



**Scientific Drilling**

## **OXY USA RMAT**

**Garfield County, CO NAD27  
Cascade Creek 609-14 Pad  
CC 697-17-14 - Slot S**

**OH**

**Design: OH**

## **Standard Survey Report**

**03 August, 2010**

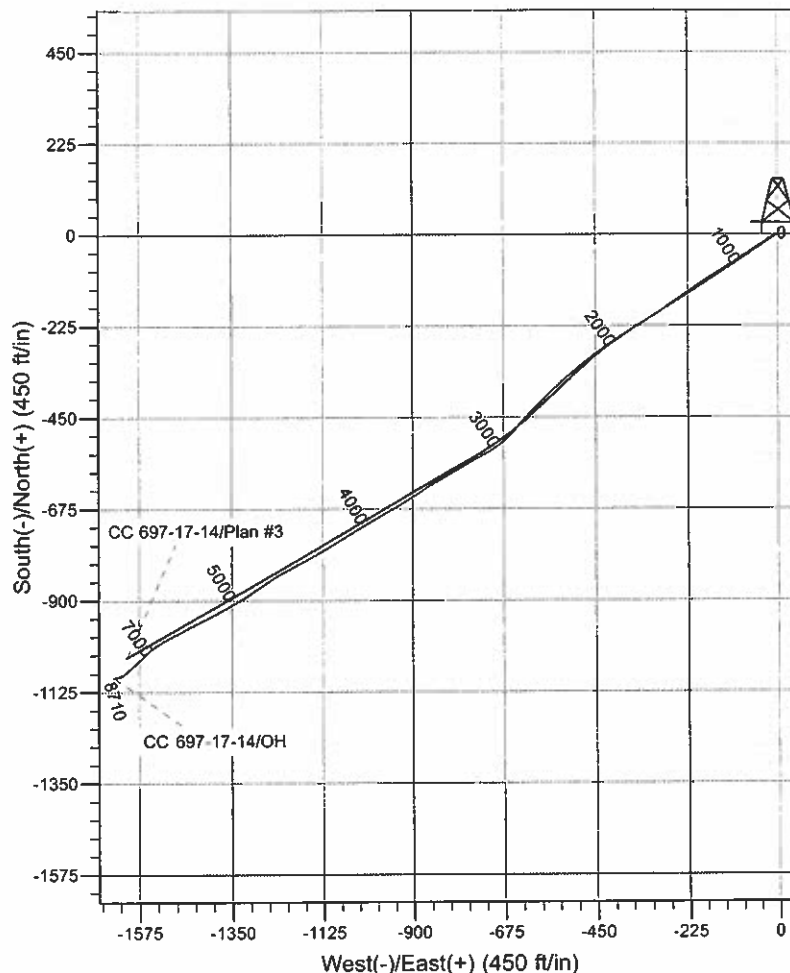
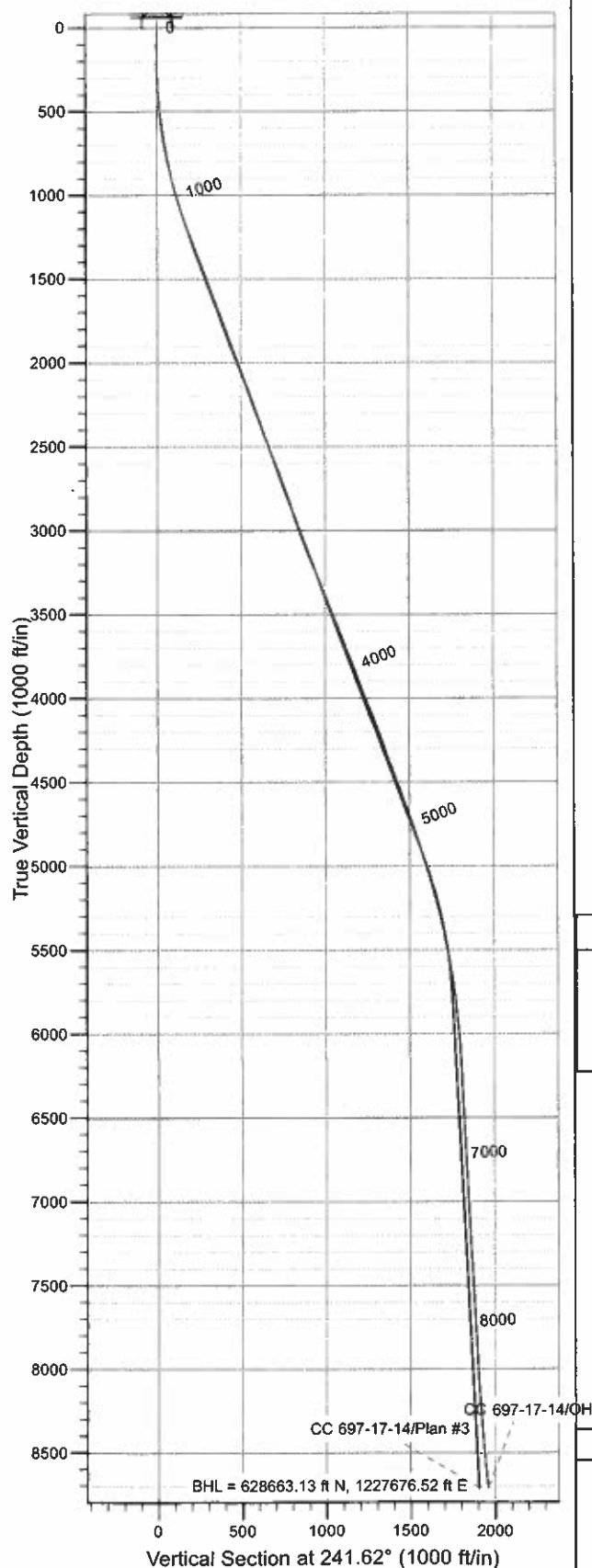




