



Williams Production Company
New Mexico
Rio Arriba County
Sec. 18-T31N-R05W
Rosa Unit #221-A - MWD Survey

Halliburton Sperry-Drilling

Survey Report

16 May, 2005

Surface Coordinates: 2148660.13 N, 624830.89 E (36° 54' 15.0000" N, 107° 24' 23.0000" W)
Grid Coordinate System: NAD27 New Mexico State Planes, Western Zone

Surface Coordinates relative to Global Coordinates: 643669.00 N, 327150.13 E (Grid)
Surface Coordinates relative to NW corner sec 18: 925.00 S, 220.00 E (True)
Kelly Bushing Elevation: 6528.00ft above Mean Sea Level
Kelly Bushing Elevation: 6528.00ft above Ground Level

Survey Ref: svy8459

30-039-29492

Surface 925/N 220/W
BNL 1198/N 840/W

MD 3294 TVD 3200

HALLIBURTON

Sperry Drilling Services

HALLIBURTON**Sperry Drilling Services****Williams Production Company**

New Mexico

Rio Arriba County

Survey Report for Sec. 18-T31N-R05W - Rosa Unit #221-A - MWD Survey

Measure Depth (ft)	Incl. Angle (Deg)	Drift Direction (Deg)	True Vertical Depth	Vertical Section (ft)	Local Coordinates		Dogleg Severit (°/100ft)	Lease Calls		Global Coordinates	
					N-S (ft)	E-W (ft)		FNL-FSL (ft)	FEL-FWL (ft)	Grid Y (ft)	Grid X (ft)
0.00	0.000	0.000	0.00	0.00	0.00 N	0.00 E		925.00 FNL	220.00 FWL	2148660.13 N	624830.89 E
346.00	0.530	308.700	346.00	-1.55	1.00 N	1.25 W	0.15	924.00 FNL	218.75 FWL	2148661.12 N	624829.64 E
377.00	0.700	317.140	376.99	-1.86	1.23 N	1.49 W	0.62	923.78 FNL	218.51 FWL	2148661.35 N	624829.40 E
408.00	0.260	317.490	407.99	-2.09	1.42 N	1.67 W	1.42	923.58 FNL	218.34 FWL	2148661.54 N	624829.22 E
439.00	0.530	128.880	438.99	-2.02	1.38 N	1.60 W	2.54	923.62 FNL	218.40 FWL	2148661.50 N	624829.29 E
470.00	1.140	128.350	469.99	-1.58	1.10 N	1.25 W	1.97	923.90 FNL	218.76 FWL	2148661.22 N	624829.64 E
501.00	2.200	135.910	500.97	-0.74	0.48 N	0.59 W	3.49	924.52 FNL	219.41 FWL	2148660.61 N	624830.30 E
