



30-015-37826

COG Operating LLC

Eddy County, NM (NAN27 NME)

Polaris B Federal #13

Polaris B Federal #13

OH

Design: Actual

Standard Survey Report

25 July, 2010



Scientific Drilling
Directional Drilling Operations



Scientific Drilling Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAN27 NME)
Site: Polaris B Federal #13
Well: Polaris B Federal #13
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Site Polaris B Federal #13
TVD Reference: RKB Elev (12') @ 3704 00usft (SO #5)
MD Reference: RKB Elev (12') @ 3704 00usft (SO #5)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Julio

Project: Eddy County, NM (NAN27 NME)
Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001
System Datum: Mean Sea Level

Site: Polaris B Federal #13
Site Position: Northing: 670,604 60 usft Latitude: 32° 50' 34 981 N
From: Map Easting: 611,545 90 usft Longitude: 103° 58' 12 505 W
Position Uncertainty: 0 00 usft Slot Radius: 0 " Grid Convergence: 0 20 °

Well: Polaris B Federal #13
Well Position: +N-S 0 00 usft Northing: 670,604 60 usft Latitude: 32° 50' 34 981 N
+E-W 0 00 usft Easting: 611,545 90 usft Longitude: 103° 58' 12 505 W
Position Uncertainty: 0 00 usft Wellhead Elevation: usft Ground Level: 3,692 00 usft

Wellbore: OH
Magnetics: Model Name Sample Date Declination Dip Angle Field Strength
(°) (°) (nT)
IGRF200510 2010/07/20 7 91 60 73 49,066

Design: Actual
Audit Notes:
Version: 1 0 Phase: ACTUAL Tie On Depth: 0 00
Vertical Section: Depth From (TVD) +N-S +E-W Direction
(usft) (usft) (usft) (°)
0 00 0 00 0 00 239 23

Survey Program Date: 2010/07/25
From To Survey (Wellbore) Tool Name Description
(usft) (usft)
100 00 1,297 00 Gyro Survey (OH) Keeper Standard Wireline Keeper ver 1 0 2
1,406 00 5,849 00 MWD Survey (OH) MWD MWD - Standard

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 14	256 63	100 00	-0 03	-0 12	0 12	0 14	0 14	0 00
200 00	0 43	324 40	200 00	0 25	-0 46	0 26	0 40	0 29	67 77
300 00	1 03	339 61	299 99	1 40	-0 99	0 13	0 63	0 60	15 21
400 00	1 49	331 73	399 97	3 38	-1 92	-0 08	0 49	0 46	-7 88
500 00	1 53	332 71	499 93	5 72	-3 14	-0 22	0 05	0 04	0 98
600 00	1 24	344 52	599 90	7 94	-4 05	-0 59	0 41	-0 29	11 81
700 00	1 47	343 01	699 87	10 21	-4 71	-1 18	0 23	0 23	-1 51
800 00	1 26	354 29	799 85	12 53	-5 19	-1 95	0 34	-0 21	11 28
900 00	1 51	24 78	899 82	14 82	-4 75	-3 50	0 77	0 25	30 49



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MD Reference: RKB Elev (12') @ 3704 00usft (SO #5)
North Reference: Grd
Survey Calculation Method: Minimum Curvature
Database: EDM-Julio

