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Williams Production Company

Rio Arriba County, NM.
Sec. 7-T31N-R4W
Rosa Unit #389A
Plan #1

Surface 2450/N 2380/E
BHL₁ 2073/N 2280/W
BHL₂ 1018/N 1074/W
md₁ 3579
TVD₁ 3288
md₂ 5143
TVD₂ 3289

Design: MWD Survey

Sperry Drilling Services Standard Report

06 November, 2006

Well Coordinates: 2,152,629.05 N, 2,880,465.97 E (36° 54' 52.00" N, 107° 17' 42.00" W)
Ground Level: 6,457.00 ft

Local Coordinate Origin:	Centered on Well Rosa Unit #389A
Viewing Datum:	RKB @ 6472.00ft (Original Well Elev)
TVDs to System:	N
North Reference:	True
Unit System:	API - US Survey Feet
Geodetic Scale Factor Applied	
Version: 2003.14 Build: 57	

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HALLIBURTON**Design Report for Rosa Unit #389A - Plan #1 - MWD Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
407.00	0.89	48.10	406.98	2.11	2.35	-0.33	0.22
First MWD Survey							
899.00	1.06	48.89	898.91	7.66	8.63	-1.28	0.03
1,389.00	1.38	43.20	1,388.80	14.94	16.08	-1.94	0.07
1,887.00	1.55	15.16	1,886.64	25.81	21.95	0.98	0.15
2,388.00	1.76	25.62	2,387.44	39.29	27.04	6.22	0.07
2,555.00	1.67	36.70	2,554.36	43.55	29.61	7.17	0.21
2,586.00	2.02	39.69	2,585.35	44.33	30.23	7.24	1.17
2,617.00	1.93	32.65	2,616.33	45.19	30.86	7.35	0.83
2,648.00	2.02	31.95	2,647.31	46.10	31.43	7.53	0.30
2,679.00	2.11	31.78	2,678.29	47.04	32.02	7.72	0.29
2,710.00	2.37	25.80	2,709.26	48.11	32.60	8.00	1.13
2,742.00	2.37	22.81	2,741.24	49.31	33.14	8.41	0.39
2,774.00	3.16	353.81	2,773.20	50.80	33.30	9.28	4.94
2,804.00	7.03	318.83	2,803.08	53.00	32.00	11.72	15.98
2,835.00	11.87	312.85	2,833.65	56.60	28.42	16.80	15.91
2,867.00	16.35	313.38	2,864.68	61.94	22.73	24.60	14.01
2,898.00	20.65	313.20	2,894.07	68.68	15.57	34.43	13.87
2,931.00	24.52	309.86	2,924.54	77.05	6.07	47.09	12.35
2,962.00	28.48	305.47	2,952.28	85.47	-4.90	60.87	14.24
2,993.00	32.50	304.53	2,978.98	94.48	-17.78	76.48	13.06
3,024.00	34.98	306.35	3,004.76	104.47	-31.80	93.58	8.64
3,056.00	37.44	307.93	3,030.58	115.89	-46.87	112.41	8.22
3,087.00	40.61	308.10	3,054.66	127.91	-62.24	131.88	10.23
3,119.00	43.55	306.86	3,078.41	140.95	-79.26	153.26	9.55
3,150.00	46.63	306.29	3,100.29	154.03	-96.89	175.11	10.02
3,182.00	49.66	305.32	3,121.64	167.97	-116.22	198.80	9.73
3,213.00	52.79	304.25	3,141.05	181.75	-136.07	222.77	10.45
3,244.00	55.83	304.10	3,159.14	195.89	-156.90	247.71	9.81
3,276.00	58.26	303.91	3,176.54	210.91	-179.16	274.29	7.61
3,307.00	60.56	303.70	3,192.32	225.75	-201.33	300.70	7.44
3,338.00	63.15	304.89	3,206.94	241.16	-223.91	327.78	9.01
3,369.00	66.39	305.80	3,220.15	257.38	-246.78	355.63	10.78
3,401.00	70.06	306.66	3,232.02	274.94	-270.74	385.19	11.74
3,432.00	73.48	307.40	3,241.72	292.67	-294.24	414.52	11.26
3,464.00	76.59	307.34	3,249.98	311.43	-318.81	445.32	9.72
3,495.00	79.26	307.58	3,256.46	329.87	-342.87	475.54	8.65
3,527.00	81.14	308.44	3,261.91	349.29	-367.71	506.99	6.44
3,558.00	82.82	309.17	3,266.24	368.52	-391.63	537.64	5.90
3,572.00	83.15	310.09	3,267.95	377.39	-402.33	551.52	6.94
3,626.00	87.97	312.67	3,272.13	412.96	-442.71	605.34	10.12
3,657.00	89.17	314.95	3,272.90	434.42	-465.08	636.31	8.31
3,689.00	89.78	316.28	3,273.19	457.28	-487.46	668.24	4.57
3,721.00	90.86	316.64	3,273.01	480.48	-509.50	700.15	3.56
3,753.00	92.52	316.72	3,272.07	503.75	-531.44	732.03	5.19
3,785.00	92.71	317.03	3,270.61	527.08	-553.30	763.88	1.14
3,817.00	92.46	317.45	3,269.17	550.55	-575.00	795.72	1.53
3,849.00	91.08	316.96	3,268.18	574.02	-596.73	827.57	4.58