532.00	2.990	127.470	531.94	0.60	0.44 S	0.46 E	2.82	925.44 FNL	220.47 FWL	2148659.69 N	624831.36 E
562.00	3.780	127.650	561.89	2.32	1.52 S	1.87 E	2.63	926.52 FNL	221.87 FWL	2148658.62 N	624832.77 E
593.00	4.480	128.350	592.81	4.48	2.89 S	3.63 E	2.26	927.90 FNL	223.63 FWL	2148657.25 N	624834.53 E
624.00	5.620	125.710	623.69	7.14	4.53 S	5.81 E	3.75	929.53 FNL	225.81 FWL	2148655.62 N	624836.72 E
655.00	6.240	124.660	654.52	10.27	6.37 S	8.43 E	2.03	931.38 FNL	228.43 FWL	2148653.79 N	624839.35 E
686.00	7.380	121.850	685.30	13.90	8.38 S	11.50 E	3.83	933.39 FNL	231.51 FWL	2148651.80 N	624842.43 E
717.00	8.350	121.320	716.01	18.10	10.60 S	15.12 E	3.14	935.61 FNL	235.12 FWL	2148649.59 N	624846.06 E
748.00	9.320	120.260	746.64	22.82	13.04 S	19.21 E	3.17	938.04 FNL	239.21 FWL	2148647.17 N	624850.16 E
779.00	10.370	118.160	777.19	28.10	15.62 S	23.84 E	3.58	940.62 FNL	243.84 FWL	2148644.61 N	624854.80 E
810.00	10.900	116.920	807.65	33.80	18.26 S	28.91 E	1.86	943.27 FNL	248.91 FWL	2148641.99 N	624859.88 E
841.00	11.950	114.990	838.04	39.94	20.95 S	34.43 E	3.60	945.95 FNL	254.44 FWL	2148639.33 N	624865.42 E
871.00	12.480	114.640	867.36	46.28	23.61 S	40.19 E	1.78	948.62 FNL	260.20 FWL	2148636.70 N	624871.19 E
902.00	13.270	114.290	897.58	53.19	26.47 S	46.48 E	2.56	951.48 FNL	266.49 FWL	2148633.86 N	624877.49 E
933.00	14.150	113.760	927.70	60.54	29.46 S	53.19 E	2.87	954.47 FNL	273.20 FWL	2148630.90 N	624884.22 E
964.00	14.940	112.530	957.70	68.32	32.52 S	60.35 E	2.74	957.52 FNL	280.36 FWL	2148627.88 N	624891.39 E
995.00	16.080	112.000	987.57	76.61	35.66 S	68.02 E	3.71	960.66 FNL	288.03 FWL	2148624.77 N	624899.08 E
1026.00	16.790	111.830	1017.31	85.38	38.93 S	76.16 E	2.30	963.94 FNL	296.16 FWL	2148621.54 N	624907.23 E
1088.00	17.490	112.710	1076.55	103.64	45.86 S	93.07 E	1.20	970.86 FNL	313.07 FWL	2148614.69 N	624924.17 E

