

NAOCDA

[illegible]

SHL: 1830' FNL & 1015' FEL
 SE/4 NE/4 Sec 36(H), T31N, R5W
 Rio Arriba, New Mexico
 BHL: End -1645' FSL & 1858' FEL
 NW/4 SE/4 Sec 36(J), T31N, R5W
 Rio Arriba, New Mexico

ROSA 406
 BASIN FRUITLAND COAL HORIZONTAL

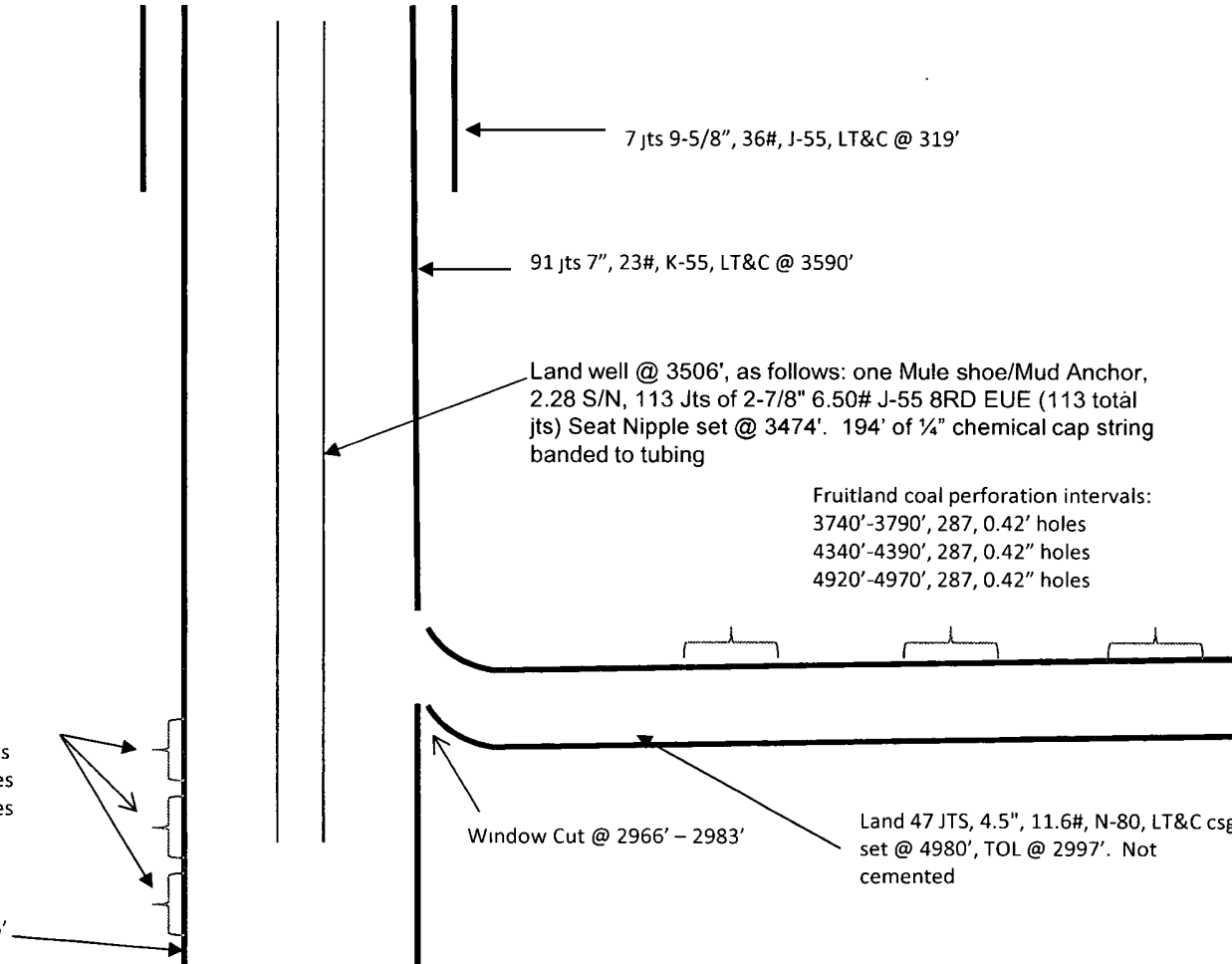
Spud 07/06/2011
 Completed 10/06/2011

Elevation: 6599' GR
 API # 30-039-30912

Top	Depth
Kirtland	2896'
Fruitland	3240'
Pictured Cliffs	3435'

