



30-015-37980

Ryan Energy Directional Drilling Report

Field: Eddy Co, NM
Site: Skelly Unit #658
Well: #658
Wellpath: OH

Prepared For:

COG Operating LLC



Ryan Energy Technology

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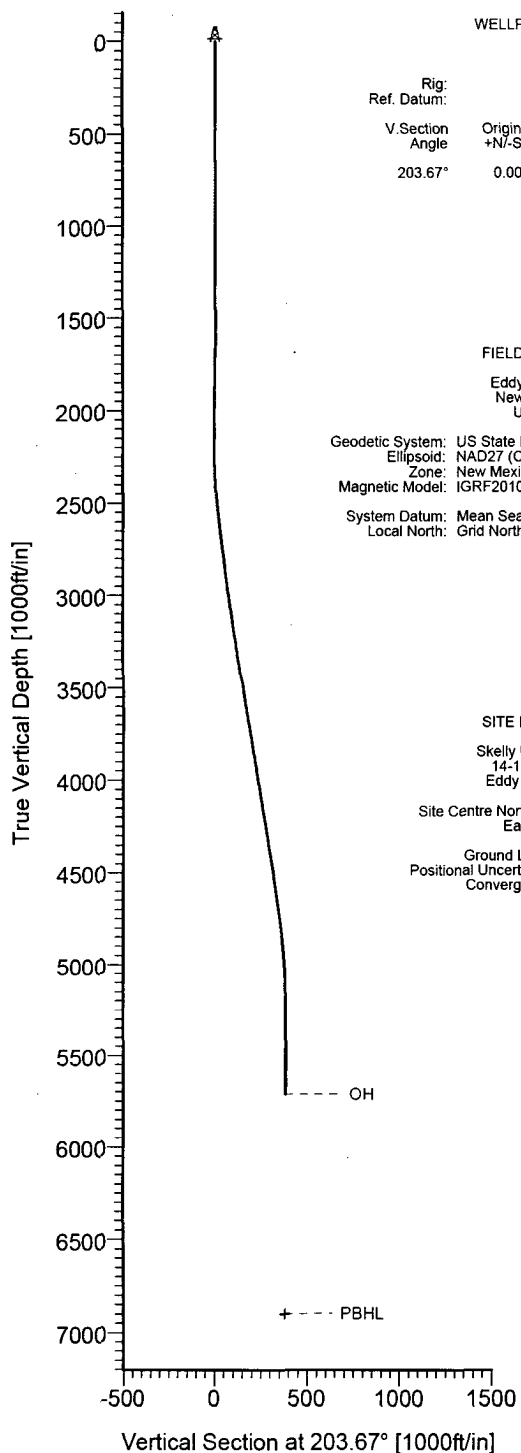
COG Operating LLC

Field: Eddy Co, NM
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Azimuths to Grid North
True North: -0.27°
Magnetic North: 7.53°

Magnetic Field
Strength: 49015nT
Dip Angle: 60.72°
Date: 2/23/2011
Model: IGRF2010



WELLPATH DETAILS

OH
Rig: Basic #35
Ref. Datum: SITE 3924.00ft
V. Section Angle: 203.67°
Origin +N/-S: 0.00
Origin +E/-W: 0.00
Starting From TVD: 0.00

