

039-26859



Black Hills Exploration & Production

SEC 17-T27N-R2W
Jicarilla 29-02-05 #3

OH

OIL CONS. DIV DIST. 3

APR 23 2014

Design: OH

Standard Survey Report

18 December, 2013

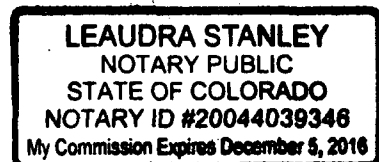
This survey is correct to the best of my knowledge and is supported by actual field data.

A handwritten signature in cursive script, appearing to read 'Leandra Stanley', is written over a horizontal line.

Notarized this date 18 of December, 2013.

A handwritten signature in cursive script, appearing to read 'Leandra Stanley', is written over a horizontal line.

Notary Signature
County of Mesa
State of Colorado

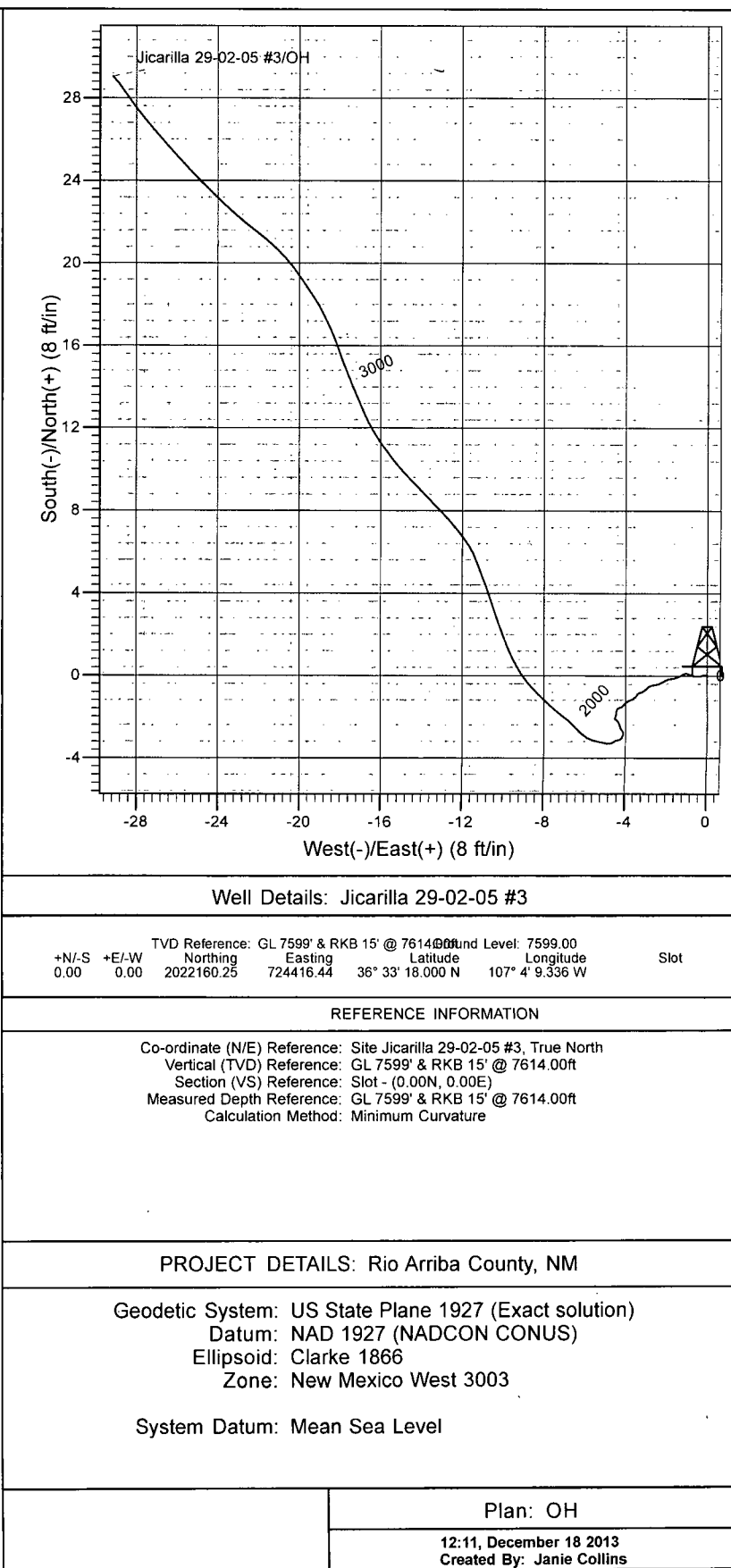
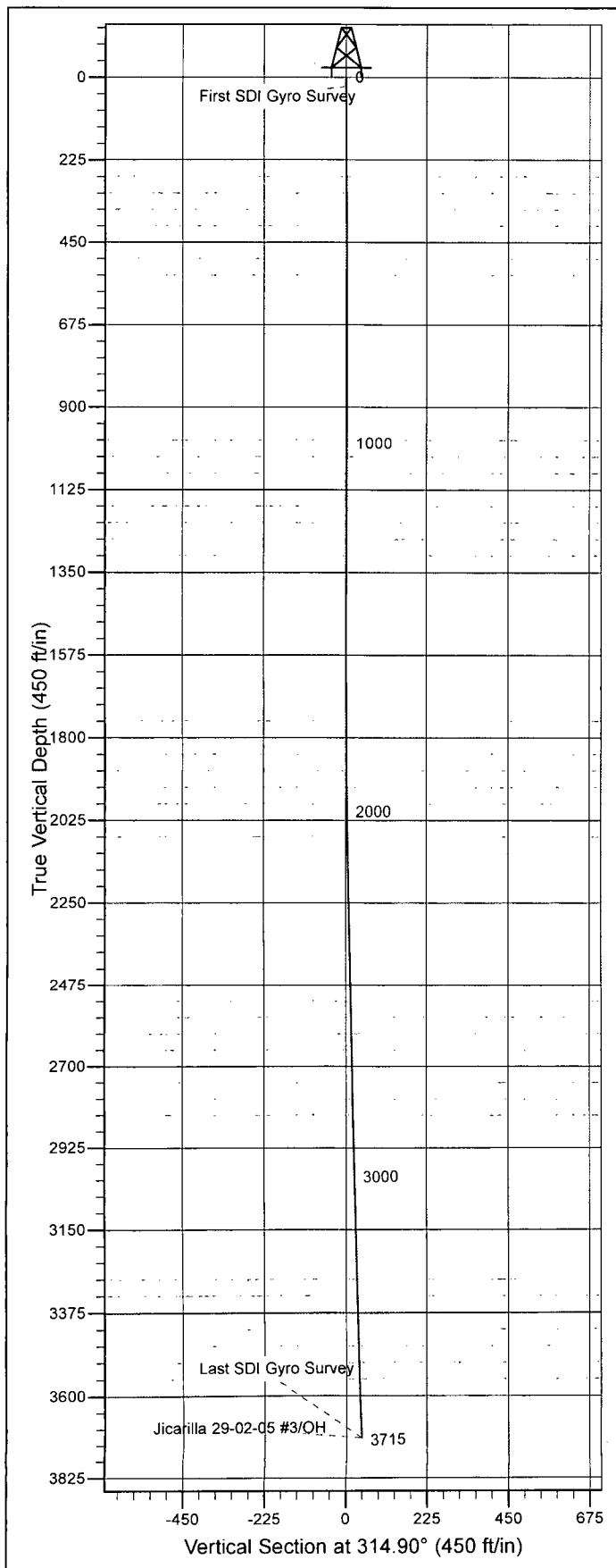


Scientific Drilling



Scientific Drilling

Company: Black Hills Exploration & Prod.
Project: Rio Arriba County, NM
Site: Jicarilla 29-02-05 #3
Well: Jicarilla 29-02-05 #3
Wellbore: OH
Design: OH