Fruitland coal perforation intervals:
 3347'-3363', 24, 0.41' holes
 3388'-3403', 60, 0.41" holes
 3404'-3419', 60, 0.41" holes

TD vertical hole @ 3605'
 PBD @ 3590'



TD @ 5180' MD
 TVD @ 3379'
 PBD @ 4980' MD
 TVD @ 3383'

12-1/4"	9-5/8", 36#	150 sx	270 cu. ft.	Surface
8-3/4"	7", 23#	485 sx	1064 cu. ft.	Surface
6-1/4"	4-1/2", 11.6#	None	None	N/A



Williams Energy

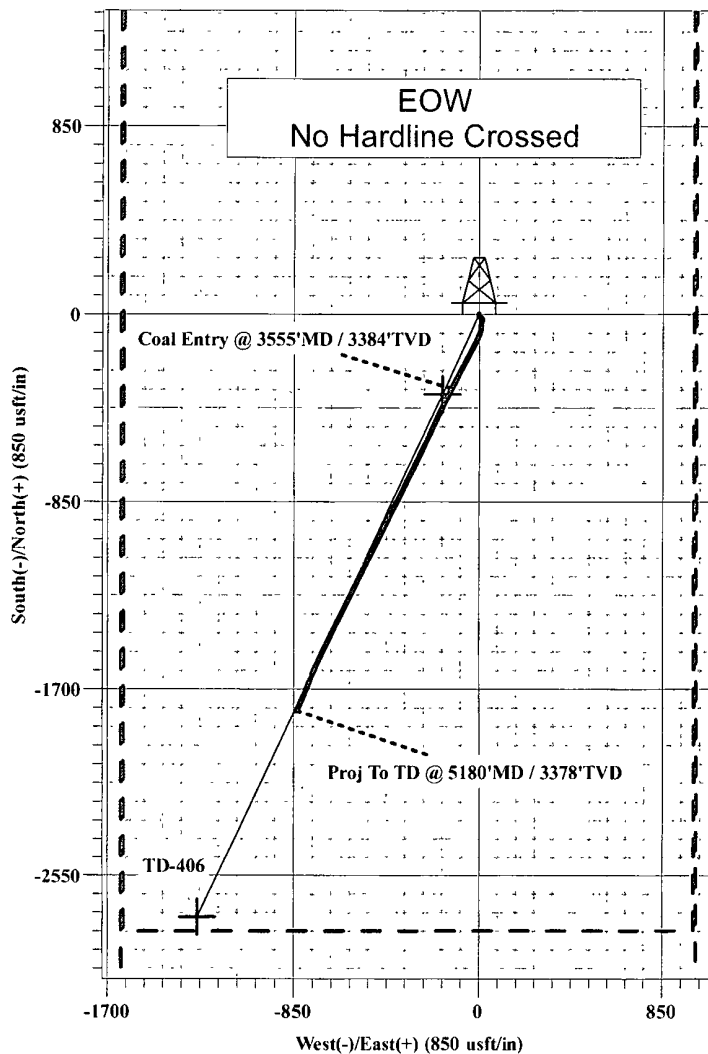
Rosa Unit #406
Sec36 T31N-R5W - #406
Rio Arriba Co. NM
GL: 6599' KB: 14'

