



Red Willow Production Company

## **Red Willow Production Company**

**Archuleta County**

**North Carracas**

**32-4 #16D-2**

**Lateral Plan**

**Survey: MWD #1**

## **Pathfinder X & Y Survey Report**

**04 January, 2011**

**PATHFINDER**  
A Schlumberger Company



Red Willow Production Company

# Pathfinder

Pathfinder X & Y Survey Report

**PATHFINDER**  
A Schlumberger Company

**Company:** Red Willow Production Company  
**Project:** Archuleta County  
**Site:** North Carracas  
**Well:** 32-4 #16D-2  
**Wellbore:** Lateral Plan  
**Design:** Lateral Plan

**Local Co-ordinate Reference:**  
**TVD Reference:** WELL @ 6143.00usft (Original Well Elev)  
**MD Reference:** WELL @ 6143.00usft (Original Well Elev)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Single User Db

**Well 32-4 #16D-2**  
**WELL @ 6143.00usft (Original Well Elev)**  
**WELL @ 6143.00usft (Original Well Elev)**  
**True**  
**Minimum Curvature**  
**EDM 5000.1 Single User Db**

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

<b>Site</b>	North Carracas		
<b>Site Position:</b>		<b>Northing:</b>	2,184,558.506 usft
<b>From:</b>	Map	<b>Easting:</b>	1,347,924.547 usft
<b>Position Uncertainty:</b>	0.00 usft	<b>Slot Radius:</b>	13-3/16 "
		<b>Latitude:</b>	39° 46' 34.713 N
		<b>Longitude:</b>	111° 22' 42.634 W
		<b>Grid Convergence:</b>	-3.61 "

<b>Well</b>	32-4 #16D-2		
<b>Well Position</b>	+N/-S	<b>Northing:</b>	1,129,372.327 usft
	+E/-W	<b>Easting:</b>	2,479,994.259 usft
<b>Position Uncertainty</b>	0.00 usft	<b>Wellhead Elevation:</b>	usft
		<b>Latitude:</b>	37° 0' 30.060 N
		<b>Longitude:</b>	107° 16' 51.096 W
		<b>Ground Level:</b>	6,128.00 usft

<b>Wellbore</b>	Lateral Plan		
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Dip Angle</b>
	IGRF2010	11/15/10	(°)
		9.79	63.80
			51,013
			(nT)

<b>Design</b>	Lateral Plan		
<b>Audit Notes:</b>			
<b>Version:</b>	1.0	<b>Phase:</b>	<b>Tie On Depth:</b>
		ACTUAL	0.00
<b>Vertical Section:</b>		<b>Depth From (TVD)</b>	<b>Direction</b>
		(usft)	(°)
		0.00	345.80
		+N/-S	+E/-W
		(usft)	(usft)
		0.00	0.00



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Pathfinder

Pathfinder X & Y Survey Report

**PATHFINDER**  
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**Company:** Red Willow Production Company  
**Project:** Archuleta County  
**Site:** North Carracas  
**Well:** 32-4 #18D-2  
**Wellbore:** Lateral Plan  
**Design:** Lateral Plan

**Local Co-ordinate Reference:**  
**TVD Reference:** WELL @ 6143.00usft (Original Well Elev)  
**MD Reference:** WELL @ 6143.00usft (Original Well Elev)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Single User Db

Well 32-4 #16D-2

WELL @ 6143.00usft (Original Well Elev)  
WELL @ 6143.00usft (Original Well Elev)  
True  
Minimum Curvature  
EDM 5000.1 Single User Db

Survey Program	From (usft)	To (usft)	Date	Survey (Wellbore)	Tool Name	Description
	100.00	2,939.00	01/04/11	Plan #2 (Lateral Plan)	MWD	MWD - Standard
	2,967.00	7,479.00		MWD #1 (Lateral Plan)	MWD	MWD - Standard

