



**Scientific Drilling**  
Rocky Mountain Operations

## **OXY USA RMAT**

Garfield County, CO NAD27  
Cascade Creek 609-14 Pad  
CC 697-16-02B - Slot L

OH

Design: OH

## **Standard Survey Report**

25 August, 2010

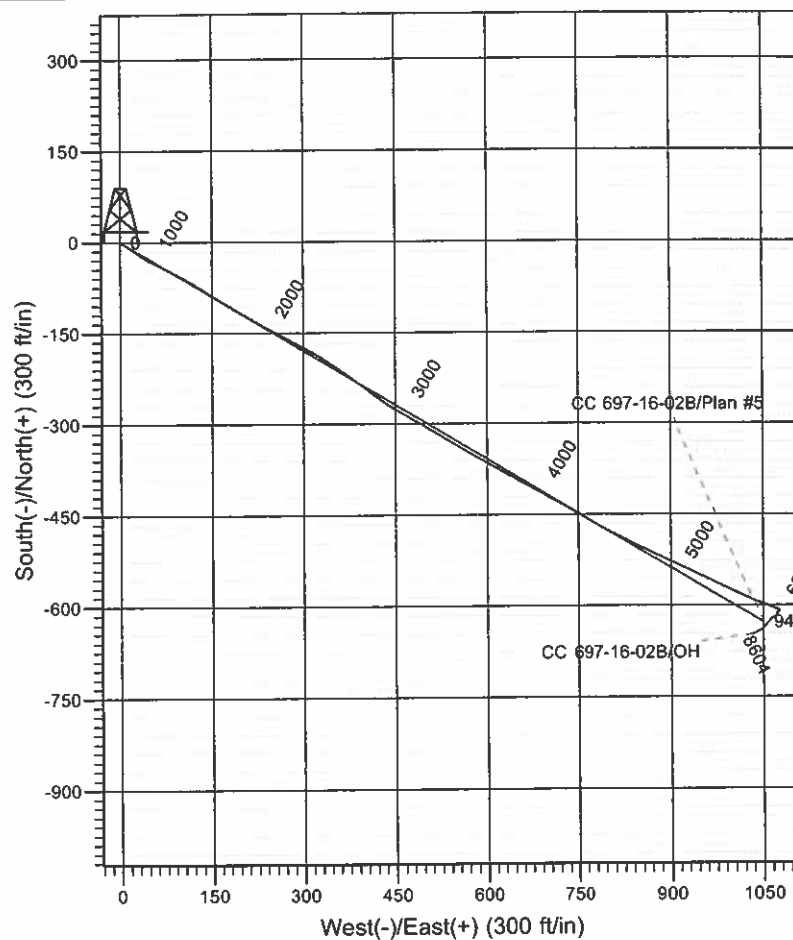
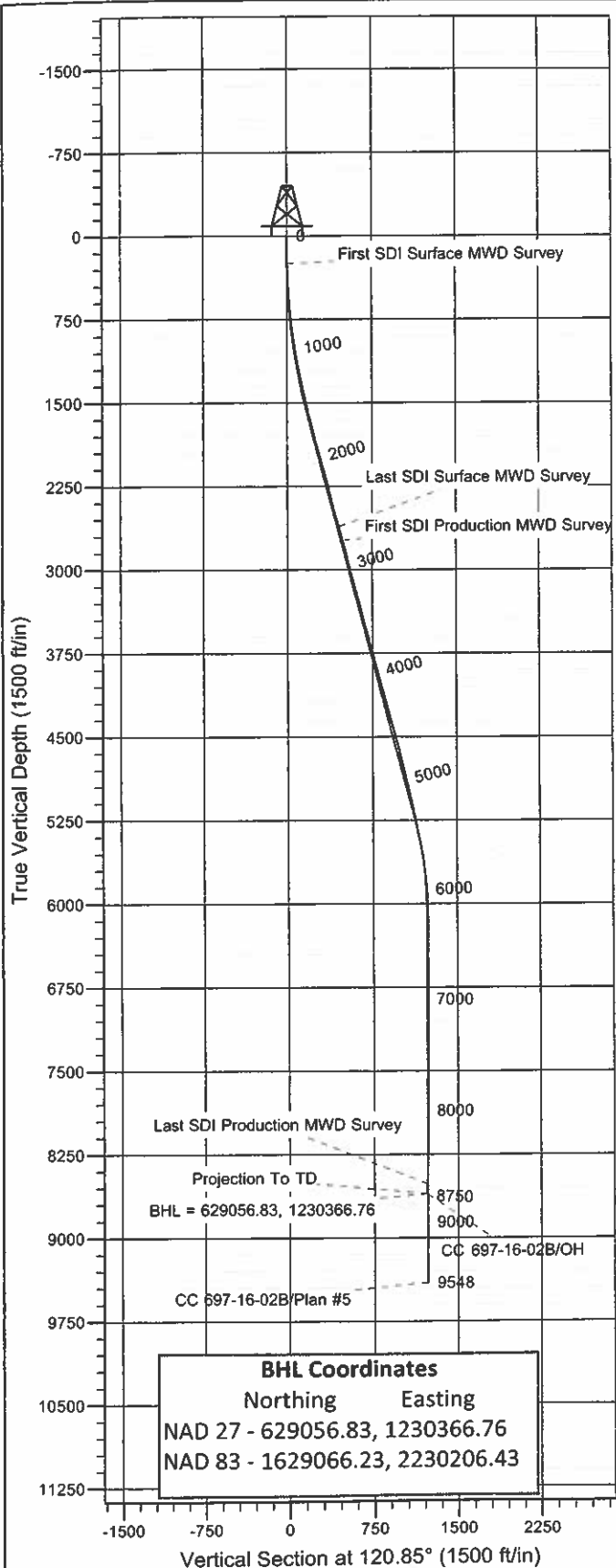




