

NM OIL CONSERVATION
ARTESIA DISTRICT

JAN 20 2015

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30-015-39813

COG Operating LLC

Eddy County, NM (NAD27 NME)

Bradley 8 Fee

#4H

WB1 / Job #1411779

Design: Surveys (Silver Oak 3)

Standard Survey Report

08 October, 2014





Phoenix
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Eddy County, NM (NAD27/NME)	TVD Reference:	KB @ 3388.00usft (Silver Oak 3)
Site:	Bradley 8 Fee	MD Reference:	KB @ 3388.00usft (Silver Oak 3)
Well:	#4H	North Reference:	Grid
Wellbore:	WB1 / Job #1411779	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Silver Oak 3)	Database:	Compass 5000 GCR DB

Project: Eddy County, NM (NAD27, 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		Bradley 8 Fee			
Site Position:		Northing:		606,797.50 usft	
From:		Easting:		478,847.80 usft	
Position Uncertainty:		Slot Radius:		Grid Convergence:	
Map		0.00 usft		13-3/16 "	
				32° 40' 5.40482 N	
				104° 24' 7.45386 W	
				-0.04 °	

Well	#4H					
Well Position	+N/-S	0.00 usft	Northing:	606,800.00 usft	Latitude:	32° 40' 5.43715 N
	+E/-W	0.00 usft	Easting:	480,067.80 usft	Longitude:	104° 23' 53.18144 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,370.00 usft

Wellbore						WB1 / Job #1411779					
Magnetics		Model Name		Sample Date		Declination (°)		Dip Angle (°)		Field Strength (nT)	
		IGRF2010_14		10/1/2014		7.60		60.37		48,463	

Design:		Surveys (Silver Oak 3)			
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	359.68	

Survey Program		Date	10/8/2014		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,420.00	VES Gyro Survey (WB1 / Job #1411779)	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro	
2,434.00	7,619.00	Phoenix MWD Survey (WB1 / Job #14117	PHX+MWD+IGRF	PHX+MWD+IGRF v3:standard declination	

Survey	Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100.00	0.44	231.98	100.00	-0.24	-0.30	-0.23	0.44	0.44	0.00
	200.00	0.86	265.20	199.99	-0.54	-1.35	-0.53	0.55	0.42	33.22
	300.00	1.96	301.32	299.96	0.29	-3.56	0.31	1.36	1.10	36.12
	400.00	2.53	321.51	399.89	2.91	-6.40	2.94	0.97	0.57	20.19
	500.00	2.77	320.30	499.78	6.49	-9.31	6.55	0.25	0.24	-1.21
	600.00	2.71	322.78	599.67	10.24	-12.29	10.30	0.13	-0.06	2.48
	700.00	2.22	316.59	699.57	13.52	-15.05	13.61	0.56	-0.49	-6.19
	800.00	1.80	316.49	799.51	16.07	-17.46	16.17	0.42	-0.42	-0.10
	900.00	1.75	334.69	899.46	18.59	-19.19	18.70	0.56	-0.05	18.20



Phoenix
Survey Report



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Site:	Bradley 8 Fee	MD Reference:	KB @ 3388.00usft (Silver Oak 3)
Well:	#4H	North Reference:	Grid
Wellbore:	WB1 / Job #1411779	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Silver Oak 3)	Database:	Compass 5000 GCR DB