Survey	MD (usft)	Inc (")	Ad (")	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	D/Lag (°/100usft)	Northing (usft)	Easting (usft)
	2,939.00	56.28	339.27	2,682.86	3,460.14	706.63	-278.83	753.44	0.00	1,130,084.14	2,479,728.95
	2,967.00	56.72	341.69	2,698.32	3,444.68	728.63	-286.63	776.68	7.38	1,130,106.29	2,479,721.57
	2,998.00	57.42	344.06	2,715.17	3,427.83	753.49	-294.29	802.66	6.80	1,130,131.29	2,479,714.39
	3,028.00	58.48	344.84	2,731.09	3,411.91	777.99	-301.11	828.08	4.16	1,130,155.92	2,479,708.04
	3,060.00	59.62	345.89	2,747.55	3,395.45	804.54	-308.04	855.52	4.54	1,130,182.60	2,479,701.62
	3,092.00	60.76	346.21	2,763.46	3,379.54	831.49	-314.73	883.29	3.67	1,130,209.67	2,479,695.44
	3,123.00	61.55	346.10	2,778.41	3,364.59	857.85	-321.23	910.44	2.57	1,130,236.15	2,479,689.44
	3,155.00	62.43	346.13	2,793.44	3,349.56	885.28	-328.01	938.69	2.75	1,130,263.70	2,479,683.19
	3,187.00	63.93	345.24	2,807.88	3,335.12	912.95	-335.07	967.25	5.30	1,130,291.50	2,479,676.65
	3,219.00	65.42	344.35	2,821.57	3,321.43	940.86	-342.66	996.17	5.29	1,130,319.55	2,479,669.60
	3,251.00	66.57	343.95	2,834.58	3,308.42	968.98	-350.64	1,025.39	3.77	1,130,347.82	2,479,662.15
	3,283.00	67.44	344.16	2,847.08	3,295.92	997.30	-358.73	1,054.83	2.79	1,130,376.29	2,479,654.60
	3,315.00	69.03	343.79	2,859.95	3,284.05	1,025.87	-366.94	1,084.53	5.08	1,130,405.00	2,479,646.94
	3,347.00	70.70	343.01	2,869.97	3,273.03	1,054.66	-375.52	1,114.55	5.70	1,130,433.95	2,479,638.91
	3,379.00	71.67	342.72	2,880.29	3,262.71	1,083.60	-384.45	1,144.80	3.15	1,130,463.06	2,479,630.54
	3,410.00	72.46	342.86	2,889.83	3,253.17	1,111.78	-393.17	1,174.25	2.58	1,130,491.40	2,479,622.35
	3,442.00	73.60	343.35	2,899.17	3,243.83	1,141.06	-402.07	1,204.83	3.85	1,130,520.85	2,479,614.02
	3,474.00	75.01	343.18	2,907.83	3,235.17	1,170.56	-410.94	1,235.60	4.44	1,130,550.51	2,479,605.71
	3,506.00	76.33	342.83	2,915.75	3,227.25	1,200.21	-420.00	1,266.57	4.26	1,130,580.33	2,479,597.22
	3,538.00	77.82	342.51	2,922.90	3,220.10	1,229.98	-429.29	1,297.71	4.76	1,130,610.27	2,479,588.50
	3,570.00	78.88	342.42	2,929.37	3,213.63	1,259.87	-438.73	1,329.00	3.32	1,130,640.33	2,479,579.62



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## Pathfinder Pathfinder X & Y Survey Report



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**Design:** Lateral Plan

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**Database:** EDM 5000.1 Single User Db

Well 32-4 #16D-2

WELL @ 6143.00usft (Original Well Elev)

WELL @ 6143.00usft (Original Well Elev)