Survey Report



Company:	Black Hills Exploration & Prod.	Local Co-ordinate Reference:	Site Jicarilla 29-02-05 #3
Project:	Rio Arriba County, NM	TVD Reference:	GL 7599' & RKB 15' @ 7614.00ft
Site:	Jicarilla 29-02-05 #3	MD Reference:	GL 7599' & RKB 15' @ 7614.00ft
Well:	Jicarilla 29-02-05 #3	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Project	Rio Arriba County, NM		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico West 3003		

Site	Jicarilla 29-02-05 #3		
Site Position:		Northing:	2,022,160.25 usft
From:	Lat/Long	Easting:	724,416.44 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in
		Latitude:	36° 33' 18.000 N
		Longitude:	107° 4' 9.336 W
		Grid Convergence:	0.46 °

Well	Jicarilla 29-02-05 #3		
Well Position	+N/-S	0.00 ft	Northing:
	+E/-W	0.00 ft	Easting:
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	36° 33' 18.000 N
		Longitude:	107° 4' 9.336 W
		Ground Level:	7,599.00 ft

Wellbore	OH		
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	10/28/2013	9.33	63.38	50,414

Design	OH		
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Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
				0.00

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	314.90

Survey Program	Date	12/18/2013
From (ft)	To (ft)	Survey (Wellbore)
25.00	3,715.43	Survey #1 - Gyro Survey (OH)
Tool Name	Description	
Standard Keeper 103	Standard Wireline Keeper ver 1.0.3	

Survey	Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25.00	0.12	280.80	25.00	0.00	-0.03	0.02	0.48	0.48	0.00
First SDI Gyro Survey	50.00	0.13	286.47	50.00	0.02	-0.08	0.07	0.06	0.04	22.68
	75.00	0.08	296.85	75.00	0.03	-0.12	0.11	0.21	-0.20	41.52
	100.00	0.13	256.42	100.00	0.03	-0.16	0.14	0.35	0.20	-161.72
	125.00	0.25	254.55	125.00	0.01	-0.24	0.18	0.48	0.48	-7.48
	150.00	0.33	260.80	150.00	-0.01	-0.37	0.25	0.34	0.32	25.00
	175.00	0.35	271.81	175.00	-0.02	-0.52	0.35	0.27	0.08	44.04
	200.00	0.33	283.96	200.00	0.00	-0.66	0.47	0.30	-0.08	48.60
	225.00	0.33	288.62	225.00	0.04	-0.80	0.59	0.11	0.00	18.64

