



Red Willow Production Company

North Carracas 32-5 #9 C-4  
Sec9 T32N-R05W - 9C-4

Archuleta Co. CO.

GE: 6150' / KB: 20'

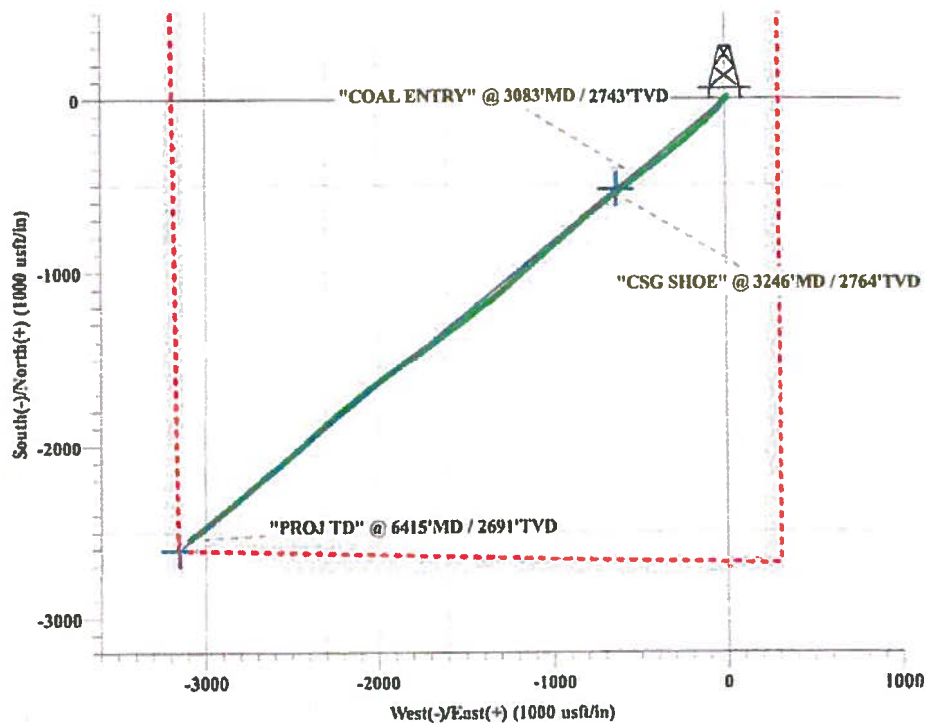
**PATHFINDER**

A Schlumberger Company

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

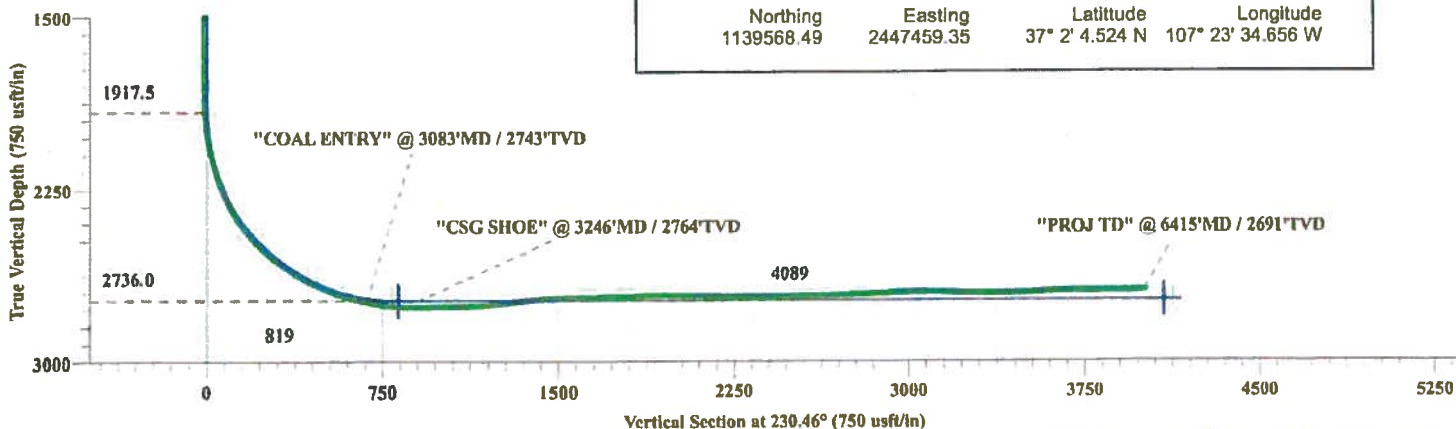
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
LAND-C4	2736.0	-521.1	-631.2	1139080.29	2446817.72	Point
TD-C4	2736.0	-2603.3	-3153.0	1137029.67	2444254.29	Point