True

Minimum Curvature

EDM 5000.1 Single User Db

### Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
3,602.00	80.20	342.78	2,935.18	3,207.82	1,289.90	-448.14	1,360.42	4.27	1,130,670.53	2,479,570.79
3,633.00	81.69	342.66	2,940.05	3,202.95	1,319.13	-457.24	1,390.98	4.82	1,130,699.93	2,479,562.25
3,665.00	82.83	342.79	2,944.36	3,198.64	1,349.40	-466.65	1,422.65	3.59	1,130,730.38	2,479,553.42
3,686.00	83.64	342.65	2,946.84	3,196.16	1,369.32	-472.85	1,443.47	3.91	1,130,750.41	2,479,547.60
Interpolated Pt Coal Entry @ 3686' MD										
3,697.00	84.06	342.57	2,948.02	3,194.98	1,379.75	-476.11	1,454.39	3.89	1,130,760.91	2,479,544.53
3,728.00	85.74	342.43	2,950.77	3,192.23	1,408.20	-485.40	1,485.22	5.44	1,130,790.53	2,479,535.81
3,760.00	87.76	343.09	2,952.59	3,190.41	1,439.71	-494.87	1,517.12	6.64	1,130,821.21	2,479,526.93
3,792.00	89.25	343.35	2,953.42	3,189.58	1,470.34	-504.10	1,549.07	4.73	1,130,852.01	2,479,518.28
3,824.00	90.04	343.32	2,953.62	3,189.38	1,500.99	-513.28	1,581.04	2.47	1,130,882.83	2,479,509.69
3,856.00	90.31	343.22	2,953.52	3,189.48	1,531.64	-522.49	1,613.01	0.90	1,130,913.65	2,479,501.06
3,888.00	90.57	343.63	2,953.28	3,189.72	1,562.31	-531.62	1,644.98	1.52	1,130,944.49	2,479,492.52
3,913.00	91.19	344.02	2,952.89	3,190.11	1,586.32	-538.58	1,669.96	2.93	1,130,968.62	2,479,486.02
4,000.00	90.66	344.63	2,951.49	3,191.51	1,670.07	-562.08	1,756.92	0.93	1,131,052.81	2,479,464.11
4,031.00	89.96	345.34	2,951.32	3,191.68	1,700.01	-570.12	1,787.92	3.22	1,131,082.90	2,479,456.66
4,061.00	90.48	346.04	2,951.20	3,191.80	1,729.08	-577.53	1,817.92	2.91	1,131,112.10	2,479,449.80
4,092.00	90.48	346.56	2,950.94	3,192.06	1,759.19	-584.87	1,848.92	1.68	1,131,142.35	2,479,443.03
4,122.00	89.98	346.29	2,950.83	3,192.17	1,788.36	-591.91	1,878.91	1.95	1,131,171.64	2,479,436.55
4,153.00	89.34	346.85	2,951.02	3,191.98	1,818.51	-599.11	1,909.91	2.70	1,131,201.93	2,479,429.92
4,183.00	89.69	346.19	2,951.27	3,191.73	1,847.68	-606.11	1,939.91	2.49	1,131,231.23	2,479,423.49
4,213.00	89.69	346.53	2,951.44	3,191.56	1,876.83	-613.18	1,969.91	1.13	1,131,260.51	2,479,416.97
4,244.00	89.24	346.56	2,951.72	3,191.28	1,906.98	-620.39	2,000.90	1.45	1,131,290.79	2,479,410.33
4,275.00	89.25	346.61	2,952.13	3,190.87	1,937.13	-627.58	2,031.90	0.16	1,131,321.07	2,479,403.72
4,306.00	90.22	347.11	2,952.28	3,190.72	1,967.32	-634.63	2,062.89	3.52	1,131,351.39	2,479,397.25
4,367.00	91.28	348.29	2,951.48	3,191.52	2,026.91	-647.63	2,123.85	2.60	1,131,411.22	2,479,385.39
4,397.00	91.28	347.86	2,950.81	3,192.19	2,056.26	-653.82	2,153.82	1.43	1,131,440.68	2,479,379.75
4,427.00	91.28	347.27	2,950.14	3,192.86	2,085.55	-660.28	2,183.80	1.97	1,131,470.08	2,479,373.86



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Pathfinder

Pathfinder X & Y Survey Report

**PATHFINDER**

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**Company:** Red Willow Production Company  
**Project:** Archuleta County  
**Site:** North Carracas  
**Well:** 32-4 #16D-2  
**Wellbore:** Lateral Plan  
**Design:** Lateral Plan

**Local Co-ordinate Reference:**  
**TVD Reference:** WELL @ 6143.00usft (Original Well Elev)  
**MD Reference:** WELL @ 6143.00usft (Original Well Elev)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Single User Db

