



**Scientific Drilling**  
Rocky Mountain Operations

## **OXY USA RMAT**

Garfield County, CO NAD27  
Cascade Creek 697-16A II Pad  
697-16-17A  
OH

Design: OH

## **Standard Survey Report**

27 May, 2010

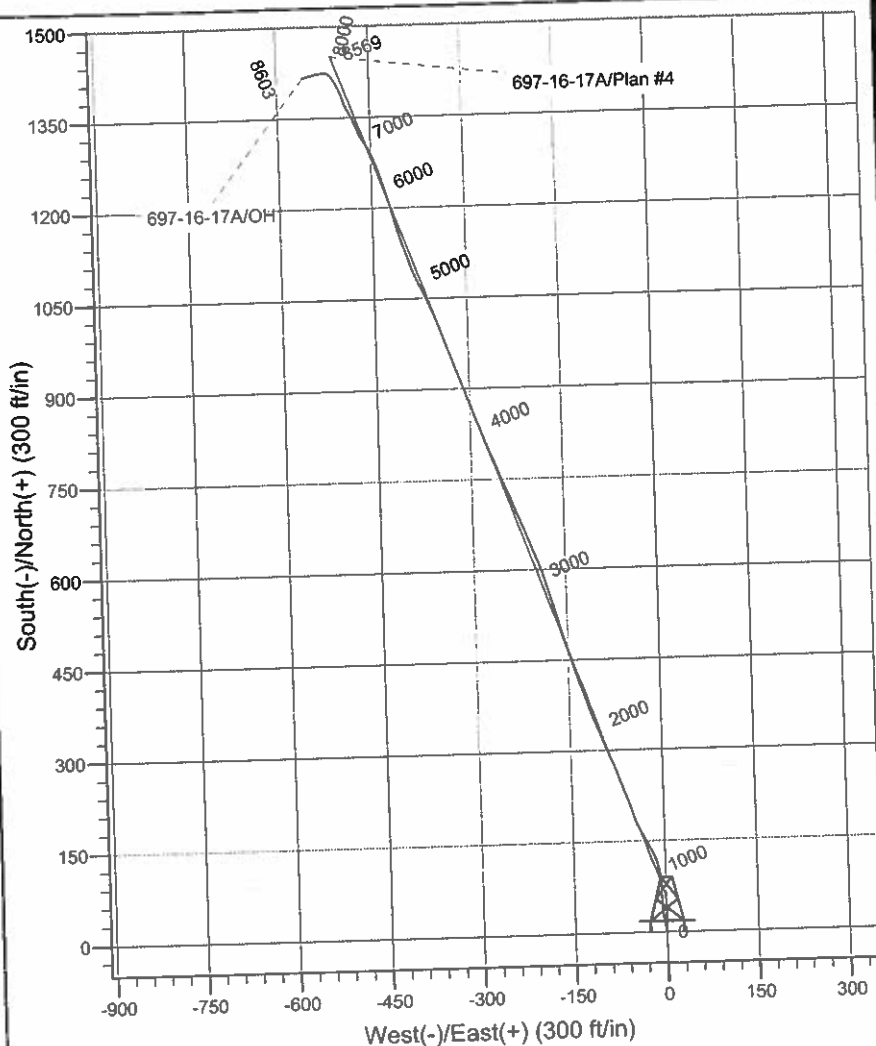
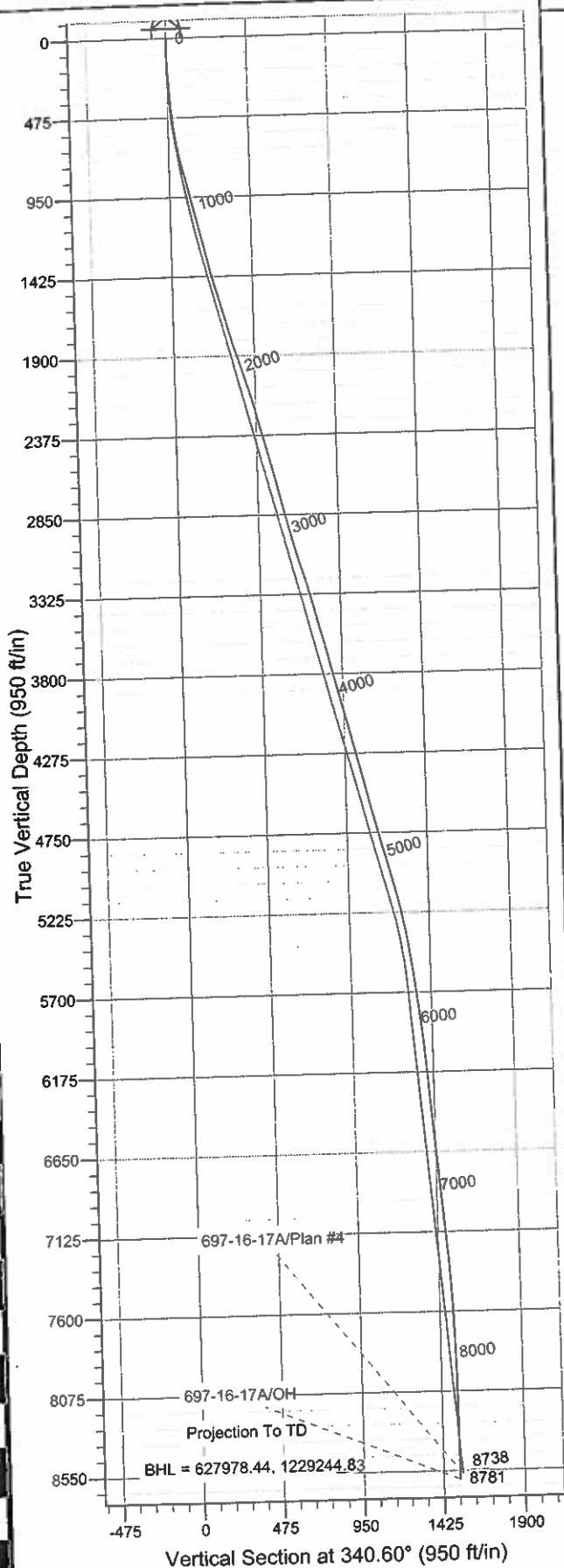