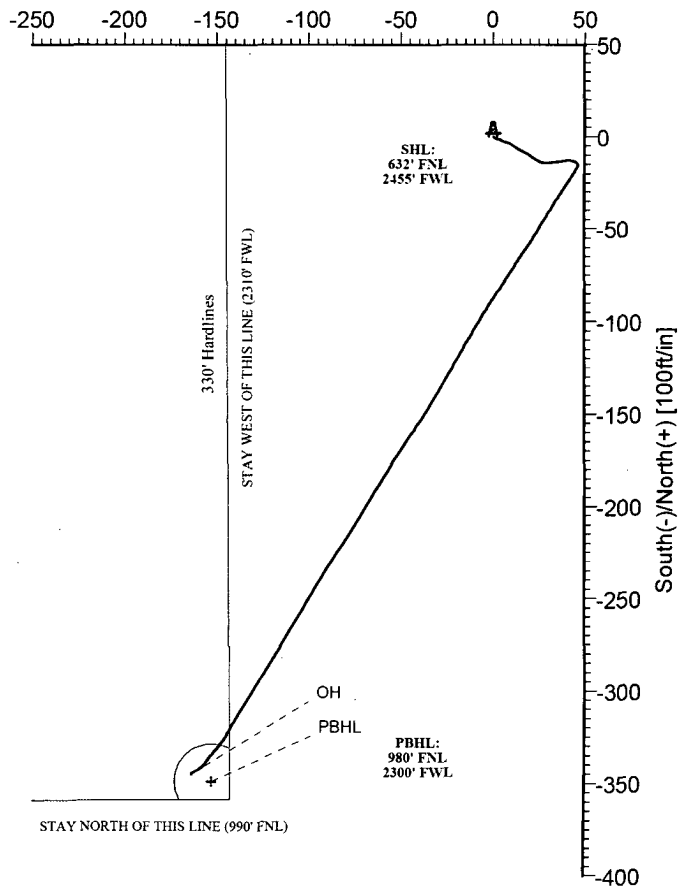
FIELD DETAILS

Eddy Co, NM
New Mexico
U.S.A.
Geodetic System: US State Plane Coordinate System 1927
Ellipsoid: NAD27 (Clarke 1866)
Zone: New Mexico, Eastern Zone
Magnetic Model: IGRF2010
System Datum: Mean Sea Level
Local North: Grid North

SITE DETAILS

Skelly Unit #658
14-17S-31E
Eddy Co, NM
Site Centre Northing: 669673.00
Easting: 651400.10
Ground Level: 3924.00
Positional Uncertainty: 0.00
Convergence: 0.27

West(-)/East(+) [100ft/in]



TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
PBHL	6900.00	-349.00	-153.00	669324.00	651247.10	32°50'20.718N	103°50'27.227W	Point



Ryan Energy Technologies Survey Report



Company: COG Operating LLC	Date: 3/10/2011	Time: 10:23:02	Page: 1
Field: Eddy Co, NM	Co-ordinate(NE) Reference:	Site: Skelly Unit #658, Grid North	
Site: Skelly Unit #658	Vertical (TVD) Reference:	SITE 3924.0	
Well: #658	Section (VS) Reference:	Well (0.00N,0.00E,203.67Azi)	
Wellpath: OH	Survey Calculation Method:	Minimum Curvature	Db: Sybase

Field: Eddy Co, NM New Mexico U.S.A.	Map Zone: New Mexico, Eastern Zone
Map System: US State Plane Coordinate System 1927	Coordinate System: Site Centre
Geo Datum: NAD27 (Clarke 1866)	Geomagnetic Model: IGRF2010
Sys Datum: Mean Sea Level	

Site: Skelly Unit #658 14-17S-31E Eddy Co, NM	
Site Position:	Northing: 669673.00 ft Latitude: 32 50 24.165 N
From: Map	Easting: 651400.10 ft Longitude: 103 50 25.415 W
Position Uncertainty: 0.00 ft	North Reference: Grid
Ground Level: 3924.00 ft	Grid Convergence: 0.27 deg

Well: #658	Slot Name:
Well Position: +N/-S 0.00 ft Northing: 669673.00 ft Latitude: 32 50 24.165 N	
+E/-W 0.00 ft Easting: 651400.10 ft Longitude: 103 50 25.415 W	
Position Uncertainty: 0.00 ft	

Wellpath: OH	Drilled From: Surface
Current Datum: SITE	Tie-on Depth: 0.00 ft
Magnetic Data: 2/23/2011	Above System Datum: Mean Sea Level
Field Strength: 49015 nT	Declination: 7.80 deg
Vertical Section: Depth From (TVD)	Mag Dip Angle: 60.72 deg
ft	+N/-S ft +E/-W ft Direction deg
0.00	0.00 0.00 203.67

Survey Program for Definitive Wellpath			Version: 0	
Date: 3/3/2011	Validated: No		Toolcode	Tool Name
Actual From ft	To ft	Survey		
100.00	1860.00	Survey #1 (100.00-1860.00)	Gyro	Gyro
1980.00	5695.00	Survey #2 (1980.00-5695.00)	Ryan MWD	Ryan MWD
5744.00	5744.00	Survey #3 (5744.00-5744.00)	Projection	Projection

