



30-015-38513

Ryan Energy Directional Drilling Report

Field: Eddy Co, NM
Site: Dodd Federal Unit #634
Well: #634
Wellpath: OH

Prepared For:

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AUG 2 2011

NMOCD ARTESIA

COG Operating LLC



Ryan Energy Technology

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Ryan Energy Technologies Survey Report



Company: COG Operating LLC	Date: 6/17/2011	Time: 12:55:51	Page: 1
Field: Eddy Co, NM	Co-ordinate(NE) Reference:	Site: Dodd Federal Unit #634, Grid North	
Site: Dodd Federal Unit #634	Vertical (TVD) Reference:	SITE: 3603.0	
Well: #634	Section (VS) Reference:	Well: (0.00N,0.00E,241 22Azi)	
Wellpath: OH	Survey Calculation Method:	Minimum Curvature	Db: Sybase

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

Site: Dodd Federal Unit #634 14, 17, 29 Eddy Co, NM	Site Position:	Northing: 665890.40 ft	Latitude: 32 49 49.070 N
From: Map	Easting: 587194.30 ft	Longitude: 104 2 58 090 W	
Position Uncertainty: 0.00 ft		North Reference: Grid	
Ground Level: 3603.00 ft		Grid Convergence: 0 15 deg	

Well: #634	Slot Name:
Well Position: +N/-S 0 00 ft	Northing: 665890.40 ft
+E/-W 0 00 ft	Easting: 587194.30 ft
Position Uncertainty: 0.00 ft	Latitude: 32 49 49.070 N
	Longitude: 104 2 58 090 W

Wellpath: OH Paddock	Drilled From: Surface
Current Datum: SITE	Tie-on Depth: 0 00 ft
Magnetic Data: 6/6/2011	Above System Datum: Mean Sea Level
Field Strength: 48956 nT	Declination: 7.86 deg
Vertical Section: Depth From (TVD)	Mag Dip Angle: 60 67 deg
ft	+N/-S
	+E/-W
	Direction
	deg
0 00	0 00
	0 00
	241 22

Survey Program for Definitive Wellpath			Version: 0	Tool Name
Date: 6/14/2011	Validated: No	Toolcode		
Actual From	To	Survey		
ft	ft			
100 00	936.00	Survey #1 (100.00-936.00)	Gyro	Gyro
1002 00	4519 00	Survey #2 (1002.00-4519.00)	Ryan MWD	Ryan MWD
4565.00	4565.00	Survey #3 (4565 00-4565 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 27	139 47	100 00	-0.18	0.15	-0 05	0 27	0 27	0 00	Gyro
200 00	0 07	191 31	200.00	-0.42	0.29	-0 06	0 23	-0 20	51.84	Gyro
300 00	0 66	22 93	300 00	0.05	0.51	-0.47	0 73	0.59	-168 38	Gyro
400.00	0.67	345.67	399 99	1.15	0 59	-1 07	0 42	0.01	-37 26	Gyro
500 00	0.87	1 67	499 98	2 47	0 46	-1.60	0.29	0 20	16 00	Gyro
600 00	1 21	13 98	599 97	4.26	0.74	-2 70	0.40	0 34	12.31	Gyro
700.00	1.80	17 19	699 93	6 78	1 46	-4.55	0 60	0 59	3 21	Gyro
800 00	1.98	19.21	799.88	9.91	2 49	-6.96	0 19	0 18	2 02	Gyro
900.00	1.87	25.64	899 82	13.02	3 77	-9 57	0 24	-0 11	6 43	Gyro
936 00	1 93	23 63	935 80	14 10	4 26	-10 53	0 25	0 17	-5 58	Gyro
1002.00	1.70	17.50	1001.77	16.05	5.00	-12.12	0.46	-0.35	-9 29	Ryan MWD
1064 00	1 50	354 97	1063.74	17 74	5 21	-13 11	1 06	-0 32	-36 34	Ryan MWD
1097 00	1.50	341.60	1096 73	18 58	5 04	-13.36	1.06	0 00	-40.52	Ryan MWD
1193 00	1.50	283.30	1192.70	20 06	3 42	-12 65	1 52	0 00	-60.73	Ryan MWD
1289.00	2.90	258.10	1288.63	19.85	-0.18	-9.40	1.74	1.46	-26 25	Ryan MWD
1385 00	4.70	252.70	1384 42	18.18	-6.32	-3 22	1 91	1 87	-5 62	Ryan MWD
1481.00	6 90	250.90	1479 92	15 12	-15 52	6 32	2 30	2 29	-1 87	Ryan MWD
1576 00	7 10	246.40	1574.21	10 90	-26 29	17 80	0 61	0 21	-4.74	Ryan MWD
1672.00	7 20	237.90	1669 47	5 33	-36.83	29 71	1 11	0.10	-8 85	Ryan MWD
1768 00	6.80	234 60	1764 75	-1 16	-46.56	41 36	0.59	-0.42	-3.44	Ryan MWD