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)
1,000 00	1 86	45 61	999 78	17 16	-3 04	-6 17	0 70	0 35	20 83
1,100 00	2 02	45 87	1,099 72	19 52	-0 61	-9 46	0 16	0 16	0 26
1,200 00	1 50	62 80	1,199 67	21 34	1 82	-12 48	0 73	-0 52	16 93
1,297 00	1 27	74 49	1,296 64	22 21	3 98	-14 78	0 37	-0 24	12 05
Gyro Tie-in									
1,406 00	1 35	82 02	1,405 61	22 71	6 42	-17 13	0 17	0 07	6 91
1,470 00	0 29	185 00	1,469 61	22 66	7 15	-17 73	2 25	-1 66	160 91
1,534 00	2 86	253 40	1,533 58	22 04	5 60	-16 09	4 32	4 02	106 88
1,597 00	3 61	242 50	1,596 48	20 67	2 34	-12 59	1 53	1 19	-17 30
1,661 00	3 76	226 10	1,660 35	18 29	-0 96	-8 53	1 66	0 23	-25 63
1,725 00	4 29	234 00	1,724 19	15 43	-4 41	-4 10	1 20	0 83	12 34
1,795 00	5 72	239 70	1,793 92	12 13	-9 54	1 99	2 16	2 04	8 14
1,859 00	6 89	236 30	1,857 54	8 39	-15 49	9 02	1 92	1 83	-5 31
1,923 00	6 71	233 70	1,921 09	4 04	-21 69	16 57	0 56	-0 28	-4 06
1,986 00	6 49	237 00	1,983 67	-0 07	-27 65	23 79	0 70	-0 35	5 24
2,050 00	7 22	244 40	2,047 21	-3 78	-34 31	31 41	1 79	1 14	11 56
2,114 00	8 34	241 70	2,110 62	-7 72	-42 02	40 06	1 84	1 75	-4 22
2,178 00	8 18	238 20	2,173 96	-12 32	-49 98	49 25	0 82	-0 25	-5 47
2,241 00	7 68	237 60	2,236 36	-16 94	-57 34	57 93	0 80	-0 79	-0 95
2,305 00	7 22	237 10	2,299 82	-21 41	-64 33	66 23	0 73	-0 72	-0 78
2,369 00	7 01	236 50	2,363 32	-25 75	-70 96	74 15	0 35	-0 33	-0 94
2,433 00	6 81	236 50	2,426 86	-30 00	-77 38	81 84	0 31	-0 31	0 00
2,496 00	6 31	235 20	2,489 45	-34 04	-83 34	89 02	0 83	-0 79	-2 06
2,560 00	7 80	234 50	2,552 96	-38 57	-89 76	96 86	2 33	2 33	-1 09
2,624 00	8 02	234 30	2,616 35	-43 70	-96 93	105 64	0 35	0 34	-0 31
2,688 00	7 82	231 50	2,679 74	-49 01	-103 96	114 40	0 68	-0 31	-4 38
2,751 00	7 84	232 80	2,742 15	-54 28	-110 74	122 92	0 28	0 03	2 06
2,815 00	8 14	235 70	2,805 53	-59 47	-117 96	131 78	0 78	0 47	4 53
2,879 00	9 35	248 40	2,868 79	-63 94	-126 53	141 43	3 55	1 89	19 84
2,943 00	9 48	247 40	2,931 93	-67 88	-136 23	151 78	0 33	0 20	-1 56
3,006 00	9 11	245 00	2,994 10	-71 98	-145 54	161 88	0 85	-0 59	-3 81
3,070 00	7 73	238 00	3,057 41	-76 40	-153 79	171 22	2 68	-2 16	-10 94
3,134 00	6 47	231 30	3,120 92	-80 94	-160 25	179 10	2 35	-1 97	-10 47
3,198 00	6 38	228 60	3,184 52	-85 54	-165 73	186 17	0 49	-0 14	-4 22
3,261 00	6 36	227 90	3,247 13	-90 20	-170 95	193 03	0 13	-0 03	-1 11
3,325 00	7 62	231 70	3,310 65	-95 20	-176 91	200 71	2 10	1 97	5 94
3,389 00	8 10	231 50	3,374 05	-100 64	-183 77	209 38	0 75	0 75	-0 31
3,452 00	7 79	230 90	3,436 45	-106 10	-190 55	218 01	0 51	-0 49	-0 95
3,516 00	7 69	237 50	3,499 87	-111 13	-197 53	226 58	1 40	-0 16	10 31
3,580 00	7 91	237 20	3,563 27	-115 82	-204 84	235 26	0 35	0 34	-0 47
3,643 00	7 91	235 30	3,625 68	-120 64	-212 05	243 92	0 42	0 00	-3 02
3,707 00	7 90	233 20	3,689 07	-125 78	-219 19	252 68	0 45	-0 02	-3 28
3,771 00	7 73	234 30	3,752 47	-130 92	-226 21	261 35	0 35	-0 27	1 72



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3,835 00	7 68	233 10	3,815 89	-136 00	-233 13	269 89	0 26	-0 08	-1 88
3,898 00	7 42	232 80	3,878 35	-140 99	-239 73	278 11	0 42	-0 41	-0 48
3,962 00	7 28	238 00	3,941 82	-145 64	-246 46	286 28	1 06	-0 22	8 13
4,026 00	7 22	237 30	4,005 31	-149 96	-253 29	294 35	0 17	-0 09	-1 09
4,090 00	6 16	238 20	4,068 88	-153 94	-259 59	301 80	1 66	-1 66	1 41
4,153 00	4 84	242 90	4,131 58	-156 93	-264 83	307 83	2 21	-2 10	7 46
4,217 00	3 51	239 80	4,195 41	-159 15	-268 93	312 49	2 11	-2 08	-4 84
4,281 00	2 19	238 30	4,259 33	-160 78	-271 66	315 67	2 07	-2 06	-2 34
4,344 00	0 90	212 70	4,322 31	-161 83	-272 95	317 32	2 27	-2 05	-40 63
4,408 00	0 61	194 20	4,386 30	-162 58	-273 31	318 01	0 59	-0 45	-28 91
4,599 00	0 77	187 20	4,577 29	-164 84	-273 72	319 51	0 09	0 08	-3 66
4,791 00	0 76	185 20	4,769 27	-167 39	-273 99	321 06	0 01	-0 01	-1 04
4,982 00	0 61	193 00	4,960 26	-169 64	-274 34	322 50	0 09	-0 08	4 08
5,173 00	0 69	314 80	5,151 25	-169 82	-275 38	323 49	0 60	0 04	63 77
5,364 00	1 01	305 80	5,342 23	-168 02	-277 56	324 45	0 18	0 17	-4 71
5,555 00	0 88	290 20	5,533 21	-166 53	-280 30	326 04	0 15	-0 07	-8 17
5,746 00	1 02	350 70	5,724 18	-164 35	-281 96	326 34	0 51	0 07	31 68
5,804 00	1 24	352 90	5,782 17	-163 22	-282 12	325 90	0 39	0 38	3 79
Last MWD Survey									
5,849 00	1 24	352 90	5,827 16	-162 25	-282 24	325 51	0 00	0 00	0 00
Projection to Bit									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,297 00	1,296 64	22 21	3 98	Gyro Tie-in
5,804 00	5,782 17	-163 22	-282 12	Last MWD Survey
5,849 00	5,827 16	-162 25	-282 24	Projection to Bit

Checked By: _____ Approved By: _____ Date: _____