PATHFINDER

A Schlumberger Company

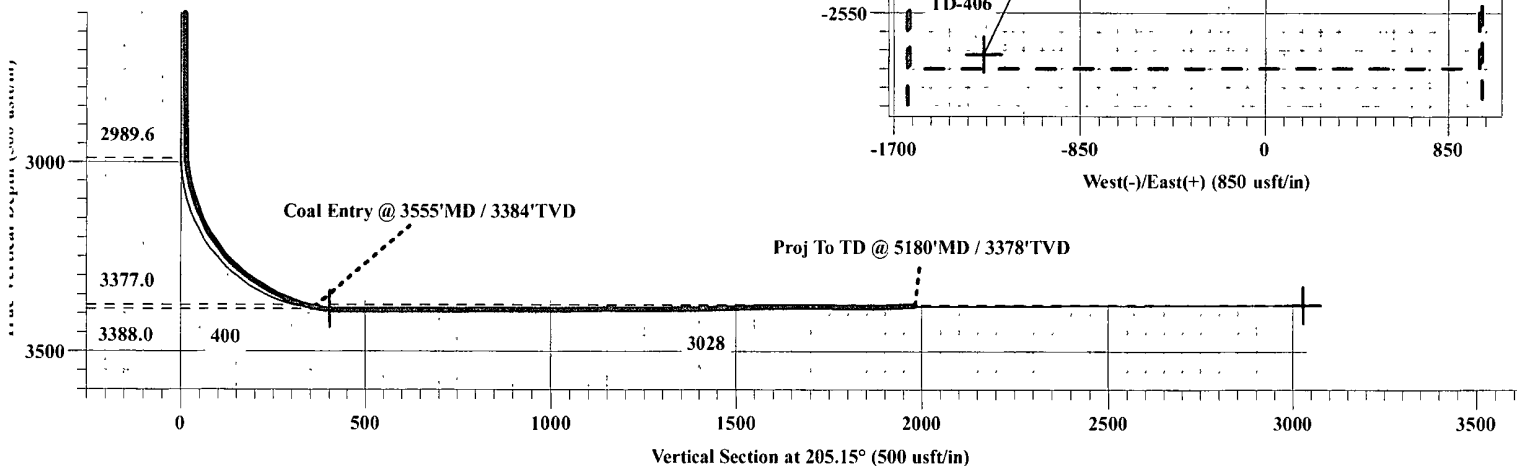
WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
TD-406	3377.0	-2741.3	-1287.0	2130645.05	189334.22	Point
LAND-406	3388.0	-362.2	-170.0	2133011.61	190477.51	Point



WELL DETAILS: Rosa Unit #406

Northing	Easting	Latitude	Longitude
2133371.91	190651.51	36° 51' 30.000 N	107° 18' 26.639 W



SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2989.6	0.00	0.00	2989.6	0.0	0.0	0.00	0.00	0.0	
3617.1	90.24	205.15	3388.0	-362.2	-170.0	14.38	205.15	400.1	
6245.4	90.24	205.15	3377.0	-2741.3	-1287.0	0.00	0.00	3028.4	TD-406

Plan: Design #1 (Rosa Unit #406/Wellbore #1)

Rev: 7/16/2011

Williams Energy

Rio Arriba Co. NM

Sec36 T31N-R5W - #406

Rosa Unit #406

Wellbore #1

Design: Wellbore #1

Standard Survey Report

22 July, 2011

Survey Report

Company:	Williams Energy	Local Co-ordinate Reference:	Site Sec36 T31N-R5W - #406
Project:	Rio Arriba Co NM	TVD Reference:	WELL @ 6613 0usft (Original Well Elev)
Site:	Sec36 T31N-R5W - #406	MD Reference:	WELL @ 6613 0usft (Original Well Elev)
Well:	Rosa Unit #406	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000 1 Single User-Db

Project:	Rio Arriba Co. NM		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico Central 3002		

Site:	Sec36 T31N-R5W - #406				
Site Position:		Northing:	2,133,371.91 usft	Latitude:	36° 51' 30.000 N
From:	Lat/Long	Easting:	190,651.52 usft	Longitude:	107° 18' 26.639 W
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0 63 °

