



**Scientific Drilling**  
Rocky Mountain Operations

## **OXY USA RMAT**

Garfield County, CO NAD27  
Cascade Creek 609-14 Pad  
CC 697-17-08A - Slot P  
OH

Design: OH

## **Standard Survey Report**

30 June, 2010

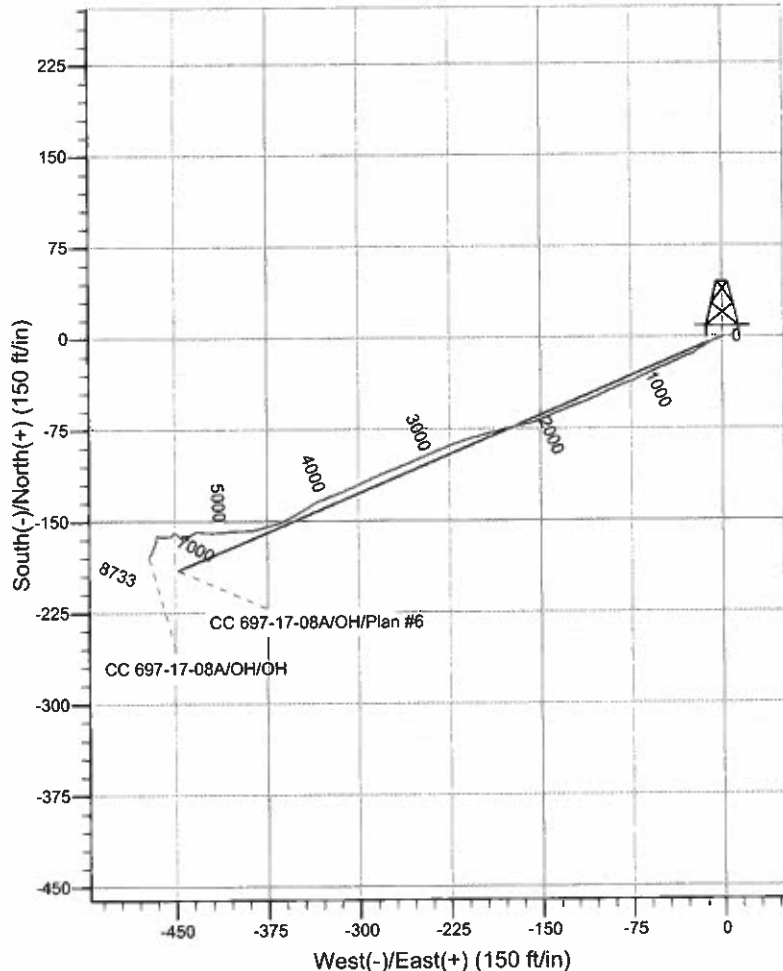
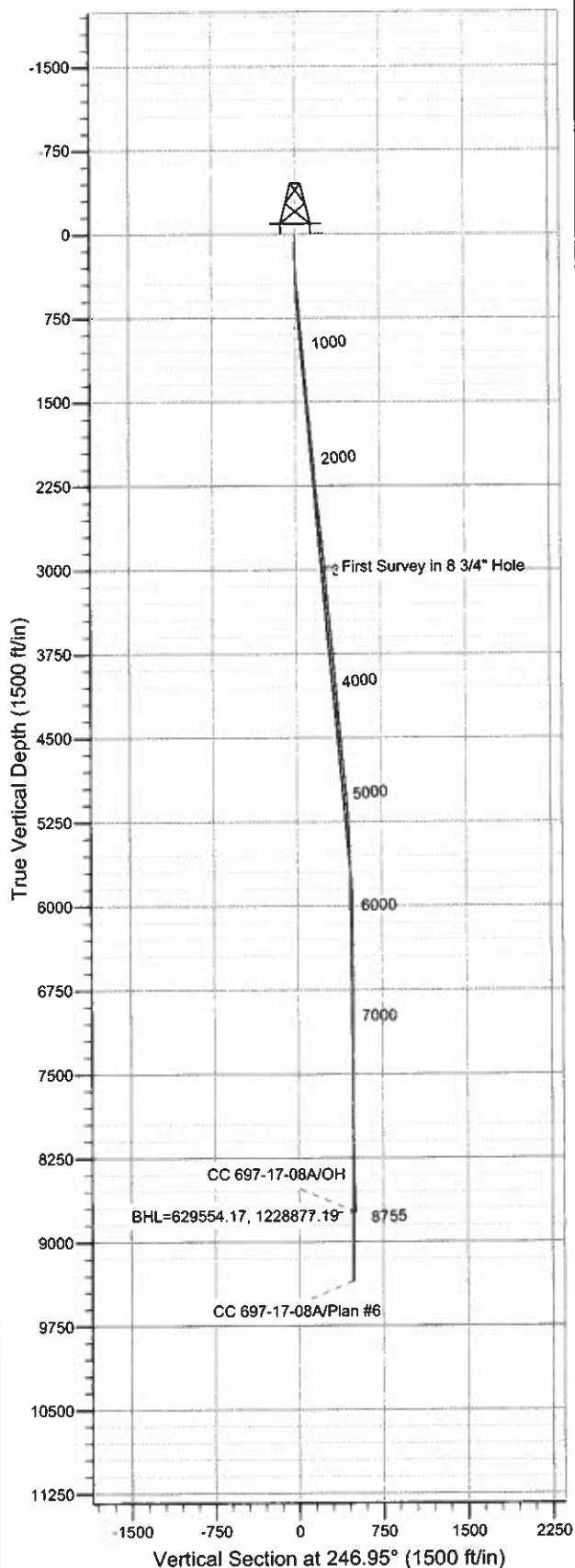