EOW  
No Hardline  
Crossed



WELL DETAILS: North Carracas 32-5 #9 C-4

Northing	Easting	6150.0 Latitude	Longitude
1139568.49	2447459.35	37° 2' 4.524 N	107° 23' 34.656 W



Plan: Design #1 (North Carracas 32-5 #9 C-4/Wellbore #1)

Created By: Frank C. Scardino

Date: 11/18/2011

# **RED WILLOW PROD. CO.**

**Archuleta Co. CO.**

**Sec9 T32N-R05W - 9C-4**

**North Carracas 32-5 #9 C-4**

**Wellbore #1**

**Design: Wellbore #1**

## **Standard Survey Report**

**05 January, 2012**

## Survey Report

**Company:** RED WILLOW PROD. CO.  
**Project:** Archuleta Co. CO.  
**Site:** Sec9 T32N-R05W - 9C-4  
**Well:** North Carracas 32-5 #9 C-4  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:** Site Sec9 T32N-R05W - 9C-4  
**TVD Reference:** WELL @ 6170.0usft (Original Well Elev)  
**MD Reference:** WELL @ 6170.0usft (Original Well Elev)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Single User Db

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

**Site** Sec9 T32N-R05W - 9C-4

<b>Site Position:</b>	<b>Northing:</b> 1,139,568.49 usft	<b>Latitude:</b> 37° 2' 4.524 N
<b>From:</b> Lat/Long	<b>Easting:</b> 2,447,459.36 usft	<b>Longitude:</b> 107° 23' 34.656 W
<b>Position Uncertainty:</b> 0.0 usft	<b>Slot Radius:</b> 13-3/16 "	<b>Grid Convergence:</b> -1.16 °

**Well** North Carracas 32-5 #9 C-4

<b>Well Position</b>	<b>Northing:</b> 1,139,568.49 usft	<b>Latitude:</b> 37° 2' 4.524 N
<b>+N/-S</b> 0.0 usft	<b>Easting:</b> 2,447,459.36 usft	<b>Longitude:</b> 107° 23' 34.656 W
<b>+E/-W</b> 0.0 usft	<b>Wellhead Elevation:</b> usft	<b>Ground Level:</b> 6,150.0 usft
<b>Position Uncertainty</b> 0.0 usft		

**Wellbore** Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/18/11	9.72	63.77	50,912

**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	230.46

**Survey Program**      **Date** 01/05/12

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
902.0	6,415.0	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
902.0	0.79	29.06	902.0	5.4	3.0	-5.8	0.09	0.09	0.00
964.0	0.79	32.48	964.0	6.2	3.5	-6.6	0.08	0.00	5.52
1,027.0	0.79	15.80	1,027.0	7.0	3.8	-7.4	0.36	0.00	-26.48
1,089.0	0.79	19.20	1,089.0	7.8	4.1	-8.1	0.08	0.00	5.48
1,150.0	0.88	13.21	1,149.9	8.6	4.3	-8.8	0.21	0.15	-9.82
1,211.0	1.06	26.53	1,210.9	9.8	4.7	-9.7	0.47	0.30	21.84
1,273.0	0.97	21.87	1,272.9	10.6	5.1	-10.7	0.20	-0.15	-7.52
1,372.0	0.35	278.04	1,371.9	11.4	5.1	-11.2	1.12	-0.63	-104.88
1,433.0	0.35	269.18	1,432.9	11.4	4.8	-10.9	0.09	0.00	-14.52

