

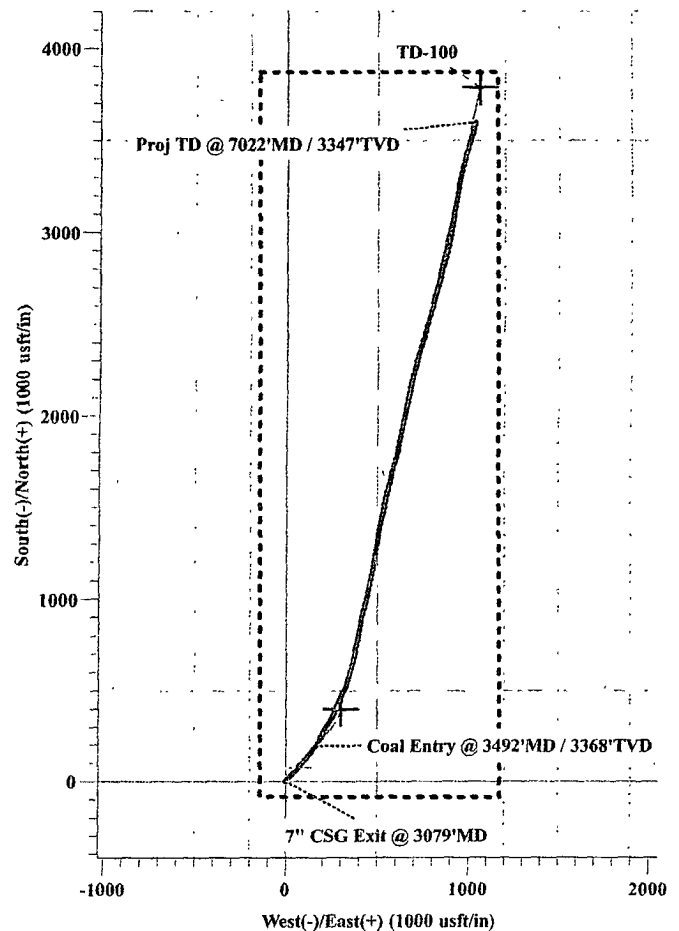
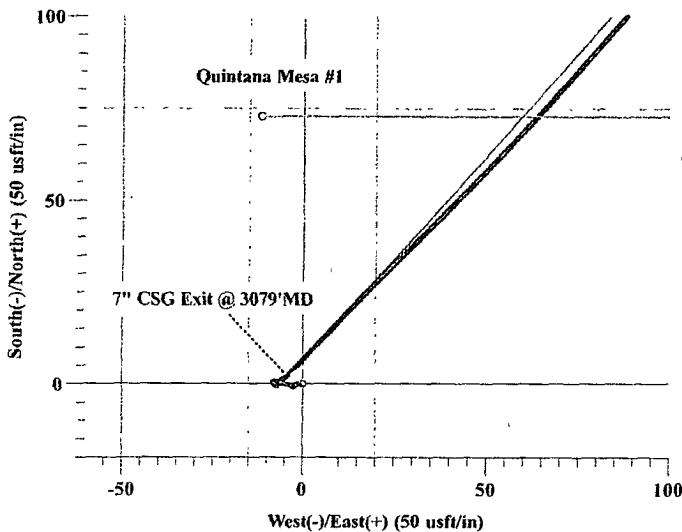
Elkhorn #100 STK
Sec29 T32N-R05W - #100 STK
Rio Arriba Co. NM
GL: 6682' KB: 15'

