

039-26866



Black Hills Exploration & Production

SEC 1-T29N-R3W
Jicarilla 29-03-01 #2

OH

OIL CONS. DIV DIST. 3

APR 23 2014

Design: OH

Standard Survey Report

18 December, 2013

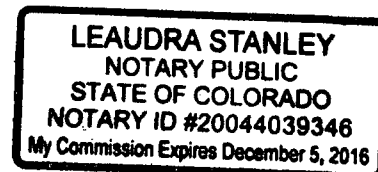
This survey is correct to the best of my knowledge and is supported by actual field data.

A handwritten signature of Leandra Stanley in black ink.

Notarized this date 18 of December, 2013.

A handwritten signature of Leandra Stanley in black ink.

Notary Signature
County of Mesa
State of Colorado

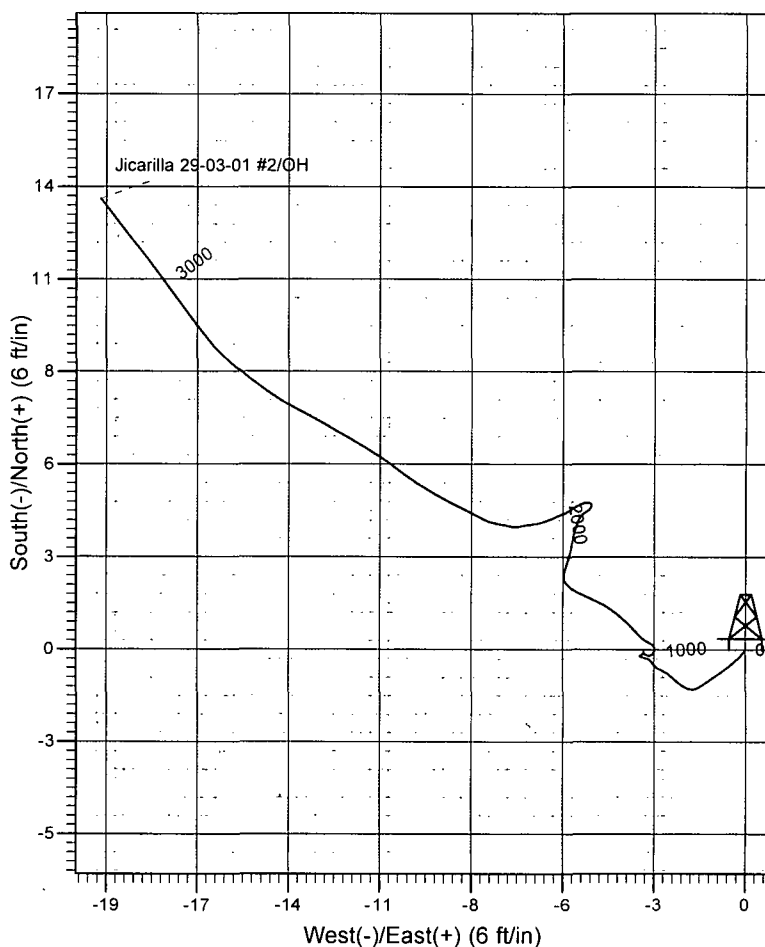
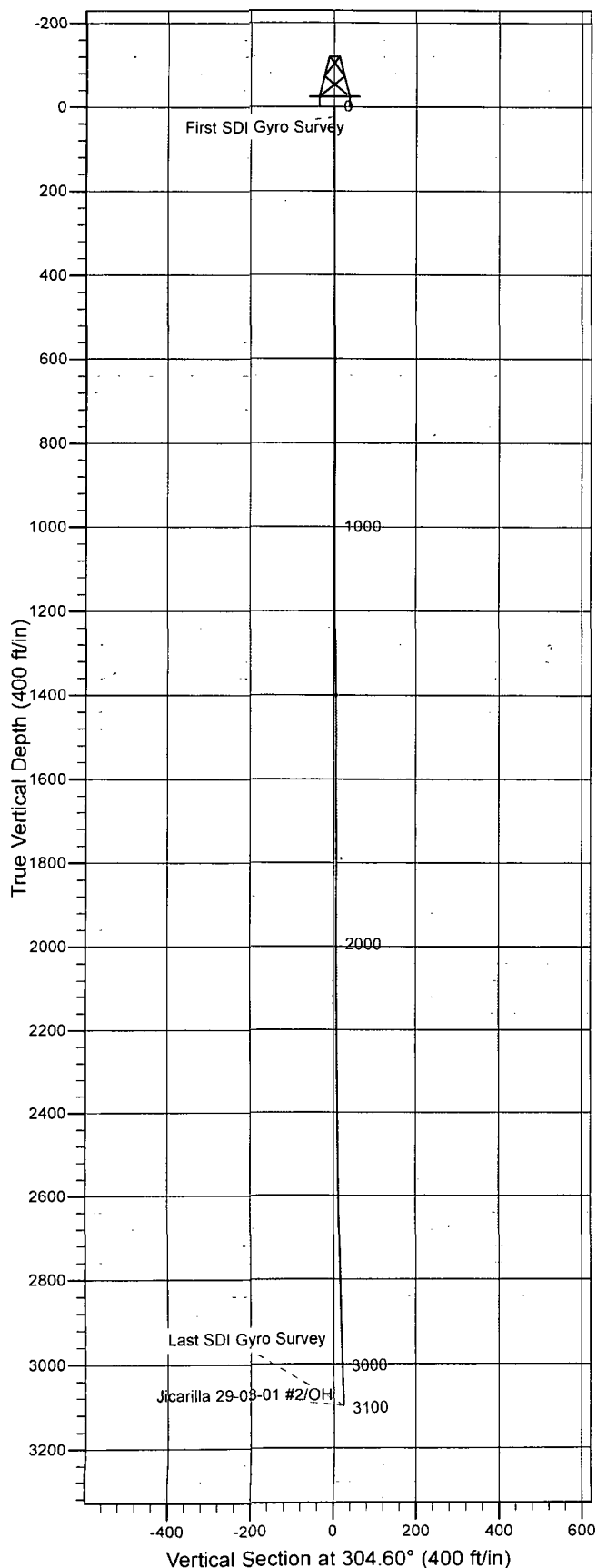