# Scientific Drilling

Rocky Mountain Operations

Company: OXY USA RMAT  
Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-16-02B  
Wellbore: OH  
Design: OH



## Well Details: CC 697-16-02B

TVD Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330) and Level: 8393.00		Slot	
+N/-S	+E/-W	North	East
0.00	0.00	629735.00	1229353.68
		39° 31' 50.230 N 108° 13' 57.115 W	

## REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-16-02B - Slot L, True North  
Vertical (TVD) Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Section (VS) Reference: Slot - L(0.00N, 0.00E)  
Measured Depth Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Calculation Method: Minimum Curvature

## 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

System Datum: Mean Sea Level

Plan: OH

10:12, August 25 2010  
Created By: Rex Hall



# Scientific Drilling International

## Survey Report



Company: OXY USA RMAT  
Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-16-02B  
Wellbore: OH  
Design: OH

Local Co-ordinate Reference: Well CC 697-16-02B - Slot L  
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)	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:		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 697-16-02B - Slot L, 162' FSL 273' FWL

Well Position	+N/-S	0.00 ft	Northing:	629,735.00 usft	Latitude:	39° 31' 50.230 N
	+E/-W	0.00 ft	Easting:	1,229,353.68 usft	Longitude:	108° 13' 57.115 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)
	IGRF2010	8/11/2010	10.57	65.75	52,303

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	120.85	

Survey Program Date 8/25/2010

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
248.00	2,660.00	Survey #1 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA
2,788.00	8,750.00	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)	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
248.00	1.56	114.49	247.97	-1.40	3.07	3.36	0.63	0.63	0.00
First SDI Surface MWD Survey									
340.00	1.76	130.37	339.93	-2.83	5.29	5.99	0.54	0.22	17.26
432.00	2.29	120.91	431.87	-4.69	7.94	9.22	0.68	0.58	-10.28
525.00	3.08	126.93	524.77	-7.15	11.53	13.57	0.90	0.85	6.47
617.00	4.61	119.73	616.56	-10.47	16.72	19.72	1.74	1.66	-7.83
709.00	6.22	125.77	708.15	-15.21	23.97	28.38	1.85	1.75	6.57
802.00	6.57	128.21	800.57	-21.45	32.24	38.68	0.48	0.38	2.62
895.00	8.32	120.11	892.79	-28.12	42.24	50.69	2.19	1.88	-8.71