Well	Rosa Unit #406					
Well Position	+N/-S	0 0 usft	Northing:	2,133,371.91 usft	Latitude:	36° 51' 30.000 N
	+E/-W	0 0 usft	Easting:	190,651.52 usft	Longitude:	107° 18' 26.639 W
Position Uncertainty		0 0 usft	Wellhead Elevation:	usft	Ground Level:	6,599.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	06/28/11	9 71	63 65	50,858

Design:	Wellbore #1				
Audit Notes:					
Version:	1 0	Phase:	ACTUAL	Tie On Depth:	0 0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0 0	0 0	0 0	205 15	

Survey Program		Date	07/22/11		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
200 0	5,180 0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

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
200 0	0.34	152 07	200 0	-0.5	0.3	0.4	0.17	0.17	0 00
400 0	0.64	210 80	400 0	-2.0	0.0	1.8	0.27	0.15	29 37
600 0	0.58	166 15	600 0	-4.0	-0.3	3.7	0.23	-0.03	-22 33
800 0	0.82	155 39	800 0	-6.2	0.5	5.4	0.14	0.12	-5 38
1,000 0	0.74	176 88	999.9	-8.8	1.2	7.5	0.15	-0.04	10 75
1,200 0	0.37	112.88	1,199.9	-10.4	1.8	8.6	0.33	-0.19	-32 00
1,400 0	0.24	129 41	1,399.9	-10.9	2.7	8.7	0.08	-0.07	8 27
1,600 0	0.92	146 12	1,599.9	-12.5	4.0	9.6	0.35	0.34	8 36
1,800 0	0.32	152 11	1,799.9	-14.3	5.1	10.8	0.30	-0.30	3 00