Scientific Drilling



Scientific Drilling

Company: Black Hills Exploration & Prod.
Project: Rio Arriba County, NM
Site: Jicarilla 29-03-01 #2
Well: Jicarilla 29-03-01 #2
Wellbore: OH
Design: OH



Well Details: Jicarilla 29-03-01 #2

+N/-S	+E/-W	North	East	Lat	Long	Slot
0.00	0.00	2095104.30	715901.97	36° 45' 19.944 N	107° 5' 46.824 W	

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Site Jicarilla 29-03-01 #2, True North
Vertical (TVD) Reference: GL 7321' & RKB 15' @ 7336.00ft
Section (VS) Reference: Slot - (0.00N, 0.00E)
Measured Depth Reference: GL 7321' & RKB 15' @ 7336.00ft
Calculation Method: Minimum Curvature

PROJECT DETAILS: Rio Arriba County, NM

Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico West 3003

System Datum: Mean Sea Level

Plan: OH

12:41, December 18 2013
Created By: Janie Collins

Survey Report



Company:	Black Hills Exploration & Prod.	Local Co-ordinate Reference:	Site Jicarilla 29-03-01 #2
Project:	Rio Arriba County, NM	TVD Reference:	GL 7321' & RKB 15' @ 7336.00ft
Site:	Jicarilla 29-03-01 #2	MD Reference:	GL 7321' & RKB 15' @ 7336.00ft
Well:	Jicarilla 29-03-01 #2	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 29-03-01 #2
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Site Position:		Northing:	2,095,104.30 usft	Latitude:	36° 45' 19.944 N
From:	Lat/Long	Easting:	715,901.97 usft	Longitude:	107° 5' 46.824 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.44 °