Measure Depth (ft)	Incl. Angle (Deg)	Drift Direction (Deg)	True Vertical Depth	Vertical Section (ft)	Local Coordinates N-S (ft)	E-W (ft)	Dogleg Severit (°/100ft)	Lease Calls FNL-FSL (ft)	FEL-FWL (ft)	Global Coordinates Grid Y (ft)	Grid X (ft)
1150.00	18.110	112.470	1135.59	122.59	53.14 S	110.57 E	1.01	978.14 FNL	330.57 FWL	2148607.48 N	624941.70 E
1212.00	17.670	111.830	1194.59	141.63	60.32 S	128.21 E	0.78	985.32 FNL	348.21 FWL	2148600.38 N	624959.37 E
1274.00	17.690	112.160	1253.66	160.45	67.37 S	145.67 E	0.16	992.38 FNL	365.67 FWL	2148593.41 N	624976.86 E
1336.00	17.430	112.300	1312.77	179.16	74.45 S	162.98 E	0.42	999.45 FNL	382.98 FWL	2148586.41 N	624994.21 E
1399.00	17.310	112.420	1372.90	197.96	81.60 S	180.38 E	0.20	1006.61 FNL	400.38 FWL	2148579.33 N	625011.63 E
1462.00	17.390	111.500	1433.03	216.74	88.63 S	197.80 E	0.45	1013.63 FNL	417.80 FWL	2148572.38 N	625029.09 E
1525.00	17.300	111.130	1493.17	235.50	95.46 S	215.30 E	0.23	1020.46 FNL	435.30 FWL	2148565.64 N	625046.61 E
1587.00	17.580	111.170	1552.32	254.07	102.16 S	232.63 E	0.45	1027.16 FNL	452.63 FWL	2148559.01 N	625063.97 E
1648.00	17.480	112.470	1610.48	272.43	108.99 S	249.68 E	0.66	1033.99 FNL	469.69 FWL	2148552.26 N	625081.06 E
1709.00	16.410	113.910	1668.83	290.21	115.98 S	266.03 E	1.88	1040.99 FNL	486.03 FWL	2148545.34 N	625097.43 E
1772.00	16.120	115.650	1729.31	307.85	123.37 S	282.05 E	0.90	1048.38 FNL	502.05 FWL	2148538.01 N	625113.49 E
1835.00	17.090	115.210	1789.68	325.84	131.10 S	298.31 E	1.55	1056.11 FNL	518.31 FWL	2148530.36 N	625129.78 E
1897.00	17.330	114.390	1848.91	344.18	138.80 S	314.96 E	0.55	1063.80 FNL	534.96 FWL	2148522.74 N	625146.47 E
1961.00	17.210	113.680	1910.02	363.18	146.54 S	332.31 E	0.38	1071.54 FNL	552.31 FWL	2148515.08 N	625163.85 E
2023.00	17.600	113.990	1969.18	381.73	154.03 S	349.27 E	0.65	1079.03 FNL	569.28 FWL	2148507.66 N	625180.85 E
2086.00	18.640	114.220	2029.06	401.32	162.03 S	367.16 E	1.65	1087.04 FNL	587.16 FWL	2148499.74 N	625198.77 E
2150.00	18.550	112.940	2089.72	421.73	170.20 S	385.86 E	0.65	1095.20 FNL	605.86 FWL	2148491.66 N	625217.51 E
2214.00	17.500	112.830	2150.58	441.53	177.90 S	404.11 E	1.64	1102.90 FNL	624.11 FWL	2148484.04 N	625235.79 E
2276.00	17.100	112.170	2209.77	459.96	184.95 S	421.14 E	0.72	1109.96 FNL	641.14 FWL	2148477.06 N	625252.85 E
2340.00	16.760	112.910	2271.00	478.60	192.10 S	438.35 E	0.63	1117.10 FNL	658.36 FWL	2148469.99 N	625270.10 E
2405.00	17.170	113.210	2333.17	497.56	199.53 S	455.80 E	0.64	1124.53 FNL	675.81 FWL	2148462.64 N	625287.58 E
2467.00	16.830	112.360	2392.46	515.69	206.55 S	472.51 E	0.68	1131.55 FNL	692.52 FWL	2148455.69 N	625304.33 E
2529.00	16.500	111.500	2451.86	533.46	213.19 S	489.01 E	0.66	1138.19 FNL	709.01 FWL	2148449.13 N	625320.85 E
2592.00	16.090	114.520	2512.33	551.13	220.09 S	505.27 E	1.49	1145.10 FNL	725.28 FWL	2148442.30 N	625337.15 E
2624.00	16.400	114.820	2543.05	560.08	223.83 S	513.41 E	1.00	1148.83 FNL	733.41 FWL	2148438.60 N	625345.30 E
2655.00	16.500	115.380	2572.78	568.85	227.55 S	521.36 E	0.60	1152.56 FNL	741.36 FWL	2148434.91 N	625353.26 E
2687.00	16.060	113.770	2603.50	577.82	231.28 S	529.51 E	1.97	1156.29 FNL	749.52 FWL	2148431.21 N	625361.44 E
2718.00	16.090	113.180	2633.28	586.41	234.70 S	537.39 E	0.54	1159.71 FNL	757.39 FWL	2148427.83 N	625369.32 E
2749.00	15.400	110.770	2663.12	594.81	237.85 S	545.19 E	3.07	1162.86 FNL	765.19 FWL	2148424.71 N	625377.14 E
2780.00	14.830	109.590	2693.05	602.88	240.64 S	552.77 E	2.09	1165.65 FNL	772.78 FWL	2148421.96 N	625384.73 E