30-039-27337

DESIGN TARGET DETAILS

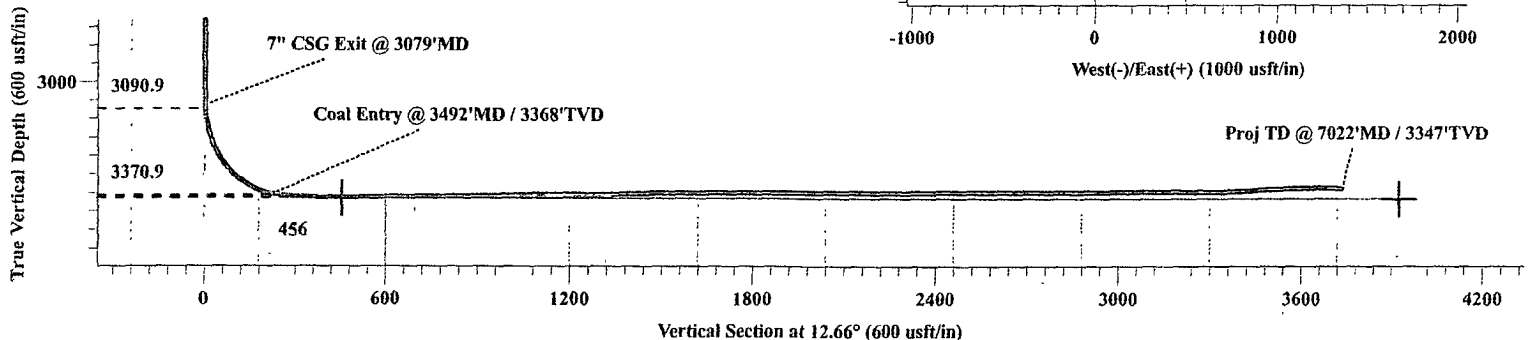
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
LAND	3382.0	400.0	300.0	2166047.15	1307017.88	36° 56' 49.699 N	107° 23' 27.432 W	Point
TD	3382.0	3786.7	1060.7	2169424.51	1307819.12	36° 57' 23.184 N	107° 23' 18.060 W	Point

EOW
No Hardline Crossed



WELL DETAILS: Elkhorn #100 STK

Northing	Easting	6682.0	Latitude	Longitude
2165650.77	1306713.11	36° 56' 45.744 N	107° 23' 31.128 W	



SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
3091.0	1.26	61.82	3090.9	2.4	-4.1	0.00	0.00	1.4	
3516.0	86.19	41.20	3370.9	202.2	173.5	20.00	-20.65	235.4	
3610.5	86.19	41.20	3377.1	273.1	235.6	0.00	0.00	318.1	
3754.3	90.00	12.66	3382.0	400.0	300.0	20.00	-83.04	456.0	LAND-100
7225.4	90.00	12.66	3382.0	3786.7	1060.7	0.00	0.00	3927.1	

Plan: Design #5 (Elkhorn #100 STK/STK)

Created By: Frank C. Scardino

Date: 10/12/2011

Survey Report

Company:	Energen Resources	Local Co-ordinate Reference:	Well Elkhorn #100 STK
Project:	Rio Arriba County	TVD Reference:	WELL @ 6697.0usft (Original Well Elev)
Site:	Sec29 T32N-R05W - #100 STK	MD Reference:	WELL @ 6697.0usft (Original Well Elev)
Well:	Elkhorn #100 STK	North Reference:	True
Wellbore:	STK	Survey Calculation Method:	Minimum Curvature
Design:	STK	Database:	EDM 5000.1 Single User Db

Project	Rio Arriba County		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Central Zone		

Site Sec29 T32N-R05W - #100 STK

Site Position:		Northing:	2,165,650.77 usft	Latitude:	36° 56' 45.744 N
From:	Lat/Long	Easting:	1,306,713.11 usft	Longitude:	107° 23' 31.128 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.69 °

Well Elkhorn #100 STK

Well Position	+N/-S	0.0 usft	Northing:	2,165,650.77 usft	Latitude:	36° 56' 45.744 N
	+E/-W	0.0 usft	Easting:	1,306,713.11 usft	Longitude:	107° 23' 31.128 W
Position Uncertainty	0.0 usft		Wellhead Elevation:	usft	Ground Level:	6,682.0 usft

Wellbore STK

Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	10/11/11	9.72	63.70	50,868

Design STK

Audit Notes:

Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
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Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	12.66

Survey Program Date 10/21/11

From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
100.0	7,022.0	Survey #1 (STK)	MWD	MWD - Standard

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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.11	242.38	100.0	0.0	-0.1	-0.1	0.11	0.11	0.00
200.0	0.11	264.76	200.0	-0.1	-0.3	-0.2	0.04	0.00	22.38
300.0	0.30	260.63	300.0	-0.1	-0.6	-0.3	0.19	0.19	-4.13
400.0	0.26	271.04	400.0	-0.2	-1.1	-0.4	0.06	-0.04	10.41
500.0	0.34	282.47	500.0	-0.1	-1.6	-0.5	0.10	0.08	11.43
600.0	0.26	235.87	600.0	-0.2	-2.1	-0.6	0.25	-0.08	-46.60
700.0	0.16	194.45	700.0	-0.4	-2.3	-0.9	0.18	-0.10	-41.42
800.0	0.15	209.43	800.0	-0.7	-2.4	-1.2	0.04	-0.01	14.98
900.0	0.16	241.24	900.0	-0.9	-2.6	-1.4	0.09	0.01	31.81