Well	Jicarilla 29-03-01 #2
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Well Position	+N/-S	0.00 ft	Northing:	2,095,104.30 usft	Latitude:	36° 45' 19.944 N
	+E/-W	0.00 ft	Easting:	715,901.97 usft	Longitude:	107° 5' 46.824 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	7,321.00 ft

Wellbore	OH
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	10/28/2013	9.37	63.55	50,525

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		304.60

Survey Program		Date 12/18/2013		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
25.00	3,100.00	Survey #1 - Gyro Survey (OH)	Standard Keeper 103	Standard Wireline Keeper ver 1.0.3

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	0.41	216.08	25.00	-0.07	-0.05	0.00	1.64	1.64	0.00
First SDI Gyro Survey									
50.00	0.58	224.54	50.00	-0.23	-0.19	0.03	0.74	0.68	33.84
75.00	0.55	231.99	75.00	-0.40	-0.38	0.08	0.32	-0.12	29.80
100.00	0.56	231.00	100.00	-0.55	-0.57	0.15	0.06	0.04	-3.96
125.00	0.56	234.75	125.00	-0.70	-0.76	0.23	0.15	0.00	15.00
150.00	0.50	238.91	149.99	-0.82	-0.95	0.32	0.28	-0.24	16.64
175.00	0.49	236.31	174.99	-0.94	-1.14	0.40	0.10	-0.04	-10.40
200.00	0.49	232.84	199.99	-1.06	-1.31	0.48	0.12	0.00	-13.88
225.00	0.31	246.24	224.99	-1.16	-1.46	0.54	0.81	-0.72	53.60