HALLIBURTON**Design Report for Rosa Unit #389A - Plan #1 - MWD Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
3,881.00	89.26	316.57	3,268.08	597.33	-618.65	859.46	5.82
3,913.00	89.54	314.64	3,268.42	620.20	-641.03	891.39	6.09
3,944.00	90.34	313.07	3,268.45	641.67	-663.39	922.38	5.68
3,976.00	90.25	313.11	3,268.29	663.53	-686.75	954.37	0.31
4,008.00	89.88	312.89	3,268.25	685.36	-710.16	986.37	1.35
4,040.00	90.86	312.07	3,268.04	706.97	-733.76	1,018.37	3.99
4,072.00	92.61	311.30	3,267.07	728.24	-757.64	1,050.35	5.97
4,103.00	93.01	311.33	3,265.55	748.68	-780.90	1,081.31	1.29
4,135.00	93.23	311.19	3,263.81	769.75	-804.92	1,113.26	0.81
4,167.00	94.99	311.65	3,261.52	790.87	-828.85	1,145.17	5.68
4,199.00	94.22	312.32	3,258.95	812.20	-852.56	1,177.07	3.19
4,230.00	90.96	311.43	3,257.55	832.87	-875.62	1,208.03	10.90
4,262.00	90.15	310.76	3,257.24	853.90	-899.73	1,240.03	3.28
4,294.00	89.97	311.09	3,257.21	874.87	-923.91	1,272.02	1.17
4,326.00	88.22	311.66	3,257.71	896.01	-947.92	1,304.01	5.75
4,358.00	87.69	311.96	3,258.85	917.33	-971.75	1,335.99	1.90
4,390.00	87.39	311.61	3,260.23	938.64	-995.59	1,367.96	1.44
4,422.00	87.20	312.19	3,261.74	959.98	-1,019.38	1,399.93	1.91
4,453.00	87.02	311.58	3,263.30	980.65	-1,042.43	1,430.89	2.05
4,485.00	86.55	311.24	3,265.09	1,001.79	-1,066.40	1,462.83	1.81
4,517.00	86.74	311.29	3,266.97	1,022.86	-1,090.41	1,494.78	0.61
4,549.00	87.63	310.38	3,268.54	1,043.75	-1,114.59	1,526.73	3.98
4,581.00	87.66	311.88	3,269.85	1,064.78	-1,138.67	1,558.70	4.68
4,613.00	87.48	311.90	3,271.21	1,086.13	-1,162.47	1,590.67	0.57
4,645.00	86.74	312.38	3,272.82	1,107.57	-1,186.17	1,622.63	2.76
4,676.00	89.17	313.23	3,273.93	1,128.62	-1,208.90	1,653.60	8.30
4,708.00	92.00	312.35	3,273.60	1,150.36	-1,232.38	1,685.59	9.26
4,740.00	93.57	312.63	3,272.05	1,171.95	-1,255.94	1,717.55	4.98
4,772.00	92.40	312.30	3,270.38	1,193.52	-1,279.52	1,749.51	3.80
4,804.00	90.77	310.97	3,269.50	1,214.77	-1,303.42	1,781.50	6.57
4,836.00	89.42	309.54	3,269.44	1,235.45	-1,327.84	1,813.48	6.15
4,868.00	88.95	308.33	3,269.90	1,255.56	-1,352.73	1,845.43	4.06
4,900.00	88.31	308.36	3,270.66	1,275.40	-1,377.82	1,877.35	2.00
4,932.00	87.29	306.92	3,271.89	1,294.93	-1,403.14	1,909.23	5.51
4,964.00	85.88	306.55	3,273.80	1,314.04	-1,428.74	1,941.04	4.55
4,996.00	85.11	306.08	3,276.31	1,332.93	-1,454.45	1,972.78	2.82
5,028.00	85.42	306.23	3,278.95	1,351.74	-1,480.20	2,004.50	1.08
5,059.00	85.97	305.78	3,281.28	1,369.92	-1,505.20	2,035.24	2.29
5,091.00	85.88	306.53	3,283.56	1,388.75	-1,530.97	2,066.99	2.35
5,105.00	85.85	306.92	3,284.56	1,397.10	-1,542.17	2,080.90	2.79
Final MWD Survey							
5,163.00	85.85	306.92	3,288.76	1,431.85	-1,588.41	2,138.51	0.00
Survey Projection to TD							