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,000.00	1.74	335.28	999.42	21.35	-20.48	21.46	0.02	-0.01	0.59
1,100.00	1.48	338.67	1,099.38	23.93	-21.59	24.05	0.28	-0.26	3.39
1,200.00	1.12	349.92	1,199.35	26.10	-22.23	26.22	0.44	-0.36	11.25
1,300.00	1.10	345.29	1,299.33	27.99	-22.64	28.11	0.09	-0.02	-4.63
1,400.00	1.01	348.80	1,399.32	29.78	-23.06	29.91	0.11	-0.09	3.51
1,500.00	0.76	345.76	1,499.30	31.29	-23.39	31.42	0.25	-0.25	-3.04
1,600.00	0.45	352.59	1,599.30	32.32	-23.61	32.45	0.32	-0.31	6.83
1,700.00	0.66	353.62	1,699.29	33.28	-23.72	33.41	0.21	0.21	1.03
1,800.00	0.82	359.01	1,799.29	34.57	-23.80	34.70	0.17	0.16	5.39
1,900.00	0.50	359.54	1,899.28	35.72	-23.81	35.85	0.32	-0.32	0.53
2,000.00	0.57	341.47	1,999.27	36.63	-23.97	36.76	0.18	0.07	-18.07
2,100.00	0.45	315.19	2,099.27	37.38	-24.41	37.52	0.26	-0.12	-26.28
2,200.00	0.35	310.88	2,199.27	37.86	-24.92	38.00	0.10	-0.10	-4.31
2,300.00	0.48	311.93	2,299.27	38.34	-25.46	38.48	0.13	0.13	1.05
2,400.00	0.60	309.05	2,399.26	38.95	-26.18	39.09	0.12	0.12	-2.88
2,420.00	0.62	301.82	2,419.26	39.07	-26.35	39.22	0.40	0.10	-36.15
Tie-on to VES Gyro Survey									
2,434.00	0.40	308.70	2,433.26	39.14	-26.45	39.29	1.63	-1.57	49.14
First Phoenix MWD Survey									
2,466.00	0.50	300.00	2,465.26	39.28	-26.66	39.43	0.38	0.31	-27.19
2,497.00	0.40	274.90	2,496.26	39.36	-26.89	39.51	0.71	-0.32	-80.97
2,529.00	1.70	355.10	2,528.25	39.84	-27.04	39.99	5.25	4.06	250.63
2,560.00	5.80	2.50	2,559.18	41.86	-27.01	42.01	13.29	13.23	23.87
2,591.00	9.90	3.90	2,589.88	46.09	-26.76	46.24	13.24	13.23	4.52
2,622.00	13.10	5.50	2,620.26	52.25	-26.24	52.39	10.37	10.32	5.16
2,653.00	16.20	6.60	2,650.25	60.04	-25.41	60.18	10.04	10.00	3.55
2,684.00	19.40	8.30	2,679.76	69.43	-24.17	69.57	10.46	10.32	5.48
2,715.00	22.70	10.40	2,708.69	80.42	-22.34	80.54	10.92	10.65	6.77
2,746.00	25.90	11.50	2,736.94	92.94	-19.91	93.05	10.42	10.32	3.55
2,778.00	29.10	11.00	2,765.32	107.43	-17.03	107.52	10.03	10.00	-1.56
2,809.00	32.40	10.50	2,791.95	123.00	-14.08	123.07	10.68	10.65	-1.61
2,840.00	35.30	11.20	2,817.70	139.95	-10.83	140.01	9.44	9.35	2.26
2,871.00	38.00	11.80	2,842.57	158.08	-7.14	158.12	8.79	8.71	1.94
2,902.00	41.00	12.40	2,866.48	177.36	-3.00	177.38	9.76	9.68	1.94
2,933.00	43.50	12.60	2,889.43	197.71	1.51	197.70	8.08	8.06	0.65
2,965.00	45.90	12.60	2,912.17	219.67	6.42	219.63	7.50	7.50	0.00
2,996.00	48.40	11.90	2,933.25	241.88	11.24	241.82	8.23	8.06	-2.26
3,027.00	51.30	11.40	2,953.24	265.09	16.02	264.99	9.44	9.35	-1.61
3,059.00	53.90	11.10	2,972.67	290.02	20.98	289.90	8.16	8.13	-0.94
3,090.00	56.50	10.90	2,990.36	315.00	25.84	314.85	8.40	8.39	-0.65
3,121.00	59.70	10.40	3,006.74	340.87	30.70	340.69	10.41	10.32	-1.61
3,152.00	62.60	10.10	3,021.70	367.58	35.53	367.38	9.39	9.35	-0.97
3,183.00	65.00	9.70	3,035.39	394.98	40.31	394.75	7.83	7.74	-1.29