Well 32-4 #16D-2

**Survey**

MD (usft)	Inc (°)	Ad (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
4,457.00	90.48	347.53	2,949.68	3,193.32	2,114.82	-666.82	2,213.78	2.80	1,131,499.48	2,479,367.87
4,488.00	90.22	347.55	2,949.49	3,193.51	2,145.09	-673.51	2,244.77	0.84	1,131,529.87	2,479,361.76
4,519.00	89.69	347.43	2,949.51	3,193.49	2,175.35	-680.23	2,275.75	1.75	1,131,560.25	2,479,355.63
4,550.00	90.13	347.66	2,949.56	3,193.44	2,205.62	-686.91	2,306.74	1.60	1,131,590.65	2,479,349.52
4,581.00	90.13	347.53	2,949.49	3,193.51	2,235.90	-693.57	2,337.72	0.42	1,131,621.04	2,479,343.44
4,611.00	89.96	347.03	2,949.47	3,193.53	2,265.16	-700.18	2,367.71	1.76	1,131,650.43	2,479,337.39
4,642.00	89.60	346.35	2,949.59	3,193.41	2,295.33	-707.32	2,398.71	2.48	1,131,680.72	2,479,330.83
4,673.00	89.87	345.97	2,949.73	3,193.27	2,325.43	-714.73	2,429.71	1.50	1,131,710.96	2,479,323.99
4,704.00	91.63	346.12	2,949.32	3,193.68	2,355.51	-722.21	2,460.70	5.70	1,131,741.18	2,479,317.09
4,733.00	91.63	345.51	2,948.50	3,194.50	2,383.62	-729.31	2,489.69	2.10	1,131,769.41	2,479,310.52
4,763.00	90.75	346.71	2,947.88	3,195.12	2,412.73	-736.51	2,519.68	4.96	1,131,798.66	2,479,303.88
4,793.00	90.22	346.38	2,947.62	3,195.38	2,441.91	-743.49	2,549.68	2.08	1,131,827.96	2,479,297.46
4,824.00	90.13	346.31	2,947.53	3,195.47	2,472.03	-750.81	2,580.68	0.37	1,131,858.22	2,479,290.71
4,854.00	91.63	347.09	2,947.07	3,195.93	2,501.22	-757.71	2,610.67	5.64	1,131,887.54	2,479,284.37
4,885.00	92.59	348.00	2,945.92	3,197.08	2,531.47	-764.39	2,641.63	4.27	1,131,917.91	2,479,278.27
4,915.00	92.33	347.59	2,944.64	3,198.36	2,560.77	-770.73	2,671.59	1.62	1,131,947.32	2,479,272.49
4,946.00	91.36	347.38	2,943.64	3,199.36	2,591.01	-777.44	2,702.56	3.20	1,131,977.69	2,479,266.35
4,977.00	91.54	347.14	2,942.85	3,200.15	2,621.24	-784.27	2,733.54	0.97	1,132,008.04	2,479,260.10
5,007.00	91.80	347.49	2,941.98	3,201.02	2,650.50	-790.86	2,763.51	1.45	1,132,037.42	2,479,254.07
5,037.00	91.45	346.76	2,941.13	3,201.87	2,679.73	-797.54	2,793.49	2.70	1,132,066.77	2,479,247.95
5,068.00	91.19	346.27	2,940.42	3,202.58	2,709.87	-804.77	2,824.48	1.79	1,132,097.04	2,479,241.30
5,099.00	90.75	346.34	2,939.89	3,203.11	2,739.98	-812.11	2,855.48	1.44	1,132,127.29	2,479,234.53
5,130.00	91.28	346.59	2,939.34	3,203.66	2,770.11	-819.36	2,886.47	1.89	1,132,157.56	2,479,227.86
5,160.00	90.75	347.69	2,938.81	3,204.19	2,799.36	-826.04	2,916.46	4.07	1,132,186.92	2,479,221.74
5,191.00	90.22	348.74	2,938.55	3,204.45	2,829.70	-832.37	2,947.43	3.79	1,132,217.38	2,479,215.99
5,222.00	90.22	349.74	2,938.43	3,204.57	2,860.16	-838.15	2,978.37	3.23	1,132,247.94	2,479,210.78
5,251.00	90.22	350.15	2,938.32	3,204.68	2,888.71	-843.22	3,007.29	1.41	1,132,276.59	2,479,206.26



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## Pathfinder

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**Wellbore:** Lateral Plan  
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Well 32-4 #16D-2

WELL @ 6143.00usft (Original Well Elev)

WELL @ 6143.00usft (Original Well Elev)

