



**Scientific Drilling**

## **OXY USA RMAT**

**Garfield County, CO NAD27  
Cascade Creek 609-14 Pad  
CC 697-09-33A - Slot B**

**OH**

**Design: OH**

## **Standard Survey Report**

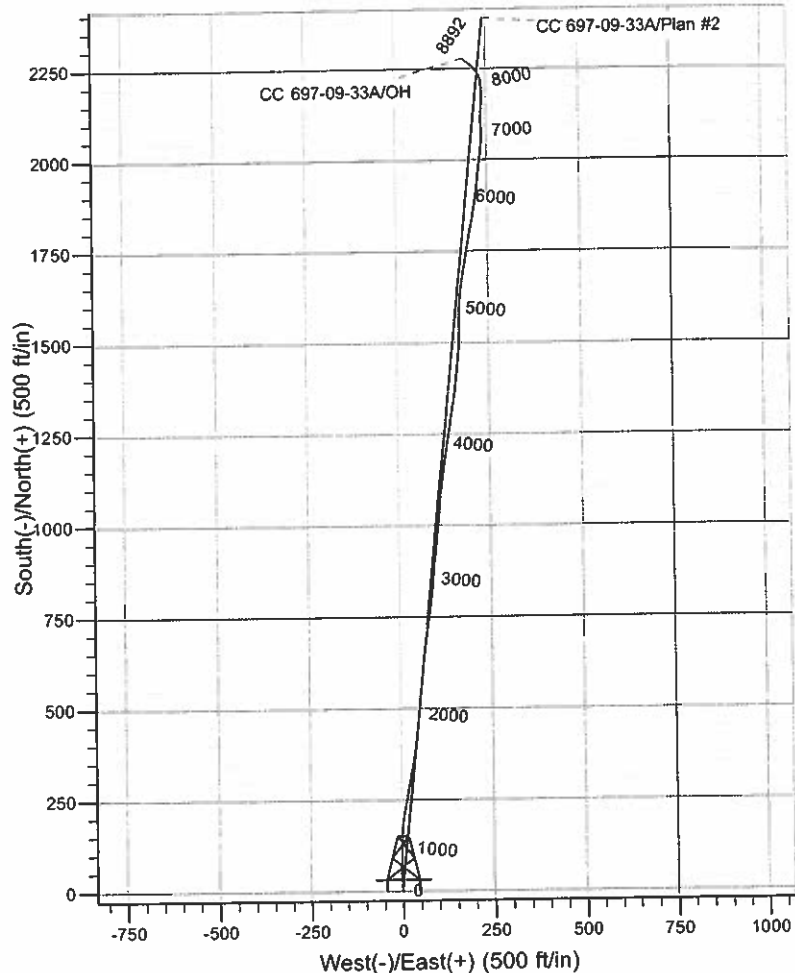
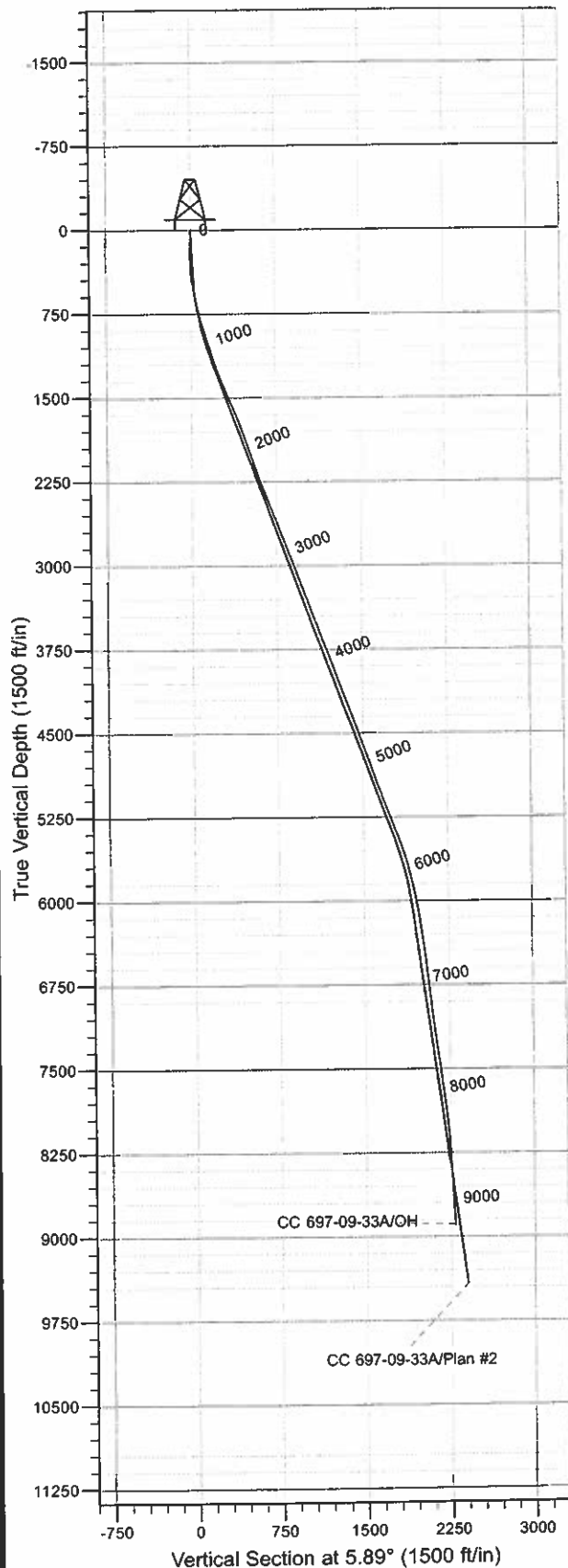
**12 October, 2010**