Survey Report

Company: Energen Resources
 Project: Rio Arriba County
 Site: Sec29 T32N-R05W - #100 STK
 Well: Elkhorn #100 STK
 Wellbore: STK
 Design: STK

Local Co-ordinate Reference: Well Elkhorn #100 STK
 TVD Reference: WELL @ 6697.0usft (Original Well Elev)
 MD Reference: WELL @ 6697.0usft (Original Well Elev)
 North Reference: True
 Survey Calculation Method: Minimum Curvature
 Database: EDM 5000.1 Single User Db

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)
1,000.0	0.15	273.36	1,000.0	-0.9	-2.9	-1.5	0.09	-0.01	32.12
1,100.0	0.21	311.18	1,100.0	-0.8	-3.1	-1.5	0.13	0.06	37.82
1,200.0	0.21	322.43	1,200.0	-0.5	-3.4	-1.3	0.04	0.00	11.25
1,300.0	0.17	303.66	1,300.0	-0.3	-3.6	-1.1	0.07	-0.04	-18.77
1,400.0	0.33	277.15	1,400.0	-0.2	-4.0	-1.1	0.19	0.16	-26.51
1,500.0	0.40	277.45	1,500.0	-0.1	-4.7	-1.1	0.07	0.07	0.30
1,600.0	0.48	281.59	1,600.0	0.0	-5.4	-1.2	0.09	0.08	4.14
1,700.0	0.43	285.15	1,700.0	0.2	-6.2	-1.2	0.06	-0.05	3.56
1,800.0	0.50	288.97	1,800.0	0.4	-7.0	-1.1	0.08	0.07	3.82
1,900.0	0.24	307.00	1,900.0	0.7	-7.5	-1.0	0.28	-0.26	18.03
2,000.0	0.17	286.90	2,000.0	0.9	-7.8	-0.9	0.10	-0.07	-20.10
2,100.0	0.39	248.55	2,100.0	0.8	-8.3	-1.0	0.28	0.22	-38.35
2,200.0	0.14	133.18	2,200.0	0.6	-8.5	-1.3	0.47	-0.25	-115.37
2,300.0	0.14	159.04	2,300.0	0.4	-8.4	-1.5	0.06	0.00	25.86
2,400.0	0.17	165.56	2,400.0	0.1	-8.3	-1.7	0.03	0.03	6.52
2,500.0	0.24	126.78	2,500.0	-0.1	-8.1	-1.9	0.15	0.07	-38.78
2,600.0	0.33	135.06	2,600.0	-0.5	-7.7	-2.2	0.10	0.09	8.28
2,700.0	0.27	57.09	2,700.0	-0.5	-7.3	-2.1	0.38	-0.06	-77.97
2,800.0	0.37	11.06	2,800.0	-0.1	-7.1	-1.6	0.27	0.10	-46.03
2,900.0	0.58	37.43	2,900.0	0.6	-6.7	-0.9	0.30	0.21	26.37
3,000.0	1.00	56.88	3,000.0	1.5	-5.7	0.2	0.49	0.42	19.45
3,079.0	1.23	61.29	3,078.9	2.3	-4.4	1.3	0.31	0.29	5.58
7" CSG Exit @ 3079'MD									
3,152.6	16.18	43.08	3,151.5	10.2	3.4	10.7	20.39	20.30	-24.73
3,184.4	23.04	44.29	3,181.5	17.9	10.8	19.8	21.61	21.57	3.81
3,216.3	28.40	44.09	3,210.1	27.8	20.4	31.6	16.85	16.84	-0.63
3,248.0	33.94	44.64	3,237.3	39.5	31.9	45.6	17.47	17.45	1.73
3,279.9	40.36	44.15	3,262.7	53.3	45.4	62.0	20.12	20.10	-1.53
3,311.7	46.60	42.91	3,285.7	69.2	60.4	80.7	19.84	19.66	-3.91
3,343.5	52.06	41.01	3,306.5	87.1	76.5	101.7	17.77	17.18	-5.98
3,375.3	57.24	41.59	3,324.9	106.6	93.6	124.5	16.34	16.27	1.82
3,407.2	62.70	38.69	3,340.8	127.7	111.4	149.0	18.86	17.14	-9.10
3,438.8	69.20	36.56	3,353.7	150.5	129.0	175.2	21.44	20.54	-6.73
3,470.6	75.80	34.80	3,363.3	175.2	146.7	203.1	21.39	20.74	-5.53
3,492.0	80.94	32.83	3,367.6	192.6	158.3	222.6	25.69	24.06	-9.21
Coal Entry @ 3492'MD / 3368'TVD									
3,499.1	82.66	32.19	3,368.6	198.5	162.1	229.2	25.69	24.10	-9.01
3,531.0	86.00	30.94	3,371.7	225.5	178.7	259.2	11.18	10.48	-3.92
3,594.0	86.79	27.79	3,375.7	280.3	209.5	319.4	5.15	1.25	-5.00
3,657.0	88.55	27.68	3,378.3	336.0	238.8	380.2	2.80	2.79	-0.17
3,721.0	89.16	25.54	3,379.5	393.3	267.5	442.3	3.48	0.95	-3.34
3,784.0	93.03	24.70	3,378.3	450.3	294.2	503.8	6.29	6.14	-1.33
3,848.0	89.96	20.09	3,376.7	509.4	318.6	566.8	8.65	-4.80	-7.20
3,911.0	91.36	18.83	3,375.9	568.8	339.6	629.4	2.99	2.22	-2.00