True

Minimum Curvature

EDM 5000.1 Single User Db

### Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	D Leg (°/100usft)	Northing (usft)	Easting (usft)
5,281.00	90.84	350.06	2,938.04	3,204.96	2,918.26	-848.37	3,037.21	2.09	1,132,306.23	2,479,201.67
5,312.00	91.45	350.53	2,937.42	3,205.58	2,948.81	-853.60	3,068.11	2.48	1,132,336.88	2,479,197.03
5,343.00	91.98	350.07	2,936.49	3,206.51	2,979.36	-858.82	3,099.00	2.26	1,132,367.51	2,479,192.39
5,374.00	90.84	349.42	2,935.73	3,207.27	3,009.85	-864.34	3,129.91	4.23	1,132,398.11	2,479,187.46
5,405.00	89.87	348.73	2,935.54	3,207.46	3,040.29	-870.21	3,160.86	3.84	1,132,428.65	2,479,182.17
5,435.00	90.40	348.50	2,935.47	3,207.53	3,069.70	-876.13	3,190.83	1.93	1,132,458.17	2,479,176.81
5,465.00	90.48	348.45	2,935.23	3,207.77	3,100.07	-882.33	3,221.79	0.30	1,132,488.66	2,479,171.19
5,496.00	90.04	347.96	2,935.09	3,207.91	3,129.44	-888.46	3,251.76	2.20	1,132,518.13	2,479,165.62
5,526.00	90.04	347.40	2,935.07	3,207.93	3,159.75	-894.86	3,281.75	1.87	1,132,547.56	2,479,159.78
5,556.00	90.22	346.76	2,935.00	3,208.00	3,187.99	-901.57	3,311.74	2.22	1,132,576.92	2,479,153.63
5,588.00	89.43	347.10	2,935.10	3,207.90	3,219.16	-908.80	3,343.73	2.69	1,132,608.22	2,479,146.99
5,619.00	89.52	347.51	2,935.39	3,207.61	3,249.40	-915.62	3,374.72	1.35	1,132,638.59	2,479,140.75
5,649.00	88.90	347.56	2,935.80	3,207.20	3,278.69	-922.09	3,404.70	2.07	1,132,668.00	2,479,134.84
5,680.00	88.64	347.15	2,936.46	3,206.54	3,308.93	-928.88	3,435.69	1.57	1,132,698.36	2,479,128.63
5,709.00	87.93	347.12	2,937.33	3,205.67	3,337.19	-935.33	3,464.66	2.45	1,132,726.74	2,479,122.72
5,740.00	87.58	348.15	2,938.55	3,204.45	3,367.45	-941.96	3,495.62	3.51	1,132,757.12	2,479,116.66
5,771.00	88.29	349.76	2,939.66	3,203.34	3,397.85	-947.90	3,526.56	5.67	1,132,787.63	2,479,111.31
5,801.00	86.97	349.61	2,940.90	3,202.10	3,427.34	-953.26	3,556.46	4.43	1,132,817.22	2,479,106.51
5,832.00	87.05	349.42	2,942.52	3,200.48	3,457.78	-958.90	3,587.35	0.66	1,132,847.76	2,479,101.45
5,863.00	87.41	349.68	2,944.02	3,198.98	3,488.23	-964.51	3,618.25	1.43	1,132,878.31	2,479,096.42
5,894.00	88.55	349.34	2,945.11	3,197.89	3,518.69	-970.15	3,649.17	3.84	1,132,908.88	2,479,091.36
5,924.00	90.84	349.37	2,945.27	3,197.73	3,548.17	-975.70	3,679.11	7.63	1,132,938.46	2,479,086.38
5,954.00	91.63	350.39	2,944.63	3,198.37	3,577.70	-980.97	3,709.02	4.30	1,132,968.08	2,479,081.68
5,985.00	93.03	350.61	2,943.37	3,199.63	3,608.25	-986.08	3,739.89	4.57	1,132,998.72	2,479,077.15
6,016.00	92.33	349.90	2,941.92	3,201.08	3,638.77	-991.32	3,770.76	3.21	1,133,029.33	2,479,072.49
6,046.00	92.42	349.50	2,940.67	3,202.33	3,668.26	-996.68	3,800.67	1.37	1,133,058.92	2,479,067.69
6,077.00	93.03	349.31	2,939.20	3,203.80	3,698.70	-1,002.37	3,831.57	2.06	1,133,089.46	2,479,062.58



Red Willow Production Company

## Pathfinder

Pathfinder X & Y Survey Report



**Company:** Red Willow Production Company  
**Project:** Archuleta County  
**Site:** North Carracas  
**Well:** 32-4 #16D-2  
**Wellbore:** Lateral Plan  
**Design:** Lateral Plan

