



North Carracas 32-5 #10C-2
Sec 09 T32N R05W
Archuleta Co., CO

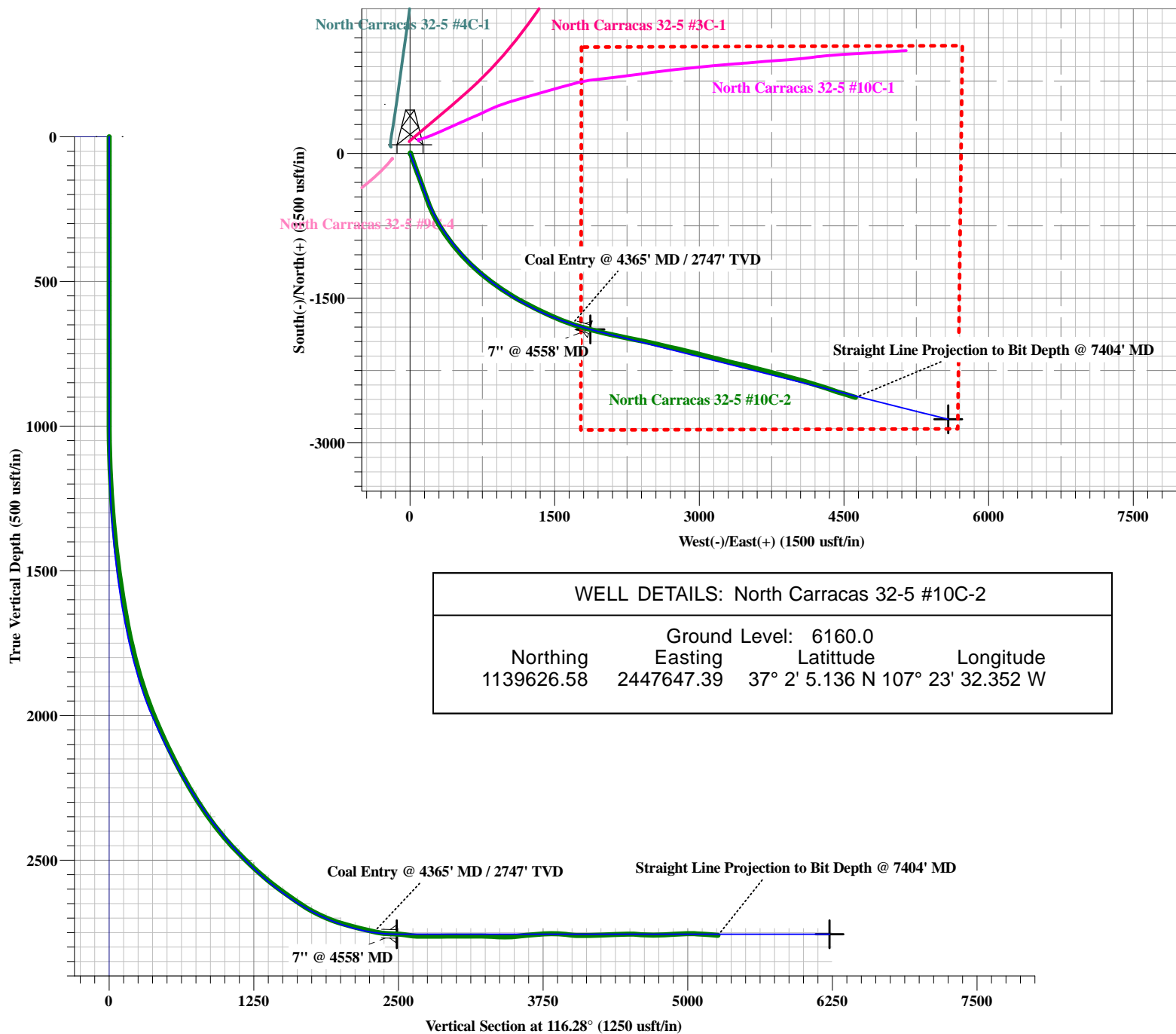
GE: 6160' / KB: 20'

PATHFINDER
A Schlumberger Company

EOW
No Hardlines
Crossed

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
CP 10C-2	2756.0	-1824.1	1871.3	1137764.90	2449481.34	Point
BHL 10C-2	2756.0	-2755.8	5581.9	1136758.30	2453172.34	Point