Survey Report



Company:	Black Hills Exploration & Prod.	Local Co-ordinate Reference:	Site Jicarilla 29-03-01 #2
Project:	Rio Arriba County, NM	TVD Reference:	GL 7321' & RKB 15' @ 7336.00ft
Site:	Jicarilla 29-03-01 #2	MD Reference:	GL 7321' & RKB 15' @ 7336.00ft
Well:	Jicarilla 29-03-01 #2	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	0.24	267.18	249.99	-1.18	-1.57	0.62	0.49	-0.28	83.76
275.00	0.19	276.85	274.99	-1.18	-1.67	0.70	0.25	-0.20	38.68
300.00	0.29	301.03	299.99	-1.15	-1.76	0.80	0.56	0.40	96.72
325.00	0.32	302.14	324.99	-1.08	-1.87	0.93	0.12	0.12	4.44
350.00	0.32	303.10	349.99	-1.00	-1.99	1.07	0.02	0.00	3.84
375.00	0.33	309.72	374.99	-0.92	-2.11	1.21	0.16	0.04	26.48
400.00	0.39	317.22	399.99	-0.81	-2.22	1.37	0.30	0.24	30.00
425.00	0.39	299.78	424.99	-0.70	-2.35	1.54	0.47	0.00	-69.76
450.00	0.41	297.99	449.99	-0.62	-2.50	1.71	0.09	0.08	-7.16
475.00	0.45	293.77	474.99	-0.54	-2.67	1.90	0.20	0.16	-16.88
500.00	0.46	340.36	499.99	-0.40	-2.80	2.07	1.44	0.04	186.36
525.00	0.33	288.58	524.99	-0.29	-2.90	2.22	1.46	-0.52	-207.12
550.00	0.28	288.91	549.99	-0.24	-3.02	2.35	0.20	-0.20	1.32
575.00	0.20	278.82	574.99	-0.22	-3.13	2.45	0.36	-0.32	-40.36
600.00	0.09	297.57	599.99	-0.20	-3.19	2.51	0.47	-0.44	75.00
625.00	0.08	92.60	624.99	-0.19	-3.19	2.51	0.66	-0.04	620.12
650.00	0.09	50.26	649.99	-0.18	-3.15	2.49	0.25	0.04	-169.36
675.00	0.14	49.82	674.99	-0.15	-3.11	2.48	0.20	0.20	-1.76
700.00	0.08	56.14	699.99	-0.12	-3.08	2.47	0.24	-0.24	25.28
725.00	0.11	18.40	724.99	-0.09	-3.05	2.47	0.27	0.12	-150.96
750.00	0.04	306.65	749.99	-0.06	-3.05	2.48	0.42	-0.28	-287.00
775.00	0.07	208.10	774.99	-0.07	-3.07	2.49	0.34	0.12	-394.20
800.00	0.06	184.30	799.99	-0.09	-3.08	2.48	0.11	-0.04	-95.20
825.00	0.09	131.82	824.99	-0.12	-3.06	2.45	0.29	0.12	-209.92
850.00	0.13	110.00	849.99	-0.14	-3.02	2.41	0.23	0.16	-87.28
875.00	0.17	117.41	874.99	-0.17	-2.96	2.34	0.18	0.16	29.64
900.00	0.21	82.94	899.99	-0.18	-2.88	2.27	0.48	0.16	-137.88
925.00	0.15	49.68	924.99	-0.15	-2.81	2.23	0.47	-0.24	-133.04
950.00	0.16	22.59	949.98	-0.10	-2.77	2.23	0.29	0.04	-108.36
975.00	0.16	35.65	974.98	-0.04	-2.74	2.23	0.15	0.00	52.24
1,000.00	0.11	354.77	999.98	0.01	-2.72	2.25	0.42	-0.20	-163.52
1,025.00	0.14	338.12	1,024.98	0.07	-2.74	2.29	0.19	0.12	-66.60
1,050.00	0.24	313.13	1,049.98	0.13	-2.79	2.37	0.51	0.40	-99.96
1,075.00	0.25	297.57	1,074.98	0.19	-2.87	2.47	0.27	0.04	-62.24
1,100.00	0.33	297.20	1,099.98	0.25	-2.99	2.60	0.32	0.32	-1.48
1,125.00	0.26	311.71	1,124.98	0.32	-3.09	2.73	0.41	-0.28	58.04
1,150.00	0.29	320.73	1,149.98	0.41	-3.17	2.84	0.21	0.12	36.08
1,175.00	0.37	305.54	1,174.98	0.50	-3.28	2.98	0.47	0.32	-60.76
1,200.00	0.40	323.92	1,199.98	0.62	-3.40	3.15	0.51	0.12	73.52
1,225.00	0.46	310.33	1,224.98	0.75	-3.52	3.33	0.47	0.24	-54.36
1,250.00	0.49	312.72	1,249.98	0.89	-3.68	3.54	0.14	0.12	9.56
1,275.00	0.54	308.28	1,274.98	1.04	-3.85	3.76	0.26	0.20	-17.76
1,300.00	0.60	304.48	1,299.98	1.18	-4.05	4.01	0.28	0.24	-15.20