**Local Co-ordinate Reference:**  
**TVD Reference:**  
**MD Reference:**  
**North Reference:**  
**Survey Calculation Method:**  
**Database:**

Well 32-4 #16D-2  
WELL @ 6143.00usft (Original Well Elev)  
WELL @ 6143.00usft (Original Well Elev)  
True  
Minimum Curvature  
EDM 5000.1 Single User Db

### Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	D Leg (°/100usft)	Northing (usft)	Easting (usft)
6,109.00	94.00	349.97	2,937.24	3,205.76	3,730.11	-1,008.12	3,863.44	3.66	1,133,120.98	2,479,057.44
6,140.00	93.65	349.26	2,935.17	3,207.83	3,760.54	-1,013.69	3,894.30	2.55	1,133,151.51	2,479,052.44
6,172.00	93.83	349.39	2,933.08	3,209.92	3,791.92	-1,019.61	3,926.17	0.69	1,133,182.99	2,479,047.13
6,204.00	93.65	348.72	2,930.99	3,212.01	3,823.27	-1,025.67	3,958.05	2.16	1,133,214.45	2,479,041.66
6,236.00	93.47	348.07	2,929.01	3,213.99	3,854.55	-1,032.09	3,989.96	2.10	1,133,245.86	2,479,035.83
6,267.00	93.83	348.02	2,927.03	3,215.97	3,884.82	-1,038.50	4,020.87	1.17	1,133,276.24	2,479,030.00
6,299.00	92.07	347.84	2,925.39	3,217.61	3,916.07	-1,045.18	4,052.81	5.53	1,133,307.61	2,479,023.92
6,331.00	91.45	347.74	2,924.40	3,218.60	3,947.33	-1,051.95	4,084.77	1.96	1,133,338.99	2,479,017.75
6,362.00	91.45	347.21	2,923.62	3,219.38	3,977.58	-1,058.67	4,115.75	1.71	1,133,369.37	2,479,011.61
6,394.00	92.95	346.96	2,922.39	3,220.61	4,008.75	-1,065.82	4,147.72	4.75	1,133,400.67	2,479,005.06
6,426.00	93.21	346.83	2,920.67	3,222.33	4,039.87	-1,073.06	4,179.66	0.91	1,133,431.92	2,478,998.41
6,457.00	92.77	347.22	2,919.05	3,223.95	4,070.04	-1,080.01	4,210.62	1.90	1,133,462.21	2,478,992.03
6,489.00	90.75	347.79	2,918.07	3,224.93	4,101.26	-1,086.93	4,242.58	6.56	1,133,493.57	2,478,985.71
6,521.00	90.40	348.31	2,917.75	3,225.25	4,132.57	-1,093.56	4,274.56	1.96	1,133,524.99	2,478,979.68
6,553.00	91.19	348.16	2,917.31	3,225.69	4,163.89	-1,100.08	4,306.53	2.51	1,133,556.44	2,478,973.76
6,584.00	90.57	347.30	2,916.83	3,226.17	4,194.18	-1,106.67	4,337.50	3.42	1,133,586.84	2,478,967.75
6,616.00	91.28	346.85	2,916.31	3,226.69	4,225.37	-1,113.83	4,369.49	2.63	1,133,618.16	2,478,961.19
6,648.00	91.45	346.65	2,915.55	3,227.45	4,256.51	-1,121.16	4,401.48	0.82	1,133,649.43	2,478,954.45
6,680.00	90.84	347.37	2,914.91	3,228.09	4,287.68	-1,128.35	4,433.46	2.95	1,133,680.74	2,478,947.85
6,710.00	90.66	348.69	2,914.52	3,228.48	4,317.02	-1,134.57	4,463.44	4.44	1,133,710.20	2,478,942.19
6,742.00	92.07	349.29	2,913.76	3,229.24	4,348.43	-1,140.68	4,495.38	4.79	1,133,741.71	2,478,936.68
6,773.00	93.03	347.94	2,912.38	3,230.62	4,378.78	-1,146.79	4,526.31	5.34	1,133,772.18	2,478,931.15
6,805.00	93.21	347.55	2,910.64	3,232.36	4,410.01	-1,153.58	4,558.24	1.34	1,133,803.53	2,478,924.96
6,837.00	92.33	348.22	2,909.09	3,233.91	4,441.26	-1,160.28	4,590.18	3.45	1,133,834.90	2,478,918.85
6,869.00	92.77	349.37	2,907.67	3,235.33	4,472.62	-1,166.50	4,622.11	3.84	1,133,866.37	2,478,913.24
6,900.00	91.80	349.76	2,906.43	3,236.57	4,503.08	-1,172.11	4,653.02	3.37	1,133,896.93	2,478,908.21
6,931.00	92.59	349.98	2,905.24	3,237.76	4,533.57	-1,177.55	4,683.92	2.65	1,133,927.53	2,478,903.35