**Scientific Drilling**  
Rocky Mountain Operations

Project: Garfield County, CO NAD27  
Site: Cascade Creek 697-16A II Pad  
Well: 697-16-17A  
Wellbore: OH  
Design: OH

**OXY USA RMAT**



**WELL DETAILS: 697-16-17A**

	Ground Level	GL 8312' & RKB 30' @ 8342.00ft		
+N/-S +E/-W	North	East	Latitude	Longitude
0.00	0.00	626546.41	1229760.67	39° 31' 18.850 N 108° 13' 50.700 W

**REFERENCE INFORMATION**

Co-ordinate (N/E) Reference: Well 697-16-17A, True North  
Vertical (TVD) Reference: GL 8312' & RKB 30' @ 8342.00ft  
Section (VS) Reference: Slot - (0.00N, 0.00E)  
Measured Depth Reference: GL 8312' & RKB 30' @ 8342.00ft  
Calculation Method: Minimum Curvature  
Local North: True  
Location: Sec 16 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 (697-16-17A/OH)**

Created By: Rex Hall Date: 2010-05-27

**Company:** OXY USA RMAT  
**Project:** Garfield County, CO NAD27  
**Site:** Cascade Creek 697-16A II Pad  
**Well:** 697-16-17A  
**Wellbore:** OH  
**Design:** OH

**Local Co-ordinate Reference:** Well 697-16-17A  
**TVD Reference:** GL 8312' & RKB 30' @ 8342.00ft  
**MD Reference:** GL 8312' & RKB 30' @ 8342.00ft  
**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)  
**Geo Datum:** NAD 1927 (NADCON CONUS)  
**Map Zone:** Colorado Central 502

**System Datum:** Mean Sea Level

**Site** Cascade Creek 697-16A II Pad, Sec 16 T6S R97W

**Site Position:** Northing: 626,314.75 ft Latitude: 39° 31' 16.584 N  
**From:** Map Easting: 1,229,837.54 ft Longitude: 108° 13' 49.631 W  
**Position Uncertainty:** 0.00 ft Slot Radius: in Grid Convergence: -1.72 °

**Well** 697-16-17A

**Well Position** +N/-S 0.00 ft Northing: 626,546.41 ft Latitude: 39° 31' 18.850 N  
 +E/-W 0.00 ft Easting: 1,229,760.67 ft Longitude: 108° 13' 50.700 W  
**Position Uncertainty** 0.00 ft Wellhead Elevation: ft Ground Level: 8,312.00 ft