Scientific Drilling

Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-09-33A  
Wellbore: OH  
Design: OH



#### WELL DETAILS: CC 697-09-33A

Ground Level: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)		North	East	Lat	Long	
0.00	0.00	629772.75	1229353.65	39° 31' 50.603 N	108° 13' 57.130 W	B

#### REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-09-33A - Slot B, True North  
Vertical (TVD) Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Section (VS) Reference: Slot - B(0.00N, 0.00E)  
Measured Depth Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Calculation Method: Minimum Curvature  
Local North: True  
Location: Sec 9 T6S R97W

#### PROJECT DETAILS: Garfield County, CO NAD27

Geodetic System: US State Plane 1927 (Exact solution)  
Datum: NAD 1927 (NADCON CONUS)  
Ellipsoid: Clarke 1866  
Zone: Colorado Central 502

#### Design: OH (CC 697-09-33A/OH)

Created By: Julie Cruse Date: 2010-10-12



# Scientific Drilling Survey Report



<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-09-33A - Slot B
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8393' & RKB 30' @ 8423.00ft (H&P 330)
<b>Site:</b>	Cascade Creek 609-14 Pad	<b>MD Reference:</b>	GL 8393' & RKB 30' @ 8423.00ft (H&P 330)
<b>Well:</b>	CC 697-09-33A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies-R5000.1

<b>Project</b>	Garfield County, CO NAD27		
<b>Map System:</b>	US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b>	Colorado Central 502		

<b>Site</b>	Cascade Creek 609-14 Pad, Sec 9 T6S R97W		
<b>Site Position:</b>		<b>Northing:</b>	629,789.23 usft
<b>From:</b>	Map	<b>Easting:</b>	1,229,350.88 usft
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13.200 in
		<b>Latitude:</b>	39° 31' 50.765 N
		<b>Longitude:</b>	108° 13' 57.172 W
		<b>Grid Convergence:</b>	-1.72 °

<b>Well</b>	CC 697-09-33A - Slot B		
<b>Well Position</b>	+N/-S	0.00 ft	<b>Northing:</b> 629,772.75 usft
	+E/-W	0.00 ft	<b>Easting:</b> 1,229,353.65 usft
<b>Position Uncertainty</b>	0.00 ft	<b>Wellhead Elevation:</b>	ft
		<b>Latitude:</b>	39° 31' 50.603 N
		<b>Longitude:</b>	108° 13' 57.130 W
		<b>Ground Level:</b>	8,393.00 ft

<b>Wellbore</b>	OH
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<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	2009-12-08	10.66	65.76	52,371

Design	OH				
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		5.89

<b>Survey Program</b>	<b>Date</b>	2010-10-12			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
524.00	2,650.00	Survey #1 - Surface (OH)	MWD-SDI	MWD - Standard ISCWSA	
2,787.00	9,255.00	Survey #2 - Production (OH)	MWD-SDI	MWD - Standard ISCWSA	