Ryan Energy Technologies

Survey Report



Company: COG Operating LLC
Field: Eddy Co, NM
Site: Dodd Federal Unit #634
Well: #634
Wellpath: OH

Date: 6/17/2011 Time: 12:55:51 Page: 2
Co-ordinate(NE) Reference: Site: Dodd Federal Unit #634, Grid North
Vertical (TVD) Reference: SITE 3603.0
Section (VS) Reference: Well (0.00N,0.00E,241.22Azi)
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
1864.00	6.80	241.10	1860.08	-7.20	-56.16	52.69	0.80	0.00	6.77	Ryan MWD
1960.00	7.00	236.10	1955.39	-13.21	-65.99	64.20	0.66	0.21	-5.21	Ryan MWD
2056.00	6.20	237.40	2050.75	-19.26	-75.22	75.20	0.85	-0.83	1.35	Ryan MWD
2152.00	7.20	235.90	2146.09	-25.43	-84.57	86.36	1.06	1.04	-1.56	Ryan MWD
2247.00	8.00	234.00	2240.26	-32.65	-94.84	98.85	0.88	0.84	-2.00	Ryan MWD
2343.00	7.60	234.60	2335.37	-40.26	-105.42	111.78	0.43	-0.42	0.62	Ryan MWD
2439.00	7.10	234.50	2430.58	-47.38	-115.43	123.98	0.52	-0.52	-0.10	Ryan MWD
2535.00	7.60	235.60	2525.79	-54.41	-125.50	136.19	0.54	0.52	1.15	Ryan MWD
2631.00	7.70	235.70	2620.94	-61.62	-136.05	148.91	0.11	0.10	0.10	Ryan MWD
2726.00	7.50	234.50	2715.10	-68.81	-146.35	161.40	0.27	-0.21	-1.26	Ryan MWD
2822.00	7.50	235.10	2810.28	-76.03	-156.59	173.85	0.08	0.00	0.62	Ryan MWD
2918.00	7.40	235.50	2905.47	-83.12	-166.83	186.23	0.12	-0.10	0.42	Ryan MWD
3013.00	7.30	234.60	2999.69	-90.08	-176.79	198.32	0.16	-0.11	-0.95	Ryan MWD
3109.00	8.10	237.00	3094.82	-97.29	-187.43	211.12	0.90	0.83	2.50	Ryan MWD
3205.00	8.60	237.20	3189.81	-104.87	-199.14	225.03	0.52	0.52	0.21	Ryan MWD
3301.00	8.50	236.70	3284.74	-112.65	-211.10	239.26	0.13	-0.10	-0.52	Ryan MWD
3396.00	8.20	236.70	3378.73	-120.22	-222.63	253.01	0.32	-0.32	0.00	Ryan MWD
3492.00	8.10	236.70	3473.76	-127.70	-234.01	266.58	0.10	-0.10	0.00	Ryan MWD
3588.00	8.00	236.70	3568.82	-135.08	-245.24	279.98	0.10	-0.10	0.00	Ryan MWD
3684.00	6.70	236.40	3664.03	-141.84	-255.49	292.22	1.35	-1.35	-0.31	Ryan MWD
3780.00	5.90	237.00	3759.44	-147.63	-264.29	302.72	0.84	-0.83	0.62	Ryan MWD
3875.00	4.40	236.30	3854.06	-152.31	-271.42	311.22	1.58	-1.58	-0.74	Ryan MWD
3971.00	3.10	235.30	3949.85	-155.83	-276.62	317.47	1.36	-1.35	-1.04	Ryan MWD
4067.00	2.00	240.50	4045.75	-158.14	-280.21	321.73	1.17	-1.15	5.42	Ryan MWD
4162.00	1.30	358.60	4140.73	-157.87	-281.68	322.89	3.00	-0.74	124.32	Ryan MWD
4258.00	0.50	6.70	4236.72	-156.37	-281.66	322.15	0.84	-0.83	8.44	Ryan MWD
4354.00	0.60	21.00	4332.72	-155.48	-281.43	321.52	0.18	0.10	14.90	Ryan MWD
4449.00	0.60	23.00	4427.71	-154.56	-281.06	320.75	0.02	0.00	2.11	Ryan MWD
4519.00	0.40	22.50	4497.71	-154.00	-280.82	320.27	0.29	-0.29	-0.71	Ryan MWD
4565.00	0.40	22.50	4543.71	-153.70	-280.70	320.02	0.00	0.00	0.00	Projection

