



3D-015-38425

Ryan Energy Directional Drilling Report

Field: Eddy Co, NM
Site: Firecracker State #16
Well: #16
Wellpath: OH

RECEIVED

JUL 18 2011

NMOCD ARTESIA

Prepared For:

COG Operating LLC



Ryan Energy Technology

19510 Oil Center Blvd
Houston, TX 77073
Ph: 281-443-1414
Fx: 281-443-1676

www.ryanenergy.com



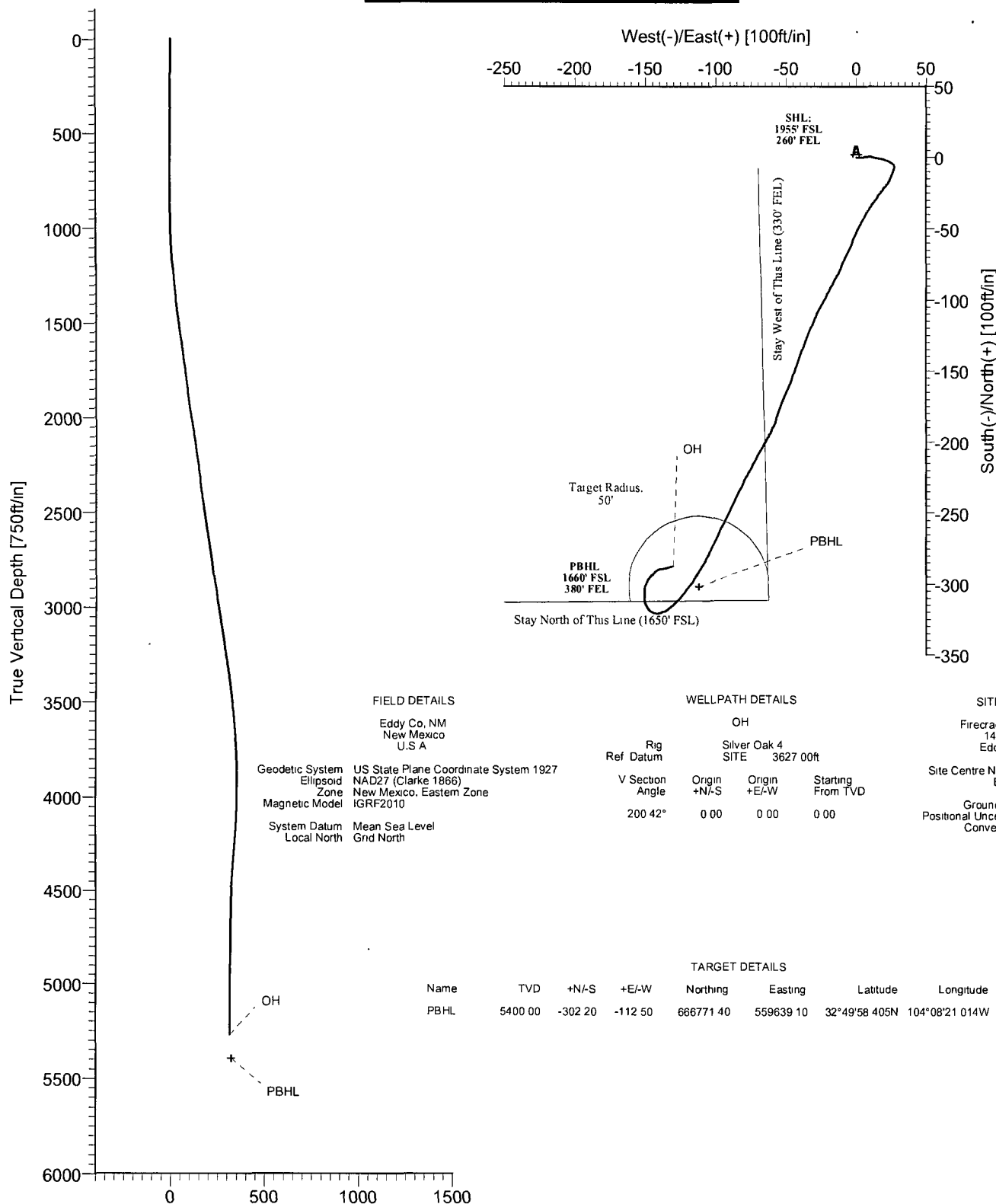
COG Operating LLC

Field: Eddy Co, NM
Site: Firecracker State #16
Well: #16
Wellpath: OH



Azimuths to Grid North
True North -0.11°
Magnetic North 7.81°

Magnetic Field
Strength 4896 nT
Dip Angle 60.66°
Date 4/19/2011
Model IGRF2010



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

WELLPATH DETAILS

OH

Rig Ref Datum	Origin +N/-S	Origin +E/-W	Starting From TVD
Silver Oak 4 SITE	3627 00ft		
V Section Angle	200.42°	0.00	0.00