Scientific Drilling

Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-17-14  
Wellbore: OH  
Design: OH

OXY USA RMAT



WELL DETAILS: CC 697-17-14

Ground Level: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)						
North	East	Lat	Long			
0.00	0.00	629705.02	1229344.01	39° 31' 49.931 N	108° 13' 57.227 W	S

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-17-14 - Slot S, True North  
Vertical (TVD) Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Section (VS) Reference: Slot - S(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 697-17-14/OH)

Created By: Julie Cruse Date: 2010-08-03



SDI  
Survey Report



Company: OXY USA RMAT  
Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-17-14  
Wellbore: OH  
Design: OH

Local Co-ordinate Reference: Well CC 697-17-14 - Slot S  
TVD Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
MD Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
North Reference: True  
Survey Calculation Method: Minimum Curvature  
Database: Rockies-R5000.1

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

Site: Cascade Creek 609-14 Pad, Sec 9 T6S R97W

Site Position: Northing: 629,789.23 usft Latitude: 39° 31' 50.765 N  
From: Map Easting: 1,229,350.88 usft Longitude: 108° 13' 57.172 W  
Position Uncertainty: 0.00 ft Slot Radius: 13.200 in Grid Convergence: -1.72 °

Well: CC 697-17-14 - Slot S  
Well Position: +N/-S 0.00 ft Northing: 629,705.02 usft Latitude: 39° 31' 49.931 N  
+E/-W 0.00 ft Easting: 1,229,344.01 usft Longitude: 108° 13' 57.227 W  
Position Uncertainty: 0.00 ft Wellhead Elevation: ft Ground Level: 8,393.00 ft

Wellbore: OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2009-12-08	10.63	65.77	52,399

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 0.00 241.62

Survey Program Date: 2010-08-03

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
92.00	737.00	Survey #1 - Surface Gyro (OH)	Standard Keeper 103	Standard Wireline Keeper ver 1.0.3
804.00	2,883.00	Survey #2 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA
2,977.00	9,020.00	Survey #3 - Production (OH)	MWD-SDI	MWD - Standard ISCWSA

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Buird 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
92.00	0.73	53.22	92.00	0.35	0.47	-0.58	0.79	0.79	0.00
122.00	0.31	86.93	122.00	0.47	0.70	-0.84	1.67	-1.40	112.37
153.00	0.24	188.66	153.00	0.41	0.78	-0.88	1.38	-0.23	328.16
184.00	0.76	224.00	183.99	0.20	0.62	-0.64	1.87	1.68	114.00
215.00	0.94	234.35	214.99	-0.10	0.28	-0.20	0.76	0.58	33.39
245.00	1.18	237.51	244.99	-0.41	-0.19	0.36	0.82	0.80	10.53
276.00	1.56	242.42	275.98	-0.77	-0.83	1.10	1.28	1.23	15.84
307.00	2.79	249.26	306.95	-1.24	-1.91	2.27	4.05	3.97	22.06



SDI  
Survey Report



Company: OXY USA RMAT  
Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-17-14  
Wellbore: OH  
Design: OH