Measure Depth (ft)	Incl. Angle (Deg)	Drift Direction (Deg)	True Vertical Depth	Vertical Section (ft)	Local Coordinates N-S (ft)	E-W (ft)	Dogleg Severit ("'/100ft)	Lease Calls FNL-FSL (ft)	FEL-FWL (ft)	Global Coordinates Grid Y (ft)	Grid X (ft)
2812.00	14.610	108.400	2724.00	610.99	243.29 S	560.46 E	1.17	1168.29 FNL	780.46 FWL	2148419.34 N	625392.43 E
2843.00	13.670	108.920	2754.06	618.53	245.71 S	567.63 E	3.06	1170.72 FNL	787.64 FWL	2148416.95 N	625399.62 E
2875.00	12.810	108.730	2785.21	625.83	248.08 S	574.37 E	2.69	1173.08 FNL	794.58 FWL	2148414.62 N	625406.57 E
2906.00	12.130	108.880	2815.48	632.50	250.23 S	580.91 E	2.20	1175.24 FNL	800.91 FWL	2148412.49 N	625412.91 E
2936.00	11.390	110.930	2844.85	638.60	252.31 S	586.66 E	2.83	1177.32 FNL	806.66 FWL	2148410.44 N	625418.67 E
2968.00	10.310	112.660	2876.28	644.62	254.54 S	592.25 E	3.52	1179.55 FNL	812.26 FWL	2148408.23 N	625424.28 E
2999.00	9.230	113.400	2906.82	649.88	256.60 S	597.09 E	3.51	1181.60 FNL	817.10 FWL	2148406.20 N	625429.13 E
3031.00	8.240	116.230	2938.45	654.74	258.63 S	601.51 E	3.37	1183.64 FNL	821.51 FWL	2148404.18 N	625433.55 E
3062.00	7.980	118.330	2969.14	659.10	260.64 S	605.39 E	1.27	1185.64 FNL	825.40 FWL	2148402.20 N	625437.44 E
3094.00	7.350	121.620	3000.86	663.35	262.76 S	609.09 E	2.40	1187.77 FNL	829.09 FWL	2148400.09 N	625441.15 E
3125.00	6.590	123.430	3031.63	667.06	264.78 S	612.26 E	2.55	1189.79 FNL	832.27 FWL	2148398.08 N	625444.33 E
3157.00	5.450	124.660	3063.45	670.36	266.66 S	615.05 E	3.59	1191.66 FNL	835.05 FWL	2148396.22 N	625447.13 E
3188.00	4.220	128.170	3094.34	672.91	268.20 S	617.15 E	4.08	1193.21 FNL	837.16 FWL	2148394.69 N	625449.24 E
3219.00	3.520	132.570	3125.27	674.92	269.55 S	618.75 E	2.45	1194.55 FNL	838.76 FWL	2148393.34 N	625450.84 E
last MWD survey											
3240.00	2.990	140.480	3146.24	676.01	270.41 S	619.58 E	3.30	1195.41 FNL	839.58 FWL	2148392.49 N	625451.67 E
projection to TD											
3294.00	2.990	140.480	3200.16	678.53	272.58 S	621.37 E	0.00	1197.59 FNL	841.37 FWL	2148390.32 N	625453.47 E