**Company:** OXY USA RMAT  
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**Well:** CC 697-16-02B  
**Wellbore:** OH  
**Design:** OH

**Local Co-ordinate Reference:** Well CC 697-16-02B - Slot L  
**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)
987.00	9.77	115.32	983.64	-34.80	55.06	65.11	1.77	1.58	-5.21
1,082.00	10.14	117.51	1,077.21	-42.11	69.76	81.48	0.56	0.39	2.31
1,177.00	9.87	118.22	1,170.77	-49.82	84.35	97.97	0.31	-0.28	0.75
1,271.00	11.72	117.19	1,263.10	-57.99	99.95	115.54	1.98	1.97	-1.10
1,366.00	10.48	121.83	1,356.32	-66.96	115.87	133.81	1.61	-1.31	4.88
1,461.00	12.44	123.47	1,449.42	-77.16	131.75	152.67	2.09	2.06	1.73
1,555.00	14.05	121.97	1,540.92	-88.78	149.87	174.20	1.75	1.71	-1.60
1,650.00	13.95	119.91	1,633.10	-100.60	169.58	197.18	0.54	-0.11	-2.17
1,744.00	13.39	121.27	1,724.43	-111.90	188.71	219.39	0.69	-0.60	1.45
1,839.00	14.72	120.67	1,816.59	-123.77	208.49	242.46	1.41	1.40	-0.63
1,934.00	16.09	119.57	1,908.17	-136.42	230.32	267.69	1.47	1.44	-1.16
2,029.00	16.29	117.14	1,999.41	-148.99	253.63	294.15	0.74	0.21	-2.56
2,123.00	15.15	118.56	2,089.89	-160.88	276.15	319.58	1.28	-1.21	1.51
2,218.00	14.28	119.19	2,181.77	-172.53	297.28	343.69	0.93	-0.92	0.66
2,313.00	13.23	118.74	2,274.05	-183.47	317.05	366.27	1.11	-1.11	-0.47
2,407.00	13.40	124.20	2,365.52	-194.77	335.49	387.89	1.35	0.18	5.81
2,502.00	14.24	124.86	2,457.77	-207.63	354.18	410.54	0.90	0.88	0.69
2,597.00	15.31	124.37	2,549.63	-221.39	374.12	434.71	1.13	1.13	-0.52
2,660.00	15.75	126.20	2,610.33	-231.14	387.88	451.53	1.05	0.70	2.90
<b>Last SDI Surface MWD Survey</b>									
2,788.00	15.70	127.89	2,733.54	-252.03	415.57	486.01	0.36	-0.04	1.32
<b>First SDI Production MWD Survey</b>									
2,883.00	14.77	125.09	2,825.20	-266.89	435.62	510.85	1.25	-0.98	-2.95
2,978.00	14.07	120.26	2,917.21	-279.67	455.51	534.47	1.46	-0.74	-5.08
3,073.00	14.33	119.20	3,009.31	-291.23	475.74	557.77	0.39	0.27	-1.12
3,167.00	14.07	120.87	3,100.44	-302.76	495.71	580.83	0.52	-0.28	1.78
3,262.00	14.77	122.19	3,192.45	-315.14	515.87	604.48	0.81	0.74	1.39
3,357.00	14.33	120.35	3,284.40	-327.53	536.26	628.34	0.67	-0.46	-1.94
3,451.00	15.04	119.73	3,375.33	-339.46	556.89	652.17	0.77	0.76	-0.66
3,546.00	15.56	120.43	3,466.96	-352.02	578.58	677.23	0.58	0.55	0.74
3,641.00	14.25	120.87	3,558.76	-364.48	599.60	701.67	1.38	-1.38	0.46
3,736.00	15.12	119.03	3,650.66	-376.49	620.47	725.75	1.04	0.92	-1.94
3,830.00	14.51	117.88	3,741.53	-387.94	641.60	749.76	0.72	-0.65	-1.22
3,925.00	15.30	118.68	3,833.34	-399.53	663.12	774.17	0.86	0.83	0.84
4,020.00	15.21	119.64	3,924.99	-411.70	684.95	799.15	0.28	-0.09	1.01
4,114.00	14.68	118.59	4,015.81	-423.50	706.12	823.38	0.63	-0.56	-1.12
4,209.00	15.21	120.52	4,107.60	-435.59	727.43	847.87	0.77	0.56	2.03
4,304.00	14.86	119.82	4,199.34	-447.98	748.73	872.52	0.42	-0.37	-0.74
4,399.00	15.92	120.35	4,290.94	-460.62	770.54	897.72	1.13	1.12	0.56
4,493.00	14.42	119.20	4,381.66	-472.84	791.89	922.32	1.63	-1.60	-1.22
4,588.00	15.65	117.27	4,473.40	-484.49	813.60	946.93	1.40	1.29	-2.03
4,683.00	15.12	116.83	4,565.00	-495.95	836.05	972.08	0.57	-0.56	-0.46
4,778.00	13.19	116.30	4,657.11	-506.34	856.82	995.24	2.04	-2.03	-0.56