<b>Survey</b>									
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
524.00	6.48	355.96	522.88	29.53	-2.09	29.16	1.24	1.24	0.00
<b>First SDI MWD Survey</b>									
616.00	9.11	357.28	614.03	41.98	-2.80	41.47	2.87	2.86	1.43
709.00	12.11	1.11	705.43	59.09	-2.96	58.48	3.31	3.23	4.12
801.00	15.66	2.14	794.72	81.16	-2.31	80.49	3.87	3.86	1.12
895.00	17.62	2.01	884.78	108.06	-1.33	107.35	2.09	2.09	-0.14
987.00	18.28	1.01	972.30	136.40	-0.59	135.62	0.79	0.72	-1.09
1,082.00	17.84	3.06	1,062.63	165.83	0.45	165.00	0.81	-0.46	2.16
1,176.00	18.11	8.19	1,152.04	194.67	3.30	193.98	1.71	0.29	5.46

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-09-33A - Slot B
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8393' & RKB 30' @ 8423.00ft (H&P 330)
<b>Site:</b>	Cascade Creek 609-14 Pad	<b>MD Reference:</b>	GL 8393' & RKB 30' @ 8423.00ft (H&P 330)
<b>Well:</b>	CC 697-09-33A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies-R5000.1

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)	
1,271.00	19.79	11.61	1,241.89	225.04	8.64	224.74	2.12	1.77	3.60	
1,365.00	22.07	11.00	1,329.69	257.97	15.21	258.16	2.44	2.43	-0.65	
1,460.00	22.77	9.33	1,417.50	293.63	21.60	294.29	1.00	0.74	-1.76	
1,555.00	24.71	9.94	1,504.46	331.33	28.01	332.45	2.06	2.04	0.64	
1,649.00	23.92	9.50	1,590.12	369.48	34.54	371.07	0.86	-0.84	-0.47	
1,744.00	21.54	7.92	1,677.74	405.75	40.13	407.73	2.59	-2.51	-1.66	
1,839.00	19.52	6.16	1,766.70	438.81	44.23	441.03	2.22	-2.13	-1.85	
1,934.00	18.64	4.67	1,856.48	469.72	47.17	472.08	1.06	-0.93	-1.57	
2,028.00	18.64	5.64	1,945.55	499.64	49.87	502.12	0.33	0.00	1.03	
2,123.00	19.08	6.96	2,035.45	530.16	53.24	532.83	0.65	0.46	1.39	
2,218.00	19.35	6.96	2,125.16	561.20	57.03	564.09	0.28	0.28	0.00	
2,312.00	20.14	5.11	2,213.63	592.78	60.36	595.84	1.07	0.84	-1.97	
2,407.00	21.46	5.11	2,302.44	626.38	63.37	629.57	1.39	1.39	0.00	
2,501.00	21.98	6.52	2,389.77	660.98	66.90	664.36	0.78	0.55	1.50	
2,596.00	21.90	7.48	2,477.89	696.21	71.22	699.84	0.39	-0.08	1.01	
2,650.00	21.98	8.01	2,527.98	716.20	73.94	720.01	0.40	0.15	0.98	
Last Survey in 14 3/4" Hole										
2,787.00	20.93	8.45	2,655.48	765.80	81.11	770.08	0.78	-0.77	0.32	
First Survey in 8 3/4" Hole										
2,882.00	22.07	6.60	2,743.87	800.31	85.65	804.88	1.40	1.20	-1.95	
2,977.00	20.31	5.64	2,832.44	834.45	89.33	839.21	1.89	-1.85	-1.01	
3,072.00	20.05	5.55	2,921.61	867.07	92.52	871.99	0.28	-0.27	-0.09	
3,166.00	20.93	6.43	3,009.66	899.79	95.96	904.89	0.99	0.94	0.94	
3,261.00	21.46	6.43	3,098.24	933.92	99.81	939.23	0.56	0.56	0.00	
3,356.00	21.19	5.73	3,186.73	968.27	103.47	973.78	0.39	-0.28	-0.74	
3,450.00	20.66	5.64	3,274.53	1,001.68	106.79	1,007.35	0.56	-0.56	-0.10	
3,545.00	20.22	5.20	3,363.55	1,034.71	109.93	1,040.53	0.49	-0.46	-0.46	
3,640.00	20.14	4.06	3,452.72	1,067.37	112.57	1,073.29	0.42	-0.08	-1.20	
3,735.00	21.37	6.87	3,541.56	1,100.87	115.80	1,106.94	1.67	1.29	2.96	
3,829.00	21.02	7.66	3,629.20	1,134.58	120.10	1,140.92	0.48	-0.37	0.84	
3,924.00	20.22	8.27	3,718.11	1,167.72	124.73	1,174.35	0.87	-0.84	0.64	
4,019.00	19.43	8.80	3,807.48	1,199.58	129.51	1,206.54	0.85	-0.83	0.56	
4,113.00	21.28	8.98	3,895.61	1,231.88	134.56	1,239.19	1.97	1.97	0.19	
4,208.00	20.58	9.42	3,984.34	1,265.38	139.99	1,273.07	0.76	-0.74	0.46	
4,303.00	20.31	9.24	4,073.35	1,298.13	145.37	1,306.19	0.29	-0.28	-0.19	
4,397.00	19.96	9.86	4,161.61	1,330.04	150.73	1,338.48	0.44	-0.37	0.66	
4,492.00	20.93	6.60	4,250.63	1,362.87	155.46	1,371.63	1.57	1.02	-3.43	
4,587.00	19.26	6.17	4,339.84	1,395.30	159.10	1,404.26	1.76	-1.76	-0.45	
4,682.00	20.22	5.11	4,429.26	1,427.23	162.24	1,436.35	1.08	1.01	-1.12	
4,776.00	19.43	5.64	4,517.68	1,458.97	165.23	1,468.23	0.86	-0.84	0.56	
4,871.00	20.58	3.53	4,606.95	1,491.36	167.81	1,500.71	1.43	1.21	-2.22	
4,966.00	19.43	1.68	4,696.22	1,523.83	169.30	1,533.16	1.38	-1.21	-1.95	
5,060.00	20.40	0.98	4,784.60	1,555.84	170.04	1,565.07	1.06	1.03	-0.74	



