD Reference: KB=20' @ 3189.80ft (Patriot 2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
8,666.00	8,663.74	-103.50	53.78	First IDS MWD Survey
14,451.00	9,345.44	198.97	5,488.96	Final IDS MWD Survey
14,511.00	9,345.69	199.19	5,548.96	Projection to TD

Checked By: _____ Approved By: _____ Date: _____