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## Survey Report



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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)
4,872.00	13.01	115.60	4,748.67	-515.67	875.98	1,016.47	0.26	-0.19	-0.74
4,967.00	13.28	115.86	4,841.18	-525.05	895.44	1,037.99	0.29	0.28	0.27
5,062.00	13.72	114.72	4,933.55	-534.52	915.50	1,060.06	0.54	0.46	-1.20
5,156.00	13.01	115.78	5,025.00	-543.78	935.15	1,081.68	0.80	-0.76	1.13
5,251.00	12.22	116.57	5,117.71	-552.93	953.77	1,102.36	0.85	-0.83	0.83
5,346.00	12.40	114.11	5,210.53	-561.59	972.07	1,122.52	0.58	0.19	-2.59
5,440.00	12.05	116.13	5,302.40	-570.04	990.09	1,142.32	0.59	-0.37	2.15
5,535.00	11.34	116.48	5,395.42	-578.57	1,007.36	1,161.51	0.75	-0.75	0.37
5,630.00	9.94	115.34	5,488.79	-586.24	1,023.13	1,178.99	1.49	-1.47	-1.20
5,724.00	8.35	113.14	5,581.59	-592.40	1,036.74	1,193.83	1.73	-1.69	-2.34
5,819.00	6.77	107.86	5,675.76	-596.83	1,048.41	1,206.12	1.82	-1.66	-5.56
5,914.00	5.89	112.96	5,770.18	-600.45	1,058.23	1,216.41	1.10	-0.93	5.37
6,009.00	4.75	111.73	5,864.77	-603.80	1,066.37	1,225.12	1.21	-1.20	-1.29
6,103.00	3.08	113.40	5,958.55	-606.25	1,072.31	1,231.47	1.78	-1.78	1.78
6,198.00	1.41	122.45	6,053.47	-607.89	1,075.64	1,235.16	1.79	-1.76	9.53
6,293.00	0.53	209.03	6,148.46	-608.90	1,076.41	1,236.35	1.55	-0.93	91.14
6,388.00	0.79	214.04	6,243.46	-609.83	1,075.83	1,236.32	0.28	0.27	5.27
6,482.00	1.06	247.96	6,337.44	-610.69	1,074.66	1,235.76	0.64	0.29	36.09
6,577.00	0.18	204.28	6,432.44	-611.16	1,073.78	1,235.25	0.99	-0.93	-45.98
6,672.00	0.26	160.60	6,527.44	-611.49	1,073.79	1,235.43	0.19	0.08	-45.98
6,766.00	0.53	194.00	6,621.44	-612.12	1,073.76	1,235.72	0.37	0.29	35.53
6,861.00	0.97	224.50	6,716.43	-613.12	1,073.09	1,235.66	0.61	0.46	32.11
6,956.00	0.53	205.95	6,811.42	-614.09	1,072.33	1,235.51	0.52	-0.46	-19.53
7,051.00	0.35	153.57	6,906.42	-614.74	1,072.27	1,235.79	0.44	-0.19	-55.14
7,146.00	0.53	198.04	7,001.41	-615.42	1,072.26	1,236.13	0.39	0.19	46.81
7,240.00	1.49	209.91	7,095.40	-616.89	1,071.52	1,236.25	1.04	1.02	12.63