WELL DETAILS: North Carracas 32-5 #10C-2

		Ground Level: 6160.0	
Northing	Easting	Latitude	Longitude
1139626.58	2447647.39	37° 2' 5.136 N	107° 23' 32.352 W

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V Sect	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
1050.0	0.00	0.00	1050.0	0.0	0.0	0.00	0.00	0.0	
2158.2	55.41	159.21	1993.4	-463.1	175.8	5.00	159.21	362.7	
4578.3	90.00	104.09	2756.0	-1824.1	1871.3	2.56	-68.41	2485.5	CP 10C-2
8404.1	90.00	104.09	2756.0	-2755.8	5581.9	0.00	0.00	6225.1	BHL 10C-2

Plan: Design #1 (North Carracas 32-5 #10C-2/Wellbore #1)

Created By: Breck Enoch

Date: 16-Jul-2012



Red Willow Production Company

Archuleta Co., CO

Sec 09 T32N R05W

North Carracas 32-5 #10C-2

Wellbore #1

Design: Wellbore #1

Standard Survey Report

16 July, 2012



Company:	Red Willow Production Company	Local Co-ordinate Reference:	Well North Carracas 32-5 #10C-2
Project:	Archuleta Co., CO	TVD Reference:	WELL @ 6180.0usft (Original Well Elev)
Site:	Sec 09 T32N R05W	MD Reference:	WELL @ 6180.0usft (Original Well Elev)
Well:	North Carracas 32-5 #10C-2	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Archuleta Co., CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Southern Zone		

Site		Sec 09 T32N R05W					
Site Position:		Northing:	1,139,747.37	usft	Latitude:	37° 2' 6.324 N	
From:	Lat/Long	Easting:	2,447,617.73	usft	Longitude:	107° 23' 32.748 W	
Position Uncertainty:	0.0	usft	Slot Radius:	13-3/16	"	Grid Convergence:	-1.16 °

Well	North Carracas 32-5 #10C-2					
Well Position	+N/-S	0.0 usft	Northing:	1,139,626.58 usft	Latitude:	37° 2' 5.136 N
	+E/-W	0.0 usft	Easting:	2,447,647.40 usft	Longitude:	107° 23' 32.352 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	6,160.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	05/29/12	9.66	63.76	50,860

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	116.28	

Survey Program	Date	07/16/12			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
930.0	7,404.0	Survey #1 (Wellbore #1)	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	
930.0	0.79	28.38	930.0	5.6	3.0	0.2	0.08	0.08	0.00	
994.0	0.26	75.60	994.0	6.1	3.4	0.4	1.00	-0.83	73.78	
1,057.0	3.25	152.19	1,056.9	4.5	4.4	1.9	5.08	4.75	121.57	
1,121.0	7.03	158.03	1,120.7	-0.7	6.7	6.3	5.95	5.91	9.13	
1,185.0	10.11	162.06	1,183.9	-9.7	9.9	13.2	4.90	4.81	6.30	
1,248.0	12.66	162.62	1,245.7	-21.5	13.6	21.8	4.05	4.05	0.89	
1,311.0	16.18	160.67	1,306.7	-36.4	18.6	32.8	5.64	5.59	-3.10	
1,375.0	19.61	160.67	1,367.6	-55.0	25.1	46.9	5.36	5.36	0.00	
1,438.0	22.95	161.97	1,426.3	-76.6	32.4	63.0	5.35	5.30	2.06	