# Scientific Drilling Survey Report



Company: OXY USA RMAT  
Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-09-33A  
Wellbore: OH  
Design: OH

Local Co-ordinate Reference:  
TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Well CC 697-09-33A - Slot B  
GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
True  
Minimum Curvature  
Rockies-R5000.1

## 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)
5,155.00	19.08	0.28	4,874.01	1,587.92	170.40	1,597.02	1.41	-1.39	-0.74
5,250.00	20.40	4.76	4,963.43	1,619.95	171.85	1,629.03	2.11	1.39	4.72
5,345.00	21.37	9.42	5,052.20	1,653.53	176.05	1,662.86	2.02	1.02	4.91
5,439.00	21.02	9.24	5,139.84	1,687.06	181.56	1,696.79	0.38	-0.37	-0.19
5,534.00	20.75	9.86	5,228.60	1,720.46	187.18	1,730.59	0.37	-0.28	0.65
5,629.00	21.02	9.07	5,317.35	1,753.86	192.75	1,764.39	0.41	0.28	-0.83
5,723.00	20.40	10.03	5,405.28	1,786.65	198.26	1,797.56	0.75	-0.66	1.02
5,818.00	20.14	11.61	5,494.40	1,818.97	204.43	1,830.35	0.64	-0.27	1.66
5,913.00	17.23	9.77	5,584.38	1,848.86	210.12	1,860.67	3.13	-3.06	-1.94
6,007.00	15.30	9.33	5,674.61	1,874.82	214.49	1,886.94	2.06	-2.05	-0.47
6,102.00	13.37	8.27	5,766.65	1,898.06	218.10	1,910.43	2.05	-2.03	-1.12
6,197.00	12.93	7.48	5,859.16	1,919.47	221.06	1,932.03	0.50	-0.46	-0.83
6,292.00	11.78	5.90	5,951.96	1,939.66	223.45	1,952.35	1.26	-1.21	-1.66
6,386.00	10.46	5.02	6,044.19	1,957.70	225.18	1,970.48	1.42	-1.40	-0.94
6,481.00	8.97	7.57	6,137.83	1,973.63	226.91	1,986.50	1.63	-1.57	2.68
6,576.00	9.06	8.01	6,231.66	1,988.38	228.93	2,001.38	0.12	0.09	0.46
6,671.00	8.00	4.67	6,325.60	2,002.38	230.51	2,015.46	1.23	-1.12	-3.52
6,765.00	7.39	6.25	6,418.76	2,014.91	231.70	2,028.05	0.69	-0.65	1.68
6,860.00	6.95	6.43	6,513.01	2,026.69	233.01	2,039.91	0.46	-0.46	0.19
6,955.00	6.95	7.48	6,607.32	2,038.10	234.40	2,051.40	0.13	0.00	1.11
7,050.00	6.86	4.14	6,701.63	2,049.46	235.56	2,062.82	0.43	-0.09	-3.52
7,144.00	6.95	2.03	6,794.95	2,060.74	236.16	2,074.10	0.29	0.10	-2.24
7,239.00	6.86	0.54	6,889.26	2,072.16	236.42	2,085.48	0.21	-0.09	-1.57
7,334.00	6.68	358.08	6,983.59	2,083.36	236.29	2,096.61	0.36	-0.19	-2.59
7,429.00	6.77	355.09	7,077.94	2,094.46	235.62	2,107.58	0.38	0.09	-3.15
7,523.00	7.65	357.46	7,171.20	2,106.23	234.87	2,119.21	0.99	0.94	2.52
7,618.00	7.91	3.27	7,265.32	2,119.07	234.97	2,132.00	0.87	0.27	6.12
7,713.00	7.74	1.77	7,359.44	2,131.99	235.54	2,144.91	0.28	-0.18	-1.58