Local Co-ordinate Reference: Well CC 697-17-14 - Slot S  
TVD Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
MD Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
North Reference: True  
Survey Calculation Method: Minimum Curvature  
Database: 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)
338.00	3.42	247.78	337.91	-1.85	-3.47	3.93	2.05	2.03	-4.77
368.00	4.09	251.20	367.84	-2.54	-5.31	5.88	2.35	2.23	11.40
399.00	4.73	244.74	398.75	-3.44	-7.51	8.24	2.61	2.06	-20.84
430.00	4.89	242.09	429.64	-4.60	-9.84	10.84	0.88	0.52	-8.55
461.00	5.45	238.80	460.52	-5.98	-12.26	13.63	2.04	1.81	-10.61
491.00	5.95	240.88	490.37	-7.48	-14.84	16.61	1.80	1.67	6.93
522.00	7.03	238.78	521.17	-9.24	-17.87	20.11	3.57	3.48	-6.77
553.00	7.75	234.26	551.91	-11.45	-21.19	24.08	2.98	2.32	-14.58
645.00	8.86	236.65	642.95	-18.97	-32.14	37.29	1.26	1.21	2.60
737.00	10.25	237.85	733.67	-27.22	-44.99	52.52	1.53	1.51	1.30
Last Gyro Survey									
804.00	11.04	237.60	799.51	-33.83	-55.45	64.87	1.18	1.18	-0.37
First SDI MWD Survey									
897.00	12.99	236.34	890.47	-44.39	-71.67	84.16	2.12	2.10	-1.35
990.00	15.44	238.95	980.62	-56.57	-90.98	106.94	2.72	2.63	2.81
1,084.00	17.76	237.05	1,070.70	-70.83	-113.73	133.73	2.53	2.47	-2.02
1,179.00	19.36	238.88	1,160.75	-86.85	-139.37	163.90	1.79	1.68	1.93
1,274.00	19.87	237.81	1,250.24	-103.59	-166.52	195.74	0.66	0.54	-1.13
1,368.00	19.48	236.12	1,338.75	-120.83	-193.05	227.28	0.73	-0.41	-1.80
1,463.00	20.03	234.73	1,428.16	-139.06	-219.48	259.20	0.76	0.58	-1.46
1,557.00	21.32	235.08	1,516.11	-158.14	-246.64	292.16	1.38	1.37	0.37
1,652.00	21.32	234.50	1,604.61	-178.05	-274.86	326.46	0.22	0.00	-0.61
1,747.00	19.94	236.85	1,693.51	-196.94	-302.48	359.74	1.69	-1.45	2.47
1,841.00	20.09	237.32	1,781.84	-214.42	-329.49	391.81	0.23	0.16	0.50
1,936.00	21.79	238.17	1,870.56	-232.53	-358.21	425.69	1.82	1.79	0.89
2,031.00	20.91	236.64	1,959.04	-251.15	-387.35	460.18	1.10	-0.93	-1.61
2,126.00	22.39	235.62	2,047.33	-270.69	-416.44	495.06	1.61	1.56	-1.07
2,220.00	20.03	232.65	2,134.96	-290.57	-444.02	528.77	2.76	-2.51	-3.16
2,315.00	19.82	231.27	2,224.28	-310.52	-469.52	560.69	0.54	-0.22	-1.45
2,410.00	21.55	231.42	2,313.15	-331.48	-495.72	593.71	1.82	1.82	0.16
2,504.00	20.92	227.18	2,400.77	-353.65	-521.53	626.95	1.77	-0.67	-4.51
2,599.00	22.10	228.60	2,489.15	-377.00	-547.38	660.79	1.36	1.24	1.49
2,694.00	22.41	224.84	2,577.08	-401.66	-573.55	695.54	1.53	0.33	-3.96
2,788.00	22.73	223.49	2,663.88	-427.54	-598.68	729.96	0.65	0.34	-1.44
2,883.00	20.85	222.83	2,752.09	-453.26	-622.81	763.41	2.00	-1.98	-0.69
Last Survey in 14 3/4" Hole									
2,977.00	17.76	218.62	2,840.80	-476.73	-643.14	792.45	3.60	-3.29	-4.48
First Survey in 8 3/4" Hole									
3,072.00	19.49	226.12	2,930.83	-499.04	-663.61	821.07	3.11	1.82	7.89
3,167.00	19.52	233.47	3,020.40	-519.48	-687.79	852.06	2.58	0.03	7.74
3,261.00	21.54	241.38	3,108.44	-537.10	-715.56	884.87	3.65	2.15	8.41
3,356.00	22.69	240.77	3,196.45	-554.40	-746.86	920.63	1.23	1.21	-0.64
3,451.00	23.04	239.27	3,283.98	-572.85	-778.83	957.52	0.72	0.37	-1.58
3,546.00	22.07	239.54	3,371.72	-591.39	-810.20	993.94	1.03	-1.02	0.28