HALLIBURTON**Design Report for Rosa Unit #389A - Plan #1 - MWD Survey****Design Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
407.00	406.98	2.11	2.35	First MWD Survey
5,105.00	3,284.56	1,397.10	-1,542.17	Final MWD Survey
5,163.00	3,288.76	1,431.85	-1,588.41	Survey Projection to TD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
User	No Target (Freehand)	312.04	Slot	0.00	0.00	0.00

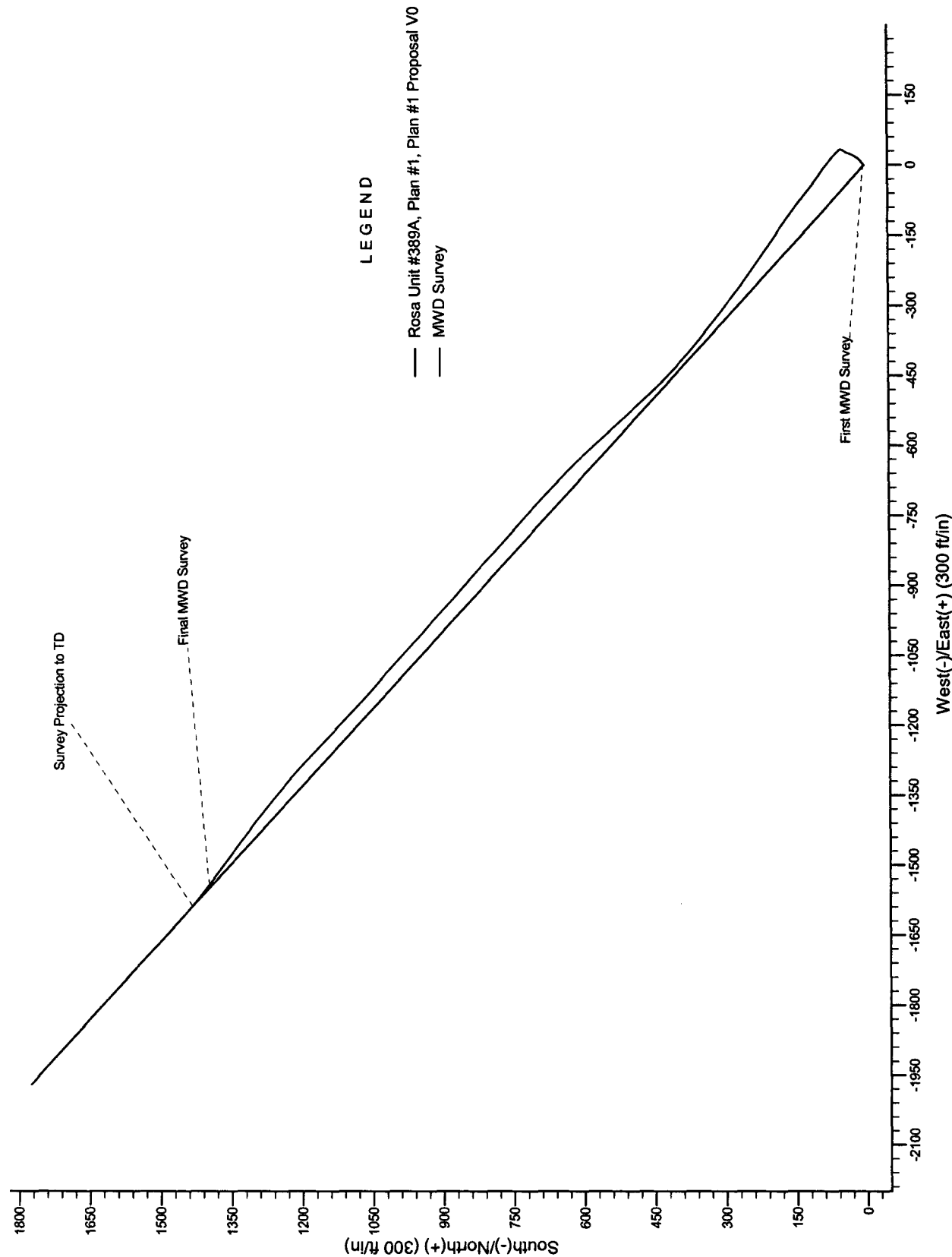
Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
407.00	5,163.00	MWD Surveys	MWD