7,807.00	8.71	5.11	7,452.47	2,145.41	236.36	2,158.34	1.15	1.03	3.55
7,902.00	8.35	3.88	7,546.42	2,159.46	237.47	2,172.43	0.42	-0.38	-1.29
7,997.00	7.21	355.44	7,640.55	2,172.28	237.47	2,185.18	1.70	-1.20	-8.88
8,091.00	7.65	0.54	7,733.76	2,184.42	237.06	2,197.21	0.84	0.47	5.43
8,186.00	7.56	357.02	7,827.92	2,196.98	236.79	2,209.68	0.50	-0.09	-3.71
8,281.00	6.86	355.62	7,922.17	2,208.88	236.03	2,221.44	0.76	-0.74	-1.47
8,376.00	5.36	348.06	8,016.63	2,218.88	234.68	2,231.25	1.79	-1.58	-7.96
8,471.00	4.92	340.15	8,111.25	2,227.05	232.38	2,239.14	0.88	-0.46	-8.33
8,565.00	4.48	331.80	8,204.94	2,234.08	229.28	2,245.81	0.86	-0.47	-8.88
8,660.00	4.66	324.24	8,299.63	2,240.48	225.27	2,251.77	0.66	0.19	-7.96
8,755.00	5.01	320.29	8,394.30	2,246.80	220.36	2,257.55	0.51	0.37	-4.16
8,850.00	4.92	317.65	8,488.94	2,253.00	214.97	2,263.17	0.26	-0.09	-2.78
8,944.00	5.01	312.64	8,582.59	2,258.76	209.23	2,268.31	0.47	0.10	-5.33
9,039.00	5.45	309.39	8,677.19	2,264.44	202.69	2,273.28	0.56	0.46	-3.42
9,133.00	5.72	307.98	8,770.75	2,270.15	195.55	2,278.23	0.32	0.29	-1.50
9,197.00	5.54	304.20	8,834.44	2,273.85	190.48	2,281.39	0.64	-0.28	-5.91



**Company:** OXY USA RMAT  
**Project:** Garfield County, CO NAD27  
**Site:** Cascade Creek 609-14 Pad  
**Well:** CC 697-09-33A  
**Wellbore:** OH  
**Design:** OH

**Local Co-ordinate Reference:**  
**TVD Reference:**  
**MD Reference:**  
**North Reference:**  
**Survey Calculation Method:**  
**Database:**

Well CC 697-09-33A - Slot B  
 GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
 GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
 True  
 Minimum Curvature  
 Rockies-R5000.1

## 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)
<b>Last SDI MWD Survey</b>									
9,255.00	5.54	304.20	8,892.17	2,277.00	185.85	2,284.05	0.00	0.00	0.00
Projection to TD - BHL = 632043.13 ft N, 1229607.90 ft E									

## Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
524.00	522.88	29.53	-2.09	First SDI MWD Survey
2,650.00	2,527.98	716.20	73.94	Last Survey in 14 3/4" Hole
2,787.00	2,655.48	765.80	81.11	First Survey in 8 3/4" Hole
9,197.00	8,834.44	2,273.85	190.48	Last SDI MWD Survey
9,255.00	8,892.17	2,277.00	185.85	Projection to TD
9,255.00	8,892.17	2,277.00	185.85	BHL = 632043.13 ft N, 1229607.90 ft E

Checked By: \_\_\_\_\_

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_