All data is in Feet (US) unless otherwise stated. Directions and coordinates are relative to True North.
Vertical depths are relative to RKB(6516' +12' KB). Northings and Eastings are relative to NW corner sec 18.

Based upon Minimum Curvature type calculations, at a Measured Depth of 3294.00ft.,
The Bottom Hole Displacement is 678.53ft., in the Direction of 113.687° (True).

HALLIBURTON**Sperry Drilling Services****Williams Production Company**

New Mexico

Rio Arriba County

Survey Report for Sec. 18-T31N-R05W - Rosa Unit #221-A - MWD Survey**Comments**

Measured Depth (ft)	Station Coordinates			Comment
	TVD (ft)	Northings (ft)	Eastings (ft)	
3240.00	3146.24	270.41 S	619.58 E	last MWD survey projection to TD
3294.00	3200.16	272.58 S	621.37 E	

North Reference Sheet for Sec. 18-T31N-R05W - Rosa Unit #221-A

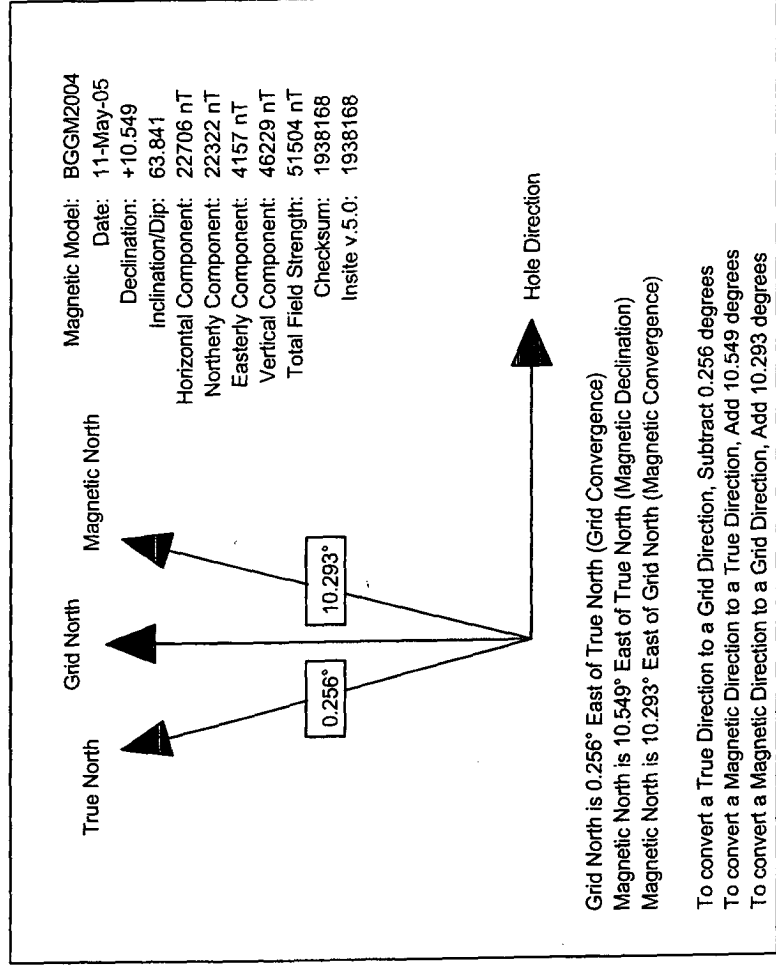
Coordinate System is NAD27 New Mexico State Planes, Western Zone, US Foot
Source: Snyder, J.P., 1987, Map Projections - A Working Manual

Datum is North American Datum of 1927 (US48, AK, HI, and Canada)