Company:	Red Willow Production Company	Local Co-ordinate Reference:	Well North Carracas 32-5 #10C-2
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Site:	Sec 09 T32N R05W	MD Reference:	WELL @ 6180.0usft (Original Well Elev)
Well:	North Carracas 32-5 #10C-2	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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)	
1,501.0	24.45	162.07	1,484.0	-100.7	40.2	80.7	2.38	2.38	0.16	
1,565.0	26.03	160.06	1,541.9	-126.5	49.1	100.1	2.81	2.47	-3.14	
1,628.0	29.11	159.99	1,597.7	-153.9	59.1	121.1	4.89	4.89	-0.11	
1,692.0	31.92	159.31	1,652.8	-184.4	70.4	144.7	4.42	4.39	-1.06	
1,755.0	34.73	159.07	1,705.5	-216.7	82.7	170.1	4.47	4.46	-0.38	
1,819.0	37.90	159.17	1,757.0	-252.2	96.2	197.9	4.95	4.95	0.16	
1,883.0	41.59	160.39	1,806.2	-290.5	110.3	227.5	5.89	5.77	1.91	
1,946.0	45.20	159.64	1,852.0	-331.2	125.1	258.8	5.79	5.73	-1.19	
2,010.0	48.36	160.61	1,895.8	-375.1	140.9	292.4	5.06	4.94	1.52	
2,073.0	51.27	160.88	1,936.5	-420.5	156.8	326.8	4.63	4.62	0.43	
2,137.0	54.26	160.08	1,975.2	-468.5	173.8	363.3	4.78	4.67	-1.25	
2,201.0	54.69	159.06	2,012.4	-517.3	192.0	401.2	1.46	0.67	-1.59	
2,265.0	55.22	157.07	2,049.1	-565.9	211.6	440.3	2.68	0.83	-3.11	
2,328.0	55.57	154.41	2,084.9	-613.2	232.9	480.3	3.52	0.56	-4.22	
2,391.0	56.37	152.28	2,120.2	-659.9	256.3	522.0	3.08	1.27	-3.38	
2,455.0	57.24	150.28	2,155.2	-706.8	282.1	565.9	2.95	1.36	-3.13	
2,518.0	57.95	148.56	2,189.0	-752.6	309.1	610.4	2.57	1.13	-2.73	
2,582.0	58.21	146.57	2,222.8	-798.4	338.3	656.8	2.67	0.41	-3.11	
2,645.0	59.18	145.19	2,255.6	-843.0	368.5	703.6	2.42	1.54	-2.19	
2,708.0	60.23	143.40	2,287.3	-887.2	400.2	751.6	2.97	1.67	-2.84	
2,772.0	61.73	141.82	2,318.4	-931.6	434.2	801.8	3.19	2.34	-2.47	
2,835.0	62.52	141.02	2,347.9	-975.2	468.9	852.2	1.68	1.25	-1.27	
2,897.0	63.93	139.57	2,375.8	-1,017.7	504.3	902.8	3.09	2.27	-2.34	
2,959.0	65.16	137.87	2,402.4	-1,059.8	541.2	954.5	3.17	1.98	-2.74	
3,020.0	66.48	136.04	2,427.4	-1,100.5	579.2	1,006.6	3.49	2.16	-3.00	
3,081.0	67.62	133.85	2,451.2	-1,140.1	619.0	1,059.8	3.80	1.87	-3.59	
3,142.0	68.59	132.15	2,474.0	-1,178.7	660.4	1,114.0	3.04	1.59	-2.79	
3,204.0	69.20	130.62	2,496.3	-1,217.0	703.7	1,169.8	2.50	0.98	-2.47	
3,265.0	69.91	129.64	2,517.6	-1,253.8	747.4	1,225.3	1.90	1.16	-1.61	
3,326.0	70.52	128.73	2,538.2	-1,290.1	791.9	1,281.3	1.72	1.00	-1.49	
3,388.0	71.40	127.39	2,558.5	-1,326.2	838.1	1,338.6	2.49	1.42	-2.16	
3,449.0	72.55	125.79	2,577.3	-1,360.8	884.7	1,395.7	3.13	1.89	-2.62	
3,510.0	73.34	124.63	2,595.2	-1,394.4	932.3	1,453.3	2.23	1.30	-1.90	
3,571.0	74.22	123.15	2,612.3	-1,427.1	980.9	1,511.4	2.74	1.44	-2.43	
3,633.0	74.48	121.92	2,629.0	-1,459.2	1,031.3	1,570.7	1.96	0.42	-1.98	
3,694.0	74.66	120.27	2,645.2	-1,489.5	1,081.6	1,629.3	2.62	0.30	-2.70	
3,755.0	75.97	119.09	2,660.7	-1,518.7	1,132.9	1,688.2	2.85	2.15	-1.93	
3,817.0	77.82	117.98	2,674.7	-1,547.6	1,185.9	1,748.6	3.46	2.98	-1.79	
3,878.0	78.96	117.03	2,687.0	-1,575.2	1,238.9	1,808.3	2.41	1.87	-1.56	
3,939.0	79.67	116.40	2,698.3	-1,602.1	1,292.5	1,868.2	1.54	1.16	-1.03	
4,000.0	81.51	116.10	2,708.3	-1,628.7	1,346.4	1,928.4	3.06	3.02	-0.49	
4,062.0	83.01	114.59	2,716.7	-1,655.0	1,402.0	1,989.8	3.42	2.42	-2.44	
4,123.0	83.71	114.25	2,723.7	-1,680.1	1,457.1	2,050.4	1.27	1.15	-0.56	
4,184.0	83.89	113.48	2,730.3	-1,704.6	1,512.6	2,111.0	1.29	0.30	-1.26	