**Scientific Drilling**  
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Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-17-08A  
Wellbore: OH  
Design: OH

**OXY USA RMAT**



**WELL DETAILS: CC 697-17-08A**

Ground Level: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)		North	East	Latitude	Longitude	
0.00	0.00	629720.01	1229353.53	39° 31' 50.082 N	108° 13' 57.111 W	P

**REFERENCE INFORMATION**

Co-ordinate (N/E) Reference: Well CC 697-17-08A - Slot P, True North  
Vertical (TVD) Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Section (VS) Reference: Slot - P(0.00N, 0.00E)  
Measured Depth Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Calculation Method: Minimum Curvature  
Local North: No north reference data is available  
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 697-17-08A/OH)**

Created By: Julie Cruse Date: 2010-06-30

**Company:** OXY USA RMAT  
**Project:** Garfield County, CO NAD27  
**Site:** Cascade Creek 609-14 Pad  
**Well:** CC 697-17-08A  
**Wellbore:** OH  
**Design:** OH

**Local Co-ordinate Reference:** Well CC 697-17-08A - Slot P  
**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:** EDM 2003.16 Multi User Db

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

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

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

**Well:** CC 697-17-08A - Slot P, 161' FSL 264' FWL

**Well Position** **+N/-S** 0.00 ft **Northing:** 629,720.01 ft **Latitude:** 39° 31' 50.082 N  
**+E/-W** 0.00 ft **Easting:** 1,229,353.53 ft **Longitude:** 108° 13' 57.111 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	2008-06-24	10.82	65.81	52,539

**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	246.95

**Survey Program** **Date** 2010-06-30

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
92.00	522.00	Survey #1 - Surface Gyro (OH)	Standard Keeper 103	Standard Wireline Keeper ver 1.0.3
619.00	2,883.00	Survey #2 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA
2,983.00	8,755.00	Survey #3 - Production (OH)	MWD-SDI	MWD - Standard ISCWSA

**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
92.00	0.17	234.56	92.00	-0.08	-0.11	0.13	0.18	0.18	0.00
122.00	0.41	287.79	122.00	-0.07	-0.25	0.26	1.12	0.80	177.43
153.00	0.44	236.75	153.00	-0.10	-0.45	0.46	1.18	0.10	-164.65
184.00	0.76	230.44	184.00	-0.30	-0.71	0.77	1.05	1.03	-20.35
245.00	1.65	237.25	244.98	-1.03	-1.76	2.03	1.48	1.46	11.16
276.00	2.09	247.55	275.97	-1.49	-2.66	3.03	1.78	1.42	33.23
338.00	2.27	230.96	337.92	-2.69	-4.66	5.34	1.05	0.29	-26.76
368.00	2.41	236.42	367.90	-3.42	-5.65	6.53	0.88	0.47	18.20
399.00	2.03	227.92	398.87	-4.15	-6.60	7.69	1.62	-1.23	-27.42
461.00	2.96	230.17	460.81	-5.91	-8.64	10.26	1.51	1.50	3.63

**Company:** OXY USA RMAT  
**Project:** Garfield County, CO NAD27  
**Site:** Cascade Creek 609-14 Pad  
**Well:** CC 697-17-08A  
**Wellbore:** OH  
**Design:** OH