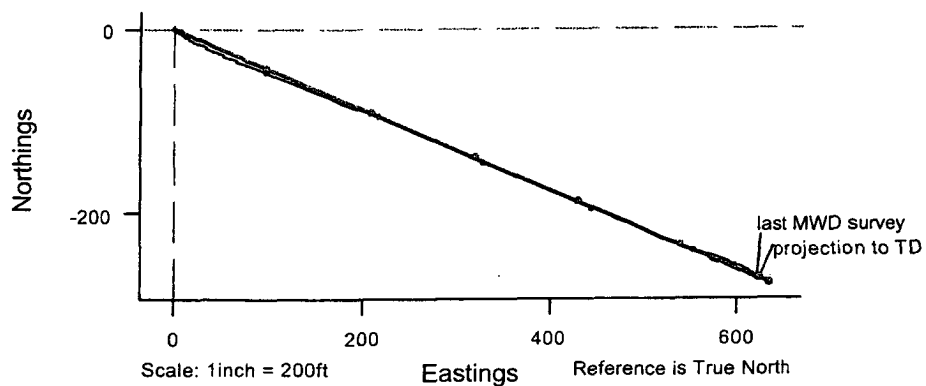
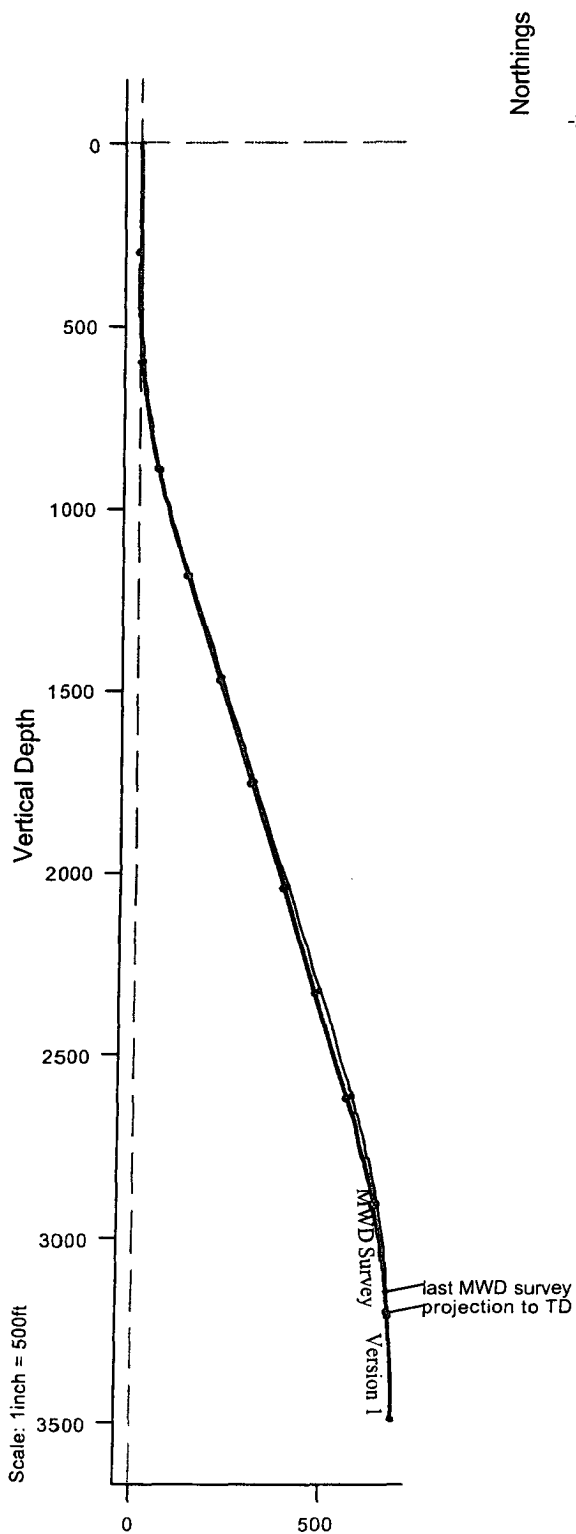
Spheroid is Clarke - 1866
Equatorial Radius: 6378206.400m.
Polar Radius: 6356583.800m.
Inverse Flattening: 294.978698213901

Projection method is Transverse Mercator or Gauss Kruger Projection
Central Meridian is -107.833°
Longitude Origin: 0.000°
Latitude Origin: 31.000°
False Easting: 152400.00m
False Northing: 0.00m
Scale Reduction: 0.99991667

Grid Coordinates of Well: 2148660.13 N, 624830.89 E
Geographical Coordinates of Well: 36° 54' 15.0000" N, 107° 24' 23.0000" W
Surface Elevation of Well: 6528.00ft
Grid Convergence at Surface is +0.256°
Magnetic Declination at Surface is +10.549° (11 May, 2005)



New Mexico
Rio Arriba County
Sec. 18-T31N-R05W
Rosa Unit #221-A



Section Azimuth: 113.598° (True North)
Vertical Section

Prepared by:
Dennis Cook

Date/Time:
16 May, 2005 - 11:14

Checked:

Approved: