

Results of Directional Survey

DD

API number:	30-025-39863		
OGRID:		Operator:	COG OPERATING LLC
		Property:	J C FEDERAL # 55

surface	ULSTR:	N	22	T 17S	R 32E
				330 FSL	1910 FWL

BH Loc	ULSTR:	N	22	T 17S	R 32E
7130 MD		7118.8	TVD	435 FSL	2232 FWL

Top Perf/OH	ULSTR:	N	22	T 17S	R 32E
5540 MD		5531.2	TVD	415 FSL	2148 FWL

Bot Perf/OH	ULSTR:	N	22	T 17S	R 32E
6900 MD		6889.0	TVD	431 FSL	2221 FWL

	MD	N/S	E/W	VD
	5443	83.63	230.88	5434.43
TOP PERFS/OH	5540	84.59	237.58	5531.19
	5582	85.00	240.48	5573.09
	6946	101.71	313.62	6934.99
BOT PERFS/OH	6900	101.06	311.47	6889.04
	7040	103.04	318.02	7028.88

NEXT TO LAST	7076	103.63	319.64	7064.84
LAST READING	7120	104.43	321.64	7108.78
TD	7130	104.61	322.09	7118.77

Surface Location	330 FS	1910 FW
Projected BHL	435 FS	2232 FW
Location of		
Top Perfs/OH	415 FS	2148 FW
Bottom Perfs/OH	431 FS	2221 FW

SUMMARY of Subsurface Locations

Surface Location	N-22-17S-32E	330 FS	1910 FW	Vert. Depth
Top Perfs/OH	N-22-17S-32E	415 FS	2148 FW	5531.19
Bottom Perfs/OH	N-22-17S-32E	431 FS	2221 FW	6889.04
Projected TD	N-22-17S-32E	435 FS	2232 FW	7118.77

MAY 03 2012

CAVALOZ DRILLING

P O BOX 1500 (575) 3910699 FAX (575) 391- 3824 HOBBS, NEW MEXICO 88241

HOBBS OCD**INCLINATION REPORT****APR 18 2012**

DATE: 2/14/12

RECEIVED

WELL NAME AND NUMBER J C FEDERAL #55
LOCATION EDDY COUNTY
OPERATOR: COG LLC
DRILLING CONTRACTOR: CAVALOZ DRILLING RIG #1

THE UNDERSIGNED HEREBY CERTIFIES THAT HE IS AN AUTHORIZED REPRESENTATIVE OF THE DRILLING CONTRACTOR WHO DRILLED THE ABOVE DESCRIBED WELL AND THAT HE HAS CONDUCTED DEVIATION TEST AND OBTAINED THE FOLLOWING RESULTS:

DEGREE	DEPTH	DEGREE	DEPTH	DEGREE	DEPTH
0.4	148	2	1813		
0.2	239				
0.6	330				
0.5	421				
0.1	516				
0.2	604				
0.6	698				
0.1	834				
0.2	1075				
0.4	1374				

SUR: N-22-17s-32e, 330/S & 1910/W
BHL: N-22-17s-32e, 435/S & 2232/W
API # 30-025-39863

DRILLING CONTRACTOR:
CAVALOZ DRILLING

BY: Bob Wegner
BOB WEGNER
DRILLING SUPERINTENDENT

SUBSCRIBED AND SWORN TO BEFORE ME ON THE 14th DAY OF Feb, 2012

MY COMMISSION EXPIRES:

01/15Jessica Bueno

OFFICIAL SEAL
JESSICA BUENO
NOTARY PUBLIC - STATE OF NEW MEXICO

My commission expires: 3/1/15



Company: COG Operating (Concho)

Lease: JC Federal 55

Location: 2.5 Miles from Maljamar

Rig Name: Cavaloz 1

State/County: New Mexico/Lea

Latitude: 32.81

GRID North is 0.31 Degrees East of True North

VS-Azi: 0.00 Degrees



RKb : 12 Feet Elevation=3993 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: jc federal 55_ed.ut

Minimum Curvature Method

Report Date/Time: 2/14/2012 / 14:31

Vaughn Energy Services

Midland, TX

432-563-5444

Surveyor: Zach Garcia

JC Federal 55 / API 30-05-39863

SUR: N-22-17s-32e, 330/S & 1910/W

BHL: N-22-17s-32e, 435/S & 2232/W

API # 30-025-39863

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	0.05	359.98	100.00	0.04	0.00	0.04	0.04	359.98	0.05
200.00	0.12	10.58	200.00	0.18	0.02	0.18	0.18	5.92	0.07
300.00	0.07	14.95	300.00	0.34	0.05	0.34	0.35	8.92	0.05
400.00	0.01	355.29	400.00	0.41	0.07	0.41	0.42	9.64	0.07
500.00	0.05	74.17	500.00	0.43	0.11	0.43	0.44	14.80	0.05
600.00	0.07	61.76	600.00	0.47	0.21	0.47	0.51	24.00	0.02
700.00	0.10	38.44	700.00	0.57	0.32	0.57	0.65	29.17	0.05
800.00	0.14	30.39	800.00	0.74	0.43	0.74	0.86	30.32	0.04
900.00	0.52	36.66	900.00	1.21	0.77	1.21	1.43	32.33	0.38
1000.00	0.12	34.50	1000.00	1.67	1.10	1.67	2.00	33.43	0.40
1100.00	0.07	52.41	1100.00	1.79	1.20	1.79	2.16	33.97	0.06
1200.00	0.04	83.76	1200.00	1.83	1.29	1.83	2.23	35.17	0.04
1300.00	0.01	85.75	1300.00	1.83	1.33	1.83	2.27	36.07	0.03
1400.00	0.00	101.42	1400.00	1.83	1.35	1.83	2.27	36.34	0.01
1500.00	0.09	115.10	1500.00	1.80	1.42	1.80	2.29	38.32	0.08
1600.00	0.27	80.40	1599.99	1.80	1.72	1.80	2.50	43.70	0.20
1700.00	0.75	53.01	1699.99	2.24	2.48	2.24	3.34	47.94	0.52
1800.00	1.19	46.83	1799.98	3.34	3.76	3.34	5.03	48.37	0.46

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	2.09	36.33	1899.93	5.52	5.60	5.52	7.87	45.39	0.94
2000.00	2.53	41.92	1999.85	8.63	8.15	8.63	11.87	43.36	0.49
2050.00	2.37	38.30	2049.81	10.26	9.53	10.26	14.00	42.88	0.44

COG Operating, LLC

Lea County , NM

JC Federal #55

JC Federal #55

Wellbore #1

SUR: N-22-17s-32e, 330/S & 1910/W

BHL: N-22-17s-32e, 435/S & 2232/W

API # 30-025-39863

Survey: MWD Survey #1

Standard Survey Report

10 February, 2012

SHL : 270' FSL & 1910' FWL

Top of Paddock : 78.25' N of Surface & 230.70' E of Surface @ 5450' TVD

BHL : 380' FSL & 2260' FWL



BV
Survey Report



Company COG Operating, LLC
Project: Lea County, NM
Site: JC Federal #55
Well: JC Federal #55
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Site JC Federal #55
TVD Reference: KB @ 4016 00ft
MD Reference: KB @ 4016 00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

Project	Lea County , NM		
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	JC Federal #55, Sec 22, T-17-S, R-32-E				
Site Position:		Northing:	660,135 50 ft	Latitude:	32° 48' 48 479 N
From:	Map	Easting:	677,339 40 ft	Longitude:	103° 45' 22 015 W
Position Uncertainty:	0 00 ft	Slot Radius:	13 200 in	Grid Convergence:	0 31 °

Well	JC Federal #55					
Well Position	+N/-S	0 00 ft	Northing:	660,135 50 ft	Latitude:	32° 48' 48 479 N
	+E/-W	0 00 ft	Easting:	677 339 40 ft	Longitude:	103° 45' 22 015 W
Position Uncertainty	0 00 ft	Wellhead Elevation:	4,016 00 ft	Ground Level:	4,003 00 ft	

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2/2/2012	7 63	60 71	48,921

Design	Wellbore #1				
Audit Notes:					
Version:	1 0	Phase:	ACTUAL	Tie On Depth:	2.037 00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0 00	0 00	0 00	60 06	

Survey Program	Date	2/10/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100 00	2,037 00	Gyro Survey #1 (OH)	Gyro		
2,037 00	7,120 00	MWD Survey #1 (Wellbore #1)			

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,037 00	2 37	38 30	2,036 81	10 27	9 52	13 38	0 00	0 00	0 00
2,144 00	2 70	35 70	2,143 71	14 06	12 36	17 73	0 33	0 31	-2 43
2,240 00	2 70	38 70	2,239 60	17 66	15 09	21 89	0 15	0 00	3 13
2,302 00	3 00	46 90	2,301 52	19 91	17 19	24 83	0 82	0 48	13 23
2,333 00	3 10	58 90	2,332 48	20 89	18 50	26 46	2 08	0 32	38 71
2,427 00	4 10	75 00	2,426 29	23 08	23 92	32 25	1 50	1 06	17 13
2,523 00	4 20	80 10	2,522 04	24 57	30 70	38 87	0 40	0 10	5 31
2,616 00	3 80	79 80	2,614 82	25 70	37 09	44 97	0 43	-0 43	-0 32
2,711 00	4 70	67 70	2,709 56	27 74	43 79	51 79	1 33	0 95	-12 74
2,805 00	4 40	64 70	2,803 26	30 74	50 61	59 20	0 41	-0 32	-3 19