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

Well CC 697-17-08A - Slot P  
 GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
 GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
 True  
 Minimum Curvature  
 EDM 2003.16 Multi User Db

**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)
522.00	1.83	259.68	521.76	-7.09	-10.81	12.72	2.68	-1.85	48.38
<b>Last Gyro Survey</b>									
619.00	2.99	254.53	618.68	-8.04	-14.77	16.74	1.22	1.20	-5.31
<b>First MWD Survey</b>									
712.00	4.68	244.87	711.46	-10.30	-20.54	22.94	1.94	1.82	-10.39
804.00	5.21	243.33	803.12	-13.77	-27.68	30.86	0.59	0.58	-1.67
897.00	4.75	250.19	895.77	-16.97	-35.07	38.92	0.81	-0.49	7.38
990.00	4.84	246.24	988.45	-19.86	-42.28	46.68	0.37	0.10	-4.25
1,084.00	5.80	242.11	1,082.04	-23.68	-50.11	55.38	1.10	1.02	-4.39
1,179.00	5.98	245.27	1,176.54	-27.99	-58.85	65.11	0.39	0.19	3.33
1,274.00	5.10	250.63	1,271.09	-31.46	-67.33	74.27	1.07	-0.93	5.64
1,368.00	5.01	249.67	1,364.73	-34.27	-75.12	82.54	0.13	-0.10	-1.02
1,463.00	5.54	243.25	1,459.33	-37.78	-83.10	91.26	0.83	0.56	-6.76
1,557.00	5.10	245.53	1,552.92	-41.55	-90.96	99.97	0.52	-0.47	2.43
1,652.00	5.10	248.52	1,647.55	-44.85	-98.73	108.41	0.28	0.00	3.15
1,747.00	5.63	249.67	1,742.13	-48.01	-107.03	117.28	0.57	0.56	1.21
1,841.00	6.24	248.35	1,835.63	-51.50	-116.10	127.00	0.66	0.65	-1.40
1,936.00	5.28	248.44	1,930.15	-55.01	-124.97	136.53	1.01	-1.01	0.09
2,031.00	5.10	245.71	2,024.76	-58.35	-132.88	145.12	0.32	-0.19	-2.87
2,126.00	5.01	248.00	2,119.39	-61.64	-140.57	153.49	0.23	-0.09	2.41
2,220.00	5.36	257.93	2,213.00	-64.10	-148.67	161.90	1.02	0.37	10.56
2,315.00	5.89	257.93	2,307.55	-66.05	-157.78	171.04	0.56	0.56	0.00
2,410.00	6.16	254.59	2,402.02	-68.42	-167.46	180.88	0.47	0.28	-3.52
2,504.00	6.06	254.50	2,495.49	-71.09	-177.10	190.80	0.11	-0.11	-0.10
2,599.00	5.80	256.61	2,589.98	-73.54	-186.61	200.50	0.36	-0.27	2.22
2,694.00	6.16	252.30	2,684.46	-76.20	-196.13	210.31	0.61	0.38	-4.54
2,788.00	5.72	251.95	2,777.96	-79.19	-205.39	220.00	0.47	-0.47	-0.37
2,883.00	4.48	248.96	2,872.58	-81.98	-213.35	228.42	1.33	-1.31	-3.15
<b>Last Survey in 14 3/4" Hole</b>									
2,983.00	5.23	246.55	2,972.22	-85.20	-221.18	236.88	0.78	0.75	-2.41
<b>First Survey in 8 3/4" Hole</b>									
3,078.00	5.28	247.81	3,066.82	-88.57	-229.20	245.58	0.13	0.05	1.33
3,173.00	5.01	246.75	3,161.44	-91.86	-237.06	254.10	0.30	-0.28	-1.12
3,267.00	4.75	245.52	3,255.10	-95.10	-244.37	262.10	0.30	-0.28	-1.31
3,362.00	5.72	249.04	3,349.70	-98.42	-252.37	270.76	1.08	1.02	3.71
3,457.00	5.98	248.60	3,444.21	-101.92	-261.40	280.44	0.28	0.27	-0.46
3,552.00	5.54	247.02	3,538.73	-105.51	-270.23	289.97	0.49	-0.46	-1.66
3,646.00	5.19	245.61	3,632.31	-109.04	-278.28	298.76	0.40	-0.37	-1.50
3,741.00	5.19	244.47	3,726.92	-112.67	-286.07	307.35	0.11	0.00	-1.20
3,836.00	5.10	244.91	3,821.54	-116.31	-293.77	315.86	0.10	-0.09	0.46
3,930.00	4.92	247.89	3,915.18	-119.60	-301.29	324.06	0.34	-0.19	3.17
4,025.00	4.92	249.56	4,009.83	-122.55	-308.88	332.21	0.15	0.00	1.76
4,120.00	4.66	250.27	4,104.50	-125.28	-316.33	340.13	0.28	-0.27	0.75
4,214.00	5.19	239.19	4,198.16	-128.75	-323.58	348.15	1.16	0.56	-11.79
4,309.00	4.75	238.49	4,292.80	-133.00	-330.62	356.30	0.47	-0.46	-0.74
4,403.00	5.19	240.78	4,386.44	-137.11	-337.65	364.38	0.51	0.47	2.44
4,498.00	5.10	240.25	4,481.06	-141.31	-345.07	372.84	0.11	-0.09	-0.56
4,593.00	5.10	252.38	4,575.69	-144.68	-352.76	381.24	1.13	0.00	12.77
4,687.00	5.80	252.03	4,669.26	-147.41	-361.26	390.13	0.75	0.74	-0.37
4,782.00	5.98	256.42	4,763.76	-150.05	-370.63	399.79	0.51	0.19	4.62
4,876.00	6.07	267.49	4,857.25	-151.42	-380.36	409.28	1.24	0.10	11.78
4,971.00	5.98	268.90	4,951.72	-151.73	-390.32	418.57	0.18	-0.09	1.48
5,066.00	5.45	262.40	5,046.25	-152.43	-399.74	427.51	0.88	-0.56	-6.84
5,160.00	4.84	269.69	5,139.87	-153.04	-408.13	435.47	0.95	-0.65	7.76