**Wellbore** OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2008/01/17	10.88	65.81	52,578

**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	340.60

**Survey Program** Date 2010/05/27

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
525.00	2,694.00	Survey #1 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA
2,792.00	8,781.00	Survey #2 - Production MWD (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)	Bulld 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
525.00	6.50	350.27	523.87	29.32	-5.03	29.32	1.24	1.24	0.00
<b>First SDI Surface MWD Survey</b>									
617.00	9.65	355.80	614.95	42.15	-6.47	41.90	3.52	3.42	6.01
710.00	12.83	359.18	706.16	60.25	-7.19	59.22	3.49	3.42	3.63
803.00	14.24	355.42	796.57	81.98	-8.25	80.06	1.79	1.52	-4.04
898.00	14.18	348.56	888.67	105.03	-11.49	102.88	1.77	-0.06	-7.22
992.00	12.59	337.48	980.13	125.78	-17.70	124.52	3.20	-1.69	-11.79
1,087.00	14.46	329.77	1,072.50	145.60	-27.64	146.51	2.73	1.97	-8.12
1,181.00	14.46	332.93	1,163.53	166.19	-38.89	169.67	0.84	0.00	3.36
1,276.00	12.99	340.41	1,255.82	186.81	-47.87	192.11	2.42	-1.55	7.87
1,370.00	13.42	342.27	1,347.33	207.16	-54.73	213.57	0.64	0.46	1.98

**Company:** OXY USA RMAT  
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**Well:** 697-16-17A  
**Wellbore:** OH  
**Design:** OH