Red Willow Production Company

## Pathfinder

Pathfinder X & Y Survey Report



**Company:** Red Willow Production Company  
**Project:** Archuleta County  
**Site:** North Carracas  
**Well:** 32-4 #16D-2  
**Wellbore:** Lateral Plan  
**Design:** Lateral Plan

**Local Co-ordinate Reference:**  
**TVD Reference:** WELL @ 6143.00usft (Original Well Elev)  
**MD Reference:** WELL @ 6143.00usft (Original Well Elev)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 Single User Db

Well 32-4 #16D-2

WELL @ 6143.00usft (Original Well Elev)  
WELL @ 6143.00usft (Original Well Elev)  
True  
Minimum Curvature  
EDM 5000.1 Single User Db

### Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
6,962.00	92.86	349.98	2,903.77	3,239.23	4,564.07	-1,182.94	4,714.80	0.87	1,133,958.12	2,478,898.54
6,994.00	91.80	349.32	2,902.47	3,240.53	4,595.52	-1,188.69	4,746.70	3.90	1,133,989.67	2,478,893.40
7,025.00	91.28	349.11	2,901.64	3,241.36	4,625.96	-1,194.48	4,777.63	1.81	1,134,020.22	2,478,888.18
7,057.00	90.31	348.29	2,901.19	3,241.81	4,657.34	-1,200.75	4,809.59	3.97	1,134,051.71	2,478,882.51
7,088.00	91.63	347.99	2,900.67	3,242.33	4,687.67	-1,207.12	4,840.56	4.37	1,134,082.16	2,478,876.72
7,120.00	91.10	346.01	2,899.90	3,243.10	4,718.84	-1,214.32	4,872.54	6.40	1,134,113.46	2,478,870.12
7,151.00	90.75	345.20	2,899.40	3,243.60	4,748.86	-1,222.03	4,903.53	2.85	1,134,143.62	2,478,862.99
7,183.00	91.28	344.94	2,898.84	3,244.16	4,779.78	-1,230.27	4,935.53	1.84	1,134,174.69	2,478,855.33
7,215.00	91.54	343.39	2,898.05	3,244.95	4,810.55	-1,239.00	4,967.50	4.91	1,134,205.62	2,478,847.19
7,246.00	90.84	344.61	2,897.41	3,245.59	4,840.34	-1,247.54	4,998.48	4.54	1,134,235.57	2,478,839.22
7,278.00	90.84	345.31	2,896.94	3,246.06	4,871.24	-1,255.84	5,030.47	2.19	1,134,266.63	2,478,831.51
7,310.00	91.36	345.41	2,896.32	3,246.68	4,902.20	-1,263.93	5,062.47	1.65	1,134,297.73	2,478,824.01
7,342.00	91.19	345.61	2,895.61	3,247.39	4,933.17	-1,271.93	5,094.46	0.82	1,134,328.85	2,478,816.60
7,373.00	91.28	345.44	2,894.94	3,248.06	4,963.18	-1,279.68	5,125.45	0.62	1,134,359.00	2,478,809.43
7,479.00	91.28	345.44	2,892.57	3,250.43	5,065.75	-1,306.32	5,231.42	0.00	1,134,462.06	2,478,784.75

BHL-7479.00°MD,91.28°INC,345.44°AZI, 2892.57°TVD, 5231.42°VS, 5065.75°N, -1306.32°E

### Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
3,686.00	2,946.84	1,369.32	-472.85	Interpolated Pt Coal Entry @ 3686' MD
7,479.00	2,892.57	5,065.75	-1,306.32	BHL-7479.00°MD,91.28°INC,345.44°AZI, 2892.57°TVD, 5231.42°VS, 5065.75°N,

Checked By: \_\_\_\_\_

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_