



COG Operating LLC

Eddy County, NM (NAN27 NME)

Spruce Federal #4

Spruce Federal #4

OH

Design: Actual

Standard Survey Report

12 December, 2011





SDI
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Spruce Federal #4
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (14') @ 3592.00usft (UDI #40)
Site:	Spruce Federal #4	MD Reference:	KB Elev (14') @ 3592.00usft (UDI #40)
Well:	Spruce Federal #4	North Reference:	Grnd
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 Single User Db

Project	Eddy County, NM (NAN27 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	Spruce Federal #4			
Site Position:		Northing:	656,406.10 usft	Latitude: 32° 48' 16.239 N
From:	Map	Easting:	530,230.20 usft	Longitude: 104° 14' 5.806 W
Position Uncertainty:	0 00 usft	Slot Radius:	13-3/16 "	Grid Convergence: 0 05 °

Well	Spruce Federal #4			
Well Position	+N/-S	0 00 usft	Northing:	656,406.10 usft
	+E/-W	0 00 usft	Easting:	530,230.20 usft
Position Uncertainty	0 00 usft	Wellhead Elevation:	usft	Ground Level: 3,578.00 usft

Wellbore	OH			
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2011/08/24	7 91	60 60	48,871

Design	Actual			
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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	176 35

Survey Program	Date: 2011/12/12			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	972.00	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1 0 2
1,056.00	3,298.00	MWD Survey (OH)	MWD	MWD - Standard

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	1.35	64.92	99.99	0.50	1.07	-0.43	1.35	1.35	0.00	
200.00	1.60	68.55	199.96	1.51	3.43	-1.29	0.27	0.25	3.63	
300.00	1.71	72.46	299.92	2.47	6.16	-2.07	0.16	0.11	3.91	
400.00	1.59	76.17	399.87	3.25	8.93	-2.68	0.16	-0.12	3.71	
500.00	1.09	77.12	499.85	3.79	11.20	-3.07	0.50	-0.50	0.95	
600.00	0.85	68.88	599.83	4.27	12.82	-3.45	0.28	-0.24	-8.24	
700.00	0.83	70.31	699.82	4.78	14.19	-3.87	0.03	-0.02	1.43	
800.00	1.55	65.20	799.80	5.60	16.10	-4.56	0.73	0.72	-5.11	
900.00	1.34	69.15	899.77	6.58	18.42	-5.39	0.23	-0.21	3.95	



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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 Single User 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)
972.00	1.23	79.33	971.75	7.02	19.97	-5.74	0.35	-0.15	14.14
Gyro Tie-in									
1,056.00	1.08	133.10	1,055.73	6.65	21.43	-5.27	1.25	-0.18	64.01
1,119.00	1.62	155.70	1,118.72	5.43	22.23	-4.00	1.19	0.86	35.87
1,183.00	1.94	159.75	1,182.69	3.59	22.98	-2.12	0.54	0.50	6.33
1,246.00	2.41	170.55	1,245.64	1.28	23.57	0.22	0.99	0.75	17.14
1,309.00	3.17	183.50	1,308.57	-1.76	23.68	3.27	1.56	1.21	20.56
1,373.00	4.36	186.37	1,372.43	-5.95	23.30	7.42	1.88	1.86	4.48
1,436.00	4.81	183.14	1,435.23	-10.96	22.89	12.40	0.82	0.71	-5.13
1,499.00	5.98	183.88	1,497.95	-16.88	22.52	18.27	1.86	1.86	1.17
1,563.00	6.16	187.23	1,561.59	-23.61	21.86	24.95	0.62	0.28	5.23
1,626.00	6.06	186.10	1,624.23	-30.27	21.09	31.55	0.25	-0.16	-1.79
1,721.00	5.75	185.02	1,718.73	-39.99	20.14	41.20	0.35	-0.33	-1.14
1,785.00	5.45	181.32	1,782.42	-46.23	19.79	47.39	0.73	-0.47	-5.78
1,887.00	5.47	177.21	1,883.96	-55.93	19.91	57.08	0.38	0.02	-4.03
1,982.00	5.15	185.27	1,978.55	-64.69	19.74	65.82	0.85	-0.34	8.48
2,077.00	5.33	181.00	2,073.15	-73.35	19.27	74.43	0.45	0.19	-4.49
2,172.00	5.35	178.60	2,167.74	-82.19	19.30	83.25	0.24	0.02	-2.53
2,267.00	4.78	192.05	2,262.37	-90.49	18.58	91.49	1.38	-0.60	14.16
2,362.00	4.80	189.75	2,357.04	-98.28	17.09	99.17	0.20	0.02	-2.42
2,458.00	4.46	190.45	2,452.73	-105.91	15.73	106.69	0.36	-0.35	0.73
2,553.00	4.61	186.26	2,547.43	-113.33	14.64	114.04	0.38	0.16	-4.41
2,647.00	4.82	174.47	2,641.12	-121.02	14.61	121.70	1.05	0.22	-12.54
2,743.00	5.17	175.99	2,736.75	-129.35	15.30	130.06	0.39	0.36	1.58
2,838.00	4.85	175.30	2,831.39	-137.62	15.93	138.36	0.34	-0.34	-0.73
2,901.00	5.37	175.87	2,894.14	-143.22	16.36	143.97	0.83	0.83	0.90
2,964.00	4.23	183.03	2,956.92	-148.48	16.45	149.22	2.04	-1.81	11.37
3,028.00	3.67	188.12	3,020.76	-152.86	16.04	153.57	1.03	-0.88	7.95
3,091.00	2.27	190.90	3,083.68	-156.08	15.52	156.75	2.23	-2.22	4.41
3,154.00	1.28	203.55	3,146.65	-157.95	15.00	158.59	1.68	-1.57	20.08
3,218.00	0.45	228.84	3,210.64	-158.77	14.52	159.38	1.40	-1.30	39.52
3,250.00	0.52	240.92	3,242.64	-158.93	14.30	159.52	0.39	0.22	37.75
Last MWD Survey									
3,298.00	0.52	240.92	3,290.64	-159.14	13.92	159.70	0.00	0.00	0.00
Projection to Bit									



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Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
972 00	971 75	7 02	19 97	Gyro Tie-in
3,250 00	3,242 64	-158 93	14 30	Last MWD Survey
3,298 00	3,290 64	-159 14	13 92	Projection to Bit

Checked By: _____	Approved By: _____	Date: _____
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