**Local Co-ordinate Reference:** Well 697-16-17A  
**TVD Reference:** GL 8312' & RKB 30' @ 8342.00ft  
**MD Reference:** GL 8312' & RKB 30' @ 8342.00ft  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** 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)
1,465.00	15.48	340.17	1,439.32	229.59	-62.39	237.27	2.24	2.17	-2.21
1,559.00	16.53	339.37	1,529.68	253.90	-71.36	263.19	1.14	1.12	-0.85
1,654.00	15.52	337.62	1,620.99	278.30	-80.96	289.39	1.18	-1.06	-1.84
1,748.00	15.84	338.54	1,711.49	301.87	-90.44	314.77	0.43	0.34	0.98
1,843.00	15.87	338.03	1,802.87	325.98	-100.05	340.71	0.15	0.03	-0.54
1,937.00	17.73	337.81	1,892.86	351.16	-110.26	367.84	1.98	1.98	-0.23
2,032.00	18.51	341.57	1,983.15	378.86	-120.49	397.37	1.48	0.82	3.96
2,126.00	17.11	341.04	2,072.64	406.09	-129.70	426.12	1.50	-1.49	-0.56
2,221.00	16.15	341.29	2,163.67	431.83	-138.48	453.31	1.01	-1.01	0.26
2,315.00	14.71	342.35	2,254.28	455.58	-146.29	478.31	1.56	-1.53	1.13
2,410.00	14.47	342.31	2,346.21	478.38	-153.56	502.23	0.25	-0.25	-0.04
2,504.00	15.09	344.30	2,437.10	501.35	-160.44	526.18	0.85	0.66	2.12
2,599.00	14.97	343.18	2,528.85	525.00	-167.33	550.77	0.33	-0.13	-1.18
2,694.00	14.62	343.58	2,620.70	548.25	-174.27	575.01	0.38	-0.37	0.42
<b>Last SDI Surface MWD Survey</b>									
2,792.00	13.63	343.30	2,715.74	571.17	-181.09	598.89	1.01	-1.01	-0.29
<b>First SDI Production MWD Survey</b>									
2,887.00	14.25	341.27	2,807.94	592.97	-188.06	621.76	0.83	0.65	-2.14
2,981.00	14.77	337.50	2,898.95	614.99	-196.36	645.30	1.15	0.55	-4.01
3,076.00	14.60	339.17	2,990.84	637.37	-205.25	669.36	0.48	-0.18	1.76
3,170.00	16.80	337.67	3,081.33	661.01	-214.63	694.77	2.38	2.34	-1.60
3,265.00	17.59	337.93	3,172.08	687.02	-225.24	722.82	0.84	0.83	0.27
3,359.00	16.36	338.46	3,261.99	712.49	-235.44	750.24	1.32	-1.31	0.56
3,454.00	15.56	337.23	3,353.32	736.69	-245.28	776.33	0.91	-0.84	-1.29
3,548.00	14.25	336.70	3,444.16	758.94	-254.74	800.46	1.40	-1.39	-0.56
3,643.00	15.83	338.02	3,535.90	781.70	-264.21	825.07	1.70	1.66	1.39
3,737.00	15.12	337.76	3,626.49	804.93	-273.65	850.13	0.76	-0.76	-0.28
3,832.00	13.98	339.08	3,718.45	827.12	-282.44	873.97	1.25	-1.20	1.39
3,926.00	14.51	339.17	3,809.56	848.73	-290.68	897.10	0.56	0.56	0.10
4,021.00	13.72	340.40	3,901.69	870.47	-298.69	920.26	0.89	-0.83	1.29
4,116.00	14.33	339.96	3,993.85	892.13	-306.50	943.28	0.65	0.64	-0.46
4,210.00	13.89	339.52	4,085.02	913.63	-314.43	966.19	0.48	-0.47	-0.47
4,305.00	13.89	339.34	4,177.24	934.98	-322.44	988.99	0.05	0.00	-0.19
4,400.00	14.68	340.84	4,269.30	957.02	-330.42	1,012.43	0.92	0.83	1.58
4,494.00	13.98	340.66	4,360.38	978.98	-338.09	1,035.70	0.75	-0.74	-0.19
4,589.00	14.68	339.52	4,452.42	1,001.09	-346.10	1,059.21	0.79	0.74	-1.20
4,683.00	13.81	336.88	4,543.53	1,022.56	-354.67	1,082.31	1.15	-0.93	-2.81
4,778.00	15.30	336.09	4,635.48	1,044.45	-364.21	1,106.12	1.58	1.57	-0.83
4,872.00	14.42	333.72	4,726.34	1,066.28	-374.41	1,130.11	1.14	-0.94	-2.52
4,967.00	14.42	336.44	4,818.34	1,087.73	-384.38	1,153.65	0.71	0.00	2.86
5,062.00	15.30	341.36	4,910.17	1,110.45	-393.11	1,177.98	1.62	0.93	5.18
5,156.00	14.95	341.80	5,000.91	1,133.72	-400.87	1,202.51	0.39	-0.37	0.47
5,251.00	14.42	342.86	5,092.81	1,156.67	-408.18	1,226.58	0.63	-0.56	1.12
5,345.00	12.84	344.26	5,184.16	1,177.91	-414.46	1,248.70	1.72	-1.68	1.49
5,440.00	12.49	344.09	5,276.85	1,197.95	-420.14	1,269.49	0.37	-0.37	-0.18
5,535.00	10.29	345.58	5,369.97	1,216.05	-425.07	1,288.19	2.34	-2.32	1.57
5,629.00	9.06	343.30	5,462.63	1,231.27	-429.29	1,303.95	1.37	-1.31	-2.43
5,724.00	7.83	341.19	5,556.60	1,244.56	-433.53	1,317.89	1.33	-1.29	-2.22
5,819.00	7.21	340.31	5,650.78	1,256.30	-437.62	1,330.33	0.66	-0.65	-0.93
5,914.00	7.56	340.13	5,745.00	1,267.79	-441.75	1,342.54	0.37	0.37	-0.19
6,008.00	7.03	339.78	5,838.24	1,279.00	-445.84	1,354.47	0.57	-0.56	-0.37
6,103.00	6.24	336.18	5,932.60	1,289.18	-449.94	1,365.43	0.94	-0.83	-3.79
6,198.00	5.45	332.66	6,027.10	1,297.91	-454.09	1,375.05	0.91	-0.83	-3.71
6,293.00	5.01	329.76	6,121.71	1,305.50	-458.26	1,383.59	0.54	-0.46	-3.05