Survey Report



Company:	Black Hills Exploration & Prod.	Local Co-ordinate Reference:	Site Jicarilla 29-02-05 #3
Project:	Rio Arriba County, NM	TVD Reference:	GL 7599' & RKB 15' @ 7614.00ft
Site:	Jicarilla 29-02-05 #3	MD Reference:	GL 7599' & RKB 15' @ 7614.00ft
Well:	Jicarilla 29-02-05 #3	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
250.00	0.26	296.80	250.00	0.09	-0.92	0.71	0.33	-0.28	32.72
275.00	0.25	271.26	275.00	0.11	-1.02	0.81	0.45	-0.04	-102.16
300.00	0.34	243.69	300.00	0.08	-1.15	0.87	0.66	0.36	-110.28
325.00	0.41	243.96	325.00	0.01	-1.29	0.92	0.28	0.28	1.08
350.00	0.42	247.14	350.00	-0.06	-1.46	0.99	0.10	0.04	12.72
375.00	0.42	256.79	375.00	-0.12	-1.63	1.07	0.28	0.00	38.60
400.00	0.33	264.68	399.99	-0.15	-1.79	1.16	0.41	-0.36	31.56
425.00	0.30	249.34	424.99	-0.18	-1.92	1.24	0.36	-0.12	-61.36
450.00	0.34	247.11	449.99	-0.23	-2.05	1.29	0.17	0.16	-8.92
475.00	0.39	235.42	474.99	-0.31	-2.19	1.34	0.36	0.20	-46.76
500.00	0.47	246.45	499.99	-0.40	-2.36	1.39	0.46	0.32	44.12
525.00	0.48	266.71	524.99	-0.44	-2.55	1.50	0.67	0.04	81.04
550.00	0.30	256.81	549.99	-0.46	-2.72	1.60	0.77	-0.72	-39.60
575.00	0.27	237.02	574.99	-0.51	-2.84	1.65	0.41	-0.12	-79.16
600.00	0.31	222.25	599.99	-0.59	-2.93	1.66	0.34	0.16	-59.08
625.00	0.33	228.49	624.99	-0.69	-3.03	1.66	0.16	0.08	24.96
650.00	0.30	236.94	649.99	-0.78	-3.14	1.68	0.22	-0.12	33.80
675.00	0.27	259.33	674.99	-0.82	-3.25	1.72	0.46	-0.12	89.56
700.00	0.17	251.58	699.99	-0.84	-3.34	1.77	0.42	-0.40	-31.00
725.00	0.21	222.52	724.99	-0.89	-3.41	1.79	0.41	0.16	-116.24
750.00	0.30	208.48	749.99	-0.98	-3.47	1.77	0.44	0.36	-56.16
775.00	0.33	229.10	774.99	-1.09	-3.56	1.75	0.47	0.12	82.48
800.00	0.30	249.08	799.99	-1.16	-3.67	1.79	0.45	-0.12	79.92
825.00	0.24	248.02	824.99	-1.20	-3.78	1.83	0.24	-0.24	-4.24
850.00	0.16	242.24	849.99	-1.24	-3.86	1.87	0.33	-0.32	-23.12
875.00	0.17	231.94	874.99	-1.27	-3.92	1.88	0.13	0.04	-41.20
900.00	0.24	232.12	899.99	-1.33	-3.99	1.89	0.28	0.28	0.72
925.00	0.29	213.11	924.99	-1.41	-4.07	1.88	0.40	0.20	-76.04
950.00	0.29	237.67	949.99	-1.50	-4.16	1.89	0.49	0.00	98.24
975.00	0.27	248.13	974.99	-1.56	-4.27	1.92	0.22	-0.08	41.84
1,000.00	0.19	252.82	999.99	-1.59	-4.36	1.97	0.33	-0.32	18.76
1,025.00	0.13	213.55	1,024.99	-1.63	-4.42	1.98	0.49	-0.24	-157.08
1,050.00	0.19	185.73	1,049.99	-1.69	-4.44	1.95	0.39	0.24	-111.28
1,075.00	0.21	188.60	1,074.99	-1.78	-4.45	1.89	0.09	0.08	11.48
1,100.00	0.26	193.44	1,099.99	-1.88	-4.47	1.84	0.22	0.20	19.36
1,125.00	0.26	192.13	1,124.99	-1.99	-4.49	1.78	0.02	0.00	-5.24
1,150.00	0.13	207.87	1,149.99	-2.07	-4.52	1.74	0.56	-0.52	62.96
1,175.00	0.02	214.29	1,174.99	-2.10	-4.53	1.73	0.44	-0.44	25.68
1,200.00	0.13	122.99	1,199.99	-2.12	-4.51	1.70	0.53	0.44	-365.20
1,225.00	0.26	127.32	1,224.99	-2.17	-4.44	1.62	0.52	0.52	17.32
1,250.00	0.23	144.39	1,249.99	-2.24	-4.37	1.51	0.31	-0.12	68.28
1,275.00	0.28	160.79	1,274.99	-2.34	-4.32	1.41	0.35	0.20	65.60
1,300.00	0.21	163.98	1,299.98	-2.44	-4.29	1.31	0.29	-0.28	12.76