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 Project: Archuleta Co. CO.  
 Site: Sec9 T32N-R05W - 9C-4  
 Well: North Carracas 32-5 #9 C-4  
 Wellbore: Wellbore #1  
 Design: Wellbore #1

Local Co-ordinate Reference: Site Sec9 T32N-R05W - 9C-4  
 TVD Reference: WELL @ 6170.0usft (Original Well Elev)  
 MD Reference: WELL @ 6170.0usft (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)
1,495.0	0.26	264.97	1,494.9	11.4	4.4	-10.7	0.15	-0.15	-6.79
1,556.0	0.26	268.63	1,555.9	11.4	4.2	-10.5	0.03	0.00	8.00
1,617.0	0.26	225.43	1,618.9	11.3	3.9	-10.2	0.31	0.00	-70.82
1,679.0	0.26	216.45	1,678.9	11.1	3.7	-9.9	0.07	0.00	-14.48
1,740.0	0.26	198.83	1,739.9	10.8	3.8	-9.7	0.13	0.00	-28.89
1,801.0	0.26	194.78	1,800.9	10.6	3.5	-9.5	0.03	0.00	-8.64
1,863.0	0.44	221.35	1,862.9	10.3	3.3	-9.1	0.38	0.29	42.85
1,924.0	2.90	219.46	1,923.9	8.9	2.2	-7.4	4.03	4.03	-3.10
1,985.0	6.42	218.33	1,984.7	5.0	-0.9	-2.5	5.77	5.77	-1.85
2,047.0	9.94	219.84	2,046.0	-1.8	-6.5	6.1	5.69	5.68	2.44
2,108.0	13.63	218.77	2,105.7	-11.5	-14.4	18.4	6.06	6.05	-1.75
2,170.0	17.15	217.39	2,165.5	-24.4	-24.5	34.4	5.71	5.68	-2.23
2,231.0	20.84	219.23	2,223.2	-40.0	-36.8	53.8	6.13	6.05	3.02
2,292.0	24.09	223.74	2,279.5	-57.4	-52.3	76.8	6.03	5.33	7.39
2,354.0	28.40	224.71	2,335.1	-77.0	-71.4	104.1	6.99	6.95	1.56
2,415.0	33.06	225.20	2,387.6	-99.1	-93.4	135.1	7.65	7.64	0.80
2,476.0	37.64	225.32	2,437.3	-123.9	-118.5	170.3	7.51	7.51	0.20
2,538.0	42.74	226.65	2,484.6	-151.7	-147.3	210.1	8.34	8.23	2.15
2,599.0	47.48	227.70	2,527.7	-181.0	-179.0	253.3	7.87	7.77	1.72
2,660.0	52.32	229.06	2,587.0	-212.0	-213.9	299.9	8.12	7.93	2.23
2,722.0	56.37	230.98	2,603.1	-244.3	-252.5	350.2	7.00	6.53	3.10
2,783.0	59.97	231.86	2,635.3	-276.6	-293.0	402.0	6.03	5.90	1.44
2,844.0	64.28	231.36	2,663.8	-310.1	-335.2	455.9	7.10	7.07	-0.82
2,906.0	67.36	231.49	2,689.2	-345.4	-379.4	512.5	4.97	4.97	0.21
2,967.0	70.70	232.15	2,711.0	-380.6	-424.2	569.4	5.57	5.48	1.08
3,028.0	74.66	232.62	2,729.2	-416.1	-470.3	627.6	6.53	6.49	0.77
3,083.0	77.31	232.87	2,742.5	-448.4	-512.6	680.9	4.84	4.82	0.45
"COAL ENTRY" @ 3083'MD / 2743'TVD									
3,090.0	77.65	232.90	2,744.0	-452.5	-518.3	687.8	4.84	4.82	0.45
3,153.0	81.87	233.29	2,755.2	-489.8	-567.8	749.7	6.73	6.70	0.62
3,246.0	87.78	232.46	2,763.6	-545.6	-641.6	842.2	6.42	6.35	-0.89
"CSG SHOE" @ 3246'MD / 2764'TVD									
3,283.0	90.13	232.13	2,764.3	-568.3	-870.9	879.1	6.42	6.35	-0.89
3,378.0	90.31	230.53	2,763.9	-627.8	-745.1	974.1	1.69	0.19	-1.68
3,441.0	91.01	229.48	2,763.2	-668.1	-793.3	1,037.1	2.00	1.11	-1.67
3,505.0	91.71	229.05	2,761.6	-709.9	-841.8	1,101.1	1.28	1.09	-0.67
3,568.0	93.56	229.54	2,758.7	-750.9	-889.5	1,164.0	3.04	2.94	0.78
3,631.0	96.46	229.81	2,753.2	-791.5	-937.4	1,226.8	4.62	4.60	0.43
3,695.0	98.86	229.78	2,744.8	-832.5	-985.6	1,290.2	3.44	3.44	-0.05
3,758.0	96.29	228.64	2,736.6	-873.3	-1,033.1	1,352.6	4.17	-3.76	-1.81
3,821.0	93.65	227.88	2,731.2	-915.0	-1,079.9	1,415.3	4.36	-4.19	-1.21
3,885.0	91.71	228.45	2,728.2	-957.7	-1,127.5	1,479.2	3.16	-3.03	0.89
3,948.0	92.59	227.54	2,725.8	-999.8	-1,174.3	1,542.1	2.01	1.40	-1.44
4,012.0	91.45	227.23	2,723.6	-1,043.1	-1,221.4	1,606.0	1.85	-1.78	-0.48