Survey Report

Company: Energen Resources
 Project: Rio Arriba County
 Site: Sec29 T32N-R05W - #100 STK
 Well: Elkhorn #100 STK
 Wellbore: STK
 Design: STK

Local Co-ordinate Reference. Well Elkhorn #100 STK
 TVD Reference: WELL @ 6697.0usft (Original Well Elev)
 MD Reference: WELL @ 6697.0usft (Original Well Elev)
 North Reference: True
 Survey Calculation Method: Minimum Curvature
 Database: EDM 5000.1 Single User Db

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)
3,975.0	90.57	14.41	3,374.9	630.1	357.9	693.2	7.01	-1.23	-6.91
4,038.0	90.75	13.15	3,374.1	691.3	372.9	756.2	2.02	0.29	-2.00
4,098.0	89.96	12.25	3,373.8	749.8	386.1	816.2	2.00	-1.32	-1.50
4,160.0	91.19	8.90	3,373.1	810.7	397.4	878.1	5.76	1.98	-5.40
4,221.0	90.57	9.42	3,372.2	871.0	407.2	939.0	1.33	-1.02	0.85
4,282.0	91.19	14.46	3,371.3	930.6	419.8	1,000.0	8.32	1.02	8.26
4,343.0	91.71	13.66	3,369.7	989.8	434.6	1,060.9	1.56	0.85	-1.31
4,404.0	90.66	12.48	3,368.5	1,049.2	448.4	1,121.9	2.59	-1.72	-1.93
4,465.0	89.60	10.88	3,368.3	1,108.9	460.7	1,182.9	3.15	-1.74	-2.62
4,526.0	89.78	9.97	3,368.6	1,168.9	471.8	1,243.9	1.52	0.30	-1.49
4,588.0	89.52	10.38	3,369.0	1,229.9	482.7	1,305.8	0.78	-0.42	0.66
4,650.0	92.15	10.07	3,368.1	1,290.9	493.7	1,367.7	4.27	4.24	-0.50
4,712.0	91.45	9.43	3,366.2	1,352.0	504.2	1,429.6	1.53	-1.13	-1.03
4,773.0	91.54	10.56	3,364.6	1,412.1	514.8	1,490.5	1.86	0.15	1.85
4,835.0	90.13	10.96	3,363.7	1,473.0	526.4	1,552.5	2.36	-2.27	0.65
4,896.0	90.31	13.54	3,363.4	1,532.6	539.3	1,613.5	4.24	0.30	4.23
4,957.0	90.31	14.94	3,363.1	1,591.7	554.3	1,674.5	2.30	0.00	2.30
5,019.0	89.69	14.72	3,363.1	1,651.6	570.2	1,736.4	1.06	-1.00	-0.35
5,080.0	90.22	14.09	3,363.2	1,710.7	585.4	1,797.4	1.35	0.87	-1.03
5,142.0	91.28	12.93	3,362.4	1,771.0	599.8	1,859.4	2.53	1.71	-1.87
5,203.0	89.96	12.44	3,361.7	1,830.5	613.2	1,920.4	2.31	-2.16	-0.80
5,265.0	89.69	11.36	3,361.9	1,891.1	626.0	1,982.4	1.80	-0.44	-1.74
5,326.0	89.96	11.37	3,362.1	1,951.0	638.0	2,043.4	0.44	0.44	0.02
5,387.0	90.13	10.77	3,362.0	2,010.8	649.8	2,104.3	1.02	0.28	-0.98
5,448.0	89.87	10.94	3,362.0	2,070.7	661.2	2,165.3	0.51	-0.43	0.28
5,509.0	89.69	12.82	3,362.3	2,130.4	673.8	2,226.3	3.10	-0.30	3.08
5,571.0	90.31	14.37	3,362.3	2,190.7	688.4	2,288.3	2.69	1.00	2.50
5,631.0	90.40	14.76	3,361.9	2,248.7	703.5	2,348.2	0.67	0.15	0.65
5,693.0	90.75	15.43	3,361.3	2,308.6	719.6	2,410.2	1.22	0.56	1.08
5,755.0	90.66	15.44	3,360.5	2,368.4	736.1	2,472.1	0.15	-0.15	0.02
5,816.0	89.78	14.68	3,360.3	2,427.3	752.0	2,533.1	1.91	-1.44	-1.25
5,880.0	90.40	15.88	3,360.2	2,489.0	768.8	2,597.0	2.11	0.97	1.88
5,943.0	89.87	16.02	3,360.0	2,549.6	786.1	2,659.9	0.87	-0.84	0.22
6,007.0	89.87	16.05	3,360.2	2,611.1	803.8	2,723.8	0.05	0.00	0.05
6,070.0	90.48	15.29	3,360.0	2,671.7	820.8	2,786.7	1.55	0.97	-1.21
6,134.0	89.43	15.88	3,360.0	2,733.4	838.0	2,850.6	1.88	-1.64	0.92
6,197.0	90.13	15.78	3,360.3	2,794.0	855.2	2,913.5	1.12	1.11	-0.16
6,261.0	91.19	14.50	3,359.5	2,855.8	871.9	2,977.4	2.60	1.66	-2.00
6,324.0	91.28	12.48	3,358.2	2,917.0	886.6	3,040.4	3.21	0.14	-3.21
6,388.0	90.04	9.87	3,357.4	2,979.8	899.0	3,104.4	4.51	-1.94	-4.08
6,451.0	89.60	9.20	3,357.6	3,041.9	909.4	3,167.3	1.27	-0.70	-1.06
6,515.0	89.52	8.52	3,358.1	3,105.2	919.3	3,231.1	1.07	-0.13	-1.06
6,578.0	88.99	8.66	3,358.9	3,167.4	928.7	3,294.0	0.87	-0.84	0.22