Survey Report



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Site:	Jicarilla 29-02-05 #3	MD Reference:	GL 7599' & RKB 15' @ 7614.00ft
Well:	Jicarilla 29-02-05 #3	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,325.00	0.13	165.35	1,324.98	-2.51	-4.27	1.25	0.32	-0.32	5.48
1,350.00	0.12	150.00	1,349.98	-2.56	-4.25	1.20	0.14	-0.04	-61.40
1,375.00	0.17	139.36	1,374.98	-2.62	-4.21	1.14	0.23	0.20	-42.56
1,400.00	0.25	143.83	1,399.98	-2.69	-4.15	1.04	0.33	0.32	17.88
1,425.00	0.25	174.67	1,424.98	-2.79	-4.12	0.95	0.53	0.00	123.36
1,450.00	0.25	198.28	1,449.98	-2.89	-4.13	0.88	0.41	0.00	94.44
1,475.00	0.14	206.29	1,474.98	-2.97	-4.16	0.85	0.45	-0.44	32.04
1,500.00	0.07	226.53	1,499.98	-3.01	-4.18	0.84	0.31	-0.28	80.96
1,525.00	0.06	216.55	1,524.98	-3.03	-4.20	0.84	0.06	-0.04	-39.92
1,550.00	0.13	213.63	1,549.98	-3.06	-4.22	0.83	0.28	0.28	-11.68
1,575.00	0.19	244.90	1,574.98	-3.11	-4.28	0.84	0.42	0.24	125.08
1,600.00	0.25	263.95	1,599.98	-3.13	-4.37	0.89	0.38	0.24	76.20
1,625.00	0.15	258.32	1,624.98	-3.14	-4.46	0.94	0.41	-0.40	-22.52
1,650.00	0.13	230.57	1,649.98	-3.17	-4.51	0.96	0.28	-0.08	-111.00
1,675.00	0.25	225.15	1,674.98	-3.22	-4.57	0.96	0.48	0.48	-21.68
1,700.00	0.36	252.36	1,699.98	-3.28	-4.68	1.00	0.72	0.44	108.84
1,725.00	0.47	274.20	1,724.98	-3.30	-4.86	1.11	0.76	0.44	87.36
1,750.00	0.41	281.48	1,749.98	-3.28	-5.05	1.27	0.33	-0.24	29.12
1,775.00	0.35	286.46	1,774.98	-3.24	-5.21	1.41	0.27	-0.24	19.92
1,800.00	0.35	276.79	1,799.98	-3.21	-5.36	1.54	0.24	0.00	-38.68
1,825.00	0.36	285.90	1,824.98	-3.17	-5.51	1.66	0.23	0.04	36.44
1,850.00	0.47	291.58	1,849.98	-3.12	-5.68	1.83	0.47	0.44	22.72
1,875.00	0.52	297.00	1,874.98	-3.03	-5.88	2.03	0.27	0.20	21.68
1,900.00	0.61	310.20	1,899.98	-2.89	-6.08	2.27	0.63	0.36	52.80
1,925.00	0.57	312.66	1,924.98	-2.72	-6.28	2.53	0.19	-0.16	9.84
1,950.00	0.53	314.90	1,949.97	-2.55	-6.45	2.77	0.18	-0.16	8.96
1,975.00	0.47	318.06	1,974.97	-2.40	-6.60	2.98	0.26	-0.24	12.64
2,000.00	0.49	312.81	1,999.97	-2.25	-6.75	3.19	0.19	0.08	-21.00
2,025.00	0.49	308.49	2,024.97	-2.11	-6.91	3.41	0.15	0.00	-17.28
2,050.00	0.50	305.41	2,049.97	-1.98	-7.08	3.62	0.11	0.04	-12.32
2,075.00	0.79	308.26	2,074.97	-1.81	-7.31	3.90	1.17	1.16	11.40
2,100.00	1.09	311.46	2,099.97	-1.54	-7.62	4.31	1.22	1.20	12.80
2,125.00	1.21	314.28	2,124.96	-1.20	-7.99	4.81	0.53	0.48	11.28
2,150.00	1.22	316.14	2,149.96	-0.83	-8.36	5.34	0.16	0.04	7.44
2,175.00	1.25	319.69	2,174.95	-0.43	-8.72	5.88	0.33	0.12	14.20
2,200.00	1.29	324.18	2,199.94	0.01	-9.06	6.43	0.43	0.16	17.96
2,225.00	1.36	331.99	2,224.94	0.50	-9.37	6.99	0.77	0.28	31.24
2,250.00	1.39	334.05	2,249.93	1.04	-9.64	7.56	0.23	0.12	8.24
2,275.00	1.32	339.20	2,274.92	1.58	-9.87	8.11	0.56	-0.28	20.60
2,300.00	1.37	340.82	2,299.92	2.13	-10.07	8.64	0.25	0.20	6.48
2,325.00	1.37	339.55	2,324.91	2.69	-10.28	9.18	0.12	0.00	-5.08
2,350.00	1.29	341.08	2,349.90	3.24	-10.47	9.70	0.35	-0.32	6.12
2,375.00	1.14	341.75	2,374.90	3.74	-10.64	10.18	0.60	-0.60	2.68