Survey

MD ft	Incl deg	Azim deg	TVD ft	+N/-S ft	+E/-W ft	VS ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft	Tool/Comment
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	TIE LINE
100.00	0.42	142.65	100.00	-0.29	0.22	0.18	0.42	0.42	0.00	Gyro
200.00	0.58	117.24	200.00	-0.81	0.89	0.39	0.27	0.16	-25.41	Gyro
300.00	0.66	106.78	299.99	-1.21	1.90	0.35	0.14	0.08	-10.46	Gyro
400.00	1.00	106.40	399.98	-1.62	3.28	0.17	0.34	0.34	-0.38	Gyro
500.00	1.59	109.71	499.95	-2.34	5.43	-0.04	0.59	0.59	3.31	Gyro
600.00	2.32	114.29	599.89	-3.64	8.58	-0.11	0.75	0.73	4.58	Gyro
700.00	1.91	126.45	699.83	-5.46	11.76	0.28	0.61	-0.41	12.16	Gyro
800.00	1.71	120.21	799.78	-7.20	14.39	0.82	0.28	-0.20	-6.24	Gyro
900.00	1.62	116.98	899.73	-8.60	16.94	1.07	0.13	-0.09	-3.23	Gyro
1000.00	1.37	125.75	999.70	-9.94	19.17	1.40	0.34	-0.25	8.77	Gyro
1100.00	1.24	121.61	1099.67	-11.20	21.06	1.80	0.16	-0.13	-4.14	Gyro
1200.00	1.10	123.20	1199.65	-12.29	22.79	2.11	0.14	-0.14	1.59	Gyro
1300.00	0.88	124.65	1299.64	-13.26	24.22	2.42	0.22	-0.22	1.45	Gyro
1400.00	0.88	106.68	1399.63	-13.91	25.59	2.47	0.27	0.00	-17.97	Gyro
1500.00	1.40	96.12	1499.61	-14.26	27.54	2.01	0.56	0.52	-10.56	Gyro
1600.00	1.52	83.38	1599.57	-14.24	30.07	0.97	0.35	0.12	-12.74	Gyro
1700.00	1.84	82.21	1699.53	-13.87	32.98	-0.54	0.32	0.32	-1.17	Gyro
1800.00	1.84	83.39	1799.48	-13.47	36.17	-2.19	0.04	0.00	1.18	Gyro
1860.00	1.94	80.82	1859.45	-13.19	38.13	-3.22	0.22	0.17	-4.28	Gyro
1980.00	1.50	87.00	1979.39	-12.79	41.70	-5.03	0.40	-0.37	5.15	Ryan MWD



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Section (VS) Reference: Well (0.00N,0.00E,203.67Azi)
Survey Calculation Method: Minimum Curvature Db: Sybase