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**MD Reference:** GL 8312' & RKB 30' @ 8342.00ft  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** 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)
6,387.00	4.57	323.78	6,215.38	1,312.07	-462.54	1,391.21	0.71	-0.47	-6.36
6,482.00	4.31	330.38	6,310.10	1,318.22	-466.54	1,398.34	0.60	-0.27	6.95
6,577.00	5.28	339.34	6,404.76	1,325.42	-469.84	1,406.23	1.29	1.02	9.43
6,671.00	5.36	340.31	6,498.36	1,333.60	-472.85	1,414.94	0.13	0.09	1.03
6,766.00	5.28	335.91	6,592.95	1,341.77	-476.13	1,423.73	0.44	-0.08	-4.63
6,861.00	5.01	334.86	6,687.57	1,349.51	-479.67	1,432.22	0.30	-0.28	-1.11
6,955.00	4.75	329.85	6,781.23	1,356.59	-483.37	1,440.13	0.53	-0.28	-5.33
7,050.00	5.01	332.05	6,875.88	1,363.66	-487.29	1,448.09	0.34	0.27	2.32
7,145.00	5.19	339.60	6,970.51	1,371.35	-490.73	1,456.49	0.73	0.19	7.95
7,240.00	4.92	341.01	7,065.14	1,379.23	-493.56	1,464.86	0.31	-0.28	1.48
7,334.00	5.10	339.87	7,158.78	1,386.96	-496.31	1,473.07	0.22	0.19	-1.21
7,429.00	5.19	337.58	7,253.40	1,394.90	-499.40	1,481.58	0.24	0.09	-2.41
7,524.00	4.13	334.68	7,348.08	1,401.96	-502.50	1,489.28	1.14	-1.12	-3.05
7,619.00	3.52	329.23	7,442.87	1,407.56	-505.46	1,495.54	0.75	-0.64	-5.74
7,713.00	2.64	329.06	7,536.73	1,411.90	-508.05	1,500.49	0.94	-0.94	-0.18
7,808.00	2.29	326.51	7,631.64	1,415.36	-510.22	1,504.47	0.39	-0.37	-2.68
7,903.00	2.20	317.10	7,726.57	1,418.28	-512.51	1,507.99	0.40	-0.09	-9.91
7,998.00	1.85	309.11	7,821.51	1,420.58	-514.94	1,510.97	0.47	-0.37	-8.41
8,093.00	1.85	300.49	7,916.46	1,422.33	-517.45	1,513.45	0.29	0.00	-9.07
8,187.00	2.11	282.30	8,010.41	1,423.46	-520.45	1,515.52	0.72	0.28	-19.35
8,282.00	2.99	269.91	8,105.31	1,423.83	-524.63	1,517.26	1.09	0.93	-13.04
8,377.00	3.78	259.80	8,200.15	1,423.27	-530.19	1,518.58	1.04	0.83	-10.64
8,471.00	4.22	258.66	8,293.92	1,422.05	-536.63	1,519.56	0.48	0.47	-1.21
8,566.00	4.13	260.15	8,388.67	1,420.77	-543.43	1,520.61	0.15	-0.09	1.57
8,661.00	4.22	250.13	8,483.42	1,419.00	-550.09	1,521.15	0.77	0.09	-10.55
8,724.00	4.40	249.96	8,546.24	1,417.38	-554.54	1,521.11	0.29	0.29	-0.27

**Last SDI Production MWD Survey**

8,781.00 4.40 249.96 8,603.07 1,415.89 -558.65 1,521.06 0.00 0.00 0.00

Projection To TD - BHL = 627978.44, 1229244.83

**Targets**

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
697-16-17A Target	-8.00	339.68	7,756.00	1,384.90	-490.69	627,945.43	1,229,311.82	39° 31' 32.538 N	108° 13' 56.962 W
- hit/miss target									
- actual wellpath misses target center by 40.93ft at 7931.04ft MD (7754.59 TVD, 1419.03 N, -513.23 E)									
- Circle (radius 50.00)									
CC 697-16-17A Target /	-8.00	340.58	7,808.00	1,386.38	-488.30	627,946.84	1,229,314.26	39° 31' 32.552 N	108° 13' 56.932 W
- actual wellpath misses target center by 42.90ft at 7982.99ft MD (7806.51 TVD, 1420.27 N, -514.56 E)									
- Circle (radius 50.00)									
697-16-17A WF Target	-5.00	339.81	7,784.00	1,386.38	-488.30	627,946.84	1,229,314.26	39° 31' 32.552 N	108° 13' 56.932 W
- actual wellpath misses target center by 42.10ft at 7959.00ft MD (7782.53 TVD, 1419.72 N, -513.95 E)									
- Circle (radius 50.00)									

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