Survey Report



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Site:	Jicarilla 29-02-05 #3	MD Reference:	GL 7599' & RKB 15' @ 7614.00ft
Well:	Jicarilla 29-02-05 #3	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,400.00	1.12	339.53	2,399.89	4.20	-10.80	10.62	0.19	-0.08	-8.88
2,425.00	1.04	339.31	2,424.89	4.65	-10.97	11.05	0.32	-0.32	-0.88
2,450.00	1.08	338.14	2,449.88	5.08	-11.14	11.47	0.18	0.16	-4.68
2,475.00	1.00	339.98	2,474.88	5.50	-11.30	11.89	0.35	-0.32	7.36
2,500.00	0.96	336.63	2,499.87	5.90	-11.46	12.28	0.28	-0.16	-13.40
2,525.00	0.94	328.42	2,524.87	6.26	-11.65	12.67	0.55	-0.08	-32.84
2,550.00	0.85	323.39	2,549.87	6.59	-11.87	13.06	0.48	-0.36	-20.12
2,575.00	0.93	320.21	2,574.87	6.89	-12.11	13.44	0.38	0.32	-12.72
2,600.00	1.02	320.75	2,599.86	7.22	-12.38	13.86	0.36	0.36	2.16
2,625.00	1.06	318.28	2,624.86	7.57	-12.67	14.32	0.24	0.16	-9.88
2,650.00	1.18	315.50	2,649.85	7.92	-13.01	14.80	0.53	0.48	-11.12
2,675.00	1.21	316.85	2,674.85	8.30	-13.37	15.33	0.16	0.12	5.40
2,700.00	1.20	316.43	2,699.84	8.68	-13.73	15.85	0.05	-0.04	-1.68
2,725.00	1.30	315.36	2,724.84	9.07	-14.11	16.40	0.41	0.40	-4.28
2,750.00	1.30	315.40	2,749.83	9.48	-14.51	16.96	0.00	0.00	0.16
2,775.00	1.29	317.02	2,774.82	9.88	-14.90	17.53	0.15	-0.04	6.48
2,800.00	1.28	321.25	2,799.82	10.31	-15.26	18.09	0.38	-0.04	16.92
2,825.00	1.28	322.47	2,824.81	10.75	-15.61	18.64	0.11	0.00	4.88
2,850.00	1.36	324.93	2,849.80	11.21	-15.95	19.21	0.39	0.32	9.84
2,875.00	1.42	327.84	2,874.80	11.72	-16.28	19.80	0.37	0.24	11.64
2,900.00	1.39	332.90	2,899.79	12.25	-16.59	20.39	0.51	-0.12	20.24
2,925.00	1.40	336.48	2,924.78	12.80	-16.85	20.97	0.35	0.04	14.32
2,950.00	1.47	336.70	2,949.77	13.37	-17.10	21.55	0.28	0.28	0.88
2,975.00	1.49	337.83	2,974.77	13.97	-17.35	22.15	0.14	0.08	4.52
3,000.00	1.47	337.14	2,999.76	14.56	-17.59	22.74	0.11	-0.08	-2.76
3,025.00	1.50	339.38	3,024.75	15.17	-17.83	23.34	0.26	0.12	8.96
3,050.00	1.50	340.22	3,049.74	15.78	-18.06	23.93	0.09	0.00	3.36
3,075.00	1.47	338.24	3,074.73	16.39	-18.29	24.52	0.24	-0.12	-7.92
3,100.00	1.40	334.95	3,099.72	16.96	-18.54	25.10	0.43	-0.28	-13.16
3,125.00	1.27	333.12	3,124.72	17.48	-18.79	25.65	0.55	-0.52	-7.32
3,150.00	1.23	330.03	3,149.71	17.96	-19.05	26.17	0.31	-0.16	-12.36
3,175.00	1.27	324.87	3,174.71	18.42	-19.34	26.71	0.48	0.16	-20.64
3,200.00	1.26	325.44	3,199.70	18.88	-19.66	27.25	0.06	-0.04	2.28
3,225.00	1.35	325.60	3,224.69	19.35	-19.98	27.81	0.36	0.36	0.64
3,250.00	1.34	323.73	3,249.69	19.82	-20.32	28.39	0.18	-0.04	-7.48
3,275.00	1.41	317.23	3,274.68	20.29	-20.70	28.98	0.68	0.28	-26.00
3,300.00	1.48	313.24	3,299.67	20.73	-21.15	29.61	0.49	0.28	-15.96
3,325.00	1.49	309.13	3,324.66	21.16	-21.63	30.26	0.43	0.04	-16.44
3,350.00	1.45	307.20	3,349.65	21.55	-22.14	30.90	0.25	-0.16	-7.72
3,375.00	1.40	308.98	3,374.65	21.94	-22.63	31.51	0.27	-0.20	7.12
3,400.00	1.39	311.25	3,399.64	22.33	-23.09	32.12	0.22	-0.04	9.08
3,425.00	1.47	313.33	3,424.63	22.75	-23.55	32.74	0.38	0.32	8.32
3,450.00	1.56	314.30	3,449.62	23.21	-24.03	33.40	0.37	0.36	3.88
3,475.00	1.63	313.01	3,474.61	23.69	-24.53	34.10	0.31	0.28	-5.16