BV
Survey Report



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Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,900 00	3 90	62 00	2,898 01	33 81	56 76	66 06	0 56	-0 53	-2 84
2,995 00	4 20	63 50	2,992 77	36 88	62 72	72 76	0 33	0 32	1 58
3,089 00	3 60	61 90	3,086 55	39 81	68 41	79 15	0 65	-0 64	-1 70
3,183 00	3 30	61 40	3,180 38	42 49	73 39	84 80	0 32	-0 32	-0 53
3,278 00	3 20	57 20	3,275 23	45 24	78 02	90 18	0 27	-0 11	-4 42
3,372 00	3 70	70 20	3,369 06	47 69	83 07	95 79	0 98	0 53	13 83
3,467 00	3 70	73 30	3,463 86	49 60	88 89	101 79	0 21	0 00	3 26
3,561 00	3 60	74 30	3,557 67	51 27	94 64	107 60	0 13	-0 11	1 06
3,654 00	3 30	71 60	3,650 51	52 91	99 99	113 05	0 37	-0 32	-2 90
3,748 00	4 70	75 50	3,744 27	54 73	106 29	119 42	1 52	1 49	4 15
3,843 00	4 50	74 30	3,838 97	56 71	113 64	126 78	0 23	-0 21	-1 26
3,937 00	4 50	76 80	3,932 68	58 55	120 78	133 89	0 21	0 00	2 66
4,030 00	4 40	77 40	4,025 40	60 16	127 82	140 79	0 12	-0 11	0 65
4,126 00	4 40	73 80	4,121 12	61 99	134 95	147 88	0 29	0 00	-3 75
4,222 00	4 40	73 40	4,216 83	64 07	142 01	155 04	0 03	0 00	-0 42
4,315 00	4 60	76 90	4,309 55	65 94	149 06	162 08	0 37	0 22	3 76
4,410 00	4 40	74 10	4,404 25	67 80	156 28	169 26	0 31	-0 21	-2 95
4,505 00	4 10	77 80	4,498 99	69 51	163 10	176 03	0 43	-0 32	3 89
4,598 00	4 40	75 40	4,591 74	71 12	169 80	182 64	0 37	0 32	-2 58
4,692 00	4 40	78 10	4,685 46	72 77	176 82	189 54	0 22	0 00	2 87
4,787 00	4 20	76 70	4,780 19	74 32	183 77	196 34	0 24	-0 21	-1 47
4,881 00	4 40	77 40	4,873 93	75 90	190 64	203 08	0 22	0 21	0 74
4,975 00	4 10	78 50	4,967 67	77 36	197 45	209 71	0 33	-0 32	1 17
5,069 00	4 30	80 10	5,061 42	78 63	204 22	216 21	0 25	0 21	1 70
5,163 00	4 10	77 90	5,155 16	79 94	210 98	222 72	0 27	-0 21	-2 34
5,256 00	4 20	76 80	5,247 92	81 42	217 54	229 14	0 14	0 11	-1 18
5,349 00	4 20	81 70	5,340 67	82 69	224 23	235 57	0 39	0 00	5 27
5,443 00	4 00	82 20	5,434 43	83 63	230 88	241 81	0 22	-0 21	0 53
5,582 00	4 00	81 50	5,573 09	85 00	240 48	250 81	0 04	0 00	-0 50
5,631 00	3 70	83 30	5,621 98	85 44	243 74	253 85	0 66	-0 61	3 67
5,725 00	3 70	85 20	5,715 78	86 05	249 78	259 38	0 13	0 00	2 02
5,819 00	3 70	81 00	5,809 59	86 78	255 79	264 96	0 29	0 00	-4 47
5,913 00	3 60	80 60	5,903 40	87 73	261 70	270 56	0 11	-0 11	-0 43
6,007 00	3 20	76 10	5,997 23	88 84	267 16	275 84	0 51	-0 43	-4 79
6,101 00	3 10	74 10	6,091 09	90 17	272 15	280 83	0 16	-0 11	-2 13
6,196 00	3 00	74 50	6,185 96	91 54	277 02	285 73	0 11	-0 11	0 42
6,290 00	3 10	76 70	6,279 82	92 78	281 86	290 55	0 16	0 11	2 34
6,384 00	3 00	76 60	6,373 69	93 94	286 73	295 34	0 11	-0 11	-0 11
6,478 00	3 00	76 20	6,467 56	95 09	291 51	300 06	0 02	0 00	-0 43
6,571 00	2 80	73 70	6,560 44	96 31	296 05	304 61	0 25	-0 22	-2 69
6,665 00	2 60	71 50	6,654 34	97 63	300 28	308 93	0 24	-0 21	-2 34
6,759 00	2 90	70 00	6,748 23	99 12	304 53	313 36	0 33	0 32	-1 60
6,852 00	2 90	76 10	6,841 11	100 49	309 03	317 94	0 33	0 00	6 56

BV
Survey Report



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Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
6,946 00	2 90	74 20	6,934 99	101 71	313 62	322 53	0 10	0 00	-2 02
7,040 00	2 70	71 90	7,028 88	103 04	318 02	327 00	0 24	-0 21	-2 45
7,076 00	2 80	68 20	7,064 84	103 63	319 64	328 70	0 57	0 28	-10 28
7,120 00	2 80	68 20	7,108 78	104 43	321 64	330 83	0 00	0 00	0 00

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2,144 00	2,143 71	14 06	12 36	First MWD Survey
7,076 00	7,064 84	103 63	319 64	Last MWD Survey
7,120 00	7,108 78	104 43	321 64	Proj to Bit

Checked By _____	Approved By _____	Date _____
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