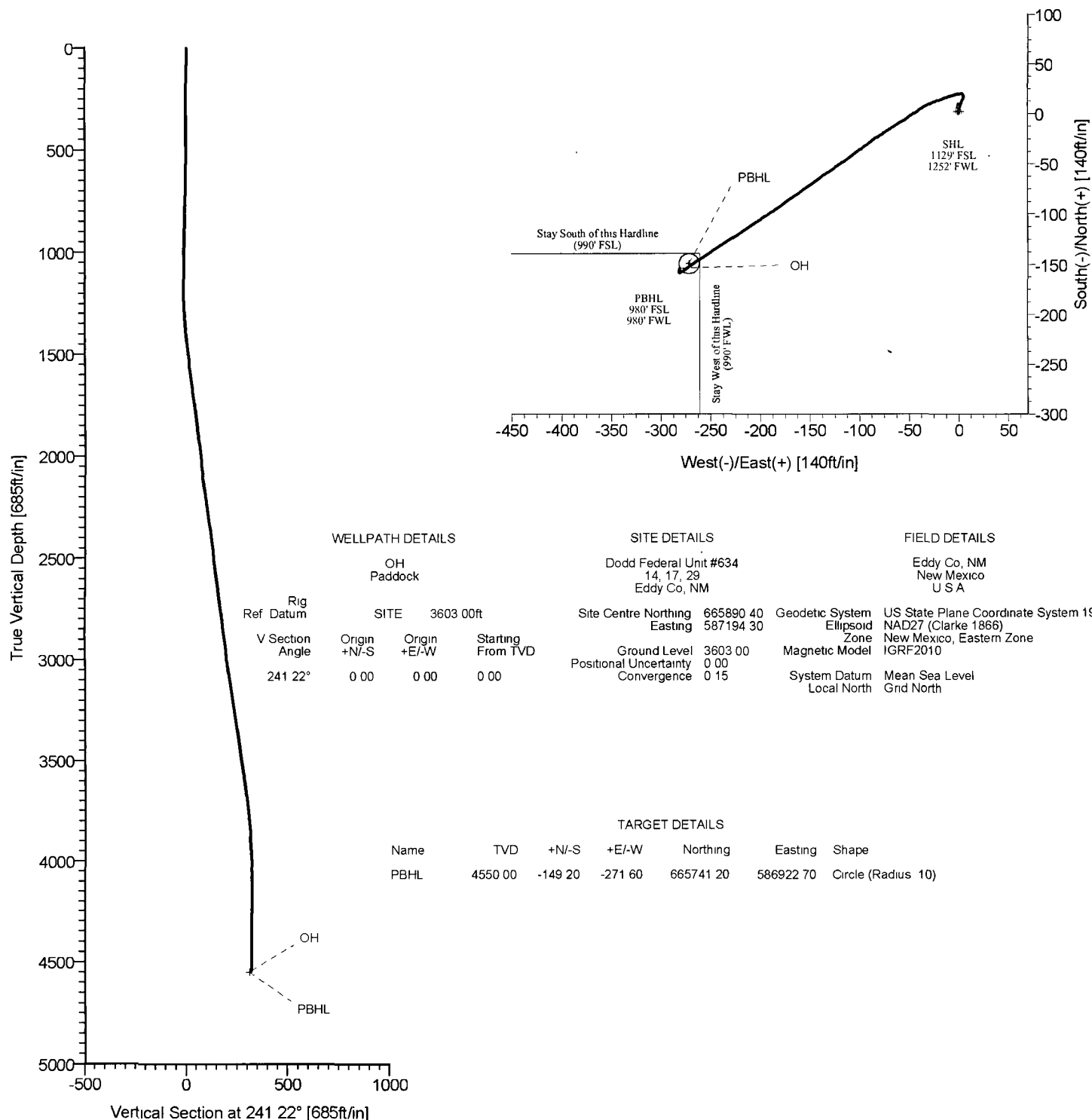


COG Operating LLC

Field: Eddy Co, NM
Site: Dodd Federal Unit #634
Well: #634
Wellpath: OH



Azimuths to Grid North
True North: 0 35°
Magnetic North: 7 70°
Magnetic Field
Strength: 48956n1
Dip Angle: 60 67°
Date: 6/6/2011
Model: K0R1 2010



WELLPATH DETAILS

OH Paddock			
Rig Ref Datum	SITE	3603 00ft	
V Section Angle	Origin +N/-S	Origin +E/-W	Starting From TVD
241 22°	0 00	0 00	0 00

SITE DETAILS

Dodd Federal Unit #634	
14, 17, 29 Eddy Co, NM	
Site Centre Northing	665890 40
Site Centre Easting	587194 30
Ground Level	3603 00
Positional Uncertainty	0 00
Convergence	0 15

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

TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL	4550 00	-149 20	-271 60	665741 20	586922 70	Circle (Radius 10)