7,335.00	0.79	229.15	7,190.38	-618.39	1,070.41	1,236.06	0.83	-0.74	20.25
7,430.00	0.97	248.31	7,285.37	-619.12	1,069.17	1,235.37	0.36	0.19	20.17
7,525.00	1.06	243.83	7,380.35	-619.80	1,067.63	1,234.40	0.13	0.09	-4.72
7,619.00	1.32	239.88	7,474.33	-620.73	1,065.91	1,233.40	0.29	0.28	-4.20
7,714.00	1.85	230.91	7,569.30	-622.24	1,063.78	1,232.35	0.61	0.56	-9.44
7,809.00	1.67	217.11	7,664.25	-624.31	1,061.75	1,231.67	0.48	-0.19	-14.53
7,903.00	1.85	216.23	7,758.21	-626.63	1,060.03	1,231.38	0.19	0.19	-0.94
7,998.00	1.93	222.83	7,853.16	-629.04	1,058.03	1,230.90	0.24	0.08	6.95
8,093.00	2.02	222.83	7,948.10	-631.44	1,055.81	1,230.22	0.09	0.09	0.00
8,187.00	2.37	222.91	8,042.03	-634.08	1,053.36	1,229.47	0.37	0.37	0.09
8,282.00	1.93	219.22	8,136.96	-636.76	1,051.01	1,228.83	0.49	-0.46	-3.88
8,377.00	2.29	232.32	8,231.90	-639.16	1,048.50	1,227.90	0.63	0.38	13.79
8,472.00	2.55	240.32	8,326.82	-641.36	1,045.16	1,226.17	0.45	0.27	8.42
8,567.00	2.90	242.95	8,421.71	-643.50	1,041.18	1,223.85	0.39	0.37	2.77
8,661.00	2.81	245.06	8,515.59	-645.56	1,036.97	1,221.29	0.15	-0.10	2.24
Last SDI Production MWD Survey									
8,750.00	2.81	245.06	8,604.48	-647.40	1,033.02	1,218.84	0.00	0.00	0.00
Projection To TD - BHL = 629056.83, 1230366.76									



# Scientific Drilling International

## Survey Report



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**Site:** Cascade Creek 609-14 Pad  
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**Wellbore:** OH  
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### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
248.00	247.97	-1.40	3.07	First SDI Surface MWD Survey
2,660.00	2,610.33	-231.14	387.88	Last SDI Surface MWD Survey
2,788.00	2,733.54	-252.03	415.57	First SDI Production MWD Survey
8,661.00	8,515.59	-645.56	1,036.97	Last SDI Production MWD Survey
8,750.00	8,604.48	-647.40	1,033.02	Projection To TD
8,750.00	8,604.48	-647.40	1,033.02	BHL = 629056.83, 1230366.76

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