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4,075.0	91.71	227.60	2,721.8	-1,085.7	-1,267.8	1,688.9	0.72	0.41	0.59
4,138.0	91.01	231.97	2,720.3	-1,126.4	-1,315.8	1,731.8	7.02	-1.11	6.94
4,202.0	91.71	232.58	2,718.8	-1,165.5	-1,366.5	1,795.8	1.45	1.09	0.95
4,263.0	92.42	231.67	2,716.6	-1,203.0	-1,414.6	1,856.7	1.89	1.16	-1.49
4,325.0	92.42	231.04	2,714.0	-1,241.6	-1,463.0	1,918.7	1.02	0.00	-1.02
4,386.0	89.25	232.00	2,713.1	-1,279.6	-1,510.7	1,979.8	5.43	-5.20	1.57
4,447.0	87.67	232.71	2,714.7	-1,316.8	-1,559.0	2,040.6	2.84	-2.59	1.16
4,508.0	88.46	232.96	2,716.8	-1,353.7	-1,607.6	2,101.5	1.38	1.30	0.41
4,570.0	89.08	234.11	2,718.1	-1,390.5	-1,657.4	2,163.4	2.11	1.00	1.85
4,631.0	90.04	234.44	2,718.6	-1,426.1	-1,706.9	2,224.2	1.66	1.57	0.54
4,692.0	89.60	234.51	2,718.6	-1,461.6	-1,756.6	2,285.1	0.73	-0.72	0.11
4,754.0	89.43	234.82	2,719.3	-1,497.4	-1,807.1	2,346.9	0.57	-0.27	0.50
4,815.0	90.48	234.91	2,719.4	-1,532.5	-1,857.0	2,407.7	1.73	1.72	0.15
4,876.0	90.57	234.49	2,718.8	-1,567.8	-1,906.8	2,468.6	0.70	0.15	-0.69
4,938.0	91.01	233.51	2,718.0	-1,604.2	-1,957.0	2,530.4	1.73	0.71	-1.58
4,999.0	91.63	232.53	2,716.5	-1,640.9	-2,005.7	2,591.4	1.90	1.02	-1.61
5,060.0	92.07	232.86	2,714.6	-1,677.8	-2,054.2	2,652.3	0.90	0.72	0.54
5,122.0	91.71	231.16	2,712.5	-1,716.0	-2,103.0	2,714.2	2.80	-0.58	-2.74
5,183.0	92.07	230.59	2,710.5	-1,754.5	-2,150.3	2,775.2	1.10	0.59	-0.93
5,244.0	93.21	230.50	2,707.7	-1,793.2	-2,197.4	2,836.1	1.87	1.87	-0.15
5,306.0	93.56	230.44	2,704.1	-1,832.6	-2,245.1	2,898.0	0.57	0.56	-0.10
5,367.0	92.95	229.76	2,700.6	-1,871.8	-2,291.8	2,958.9	1.50	-1.00	-1.11
5,428.0	91.36	227.64	2,698.3	-1,911.9	-2,337.6	3,019.8	4.34	-2.61	-3.48
5,490.0	89.25	227.79	2,698.0	-1,953.6	-2,383.5	3,081.8	3.41	-3.40	0.24
5,551.0	87.58	227.82	2,699.7	-1,994.5	-2,428.6	3,142.7	2.74	-2.74	0.05