Phoenix
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Wellbore:	WB1 / Job #1411779	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Silver Oak 3)	Database:	Compass 5000 GCR DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,215.00	67.60	9.00	3,048.25	423.89	45.07	423.63	8.37	8.13	-2.19
3,246.00	70.10	8.00	3,059.43	452.48	49.34	452.20	8.61	8.06	-3.23
3,277.00	72.20	7.20	3,069.45	481.56	53.22	481.26	7.20	6.77	-2.58
3,308.00	74.60	6.00	3,078.30	511.07	56.63	510.74	8.58	7.74	-3.87
3,339.00	77.60	4.80	3,085.75	541.02	59.46	540.68	10.38	9.68	-3.87
3,371.00	81.20	4.20	3,091.64	572.38	61.93	572.02	11.40	11.25	-1.88
3,402.00	84.60	3.70	3,095.47	603.06	64.04	602.69	11.08	10.97	-1.61
3,434.00	88.00	3.20	3,097.53	634.93	65.97	634.55	10.74	10.63	-1.56
3,465.00	90.50	2.70	3,097.94	665.88	67.56	665.50	8.22	8.06	-1.61
3,516.00	92.40	2.20	3,096.65	716.82	69.74	716.42	3.85	3.73	-0.98
3,579.00	92.30	2.70	3,094.06	779.71	72.43	779.29	0.81	-0.16	0.79
3,672.00	90.70	2.70	3,091.63	872.57	76.81	872.13	1.72	-1.72	0.00
3,765.00	90.60	2.50	3,090.57	965.47	81.03	965.00	0.24	-0.11	-0.22
3,859.00	90.60	1.80	3,089.59	1,059.40	84.55	1,058.91	0.74	0.00	-0.74
3,952.00	89.40	359.60	3,089.59	1,152.38	85.69	1,151.89	2.69	-1.29	-2.37
4,046.00	90.20	358.80	3,089.92	1,246.37	84.38	1,245.88	1.20	0.85	-0.85
4,139.00	90.80	358.00	3,089.11	1,339.33	81.78	1,338.85	1.08	0.65	-0.86
4,233.00	91.00	357.90	3,087.63	1,433.26	78.42	1,432.80	0.24	0.21	-0.11
4,327.00	90.80	357.80	3,086.15	1,527.18	74.89	1,526.74	0.24	-0.21	-0.11
4,420.00	90.70	357.70	3,084.94	1,620.10	71.24	1,619.68	0.15	-0.11	-0.11
4,513.00	91.10	357.90	3,083.48	1,713.02	67.67	1,712.62	0.48	0.43	0.22
4,607.00	91.70	358.00	3,081.18	1,806.93	64.31	1,806.54	0.65	0.64	0.11
4,701.00	90.90	358.60	3,079.05	1,900.86	61.52	1,900.49	1.06	-0.85	0.64
4,795.00	89.50	358.70	3,078.72	1,994.84	59.31	1,994.47	1.49	-1.49	0.11
4,888.00	89.90	358.70	3,079.20	2,087.81	57.20	2,087.46	0.43	0.43	0.00
4,982.00	90.20	358.80	3,079.12	2,181.79	55.15	2,181.45	0.34	0.32	0.11
5,075.00	90.40	358.50	3,078.64	2,274.76	52.96	2,274.43	0.39	0.22	-0.32
5,169.00	90.60	358.00	3,077.82	2,368.71	50.09	2,368.40	0.57	0.21	-0.53
5,262.00	90.80	357.80	3,076.68	2,461.64	46.68	2,461.34	0.30	0.22	-0.22
5,356.00	90.60	357.90	3,075.53	2,555.57	43.15	2,555.29	0.24	-0.21	0.11
5,449.00	90.10	358.00	3,074.96	2,648.51	39.83	2,648.24	0.55	-0.54	0.11
5,543.00	90.10	358.90	3,074.80	2,742.47	37.28	2,742.22	0.96	0.00	0.96
5,637.00	90.20	359.30	3,074.55	2,836.46	35.81	2,836.22	0.44	0.11	0.43
5,730.00	90.50	359.10	3,073.98	2,929.45	34.51	2,929.21	0.39	0.32	-0.22
5,824.00	90.50	359.30	3,073.16	3,023.44	33.20	3,023.20	0.21	0.00	0.21
5,918.00	90.50	358.80	3,072.34	3,117.42	31.64	3,117.20	0.53	0.00	-0.53
6,011.00	89.40	357.70	3,072.43	3,210.37	28.80	3,210.16	1.67	-1.18	-1.18
6,105.00	89.50	357.60	3,073.33	3,304.29	24.94	3,304.10	0.15	0.11	-0.11
6,199.00	89.80	357.40	3,073.90	3,398.20	20.84	3,398.03	0.38	0.32	-0.21
6,293.00	90.00	356.80	3,074.07	3,492.08	16.09	3,491.93	0.67	0.21	-0.64
6,387.00	90.20	357.30	3,073.90	3,585.95	11.25	3,585.83	0.57	0.21	0.53
6,481.00	90.30	357.90	3,073.49	3,679.87	7.31	3,679.77	0.65	0.11	0.64
6,575.00	90.20	358.40	3,073.08	3,773.82	4.28	3,773.74	0.54	-0.11	0.53
6,669.00	90.40	358.70	3,072.59	3,867.79	1.90	3,867.72	0.38	0.21	0.32