Survey Report

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 Design: STK

Local Co-ordinate Reference: Well Elkhorn #100 STK
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 North Reference: True
 Survey Calculation Method: Minimum Curvature
 Database: EDM 5000.1 Single User Db

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)
6,641.0	92.24	10.40	3,358.3	3,229.6	939.1	3,356.9	5.85	5.16	2.76
6,705.0	92.95	10.18	3,355.4	3,292.5	950.6	3,420.7	1.16	1.11	-0.34
6,769.0	93.56	13.97	3,351.7	3,354.9	963.9	3,484.6	5.99	0.95	5.92
6,832.0	92.33	16.69	3,348.5	3,415.6	980.6	3,547.5	4.73	-1.95	4.32
6,896.0	91.71	18.10	3,346.2	3,476.6	999.7	3,611.2	2.41	-0.97	2.20
6,966.0	88.90	17.03	3,345.9	3,543.4	1,020.8	3,680.9	4.30	-4.01	-1.53
7,022.0	88.90	17.03	3,346.9	3,596.9	1,037.2	3,736.8	0.00	0.00	0.00

Proj TD @ 7022'MD / 3347'TVD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates	Comment
3,079.0	3,078.9	+N/-S (usft) 2.3	-4.4 7" CSG Exit @ 3079'MD
3,492.0	3,367.6	+E/-W (usft) 192.6	158.3 Coal Entry @ 3492'MD / 3368'TVD
7,022.0	3,346.9	+N/-S (usft) 3,596.9	1,037.2 Proj TD @ 7022'MD / 3347'TVD

Checked By: _____ Approved By: _____ Date: _____

$$N/S \rightarrow 725' + 3596.9 = 4321.9 \text{ FSL or } 958. \text{ FNL}$$

$$E/W \rightarrow 800' + 1037.2 = 1837.2 \text{ FNL}$$