Survey Report



Company:	Black Hills Exploration & Prod.	Local Co-ordinate Reference:	Site Jicarilla 29-03-01 #2
Project:	Rio Arriba County, NM	TVD Reference:	GL 7321' & RKB 15' @ 7336.00ft
Site:	Jicarilla 29-03-01 #2	MD Reference:	GL 7321' & RKB 15' @ 7336.00ft
Well:	Jicarilla 29-03-01 #2	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	0.53	299.05	1,324.98	1.32	-4.26	4.25	0.35	-0.28	-21.72
1,350.00	0.54	295.07	1,349.98	1.42	-4.47	4.48	0.15	0.04	-15.92
1,375.00	0.55	293.38	1,374.98	1.52	-4.68	4.72	0.08	0.04	-6.76
1,400.00	0.47	296.28	1,399.97	1.61	-4.89	4.94	0.34	-0.32	11.60
1,425.00	0.47	293.50	1,424.97	1.70	-5.07	5.14	0.09	0.00	-11.12
1,450.00	0.39	311.17	1,449.97	1.79	-5.23	5.32	0.62	-0.32	70.68
1,475.00	0.36	315.72	1,474.97	1.91	-5.35	5.49	0.17	-0.12	18.20
1,500.00	0.36	324.56	1,499.97	2.03	-5.45	5.64	0.22	0.00	35.36
1,525.00	0.46	8.37	1,524.97	2.19	-5.48	5.76	1.28	0.40	175.24
1,550.00	0.53	16.80	1,549.97	2.40	-5.43	5.84	0.40	0.28	33.72
1,575.00	0.50	17.86	1,574.97	2.62	-5.37	5.90	0.13	-0.12	4.24
1,600.00	0.58	16.99	1,599.97	2.84	-5.30	5.97	0.32	0.32	-3.48
1,625.00	0.55	9.89	1,624.97	3.08	-5.24	6.06	0.30	-0.12	-28.40
1,650.00	0.54	10.27	1,649.97	3.31	-5.20	6.16	0.04	-0.04	1.52
1,675.00	0.50	17.64	1,674.96	3.53	-5.14	6.24	0.31	-0.16	29.48
1,700.00	0.31	17.12	1,699.96	3.70	-5.09	6.29	0.76	-0.76	-2.08
1,725.00	0.22	23.30	1,724.96	3.81	-5.05	6.32	0.38	-0.36	24.72
1,750.00	0.23	28.22	1,749.96	3.90	-5.01	6.34	0.09	0.04	19.68
1,775.00	0.26	42.31	1,774.96	3.98	-4.95	6.33	0.27	0.12	56.36
1,800.00	0.19	56.18	1,799.96	4.05	-4.87	6.31	0.35	-0.28	55.48
1,825.00	0.26	61.37	1,824.96	4.10	-4.79	6.27	0.29	0.28	20.76
1,850.00	0.19	40.81	1,849.96	4.16	-4.71	6.24	0.42	-0.28	-82.24
1,875.00	0.14	38.07	1,874.96	4.21	-4.67	6.23	0.20	-0.20	-10.96
1,900.00	0.16	10.81	1,899.96	4.27	-4.64	6.25	0.29	0.08	-109.04
1,925.00	0.11	313.89	1,924.96	4.32	-4.65	6.28	0.54	-0.20	-227.68
1,950.00	0.14	279.87	1,949.96	4.35	-4.70	6.34	0.31	0.12	-136.08
1,975.00	0.18	282.18	1,974.96	4.36	-4.77	6.40	0.16	0.16	9.24
2,000.00	0.22	260.88	1,999.96	4.36	-4.85	6.47	0.33	0.16	-85.20
2,025.00	0.35	242.75	2,024.96	4.32	-4.97	6.54	0.63	0.52	-72.52
2,050.00	0.35	241.49	2,049.96	4.25	-5.10	6.61	0.03	0.00	-5.04
2,075.00	0.46	236.97	2,074.96	4.15	-5.25	6.68	0.46	0.44	-18.08
2,100.00	0.51	250.02	2,099.96	4.06	-5.44	6.79	0.48	0.20	52.20
2,125.00	0.49	245.76	2,124.96	3.98	-5.65	6.91	0.17	-0.08	-17.04
2,150.00	0.49	244.03	2,149.96	3.89	-5.84	7.01	0.06	0.00	-6.92
2,175.00	0.49	250.51	2,174.96	3.81	-6.04	7.13	0.22	0.00	25.92
2,200.00	0.53	258.77	2,199.96	3.75	-6.25	7.27	0.33	0.16	33.04
2,225.00	0.43	263.60	2,224.96	3.72	-6.46	7.42	0.43	-0.40	19.32
2,250.00	0.45	261.30	2,249.95	3.69	-6.65	7.57	0.11	0.08	-9.20
2,275.00	0.43	255.19	2,274.95	3.65	-6.83	7.70	0.20	-0.08	-24.44
2,300.00	0.46	281.44	2,299.95	3.65	-7.02	7.85	0.82	0.12	105.00
2,325.00	0.53	282.87	2,324.95	3.69	-7.23	8.05	0.28	0.28	5.72
2,350.00	0.65	278.14	2,349.95	3.74	-7.49	8.29	0.52	0.48	-18.92
2,375.00	0.66	290.52	2,374.95	3.81	-7.76	8.55	0.57	0.04	49.52