Survey

MD ft	Incl deg	Azim deg	TVD ft	+N/-S ft	+E/-W ft	VS ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft	Tool/Comment
2075.00	1.90	124.00	2074.35	-13.60	44.25	-5.30	1.20	0.42	38.95	Ryan MWD
2169.00	0.40	116.70	2168.33	-14.62	45.83	-5.01	1.60	-1.60	-7.77	Ryan MWD
2265.00	1.10	193.20	2264.33	-15.67	45.92	-4.08	1.12	0.73	79.69	Ryan MWD
2360.00	2.90	212.60	2359.26	-18.58	44.42	-0.81	2.00	1.89	20.42	Ryan MWD
2455.00	4.00	212.10	2454.09	-23.41	41.36	4.84	1.16	1.16	-0.53	Ryan MWD
2551.00	5.90	213.70	2549.73	-30.36	36.85	13.01	1.98	1.98	1.67	Ryan MWD
2647.00	6.80	210.90	2645.14	-39.34	31.19	23.51	0.99	0.94	-2.92	Ryan MWD
2748.00	7.80	211.60	2745.32	-50.31	24.53	36.23	0.99	0.99	0.69	Ryan MWD
2844.00	6.90	213.30	2840.53	-60.68	17.95	48.37	0.96	-0.94	1.77	Ryan MWD
2939.00	8.00	212.60	2934.73	-71.01	11.25	60.52	1.16	1.16	-0.74	Ryan MWD
3034.00	9.00	214.20	3028.68	-82.73	3.51	74.36	1.08	1.05	1.68	Ryan MWD
3130.00	8.30	211.90	3123.59	-94.82	-4.37	88.60	0.81	-0.73	-2.40	Ryan MWD
3225.00	9.00	210.80	3217.51	-107.03	-11.80	102.76	0.76	0.74	-1.16	Ryan MWD
3320.00	8.50	210.10	3311.40	-119.48	-19.12	117.11	0.54	-0.53	-0.74	Ryan MWD
3415.00	9.60	211.20	3405.22	-132.33	-26.75	131.94	1.17	1.16	1.16	Ryan MWD
3510.00	9.30	209.60	3498.93	-145.78	-34.64	147.43	0.42	-0.32	-1.68	Ryan MWD
3605.00	9.20	215.10	3592.69	-158.67	-42.80	162.51	0.94	-0.11	5.79	Ryan MWD
3701.00	9.80	213.10	3687.38	-171.80	-51.68	178.09	0.71	0.62	-2.08	Ryan MWD
3795.00	9.90	211.80	3779.99	-185.37	-60.30	193.98	0.26	0.11	-1.38	Ryan MWD
3890.00	9.70	210.40	3873.61	-199.21	-68.66	210.01	0.33	-0.21	-1.47	Ryan MWD
3985.00	9.20	211.60	3967.32	-212.58	-76.68	225.48	0.57	-0.53	1.26	Ryan MWD
4080.00	9.40	213.10	4061.07	-225.55	-84.90	240.66	0.33	0.21	1.58	Ryan MWD
4175.00	9.50	211.80	4154.78	-238.71	-93.27	256.07	0.25	0.11	-1.37	Ryan MWD
4270.00	9.30	209.60	4248.50	-252.05	-101.19	271.47	0.43	-0.21	-2.32	Ryan MWD
4364.00	9.40	211.20	4341.26	-265.22	-108.92	286.63	0.30	0.11	1.70	Ryan MWD
4459.00	9.40	211.70	4434.98	-278.45	-117.02	302.01	0.09	0.00	0.53	Ryan MWD
4554.00	8.10	212.30	4528.87	-290.71	-124.67	316.31	1.37	-1.37	0.63	Ryan MWD
4648.00	8.00	211.70	4621.95	-301.87	-131.64	329.33	0.14	-0.11	-0.64	Ryan MWD
4743.00	8.00	211.20	4716.02	-313.15	-138.54	342.43	0.07	0.00	-0.53	Ryan MWD
4837.00	6.60	208.80	4809.26	-323.48	-144.53	354.30	1.52	-1.49	-2.55	Ryan MWD
4933.00	5.60	222.00	4904.72	-331.80	-150.33	364.24	1.79	-1.04	13.75	Ryan MWD
5029.00	4.40	215.30	5000.35	-338.29	-155.59	372.29	1.39	-1.25	-6.98	Ryan MWD
5124.00	3.00	237.60	5095.16	-342.59	-159.79	377.92	2.09	-1.47	23.47	Ryan MWD
5220.00	1.30	259.70	5191.09	-344.13	-162.99	380.62	1.94	-1.77	23.02	Ryan MWD
5316.00	1.00	122.20	5287.08	-344.77	-163.35	381.35	2.24	-0.31	-143.23	Ryan MWD
5411.00	1.10	293.60	5382.07	-344.85	-163.48	381.47	2.20	0.11	180.42	Ryan MWD
5505.00	0.30	90.80	5476.07	-344.49	-164.06	381.38	1.47	-0.85	167.23	Ryan MWD
5600.00	0.10	111.00	5571.07	-344.53	-163.74	381.28	0.22	-0.21	21.26	Ryan MWD
5695.00	0.40	178.50	5666.07	-344.89	-163.65	381.57	0.39	0.32	71.05	Ryan MWD
5744.00	0.40	178.50	5715.06	-345.23	-163.64	381.88	0.00	0.00	0.00	Projection