5,612.0	87.05	228.34	2,702.5	-2,035.2	-2,474.0	3,203.6	1.22	-0.87	0.85
5,674.0	88.90	229.41	2,704.7	-2,076.0	-2,520.7	3,265.5	3.45	2.98	1.73
5,735.0	89.87	230.47	2,705.4	-2,115.2	-2,567.3	3,326.5	2.36	1.59	1.74
5,796.0	91.01	231.72	2,704.9	-2,153.5	-2,614.8	3,387.5	2.77	1.87	2.05
5,858.0	91.01	230.66	2,703.8	-2,192.4	-2,663.1	3,449.5	1.71	0.00	-1.71
5,919.0	90.75	229.58	2,702.9	-2,231.5	-2,709.9	3,510.4	1.82	-0.43	-1.77
5,981.0	93.47	228.87	2,700.6	-2,272.0	-2,756.8	3,572.4	4.53	4.39	-1.15
6,042.0	93.39	230.87	2,696.9	-2,311.2	-2,803.4	3,633.3	3.28	-0.13	3.28
6,103.0	91.89	232.03	2,694.1	-2,349.2	-2,851.0	3,694.2	3.11	-2.46	1.90
6,164.0	89.43	229.78	2,693.4	-2,387.6	-2,898.4	3,755.2	5.46	-4.03	-3.69
6,226.0	90.40	230.15	2,693.5	-2,427.5	-2,945.8	3,817.2	1.67	1.56	0.60
6,287.0	89.78	230.95	2,693.4	-2,466.3	-2,992.9	3,878.2	1.66	-1.02	1.31
6,349.0	91.63	232.76	2,692.6	-2,504.6	-3,041.7	3,940.1	4.17	2.98	2.92
6,366.0	91.19	232.75	2,692.2	-2,514.9	-3,055.2	3,957.1	2.59	-2.59	-0.06
6,415.0	91.19	232.75	2,691.2	-2,544.5	-3,094.2	4,006.1	0.00	0.00	0.00

"PROJ TD" @ 6415' MD / 2691' TVD

## Survey Report

**Company:** RED WILLOW PROD. CO.  
**Project:** Archuleta Co. CO.  
**Site:** Sec9 T32N-R05W - 9C-4  
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**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

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**North Reference:** True  
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### Design Annotations

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		+N/-S (usft)	+E/-W (usft)	
3,083.0	2,742.5	-448.4	-512.8	"COAL ENTRY" @ 3083'MD / 2743'TVD
3,246.0	2,763.6	-545.6	-641.6	"CSG SHOE" @ 3246'MD / 2764'TVD
6,415.0	2,691.2	-2,544.5	-3,094.2	"PROJ TD" @ 6415'MD / 2691'TVD

Checked By: _____	Approved By: _____	Date: _____
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