# Scientific Drilling Survey Report



**Company:** OXY USA RMAT  
**Project:** Garfield County, CO NAD27  
**Site:** Cascade Creek 609-14 Pad  
**Well:** CC 697-17-08A  
**Wellbore:** OH  
**Design:** OH

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

Well CC 697-17-08A - Slot P  
GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
True  
Minimum Curvature  
EDM 2003.16 Multi User Db

## 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)
5,255.00	3.61	279.18	5,234.61	-152.58	-415.09	441.70	1.49	-1.29	9.99
5,349.00	1.58	275.67	5,328.51	-151.98	-419.31	445.34	2.17	-2.16	-3.73
5,444.00	2.11	240.25	5,423.46	-152.72	-422.13	448.22	1.30	0.56	-37.28
5,539.00	2.20	236.03	5,518.40	-154.61	-425.16	451.75	0.19	0.09	-4.44
5,635.00	1.14	280.59	5,614.36	-155.46	-427.62	454.36	1.67	-1.10	46.42
5,730.00	0.35	268.72	5,709.35	-155.29	-428.84	455.41	0.84	-0.83	-12.49
5,825.00	0.53	231.20	5,804.35	-155.58	-429.48	456.10	0.35	0.19	-39.49
5,919.00	0.44	221.70	5,898.34	-156.12	-430.06	456.85	0.13	-0.10	-10.11
6,014.00	1.23	228.21	5,993.33	-157.07	-431.06	458.14	0.84	0.83	6.85
6,109.00	0.26	300.89	6,088.32	-157.64	-432.00	459.24	1.24	-1.02	76.51
6,204.00	0.35	311.70	6,183.32	-157.34	-432.41	459.49	0.11	0.09	11.38
6,298.00	0.79	282.70	6,277.32	-157.00	-433.25	460.14	0.55	0.47	-30.85
6,393.00	0.88	326.38	6,372.31	-156.25	-434.29	460.80	0.66	0.09	45.98
6,488.00	0.88	315.83	6,467.30	-155.12	-435.21	461.20	0.17	0.00	-11.11
6,582.00	1.14	295.62	6,561.28	-154.20	-436.55	462.08	0.47	0.28	-21.50
6,677.00	1.41	291.58	6,656.26	-153.36	-438.49	463.53	0.30	0.28	-4.25
6,772.00	0.44	19.47	6,751.25	-152.59	-439.46	464.12	1.54	-1.02	92.52
6,866.00	0.26	155.96	6,845.25	-152.44	-439.25	463.87	0.70	-0.19	145.20
6,961.00	0.62	194.90	6,940.25	-153.13	-439.29	464.18	0.47	0.38	40.99
7,056.00	1.23	210.10	7,035.23	-154.51	-439.94	465.31	0.69	0.64	16.00
7,151.00	0.62	274.17	7,130.22	-155.36	-440.96	466.59	1.17	-0.64	67.44
7,246.00	0.97	250.36	7,225.21	-155.59	-442.23	467.85	0.50	0.37	-25.06
7,340.00	1.41	258.27	7,319.19	-156.09	-444.11	469.77	0.50	0.47	8.41
7,435.00	0.53	242.62	7,414.18	-156.53	-445.65	471.36	0.96	-0.93	-16.47
7,530.00	0.97	298.70	7,509.17	-156.35	-446.74	472.30	0.85	0.46	59.03
7,625.00	0.26	259.76	7,604.17	-156.00	-447.66	473.00	0.83	-0.75	-40.99
7,719.00	0.35	261.52	7,698.16	-156.08	-448.16	473.49	0.10	0.10	1.87
7,814.00	0.44	253.87	7,793.16	-156.22	-448.79	474.13	0.11	0.09	-8.05