Phoenix
Survey Report



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Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3388.00usft (Silver Oak 3)
Site:	Bradley 8 Fee	MD Reference:	KB @ 3388.00usft (Silver Oak 3)
Well:	#4H	North Reference:	Grid
Wellbore:	WB1 / Job #1411779	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Silver Oak 3)	Database:	Compass 5000 GCR DB

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,762.00	90.50	359.10	3,071.86	3,960.77	0.12	3,960.71	0.44	0.11	0.43
6,856.00	90.40	359.10	3,071.12	4,054.75	-1.36	4,054.70	0.11	-0.11	0.00
6,949.00	91.40	357.60	3,069.66	4,147.70	-4.04	4,147.66	1.94	1.08	-1.61
7,044.00	91.30	357.50	3,067.42	4,242.59	-8.10	4,242.57	0.15	-0.11	-0.11
7,138.00	91.40	357.80	3,065.21	4,336.48	-11.95	4,336.48	0.34	0.11	0.32
7,232.00	91.00	357.40	3,063.24	4,430.38	-15.89	4,430.40	0.60	-0.43	-0.43
7,325.00	91.20	357.20	3,061.45	4,523.26	-20.27	4,523.30	0.30	0.22	-0.22
7,419.00	91.60	357.10	3,059.16	4,617.11	-24.94	4,617.18	0.44	0.43	-0.11
7,512.00	90.90	358.00	3,057.13	4,710.00	-28.91	4,710.09	1.23	-0.75	0.97
7,558.00	91.00	358.60	3,056.36	4,755.98	-30.28	4,756.07	1.32	0.22	1.30
* Last Phoenix MWD Survey									
7,619.00	91.00	358.60	3,055.30	4,816.95	-31.77	4,817.05	0.00	0.00	0.00
* Projection to TD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,420.00	2,419.26	39.07	-26.35	Tie-on to VES Gyro Survey
2,434.00	2,433.26	39.14	-26.45	First Phoenix MWD Survey
7,558.00	3,056.36	4,755.98	-30.28	Last Phoenix MWD Survey
7,619.00	3,055.30	4,816.95	-31.77	Projection to TD

Checked By: _____ Approved By: _____ Date: _____