Survey Report



Company:	Black Hills Exploration & Prod.	Local Co-ordinate Reference:	Site Jicarilla 29-02-05 #3
Project:	Rio Arriba County, NM	TVD Reference:	GL 7599' & RKB 15' @ 7614.00ft
Site:	Jicarilla 29-02-05 #3	MD Reference:	GL 7599' & RKB 15' @ 7614.00ft
Well:	Jicarilla 29-02-05 #3	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
3,500.00	1.64	315.05	3,499.60	24.18	-25.05	34.81	0.24	0.04	8.16
3,525.00	1.74	316.65	3,524.59	24.71	-25.56	35.55	0.44	0.40	6.40
3,550.00	1.67	319.13	3,549.58	25.26	-26.06	36.29	0.41	-0.28	9.92
3,575.00	1.67	318.80	3,574.57	25.81	-26.55	37.02	0.27	0.00	-9.32
3,600.00	1.73	320.14	3,599.56	26.36	-27.04	37.76	0.46	0.24	13.36
3,625.00	1.72	319.33	3,624.55	26.94	-27.52	38.51	0.11	-0.04	-3.24
3,650.00	1.72	322.25	3,649.54	27.52	-28.00	39.26	0.35	0.00	11.68
3,675.00	1.72	326.05	3,674.53	28.12	-28.44	40.00	0.46	0.00	15.20
3,700.00	1.62	319.87	3,699.51	28.71	-28.87	40.72	0.82	-0.40	-24.72
3,715.43	1.72	321.69	3,714.94	29.05	-29.16	41.16	0.73	0.65	11.80
Last SDI Gyro Survey									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
3,715.43	3,714.94	29.05	-29.16	Last SDI Gyro Survey

Checked By: _____ Approved By: _____ Date: _____