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**Local Co-ordinate Reference:** Well CC 697-17-14 - Slot S  
**TVD Reference:** GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
**MD Reference:** GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** 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)
3,640.00	21.46	239.45	3,459.02	-609.09	-840.23	1,028.77	0.65	-0.65	-0.10
3,735.00	21.98	236.90	3,547.27	-627.63	-870.09	1,063.85	1.13	0.55	-2.68
3,830.00	20.93	238.04	3,635.69	-646.32	-899.38	1,098.51	1.19	-1.11	1.20
3,924.00	21.81	238.48	3,723.22	-664.34	-928.51	1,132.70	0.95	0.94	0.47
4,019.00	21.19	241.38	3,811.62	-681.79	-958.63	1,167.49	1.30	-0.65	3.05
4,114.00	20.14	240.85	3,900.50	-697.98	-987.98	1,201.02	1.12	-1.11	-0.56
4,209.00	20.84	238.83	3,989.49	-714.69	-1,016.73	1,234.25	1.05	0.74	-2.13
4,303.00	22.16	240.33	4,076.95	-732.12	-1,046.44	1,268.68	1.52	1.40	1.60
4,398.00	21.02	238.31	4,165.29	-749.94	-1,076.51	1,303.60	1.43	-1.20	-2.13
4,493.00	19.43	238.92	4,254.43	-767.05	-1,104.54	1,336.39	1.69	-1.67	0.64
4,588.00	19.79	241.03	4,343.92	-783.00	-1,132.14	1,368.26	0.84	0.38	2.22
4,682.00	21.46	241.47	4,431.89	-798.92	-1,161.17	1,401.37	1.78	1.78	0.47
4,777.00	20.31	241.91	4,520.65	-814.98	-1,190.99	1,435.24	1.22	-1.21	0.46
4,872.00	19.87	242.08	4,609.87	-830.31	-1,219.80	1,467.87	0.47	-0.46	0.18
4,966.00	20.40	237.34	4,698.13	-846.63	-1,247.71	1,500.18	1.82	0.56	-5.04
5,061.00	18.55	235.23	4,787.69	-864.18	-1,274.06	1,531.71	2.08	-1.95	-2.22
5,156.00	17.15	236.02	4,878.11	-880.63	-1,298.09	1,560.67	1.50	-1.47	0.83
5,250.00	17.76	237.34	4,967.78	-896.11	-1,321.65	1,588.76	0.77	0.65	1.40
5,345.00	16.36	240.33	5,058.60	-910.55	-1,345.48	1,616.59	1.74	-1.47	3.15
5,440.00	16.00	241.73	5,149.84	-923.38	-1,368.63	1,643.06	0.56	-0.38	1.47
5,534.00	14.77	240.33	5,240.47	-935.45	-1,390.46	1,667.99	1.37	-1.31	-1.49
5,629.00	12.40	244.63	5,332.81	-945.81	-1,410.20	1,690.29	2.71	-2.49	4.53
5,724.00	11.43	241.03	5,425.76	-954.74	-1,427.65	1,709.89	1.29	-1.02	-3.79
5,819.00	10.02	243.40	5,519.10	-963.00	-1,443.28	1,727.56	1.55	-1.48	2.49
5,913.00	9.15	242.96	5,611.79	-970.06	-1,457.25	1,743.21	0.93	-0.93	-0.47
6,008.00	8.71	239.36	5,705.64	-977.16	-1,470.16	1,757.95	0.75	-0.46	-3.79
6,103.00	7.91	245.51	5,799.64	-983.54	-1,482.30	1,771.66	1.26	-0.84	6.47
6,198.00	5.89	242.35	5,893.95	-988.51	-1,492.57	1,783.05	2.16	-2.13	-3.33
6,292.00	4.31	238.31	5,987.57	-992.60	-1,499.85	1,791.40	1.72	-1.68	-4.30
6,387.00	3.78	238.83	6,082.34	-996.10	-1,505.56	1,798.09	0.56	-0.56	0.55
6,482.00	2.29	249.82	6,177.20	-998.38	-1,510.02	1,803.10	1.68	-1.57	11.57
6,576.00	2.46	243.32	6,271.12	-999.93	-1,513.59	1,806.98	0.34	0.18	-6.91
6,671.00	3.08	236.90	6,366.01	-1,002.24	-1,517.55	1,811.56	0.73	0.65	-6.76
6,766.00	3.08	238.48	6,460.87	-1,004.97	-1,521.86	1,816.65	0.09	0.00	1.66
6,860.00	3.17	236.11	6,554.73	-1,007.74	-1,526.17	1,821.76	0.17	0.10	-2.52
6,955.00	3.08	234.79	6,649.59	-1,010.67	-1,530.44	1,826.91	0.12	-0.09	-1.39
7,050.00	3.25	234.09	6,744.45	-1,013.72	-1,534.71	1,832.11	0.18	0.18	-0.74
7,145.00	2.90	237.08	6,839.31	-1,016.61	-1,538.90	1,837.18	0.41	-0.37	3.15
7,240.00	3.08	231.36	6,934.18	-1,019.51	-1,542.91	1,842.08	0.37	0.19	-6.02
7,334.00	3.25	234.26	7,028.04	-1,022.64	-1,547.05	1,847.21	0.25	0.18	3.09
7,429.00	2.90	219.41	7,122.90	-1,026.07	-1,550.76	1,852.11	0.91	-0.37	-15.63
7,524.00	3.25	229.60	7,217.76	-1,029.67	-1,554.34	1,856.97	0.68	0.37	10.73
7,619.00	3.25	229.78	7,312.61	-1,033.16	-1,558.44	1,862.23	0.01	0.00	0.19