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Site:	Sec36 T31N-R5W - #406	MD Reference:	WELL @ 6613.0usft (Original Well Elev)
Well:	Rosa Unit #406	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)	
2,000.0	0.60	142.85	1,999.9	-15.6	6.0	11.6	0.14	0.14	-4.63	
2,200.0	0.83	45.96	2,199.9	-15.5	7.7	10.7	0.54	0.12	-48.45	
2,400.0	0.56	131.33	2,399.9	-15.1	9.5	9.7	0.48	-0.14	42.69	
2,600.0	0.74	138.47	2,599.9	-16.7	11.1	10.4	0.10	0.09	3.57	
2,800.0	0.57	160.63	2,799.9	-18.6	12.2	11.7	0.15	-0.09	11.08	
2,947.0	0.60	168.74	2,946.9	-20.1	12.6	12.8	0.06	0.02	5.52	
2,966.0	0.60	168.74	2,965.9	-20.3	12.7	13.0	0.00	0.00	0.00	
3,025.0	9.76	185.74	3,024.5	-25.6	12.2	17.9	15.57	15.53	28.81	
3,057.0	14.25	183.88	3,055.8	-32.2	11.7	24.2	14.08	14.03	-5.81	
3,089.0	18.11	181.65	3,086.6	-41.1	11.3	32.4	12.22	12.06	-6.97	
3,121.0	21.98	182.08	3,116.6	-52.0	10.9	42.5	12.10	12.09	1.34	
3,153.0	25.06	190.06	3,146.0	-64.7	9.5	54.5	13.83	9.63	24.94	
3,184.0	28.58	197.29	3,173.6	-78.3	6.2	68.2	15.46	11.35	23.32	
3,217.0	33.24	201.79	3,201.9	-94.2	0.5	85.1	15.75	14.12	13.64	
3,249.0	38.16	204.55	3,227.9	-111.4	-6.9	103.7	16.17	15.38	8.63	
3,281.0	42.91	206.78	3,252.2	-130.1	-15.9	124.5	15.52	14.84	6.97	
3,314.0	47.92	208.55	3,275.4	-150.9	-26.9	148.0	15.65	15.18	5.36	
3,346.0	52.41	209.76	3,295.9	-172.3	-38.8	172.5	14.33	14.03	3.78	
3,378.0	56.63	210.48	3,314.5	-194.9	-51.9	198.5	13.31	13.19	2.25	
3,410.0	59.79	209.12	3,331.3	-218.5	-65.4	225.6	10.51	9.88	-4.25	
3,442.0	62.96	207.80	3,346.6	-243.2	-78.8	253.6	10.55	9.91	-4.13	
3,474.0	67.18	207.39	3,360.1	-268.9	-92.2	282.6	13.24	13.19	-1.28	
3,506.0	71.75	207.79	3,371.4	-295.4	-106.1	312.5	14.33	14.28	1.25	
3,538.0	76.41	207.59	3,380.1	-322.7	-120.4	343.2	14.57	14.56	-0.63	
3,555.0	78.63	207.42	3,383.8	-337.4	-128.1	359.8	13.10	13.06	-1.01	
Coal Entry @ 3555' MD / 3384' TVD										
3,569.0	80.46	207.28	3,386.3	-349.6	-134.4	373.6	13.10	13.06	-0.99	
3,601.0	85.12	206.51	3,390.4	-377.9	-148.7	405.3	14.76	14.56	-2.41	
3,625.0	89.78	205.57	3,391.4	-399.5	-159.3	429.3	19.81	19.42	-3.92	
3,657.0	91.28	205.26	3,391.1	-428.4	-173.0	461.3	4.79	4.69	-0.97	
3,686.0	90.48	204.90	3,390.7	-454.6	-185.3	490.3	3.02	-2.76	-1.24	
3,716.0	90.04	204.56	3,390.6	-481.9	-197.8	520.3	1.85	-1.47	-1.13	
3,747.0	89.43	204.55	3,390.7	-510.1	-210.7	551.3	1.97	-1.97	-0.03	
3,777.0	89.34	204.76	3,391.0	-537.3	-223.2	581.3	0.76	-0.30	0.70	
3,808.0	90.48	205.38	3,391.1	-565.4	-236.4	612.3	4.19	3.68	2.00	
3,838.0	90.66	205.69	3,390.8	-592.5	-249.3	642.3	1.19	0.60	1.03	
3,868.0	89.87	205.69	3,390.6	-619.5	-262.3	672.3	2.63	-2.63	0.00	
3,899.0	90.22	206.08	3,390.6	-647.4	-275.8	703.3	1.69	1.13	1.26	
3,930.0	89.69	205.98	3,390.6	-675.3	-289.5	734.3	1.74	-1.71	-0.32	
3,960.0	90.48	206.19	3,390.6	-702.2	-302.6	764.2	2.72	2.63	0.70	
3,991.0	90.31	206.37	3,390.4	-730.0	-316.4	795.2	0.80	-0.55	0.58	
4,022.0	89.96	206.05	3,390.3	-757.8	-330.1	826.2	1.53	-1.13	-1.03	
4,053.0	90.04	205.72	3,390.3	-785.7	-343.6	857.2	1.10	0.26	-1.06	
4,083.0	90.04	206.63	3,390.3	-812.6	-356.8	887.2	3.03	0.00	3.03	