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Design:	Wellbore #1	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)
4,246.0	84.33	111.69	2,736.7	-1,728.3	1,569.5	2,172.5	2.96	0.71	-2.89
4,307.0	84.86	110.98	2,742.4	-1,750.4	1,626.1	2,233.0	1.45	0.87	-1.16
4,365.0	84.77	108.69	2,747.6	-1,770.0	1,680.4	2,290.4	3.94	-0.15	-3.95
Coal Entry @ 4365' MD / 2747' TVD									
4,368.0	84.77	108.57	2,747.9	-1,771.0	1,683.2	2,293.4	3.94	-0.14	-3.95
4,430.0	87.14	106.23	2,752.3	-1,789.4	1,742.3	2,354.5	5.37	3.82	-3.77
4,491.0	89.16	104.11	2,754.3	-1,805.4	1,801.1	2,414.3	4.80	3.31	-3.48
4,558.0	89.09	105.65	2,755.3	-1,822.6	1,865.8	2,480.0	2.30	-0.10	2.30
7"									
4,572.0	89.08	105.97	2,755.5	-1,826.4	1,879.3	2,493.7	2.30	-0.10	2.30
4,635.0	86.26	104.74	2,758.1	-1,843.1	1,940.0	2,555.5	4.88	-4.48	-1.95
4,699.0	87.67	103.42	2,761.5	-1,858.6	2,002.0	2,618.0	3.02	2.20	-2.06
4,762.0	89.87	102.24	2,762.8	-1,872.6	2,063.4	2,679.2	3.96	3.49	-1.87
4,826.0	90.31	102.22	2,762.7	-1,886.2	2,125.9	2,741.3	0.69	0.69	-0.03
4,889.0	89.78	101.61	2,762.7	-1,899.2	2,187.6	2,802.4	1.28	-0.84	-0.97
4,953.0	90.31	101.48	2,762.6	-1,912.0	2,250.3	2,864.2	0.85	0.83	-0.20
5,016.0	90.31	101.46	2,762.3	-1,924.5	2,312.0	2,925.2	0.03	0.00	-0.03
5,080.0	89.78	100.98	2,762.2	-1,937.0	2,374.8	2,987.0	1.12	-0.83	-0.75
5,143.0	90.22	102.07	2,762.2	-1,949.5	2,436.5	3,047.9	1.87	0.70	1.73
5,207.0	90.04	102.41	2,762.1	-1,963.1	2,499.1	3,110.0	0.60	-0.28	0.53
5,270.0	89.87	102.86	2,762.1	-1,976.9	2,560.6	3,171.2	0.76	-0.27	0.71
5,334.0	89.78	103.74	2,762.3	-1,991.6	2,622.8	3,233.6	1.38	-0.14	1.38
5,397.0	88.55	103.10	2,763.2	-2,006.2	2,684.1	3,295.0	2.20	-1.95	-1.02
5,460.0	88.81	102.78	2,764.7	-2,020.3	2,745.5	3,356.2	0.65	0.41	-0.51
5,524.0	89.78	102.88	2,765.5	-2,034.6	2,807.9	3,418.5	1.52	1.52	0.16
5,588.0	91.36	104.07	2,764.8	-2,049.5	2,870.1	3,480.9	3.09	2.47	1.86
5,651.0	92.59	104.56	2,762.7	-2,065.0	2,931.1	3,542.5	2.10	1.95	0.78
5,715.0	92.86	104.12	2,759.6	-2,080.9	2,993.1	3,605.0	0.81	0.42	-0.69
5,778.0	91.19	103.76	2,757.4	-2,096.0	3,054.2	3,666.5	2.71	-2.65	-0.57
5,842.0	91.54	103.71	2,755.9	-2,111.2	3,116.3	3,729.0	0.55	0.55	-0.08
5,905.0	91.10	104.73	2,754.4	-2,126.7	3,177.4	3,790.6	1.76	-0.70	1.62
5,969.0	88.90	105.07	2,754.4	-2,143.2	3,239.2	3,853.3	3.48	-3.44	0.53
6,032.0	88.20	104.15	2,756.0	-2,159.0	3,300.2	3,915.0	1.83	-1.11	-1.46
6,096.0	87.49	102.14	2,758.4	-2,173.6	3,362.4	3,977.3	3.33	-1.11	-3.14
6,159.0	89.52	103.04	2,760.1	-2,187.3	3,423.9	4,038.5	3.52	3.22	1.43
6,222.0	90.40	104.38	2,760.1	-2,202.2	3,485.1	4,099.9	2.54	1.40	2.13
6,285.0	90.66	105.24	2,759.5	-2,218.3	3,546.0	4,161.7	1.43	0.41	1.37
6,349.0	90.04	104.26	2,759.1	-2,234.6	3,607.9	4,224.4	1.81	-0.97	-1.53
6,413.0	90.31	103.57	2,758.9	-2,250.0	3,670.0	4,286.9	1.16	0.42	-1.08
6,476.0	90.92	105.14	2,758.3	-2,265.6	3,731.0	4,348.5	2.67	0.97	2.49
6,539.0	92.24	105.53	2,756.5	-2,282.3	3,791.8	4,410.4	2.18	2.10	0.62
6,602.0	90.04	105.04	2,755.3	-2,298.9	3,852.5	4,472.2	3.58	-3.49	-0.78
6,666.0	88.72	104.12	2,756.0	-2,315.0	3,914.5	4,534.9	2.51	-2.06	-1.44



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Well:	North Carracas 32-5 #10C-2	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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)	
6,728.0	88.37	103.80	2,757.5	-2,330.0	3,974.6	4,595.4	0.76	-0.56	-0.52	
6,789.0	88.90	105.53	2,759.0	-2,345.4	4,033.6	4,655.1	2.97	0.87	2.84	
6,850.0	90.22	106.32	2,759.5	-2,362.1	4,092.3	4,715.1	2.52	2.16	1.30	
6,911.0	91.19	107.27	2,758.7	-2,379.8	4,150.7	4,775.3	2.23	1.59	1.56	
6,972.0	91.45	107.23	2,757.3	-2,397.8	4,208.9	4,835.5	0.43	0.43	-0.07	
7,034.0	91.36	107.84	2,755.8	-2,416.5	4,268.0	4,896.8	0.99	-0.15	0.98	
7,095.0	90.66	108.36	2,754.7	-2,435.5	4,326.0	4,957.2	1.43	-1.15	0.85	
7,156.0	90.40	108.92	2,754.1	-2,455.0	4,383.8	5,017.6	1.01	-0.43	0.92	
7,218.0	88.81	107.36	2,754.6	-2,474.3	4,442.7	5,079.0	3.59	-2.56	-2.52	
7,279.0	88.20	106.43	2,756.2	-2,492.0	4,501.0	5,139.1	1.82	-1.00	-1.52	
7,340.0	88.46	107.14	2,757.9	-2,509.6	4,559.4	5,199.3	1.24	0.43	1.16	
7,404.0	88.46	107.14	2,759.7	-2,528.5	4,620.5	5,262.5	0.00	0.00	0.00	
Straight Line Projection to Bit Depth @ 7404' MD										

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
4,558.0	2,755.3	7"	7	8-3/4

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,365.0	2,747.6	-1,770.0	1,680.4	Coal Entry @ 4365' MD / 2747' TVD
7,404.0	2,759.7	-2,528.5	4,620.5	Straight Line Projection to Bit Depth @ 7404' MD

Checked By: _____	Approved By: _____	Date: _____
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