SITE DETAILS

Firecracker State #16
14-17S-28E
Eddy Co, NM

Site Centre Northing	667073.60
Easting	559751.60
Ground Level	3627.00
Positional Uncertainty	0.00
Convergence	0.11

TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
PBHL	5400.00	-302.20	-112.50	666771.40	559639.10	32°49'58.405N	104°08'21.014W	Point



Ryan Energy Technologies Survey Report



Company: COG Operating LLC	Date: 5/5/2011	Time: 14:57 57	Page: 1
Field: Eddy Co, NM	Co-ordinate(NE) Reference:	Site: Firecracker State #16, Grid North	
Site: Firecracker State #16	Vertical (TVD) Reference:	SITE 3627.0	
Well: #16	Section (VS) Reference:	Well (0.00N,0.00E,200 42Azi)	
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: Firecracker State #16 14-17S-28E Eddy Co, NM	Site Position:	Northings: 667073.60 ft	Latitude: 32 50 1.393 N
From: Map	Easting: 559751.60 ft	Longitude: 104 8 19 689 W	
Position Uncertainty: 0.00 ft	North Reference: Grid	Grid Convergence: 0.11 deg	
Ground Level: 3627.00 ft			

Well: #16	Slot Name:
Well Position: +N/-S 0.00 ft	Northings: 667073.60 ft
+E/-W 0.00 ft	Easting: 559751.60 ft
Position Uncertainty: 0.00 ft	Latitude: 32 50 1.393 N
	Longitude: 104 8 19.689 W

Wellpath: OH	Drilled From: Surface
Current Datum: SITE	Tie-on Depth: 0.00 ft
Magnetic Data: 4/19/2011	Above System Datum: Mean Sea Level
Field Strength: 48961 nT	Declination: 7.91 deg
Vertical Section: Depth From (TVD)	Mag Dip Angle: 60.66 deg
ft	+N/-S
	+E/-W
	Direction
	deg
0.00	0.00
	0.00
	200.42

Survey Program for Definitive Wellpath			
Date: 5/5/2011	Validated: No	Version: 0	
Actual From	To	Survey	Tool Name
ft	ft		
100.00	5254.00	Survey #1 (100.00-5254.00)	Ryan MWD
5303.00	5303.00	Survey #2 (5303.00-5303.00)	Projection