Survey Report



Company:	Black Hills Exploration & Prod.	Local Co-ordinate Reference:	Site Jicarilla 29-03-01 #2
Project:	Rio Arriba County, NM	TVD Reference:	GL 7321' & RKB 15' @ 7336.00ft
Site:	Jicarilla 29-03-01 #2	MD Reference:	GL 7321' & RKB 15' @ 7336.00ft
Well:	Jicarilla 29-03-01 #2	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	0.70	300.71	2,399.95	3.94	-8.03	8.85	0.51	0.16	40.76
2,425.00	0.73	294.04	2,424.95	4.08	-8.31	9.15	0.35	0.12	-26.68
2,450.00	0.82	295.88	2,449.94	4.22	-8.61	9.49	0.37	0.36	7.36
2,475.00	0.77	298.75	2,474.94	4.38	-8.92	9.83	0.26	-0.20	11.48
2,500.00	0.73	298.72	2,499.94	4.54	-9.21	10.16	0.16	-0.16	-0.12
2,525.00	0.80	299.06	2,524.94	4.70	-9.50	10.49	0.28	0.28	1.36
2,550.00	0.84	303.35	2,549.93	4.89	-9.81	10.85	0.29	0.16	17.16
2,575.00	0.83	300.95	2,574.93	5.08	-10.11	11.21	0.15	-0.04	-9.60
2,600.00	0.76	309.93	2,599.93	5.28	-10.40	11.56	0.57	-0.28	35.92
2,625.00	0.97	306.32	2,624.93	5.51	-10.69	11.93	0.87	0.84	-14.44
2,650.00	1.04	300.66	2,649.92	5.75	-11.06	12.37	0.49	0.28	-22.64
2,675.00	1.01	302.07	2,674.92	5.99	-11.44	12.82	0.16	-0.12	5.64
2,700.00	1.06	298.43	2,699.91	6.21	-11.83	13.27	0.33	0.20	-14.56
2,725.00	1.10	300.36	2,724.91	6.44	-12.24	13.74	0.22	0.16	7.72
2,750.00	1.13	298.64	2,749.90	6.68	-12.67	14.22	0.18	0.12	-6.88
2,775.00	1.09	298.37	2,774.90	6.91	-13.09	14.70	0.16	-0.16	-1.08
2,800.00	1.15	296.81	2,799.90	7.14	-13.52	15.19	0.27	0.24	-6.24
2,825.00	1.21	300.90	2,824.89	7.39	-13.97	15.70	0.41	0.24	16.36
2,850.00	1.30	305.29	2,849.88	7.69	-14.43	16.25	0.53	0.36	17.56
2,875.00	1.50	306.59	2,874.88	8.05	-14.93	16.86	0.81	0.80	5.20
2,900.00	1.70	310.51	2,899.87	8.48	-15.47	17.55	0.91	0.80	15.68
2,925.00	1.69	318.83	2,924.86	9.00	-16.00	18.28	0.98	-0.04	33.28
2,950.00	1.86	323.08	2,949.84	9.60	-16.48	19.02	0.86	0.68	17.00
2,975.00	1.96	322.24	2,974.83	10.27	-16.99	19.81	0.42	0.40	-3.36
3,000.00	1.97	324.16	2,999.82	10.95	-17.50	20.63	0.27	0.04	7.68
3,025.00	1.83	321.20	3,024.80	11.61	-18.00	21.41	0.68	-0.56	-11.84
3,050.00	1.79	320.61	3,049.79	12.22	-18.50	22.17	0.18	-0.16	-2.36
3,075.00	1.69	323.26	3,074.78	12.82	-18.97	22.90	0.51	-0.40	10.60
3,100.00	1.68	320.34	3,099.77	13.40	-19.42	23.60	0.35	-0.04	-11.68

Last SDI Gyro Survey

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
3,100.00	3,099.77	13.40	-19.42	Last SDI Gyro Survey

Checked By: _____ Approved By: _____ Date: _____