Survey Report

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Site:	Sec36 T31N-R5W - #406	MD Reference:	WELL @ 6613 0usft (Original Well Elev)
Well:	Rosa Unit #406	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)	
4,114.0	90.04	207.03	3,390.3	-840.3	-370.8	918.2	1.29	0.00	1.29	
4,144.0	90.31	207.21	3,390.2	-867.0	-384.5	948.2	1.08	0.90	0.60	
4,174.0	89.78	206.90	3,390.1	-893.7	-398.1	978.2	2.05	-1.77	-1.03	
4,205.0	90.75	207.02	3,390.0	-921.3	-412.2	1,009.2	3.15	3.13	0.39	
4,235.0	90.75	207.04	3,389.6	-948.1	-425.8	1,039.1	0.07	0.00	0.07	
4,266.0	90.48	206.81	3,389.3	-975.7	-439.9	1,070.1	1.14	-0.87	-0.74	
4,297.0	90.40	207.03	3,389.0	-1,003.3	-453.9	1,101.1	0.76	-0.26	0.71	
4,329.0	90.40	207.00	3,388.8	-1,031.8	-468.4	1,133.1	0.09	0.00	-0.09	
4,360.0	90.13	207.18	3,388.7	-1,059.4	-482.5	1,164.1	1.05	-0.87	0.58	
4,392.0	89.69	206.82	3,388.7	-1,087.9	-497.1	1,196.1	1.78	-1.38	-1.13	
4,424.0	89.60	206.55	3,388.9	-1,116.5	-511.4	1,228.0	0.89	-0.28	-0.84	
4,455.0	89.96	206.39	3,389.0	-1,144.3	-525.3	1,259.0	1.27	1.16	-0.52	
4,488.0	90.66	207.05	3,388.9	-1,173.8	-540.1	1,292.0	2.92	2.12	2.00	
4,520.0	90.92	206.59	3,388.4	-1,202.3	-554.5	1,324.0	1.65	0.81	-1.44	
4,552.0	90.75	206.57	3,387.9	-1,230.9	-568.9	1,356.0	0.53	-0.53	-0.06	
4,583.0	90.48	206.80	3,387.6	-1,258.6	-582.8	1,387.0	1.14	-0.87	0.74	
4,613.0	90.57	206.92	3,387.3	-1,285.4	-596.3	1,417.0	0.50	0.30	0.40	
4,645.0	91.19	207.74	3,386.8	-1,313.8	-611.0	1,448.9	3.21	1.94	2.56	
4,676.0	91.89	207.75	3,386.0	-1,341.2	-625.4	1,479.9	2.26	2.26	0.03	
4,708.0	92.15	207.61	3,384.9	-1,369.6	-640.3	1,511.8	0.92	0.81	-0.44	
4,740.0	91.80	206.64	3,383.8	-1,398.0	-654.9	1,543.8	3.22	-1.09	-3.03	
4,772.0	91.54	205.81	3,382.9	-1,426.7	-669.0	1,575.8	2.72	-0.81	-2.59	
4,804.0	90.84	205.65	3,382.2	-1,455.5	-682.9	1,607.8	2.24	-2.19	-0.50	
4,836.0	89.69	205.33	3,382.0	-1,484.4	-696.7	1,639.8	3.73	-3.59	-1.00	
4,867.0	90.04	205.16	3,382.1	-1,512.5	-709.9	1,670.8	1.26	1.13	-0.55	
4,899.0	91.01	205.27	3,381.8	-1,541.4	-723.5	1,702.8	3.05	3.03	0.34	
4,931.0	89.78	204.76	3,381.6	-1,570.4	-737.1	1,734.8	4.16	-3.84	-1.59	
4,962.0	87.14	203.41	3,382.4	-1,598.7	-749.7	1,765.8	9.56	-8.52	-4.35	
4,994.0	89.78	204.33	3,383.3	-1,627.9	-762.6	1,797.7	8.74	8.25	2.88	
5,026.0	89.87	202.78	3,383.4	-1,657.3	-775.4	1,829.7	4.85	0.28	-4.84	
5,058.0	90.75	202.53	3,383.2	-1,686.8	-787.8	1,861.7	2.86	2.75	-0.78	
5,089.0	92.42	203.01	3,382.4	-1,715.4	-799.8	1,892.6	5.61	5.39	1.55	
5,180.0	92.42	203.01	3,378.5	-1,799.1	-835.3	1,983.5	0.00	0.00	0.00	
Proj To TD @ 5180' MD / 3378'TVD										

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
3,555.0	3,383.8	-337.4	-128.1	Coal Entry @ 3555' MD / 3384'TVD
5,180.0	3,378.5	-1,799.1	-835.3	Proj To TD @ 5180' MD / 3378'TVD

Survey Report

Company:	Williams Energy	Local Co-ordinate Reference:	Site Sec36 T31N-R5W - #406
Project:	Rio Arriba Co NM	TVD Reference:	WELL @ 6613' 0usft (Original Well Elev)
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Well:	Rosa Unit #406	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000 1 Single User Db

Checked By:	Approved By:	Date:
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