MD	Incl	Azim	TVD	+N/-S	+E/-W	VS	DLS	Build	Turn	Tool/Comment
ft	deg	deg	ft	ft	ft	ft	deg/100ft	deg/100ft	deg/100ft	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	TIE LINE
100.00	1.24	93.97	99.99	-0.07	1.08	-0.31	1.24	1.24	0.00	Ryan MWD
200.00	1.95	80.21	199.95	0.14	3.84	-1.47	0.80	0.71	-13.76	Ryan MWD
300.00	2.06	88.57	299.89	0.47	7.31	-2.99	0.31	0.11	8.36	Ryan MWD
400.00	2.75	103.27	399.80	-0.03	11.44	-3.96	0.92	0.69	14.70	Ryan MWD
500.00	2.46	99.56	499.70	-0.94	15.89	-4.66	0.34	-0.29	-3.71	Ryan MWD
600.00	1.85	101.80	599.63	-1.63	19.59	-5.31	0.62	-0.61	2.24	Ryan MWD
700.00	1.56	114.94	699.59	-2.53	22.40	-5.45	0.48	-0.29	13.14	Ryan MWD
800.00	1.47	131.29	799.55	-3.95	24.60	-4.88	0.44	-0.09	16.35	Ryan MWD
840.00	1.44	129.37	839.54	-4.61	25.37	-4.54	0.14	-0.07	-4.80	Ryan MWD
893.00	1.40	132.00	892.52	-5.46	26.37	-4.08	0.14	-0.08	4.96	Ryan MWD
989.00	1.30	194.80	988.50	-7.30	26.96	-2.57	1.47	-0.10	65.42	Ryan MWD
1085.00	2.80	196.10	1084.44	-10.61	26.04	0.86	1.56	1.56	1.35	Ryan MWD
1180.00	3.90	207.40	1179.27	-15.70	23.91	6.38	1.35	1.16	11.89	Ryan MWD
1276.00	5.00	218.90	1274.98	-21.86	19.78	13.59	1.47	1.15	11.98	Ryan MWD
1371.00	6.60	216.30	1369.50	-29.48	13.94	22.76	1.71	1.68	-2.74	Ryan MWD
1467.00	8.00	212.50	1464.72	-39.56	7.09	34.60	1.54	1.46	-3.96	Ryan MWD
1562.00	8.20	204.00	1558.77	-51.33	0.78	47.83	1.28	0.21	-8.95	Ryan MWD
1665.00	7.70	204.50	1660.78	-64.32	-5.07	62.04	0.49	-0.49	0.49	Ryan MWD
1761.00	7.40	205.10	1755.95	-75.77	-10.36	74.62	0.32	-0.31	0.62	Ryan MWD
1856.00	8.20	208.70	1850.07	-87.25	-16.21	87.42	0.99	0.84	3.79	Ryan MWD
1951.00	7.80	207.40	1944.14	-98.92	-22.43	100.53	0.46	-0.42	-1.37	Ryan MWD



Ryan Energy Technologies Survey Report



Company: COG Operating LLC
Field: Eddy Co, NM
Site: Firecracker State #16
Well: #16
Wellpath: OH

Date: 5/5/2011 Time: 14:57 57 Page: 2
Co-ordinate(NE) Reference: Site: Firecracker State #16, Grid North
Vertical (TVD) Reference: SITE 3627.0
Section (VS) Reference: Well (0.00N,0.00E,200.42Azi)
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
2047.00	7.70	206.20	2039.27	-110.47	-28.27	113.39	0.20	-0.10	-1.25	Ryan MWD
2143.00	8.00	201.70	2134.37	-122.45	-33.58	126.47	0.71	0.31	-4.69	Ryan MWD
2238.00	7.90	201.40	2228.46	-134.67	-38.40	139.60	0.11	-0.11	-0.32	Ryan MWD
2334.00	7.60	198.00	2323.58	-146.85	-42.77	152.54	0.57	-0.31	-3.54	Ryan MWD
2430.00	8.20	202.90	2418.67	-159.19	-47.40	165.73	0.94	0.62	5.10	Ryan MWD
2525.00	8.40	201.70	2512.67	-171.88	-52.60	179.43	0.28	0.21	-1.26	Ryan MWD
2621.00	8.40	199.70	2607.64	-185.00	-57.55	193.45	0.30	0.00	-2.08	Ryan MWD
2716.00	8.70	210.00	2701.59	-197.75	-63.49	207.48	1.64	0.32	10.84	Ryan MWD
2812.00	8.80	209.20	2796.48	-210.45	-70.70	221.89	0.16	0.10	-0.83	Ryan MWD
2908.00	8.90	207.30	2891.33	-223.46	-77.69	236.52	0.32	0.10	-1.98	Ryan MWD
3003.00	8.70	206.40	2985.22	-236.43	-84.25	250.97	0.26	-0.21	-0.95	Ryan MWD
3099.00	9.00	205.80	3080.07	-249.69	-90.75	265.66	0.33	0.31	-0.62	Ryan MWD
3195.00	8.80	205.90	3174.92	-263.06	-97.22	280.45	0.21	-0.21	0.10	Ryan MWD
3290.00	8.90	205.80	3268.79	-276.21	-103.60	295.00	0.11	0.11	-0.11	Ryan MWD
3386.00	7.80	211.10	3363.77	-288.47	-110.19	308.79	1.40	-1.15	5.52	Ryan MWD
3481.00	6.80	215.00	3458.00	-298.60	-116.75	320.57	1.17	-1.05	4.11	Ryan MWD
3577.00	6.00	218.60	3553.40	-307.18	-123.14	330.84	0.93	-0.83	3.75	Ryan MWD
3673.00	4.70	224.50	3648.98	-313.91	-129.03	339.20	1.47	-1.35	6.15	Ryan MWD
3770.00	3.90	237.70	3745.71	-318.50	-134.60	345.45	1.31	-0.82	13.61	Ryan MWD
3864.00	2.80	252.20	3839.55	-320.91	-139.49	349.42	1.47	-1.17	15.43	Ryan MWD
3959.00	2.80	283.00	3934.44	-321.10	-143.96	351.15	1.56	0.00	32.42	Ryan MWD
4054.00	2.90	319.50	4029.33	-318.75	-147.78	350.28	1.88	0.11	38.42	Ryan MWD
4150.00	3.70	338.00	4125.17	-314.03	-150.52	346.81	1.38	0.83	19.27	Ryan MWD
4246.00	4.30	3.50	4220.95	-307.57	-151.46	341.08	1.94	0.62	26.56	Ryan MWD
4341.00	4.40	20.90	4315.68	-300.61	-149.94	334.03	1.39	0.11	18.32	Ryan MWD
4452.00	3.80	48.60	4426.40	-294.20	-145.67	326.53	1.84	-0.54	24.95	Ryan MWD
4533.00	2.70	49.30	4507.27	-291.18	-142.21	322.50	1.36	-1.36	0.86	Ryan MWD
4628.00	2.60	85.90	4602.18	-289.56	-138.36	319.64	1.75	-0.11	38.53	Ryan MWD
4723.00	0.90	61.60	4697.13	-289.06	-135.55	318.19	1.91	-1.79	-25.58	Ryan MWD
4819.00	0.90	82.30	4793.12	-288.60	-134.14	317.26	0.34	0.00	21.56	Ryan MWD
4915.00	1.10	73.10	4889.10	-288.23	-132.51	316.35	0.27	0.21	-9.58	Ryan MWD
5010.00	0.10	124.50	4984.10	-288.01	-131.57	315.82	1.10	-1.05	54.11	Ryan MWD
5102.00	0.20	70.20	5076.10	-288.00	-131.36	315.73	0.18	0.11	-59.02	Ryan MWD
5201.00	0.30	74.40	5175.10	-287.87	-130.94	315.47	0.10	0.10	4.24	Ryan MWD
5254.00	0.30	75.80	5228.09	-287.80	-130.68	315.31	0.01	0.00	2.64	Ryan MWD
5303.00	0.30	75.80	5277.09	-287.74	-130.43	315.16	0.00	0.00	0.00	PROJECTED to TD



Ryan Energy Technologies COMPLETION REPORT



Company: COG Operating LLC	Date: 5/5/2011	Time: 14.59 35	Page: 1
Field: Eddy Co, NM	Co-ordinate(NE) Reference:	Site: Firecracker State #16, Grid North	
Site: Firecracker State #16	Vertical (TVD) Reference:	SITE 3627 0	
Well: #16	Section (VS) Reference:	Well (0.00N,0 00E,200.42Azi)	
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

Geo Datum: NAD27 (Clarke 1866)

Sys Datum: Mean Sea Level

Map Zone:

New Mexico, Eastern Zone

Coordinate System:

Site Centre

Geomagnetic Model:

IGRF2010

Site: Firecracker State #16
14-17S-28E
Eddy Co, NM

Site Position:	Northing: 667073 60 ft	Latitude: 32 50 1 393 N
From: Map	Easting: 559751 60 ft	Longitude: 104 8 19 689 W
Position Uncertainty: 0 00 ft		North Reference: Grid
Ground Level: 3627 00 ft		Grid Convergence: 0.11 deg

Well: #16

Slot Name:

Well Position: +N/-S 0 00 ft	Northing: 667073 60 ft	Latitude: 32 50 1.393 N
+E/-W 0 00 ft	Easting: 559751 60 ft	Longitude: 104 8 19 689 W
Position Uncertainty: 0 00 ft		

Wellpath: OH

Current Datum: SITE
Magnetic Data: 4/19/2011
Field Strength: 48961 nT
Vertical Section: Depth From (TVD)
ft

Height 3627.00 ft

Drilled From: Surface
Tie-on Depth: 0 00 ft
Above System Datum: Mean Sea Level
Declination: 7.91 deg
Mag Dip Angle: 60.66 deg
Direction
deg

0 00

0.00

0.00

200.42

Survey

MD ft	Incl deg	TVD ft	VS ft	Azim deg	N/S ft	E/W ft	Clsr Dist. ft	Clsr Azi. deg	DLS deg/100ft	Tool
0 00	0 00	0 00	0.00	0 00	0.00	0 00	0.00	0.00	0 00	TIE LINE
100.00	1 24	99 99	-0.31	93 97	-0.07	1 08	1.08	93.97	1 24	Ryan MWD
200.00	1 95	199 95	-1.47	80 21	0.14	3 84	3.84	87.92	0 80	Ryan MWD
300.00	2 06	299 89	-2.99	88 57	0.47	7 31	7.32	86.29	0 31	Ryan MWD
400.00	2 75	399 80	-3.96	103.27	-0.03	11 44	11 44	90 16	0.92	Ryan MWD
500.00	2.46	499.70	-4.66	99.56	-0.94	15.89	15 92	93 38	0 34	Ryan MWD
600.00	1.85	599 63	-5 31	101.80	-1 63	19 59	19 66	94 74	0.62	Ryan MWD
700.00	1 56	699 59	-5.45	114 94	-2.53	22 40	22 54	96.44	0.48	Ryan MWD
800.00	1 47	799.55	-4.88	131 29	-3.95	24 60	24 92	99 12	0 44	Ryan MWD
840.00	1.44	839 54	-4 54	129 37	-4 61	25.37	25 79	100.29	0.14	Ryan MWD
893 00	1 40	892 52	-4 08	132.00	-5 46	26 37	26 93	101.70	0 14	Ryan MWD
989 00	1 30	988 50	-2 57	194.80	-7 30	26 96	27 93	105.15	1 47	Ryan MWD
1085.00	2 80	1084 44	0.86	196.10	-10 61	26.04	28 11	112 17	1 56	Ryan MWD
1180.00	3 90	1179 27	6 38	207.40	-15 70	23.91	28 60	123 30	1 35	Ryan MWD
1276.00	5.00	1274 98	13 59	218 90	-21 86	19.78	29 48	137 87	1.47	Ryan MWD
1371.00	6.60	1369 50	22.76	216 30	-29 48	13 94	32 61	154 69	1.71	Ryan MWD
1467 00	8.00	1464 72	34.60	212 50	-39 56	7.09	40 19	169 84	1.54	Ryan MWD
1562 00	8 20	1558 77	47.83	204.00	-51.33	0.78	51 33	179 13	1.28	Ryan MWD
1665.00	7 70	1660.78	62 04	204 50	-64.32	-5 07	64.52	184.51	0 49	Ryan MWD
1761.00	7 40	1755.95	74.62	205 10	-75.77	-10 36	76.47	187.79	0 32	Ryan MWD
1856 00	8.20	1850.07	87.42	208 70	-87 25	-16 21	88 74	190 52	0.99	Ryan MWD
1951.00	7.80	1944.14	100 53	207 40	-98.92	-22 43	101.43	192 78	0.46	Ryan MWD
2047 00	7.70	2039 27	113.39	206.20	-110 47	-28 27	114 03	194 35	0.20	Ryan MWD
2143 00	8 00	2134 37	126.47	201.70	-122.45	-33.58	126.97	195 33	0 71	Ryan MWD
2238.00	7 90	2228 46	139 60	201.40	-134 67	-38.40	140.04	195.92	0 11	Ryan MWD
2334.00	7.60	2323 58	152 54	198 00	-146 85	-42.77	152 95	196.24	0 57	Ryan MWD
2430.00	8 20	2418.67	165 73	202.90	-159 19	-47 40	166.10	196 58	0.94	Ryan MWD
2525 00	8 40	2512 67	179 43	201.70	-171 88	-52.60	179 75	197 01	0.28	Ryan MWD



Ryan Energy Technologies COMPLETION REPORT



Company: COG Operating LLC
Field: Eddy Co, NM
Site: Firecracker State #16
Well: #16
Wellpath: OH

Date: 5/5/2011
Co-ordinate(NE) Reference: Site: Firecracker State #16, Grid North
Vertical (TVD) Reference: SITE 3627.0
Section (VS) Reference: Well (0.00N,0.00E,200.42Azi)
Survey Calculation Method: Minimum Curvature
Db: Sybase

Page: 2

Survey

MD ft	Incl deg	TVD ft	VS ft	Azim deg	N/S ft	E/W ft	Clsr Dist. ft	Clsr Azi. deg	DLS deg/100ft	Tool
2621 00	8.40	2607.64	193.45	199 70	-185.00	-57.55	193.74	197.28	0 30	Ryan MWD
2716 00	8.70	2701 59	207.48	210.00	-197.75	-63 49	207.70	197 80	1.64	Ryan MWD
2812 00	8.80	2796.48	221.89	209 20	-210.45	-70 70	222.01	198 57	0.16	Ryan MWD
2908 00	8.90	2891.33	236.52	207.30	-223.46	-77 69	236.58	199.17	0 32	Ryan MWD
3003 00	8.70	2985 22	250 97	206.40	-236 43	-84.25	250 99	199 61	0.26	Ryan MWD
3099 00	9.00	3080 07	265 66	205.80	-249 69	-90.75	265.67	199 97	0.33	Ryan MWD
3195.00	8 80	3174 92	280 45	205.90	-263.06	-97 22	280.45	200 28	0.21	Ryan MWD
3290 00	8.90	3268.79	295 00	205.80	-276 21	-103.60	295 00	200 56	0 11	Ryan MWD
3386.00	7 80	3363.77	308 79	211.10	-288 47	-110.19	308 80	200 91	1 40	Ryan MWD
3481.00	6 80	3458.00	320 57	215.00	-298 60	-116.75	320 61	201.36	1.17	Ryan MWD
3577 00	6 00	3553 40	330.84	218.60	-307 18	-123.14	330 94	201.84	0.93	Ryan MWD
3673.00	4.70	3648 98	339.20	224.50	-313 91	-129 03	339 39	202.34	1.47	Ryan MWD
3770.00	3.90	3745 71	345.45	237.70	-318 50	-134 60	345.78	202 91	1.31	Ryan MWD
3864.00	2 80	3839.55	349 42	252.20	-320.91	-139 49	349 92	203.49	1 47	Ryan MWD
3959.00	2.80	3934 44	351.15	283 00	-321.10	-143.96	351 90	204 15	1.56	Ryan MWD
4054.00	2.90	4029 33	350.28	319 50	-318 75	-147 78	351.34	204 87	1.88	Ryan MWD
4150.00	3 70	4125 17	346 81	338 00	-314.03	-150 52	348.24	205.61	1 38	Ryan MWD
4246 00	4.30	4220.95	341 08	3 50	-307.57	-151 46	342.84	206 22	1 94	Ryan MWD
4341 00	4 40	4315.68	334.03	20 90	-300.61	-149.94	335.93	206 51	1.39	Ryan MWD
4452 00	3.80	4426 40	326.53	48 60	-294.20	-145 67	328.28	206 34	1.84	Ryan MWD
4533 00	2 70	4507 27	322.50	49 30	-291.18	-142 21	324.05	206 03	1 36	Ryan MWD
4628.00	2.60	4602 18	319.64	85 90	-289 56	-138 36	320.92	205 54	1.75	Ryan MWD
4723.00	0.90	4697 13	318.19	61 60	-289 06	-135 55	319.26	205 12	1.91	Ryan MWD
4819 00	0 90	4793 12	317.26	82 30	-288 60	-134.14	318.25	204 93	0 34	Ryan MWD
4915.00	1 10	4889.10	316.35	73 10	-288.23	-132.51	317 23	204.69	0 27	Ryan MWD
5010.00	0 10	4984.10	315.82	124.50	-288.01	-131.57	316 64	204 55	1 10	Ryan MWD
5102 00	0 20	5076.10	315 73	70.20	-288 00	-131.36	316.54	204.52	0.18	Ryan MWD
5201 00	0.30	5175.10	315.47	74.40	-287 87	-130.94	316.25	204.46	0.10	Ryan MWD
5254.00	0 30	5228.09	315 31	75.80	-287 80	-130 68	316.08	204.42	0 01	Ryan MWD
5303 00	0 30	5277 09	315.16	75 80	-287.74	-130.43	315.92	204.38	0.00	PROJECTED