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**MD Reference:** GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** Rockies-R5000.1

**Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Bulld Rate (°/100ft)	Turn Rate (°/100ft)
7,713.00	3.69	221.78	7,406.44	-1,037.13	-1,562.49	1,867.69	0.69	0.47	-8.51
7,808.00	3.78	220.73	7,501.24	-1,041.79	-1,566.57	1,873.49	0.12	0.09	-1.11
7,903.00	3.52	227.41	7,596.05	-1,046.13	-1,570.77	1,879.24	0.52	-0.27	7.03
7,997.00	3.25	224.77	7,689.88	-1,049.98	-1,574.77	1,884.59	0.33	-0.29	-2.81
8,092.00	3.25	228.81	7,784.73	-1,053.66	-1,578.69	1,889.79	0.24	0.00	4.25
8,187.00	3.08	231.10	7,879.58	-1,057.04	-1,582.70	1,894.93	0.22	-0.18	2.41
8,282.00	3.17	229.60	7,974.44	-1,060.34	-1,586.69	1,900.01	0.13	0.09	-1.58
8,376.00	3.43	225.91	8,068.29	-1,063.99	-1,590.69	1,905.26	0.36	0.28	-3.93
8,471.00	3.96	226.70	8,163.09	-1,068.21	-1,595.12	1,911.16	0.56	0.56	0.83
8,566.00	4.40	227.93	8,257.84	-1,072.90	-1,600.21	1,917.87	0.47	0.46	1.29
8,661.00	4.31	227.06	8,352.56	-1,077.78	-1,605.53	1,924.87	0.12	-0.09	-0.92
8,755.00	4.84	230.13	8,446.26	-1,082.73	-1,611.16	1,932.17	0.62	0.56	3.27
8,850.00	5.63	252.98	8,540.88	-1,086.66	-1,618.69	1,940.67	2.33	0.83	24.05
8,945.00	5.98	253.86	8,635.39	-1,089.40	-1,627.90	1,950.08	0.38	0.37	0.93
<b>Last SDI MWD Survey</b>									
9,020.00	5.98	253.86	8,709.98	-1,091.57	-1,635.40	1,957.71	0.00	0.00	0.00

Projection to TD - BHL = 628663.13 ft N, 1227676.52 ft E

**Design Targets**
**Target Name**

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N-S (ft)	+E-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- Shape									
CC 697-17-14 8°	-3.00	240.06	7,876.00	-1,018.84	-1,566.67	628,733.77	1,227,747.41	39° 31' 39.860 N	108° 14' 17.221 W
- actual wellpath misses target center by 41.21ft at 8181.39ft MD (7873.98 TVD, -1056.85 N, -1582.47 E)									
- Circle (radius 50.00)									

**Design Annotations**

Measured Depth (ft)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Comment
2,883.00	2,752.09	-453.26	-622.81	Last Survey in 14 3/4" Hole
2,977.00	2,840.80	-476.73	-643.14	First Survey in 8 3/4" Hole
8,945.00	8,635.39	-1,089.40	-1,627.90	Last SDI MWD Survey
9,020.00	8,709.98	-1,091.57	-1,635.40	Projection to TD
9,020.00	8,709.98	-1,091.57	-1,635.40	BHL = 628663.13 ft N, 1227676.52 ft E

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

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

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