Project: Rio Arriba County, NM.
Site: Sec. 7-T31N-R4W
Well: Rosa Unit #389A

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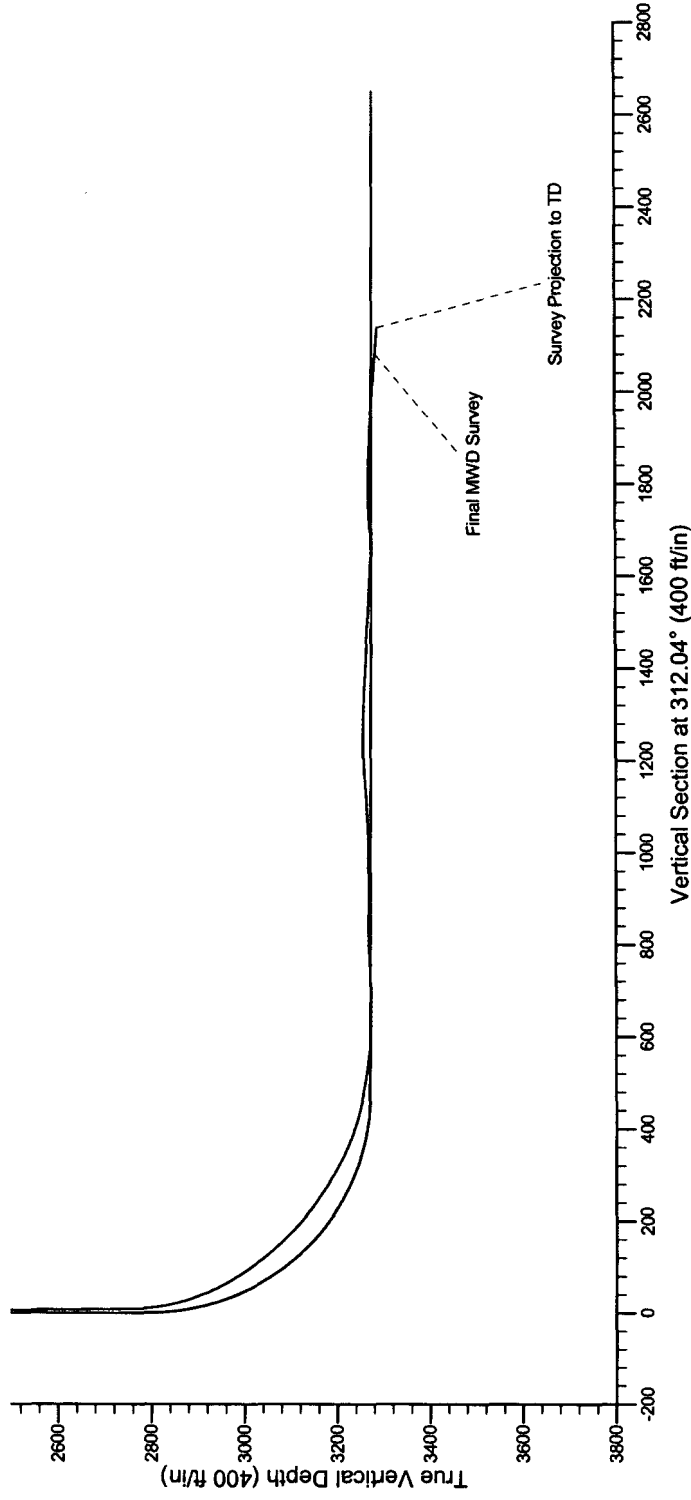
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Project: Rio Arriba County, NM.
Site: Sec. 7-T31N-R4W
Well: Rosa Unit #389A

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LEGEND

- Rosa Unit #389A, Plan #1, Plan #1 Proposal V0
- MWD Survey