7,909.00	0.70	274.61	7,888.16	-156.28	-449.72	475.01	0.35	0.27	21.83
8,003.00	0.70	287.97	7,982.15	-156.06	-450.84	475.95	0.17	0.00	14.21
8,098.00	0.53	312.93	8,077.15	-155.58	-451.71	476.57	0.33	-0.18	26.27
8,193.00	0.79	248.16	8,172.14	-155.52	-452.64	477.40	0.78	0.27	-68.18
8,288.00	0.70	179.52	8,267.13	-156.35	-453.25	478.28	0.89	-0.09	-72.25
8,382.00	1.41	181.71	8,361.12	-158.08	-453.28	478.98	0.76	0.76	2.33
8,477.00	2.29	197.97	8,456.07	-161.05	-453.90	480.72	1.07	0.93	17.12
8,572.00	2.90	203.69	8,550.97	-165.06	-455.45	483.71	0.70	0.64	6.02
8,667.00	3.08	207.11	8,645.84	-169.53	-457.58	487.42	0.27	0.19	3.60
8,704.00	2.90	203.86	8,682.79	-171.27	-458.41	488.87	0.67	-0.49	-8.78
Last SDI Survey									
8,755.00	2.90	203.86	8,733.72	-173.63	-459.45	490.75	0.00	0.00	0.00
Projection to TD - BHL=629554.17, 1228877.19									

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**Wellbore:** OH  
**Design:** OH

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

Well CC 697-17-08A - Slot P  
 GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
 GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
 True  
 Minimum Curvature  
 EDM 2003.16 Multi User Db

**Targets**

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
CC 697-17-08A 8° - actual wellpath misses target center by 34.08ft at 7927.73ft MD (7906.89 TVD, -156.26 N, -449.95 E) - Circle (radius 50.00)	0.00	0.00	7,907.00	-190.21	-447.11	629,543.33	1,228,900.90	39° 31' 48.202 N	108° 14' 2.818 W
CC 697-17-08A Target 3 - actual wellpath misses target center by 34.08ft at 7927.73ft MD (7906.89 TVD, -156.26 N, -449.95 E) - Circle (radius 50.00)	0.00	0.00	7,907.00	-190.21	-447.11	629,543.33	1,228,900.90	39° 31' 48.202 N	108° 14' 2.818 W
CC 697-08-64C Target - actual wellpath misses target center by 33.99ft at 7877.84ft MD (7857.00 TVD, -156.29 N, -449.37 E) - Circle (radius 50.00)	0.00	0.00	7,857.00	-190.21	-447.11	629,543.33	1,228,900.90	39° 31' 48.202 N	108° 14' 2.818 W

**Design Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
522.00	521.76	-7.09	-10.81	Last Gyro Survey
619.00	618.68	-8.04	-14.77	First MWD Survey
2,883.00	2,872.58	-81.98	-213.35	Last Survey in 14 3/4" Hole
2,983.00	2,972.22	-85.20	-221.18	First Survey in 8 3/4" Hole
8,704.00	8,682.79	-171.27	-458.41	Last SDI Survey
8,755.00	8,733.72	-173.63	-459.45	Projection to TD
8,755.00	8,733.72	-173.63	-459.45	BHL=629554.17, 1228877.19

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_